RADio COMmunication

July 1982

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SUNDAY 1 AUGUST 1982

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(see page 575 for details)

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Journal of the Radio Society of Great Britain

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JULY 1982

VOLUME 58 No 7

RADio COMmunication

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The Directors & Staff

of

LOWE ELECTRONICS

have pleasure in inviting you to their open day on

Saturday, August 14, 1982

VHF

The TR-7730 is an incredibly compact, reasonably priced, 25-watt, 2-metre FM mobile transceiver with five memories, memory scan, automatic band scan, and other convenient operating features.

TR7730

TR-7730 FEATURES

- **Smallest ever mobile**
  Measures only 5¾ inches wide, 2 inches high, and 7¾ inches deep. Mounts even in the smallest car, and is an ideal combination with the equally compact TR-8400 synthesized 70cm FM mobile transceiver.
- **25 Watts RF output power**
  HI/LOW power switch selected 25W or 5W output.
- **Five memories**
  May be operated in simplex mode or repeater mode with the transmit frequency offset ±600kHz. The fifth memory stores both receive and transmit frequency independently. Memory backup terminal on rear panel.
- **Memory scan**
  Automatically locks on busy memory channel and resumes when signal disappears or when SCAN switch is pushed. Scan HOLD or microphone PTT switch cancels scan.
- **Automatic band scan**
  Scans entire band in 5kHz or 10kHz steps and locks on busy channel. Scan resumes when signal disappears or when SCAN switch is pushed. Scan HOLD or microphone PTT switch cancels scan.
- **UP/DOWN frequency control from microphone**
  Manual UP/DOWN scan of entire band in 5kHz steps.
- **Offset switch**
  Allows VFO and four or five memory frequencies to be offset ±600kHz for repeater access or simplex.
- **S/RF bar meter and LED indicators**
  Bar meter or multicolour LEDs shows S/RF levels. Other LEDs indicate BUSY, ON AIR, and REPEATER offset.
- **Tone switch**

TR7730 £247.94 inc VAT
Carriage £5.00

LOWE ELECTRONICS | Access | BARCLAYCARD VISA | LOWE ELECTRONICS | Access | BARCLAYCARD VISA

NEW HF TRIO *pacesetter in amateur radio*

TS 930S

With the advent of amateur band transceivers/general coverage receivers in one package, the question all the inquiring Trio owners asked was "when will Trio produce their answer/equivalent to the FT-one?". We are delighted to say that it's here right now and, if previous experience is anything to go by, Trio have got it right first time (as always).

The basic package is apparently straightforward. The TS930S is all solid state, gives 120W out from transistors run from a 28V supply for "better than the rest" linearity; covers all amateur bands and general coverage from 150kHz to 30MHz; uses a built in power supply; has digital readout; has twin VFO and multi channel memory facilities and so on and so on.

What makes the TS930S stand out from the rest is, once again, the Trio attention to detail. I have always said, Trio design their equipment to be used by the average amateur, whereas some rigs look like the control panels for the space shuttle. The acid test is to sit down in front of the TS930S and compare it *in use* to anything else. Notice how the RF and AF gain controls are together, as are the mic gain and carrier level controls.

Need the variable bandwidth? Trio have come up with the most versatile system ever, with completely independent adjustments for the upper and lower sides of the filter passband, so you can have any bandwidth you like anywhere around the signal you want – think about it.

Now switch on and operate on 14MHz. So simple, just touch the button marked 14. Need to go to 21? Just push the button marked 21. Compare that to some rigs which need four hands and a degree in computing science to even get switched on!

What about general coverage? Equally simple using the 1MHz step buttons. If you are on 14MHz and you need to listen to the 15MHz broadcast band just touch the 1MHz UP button and there you are. Keep going and you step right through the spectrum in 1MHz bands.

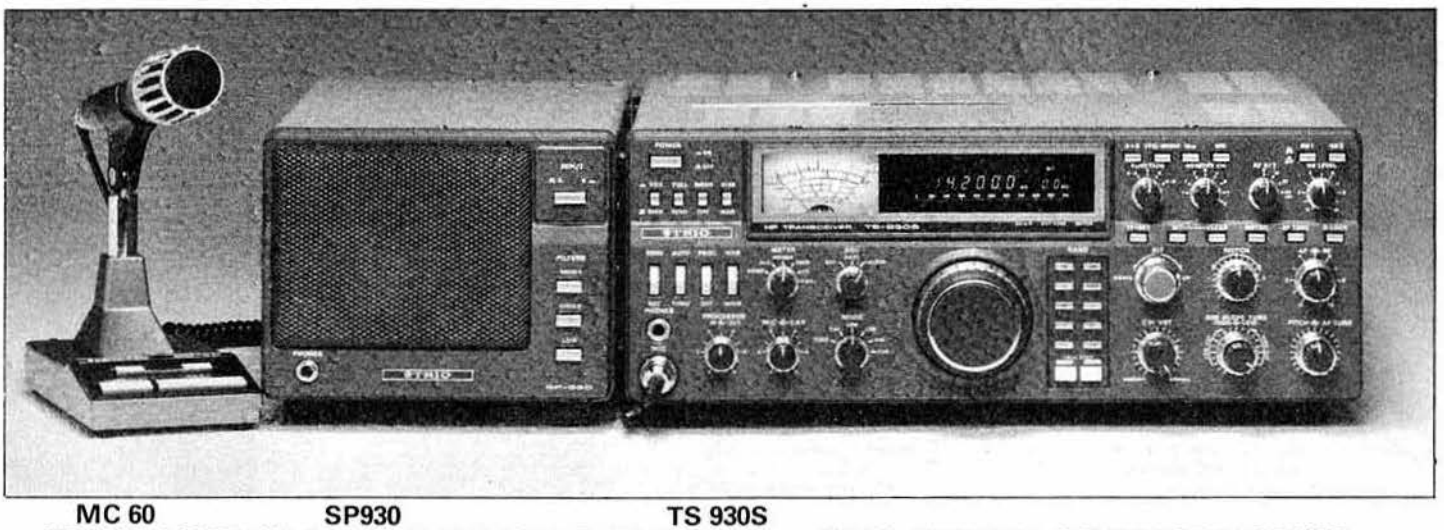
Now just mention some of the other features, look at the display which is bright white on a black background. Frequency readout is to 100Hz whilst the synthesiser tunes in 10Hz steps for true "VFO feel". Also included in the display are an analogue dial and the R.I.T. offset in kHz away from dial frequency.

The memory facilities not only remember frequency but also mode in use, and because of the operating simplicity of the TS930S, you don't have to fill the memories with the amateur bands. RF speech processing is fitted together with tunable audio filtering and full break in keying for the real CW operator. The noise blanker system has switchable gate times to cope with not only impulse noise but also the infamous "woodpecker". *And it works.*

Finally, there is provision for fitting *internally* a fully automatic aerial tuner for the amateur bands.

Alan, just back from Tokyo where he tried out the 930, is walking about in a daze muttering, "I've got to have the first one." Judging by his impressions of the rig, it's simply fabulous and we can't wait. By the time you read this, we should have them on show (and in use), so come, see, try out the new leader in HF rigs. The family is now completed from TS130S/V through TS530S, TS830S to the amazing TS930S. There is now a rig to suit everyone in the Trio range.

TS 930S £1,078.00 inc VAT
AT 930 £125.00 inc VAT
carriage £5.00

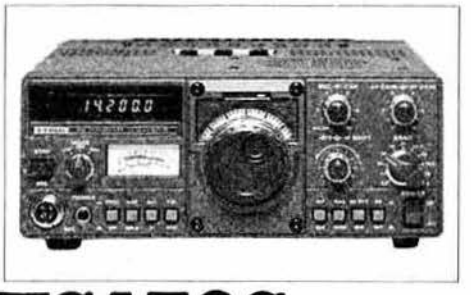


MC 60 SP930 TS 930S

TS 930S AMATEUR BAND TRANSCEIVER WITH 100KHz to 30MHz GENERAL COVERAGE RECEIVER

TS 830S
£694.30 inc VAT carr £5.00

TS 530S
£543.98 inc VAT carr £5.00



TS 130S
£529.09 inc VAT carr £5.00

LOWE ELECTRONICS Ltd
CHESTERFIELD ROAD MATLOCK DE4 5LE TEL 0629 2430/2817

NEW *from Trio for 1982*

The R-600 is a high performance general coverage communications receiver covering 150kHz to 30MHz in 30 bands, at an affordable price. Use of PLL synthesized circuitry provides high accuracy of frequency with maximum ease of operation.

R-600 FEATURES:
- 150kHz to 30MHz continuous coverage, AM, SSB, or CW.
- 30 bands, each 1MHz wide, for easier tuning.
- Five digit frequency display, with 1kHz resolution.
- 6kHz IF filter for AM (wide), and 2·7kHz filters for SSB, CW and AM (narrow).
- Up-conversion PLL circuit, for improved sensitivity, selectivity and stability.
- Communications type noise blanker eliminates "pulse-type" noise.
- RF Attenuator allows 20dB attenuation of strong signals.
- Tone control.
- Front mounted speaker.
- "S" meter, with 1 to 5 SIMPO scale, plus standard scale.
- Coaxial, and wire antenna terminals for 2MHz to 30MHz. Wire terminals for 150kHz to 2MHz.
- 100, 120, 220, and 240VAC, 50/60Hz. Selector switch on rear panel.
- 13·8V DC operation.
- Other features include carrying handle, headphone jack, and record jack.

R 600

R600 RECEIVER. £235.06 inc VAT carriage £5.00

The TR-2500 is a compact 2 metre FM handheld transceiver featuring an LCD readout, 10 channel memory, lithium battery memory back-up, memory scan, programmable automatic band-scan and Hi/Lo power switch.

TR-2500 FEATURES:
- Extremely compact size and light weight 66 (2-5/8) W × 168 (6-5/8) H × 40 (1-5/8) D, mm (inches), 540g, (1·2lbs) with Ni-Cd pack.
- LCD digital frequency readout, with memory channel and function indication.
- Ten channel memory, includes "M0" memory for non-standard split frequencies.
- Lithium battery memory back-up, built-in, (estimated 5 year life) saves memory when Ni-Cd pack discharged.
- Memory scan, stops on busy channels, skips channels in which no data is stored.
- UP/DOWN manual scan in 5kHz steps.
- 2·5W or 300mW RF output. (HI/LOW power switch.)
- Programmable automatic band scan allows upper and lower frequency limits and scan steps of 5kHz and larger (5, 10, 15, 20, 25, 30kHz . . . etc) to be programmed.
- Slide-lock battery pack.
- Repeater reverse operation.
- Keyboard frequency selection across full range.
- Frequency coverage, 144·000 to 145·995MHz
- Optional power source, MS-1 mobile or ST-2 AC charger/power supply allows operation while charging. (Automatic drop-in connections.)
- High impact plastic case.
- Battery status indicator.
- Two lock switches for keyboard and transmit.

STANDARD ACCESSORIES:
- Flexible rubberized antenna with BNC connector.
- 400mAH heavy-duty Ni-Cd battery pack.
- AC charger.

TR 2500

TR2500 HANDHELD TRANSCEIVER £207.00 inc VAT carriage £5.00

APPROVED TRIO DEALER

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Belfast 647570

TRIO

As the appointed distributors for Trio, we recommend that you purchase your Trio equipment from an approved stockist (list above). Any stockist *not* on the list has no connection with the Trio UK sales and service organisation and cannot, despite claims to the contrary, offer any meaningful guarantee of backup service on Trio equipment.

EMPORIUM NEWS

Good morning

The new piece of equipment I mentioned last month, **the Lowe MX4, 4 metre SSB/CW portable transceiver:** whilst I was staying in Appleby with **Bill G3JYP,** we were favoured with an auroral opening and Bill worked on CW using 200 M.Watts several stations including EI and GC. To say we were impressed with the rig would be an understatement.

The new 2 metre rig from Trio, **the multimode TR9130,** is now here and proving very popular. I especially like the squelch on sideband and the easier synthesizer stepping rates for use on sideband. To locate and work a station on **the TR9130** is indeed **a pleasure.** I have just spoken to a chap on the 'phone regarding a power supply for his TR9130. The TR9130 requires 5.5 amps to produce its 25 watts of signal. Unfortunately, the PS20 only produces four amps so if you require a power supply with the Trio name then the PS30 is the one for you. The PS30 is currently priced at £88.55. I agreed that the 15 amps continuous, 20 amps intermittent, is more than you require **but I have always been very pleased to have a PS30 in my shack.** Ideal for supplying power for the microwave module range of linear amplifiers and also, of course, any other piece of kit that may find its way into your shack. Indeed, when I was using the MM2000 RTTY converter with my NRD515 the PS30 came to the rescue. **An alternative source** of power for **the TR9130** and **the TR7800,** of course, is **the PP1307** giving a regulated 13.8 volts DC at 7 amps. Priced at £32.00 this power supply is the middle model in a comprehensive range of three units. The other models being **the PP1305GS** giving 4 amps and costing £15.00 and **the PP1310** giving 10 amps and costing £49.50. Carriage on the power supplies is £2.00 for the two smaller ones and £2.50 for the PP1310.

For those of you who really want the ultimate in power supplies, we have **the Daiwa PS300** which gives **a colossal 30 amps intermittent and 22 amps continuous.** This unit costs £117.99 inc. VAT, carriage on the item being £5.00.

For the CW enthusiasts amongst you we have just received two items which will please you. The first is **a new key** to add to the range: **the EK702** at £24.50. Looking at the key it is a thing of great beauty having a marble – yes real marble not a plastic marble base – and the nicest knob you have ever seen. **David,** our man out front who is **a self-confessed CW expert,** speaks very highly of the key. For those squeeze keyers out there we have now in stock the DK210 electronic keyer from Daiwa. A nice piece of equipment having speed, **weight,** semi auto or auto controls and a led strip speed indicator. John, who played with the device the day it arrived, was particularly impressed with the weight control, **"Perfect"** he was heard to murmur.

The SRX30D, as advertised by us in **World Radio & TV Handbook,** is still proving a popular item. For the newcomer to the world of shortwave, this receiver provides at £215.00 a most economical way of getting on the bands. Easy to use and in these days of a growing awareness of shortwave broadcasts and the **exotic stations** which can be heard for very little outlay, the SRX30D is ideal.

For a little more sophistication, **the Trio R1000** and **R600** are other choices. Priced at £297.85 and £235.06 respectively. As a shortwave listener myself, I still find it difficult to explain the pleasure and satisfaction gained by finding on the busy band a particular station **located far away on the other side of the world.** Perhaps it's just me but I get the feeling that with the advent of the more aesthetically acceptable range of general coverage receivers, and by that I mean equipment that would not look out of place alongside the Hi Fi equipment in the lounge, that more and more people are discovering for themselves **the pleasure of shortwave listening.**

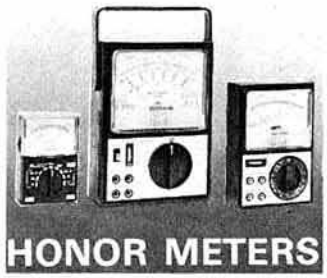
Whilst we are musing on the pleasures to be had on the shortwave band, consider this: an NRD 515 costs £1090 and, to my way of thinking, is worth every penny. Barry, one of our lads in the workshop, has just purchased for £8.50 a – wait for it – **Zenith trans-oceanic shortwave receiver** in absolutely mint condition, both to look at and to listen to. Barry has spent the last two weeks polishing the same and has agreed to allow the receiver to be on view in the showroom. We estimate that the set is 1959 vintage but it may be much later – still it looks good and should certainly be a conversation piece for visitors to the Emporium.

Many of the new licence holders are now joining **the pround ranks of TR2300 owners.** A superb transceiver giving its owner full 2 metre band FM coverage, reverse repeater, etc. etc. and still the rig costs only £166.75. Nicads for the same £10 and the 10 watt linear, the VB2300 £58.00.

A new item is the BT1 battery case from Trio for the TR2500. Designed to take six AA size non-rechargeable batteries, the unit is an alternative way from Trio to keep you operational on those long days out portable.

The final accessory for TR2500, we now have available the full range – not always in stock but we have had the full range. **The VB2530 amplifier,** suitable for either mobile or fixed station use gives 25 watts output, RF switched and complete with all necessary brackets and cables. The VB2530 is £62.10 inc. VAT, carriage £1.50. Some of you may have noticed in the advertising a model VB2500. **My mistake and I apologize profusely** for misleading you. I have subsequently found out that the VB2500 is a Japanese home market version having 10 watts output only. **Not the thing for we "high" power operators in the UK.**

Don't forget that **Saturday, August 14th is the Lowe Electronics' Open Day.** If you came along to the last one you will know all about it but for those who didn't let me explain: On the 14th **the entire staff** will be here in attendance – **conducted tours** of the establishment will be in progress, **demonstrations** of the superb equipment in the workshop, **a free raffle,** the latest pieces of equipment and a chance to meet everyone here. **In addition** friends of the company will be in attendance – **those gorgeous girls** from Club 24 – **John Fell** from Practical Wireless, **Strumech** with their tower on the car park, **John Birkett** with his bits from Lincoln and last, but certainly not least, **the RSGB** will be in the entrance hall coercing you who are not members to become members. On that subject we wholly support the RSGB and application forms and the information book on amateur radio are available from the shop here at Matlock.



Still on the subject of the Open Day, it may not be widely known but John and myself are very keen on **Brass Band music** and we have decided that the musical education of the staff is to be completed on August 14th. So, for everyone's edification, **the Matlock Brass Band ensemble** have been engaged to play in **the grounds of the Emporium** on the Open Day. We, John and myself, are putting together a programme of music – old favourites such as, **"Abide with Me", "Cwm Rhondda",** etc. but there is still room on the programme for a few favourites so those of you with a penchant for good music can ring me (David) and add your request to the list. Regarding the raffle, the competition this year is quite simple. **Remember Spot The Ball competitions?** Well, **Tracy our girl** on the switchboard, **has a birthmark,** where for obvious reasons, I cannot say but the prize is to be awarded to the first person whose name is drawn out of the hat who has successfully marked on his card **the birthmark's location** – simple isn't it. No, to be serious, there will be a conventional raffle, all who attend on the day being given a ticket.

Anyway, that's about it for now as I've just heard a rumour that John has got some **discount** off the price of a new piece of test equipment for the workshop and we are all going out to celebrate.

So, until next month Gud DXes 73es FBYLS, XYLS, esFBOM, etc. from **David** (just to confuse, there are three Davids who work for Lowe Electronics: David in the shop, David in the workshop and, of course, myself).

ICOM

Spans the world.

IC-720A
Possibly the best choice in HF. £883.inc.

The main problem that the amateur of today has to deal with is deciding just which rig out of the many excellent products available he is going to choose. Technology is advancing at such a rapid rate and getting so sophisticated that many cannot hope to keep up. Some go too far!

Perhaps one way of dealing with the problem is to look at just what each model offers in its basic form without having to lay out even more hard earned cash on "extras". The IC-720A scores very highly when looked at in this light. How many of its competitors have two VFOs as standard or a memory which can be recalled, even when on a different band to the one in use, and result in instant retuning AND BANDCHANGING of the transceiver? How many include a really excellent general coverage receiver covering all the way from 100kHz to 30MHz (with provision to transmit there also if you have the correct licence)? How many need no tuning or loading whatsoever and take great care of your PA, should you have a rotten antenna, by cutting the power back to the safe level? How many have an automatic RIT which cancels itself when the main tuning dial is moved? How many will run full power out for long periods without getting hot enough to boil an egg? How many have band data output to automatically change bands on a solid state linear AND an automatic antenna tuner unit when you are able to add these to your station?

Well you will have to do quite a bit of hunting through the pages of this magazine to find anything to approach the IC-720A. It may be just a little more expensive than some of the others – but when you remember just how good it is, and of course the excellent reputation for keeping their secondhand value you will see why your choice will have to be an IC-720A!

IC-PS15 Mains PSU £99

IC-2E £159.inc.
IC-4E £199.inc.
The World's most popular portables & now the marine version IC-M12

Nearly everybody has an IC2E – the most popular amateur transceiver in the world – now there is the 70 cm version which is every bit as good and takes the same accessories. Check the features.

Fully synthesized – Covering 144 – 145.995 in 400 5KHz steps. (430-439.999 4E)
Power output – 1.5W with the 9v. rechargeable battery pack as supplied – but lower or higher output available with the optional 6v or 12v packs. Rapid slide-on changing facility.
BNC antenna output socket – 50 ohms for connecting to another antenna or use the Rubber Duck supplied (flexible ¼ λ whip – 4E)
Send/battery indicator – Lights during transmit but when battery power falls below 6v it does not light, indicating the need for a recharge.
Frequency selection – by thumbwheel switches, indicating the frequency. 5KHz switch – adds 5KHz to the indicated frequency.
Duplex simplex Switch – gives simplex or plus 600KHz or minus 600KHz transmit (1·6MHz and listen input on 4E)
Hi-Low switch – reduces power output from 1.5W to 150mW reducing battery drain.
External microphone jack – if you do not wish to use the built-in electret condenser mic an optional microphone speaker with PTT control can be used. Useful for pocket operation.
External speaker jack – for speaker or earphone. This little beauty is supplied ready to go complete with nicad battery pack, charger, rubber duck.

A full range of accessories in stock.		£ p			
ICML1	10W mobile booster for IC2E	49 00	BC25	Mains charger as supplied	4 25
BP5	11 volt battery pack	30 00	DC1	12 volt adapter pack	8 40
BP4	Empty battery case for 6 x AA cells	5 80	HM9	Speaker microphone	12 00
BP3	Standard battery pack	17 70	CP1	Mobile charging lead	3 20
BP2	6 volt pack	22 00	IC123	cases	each 3 60
BC30	Base charger for above	39 00	All prices include VAT		

The IC4E is going to revolutionise 70 CM!

Well worth thinking about!

IC-25E
The Tiny Tiger
£239.inc.

Amazingly small, yet very sensitive. Two VFO's, five memories, priority channel, full duplex and reverse. LED S-meter, 25KHz or 5KHz step tuning. Same multi-scanning functions as the 290 from mic or front panel. All in all the best 2M FM mobile ICOM have ever made.

IC-251 £499.inc.
IC-451 £630.inc.
Great Base Stations

ICOM produce a perfect trio in the VHF base station range, ranging from 6 Meters through 2 Meters to 70 cms. Unfortunately you are not able to benefit from the 6m product in this country, but you CAN own the IC-251E for your 2 Meter station and the 451E for 70 cms.

Both are really well designed and engineered multi-mode transceivers capable of being operated from either the mains or a 12 volt supply. Both contain such exciting features as scan facilities, automatic selection of the correct repeater shift for the band concerned, full normal and reverse repeater operation, tuning rate selection according to the mode in use. VOX on SSB continuous power adjustment capability on FM and 3 memory channels. Of course they are both fitted with a crystal controlled tone burst and have twin VFO's as have most of ICOM's fully synthesized transceivers. There is now a superb low noise mast head pre-amp available for the IC-451.

IC-290E £366./IC-490E £445.inc.
Multimode mobiles
290E-144-146 MHz/490E-430-440 MHz

IOW RF ouput on SSB, CW and FM. Standard and non-standard repeater shifts. 5 memories and priority channel.

Memory scan and band scan, controlled at front panel or microphone. Two VFO's LED S-meter 25KHz and 1KHz on FM – 1KHz and 100Hz tuning steps on SSB. Instant listen input for repeaters.

IC-24G
Low-priced mobile
£169.inc.

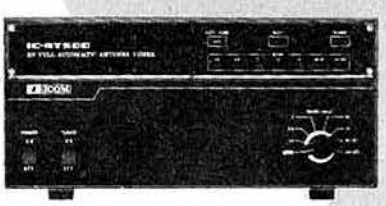
The famous IC-240 has been improved, given a face lift and renamed the IC-24G. Many thousands of 240's are in use, and its popularity is due in part to simplicity of operation, high receiver sensitivity and superb audio on TX and RX. The new IC-24G has these and other features. Full 80 channels (at 25kHz spacing) are available and readout is by channel number – selected by easy to operate press button thumbwheel switches. This readout can clearly be seen in the brightest of sunlight. Duplex and reverse duplex is provided along with a 12½ KHz upshift, should the new channel spacing be necessary. The old IC-240 proved to be the most reliable rig we have ever sold – the IC-24G because it is so similar, looks like following the same pattern. Remember for mobile use a rig MUST be easy to operate to be safe. Send for technical details.

ICOM & Thanet....open

IC-730 The best for mobile or economy base station
£586.inc.

ICOM's answer to your HF mobile problems – the IC-730. This new 80m-10m, 8 band transceiver offers 100W output on SSB, AM and CW. Outstanding receiver performance is achieved by an up-conversion system using a high IF of 39MHz offering excellent image and IF interference rejection, high sensitivity and above all, wide dynamic range. Built in Pass Band Shift allows you to continuously adjust the centre frequency of the IF pass band virtually eliminating close channel interference. Dual VFO's with 10Hz and 1KHz steps allows effortless tuning and what's more a memory is provided for one channel per band. Further convenience circuits and provided such as Noise Blanker, Vox, CW Monitor, APC and SWR Detector to name a few. A built in Speech Processor boosts talk power on transmit and a switchable RF Pre-Amp is a boon on today's crowded bands. Full metering, WWV reception and connections for transverter and linear control almost completes the IC-730's impressive facilities.

IC-AT500 £299.inc.
Automatic antenna tuner
100W version AT100 £249. inc.



The Automatic Antenna Tuners which put all the others to shame.

It was only when we started to use the new fully automatic antenna tuners from ICOM that we realised just how far ahead of their competitors they are! The very fast tune up time and simplicity of use make them a real worthwhile addition to any station even if the rest of your station isn't ICOM. If it is, then you have the added advantage of fully automatic band selection so that you can virtually hide it away in a cupboard if you want (though we think you will want to show it off).

Apart from its very rapid action and auto band selection facilities it will select the correct antenna for the band (up to four). The new bands are covered of course, but the AT100 does not cover topband, whereas the AT500 does.

Dual accessory sockets are supplied so that you can easily chain your IC-720A, (or IC-701 or IC-730) together with the IC-2KL and AT5 to produce what must be one of the most advanced automatic stations available.

Why not call us for more details or get your dealer to demonstrate one to you today?

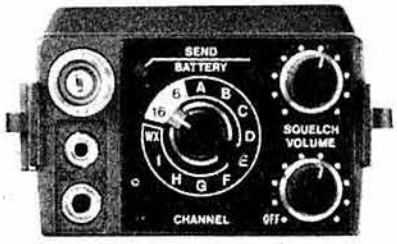
Super Linear IC-2KL £839.inc.
Matching Power Supply IC-2KLPS £211.inc.

To compliment the excellent IC-720A HF Transceiver, ICOM have produced the IC-2KL linear amplifier. It is of a similar size and matches the IC-720A perfectly. It produces 500W output on SSB, CW, AM and RTTY needing 80-100W of drive. As with the IC-720A it will operate from 1.6MHz to 30MHz continuously at full output power, but you still need an antenna that matches. It will follow the IC-720A automatically changing bands WITH NO TUNING – the operating is done from the prime-mover.

This automatic facility can be overriden for use on rigs other than the IC-720A, but can be added to the IC-701 and the IC-730. The IC-2KL employs a heat pipe cooling system for the heatsink of the power transistors. This is a new technology used to transfer the heat, and has a high conductance, several hundred times that of copper, plus a very quick response.

The IC-2KL has a matching power supply the IC-2KLPS delivering 40vDC at 25A continuous for 10 minutes maximum.

A marine version of the IC-2E
£199.+VAT.



12 Channels – Synthesised – No Crystals to buy!

ICOM are proud to introduce the IC-M12 which is the Marine version of the worlds most popular portable, the IC-2E. It uses all the same accessories, has the same exceptional receiver sensitivity and versatility of the 2E and it is HOME OFFICE APPROVED.

It is almost certain to prove the most popular Marine hand portable in the world. So if you are not in marine yourself why not tell your friends about it!

12 programmable channels which include the private ones.
£199 + VAT.

Trade Enquiries Welcome

Thanet Electronics

ICOM

143 Reculver Road, Beltinge, Herne Bay, Kent. Telephone (02273) 63859.

up the airways!

Tono RTTY and CW computers
7000E-£550./9000E-£650.inc.

The TONO range of communication computers take a lot of beating when it comes to trying to read RTTY and CW in the noise. Others don't always quite make it!

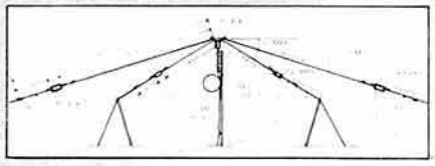
Check the many facilities offered before you buy – especially look at the 9000E which also throws in a Word Processor. Previous ads have told you quite a lot about these products – but why not call us for further information and a brochure?

NEW! £699.inc.
with built-in VDU

The **Telereader** range of communications computers are becoming very popular right through the range. All have composite video and UHF output for use with a TV set. Add a new dimension to your short wave listening.

CWR 685E	Send/receive with VDU and Keyboard	**£699**
CWR-670	Delux rx only version with CW and six selectable baud rates – 3 shifts	**£259**
CWR-600	**"Morse Master'** Rx only (but it does RTTY also-3 baud rates). Key socket and built in oscillator for morse practice.	**£189**

A new Trap Dipole!



£49.50.inc.

The MT-240X Multi-band trap dipole antenna (80m – 10m) is a superbly constructed antenna with its own Balun incorporated in the centre insulator with an SO239 connector. Separate elements of multi-stranded heavy duty copper wire are used for 80-40-15 and 20-10 Metres.

Really one up on its competitors. £49.50 inc. VAT

CUE DEE antennas
Hot stuff from Sweden!

The BEST in recent tests and really well made too. Send for a catalogue of these Dx antennas. Here's part of the range:-

10 element	2m	long yagi	**10144A**	11.4	dBd	**£44.90**
* 15 element	2m	long yagi	**15144A**	14	dBd	**£57.00**
17 element	70cm	long yagi	**17432AN**	14.5	dBd	**£43.00**

* **SM2GGF** uses 8 of these for moonbounce!!

Prices of other Tono quality products
These prices may be subject to change, depending upon the state of the £.
All inclusive of vat.
Green display monitor CRT1200G £136.00
Dot Matrix Printer HC900 £590.00
Dot Matrix Printer HC800 £499.00
Printer socket SK7 £8.50p
Linear amplifiers:
UC70 430 MHz 55W - RX pre-amp £149.00
2M-50W (2M) £65.00
2M-100W (2M) - RX pre-amp £115.00
MR-250W (2M) - RX pre-amp £259.00
MR-28LB
(26-30 MHz) - RX pre-amp £65.00
Mast-Head Pre-amp -
RX144 £65.00 – RX430 £70.00
(both include control and psu box)

You will get a good deal from Thanet – Call us.
Why buy from Thanet?
1. Full 2 years warranty on all equipment
2. Excellent back up and after sales service using fully equipped work shop.
3. ICOM trained technical staff
4. No charge for speedy delivery service
5. Avoid disappointment – buy from the experts with years of experience.

Instant credit available in most cases.
1. Phone us during office hours
2. Out of hours leave a message on our ansaphone stating clearly your name, address, day time telephone number and Access/Barclaycard number.
3. Write enclosing full details of your requirements together with payment, quoting call sign if possible.

Please note: Access/Barclaycard owners – goods must be sent to address registered with credit card company.

Free carriage on direct sales – call us.

Your nearest ICOM Supplier is....

ICOM DEALERS

London	Amateur Radio Exchange	01-992 5765	**Yorkshire**	Leeds Amateur Radio	(0532) 452657
	H Laxton Ltd	01-558 0854		Greens Telecom	(0226) 5031
	Lee Electronics Ltd	01-723 5521		Northern Telecoms	(0422) 40792
	CQ Centre	01-543 5150	**Midlands**	Amateur Electronics (UK)	021-327 1497
Essex	Waters and Stanton Electronics	(0702) 206835	**N. Ireland**	George Moore Electronics	(0232) 647570
	Arrow Electronics	(0277) 226470		Tyrone Amateur Electronics	(0662) 3680
Sussex	Bredhurst Electronics	(0444) 400786	**Eire**	Armstrong Electronics	Dublin 309839
Herts	Photo Acoustics	(0908) 610625	**C.I.**	Radio & Electronic Services	(0481) 28837
Avon	Booth Holdings Ltd	(02217) 2402	**North East**	Alvtronics	(0632) 683418

Thanet Agents (phone first all evening weekends only except Scotland)
Scotland – Jack GM8 GEC 031-657 2430 (daytime) 031-665 2420 (evenings)
Midlands – Tony G8AVH 021-329 2305
Wales – Tony GW3 FKO (0874) 2772 or (0874) 3992
North West – Gordon G3LEQ Knutsford (0565) 4040 Ansaphone available

Remember we also stock Yaesu, Jaybeam, Datong, Welz, G-Whip, Western, TAL, Bearcat, RSGB Publications.

We welcome letters

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AMATEUR ELECTRONICS UK

Your number one source for YAESU MUSEN

G3FIK

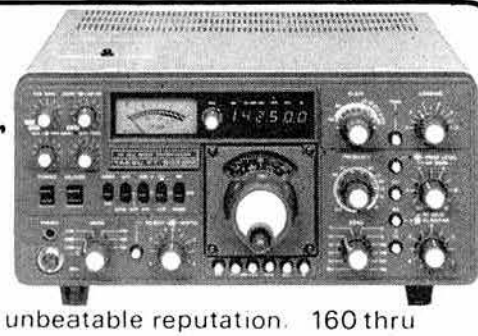
FT-ONE SUPER HF TRANSCEIVER

The ultimate in HF transceivers–
–the new FT-ONE provides continuous RX coverage of 150KHz–30MHz plus all nine amateur bands (160 thru 10m). All mode operation LSB, USB, CW, FSK, AM, *FM • 10 VFO system • **FULL** break-in on CW • audio peak filter • notch filter • variable bandwidth and IF shift • keyboard scanning and entry • RX dynamic range over 95dB! and **NO** band switch!!! *OPTIONAL

FT-101ZD Mk III

YAESU's FT-101ZD **WITH FM** is the most popular HF rig on the market thanks to its very comprehensive specification and competitive price. Incorporates notch filter, audio peak filter, variable IF bandwidth plus many other features.

FT-902DM Competition grade HF transceiver



The YAESU world famous pace-setter with the acknowledged unbeatable reputation. 160 thru 10 metres including the new WARC bands. All-mode capability, SSB, CW, AM, FSK **and FM** transmit and receive. Teamed with the FTV-901R transverter coverage extends to 144 & 430MHz.

FT-707 All solid-state HF mobile transceiver

The definitive HF mobile rig, digital, variable IF bandwidth, 100 watts PEP SSB. AM, CW (pictured here with 12 channel memory VFO). Latest bands

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

KEEP AHEAD WITH THE NEW FT-102!

Once again YAESU lead the field with the exciting new FT-102 HF transceiver– no other manufacturer offers so many innovative features.

Better Dynamic Range
The extra high-level receiver front end uses 24 VDC for both RF amplifier and mixer circuits, allowing an extremely wide dynamic range for solid copy of the weak signals even in the weekend crowds. For ultra clear quality on strong signals or noisy bands the high voltage JFET RF amplifier can be simply bypassed via a front panel switch, boosting dynamic range beyond 100dB. A PLL system using six narrow band VCOs provides exceptionally clean local signals on all bands for both transmit and receive.

Total IF Flexibility
An extremely versatile IF Shift/Width system, using friction-linked concentric controls and a totally unique circuit design, gives the operator an infinite choice of bandwidths between 2.7kHz and 500Hz, which can then be tuned across the signal to the portion that provides the best copy sans QRM, even in a crowded band. A wide variety of crystal filters for fixed IF bandwidths are also available as options for both parallel and cascaded configurations. But that's not all; the 455kHz third IF also allows an extremely effective IF notch tunable across the selected passband to remove interfering carriers, while an independent audio peak filter can also be activated for single-signal CW reception.

New Noise Blanker
The new noise blanker design in the FT-102 enables front panel control of the blanking pulse width, substantially increasing the number of types of noise interference that can be blanked, and vastly improving the utility of the noise blanker for all types of operation.

Commercial Quality Transmitter
The FT-102 represents significant strides in the advancement of amateur transmitter signal quality, introducing to amateur radio design concepts that have previously been restricted to top-of-the-line commercial transmitters; far above and beyond government standards in both freedom from distortion and purity of emissions.

Transmitter Audio Tailoring
The microphone amplifier circuit incorporates a tunable audio network which can be adjusted by the operator to tailor the transmitter response to his individual voice characteristics before the signal is applied to the superb internal RF speech processor.

IF Transmit Monitor
An extra product detector allows audio monitoring of the transmitter IF signal, which, along with the dual meters on the front panel, enables precise setting of the speech processor and transmit audio so that the operator knows exactly what signal is being put on the air in all modes. A new "peak hold" system is incorporated into the ALC metering circuit to further take the guesswork out of transmitter adjustment.

New Purity Standard
Three 6146B final tubes in a specifically configured circuit provide a freedom from IMD products and an overall purity of emission unattainable in two-tube and transistor designs, while a new DC fan motor gives whisper-quiet cooling as a standard feature. For the amateur who wants a truly professional quality signal, the answer is the Yaesu FT-102.

New VFO Design
Using a new IC module developed especially for Yaesu, the VFO in the FT-102 exhibits exceptional stability under all operating conditions.

ANCILLARY EQUIPMENT

SP-102 EXTERNAL SPEAKER/AUDIO FILTER
The SP-102 features a large high-fidelity speaker with selectable low- and high-cut audio filters allowing twelve possible response curves. Headphones may also be connected to the SP-102 to take advantage of the filtering feature, which allows audio tailoring for each bandwidth and mode of operation to obtain optimum readability under a variety of conditions.

FC-102 1.2 KW ANTENNA COUPLER

FV-102DM SYNTHESIZED, SCANNING EXTERNAL VFO

NEW! FT-230R 25watt 2m FM mobile

- Two independent VFO's
- 1C emories
- Priority function
- Memory and band scan
- 12.5/25 KHz steps
- Large LCD readout.

£239.00 INCL. VAT

FT-290R All-mode 2m portable

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

AGENTS

North West – Thanet Electronics Ltd. Gordon, G3LEQ, Knutsford (0565) 4040
Wales & West – Ross Clare, GW3NWS, Gwent (0633) 880 146
East Anglia – Amateur Electronics UK, East Anglia, Dr. T. Thirst (TIM) G4CTT, Norwich 650865 0692
North East – North East Amateur Radio, Darlington 0325 55969
South East – Amateur Electronics UK, Kent. Ken McInnes, G3FTE, Thanet (0843) 291297

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Telex: 337045
Opening hours: 9.30 to 5.30 Tues. to Sat. continuous – CLOSED all day Monday.

For full details of these new and exciting models, send today for the latest YAESU PRICE LIST & LEAFLETS. All you need do to obtain the latest information about these exciting developments from the World's No.1 manufacturer of amateur radio equipment is to send 36p in stamps and as an added bonus you will get our credit voucher value £3·60 – a 10 to 1 winner!

As factory appointed distributors we offer you-widest choice, largest stocks, quickest deal and fast sure service right through-

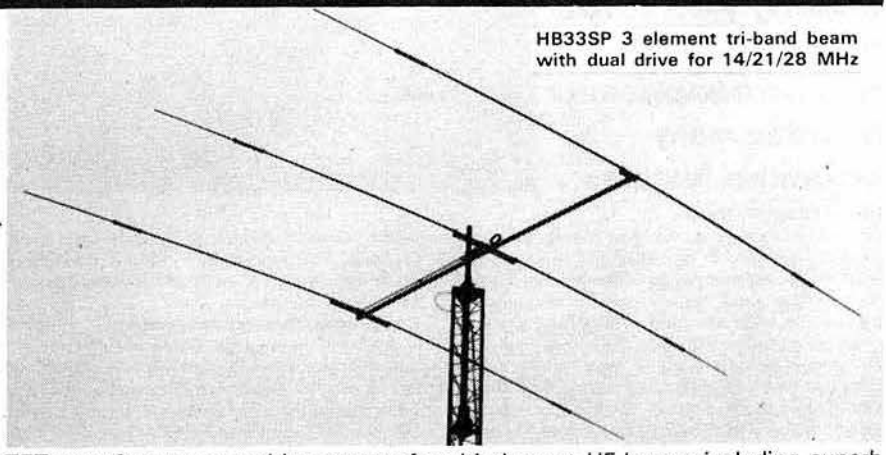
TET ANTENNA SYSTEMS

THE ANTENNA WITH THE DIFFERENCE

TET HF antennas are unique in that they employ dual driven elements with the following distinct advantages—

- **Improved gain over conventional arrays.**
- **Broader bandwidth with lower SWR.**
- **Enhanced front to back ratio.**
- **Better matching into solid state transceivers without an A.T.U.**
- **High power handling capacity.**

TET SOLE AGENTS



HB33SP 3 element tri-band beam with dual drive for 14/21/28 MHz

TET manufacture an exciting range of multi-element HF beams including superb monobanders plus HF verticals. Also there is a full range of VHF/UHF antennas most of which have multi-element drive or distinctive technical features.

NEW from TOKYO HY-POWER LABS

HL-160V

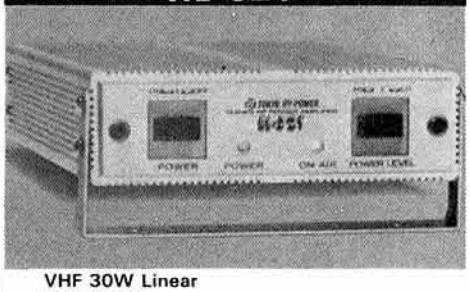
VHF 160W Plus Linear
FEATURES:
160W output achieved with a pair of rugged MRF247 transistors. Drive requirement as low as 10W or 3W from hand-held. Selectable hi/lo output. Newly designed effective heat sink and high reliability one board construction.
SPECIFICATION:
Freq. Band: 144-146MHZ, **Mode:** FM-SSB-CW, Supply **Voltage:** DC 13.8V neg. ground, 12-23A, **Output:** 160W, **RF Input:** 1-15W (or 0.5-3W), **Receive Pre-amp:** 12 dB gain with low-noise 2SK 125 JFET, **In/Out Connectors:** SO-239 (50 ohm), **Built-in Circuitry:** COX, remote-control terminal, hi/lo output select, output power meter, reverse polarity protection, **Dimensions:** 218W x 82H x 299D (m/m), **Weight:** 3.5 kgs.

HL-82V

VHF 85W Plus Linear
FEATURES:
A compact 144MHZ band amp.with receive preamp and power output meter.

SPECIFICATION:
Freq. Band: 144-146MHZ, **Mode:** FM-SSB-CW, **Supply Voltage:** DC 13.8V neg. ground, 13A max., **Output:** 35-85W, **RF Input:** 2-12W, **In/Out Connectors:** SO-239 (50 ohm), **Built-in Circuitry:** COX, remote control terminal, receive preamp (MOS FET 12dB gain), output power meter, output select (hi/lo), reverse polarity protection, **Dimensions:** 152W x 92H x 217D (m/m), **Weight:** 1.8 kgs.

HL-32V



VHF 30W Linear
FEATURES:
A compact and light-weight 144MHZ band amp with 30W output. Drive power of 1W to 5W from hand-held radio. Hi/Lo output selection.
SPECIFICATION:
Freq. Band: 144-146MHZ, **Mode:** FM-SSB-CW, **Supply Voltage:** DC 13.8V neg. ground, 4A max., **Output:** 25-30W, **RF Input:** 1-5W, **In/Out Connectors:** SO-239 (50 ohm), **Built-in Circuitry:** COX, output select (hi/lo), reverse polarity protection, **Dimensions:** 100W x 30H x 158D (m/m), **Weight:** 520g.

- An S.A.E. will bring you full details.

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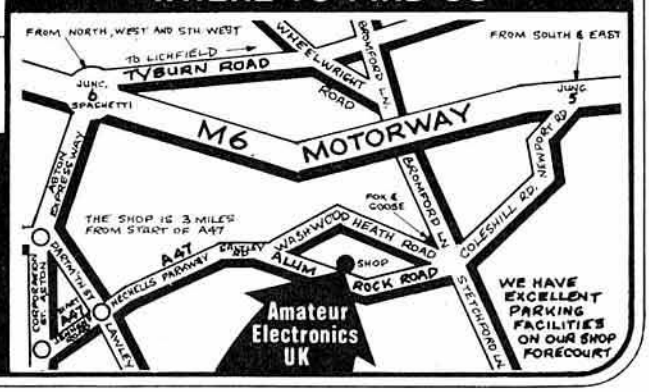
WHERE TO FIND US



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WATERS & STANTON ELECTRONICS

18/20 MAIN ROAD, HOCKLEY, ESSEX. Tel: (0702) 206835

Dear Customer,
This month I've put together a selection of items that I think you'll agree offers some of the best values in amateur radio today. The prices are unbeatable and the performance and quality is excellent. All come with a full 12 months warranty backed up by our own service department. We really do try and be as competitive as we can on prices but we will never allow our margins to fall below the level at which we can offer an honest after sales service throughout the expected life of a rig. That way, not only do we get more customers we also keep more customers.

Peter Waters

2M and 70cms — FDK — — — — THE SENSIBLE APPROACH

70cms EXPANDER £199 2m M750E £289 PS750 AC PSU £66

AMAZING AZDEN PCS 300

£179

3 watts
144-146MHz
8 memories
12½ kHz steps
S-meter
Scanning
ni-cads
AC charger

NEW! Squeeze Key £59

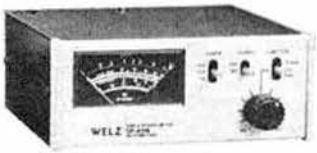
* 220v AC 13·8v DC
* Built-in Speaker
* Speed & Volume controls
* Tone & Weight controls
* Full 12 months warranty

FDK THE NUMBER ONE FM RIG

M700EX 25 WATTS £199

Every so often a classic is born that outlasts and outperforms the competition. In FM radio the M700EX is just such a rig. It's the simplicity of design combined with rugged and total reliability plus a power output in excess of 25 watts that make it a rig of technical excellence. Then consider that it costs under £200, has scanning, and you'll start to see how it so quickly became Britain's number one selling FM rig. Send for colour leaflet today and learn more about the M700EX classic design.

WELZ—IS THERE REALLY ANY OTHER CHOICE?



SP-45M SWR/PWR METER £45
The SP-45M has been designed for the VHF/UHF enthusiast who requires the means of accurately measuring true rf power and swr. The completely flat response means instant measurement from 140-470MHz. Full scale ranges of 3, 20 and 100 watts cater for most requirements.
SP-15M Limited quantity in stock £29.95

CH-20N COAX SWITCH—Rated to 1·3GHz!
Here's a switch that is a must for UHF. Fitted "N" sockets it has an insertion loss of less than 0·1dB up to 1,300MHz and cross talk better than 50dB. There is certainly nothing else on the market that can touch this performance at this price! **£27.95**
CH-20A As above with S0239 £15.95

Max power 1kW
Freq range 1·8MHz-160MHz

THE SUPERB SP200 EVERY SHACK SHOULD HAVE ONE!

£59 inc VAT

The SP200 is a highly reliable and accurate RF power and in-line SWR meter. Its specially designed sensing head has a flat response from 1·8MHz to 160MHz requiring no calibration. Simply connect it in the aerial line and whether you are on 160 metres or 2 metres, it will read true RF power. Also incorporated is a 2-way aerial switch and a 3-range power selector covering 20 watts, 200 watts and 1kW.

WATERS & STANTON ELECTRONICS

18-20, MAIN ROAD, HOCKLEY, ESSEX TEL: (0702) 206835 204584

		Price Inc. VAT	Carr. & Ins.
FDK RANGE			
M.700EX	2m FM 25 watt.	199.00	n/c
M.750E	2m FM/SSB/CW 10w.	289.00	n/c
Expander	70cm transverter	199.00	n/c
PS750	230v AC power supply	66.00	n/c
Palm II	2m FM 6 channel	109.00	n/c
Palm IV	70cm FM 6 channel	125.00	n/c
TB1	1750Hz tone burst	10.00	0.50
TM56B	2m FM 230v/12v DC scanner	89.00	n/c
TM56B	Marine version	89.00	n/c
FDK	12v DC leads	2.75	0.65
CC2	Case for Palm II/IV	6.75	0.75
BC2	230v AC charger	4.50	0.75
BB2	"AA" size battery case	5.00	0.75
BT2	Ni-cad battery pack	12.00	0.75
Xtals	for Palm II and Palm IV	3.00	0.25
Xtals	for TM56B	3.00	0.25
T1200	2m synthesised handheld	159.00	n/c
SNAP-1	Joining plates. M750/Expander	7.95	1.00
AZDEN RANGE			
PCS3000	25w 2m FM trans.	219.00	n/c
PCS300	2m synthesised handheld	184.00	n/c
ECK	5m cable kit	25.00	n/c
AS006	Mobile extension speaker	8.95	1.00
DX-354	Deluxe base station mic.	29.00	1.50
WELZ PROFESSIONAL POWER/ SWR METERS & ACCESSORIES			
SP200	1·8-160MHz 20w-200w-1kw	59.95	n/c
SP300	1·8-500MHz 20w-200w-1kw	79.95	n/c
SP400	130-500MHz 5w-20w-150w	59.95	n/c
SP15M	1·8-160MHz 5w-20w-200w	29.95	n/c
AC38	3·5-30MHz Coax ATU	59.00	n/c
CT15A	50w dummy load	6.95	0.75
CT15N	15/50w dum load. N Plug	11.95	0.75
CT150	150/400w dummy load	31.00	n/c
CT300	300/kw dummy load	43.00	n/c
CH20A	2 way coax switch	15.95	n/c
CH20N	2 way coax switch "N"	27.95	n/c
CT-03N	3w dummy load 1·3GHz	24.95	n/c
ADONIS MICROPHONES			
MM202S	Safety mic. Lapel type	20.95	1.00
MM202HD	Safety mic. head band	29.00	1.00
MM202HM	Headphone & Mic.	39.00	1.00
NEW AM303	Base station mic.	27.00	1.00
NEW AM503	Base station mic.	35.00	1.00
AM802	Base station mic.	49.00	1.00
TRIO			
NEW TS930S	Solid state transceiver	1,098.00	n/c
TS830S	160-10m transceiver	694.00	n/c
VFO230	Digital VFO	215.00	5.00
AT230	All band ATU	119.00	5.00
SP230	External speaker unit	34.95	1.75
DS2	Optional dc pack	43.95	1.75
DFC230	Digital remote controller	179.00	1.75
YK88C	500Hz CW filter	29.60	0.75
YK88CN	270Hz CW filter	32.60	0.75
SM220	Station monitor scope	198.00	5.00
BS8	Panoramic display module	44.85	1.50
TS530S	160-10m transceiver	534.00	n/c
VFO240	External VFO	92.50	5.00
TS130S	8 band 200w pep mobile	525.00	n/c
TS130V	8 band 20w pep mobile	445.00	n/c
TL120	200w pep linear for TS120V	144.00	2.00
MB100	Mobile mount for TS130	17.00	1.50
VFO120	External VFO	85.00	2.00
SP120	Base station speaker	23.00	2.00
SP40	New mobile speaker unit	12.40	1.00
AT130	100w antenna tuner	79.12	1.50
PS20	AC power supply 4 amps	49.45	3.00
PS30	AC power supply 20 amps	88.50	5.00
MA5	Trio 5 band mobile aerial	88.75	3.25
MC50	Deluxe desk mic.	25.75	1.50
MC35S	Fist microphone 50k	13.80	0.75
MC30S	Fist microphone 500ohm	13.80	0.75
MC40S	Up/down microphone	13.80	0.75
LF30A	HF low pass filter	17.90	1.00
RD300	1kw dummy load	52.20	2.00
NEW TS780	2m/70cm transceiver	748.00	n/c
TR9000	2m multimode transceiver	359.00	n/c
TR9130	2m multimode 25w	395.00	n/c
BO9	Base plinth for TR9000	34.95	1.50
TR7730	Compact 25w 2m FM tcvr	247.00	2.00
TR7800	2m FM 25w transceiver	257.00	2.00
TR2300	2m FM portable tcvr	166.75	2.00
VB2300	10w amplifier for TR2300	58.00	1.50
MB2	Mobile mount	17.70	1.00
RA1	Rubber flexible antenna	6.90	0.75
PS1200	AC power supply unit & charger	29.50	1.50
NEW TR2500	Compact 2m FM h'held	207.00	2.50
ST2	Base stand charger	46.00	1.75
SC4	Soft case	12.00	0.75
MS1	Mobile stand/trickle chgr	28.00	1.25
SMC25	Speaker microphone	14.50	0.75
PB25	Spare battery pack	22.30	0.75
LH2	Deluxe leather case	21.30	0.75
TR8400	70cm FM mobile tcvr	299.00	2.00
PS10	Base station power supply	64.00	2.50
TR9500	70cm multimode tcvr	449.00	n/c
PL1	Charger lead for TR2300	1.30	0.75
R1000	Synthesised 200kHz-30MHz receiver	297.00	n/c
SP100	External speaker unit	26.90	2.00
HC10	Digital station clock	58.75	1.50
HS5	Deluxe headphones	21.85	1.25
HS4	Economy headphones	10.35	1.25
NEW R600	Synthesised 150kHz-30MHz receiver	235.00	n/c
DM81	Dip resonance meter	60.00	1.50
DL705	Digital multimeter	80.00	1.50
MC76	Case for DL705	4.95	1.00

SERVICE

"YES IT DOES GO WRONG SOMETIMES"

Even the best equipment goes wrong and you want to be in a position whereby you are assured that any faults can be rectified quickly and efficiently. At Hockley we have a well equipped, full-time service department to give you just that re-assurance. It's only when things go wrong that you begin to tell the "men from the boys" in the retailing world. Our policy is quite simple. We will service any equipment that we sell both in and out of warranty and do our utmost to get the work completed as fast as is humanly possible. Minor faults we will try and do whilst you wait but do please telephone before making a journey to us so that we can make sure it can be fitted into our day's schedule.

YAESU			
NEW FT1	Deluxe solid st state tcvr	1,295.00	n/c
KEYT901	Curtis keyer	23.00	0.75
DCT1	DC lead	6.50	0.75
RAMT1	Memory board	10.00	0.75
FMUT1	F.M. Unit	t.b.a.	0.75
XF8.9KCN	300Hz CW filter	15.35	0.75
XF8.9KC	600Hz CW filter	15.35	0.75
XF8.9KA	6kHz AM filter	15.35	0.75
XF10.7KC	CW filter	13.80	0.75
FT902DM	9 band AM/FM transceiver	885.00	n/c
FT902DE	9 band transceiver	790.00	n/c
FC902	9 band atu SWR/PWRetc	135.00	5.00
FTV901R(2)	Transverter fitted 2m mod	285.00	5.00
FTV901R	T'verter main frame only	195.00	5.00
430TV	70cms module for tvtr	185.00	2.00
144TV	2m module for transverter	100.00	2.00
70TV	4m module for transverter	80.00	2.00
YO91P	Monitor scope with pan. adaptor	330.00	5.00
FV901DM	Remote vfo for 901	260.00	5.00
SP901	External speaker	31.00	2.00
FL2100Z	160-10m 1200w linear	425.00	n/c
FT101ZFM	160-10m 9 band transc.	590.00	n/c
FT101ZDFM	As above with digital readout	665.00	n/c
DCT101Z	12v DC adaptor	42.50	1.50
FV101Z	Remote VFO for FT101Z/ZD	112.00	5.00
FV101DM	External Digital VFO	249.00	5.00
FANT101	Fan for 101 series	13.80	1.00
FT707	80-10m 8 band tcvr	569.00	n/c
FP707	230v AC for FT707	125.00	5.00
MR7	Metal rack for FT707	15.70	2.00
MMB2	Mobile mounting bracket	16.00	1.50
FV707DM	Digital VFO	203.00	5.00
FL110	100w linear amplifier	155.00	5.00
FRG7	General Coverage rcvr	199.00	n/c
FRG7700	Gen. co. receiver	329.00	n/c
MEMGR7700	Memory module	90.00	1.00
DCRG7700	DC modification kit	1.15	0.50
FRT7700	Antenna tuner	37.00	1.50
FF5	Low pass filter	9.95	0.75
VHF Converters for FRG7700:			
	FRV7700 'A' 118-130; 130-140; 140-150MHz	69.75	1.50
	FRV7700 'B' 118-130; 140-150; 50-59MHz	75.50	1.50
	FRV7700 'C' 140-150; 150-160; 160-170MHz	65.95	1.50
	FRV7700 'D' 118-130; 140-150; 70-80MHz	72.45	1.50
	FRV7700 'E' 118-130; 140-150; 150-160MHz	71.30	1.50
	FRV7700 'F' 118-130; 150-160; 170-180MHz	71.30	1.50
FT208R	2½ watt 2m h'held tcvr	209.00	1.50
FT708R	1 watt 70cms h'held tcvr	219.00	1.50
FNB2	Nicad battery pack	17.25	0.75
NC9C	Slow charger unit	8.00	0.75
PA3	12v charger unit	13.40	0.75
MMB10	Mobile bracket	6.50	0.75
FT290R	2m all-mode portable	249.00	n/c
FT790R	70cms all-mode portable	t.b.a.	1.00
NC11C	Charger for FT290R	8.00	1.00
CSC-1	Carrying case	3.45	0.75
MMB-11	Mobile mounting bracket	22.25	1.50
FL2010	10 watt linear	64.00	2.00
NC/WSE	2amp hour ni-cad pack	20.00	1.75
FT480R	2m 10 watt SSB/CW/FM transceiver	379.00	n/c
FP80A	230v AC power supply	63.25	2.00
FL2050	50 watt linear	126.50	2.00
FT780R	70cms all-mode tcvr	449.00	2.00
YAESU ACCESSORIES			
YM21	Hand mic. 600ohm 4 pin	13.80	0.75
YM24A	Hand mic. 2K ohm 6 pin	16.85	0.75
YM34	Desk mic. 500/50K ohm 8 pin	21.45	1.50
YM35	Hand mic. 8 pin scanning. 600ohm	13.80	0.75
YM36	Hand mic. 8 pin n/c. 600ohm	13.05	0.75
YM37	Hand mic. 600ohm 8 pin	6.90	0.75
YM38	Desk mic. 600/50K ohm 8 pin	24.90	1.50
YM39	600ohm 7 pin hand speaker/mic.	14.95	0.75
YE7A	Hand mic. 600ohm 4 pin	6.90	0.75
YD148A	Desk mic. 600/50k ohm 4 pin	21.10	1.50
YD844A	Desk mic. 600/50k ohm	25.30	1.50
FP4	230v/4 amp 12v psu	42.95	2.00
FP12	230v/12 amp 12v psu	86.25	5.00
YH55	8ohm communication headphones	10.00	1.00
YH77	Lightweight headphones	10.00	1.00
QTR24D	24 hour World clock	28.00	1.50
FF501DX	Low pass filter 2kw	23.00	1.50
YP150Z	Dummy load/wattmeter	92.00	1.50
ICOM			
IC730	HF Mobile tcvr 100W	586.00	n/c
FL30	SSB Pass band tune filter	24.70	0.75
FL44	Hi Q 455kHz xtal filter	t.b.a.	0.75
FL45	CW Narrow xtal filter	34.20	0.75
EX202	LDA unit for above	t.b.a.	0.75
EX203	CW Audio filter	11.60	0.75
EX205	Transverter controller	10.50	1.00
IC720A	HF transceiver + Gen. Cov. Rcvr.	883.00	n/c
PS20	PSU for above with speaker	130.00	5.00
PS15	PSU no speaker	99.00	5.00
FL32	CW narrow filter	29.30	0.75
FL34	AM filter	23.40	0.75
BC10A/E	Mains memory backup	5.30	0.75
IC2KL	Matching HF linear 500W	839.00	n/c
IC2KLPS	PSU for above	211.00	5.00
ICAT500	1·8-30MHz auto tuner	299.00	5.00
ICAT100	3·5-30MHz auto tuner	249.00	5.00
IC45IE	70cm FM + SSB base stn	630.00	n/c
IC25IE	2m FM + SSB base stn	499.00	n/c
IC290E	2m Multimode mobile 10W	366.00	n/c
IC490E	70cm multimode mobile	445.00	n/c
IC25E	2m FM mobile 25W	259.00	n/c
IC2E	2m FM handy talky	159.00	n/c
IC4E	70cm hand portable	199.00	n/c
ICML1	10 watt mobile booster	49.00	1.00
BP5	11 volt battery pack	30.50	0.75
BP4	Battery box for 6 × AA	5.80	0.75
BP3	Standard battery pack	17.70	0.75
BP2	6 volt pack	22.00	0.75
BC30	Base charger for above	39.00	0.75
BC25	Mains charger as supplied	4.25	0.75
DC1	12 volt adaptor pack	8.40	0.75
HM9	Speaker/Microphone	12.00	0.75
CP1	Mobile charging lead	3.25	0.75
LC1/2/3	Cases each	3.50	0.75
IC202S	2m SSB portable tcvr.	169.00	n/c
IC402	70cm SSB portable tcvr.	245.00	n/c
ICSP2/3	External speaker	29.00	1.50
IC3PE	3 amp psu + speaker	64.90	1.50
ICSM2	Desk mic. 4 pin plug	29.00	1.50
ICSM5	Desk mic. 8 pin plug	29.00	1.50
ICHM3	Hand mic.	12.00	0.75
ICHM5	N/C mic. as above	20.00	0.75
ICHM7	Hand mic.	12.00	0.75
ICHM10	Scan mic.	20.00	0.75
LOWE RECEIVERS			
SRX-30	General Coverage HF receiver	158.00	n/c
SRX-30D	SRX30 with dig readout	195.00	n/c

MICROWAVE MODULES RANGE

MML28/100-3	10m 100w linear/preamp	129.95	2.00
MML70/40	4m 40 watt linear/preamp	77.00	1.25
MML70/100-S	4m 100 w linear/preamp	129.95	2.00
MML144/30L-S	1-3 w I/P 30 w O/P	65.00	1.75
MML144/40	2m 40 w linear/preamp	77.00	1.25
MML144/100-S	2m 100 w linear/preamp	129.95	2.00
MML144/100LS	2m 100 w (1 or 3w i/p)	145.00	2.00
MML432/20	70cm 20 w linear/preamp	77.00	1.25
MML432/50	70cm 50 w linear/preamp	99.00	2.00
MML432/100	70cm 100 watt linear	228.65	2.00
MML1296/10	23cm 10 watt linear	199.00	1.25
MMC435/51	70cm ATV converter	34.90	0.75
MMC435/600	70cm ATV converter	27.90	0.75
MTV435	70cm ATV 20 watt tx	149.00	1.25
MM1000	ASC11 to morse converter	59.00	1.25
MM1000KB	Morse converter with keyboard	89.00	2.00
MM2000	RTTY to TV converter	169.00	1.25
MM4000	RTTY transceiver	269.00	1.25
MM4000KB	with keyboard	299.00	2.00
MMS1	The MORSETALKER	115.00	1.25
MMS2	Advanced morse trainer	155.00	1.25
MMT28/144	10m transverter	99.00	1.25
MMT70/28	4m transverter	115.00	1.25
MMT70/144	4m transverter	115.00	1.25
MMT144/28	2m transverter	99.00	1.25
MMT432/28-S	70cm transverter	149.00	1.25
MMT432/144-R	70cm transverter	184.00	1.25
MMT1296/144	23cm transverter	184.00	2.00
MMC28/144	10m to 2m converter	27.90	0.75
MMC50/28	6m to 10m converter	27.90	0.75
MMC70/28	4m to 10m converter	27.90	0.75
MMC70/28LO	4m to 10m converter	29.90	0.75
MMC144/28	2m to 10m converter	27.90	0.75
MMC144/28LO	2m to 10m converter	29.90	0.75
MMC432/28-S	70cm to 10m converter	34.90	0.75
MMC432/144-S	70cm to 2m converter	34.90	0.75
MMC1296/28	23cm to 10m converter	32.20	0.75
MMK1296/144	23cm to 2m converter	59.80	0.75
MMK1691/137.5	1691MHz Meteosat converter	115.00	1.25
MMA28	10m low noise preamp	14.95	0.75
MMA144V	2m RF switched preamp	34.90	0.75
MMA1296	23cm low noise preamp	29.90	0.75
MMDO50/500	500MHz digital meter	69.00	0.75
MMD600P	600MHz prescaler	23.00	0.75
MMDP1	Counter amplifier/probe	11.50	0.75
MMF144	2m bandpass filter	9.90	0.75
MMF432	70cm bandpass filter	9.90	0.75
MMV1296	70cm to 23cm varactor	34.50	0.75
MMR15/10	15dB, 10 watt attenuator	9.90	0.75

DATONG

PC1	General Cov. Converter	120.75	n/c
VLF	VLF converter 28-29MHz coverage	25.30	n/c
FL1	Agile audio filter	67.85	n/c
FL2	Multi-Mode audio filter	89.70	n/c
ASP/B	Automatic r.f. clipper (Trio)	79.35	n/c
ASP/A	Automatic r.f. clipper (Yaesu)	79.35	n/c
D75	Manual r.f. speech clipper	56.35	n/c
D70	Morse Tutor	49.45	n/c
MK	Keyboard morse sender	129.00	n/c
RFA	Broad band pre-amplifier	29.30	n/c
AD270	Active dipole (indoor mounting)	37.95	n/c
AD370	Active dipole (outdoor mounting)	51.75	n/c
MPU	Mains power unit	6.90	n/c
DC144/28	2 metre converter	35.65	n/c
Codecall 'A'	4000 link programmable codes	27.60	n/c
Codecall 'B'	4000 switch programmable codes	29.30	n/c

JAYBEAM ANTENNAS

10, 15 & 20 metre antennas			
TB3	HF 3 el tribander 1kw	181.70	5.00
VR3	HF Vertical triband 1kw	46.00	4.00
4 metre antennas			
4Y/4M	4 element beam	22.42	4.00
PMH2/4M	2 way phasing harness	13.22	1.50
2 metre antennas			
DC1/WB	Wide band discone (100-470MHz)	41.40	3.00
LR1/2M	Colinear 4·3db	25.87	3.00
LR2/2M	Colinear 2·8db	21.85	3.00
C5/2M	5db glass fibre colinear	47.72	4.00
5Y/2M	5 element yagi	12.07	3.00
8Y/2M	8 element yagi	15.52	3.50
10Y/2M	10 element yagi	33.35	4.00
PBM10/2M	10 element parabeam	39.67	4.00
PBM14/2M	14 element parabeam	48.30	4.00
5XY/2M	Crossed 5 element yagi	24.72	3.50
8XY/2M	Crossed 8 element yagi	31.00	4.00
10XY/2M	Crossed 10 element yagi	40.82	4.00
X6/2M/X12/70cm	dual band crossed yagi	41.40	4.00
PMH/2C	Harness for circular pol.	8.00	1.50
Q4/2M	4 element quad yagi	25.87	3.00
Q6/2M	6 element quad yagi	33.90	4.00
Q8/2M	8 element quad yagi	39.10	4.00
D5/2M	Double 5 slot-fed yagi	21.85	3.00
D8/2M	Double 8 slot-fed yagi	29.32	4.00
SVMK/2M	Kit for vertical pol.	8.00	3.00
UGP/2M	Ground plane	10.90	2.00
HO/2M	Mobile 'halo' head only	5.15	2.00
HM/2M	Mobile 'halo' with 24" mast	5.75	2.00
PMH2/2M	2 way phasing harness	10.90	1.50
PMH4/2M	4 way phasing harness	25.30	1.50
70cm Antennas			
C8/70cm	8db glass fibre colinear	54.00	4.00
D8/70cm	Double 8 slot-fed yagi	22.40	3.00
PBM18/70cm	18 element parabeam yagi	27.60	3.00
PBM24/70cm	24 element parabeam yagi	36.80	4.00
MBM28/70cm	28 el multibeam yagi	18.40	3.00
MBM48/70cm	48 el multibeam yagi	31.00	3.00
MBM88/70cm	88 el multibeam yagi	42.55	4.00
8XY/70cm	Crossed 8 element yagi	36.80	3.00
12XY/70cm	Crossed 12 element yagi	46.00	4.00
PMH2/70cm	2 way phasing harness	9.20	1.50
PMH4/70cm	4 way phasing harness	19.55	1.50
23cm Antennas			
CR23cm	Corner reflector array	39.00	3.00
D15/1296	Double 15 slot-fed yagi	36.80	3.00
PMH2/23cm	2 way phasing harness	27.60	1.50
JAYBEAM Sundries			
DL	Double lashing chimney kit	10.78	3.00
W6	6" wall bracket (1½" mast)	3.00	2.00
W21	21" wall bracket (2" masts)	10.80	3.50
W24HD	24" wall bracket (2" masts)	15.45	4.00
SPM	16' × 1" portable masts	16.35	3.00
PME	4' extension	2.75	3.00
A4	4'6" × 1½" straight	4.30	3.00
A5	5' × 1" straight	2.80	3.00
A9	9' × 1½" straight	8.65	3.00

MAIL ORDER

"FASTEST IN THE BUSINESS"

Once you've made the decision to buy you'll want to get your equipment as quickly as possible. That's why we set up a completely separate mail order department to give you exactly that kind of service. Martin Pyke is our mail order manager and his number one job is to get all goods shipped out the same day as the order is received. We can take orders right up to around 5.00 p.m. for same day despatch (with the exception of the larger items where 2.30 p.m. is the limit). Either send us your order by post using our clip out order form contained in this advert or telephone us your credit card details.

A10	10' × 2" straight	13.55	3.50
A12	12' × 2" straight	16.20	4.00
A14	14' × 2" straight	18.85	4.00
CP1	Cross-over plate 2" × 2"	3.60	1.75
JBL59/15	15" jointing sleeve	6.05	2.00
JBL29	Universal clamp	1.75	1.00
JBL30	Universal clamp	1.70	1.00
JBL53	Universal clamp	1.25	1.00
JBL58	Guy wire clamp	1.60	1.00
JBL63	Universal clamp	2.15	1.00
JBL64	Die-cast clamp	1.32	1.00
JBL65	Die-cast clamp	1.35	1.00
MBP	Mast base plate 2"	3.90	1.50

SPECIAL VHF ANTENNAS

Scan-X	65-520MHz discone rx only	16.00	3.00
LAB	Airband ground plane	11.50	2.50
LMD	Marine dipole aerial	4.80	2.00
GDX-2	Discone aerial 50-480mHz tx & rx	39.50	3.00

G-WHIP MOBILE ANTENNA RANGE

Tribander helical for 10/15/20 metres	25.80	3.00
Base mount single hole fixing + 3m cable	6.30	1.25
LF40m coil for above aerial	6.55	1.25
LF80m coil for above aerial	6.55	1.25
LF160m coil for above aerial	6.55	1.25
LF telescopic resonator whip	4.25	1.25

AERIAL ROTATORS (complete with control boxes)

CDE AR40 (5 core cable) up to 2 el. tribander	65.00	3.50
Channelmaster 9502B (3 core) up to 8 el. VHF	54.00	3.50
9523 Channelmaster alignment bearing	14.50	1.25
Jaybeam KR400 (6 core) up to 3 el. HF beams	99.00	3.50
250 Hirschmann (3 core) suits VHF aerials up to 8 el.	43.00	2.50
SL100 Alignment bearing for 250	13.50	1.50

HF ANTENNAS (Various manufacturers)

Mini-Products HQ-1 20/15/10m 2 el. 1kw "Mini-Beam	115.00	4.00
Mini-Products C4 20/15/10m vertical dipole 1kw	55.00	3.00
Mosley TD3JR20/15/10m wire dipole 600w	40.00	2.00
Mosley "Mini-Beam" 20/15/10m 2 el. beam 600 watts	99.00	4.00
Mosley TA33JR 3 band 3 el. beam 600 w	133.00	4.00
Hy-Gain 12AVQ 20/15/10m vertical 2kw	43.00	3.00
Hy-Gain 14AVQ 40-10m vertical 2kw	64.00	3.00
Hy-Gain 18AVT/WB 80-10m vertical 2kw	91.00	3.50
HF5 80-10m vertical 200 watts	48.50	3.50
Radial kit for HF5	30.50	3.00
Jaybeam TB3 HF 3 el tribander beam 2kw	181.70	5.00
Jaybeam VR3 HF vertical 2kw	46.00	4.00
Western DX-5V 5 band 2kw vertical	89.00	3.00
5-band commercial grade 1kw 80-10m dipole	39.00	2.00

VHF/UHF MONITOR RECEIVERS

SX200N	Scanning receiver	260.00	5.00
BEARCAT 220	Scanning receiver	229.00	5.00
TM56B	FM Scanner 12v DC/230v AC	89.00	2.00
Sound Air 008	8 channel FM monitor	39.00	2.00
Sound Air M161	16 channel FM monitor	39.00	2.00
SR9(A)	2m Amateur receiver 12v DC	46.00	2.00
SR9(M)	Marine band rcvr 12v DC	46.00	2.00

ANTIFERENCE (ANTENNA SPECIALISTS) MOBILE ANTENNAS

ASP201	2m ¼ wave aerial	3.95	3.00
ASP3462	70cm colinear 3db gain	8.95	3.00
K220A	Magnetic mount for above	8.95	2.00
ASP3009	2m 3db gain 5/8th wave	9.95	3.00
ASP3677	Deluxe 2m 3db gain 5/8th wave	15.95	3.00
ASP3667	Deluxe 70cms 5db gain	16.95	3.00
K220	Magnetic mount	8.95	2.00
ASPM161	'No-hole' boot mount	3.75	1.00
ASPM124	27/28MHz ¼ wave whip	18.95	3.00

HOKUSHIN RANGE (MOBILE ANTENNAS)

2E	2m 5/8 wave 3·4db gain	8.50	3.00
2NE	2m 7/8 wave 4·5db gain	14.50	3.00
10SE	28MHz whip	12.65	3.00
15SE	21MHz whip	12.65	3.00
20SE	14MHz whip	13.80	3.00
RG4M	Base for all above aerials	4.50	1.50
GSS	Gutter/boot mount	4.50	1.50
MB5	Magnetic mount with 5m coax (not 2NE)	7.95	2.00
CBA311	2m ¼ wave gutter clip aerial	5.00	3.00

SWL AERIALS & ATU's

SW69	SWL 50ft dipole 3-30MHz	24.95	1.50
004	3-30MHz 60ft dipole with 50ft coax	29.92	2.00
Mosley RD5	All band dipole	40.00	2.00
Global AT1000	SWL antenna tuning unit 0·2MHz-30MHz	31.95	2.00

AIR BAND PORTABLE MONITORS

R517	Air band portable receiver	49.50	1.50
AIR1	Soft case for R517	3.00	1.00
Crystals for R517		3.00	0.25
ATC720	Synth Air Roc 118 136MHz	TBA	

MISCELLANEOUS ITEMS

PS134	13·8v 4 amp power supply	24.95	2.00
PS125	5 amp AC power supply	29.95	2.50
PP1310	PSU 240v/13·8v DC output at 10amp protected	49.50	3.00
Global PS15	6 amp psu with meter	32.95	2.00
EK121	Katsumi Electronic keyer	29.00	1.50
EKM12	Matching side tone monitor	10.95	1.25
COK2	Morse code oscillator	6.95	0.75
HK708	Telegraph CW key (manual)	11.50	1.00
YW3	Twin SWR/Power/Field strength meter	11.95	0.75
MF210	Self powered 2m FM monitor	9.95	0.75
FX1	Deluxe station wavemeter	33.00	1.50
DM81	Solid state dip meter	60.00	1.50
Altai	Dip oscillator	47.00	1.50

MAIL ORDER SLIP to: Waters & Stanton Electronics, Main Road, Hockley, Essex.

Name..... Goods required.....

Address..... .....

....

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Please rush me the above. Cheque enclosed for £..... Please charge to credit card No. .....

YAESU TRANSCEIVERS

FT-ONE	1,295.00
FT-902	885.00
FT-102 AM/FM	To be announced
FT-101ZD FM	665.00
FT-101ZD AM	650.00
FT-101Z FM	590.00
FT-101Z AM	575.00
FT-107	725.00
FT-707	569.00
FL-2100 Linear Amp	425.00
FT-480 VHF	379.00
FT-290 VHF	249.00
FT-230 VHF	239.00
FT-790 UHF	To be announced

YAESU RECEIVERS AND ACCESSORIES

FRG-7	189.00
FRG-7700	329.00
FRG-7700M	409.00
FRT-7700 ATU	37.00
FRV-7700A Converter	68.00
FRV-7700B Converter	75.00
FRV-7700C Converter	65.00
FRV-7700D Converter	72.00

ICOM

IC-720A, IC-730, IC-451, IC-251, IC-290, IC-25E, PS-15, IC-2E, IC-4E — Prices on application

TRIO

TS-930, TS-530, TS-830, PS-30 — Prices on application

All other TRIO models available

MICROWAVE MODULES

MMT144/28	2M Transverter for HF Rig	99.00
MMT432/28S	70cm Transverter for HF Rig	149.00
MMT432/144R	70cm Transverter for 2M Rig	184.00
MMT70/28	4M Transverter for HF Rig	115.00
MMT70/144	4M Transverter for 2M Rig	115.00
MMT1296/144	23cm Transverter for 2M Rig	184.00
MML144/25	2M 25W Linear Amp (3W I/P)	59.00
MML144/40	2M 40W Linear Amp (10W I/P)	77.00
MML144/100S	2M 100W Linear Amp (10W I/P)	129.00
MML432/20	70cm 20W Linear Amp (3W I/P)	77.00
MML432/50	70cm/50W Linear Amp	119.00
MML432/100	70cm 10/100W Linear Amp	228.60
MM2000	RTTY to TV Converter	169.00
MM4000	RTTY Transceiver	269.00
MMC50/28	6M Converter to HF Rig	27.90
MMC70/28	4M Converter to HF Rig	27.90
MMC144/28	2M Converter to HF Rig	27.90
MMC432/28S	70cm Converter to HF Rig	34.90
MMC432/144S	70cm Converter to 2M Rig	34.90
MMC435/600	70cm ATV Converter	27.90
MMK1296/144	23cm Converter to 2M Rig	59.80
MMD050/500	500MHz Dig. Frequency Meter	69.00
MMD600P	600MHz Prescaler	23.00
MMDP1	Frequency Counter Probe	11.50
MMA28	10M Preamp	14.95
MMA144V	2M RF Switched Preamp	34.90
MMF144	2M Band Pass Filter	9.90
MMF432	70cm Band Pass Filter	9.90
MMS1	The Morse Talker	115.00

MORSE EQUIPMENT

MK704	Squeeze Paddle	10.50
HK707	Up/Down Key	10.50
HK704	Deluxe Up/Down Key	14.50

MORSE EQUIPMENT

BY1	Keyer Paddle (black)	32.00
BY2	Keyer Paddle (chrome)	39.95
BY3	Keyer Paddle (gold-plated)	92.00

ROTATORS

KR250	Kenpro Lightweight 1-1½" mast	44.95
9502B	Colorotor (Med VHF)	49.95
KR400RC	Kenpro-inc lower clamps	99.95
KR600RC	Kenpro-inc lower clamps	139.95

DESK MICROPHONES

SHURE 444D Dual Impedance	33.00
SHURE 526T Mk II Power Microphone	46.00
ADONIS AM502 Compression Mic 1 O/P	39.00
ADONIS AM601 Compression Mic + Meter 1 O/P	49.00
ADONIS AM802 Compression Mic + Meter 3 O/P	59.00

MOBILE SAFETY MICROPHONES

ADONIS AM 202S Clip-on	20.95
ADONIS AM 202F Swan Neck + Up/Down Buttons	30.00
ADONIS AM 202H Head Band + Up/Down Buttons	30.95

DRAE PRODUCTS — fully protected power supplies

4 Amp	27.95	12 Amp	69.00
6 Amp	44.95	24 Amp	99.00
VHF Wavemeter 130-450MHz			24.95
Morse Tutor — new product			

TEST EQUIPMENT

AT145	Packer VHF Wavemeter	19.95
Welz SP15M	1.8-150MHz—200W	29.00
DM81 Trio Dip Meter		63.25

LICENSED CREDIT BROKERS ✻ Ask for written quotation. Credit Card sales by telephone.

Prices are correct as we go to press, but we reserve the right to vary them if forced to do so by the time this advertisement appears.

AMATEUR RADIO EXCHANGE

OUR STOCK IS JUST A PHONE CALL AWAY

In London's leading amateur radio store, Brenda and Bernie are now geared up to provide Britain's best phone and mail order service too. So, whether you want an HF transceiver or just a meter and a couple of PL-259s, try us. Any item in stock – and in our new premises we carry an even wider range than before – which is ordered before 2pm will normally be dispatched the same day. Carriage is free within mainland UK, and delivery will be as rapid as insured Post or Securicor can make it.

When it comes to paying the choice is yours. If you want to use your Access or VISA Credit Card, just give us your name, address and Card number, and your order is on its way. However, if you prefer to send a cheque, there won't even be a delay to clear it if you are in the Call Book. Indeed, if you are a licensed Amateur (or if you have a Cheque or Credit Card), we can even arrange HP on the telephone, with free credit for up to 12 months if you put down a 50% deposit. Alternatively, we can offer normal HP terms over varying periods with smaller down-payments, including a special **10%** deposit scheme on transceivers.

This advertisement can only list a selection from our complete range, so please phone for up-to-date price and stock information, or send 50p for our full Stock List (refundable against any purchase over £5)... It's the next- best thing to browsing round the store...and don't worry about missing your cup of Brenda's coffee. We've even found a way of organising this for our post and telephone customers!

OTHER RANGES AND PRODUCTS

Standard • Welz • Datong • Sota • Packer • Wood & Douglas Kits

Antennas and accessories by Cushcraft, G-Whip, Jaybeam etc.
Scanning receivers by Bearcat, also the SX200N and AR-22.
Tono VHF amps. Tasco CW readers.
Wraase SSTV kits etc etc.

FT-790

Yaesu's popular 2m Portable format now available for 70cm as well, with full 10MHz coverage, all-mode FM/CW/USB/LSB, 25/50kc steps, 1.6MHz shift for repeater operation, toneburst, etc.

PHONE FOR FULL DETAILS AND PRICE

FT-102

Yaesu's latest HF transceiver...a worthy successor to the evergreen FT-101 series, with so many extra features.

- Notch filter • Three 6146B final tubes • IF shift control
- Bandwidth control from 2.7kHz to 500Hz • APF control
- RF processing • Tunable audio network for speech tailoring
- SSB/CW/AM/FM

PHONE FOR FULL DETAILS OF THE TRANSCEIVER ITSELF AND OF THE RANGE OF MATCHING ACCESSORIES.

5-YEAR GUARANTEE
2 years free – up to 3 years further cover available at 2½% pa.
YAESU ONLY

373 UXBRIDGE ROAD, ACTON, LONDON W3 9RH
Tel: 01-992 5765/6/7 *Just 500 yards east of Ealing Common station on the District and Piccadilly Lines, and 207 bus stops outside.*

136 GLADSTONE STREET, ST HELENS, MERSEYSIDE Tel: 0744 53157 *Our North West branch run by Mike (G4NAR), just around the corner from the Rugby Ground.*

Closed Wednesday at Acton and Monday at St Helens, but use our 24-hour Ansafone service at either shop.

SMC SERVICE

Free Finance on many items. Two year guarantee on Yaesu. Free Securicor on major Yaesu items. Access and Barclaycard over the telephone. Biggest Branch, Agent and Dealers network. Ably staffed, courteous, Service Department. "B Services" Securicor contract at £4.49!! Biggest stocks of amateur equipment in UK. Twenty-four years of experience

FREE FINANCE

On regular priced items from: Yaesu, Ascot SMCHS, CDE, HyGain, Channel Master, Hansen, SMC, MFJ, KLM, Mirage and Hy Mound, on invoices over £100 SMC offers Free Finance! How is it done? Simple, pay 20%, split the balance equally over 6 months or pay 50% down and split the balance over a year.

You pay no more than the cash price!!

GUARANTEE

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

FT102

HF TRANSCEIVER

100db DYNAMIC RANGE
–40db 3rd order Tx
SSB-FM*-CW-AM*

*OPTION

FT102	Transceiver	FV102DM	VFO	XF82HSN	1.8kHz (1.7:1)
AM/FM	AM/FM unit	SP102	Patch	XF82NC	600Hz (2.2:1)
MD–1B8	Hand mic.	FC102	ATU	XF82NCN	300Hz (2.7:1)
MD–1B8	Desk mic.	FAS14R	Relays	XF445C	500Hz (2.2:1)
SP102	Speaker	XF 82GA	6KHz (2.1:1)	XF445CN	270Hz (2.2:1)

BETTER DYNAMIC RANGE

The extra high-level receiver front end uses 24 VDC for both RF amplifier and mixer circuits. For ultra clear copy on strong signals or noisy bands the JFET RF amplifier can be bypassed via a front panel switch, boosting dynamic range beyond 100dB. A PLL system using six narrow band VCOs provides exceptionally clean local signals on all bands for both transmit and receive.

TOTAL IF FLEXIBILITY

An extremely versatile IF Shift/Width system, using friction-linked concentric controls gives an infinite choice of bandwidths between 2·7kHz and 500Hz, which can then be tuned across the signal to the portion that provides the best copy. A wide variety of crystal filters for fixed IF bandwidths are also available as options for both parallel and cascaded configurations. The 455kHz third IF allows an extremely effective IF notch tunable across the selected passband, while an independent audio peak filter can also be activated for single-signal CW reception.

NEW STANDARD OF PURITY

Three 6146B tubes in a special configuration provide a freedom from IMD products and an overall purity of emission unattainable in two-tube and transistor designs, while a new DC fan motor gives whisper-quiet cooling as standard.

IF TRANSMIT MONITOR

An extra product detector allows audio monitoring of the transmitter IF signal, which, along with dual meters on the front panel, and a new "peak hold" system incorporated into the ALC metering circuit enables precise setting of the speech processor and transmit audio.

VERSATILE APPLICATIONS

The rear panel has jacks for an external receiver and separate receive antenna for contest and top band operation, and an optional AM/FM Unit enables operation on these modes.

NEW NOISE BLANKER

A new noise blanker design enables front panel control of the blanking pulse width, substantially improving the utility of the noise blanker for all types of operation, including woodpecker blanking.

NEW VFO DESIGN

Using a new IC module developed especially the VFO exhibits exceptional stability under all operating conditions. It is extremely simple, using only axial-lead components, that decrease the number of discrete components that can cause instability or fail in conventional designs. It is encased in a heavy, cast-aluminium housing to prevent interaction with other circuits.

FV-102DM SYNTHESIZED VFO

The FV-102DM provides advanced frequency control for optimum convenience, especially in DX and contest situations. The PLL synthesizer steps in 10Hz, while slow or fast scanning can be controlled either from the front panel or directly from an optional scanning microphone. Twelve frequencies can be memorized, entered from the FT-102 itself, the FV-102DM VFO or numerical keyboard. Front panel controls include ±5kHz and ±20kHz step buttons; VFO dial lock, last digit blanking, and transmit/receive Main/VFO/memory selector. The VFO dial can be used as a clarifier for a selected memory, while the five digit fluorescent display resolves to 10Hz.

COMMERCIAL QUALITY TRANSMITTER

The FT-102 represents a significant advance in amateur transmitter signal quality, introducing design concepts previously restricted to top-of-the-line commercial transmitters.

TRANSMITTER AUDIO TAILORING

The microphone amplifier circuit incorporates a tunable audio network which can be adjusted to tailor the transmitter response to individual voice characteristic before application to the superb internal RF speech processor.

SP-102 SPEAKER/AUDIO FILTER

The SP-102 features a large (120mm) Hi-Fi speaker with selectable low and high-cut audio filters. Headphones may be connected to take advantage of the filtering feature, which allows audio tailoring for each bandwidth and mode of operation to obtain optimum readability.

FC-102 ANTENNA COUPLER

The FC-102 will handle 1·2kW the bandswitched L-C pi-network matches a wide variety of antennas (including a single wire) with transceiver or linear amplifier on all HF amateur bands. New design features include an in-line wattmeter with three ranges (20, 200 and 1200 watts FSD) and a "peak hold" system plus a separate SWR meter. Internal relays provide low-loss pushbutton selection of two different antennas (and two transmitters). The optional FAS-1-4R Remote Antenna Selector, (four independent, low loss, excellent isolation relays housed in a diecast weatherproof housing) may be mounted either inside the FC-102 or on a tower allowing selection of four additional antennas.

SOUTH MIDLANDS COMMUNICATIONS LTD

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Buckley (0244) 549563
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SMC AGENTS

Edinburgh	Jack	GM8GEC	(031657) 2430 day (031665) 240 eve	Bangor	John	GI3KDR	(0247) 55162	Neath	John	GW4FOI	(0639) 55114 day (0639) 2942 eve
Stourbridge	Brian	G3ZUL	(03843) 5917	Tandragee	Mervyn	GI3WWY	(0762) 840656	Jersey	Geoff	GJ4ICD	(0534) 26788

FT ONE £1,295 inc. VAT @ 15% & SECURICOR

*Option

★ Rx: 150KHz-30MHz. Continuous general coverage.
★ Tx: 160-10m (9 bands) or 1.5-30MHz commercial.
★ All Modes: AM, CW, FM*, FSK, LSB, USB.
★ 10 VFO's!!! Any Tx-Rx split within coverage.
★ Two frequency selection ways, *NO* bandswitch.
★ Main dial, velvet smooth, 10Hz resolution.
★ Inbuilt keyboard with up/down scanning.
★ Dedicated digital display for RIT offset.
★ Receiver dynamic range up to 100dB!!!
★ SSB: Variable bandwidth *AND* IF shift.
★ 300* or 600Hz*, 2,400 → 300Hz, 6kHz*, 12kHz*.
★ Audio peak and notch filter. FM squelch.
★ Advanced variable threshold noise blanker.
★ 100W RF, key down capability, solid state.
★ Mains and 12VDC. Switch mode PSU built in.
★ RF processor. Auto mic gain control. VOX.
★ Last but not least *FULL* break in on CW.

FT902DM £885inc. VAT @ 15% & SECURICOR

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

*Option

FT101ZD £635inc. VAT @ 15% & SECURICOR

*Option

★ 160-10 metres including new allocations.
★ Variable IF bandwidth 2.4kHz down to 300Hz.
★ Selectable CW fixed bandwidth CW-W and CW-N*.
★ Semi-break in with sidetone for excellent CW.
★ Digital plus analogue frequency displays.
★ 180W PIP and −31dB 3rd order intermod.
★ RF speech processor fitted − adjustable level.
★ VOX built-in and is adjustable from the front panel.
★ Wide dynamic range for big signal handling.
★ High usable sensitivity, for those weak ones.
★ Superb noise blanker − adjustable threshold.
★ Attenuator; 0-10-20dB, AGC; slow-fast-off.
★ Clarifier (RIT) switchable on TX, RX or both.
★ Low level transvertor drive output facility.
★ Universal power supply 100-234V AC and 12V DC*
★ Incredible range of matching accessories
★ 6 models: Digital/Analogue − AM/FM options.

FT107M £625inc. VAT @ 15% & SECURICOR

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

*Option

FT707 £569inc. VAT @ 15% & SECURICOR

*Option

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

OVER 40% OFF

Reductions shown are taken from previously advertised prices and are not necessarily those at which the equipment has been offered continuously for the last 28 days. Certain items are shop soiled/ex demo—please enquire.

2m SYNTHESISED £205 inc.

CPU2500RKS. 10W keyboard mic up/down tuning etc., 25W model **£210**, 25KHz stepper version **£220**.

OVER 33% OFF

Reductions shown are taken from previously advertised prices and are not necessarily those at which the equipment has been offered continuously for the last 28 days. Certain items are shop soiled/ex demo—please enquire.

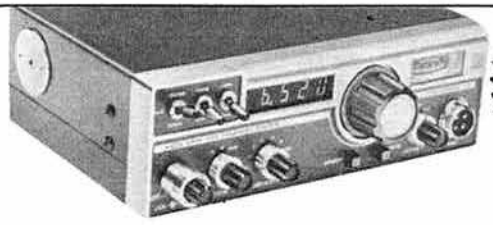
2m SYNTHESISED £175 inc.

FT227RB 10W remote tuning transceiver.
FT227RXS 227 fitted special scanner **£195.**

NEW YAESU

2m, 25W, FM, £239 inc. VAT @ 15% + SECURICOR

FT230R 6" × 2" × 7", 12½/25kHz, ±600kHz, special LCD display, 10 memories, memory and band scan, RX priority feature, two independent VFO's.



£20 OFF

2m, 25W, FM, £179 inc. VAT @ 15% + SECURICOR

2025 MARK II Full coverage 2M Transceiver, 12½kHz (set 12½-200kHz), rapid tune, 10 "easy write" memory channels, memory or band-scan between programmable limits, autoscan stop dependent on squelch *and* centre zero.

FT480R (2m) £379 inc. VAT @ 15% & SECURICOR

- ★ USB-LSB-CW-FM (A3j, A1, F3).
- ★ 30W PIP A3j, 10/1 W out A1 F3.
- ★ Bandpass filter no tune design.
- ★ Bandwidth 2.4kHz and 14kHz at −6dB.
- ★ Semi break in with side tone.
- ★ Very bright blue 100Hz digital display.
- ★ Display shows Tx & Rx freq (inc RIT).
- ★ String LED display for "S" and PO.
- ★ Digital receiver offset tuning.

- ★ Advanced effective noise blanker.
- ★ Memory scanning with slot display.
- ★ Up/down tuning/scanning from mic.
- ★ Priority channel on any memory slot.
- ★ Satellite mode allows tuning on Tx.
- ★ Scanning for busy or clear channels.
- ★ Size (Case): 8.3" D, 2.3" H, 6.9" W.
- ★ LED's; "On Air" Clar, Hi/Low, FM mod.
- ★ Matching FP80 Mains PSU available.

FT780R (70cm) £449 inc VAT @ 15% & SECURICOR

- ★ 144-146MHz (143.5-148.5MHz possible).
- ★ Excellent dynamic range and sensitivity.
- ★ FM; 25, 12½, 1kHz steps.
- ★ SSB; 1,000, 100, 10Hz steps.
- ★ Any TX Rx split with dual VFO's.
- ★ ±600kHz standard repeater split.
- ★ Four easy write-in memory channels.

FT480R

- ★ 1·6MHz shift now available.

- ★ 430-434MHz (440-445MHz) possible.
- ★ GaAs Fet RF for incredible sensitivity.
- ★ NMOS four bit micro control.
- ★ FM; 100kHz, 25kHz, 1kHz, steps.
- ★ SSB; 1,000, 100, 10Hz steps.
- ★ Repeater access by use of dual VFO's.
- ★ Four easy write-in memory channels.
- ★ FT780R 1·6 fitted 1·6MHz Shift **£459** inc.

FT780R

FRG7700 £329 inc. VAT @ 15% + SECURICOR

ALL MODE RECEIVER

- ★ 30MHz down to 150kHz (and below).
- ★ 12 Channel memory option with fine tune.
- ★ SSB (LSB/USB), CW, AM, FM.
- ★ 2·7kHz. 6kHz, 12kHz,15kHz, @ −6dB.
- ★ 3 Selectivities on AM, squelch on FM.
- ★ Up conversion, 48MHz first IF.
- ★ 1kHz digital, plus analogue, display.
- ★ Inbuilt quartz clock/timer.
- ★ No preselector, auto selected LPF's.
- ★ Advanced noise blanker fitted.
- ★ Antenna 500Ω to 2MHz, 50Ω to 30MHz.
- ★ 20dB pad plus continuous attenuator.
- ★ Switchable A.G.C. Variable tone.
- ★ 110 and 240Vac and 12Vdc option.
- ★ Signal meter calibrated in "S" and SIMPO.

SUMMERTIME = HAND PORTABLE TIME

LOW PRICE

FT207R
£159 inc.
VAT @ 15%
& POSTAGE

SALE £159

- ★ 144-146MHz (144-148 possible)
- ★ 12.5kHz synthesizer steps
- ★ 4 bit CPU chip for freq. control
- ★ Keyboard entry of frequencies
- ★ Keyboard lockout safety features
- ★ Digital display to hundreds of Hz
- ★ Display auto shutdown timer
- ★ Four Channels of memory
- ★ Memory back up, disable switch
- ★ Up/down manual tuning
- ★ Bandscan for busy or clear channels
- ★ Memory scanning features
- ★ ±600kHz split built in
- ★ Any split + or − programmable
- ★ Easy change NiCad pack
- ★ BNC antenna connector
- ★ "On Air" and "Channel Busy" LEDs
- ★ Built in condenser microphone
- ★ 200mW AF to internal/external speaker
- ★ External speaker/mic available
- ★ 2.5/0.2W of RF output
- ★ Rx; 35mA squelch, 150mA full vol.
- ★ Tx; 250mA low, 800mA high
- ★ 0.3μV for 20dB quieting
- ★ Double conversion 10.7MHz and 455kHz
- ★ D.T.M.F. encoder built in
- ★ 1.7 (2.2)" D × 2.5 (2.7)" W × 6.7 (7.2)" H
- ★ C/w NiCad pack, helical and case

FT290R MULTIMODE PORTABLE/MOBILE £249 inc.
VAT @ 15% & SECURICOR

- ★ 144-146MHz (144-148 possible)
- ★ Multimode USB, LSB, FM, CW
- ★ 2.5W PEP, 2.5W RMS/300mW out
- ★ LEDs, "ON AIR", "BUSY" MC meter; S.PO
- ★ Integral telescopic antenna
- ★ Bandwidth 2.4kHz and 14kHz @ −6dB
- ★ 100Hz backlit LCD Frequency display
- ★ 10 memory channels "5 year" backup
- ★ FM: 25kHz and 12.5kHz steps
- ★ SSB: 1kHz and 100Hz steps
- ★ Any TX/RX split with dual VFOs
- ★ ±600kHz repeater split 1750kHz burst
- ★ Up/down tuning from microphone
- ★ AF output 1W @ 10% THD
- ★ 58 (H) × 150 (W) × 195 (D) (1.3kg)
- ★ Rx, 70mA, Tx; 800mA (FM maximum)
- ★ Mobile bracket available

2 Yr. GUARANTEE AND FREE FINANCE AVAILABLE

★ FT790R SOON ★
(JULY)

FULL RANGE OF MATCHING ACCESSORIES

- ★ Matching 10W linear Amplifier available
- ★ 8.5-15.2V DC External (not included)
- ★ 8 'C' NiCads or Drys (not included)
- ★ SMC 2.2 A/Hr NiCad **£2.70** inc

FT208R (2m) £209 inc.
VAT @ 15% & POSTAGE

- ★ 4 bit CPU chip frequency control
- ★ Keyboard entry of frequencies/splits
- ★ LCD digital display with backlight
- ★ Ten channels of memory
- ★ Memory back up five-year lifetime cell
- ★ Up/down manual tuning
- ★ Manual or auto scan for busy/clear
- ★ Priority channel with search back
- ★ Memory scanning feature
- ★ Scan between any two frequencies
- ★ Auto scan restart
- ★ Quick change NiCad pack
- ★ 1,750Hz tone burst
- ★ Built in condenser microphone
- ★ 500mW to int/ext speaker
- ★ External speaker/mic available
- ★ Keyboard offers 16 tone DTMF
- ★ 168(H) × 61(W) × 39(D)mm
- ★ C/w NiCad pak, helical

FT708R (70cm) £219
inc VAT @ 15% & SECURICOR

- ★ 144-146MHz (144-148 possible)
- ★ 12.5/25kHz synthesizer steps
- ★ Any split + or − programmable
- ★ ±600kHz repeater split
- ★ 2.5 or 0.3W RF output
- ★ Rx: 20mA squelch 150mA max AF
- ★ Tx: 800mA at 2.5W RF
- ★ 0.25μV for 12dB SINAD
- ★ Dual conversion 16.9MHz and 455kHz

FT208R

FT708R

- ★ 430-440MHz (440-450 option)
- ★ 25kHz synthesizer steps
- ★ Any split + or − programmable
- ★ ±7.6MHz EU split standard
- ★ 1W or 100mW RF output
- ★ Rx; 20mA squelch, 150mA (max AF)
- ★ TX: 500mA at 1W RF
- ★ 0.4μV for 12dB SINAD
- ★ Dual conversion 46.255MHz and 455kHz

FREE FINANCE AVAILABLE—TWO YEAR GUARANTEE

SOUTH MIDLANDS COMMUNICATIONS LTD

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

GRIMSBY
S.M.C. (Humberside)
247A Freeman Street,
Grimsby, Lincolnshire.
Grimsby (0472) 59388
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STOKE-ON-TRENT
S.M.C. (Stoke)
76 High Street
Talke Pits, Stoke
Kidsgrove (07816) 72644
9-5.30 Tuesday-Saturday

LEEDS
S.M.C. (Leeds)
257 Otley Road,
Leeds 16, Yorkshire.
Leeds (0532) 782326
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CHESTERFIELD
S.M.C. (Jack Tweedy) LTD
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New Whittington, Chesterfield.
Chesterfield (0246) 453340
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BUCKLEY
S.M.C. (T.M.P.)
Unit 27 Pinfold Workshops,
Pinfold Lane, Buckley.
Buckley (0244) 549563
9.30-5.30 Tuesday-Saturday

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Bangor	John	GI3KDR	(0247) 55162	Stourbridge	Brian	G3ZUL	(03843) 5917	Neath	John	GW4FOI	(0639) 55114/2942
Tandragee	Mervyn	GI3WWY	(0762) 840656	Edinburgh	Jack	GM8GEC	(031665) 2420	Jersey	Geoff	GJ4ICD	(0534) 26788

hy-gain

The TH3jnr is a 3 element triband (10-15-20m) beam whose compact design (longest element 24·2ft, boom 12ft turning radius 14·3ft) makes it ideal where space is the limiting factor. Separate and matched air dielectric Hy-Q traps are used for each band giving a 52ohm fed with a 1·5:1 VSWR at resonance, 8dB Av gain, 25dB F.B. ratio and a power handling of 600W P.E.P. By using a 1¼in boom the antenna presents only 3·4sq ft of surface area (equals 87lb of load at 80mph). The mast to boom clamp accepts 1-1¾in masting and, like all the hardware, is Iridite treated to mil specs.

12AVQ	Vertical 10-20m inc.	**£43.13**	£1.73
14AVQ/WB	Vertical 10-40m inc.	**£58.08**	£1.73
18AVT/WB	Vertical 10-80m inc.	**£90.85**	£1.73
14RMQ	Roof mounting Kit	**£30.48**	£1.73
18V	Vertical 10-80m inc.	**£31.97**	£1.73
18HT	"HY Tower" 10-80m	**O.S.**	
103BA	3 Ele Yagi 10m	**£60.38**	£1.73
105BA	3 Ele Yagi 10m	**£112.70**	£3.16
153BA	3 Ele Yagi 15m	**£74.75**	£2.36
155BA	5 Ele Yagi 15m	**£135.13**	£4.77
203BA	3 Ele Yagi 20m	**£159.85**	£3.97
204BA	4 Ele Yagi 20m	**£217.35**	£5.87
205BA	5 Ele Yagi 20m	**£281.75**	£7.59
402BA	2 Ele Yagi 40m	**£201.25**	£5.23
DB10/15A	3 Ele Yagi 10-15m	**£146.05**	£3.91
TH3JNR	3 Ele Yagi 10-15-20m	**£159.28**	£2.47
TH2MK3	2 Ele Yagi 10-15-20m	**£136.85**	£2.59
TH3MK3	3 Ele Yagi 10-15-20m	**£205.85**	£4.66
TH5DXX	"Thunderbird" 5 Ele	**£228.85**	£5.41
TH6DXX	"Thunderbird" 6 Ele	**£281.75**	£6.97
HYQUAD	2 Ele Quad 10-15-20m	**£240.35**	£4.89
18TD	Dipole Tape 10-80m	**£80.39**	£2.30
BN86	Balun 1:1-3·30MHz	**£15.53**	£1.15
LA1	Lightning Arrestor	**TOS**	£0.75

NB: PRICES INCLUDE VAT AT 15%
Carriage extra, mainland rate shown

SMC

COAXIAL 50 OHM CABLE			
URM95			£0.23
UR43			£0.23
UR76			£0.25
RG58U			£0.25
RG213			£0.55
UR67			£0.60
LDF450	Heliax ½" Foam	p/m	£3.45
COAXIAL 75 OHM CABLE			
307EP			£0.18
UR70			£0.28
UR39			£0.41
UR57			£0.66
BALANCED TWIN CABLE			
302			£0.16
306			£0.17
UHF COAXIAL PLUG			
PL 259	Standard type 11.2mm		£0.55
PL259P	Push-on type 11.2mm		£0.79
UG175	Reducer 5.0mm		£0.14
UG176	Reducer 5.6mm		£0.14
PL259R	Reduced type 5.0mm		£0.67
PL259A	De-luxe type 11.2mm		£1.50
PL259B	De-luxe type 5.0mm		£1.13
PL259SL	'Solderless' 11.2mm		£0.63
PL259SS	'Solderless' 5.0mm		£0.63
PL 259E	Angle type 5.0mm		£0.95
PL259M	Metric type standard		£0.75
PL259PM	Panel mount 4 hole		£1.07
UF COAXIAL SOCKET			
SO239F	Standard 4 hole fix		£0.48
SO239T	2 hole fixing type		£0.48
SO239NI	Nut fix inside type		£0.59
SO239NO	Nut fix outside type		£0.59
SO239E	Free angle type 5.0mm		£1.01
UHF COAXIAL COUPLER			
PL258	Back to back female		£0.91
PL274	Back to back chassis		£1.07
PL258M	Back to back male		£1.38
M359	Elbow male-female		£1.07
M358	'T' 2 female, 1 male		£1.38
M358AF	'T' 3 female		£1.70
M458	'X' 3 female, 1 male		£2.13
UHF CABLES			
PL36PL	3.0" RG58 PL259 ends		£1.85

N.B. PRICES INCLUDE VAT AT 15%
Carriage: Cable £1.50 to 7 kg, plugs £0.50 any quantity

J-BEAM

FOUR METRES				
4Y/4M	Yagi, 4 element	7·0dB	**£22.43**	£1.73
PMH2/4M	Harness, 2 way		**£13.23**	£1.44
TWO METRES				
HO 2M	Halo, head only	3·0dB	**£5.17**	£0.63
HM 2M	Halo, 24in mast	3·0dB	**£5.75**	£0.75
UGP 2M	Ground Plane	0·0dB	**£10.92**	£1.73
C5 2M	Colinear omnivert	4·8dB	**£47.72**	£1.73
5Y 2M	Yagi 5 element	7·8dB	**£12.07**	£0.58
8Y 2M	Yagi 8 element	9·5dB	**£15.52**	£1.73
10Y/2M	Long Yagi, 10 element	11·4dB	**£33.35**	£1.73
14Y/2M	Long Yagi, 14 element	13·0dB	**£36.00**	£1.73
D5/2M	Yagi, 5 over 5 slot	10·6dB	**£21.85**	£1.73
D8 2M	Yagi, 8 over 8 slot	12·3dB	**£29.32**	£1.73
PBM10 2M	10 element parabeam	12·4dB	**£39.67**	£1.73
PBM14 2M	14 element parabeam	13·7dB	**£48.00**	£1.73
Q4 2M	Quad, 4 element	10·0dB	**£25.87**	£1.73
Q6 2M	Quad, 6 element	12·0dB	**£33.92**	£1.73
5XY/2M	Yagi, 5 element cross	7·8dB	**£24.72**	£1.73
8XY/2M	Yagi, 8 element cross	9·5dB	**£31.05**	£1.73
10XY/2M	Yagi, 10 element cross	11·3dB	**£40.82**	£1.73
PMH2 C	Harness, Cir. Polar		**£8.05**	£0.52
PMH2 2M	Harness, 2 way		**£10.92**	£0.86
PMH2 2ML	Harness, 2 way long		**£11.92**	£1.15
PMH4 2M	Harness, 4 way		**£25.00**	£1.73
SEVENTY CMS				
C8/70	Colinear vert.	7·8dB	**£54.05**	£1.73
D8/70	Yagi, 8 over 8 slot	12·3dB	**£22.43**	£1.73
PBM18/70	Parabeam 18 element	14·9dB	**£27.60**	£1.73
PBM24/70	Parabeam 24 element	dB	**£36.80**	£1.73
MBM28/70	Multibeam, 28 element	dB	**£18.40**	£1.73
MBM48/70	Multibeam, 48 element	15·7dB	**£31.05**	£1.73
MBM88/70	Multibeam, 88 element	18·5dB	**£42.55**	£1.73
8XY/70	Yagi, 8 element cross	10·0dB	**£36.80**	£1.73
12XY/70	Yagi, 12 element cross	13·0dB	**£46.00**	£1.73
PMH2/70	Harness 2 way		**£9.20**	£0.75
PMH4/70	Harness 4 way		**£19.55**	£1.44
TWENTY THREE CMS				
D15/23	15 over 15 slot	15·0dB	**£36.80**	£1.73
CR/23	Corner reflector	dB	**£35.08**	£1.73
PMH2/23	Harness 2 way	dB	**£27.60**	£1.73

NB: PRICES INCLUDE VAT AT 15%
Carriage extra, mainland rate shown

Kenpro

KR600RC
£132.25

360° round type meter
Max. load 200kg.
Rot. 600kg/cm, brake
4,000kg/m.
1½in-2½in masts
Lower casting optional.

KR400RC

360° round type meter.
Max. load 200kg.
Rot. 400kg/cm, brake
1,500kg/cm
1½in-2½in masts.
Lower casting optional.

KR500

Elevation Rotator (180°).
Up to 50kg of Load.
1¼in-2¼in mast.
1¼in-1¾in boom.

KR250
£44.85

Twist and switch controller.
Rotator 200kg/cm.
Brake 600kg.
1in-1¼in masts.

NB: PRICES INCLUDE VAT AT 15%
Carriage free (post or road) mainland only

Channel Master

9508

£65·00

Auto control, secondary pointer gives position during travel. Stainless steel hardware. Heaviest duty "offset type". To 5sq

Takes 1-2" masts and 1-2" stub.

9502

£47·35

Automatic control box. Dial direction secondary pointer gives position during travel.

Takes 1-2" mast and 1-1⅞" stub.

Upper mast support bearing.

2" mast and 1¾" stub.

Post and packing **£1.20**
9523 **£14.38**

Rotary bearing 3-way guying.

Takes $1\frac{23}{32}$" mast.

Post and packing. **85p**
9525 **£14.38**

NB: PRICES INCLUDE VAT AT 15%
Carriage free (or as shown) mainland only

CDE

AR40
£65.55

Accurate, silent self-calibrating control box. Dial up desired beam heading, push knob; motor rotates to that position and then switches off.

CD45
£113.85

Large illuminated meter gives read out of antenna heading at all times. Armature brake. Low voltage meter. Handles antennas to 8½sq ft.

HAM IV
£189.75

Large illuminated meter gives read out of antenna heading at, all times. wedge solenoid brake mechanism. Handles antennas to 15sq ft.

T2X
£270.25

Large illuminated meter gives read out of antenna heading at all times. Wedge solenoid brake mechanism. Handles antennas to 30sq ft.

NB: PRICES INCLUDE VAT AT 15%
Carriage free (post or road) mainland only

SOUTH MIDLANDS COMMUNICATIONS LIMITED

BRANCHES: CHESTERFIELD · HUMBERSIDE · STOKE · LEEDS · BUCKLEY

VERSATOWER

TELESCOPIC & TILTOVER RADIO TOWERS 25-120 FT

Below is a photograph of the versatowers chosen for the important approach lights for Manchester Airport. Be sure of quality and reliability by using the original Versatowers achieved through twelve years of continuous development which has produced a range of over 50 models, all of which, being made in England, conform to the current B.S.S., requiring minimum designed wind speeds of 85mph and up to 117mph.

Before purchasing a Tower, we strongly recommend consulting one of our engineers for advice regarding the most suitable combination for an installation. *It would be incorrect to nominate a specific headload as this is dependent upon load distribution, geographical location and siting.*

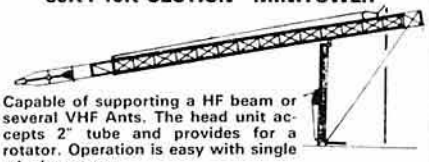
SEND NOW FOR SPECIFICATIONS/PRICES

They cost less than you would expect:

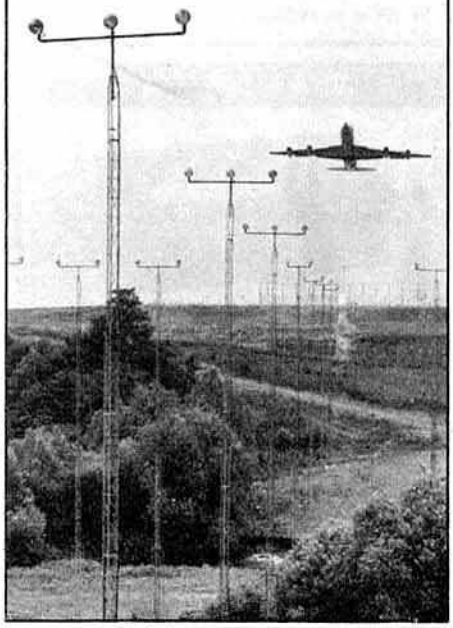
Post mounting 30ft inc. VAT **£388.35**

Post mounting 60ft inc. VAT **£533.83**

'30ft': 10ft SECTION "MINITOWER"



Capable of supporting a HF beam or several VHF Ants. The head unit accepts 2" tube and provides for a rotator. Operation is easy with single winch system.



HANSEN

IN LINE POWER/SWR BRIDGES P.E.P., R.M.S. 1·8–440MHz

The Hansen range covers 30 quality models with top-of-the-line the FS710. This is a flat frequency response, peak envelope power and average in-line wattmeter with many novel features. Most notable being the 'power independent' SWR scale—no forward power calibration knob, just direct reading SWR.

FS710; PEP AUTO-SWR RMS LEVEL

FS710 £78.20

FS710H: 1·8-60MHz. 15, 150, 1·5kW
FS710V: 50-150MHz. 15, 150W
V.S.W.R: 4:1 and to 20:1
Accuracy: ±7% of FSD
Impedance: 50-52 Ohms
Connectors: SO239
Power: 240 Volts AC 50Hz
Weight: 3·lbs (1·5Kgs)
Size overall: 8 × 4 × 5½"
Size Meter: 2 × 3½"
Time Const: PEP follow 4 second

FS500 £60.95

PEAK READING LEVEL RESPONSE
FS500H 1·8 60MHz 20, 200 & 2kW
FS500V 50 150MHz 20 & 200W
Power ±7% FSD. SWR 1:1 5:1
Size: 8 × 4 × 5½"

FS600 £44.85

PEAK READING LEVEL RESPONSE
FS601M 1·8 30MHz 20 & 200W
FS601MH 1·8 30MHz 200 & 2kW
FS602M 50 150MHz 20 & 200W
FS603M 430 440MHz 5 & 20W
Power ±10% FSD. SWR 1:1 3:1
Size: 6¼ × 2¼ × 4¼"

FS300 £40.25

LEVEL RESPONSE, LARGE METER
FS300H 1·8MHz 20, 200 1kW.
FS300V 50 150MHz 20, 200W FSD
Power ±10% SWR 1:1 3:1 ±10%
Size: 8 × 4 × 5½"

FS7 £35.65

VHF/UHF WATTMETER & BRIDGE
FS7 145MHz & 432MHz 5, 20, 200W
Power average ±10%. SWR 1:1-3:1
Power Max: 144MHz, 200W
432MHz 20W
Size: 6¼ × 2¼ × 4¼". 'N' type sockets

FS711 £32.20

REMOTE INDICATOR TYPE
FS711H 1·8-30MHz 20 & 200W
FS711V 50-150MHz 20 & 200W
FS711U 430-440MHz 5 & 20W
Power ±10% SWR 1:1 3:1 ±3%
Indicator 5 × 2¾ × 1½"
coupler 3½ × 2¾ × 1¼"

FS5E £32.20

INDEPENDENT TWIN METER
FS5E 3·5 150MHz 20, 200 & 1kW
Power average ±10%. SWR 1:1-5:1
Power Max: 1kW 3·5 30MHz
50W 50 150MHz
Size: 7 × 3 × 3½". 'On the Air' LED

FS300M £31.05

LEVEL RESPONSE, POWER & SWR
FS301M 1·8 30MHz 20, 200W
FS301MH 1·8 30MHz 200, 2kW
FS302M 50 150MHz 20, 200W
Power ±10%. SWR 1:1 3:1 ±3%
Size: 6¼ × 2¼ × 4¼"

SWR3S £23.00

WIDE RANGE POWER & SWR
SWR3S 3·5 150MHz 20 & 200W
Power average ±10%. SWR 1:1-3:1
Power Max: 200W 3·5 30MHz
50W 50 150MHz
Size: 6 × 2¼ × 2½". Antenna/switch

SWR50B £23

TWIN METER, RELATIVE POWER
SWR50B 3·5 150MHz Scaled 1kW
Power average ±20% SWR 1:1-3:1
Power Max: HF 1kW 1:1, 300W 3:1,
VHF 50W
Size: 6 × 2¼ × 2½". 'On the Air' LED

8 new models in stock. Sae for details

NB· PRICES INCLUDE VAT AT 15%

Carriage free (surface post) worldwide

SMC-HS

HF, VHF, UHF ANTENNAS MOBILE VERTICALS

SMC-HS Mobile Antennas, tabulated below, feature an inbuilt PL259M connector, which mates with the SO239M on any of the four standard mounts. This arrangement is ideal for easy removal —band changes, comparative test, car wash, and anti-vandal, system checks from the feed point, portable operation and for ease of garaging etc. All models have fold over bases (either lift and lay or locking) except the 78B which has an inbuilt ball in case the mount is fitted askew.

Model	Band	Gain	Type	Power	Length	Price
20SE	20m		(½λ)	100W	1·72m	£13.80
15SE	15m		(½λ)	130W	1·72m	£12.65
10SE	10m		(½λ)	100W	1·72m	£12.65
4E	4m	0dB	¼λ	150W	1·03m	£7.48
2H/PL	2m		(½λ)	50W	0·17m	£3.45
2QW	2m	0dB	¼λ	200W	0·49m	£2.30
2VF	2m	3dB	⅝λ	50W	1·06m	£10.35
2NE	2m	3dB	⅝λ	150W	1·30m	£6.33
78SF	2m		(½λ)	100W	1·42m	£11.50
78F	2m	4·5dB	⅝λ	100W	1·75m	£11.50
78B	2m	4·5dB	⅝λ	150W	1·72m	£12.65
88F	2m	5·2dB	¾λ	100W	2·03m	£16.10
70N2M	2/70	2·7dB 5·1dB	(½λ) 2 × ½λ	100w	0·89m	£14.38
258	70cm	5·5dB	2 × ½λ	100W	0.9m	£11.50
358	70cm	6·3dB	3 × ½λ	100W	1·36m	£14.38

Model	Description	Price
SOWM	**Wing Mount.** SO239M upper SO239 under adjustable angle	£3.35
TMCAS	**Boot Mount** c/w 6 mtrs RG58 and PL259 plug	£7.65
GCCA	**Gutter Mount** deluxe cast type c/w 4 mtr cable assembly and PL259	£8.80
SOMM	**Magnetic Mount**c/w 4 mtrs RG58 and PL259 plug. *For use with smaller antennas only*	£8.45

An alternative mounting for any of the two metre antennas listed above is the BSD stainless steel bumper strap at **£7.75** plus the HS88BK extension tube at **£17.65** which raises by 80 cms and decouples the base of the antenna.

Also fitting the bumper mount is the 10 foot, 3 section (quick disconnect and fold over jointed) mobile colinear element which provides about 7dB of gain for **£28.35** (ills. right).

For operation on 2 metres and 70 cms the dual band 70N2M is an elegant solution particularly when combined with the HS770 diplexer which provides 50W power handling, 30dB isolation between transceivers with an insertion loss of only 0·5dB for **£13.80.**

Mainland delivery: accs. £0.65. antennas £1.73

NB: PRICES INCLUDE VAT AT 15%

S. M. HOUSE, OSBORNE ROAD, TOTTON, SOUTHAMPTON, SO4 4DN, ENGLAND
Tel: Totton (0703) 867333, Telex: 477351 SMCOMM G, Telegram: "Aerial" Southampton
See preceding pages for complete addresses and phone numbers

MICROWAVE MODULES LTD

FROM THE HALL OF FAME No. 2

MTV435

Price: £149 inc VAT (p + p £2·50)

435MHz 20 WATT ATV TRANSMITTER
Two channel, two video inputs, internal aerial changeover switching internal waveform test generator

MML144/30-LS

Price: £65 inc VAT (p + p £2·50)

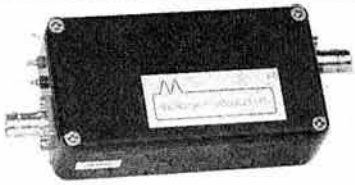
144MHz 30 WATT LINEAR AMP AND RECEIVE PREAMP
Switchable input, 1 or 3 Watts, suitable for use with rigs such as C58, FT290-R, TR2300 etc

MML144/50-S

Price: £85 inc VAT (p + p £2·50)
MML144/100-S pictured above

144MHz 50 WATT LINEAR AMP AND RECEIVE PREAMP
Suitable for 10 Watt transceivers, RF Vox, switchable PA and preamp

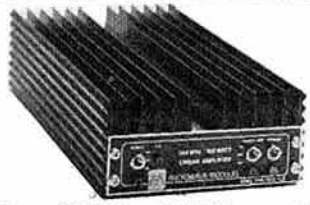
MMC435/600



Price: £27·90 inc VAT (p + p £1)

435MHz ATV RECEIVE CONVERTER SUITABLE FOR UHF TV SETS-CH35
Gain: 25dB Noise figure: 1·9dB
Fully compatible with our MTV435 transmitter

MML144/100-LS



Price: £145 inc VAT (p + p £3)

144MHz 100 WATT LINEAR AMP AND RECEIVE PREAMP
Switchable input, 1 or 3 Watts, suitable for use with rigs such as C58, FT290-R, TR2300 etc

MML144/100-S

Price: £129·95 inc VAT (p + p £3)

144MHz 100 WATT LINEAR AMP AND RECEIVE PREAMP
Suitable for 10 Watt transceivers RF Vox, switchable PA and preamp

MM1000 KB

Price: £89 inc VAT (p + p £3)

MORSE KEYBOARD—
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Mr E. G. Allen, G3DRN, QSL Bureau manager, 30 Bodnant Gardens, London SW20 0UD

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The national society representing all UK radio amateurs

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.

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D. A. Evans, G3OUF

EDITOR
A. W. Hutchinson

RSGB HEADLINE NEWS

Tel 01-837 4118

By telephoning the above number, members can receive up-to-date amateur radio news of immediate interest from a three-minute recording. This is updated on Tuesdays and Fridays, or more frequently as necessary.

RSGB SUNDAY NEWS BROADCASTS

These broadcasts are made every Sunday morning, giving almost complete coverage of the British Isles. Stations broadcasting them (particulars below) use the callsign GB2RS.

The purpose of these news broadcasts is to provide an outlet for amateur radio news items which cannot wait for the next issue of *Rad Com*. Items for inclusion should reach RSGB HQ by letter (marked "GB2RS news") or telephone before 10am on Wednesdays, although no guarantee of inclusion can be given. Once broadcast, items are not usually repeated.

INTENDED RECEPTION AREA	NORMAL READER	RESERVE READER	LOCAL START TIME
Frequency: 3·640MHz. Mode: ssb			
NE Scotland	GM3HGA	GM3VEY	1130
Frequency: 3·650MHz. Mode: ssb			
SE England	G2MI	G4ARZ	0900
Midlands	G2CVV	G8QZ	0930
SW England/Wales	G8ML	G3JFH	1000
Northern Ireland	GI3GAL	GI3SXG	1030
NE England	G5VO	G3MCF	1100
E Scotland	GM4CUZ	GM4FLP	1430
Midlands	G8QZ	G2CVV/G3SZJ	1800
Frequency: 3·660MHz. Mode: ssb			
Central Scotland	GM3TCW	GM3ULP	1130
Frequency: 7·0475MHz. Mode: a.m.			
UK (from Northern Ireland)	GI3GGY	GI2DHB	0900
UK (from N Midlands)	G3LEQ	G2CVV	1100
Frequency: 144·250MHz. Mode: ssb (horizontal polarization)			
N from Carlisle	G4LAA	(Vacancy)	0930
SW from the Midlands	G3BA	G3KQF	0930
NE from S Devon	G3CHN	G3PBV	1000
NW from Manchester	G3SMT	G4IAL	1000
NNW from Cleveland	G4JJB	G8FTZ	1000
W from Carlisle	G4LAA	(Vacancy)	1030
SE from Lincoln	G3NRO	G8OFQ	1030
SW from London	G3FZL/G3VAG	G3IIR	1030
S from Aberdeen	GM8GHV/GM8MBP		1030
W from Bristol	G4CJZ	G3ZWY	1100
W from Bangor, Co Down	GI3TLT	GI3SXG	1130
Frequency: 145·525MHz (S21). Mode: fm (vertical polarization)			
Cornwall	G2ABC	G3NPB/G3VGO	0930
Hampshire, north	G8CKN	G3PZN	0930
Suffolk	G3ZNU	G4FSG/G4FZZ	0930
Leeds	G3SPX	G8XGN	0930
Co Down	GI3WEM	GI4DOR	0930
Edinburgh	GM4EHO	GM4JFS	0930
E Cornwall/S Devon	G3ZYY	G4GWJ/G4KYY	1000
Londonderry	GI2DHB	GI4AHD	1000
London	G3FZL/G3VAG	G3IIR	1000
Birmingham	G3PWJ	G3BA	1000
Lincolnshire	G3NRO	G8OFQ	1000
Tyneside	G4FUT	G3WNR	1000
Glasgow	GM4HCO	GM4CXM/GM3VTB	1000
Elgin	GM4ILS	(Vacancy)	1000
Southampton	G8LVC	G8ADM	1030
E Sussex coast	G8SC	G3ZFE	1030
Bristol	G4CJZ	G3ZWY/G8NNU	1030
Manchester	G3LEQ	G3JWK	1030
Dumfries	GM8TKA	GM3MSG	1100
Brighton and coast	G3ZYE/G8GEZ	G4JGJ/MA	1100
Huntingdon, Cambs	G8BBK	(Vacancy)	1100
Jersey	GJ8KNV	GJ4ICD/GJ4JWA	1100H
Gwynedd	GW8TTM	(Vacancy)	1100
Clwyd/Merseyside	GW4IEQ	G8NNS	1100
Exeter	G3PBV	(Vacancy)	1130
Leicester	G4JYS	G4MFU	1130
Scarborough	G8XTL	G4EEV	1130

H = horizontal polarization

QTC
Amateur radio news

Radio Communication lead-time
The editor has been advised that several members were informed by "an RSGB representative on the stand" at the Alexandra Palace exhibition this year that the "normal lead-time" for material to be published in *Radio Communication* is three months.

This information is so wildly inaccurate that it is necessary to advise those and other members—in addition to the unidentified source—what the true lead-time is. Apart from technical articles, which are subject to technical vetting and reference back to authors, the normal lead-time for all other editorial content is five weeks, and can be as short as three weeks for last minute news items—from receipt of items to despatch of copies. It is obvious therefore that even items which miss the final deadline and are published in the following issue have a maximum lead-time of seven weeks —still only half the time quoted at AP.

"The ferrite-cored balun transformer"
Mr R. G. Titterington, G3ORY, the author of this article published in *Rad Com* March 1982, reports that he has received a great many enquiries about a source of supply of Mullard FX1588 cores. The long-term future of these most useful components is not assured, and he advises anyone with a requirement for them to purchase them without delay.

Havant Electronics Ltd, Firswood Road, Garretts Green, Birmingham B33 0TQ, tel 021-784 2485, will supply four FX1588 cores for £5.75, incl p&p and VAT, on a cash-with-order basis.

"A power fet amplifier for 144MHz"
Mr G. R. Jessop, G6JP, the author of this article published in *Rad Com* May 1982, advises that the Siliconix device DV1007 specified has now been superseded by another device equally suitable, the DV2840S.

Stolen equipment
Between Chatham and Dublin, KW TenTec Delta transceiver, serial No 2415. Information in full confidence to Rowley Shears, md, KW Communications Ltd, tel 0634 815173. A reward is offered for information leading to the recovery of this unit.

On 17/18 May from a car in a locked garage in Little Hulton, Manchester: Kenwood/Trio 7500, serial No 662166, and 7λ/8 antenna engraved G8MLF. Information to G8MLF or pc Willen, Little Hulton Police Station; tel 061-736 5877.

Aberdeen ARS presents the 1982

SCOTTISH AMATEUR RADIO CONVENTION

and

Zone G conference (11am–12.30pm)

at Nat Phil Dept, Aberdeen University

St Machar Drive, Aberdeen

Talk-in: R7, S22, SU20, 3·65MHz

10am to 5pm, 11 September 1982

- **Trade stands**
- **RSGB bookstall and id cards (bring licences)**
- **Bring and buy (only 10% commission on sales. Max comm £5)**
- **Raffle with first prize of 14in portable colour tv**
- **Lectures by Prof R. V. Jones; M. C. Hately, GM3HAT; J. Nelson, G4FRX; and Moray Firth Amateur TV Group**

Luncheons, snacks and licensed bar

Reduced hotel rates available

Admission £1.50 at door (or in advance and receive programme details and routes)

A dinner will be held in the Stakis Royal Darroch Hotel, Cults, at 7.30pm. Tickets at £6 per person, must be purchased before 6 September.

Tickets and enquiries apply: Findlay Baxter, GM3VEY, 24 Hillview Crescent, Cults, Aberdeen AB1 9RT (Tel 0224 868263)

On 13 May from a car in Manor Park, London: Trio TR9000, serial No 0121921, without reverse repeater switch but with normal repeater operation and automatic toneburst selected by CALL button. Information to G8WBU, tel 01-588 5495 (office hours) or Forest Gate, London E7, police station, reference MV1090.

On 5 May in Ellesmere Port: Icom IC255E, serial, No 10201594. Information to GW3WEQ or Ellesmere Port police, pc 977, tel 051-355 4066.

On 4 June from a car in Gravesend: IC245E, serial No 7106414. Information to Gravesend CID, tel 0474 64346, or G3KZN 0474 55736.

On 12 June from a car in Northampton: Trio TR2200G, serial No 310369, and VB2200 10W amplifier. Information to 09334 55645 or Northampton police.

Proposed emergency listening watch
Members of the London Raynet groups are considering the organization of a listening watch on one named channel on 144MHz in case an amateur needs help in the London area. Anyone interested in this project (whether a Raynet member or not) is invited to contact G8SUS, QTHR.

OBITUARIES

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

Mr S. Allan, GW8TR
Stan Allan died on 30 April. He had held his licence since the mid-'thirties, and had been a member of Torbay ARS for many years. He was a regular member of the Torbay 3·5MHz morning net, and had remained active until shortly before his death.

Mr C. T. Bown, G3EHR
Mr Bown died on 28 April. He took an active part in the MIRA RC until his retirement, and in later years his main interest lay in cw operating.

Mr H. J. M. Box, G6BQ
Jack Box, one of the outstanding personalities of amateur radio, died on 16 May, only a few months after he had retired. He was particularly well-known on top band and had won the top band contest on a number of occasions. Exclusively a cw operator, he had more than once been instrumental in the winning of NFD on behalf of the Gravesend RS.

Mr C. N. H. Brown, GW5YI
Cyril Brown died on 20 April, aged 71. He had been licensed in 1934, and had contacts all over the world, including his brother Ronnie, VK4NSY, with whom he spoke daily. He was well-known through his use of the Arfon repeater.

Mr C. L. Hubbard, G3CSZ
Mr Hubbard died on 28 November, aged 63. He had been an enthusiastic operator and was a member of Wirral ARS.

Mr L. W. Kenyon, G4ITU, 9H1FZ
Leonard Kenyon died on 5 May, only days after returning to this country from Malta.

Mr W. A. Martin, G3FVG
Bill Martin died in April. He served as chairman of Clifton ARS for many years, having been a member from its earliest days. Well known in south London during the heyday of top band he later transferred his activities to 144MHz. When illness restricted his mobility, he continued operating with an hf rig at his bedside and had recently joined RAIBC.

Mr T. Murgatroyd, G3AYK
Trevor Murgatroyd died on 18 June 1981. He was a member of the now disbanded Leeds RS.

Mr D. Pierce, G8AAJ
David Pierce died in January. His contacts with other amateurs gave him great pleasure.

Also:
Mr N. Ashton, GW3DQU;
Mr R. J. E. Bladon, RS32723, on 11 April;
Dr J. M. Brown, G4CUU;
Mr H. Chapman, RS13573;
Mr R. C. Davies, RS17109, on 10 April;
Rev G. H. Gilmour, GM3OTG, on 27 April;
Mr L. M. Lyske, GI3CDF, on 25 February;
Mr T. L. Nally, RS39131, on 23 April;
Mr H. Sauer, OE3HSW, on 13 October 1981;
Mr T. Short, ZE1AN, on 20 April;
Mr J. C. Tyler, G4HYA, on 19 July 1981; and
Mr C. D. Webber, G3RFW, on 12 April.

RSGB NATIONAL MOBILE RALLY

Woburn Abbey, Bedfordshire

(Coach Park Site)

Sunday 1 August 1982

From 10am

- **Large trade exhibition**
- **RSGB bookstall and enquiries stand**
- **Bring-and-buy stand**
- **Raynet stand**
  (All under cover)
- **BARTG stand**

Bring-and-buy this year will be charged at **£2 per hour per table**, which will enable members to sell direct. Tables will be offered on a first-come first-served basis.

The RSGB makes no charge for entrance to the rally but all visitors must pay for entrance to Woburn Park, in which the rally takes place, at **£1.50 per car including passengers.**

All the normal Woburn attractions will be available at small extra charges. Various bars and cafés are available nearby.

HOW TO GET THERE

Via the M1—Leave the M1 from north or south at intersection 13, **not 12 as signposted.** After leaving the motorway follow signposts through Husborne Crawley to Woburn Abbey.
From the south via the A5—Turn right at Hockliffe and follow the A50 to Woburn.
From the north via the A5—Turn left at A418, five miles south of Fenny Stratford, and follow to Woburn.
From other directions make for the points indicated above and proceed as indicated.

Avoid routes signposted to "The Wild Animal Kingdom" or "Game Reserve". The rally takes place in Woburn Park and correct routes are signposted to "Woburn Park" or "The Abbey". Also watch for RSGB signs.

Usual talk-in facilities will be in operation by Dunstable Downs RC on 1·8, 70, 144 and 432MHz.

All enquiries regarding this event should be made to Norman Miller, G3MVV, "Avon", Gardiners Lane North, Crays Hill, Billericay, Essex.

RSGB QSL BUREAU SUB-MANAGERS

(At 1 June 1982)

G2 calls	C. H. Adams, RS10906, 4 Park Gate Gardens, East Sheen, London SW14 8BQ.
G3AA-ZZ **G4AA-ZZ** **G5 calls**	Mrs C. Pope, G4CMM, 136 Ridgeway Drive, Bromley, Kent BR1 5DD.
G6AA-ZZ **G8AA-ZZ**	F. J. T. Harris, G4IEY, 4 Merestones Drive, The Park, Cheltenham, Glos GL50 2SS.
G3AA-DZZ	C. A. Bradbury, BRS1066, 13 Salisbury Avenue, Cheltenham, Glos GL51 5BT.
G3EAA-HZZ	S. L. Newport, G4DEV, 101 Elibank Road, Eltham, London SE9 1QJ.
G3IAA-KZZ	P. Lumb, G3IRM, 14 Linton Gardens, Bury St Edmunds, Suffolk IP33 2DZ.
G3LAA-NZZ	J. G. Holland, G3GHS, 26 Grand Avenue, Berrylands, Surbiton, Surrey KT5 9HU.
G3OAA-PZZ	J. H. Brazzill, G3WP, 43 Forest Drive, Chelmsford, Essex CM1 2TT.
G3RAA-TZZ	Mrs C. Pope, G4CMM, 136 Ridgeway Drive, Bromley, Kent BR1 5DD.
G3UAA-VZZ	M. J. Newton, G3UKW, 11 Chestnut Close, Rushmere St Andrew, Ipswich IP5 7ED.
G3WAA-XZZ	F. G. Rylands, G2VF, 39 Parkside Avenue, Millbrook, Southampton, Hants SO1 9AF.
G3YAA-ZZZ	I. Batley, G8TKU, 3 Folidon Avenue, Fulwell, Sunderland, Tyne & Wear SR6 9HP.
G4AAA-AZZ	C. Johnson, BRS31379, 118 Harvest Road, Smethwick, Warley, West Midlands B67 6NG.
G4BAA-BZZ	R. F. Rawlings, G3WBV, 74 The Lindens, Fieldway, New Addington, Surrey CR0 9EL.
G4CAA-CZZ	P. Jobson, G3HLF, 41 The Avenue, Gravesend, Kent DA11 0NA.
G4DAA-DZZ	D. Buckley, G3VLX, 16 Wood Ride, Petts Wood, Orpington, Kent BR5 1PX.
G4EAA-EZZ	P. C. Barry, G8OPA, 32 Rutland Avenue, Sidcup, Kent DA15 9DZ.
G4FAA-FZZ	Mrs A. R. Burchmore, G8LXK, 49 School Lane, Horton Kirby, Dartford, Kent DA4 9DQ.
G4GAA-GZZ	L. Craven, G4EQI, "Grass Moor", Radford Road, Alvechurch, Birmingham B48 7DT.
G4HAA-HZZ	Mrs J. Brakespear, G8RZO, The Chequers Stores, Eastchurch Road, Minster, Sheppey, Kent.
G4IAA-IZZ	C. J. Webb, G4JFF, 153 Apsley Road, Oldbury, Warley, West Midlands B68 0QT.
G4JAA-JZZ	K. Baker, G3WTV, 33 Ashdown Drive, Borehamwood, Herts WD6 4NA.
G4KAA-KZZ	K. Draycott, G3UQT, 175 Oliver Road, Kirk Hallam, Ilkeston, Derbyshire DE7 4JW.
G4LAA-LZZ	C. Lennox, G4LXU, 65 Westover Road, Bramley, Leeds 13, West Yorks.
G4MAA-MZZ	Mrs Gwen Thomas, G4JYL, 36 Chelwood Crescent, Leeds LS8 2AQ, West Yorks.
G4NAA-NZZ	John Brakespear, G8RZP, The Chequers Stores, Eastchurch Road, Minster, Sheppey, Kent.
G4OAA-OZZ	Mrs J. F. Rhodes, G8LRT, Wesley Mount, Spring Bank, New Mills, Stockport SK12 4BH.
G6AAA-ZZZ	Mr and Mrs D. R. Brooks, G4IAQ/G4IAR, 28 Avon Vale Road, Loughborough, Leics LE11 2AA.
G8AAA-CZZ	F. J. T. Harris, G4IEY, 4 Merestones Drive, The Park, Cheltenham GL50 2SS.
G8DAA-OZZ	T. Batley, G8TKU, 3 Folldon Avenue, Fulwell, Sunderland, Tyne & Wear SR6 9HP.
G8PAA-RZZ	Mrs C. Pope, G4CMM, 136 Ridgeway Drive, Bromley, Kent BR1 5DD.
G8SAA-SZZ	K. Baker, G3WTV, 33 Ashdown Drive, Borehamwood, Herts WD6 4NA.
G8TAA-TZZ	K. Draycott, G3UQT, 175 Oliver Road, Kirk Hallam, Ilkeston, Derbyshire DE7 4JW.
G8UAA-ZZZ	C. Lennox, G4LXU, 65 Westover Road, Bramley, Leeds LS13 3PB.
GB calls	C. Turner, G8NL, 56 Sunny Bower, Tottington, Bury, Lancs BL8 3HL.
GD calls	W. P. Waid, GD3GQX, 1 Mount William, Summer Hill, Douglas, Isle of Man.
GI calls	R. P. Parsons, GI3HXV, 45 Erinvale Avenue, Belfast BT10 0FP.
GJ calls	H. J. Chater, GJ2LU, 106 Rouge Baulion, St Helier, Jersey, CI.
GM 2-letter calls **GM4AAA-ZZZ** **GM5AAA-ZZZ** **GM6AAA-ZZZ** **GM8AAA-ZZZ**	D. R. Macadie, GM6MD, 11 Marchmont Road, Ayr KA7 2SB.
GM3AAA-ZZZ	J. Johnston, GM3LYY, "The Dolphins", Montgomerie Drive, Fairlie, Ayrshire.
GU calls	W. E. Butt, GU2FZC, "Meo Voto", Green Lanes, St Peter Port, Guernsey, CI.
GW2, 3, 4, 5	J. Reid, GW3ANU, 28 Waterson Road, Gabalfa, Cardiff CF4 2SS.
GW6 and 8	J. Lewis, GW8UZL, 14 Gareg Y Gad, Llanfair PG, Anglesey LL61 5QF.

EQUIPMENT REVIEW

The Trio TS830S hf transceiver

by P. J. HART, BSc, G3SJX*

Introduction

Both Yaesu and Trio, the main Japanese manufacturers of amateur hf transceivers, market a range of transceivers to suit all needs. Four up-to-date models currently comprise the Trio range. The TS130, available in 10W or 100W versions, is a small fully solidstate 12V transceiver ideally suited for mobile and portable use. The TS530S and TS830S are largely intended for mains-operated home-station use, and incorporate valve driver and pa stages. The TS830S is the big brother of the pair, offering a highly versatile system of i.f. selectivity. The TS530S is the economy version, not incorporating variable bandwidth tuning or i.f. notch, but virtually identical in other respects. The recently introduced TS930S is the current top-of-the-range state-of-the-art model, providing general coverage receiver as well as amateur band operation, multiple memories, versatile i.f. selectivity system and a host of other features.

Matching accessories are available for all models in the Trio range. For the TS830S these include remote vfo, antenna tuner, external speaker and station monitor. Fitted optional extras include 12V dc inverter unit for mobile operation, and 500Hz or 270Hz bandwidth cw filters.

The item obtained for review comprised a standard TS830S without extra filters or 12V dc inverter supply.

Principal features

This transceiver provides for ssb and cw operation on the nine current and future hf allocations from 1·8 to 30MHz. Each tuning range is 500kHz, and 28–30MHz is covered in four bands. Both analogue and digital readout are provided as standard, and a mains psu is built-in. Principal features include rit operating on receive or transmit, speech processor, noise blanker, two agc time constants plus off, transmission monitor and tone control. A versatile i.f. system allows for variable control of bandwidth from 500Hz to 2·4kHz, adjustment of centre frequency through the i.f. shift control, and a controllable notch filter. On transmit the valve driver and pa deliver a nominal 100W output, and comprehensive metering of anode current, rf output, alc, ht voltage and compression level is available. Facilities are provided for cw and ssb vox. No provision is made for operation on a.m. or fm for either transmit or receive.

The rear panel includes the following connectors: antenna socket, key jack, wideband and narrowband i.f. outlets for spectrum analyser and signal monitoring, external vfo, transverter control which also incorporates external receiver antenna, antenna output to an external receiver and low level rf output, and a general-purpose accessory connector providing linear switching, alc, receiver af output etc. A cooling fan is provided as standard.

*42 Gravel Hill, Addington, Croydon, Surrey.

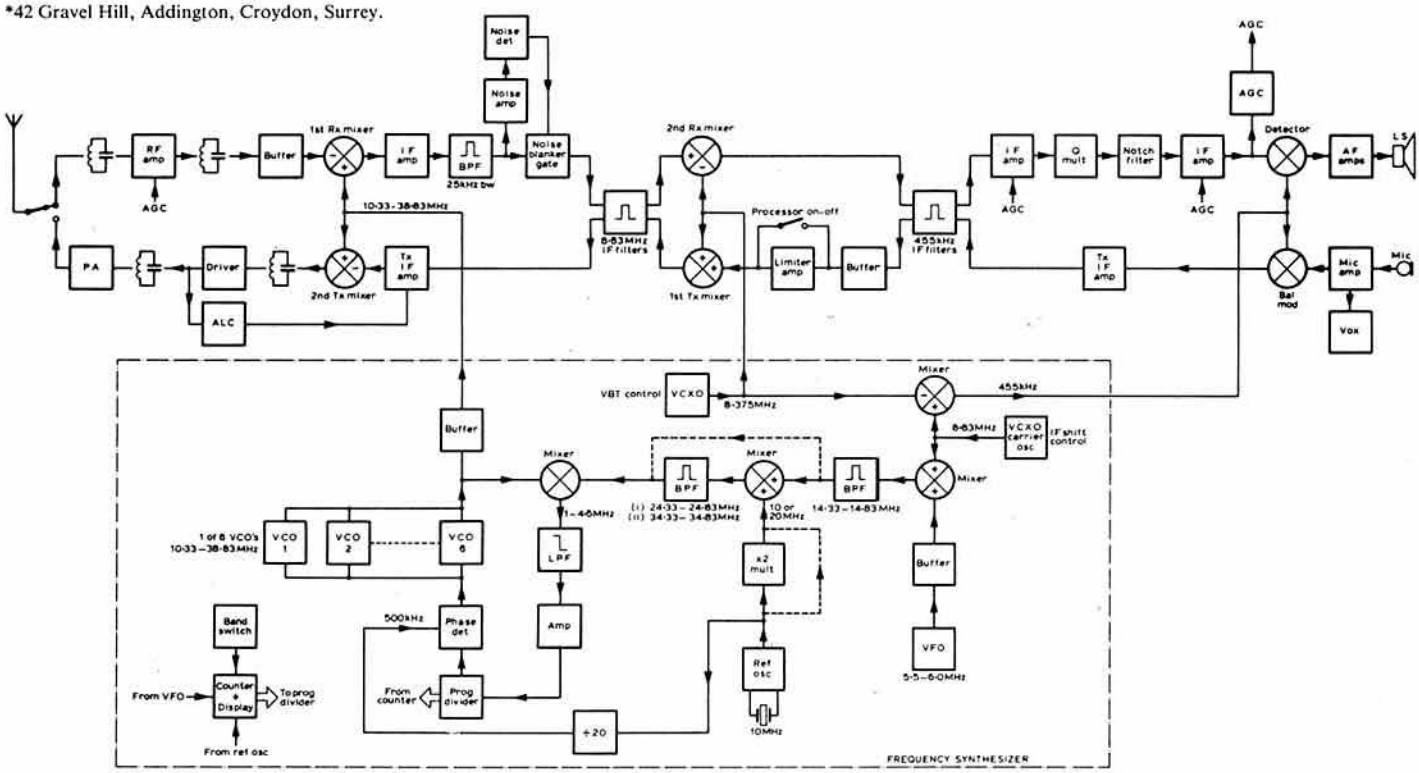


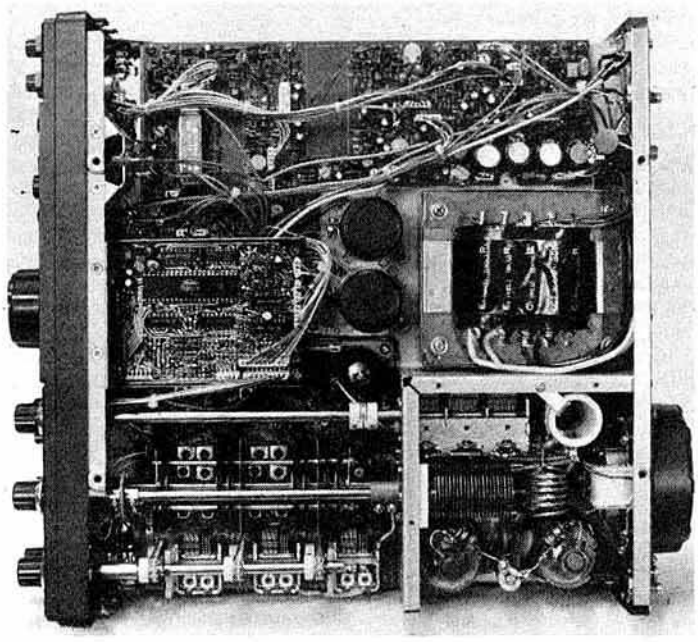
Fig 1. Simplified block diagram of the TS830S

Description

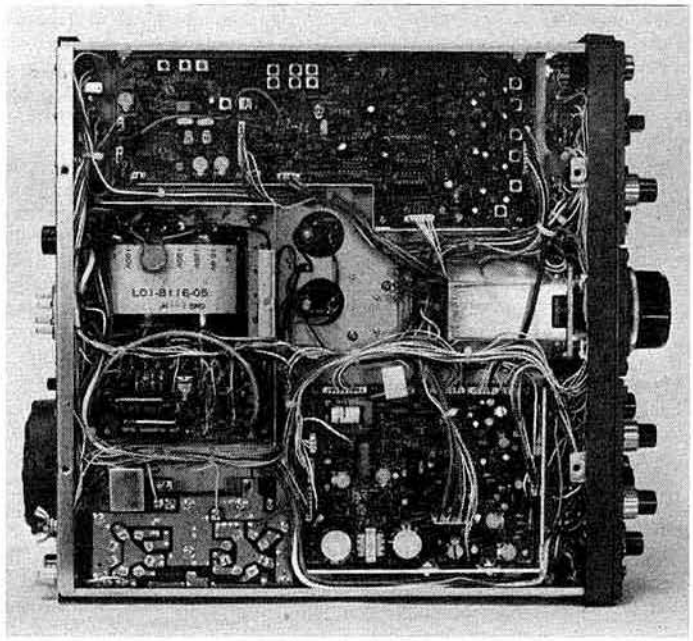
This transceiver is remarkably similar in construction and layout to the Yaesu FT101Z series previously reviewed [2]. A steel chassis forms the backbone, with steel front and rear panels and a substantial diecast aluminium front over-panel.The majority of the circuitry is constructed on four main circuit boards with four subsidiary boards and a solidly-constructed vfo box. Board interconnections are via miniature plug and socket flying leads. The transceiver measures 33·3 (w) by 13·3 (h) by 33·3cm (d) and weighs 13·5kg. This is a little smaller and lighter than the Yaesu transceiver. All the operating controls are mounted on the front panel, and a 7·5cm diameter speaker is mounted in the top of the case. Miniature controls are used throughout, with a number of dual-purpose concentric rotary controls to conserve space. The tuning rate is 25kHz per revolution of the 50mm diameter knob. Frequency readout to 100Hz is provided by a blue fluorescent display which is particularly bright and easy to read under conditions of high ambient light level. Red rectangular l.e.ds indicate the selection of certain functions.

A simplified version of the block diagram is shown in Fig 1. The transceiver is dual conversion with intermediate frequencies of 8·83MHz and 455kHz. On receive, incoming signals are amplified in a dual-gate mosfet agc-controlled rf amplifier and pass to the first mixer via a single-gate junction fet source follower. Preselector tuned circuits are positioned at the input and the output of the rf amplifier. The mixer comprises a push-pull pair of junction fets, and is followed by a grounded-gate i.f. amplifier at 8·83MHz. A 25kHz bandwidth ceramic filter then follows with the noise-blanking circuitry. The signal then passes through the main 8·83MHz i.f. block filter and into the second mixer. This mixer comprises a push-pull pair of mosfets and is followed by the second i.f. block filter at 455kHz. The main i.f. amplification is achieved at 455kHz and a high-Q notch filter is also provided. A diode-ring product detector and integrated af amplifier complete the signal path on receive.

Two i.f. filter blocks with similar bandwidth and skirt response are used. This has several consequences. First, two cascaded high-performance filters give a very high stopband attenuation. Second, if the frequency of the second conversion oscillator is shifted, the passband of one filter will move relative to the other, resulting in a narrowing of the overall bandwidth. In order to prevent a change in pitch of the incoming signal and to maintain a constant centre frequency for the overall passband, it is necessary to shift the frequency of the detector heterodyning oscillator by an equal amount. This describes the function of the vbt control. Third, if the frequency of the detector heterodyning oscillator is shifted, the demodulated i.f. centre frequency will shift, leaving the overall bandwidth unaltered. Again, in order to prevent a change in pitch of the incoming signal, it is necessary to change the frequency of another conversion oscillator by an equal amount. This time it is the first-conversion oscillator controlled from the vfo. This describes the function of the i.f. shift control.



Top view of the TS830S with cover removed

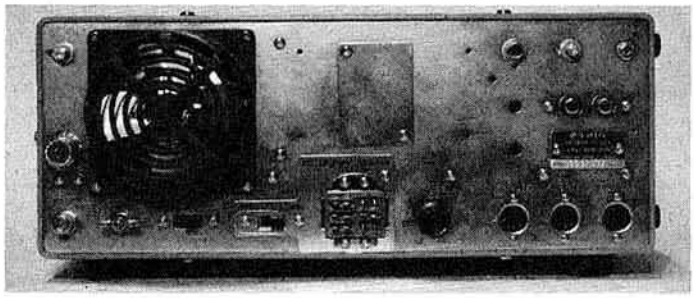


Bottom view of the TS830S with cover removed

Although the vbt control may be used to narrow the passband down to 500Hz, the skirt roll-off response will still be determined by each individual i.f. filter. For serious cw operation it is preferable to fit a narrow cw filter in the 8·83MHz i.f. amplifier, and either 270Hz or 500Hz bandwidth filters are available. This gives the advantage of narrower skirt selectivity. Matching narrow bandwidth filters are also available for the 455kHz i.f., and the incorporation of both i.f. filters allows full-performance variable-bandwidth facilities down to a bandwidth of 150Hz. However, most owners will probably settle for the hf filter only, as the 455kHz cw filter costs a staggering £61.

On transmit, dsb is generated at 455kHz in a diode-ring balanced modulator and passed through the 455kHz i.f. filter. The resulting ssb signal is converted up to 8·83MHz in a single dual-gate mosfet and passed through the 8·83MHz i.f. filter. With the speech processor in operation, the 455kHz ssb signal is further amplified and limited before conversion to 8·83MHz. After further amplification the 8·83MHz signal is converted to final frequency in a push-pull mosfet mixer. Amplification at signal frequency is achieved using valves, a 12BY7A driver and two parallel 6146B pa valves. Negative feedback is applied to the pa to improve linearity. Selectivity at signal frequency is achieved by resonant circuits at the input and output of the driver, tuned by the preselector control, and also the pi-tank pa output circuit.

The frequency generating section, loosely termed the frequency synthesizer, provides oscillator injection for the first and second mixers, product detector and balanced modulator. The 8·375MHz second receiver and first transmitter mixer injection is derived from a vcxo which also functions as the vbt control. The 455kHz injection is derived from mixing the 8·375MHz vcxo with an 8·83MHz vcxo, this second vcxo providing the functions of the i.f. shift control. Local oscillator injection for the signal frequency mixers is required in discrete 500kHz bands, 8·83MHz above the frequency to which the transceiver is tuned. Six separate vcos are used to



Rear view of the TS830S

cover this frequency range of 10·33–38·33MHz, operating in a phase-locked loop. The reference frequency of 500kHz for the loop is derived from a 10MHz crystal oscillator. The output of the selected vco is mixed down to a frequency in the range 1–4·5MHz, driving a programmable divider giving an output frequency of 500kHz to feed the phase detector. This divider provides division ratios in the range 2 to 9 as determined by the band switch. The heterodyning signal for the vco mixer is derived from three oscillators–the vfo tuning 5·5–6·0MHz, the 8·83MHz vcxo and the 10 or 20MHz reference oscillator. The order in which these oscillators are mixed together is determined by the band selected. On 1·8, 3·5, 7 and 10MHz this heterodyning signal tunes 14·33–14·83MHz; on 14 and 18MHz, 24·33–24·83MHz; and on 24 and 28MHz, 34·33–34·83MHz. Operation of this section of the circuit is described in greater detail in the service manual.

Measurement technique

The measurement technique adopted was substantially the same as that used for measurements on the IC720A and FT101ZD described in [1] and [2]. All signal input voltages are given as pd across the antenna terminal. A single Hewlett Packard 8640B generator was used to evaluate sensitivity-based measurements and spurious responses. Two hybrid coupled 8640B signal generators were used to evaluate signal handling properties.

Unless stated otherwise, all measurements were made on ssb with the audio gain set to give about 100mW af output, vbt set to normal and i.f. shift and tone control set to the centre position.

Receiver measurements

Sensitivity

The results of sensitivity measurements on ssb are shown in Table 1. These are given for a 10dB signal plus noise-to-noise ratio. The receiver exhibits a noise floor around −135 to −136dBm in ssb bandwidths, which represents a noise figure of about 5 to 6dB. This is very sensitive for an hf receiver but is fairly typical of modern equipment.

The attenuation provided by the input attenuator was measured as 18·8dB at 28MHz, and 20·0dB at 1·8MHz.

Table 1. Receiver measurements

Frequency	Sensitivity on ssb for 10dB s+n:n	Input for S9
1·8MHz	0·11μV (−126dBm)	50μV
3·5MHz	0·12μV (−125dBm)	70μV
7MHz	0·12μV (−125dBm)	75μV
10MHz	0·14μV (−124dBm)	100μV
14MHz	0·11μV (−126dBm)	55μV
18MHz	0·11μV (−126dBm)	55μV
21MHz	0·1μV (−127dBm)	55μV
24MHz	0·1μV (−127dBm)	45μV
28MHz	0·13μV (−125dBm)	70μV

S-meter calibration

Table 1 shows the input signal level required to give a reading of S9. At 14MHz the S-meter calibration was:

S-reading	Input signal	Relative increase
S1	1·8μV	
		2dB
S3	2·2μV	
		4·5dB
S5	3·7μV	
		9·5dB
S7	11μV	
		14dB
S9	56μV	
		10·5dB
S9+10	190μV	
		9dB
S9+20	530μV	
		11dB
S9+30	1·9mV	
		9·5dB
S9+40	5·6mV	

An enormous variation exists in the S-meter calibration of different receivers. Many receiver S-meters indicate S9 for well under 10μV which is rather optimistic. The S-meter calibration of the TS830S is probably nearer the truth, and the linearity and accuracy above S9 are excellent.

Spurious responses

Table 2 shows the 8·83MHz i.f. rejection and the primary image rejection. The image frequency occurs 17·66MHz above the frequency to which the receiver is tuned. These levels were measured by setting the signal generator to give the required spurious response at a level giving 10dB s+n:n ratio and relating this level to an on-tune signal of 10dB s+n:n ratio (the sensitivity result). There was no detectable response on any band at the 455kHz i.f..

Table 2. Receiver measurements

Frequency	Image rejection	8·83MHz i.f. rejection
1·8MHz	86dB	101dB
3·5MHz	80dB	98dB
7MHz	78dB	100dB
10MHz	69dB	100dB
14MHz	66dB	100dB
18MHz	63dB	100dB
21MHz	63dB	101dB
24MHz	63dB	102dB
28MHz	60dB	96dB

To check for internally-generated spurious signals, the antenna socket was terminated in 50Ω and the receiver carefully tuned across each band in turn. Seven weak spurii were noted, none strong enough to move the S-meter. Five were located between 28 and 30MHz and all occurred at either 0 or 337kHz above the bottom of the band.

Other spurious responses were checked by setting the signal generator on either side of the on-tune frequency and noting the amplitude for any responses obtained corresponding to an S1 meter reading. The generator was tuned from 100kHz off frequency down to 1MHz (ignoring generator harmonics) and from 100kHz off frequency up to vhf (ignoring i.f. and image responses).

Frequency	Worst response	Other responses
1·8MHz	80mV	Five up to 250mV
3·5MHz	110mV	Four up to 250mV
7MHz	56mV	Three up to 250mV
10MHz	45mV	Three up to 250mV
14MHz	22mV	Nine up to 250mV
18MHz	7mV	Six up to 250mV
21MHz	20mV	Several around 100mV
24MHz	32mV	Several around 100mV
28MHz	40mV	Several around 100mV

AGC performance

The agc threshold was found by slowly increasing the input signal until the af output ceased to rise linearly with the rf input. This occurred at around 2·2μV at 7MHz and 2·5μV at 28MHz. A further 100dB increase in signal resulted in a 1dB increase in audio output. The attack time for a 20dB increase in a 100μV signal was measured as about 10ms and the decay times for a 20dB decrease in a 1mV signal was measured as 1s in the slow position or 150ms in the fast position.

Signal handling

Blocking was evaluated at 28MHz with an on-tune signal at a level of 500μV. A second generator was introduced 50kHz off frequency and its level increased until the S-meter just started to decrease. This occurred at a level of around 50mV. Repeating the measurement with a frequency offset of 100kHz gave a similar result.

Third-order intermodulation was evaluated at 7 and 28MHz. The two generators were set 20 and 40kHz away, respectively, from the frequency to which the receiver was tuned, and the levels increased equally until a third-order intermodulation product was generated in the receiver passband at a level giving an s+n:n ratio of 10dB. This occurred when each generator was set to give a signal input to the receiver of −42dBm (1·8mV) on 7MHz, or −41dBm (2·0mV) on 28MHz. This corresponds to a third-order intercept of 0dBm (see [1]). Referencing the above measurements to the noise floor of the receiver gives a spurious-free dynamic range of approximately 90dB in a 2·4kHz bandwidth. Reducing the rf gain control did not affect the intermodulation performance; neither did the noise blanker except with the nb level control advanced to the top two divisions, when the intermodulation performance was noticeably degraded.

Cross-modulation and reciprocal mixing measurements were not performed. However, while performing measurements on selectivity, the impression was gained that the oscillator sideband noise was relatively low.

It is often found when comparing receivers of apparently similar sensitivity, selectivity and signal handling properties that one particular receiver stands out above the rest in its ability to resolve weak cw signals among a welter of stronger inband signals. This is invariably due to two reasons: oscillator sideband noise (reciprocal mixing)—a difficult parameter to measure and compare—and overall inband linearity. In order to assess inband linearity, a third-order intermodulation measurement was made with signal spacings of 200Hz, centring the composite signal in the i.f. passband and viewing the resulting audio output on a spectrum analyser. Any third-order intermodulation products generated will appear 200Hz on either side of the two test signals and within the passband of the

i.f. amplifier. With the amplitude of the input signals in the range 5μV to 1mV, the amplitude of the intermodulation products generated was at a constant level of −40dB with respect to the amplitude of either wanted signal. Below 5μV, the intermodulation products disappeared into the noise. With two input signals of 5mV each, the intermodulation products were −30dB, and with two input signals of 20mV each, the intermodulation products were −20dB. Calculations show that these products are generated in the i.f. amplifier and not in the front-end. Reducing the rf gain control reduced the level of the intermodulation products by up to 10dB.

Audio power output and distortion

The maximum audio power output into an 8Ω load was measured as 1·7W before the onset of clipping. At 1·5W output power, the distortion was about one per cent. Maximum audio output could be achieved with 0·7μV input signal.

Selectivity

The i.f. selectivity was measured by tuning a signal generator across the receiver passband and noting the level required to give an S-meter reading of S1. It was found possible to measure about 75–80dB down the skirts of the filter before local oscillator noise, generator noise and signal overloading problems became apparent. This figure would suggest that the local oscillator noise sidebands were relatively low. The results for the vbt control set to minimum selectivity (normal) and maximum selectivity (narrow) were:

Response	Bandwidth vbt normal	Bandwidth vbt narrow
−3dB	2·0kHz	300Hz
−6dB	2·4kHz	430Hz
−10dB	2·7kHz	620Hz
−20dB	2·9kHz	950Hz
−40dB	3·3kHz	1,480Hz
−60dB	3·6kHz	2,070Hz
−70dB	3·8kHz	2,410Hz

The ripple in the passband was about 1·5dB in the normal position, and the skirt response was reasonably symmetrical.

The notch filter depth was measured as 35dB.

Transmitter measurements

CW power output

The handbook warns against tune-up periods in excess of 10s. This warning should be heeded, as excessive tune-up periods or transmissions at full power resulted in a 20 per cent reduction in power output and distortion on ssb. This condition reverted to normal after a short period on receive. The pa neutralization was far from ideal on the higher frequency bands, and there was no correlation whatsoever between anode current dip and rf output power on 21 or 28MHz. Re-adjustment of the neutralizing would probably have improved matters. Following the tuning procedure laid down in the handbook and tuning for maximum rf output power, the following results were obtained on cw:

Band	Power output	Anode current	DC input power	PA efficiency
1·8MHz	120W	255mA	200W	60 per cent
3·5MHz	110W	235mA	185W	59 per cent
7MHz	110W	240mA	190W	58 per cent
10MHz	115W	245mA	195W	59 per cent
14MHz	120W	255mA	200W	60 per cent
18MHz	115W	245mA	195W	59 per cent
21MHz	120W	255mA	200W	60 per cent
24MHz	115W	245mA	195W	59 per cent
28MHz	105W	245mA	195W	54 per cent

The carrier control may be used to set the power output to 100W (20dBW) on 3·5 to 28MHz, or 8W (9dBW) on 1·8MHz. The ht voltage indicated on the meter was 880V with the key up, or 790V with the key down. This figure depends on the precise value of the mains voltage. Note that with the key up, −65V appears across the key contacts.

Harmonics and spurious outputs

Harmonics and other spurious outputs were measured on cw at full power output.

Band	Harmonics	Other spurii
1·8MHz	−45dB	Less than −80dB
3·5MHz	−45dB	One each −75dB, −85dB
7MHz	−50dB	−55dB inband. −70dB at 90W
10MHz	−52dB	One each −76dB, −80dB
14MHz	−54dB	Two at −76dB
18MHz	−56dB	One each −45dB, −55dB
21MHz	−55dB	One each −64dB, −68dB two at −79dB
24MHz	−46dB	One each −70dB, −75dB
28MHz	−45dB	Three −72 to −76dB, one inband

The spurious output at −45dB on the 18MHz band is the second harmonic of the 8·83MHz i.f. on 17.66MHz, and too close to the 18MHz band to be removed by subsequent selectivity; −45dB is quite a reasonable figure for a balanced mixer under these circumstances. Fig 2 shows the output spectrum on the 18MHz band between 16 and 20MHz, and Fig 3 shows the clean spectrum on the 10MHz band between 1 and 35MHz. The vertical scale in both photographs is 10dB per division.

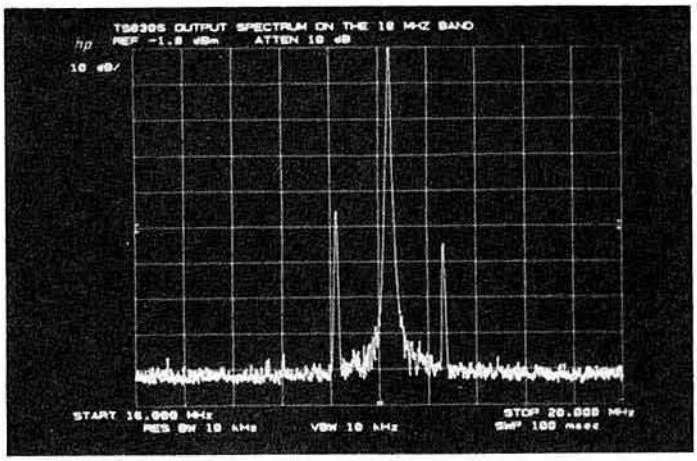


Fig 2. Transmitter spectrum on 18MHz band between 16 and 20MHz

SSB power output and distortion

The comments made regarding tuning on cw apply equally on ssb. Two-tone measurements were made by applying 700Hz and 1·7kHz equal amplitude audio tones to the microphone socket and measuring the amplitude of intermodulation products generated with respect to the amplitude of either wanted tone. With the processor switched out, the results were:

Band	Power output (p.e.p.)	Third-order ips	Intermodulation products at ±10kHz	±20kHz
1·8MHz	32W	−26dB	−80dB	−80dB
3·5MHz	100W	−34dB	−80dB	−80dB
7MHz	100W	−34dB	−80dB	−80dB
10MHz	100W	−34dB	−80dB	−80dB
14MHz	100W	−34dB	−80dB	−80dB
18MHz	100W	−34dB	−80dB	−80dB
21MHz	100W	−33dB	−80dB	−80dB
24MHz	100W	−33dB	−80dB	−80dB
28MHz	100W	−38dB	−68dB	−80dB

An output of 130W p.e.p. could be obtained on bands 3·5 to 18MHz, 120W on bands 21 and 24MHz, and 115W on 28MHz—all at the −30dB ip level. An output of 130W p.e.p. could be obtained on 1·8MHz at −22dB ip level.

After an extended period of transmitting under two-tone conditions, severe degradation of the intermodulation products occurred, accompanied by a reduction in rf output. This is illustrated in Figs 4 and 5.

With the speech processor in operation, additional distortion was generated. High levels of intermodulation products are generated by the action of the limiter in the speech processor circuitry. These high levels are largely confined to the audio bandwidth of the transmitter by the 8·83MHz i.f. filter. Fig 6 shows the two-tone spectrum with 10dB speech compression.

Figs 4, 5 and 6 all show a frequency span of 10kHz and a vertical scale of 10dB/division.

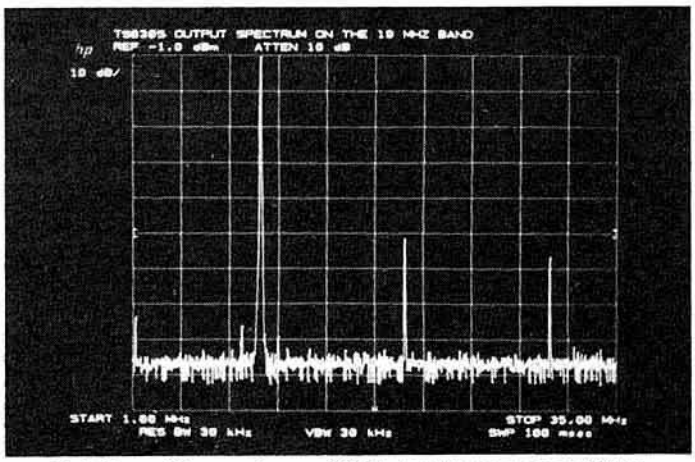


Fig 3. Transmitter spectrum on 10MHz band between 1 and 35MHz

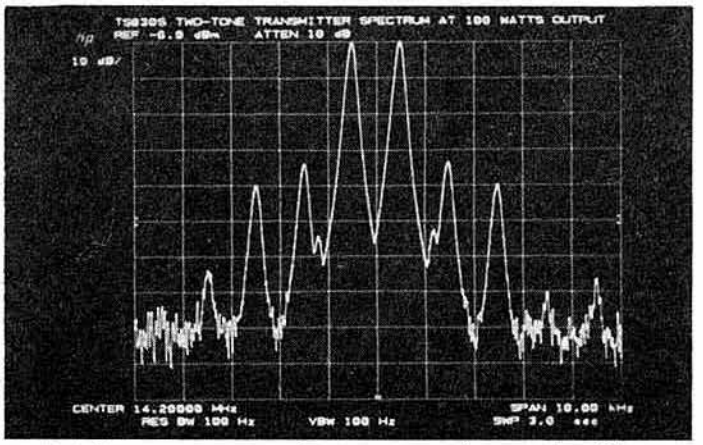


Fig 4. Clean two-tone transmitter spectrum under normal conditions

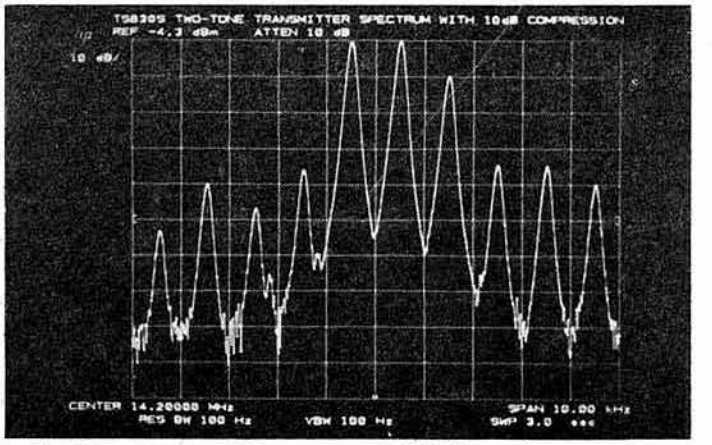


Fig 6. Two-tone transmitter spectrum with 10dB speech compression

The carrier suppression was 60dB, and the sideband suppression with a 1kHz audio tone was 75dB, both measured with respect to 100W output. Distortion generated in the transmitter audio stages was generally very low. The second harmonic of a 1kHz audio tone driving the transmitter to 100W output power was at a level of −65dB.

Audio response

The transmitter audio response with the processor off was measured as 340Hz to 2·6kHz between the −6dB points. Full output could be achieved with 0·4mV af input with the processor off.

Frequency stability

The frequency drift was measured on 28MHz by putting the transmitter in the tune position at very low power output and measuring the frequency with a counter. After allowing an initial 5min warm-up period, the transceiver drifted 100Hz during the first 15min, and a total of 260Hz during the first hour. Complete stabilization was achieved in 90min, after which time random changes in frequency never exceeded 3Hz in any 5min period. This is extremely good for a vfo-controlled transceiver.

On the air results

The transceiver was used for a period of three months from the home location without any problems arising. Generally the receiver performed well, giving clean results provided the attenuator was switched in on the lf bands and on 14MHz when strong signals were around. The variable bandwidth and i.f. shift controls were useful for winkling out the weak signals, and the notch filter was a real boon at times. The noise blanker worked but could degrade the strong signal performance if the nb level control was advanced too far. The phone jack is convenient in that it will accept stereo headphones and route the audio to both channels in parallel. The tone control and display hold switch were somewhat superfluous.

On transmit, some problems were experienced in tuning the pa on the higher frequency bands. Once the optimum loading position has been found for a particular antenna, it is useful to note this for future reference. Reports received on ssb using the Kenwood MC-35S 50kΩ impedance noise-cancelling microphone were generally complimentary. Good quality reports were received in the normal position on the microphone switch, and slightly thinner sound in the noise-cancelling position. It was generally preferred to have the processor switched off for local working, and on for dx working. The optimum position for the microphone gain control with the MC-35S was one-third advanced; and for the compression level control, between one quarter and a half advanced.

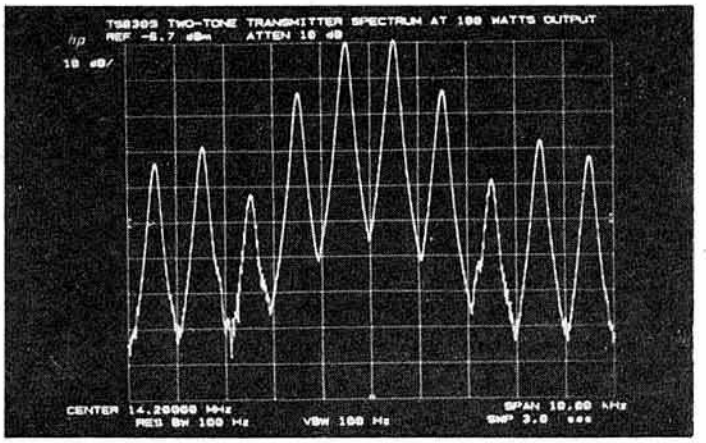


Fig 5. Two-tone transmitter spectrum with pa hot

Manual

A 35-page instruction manual provided with the transceiver gives installation and operating instructions together with brief alignment details and circuit diagrams. A 64-page service manual is available at extra cost, and this is essential for anyone contemplating their own servicing and maintenance. This is an excellent manual giving full details of circuit description, pc board layout, exploded diagrams of the mechanical assembly, parts lists and full alignment procedures.

Conclusions

The TS830S is a versatile transceiver largely intended for home-station use. Its principal features are flexible selectivity arrangements, reasonable strong-signal performance and, providing the pa is tuned correctly and not overrun, lower-than-average transmitter distortion. At £694 incl VAT, the TS830S falls in the medium price bracket. The TS530S offers most of the facilities and performance of the TS830S, but without the flexible i.f. tuning system, for £534—a substantial saving of £160.

In many respects the TS830S is similar to the FT101ZD (£635 incl VAT) [2]. Comparing the measured performance, the receive sensitivity, selectivity shape factor and overall spurious responses are similar. The TS830S possesses a higher intercept point (0dBm as against −12dBm for the FT101ZD) and consequently a higher dynamic range (90dB as against 83dB for the FT101ZD) in a 2·4kHz bandwidth. On transmit the TS830S delivers marginally more power at lower distortion but is more difficult to tune and possibly more prone to damage. Both transmitters exhibit spurious outputs on 18MHz, but this is inevitable with a final i.f. around 9MHz. Both transceivers employ similar valve driver and pa line-ups. In the final analysis a decision on which to buy is more likely to be determined by facilities required. Both offer reasonable interfacing to transverters and linears. The TS830S offers a more flexible system of i.f. selectivity but no provision for a.m. or fm. The FT101ZD has optional boards for fm or a.m.. Reduced facilities are provided by the FT101Z and TS530S economy versions. You pay your money and take your choice.

Acknowledgements

The transceiver used in this review was kindly loaned by Lowe Electronics of Matlock, Derbyshire. The reviewer would like to thank G3WRR for providing critical on-the-air comments.

References

[1] "The Icom IC720A hf transceiver", P. J. Hart, G3SJX. *Rad Com* February 1982, pp129-33.

[2] "The Yaesu Musen FT101ZD hf transceiver", P. J. Hart, G3SJX. *Rad Com* May 1982, pp404-7.

Reflected power does not mean lost power

by KENNETH PARKER, G3PKR*

THE ABOVE TITLE is a quote from *Technical Topics* November 1981, and this article is an attempt to show that the statement is true, even though this would seem to be impossible. How, it might be asked, can the maximum power be going out if some is reflected back to the generator. The explanation which follows has been made as concise as possible to avoid the essential points being lost in unnecessary detail, and involves nothing more than Ohm's Law and some easy-to-use figures.

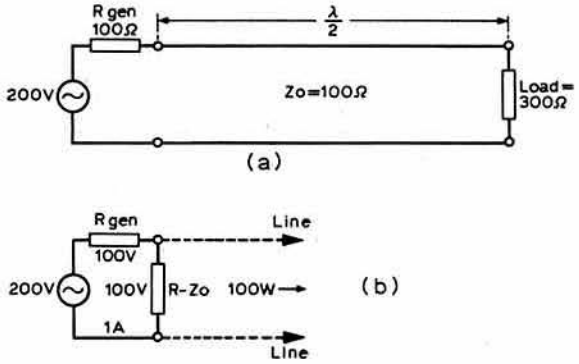


Fig 1. (a) Circuit diagram. (b) Equivalent circuit during first cycle

Take, for example, the line in Fig 1(a) where the mismatch ratio between line and load is 3:1 and the characteristic impedance Zo matches the internal resistance of the generator. Until the reflected energy returns to the input, the generator sees only Zo, so for the purpose of calculation the circuit at this stage can be represented as Fig 1(b), where the line has been replaced by a resistor having the same value as Zo. This shows that the forward voltage and current along the line are 100V and 1A, and the power 100W—the maximum amount that the generator can supply to the line.

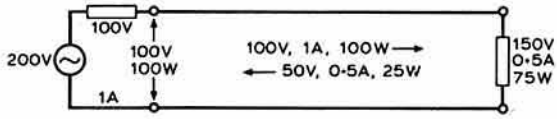


Fig 2. Effect of mismatch

On reaching the load, 50 per cent of the voltage and current (25 per cent of the power) is reflected by the mismatch. The forward and reflected voltages add at the load while the currents subtract, as shown at Fig 2. Taking stock of the conditions at this stage it will be seen that the generator is still supplying 100W to the line, 75 per cent of which is expended in the load, and the rest reflected from it.

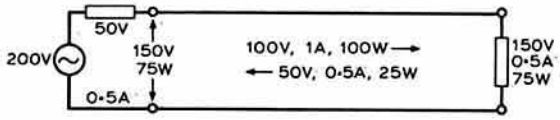


Fig 3. Effect of reflected power on input circuit

By the time the reflected energy arrives back at the input it will have travelled a distance of one wavelength, and the phase of the forward and reflected voltages and currents is such that they will add and subtract as they did at the load. The generator now sees an impedance that has changed from 100 to 300Ω, just as if it were working directly into the load, and adjusts itself accordingly. The conditions existing at this point are as shown in Fig 3. From this it can be seen that although the power supplied to the line is less than it was originally, all of it is now being expended in the load. Note that the forward power is still what it was from the beginning, 100W, but as 25 per cent of it is now being reflected, the net outward flow has dropped to 75W.

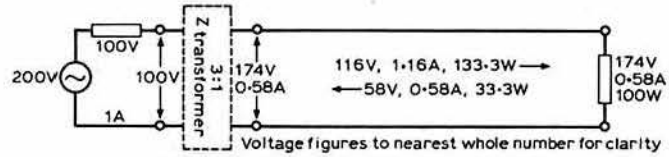


Fig 4. Effect with line and generator matched

The reason for the drop in power supplied to the line, is that its input impedance no longer has the same value as that of the generator. If matching is brought about by means of an impedance transformer, the original output of 100W will again be obtained from the generator and the whole of it will now be delivered to the load, as shown at Fig 4. It will be seen from this that the only effect of mismatching has been to alter the input impedance of the line. Provided that this impedance is made to match that of the generator, as it has to whether the line is mismatched or not, the maximum power will be delivered to the load. Fig 5 shows that the reason why energy can be reflected from the load without reducing the maximum power output, is that the forward power is increased accordingly by the action of mismatching, and in this particular example has risen by one third to 133·3W.

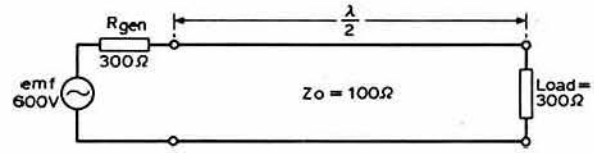


Fig 5. Diagram of modified circuit

If the characteristic impedance of the line had not matched the internal resistance of the generator, some of the reflected power—but not all of it—would have been reflected back to the load. For example, take again the line in Fig 1(a), but this time with the resistance of the generator increased to 300Ω (Fig 5). (To make the figures easy to work with, the emf of the generator has been raised to 600V.)

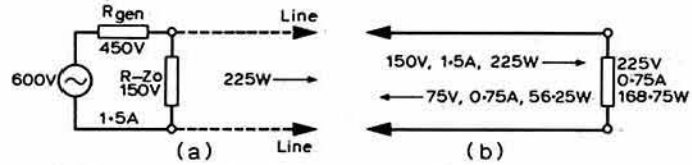


Fig 6. (a) Equivalent of Fig 5 during first cycle. (b) Conditions at load after first half-cycle

At first the generator sees only the impedance of the line (Zo), so at this stage the circuit can be represented as in Fig 6(a), the line being replaced by a resistor equal in value to Zo. From this point on, until the reflected power returns to the input one cycle later (Fig 7(b)), the action will be as already described [Fig 1]. However, there is now an impedance mismatch between the line and generator (3:1 ratio), and 50 per cent of the voltage and current reflected from the load will now be reflected from the generator. The phase of this reflected power in terms of voltage and current, relative to the forward power, is such that they add as shown in Fig 7(a). Comparing this with Fig 6(a) shows the effect of the reflected power on the input circuit. Note that the voltages across the line input and Rgen still add up to that of the emf, as they must do at all times. On reaching the load, 25 per cent of the now increased forward power will be reflected back to the generator (Fig 7(b)).

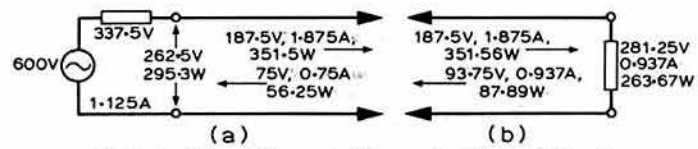


Fig 7. Conditions (a) at end of first cycle; (b) after 1·5 cycles

This process continues with the strength of the forward and reflected power increasing (but at a diminishing rate) with each succeeding cycle, until a state of equilibrium is reached (Fig 8). Equilibrium is reached in the

(Continued on page 583)

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Two improvements to the FT7B

by D. A. BUNDEY, CEng, MIEE, G3JQQ*

Frequency drift

One source of annoyance with this otherwise good transceiver is its slow frequency drift from switch on, which can amount to over 1kHz within about 2h. The source of the drift has not been established conclusively, but tests indicate that the varicap diode in the vfo may contribute to it as a result of overall temperature rise after switch-on. A solution has been found in applying a compensating voltage with temperature to the varicap diode by use of a bead thermistor in conjunction with the existing dc divider network.

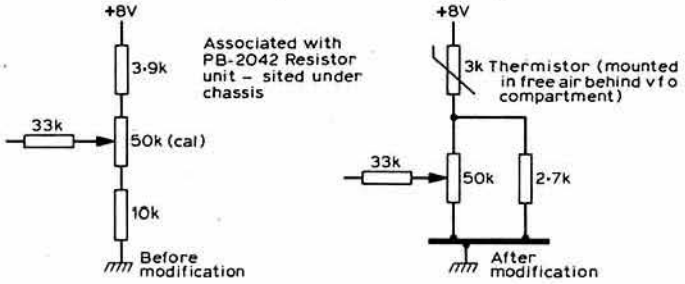

Fig 1. Modification details for varicap circuitry

A simple modification of pcb PB2042 located under the chassis is necessary. This comprises removal of resistors R1704 and R1703 and insertion of a 2·7kΩ resistor and remotely-located bead thermistor (Fig 1). The thermistor is attached to the cable loom just behind the vfo compartment to sample the internal temperature.

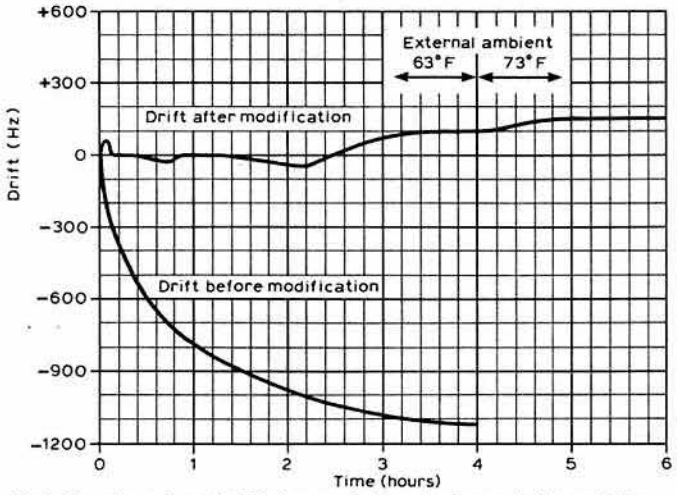

Fig 2. Plot of receiver vfo drift from switch-on, before and after stability modification

Results achieved are shown in Fig 2. The thermistor used was obtained from the air-failure-alarm assembly of a T4188 transmitter unit (modified by the author as a linear amplifier). However, any standard bead thermistor of a nominal 3kΩ resistance should suffice. Slightly different values might require some alteration in the value of the 2·7kΩ resistor.

Outboard variable-bandwidth crystal filter

The excellent ladder filter designed by G3UUR (*Rad Com* December 1980) has been used to provide a worthwhile variable-bandwidth facility. The vxo control allows the passband of the outboard filter to be steered across the internal 9MHz passband, the result being an overall bandwidth dependent upon the degree of overlap. A crystal notch for removing unwanted carriers has now been added. The filter is particularly useful on cw, where agc pumping by adjacent signals (a snag with audio filtering) is completely eliminated. The input changeover switch allows reversion to the original i.f. arrangement if required (Figs 3, 4).

Construction

The filter unit is housed in a small diecast box (4·25 by 1·25 by 2·25in). The layout is shown in Fig 5. A small home-etched pcb accommodates the ics, components and ladder filter. A 3:1 slow-motion drive has been used for the vxo (passband) tuning, but direct drive would be quite acceptable.

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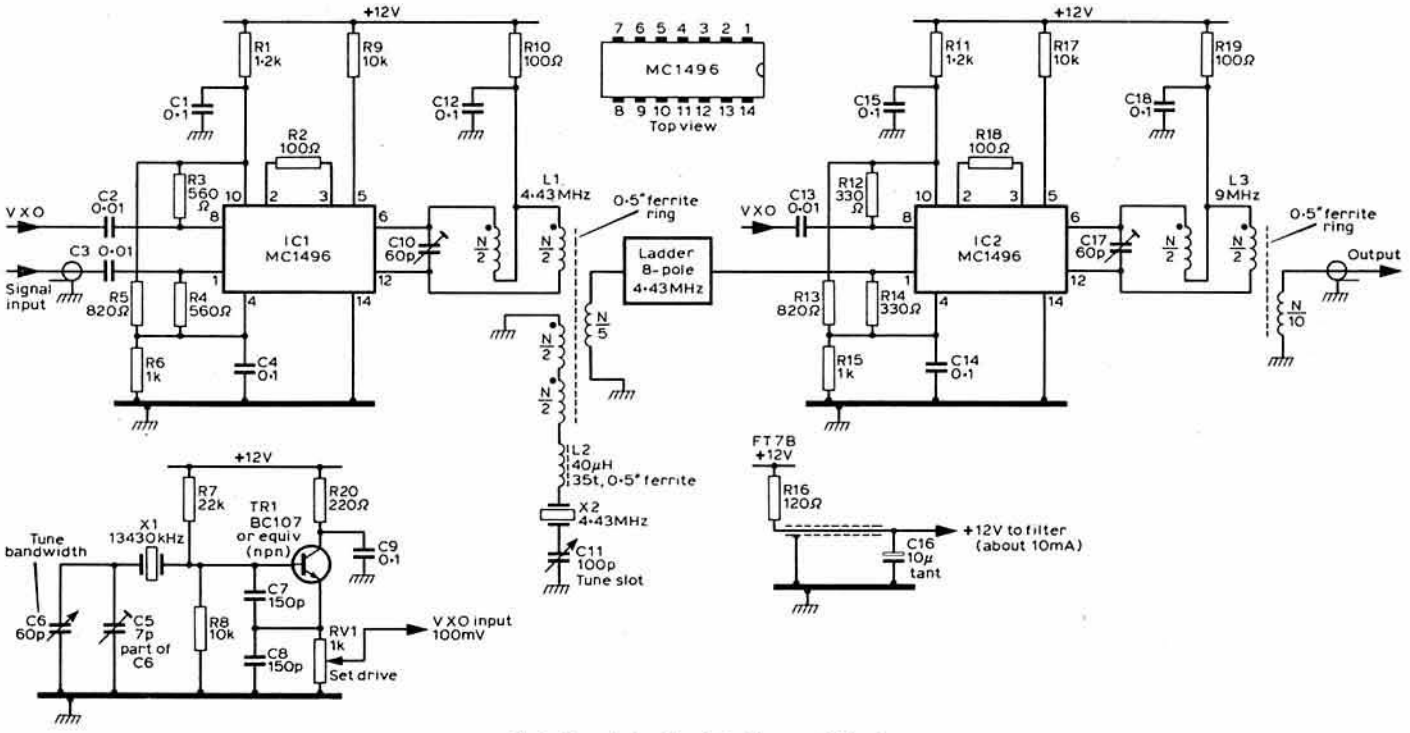

Fig 3. Circuit details of the filter modification

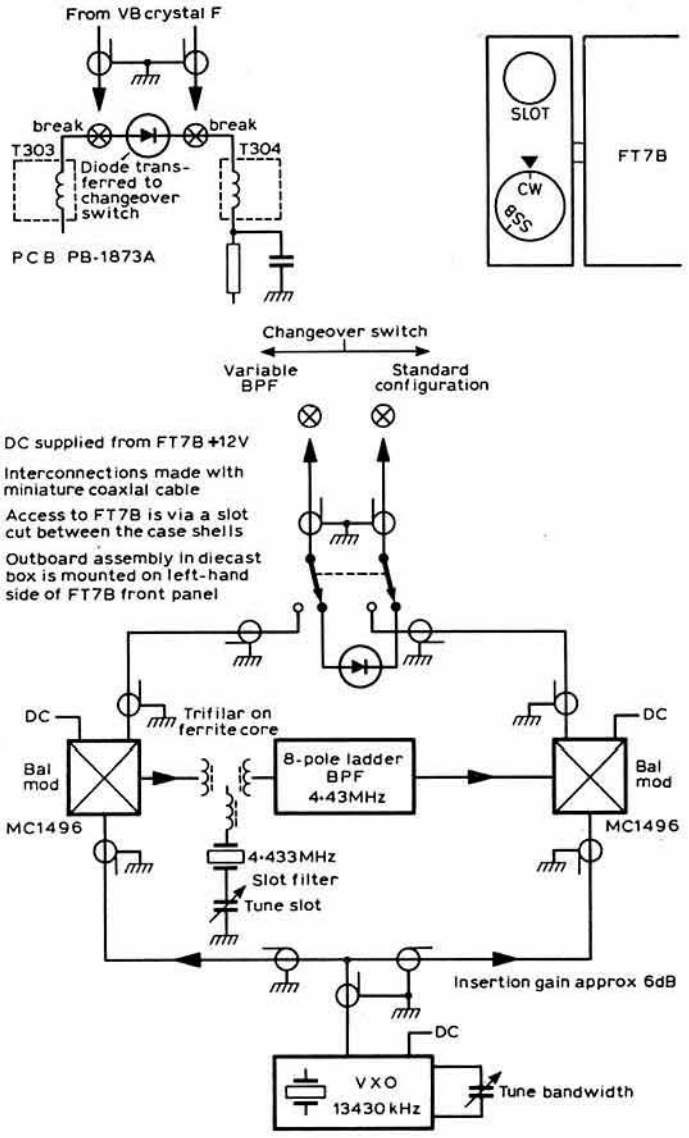

Fig 4. Outline schematic diagram

The tuned circuits are bifilar and trifilar wound coils, where N is the number of turns needed to resonate to the tuned frequency in conjunction with the 60pF preset trimming capacitors. Having determined N, the coil turn numbers are as shown. The value of N depends upon the particular ferrite size and material used (30t 4·3MHz, and15t 9MHz for the author's ferrites). A useful technique to determine the values is to plot N against inductance using a conventional instrument, or a capacitance standard and calibrated grid-dip meter. The required turns for resonance with, say, 40pF, can be determined by calculation. The coils and trimmers are arranged to fill the space above the ics, see Fig 5, but as it is tight the use of a slightly larger box may be preferred.

Power is taken from the FT7B audio amplifier module. Signal input and output leads are miniature coaxial, and all connections are taken via a slot cut between the FT7B top and bottom enclosures where they join. The

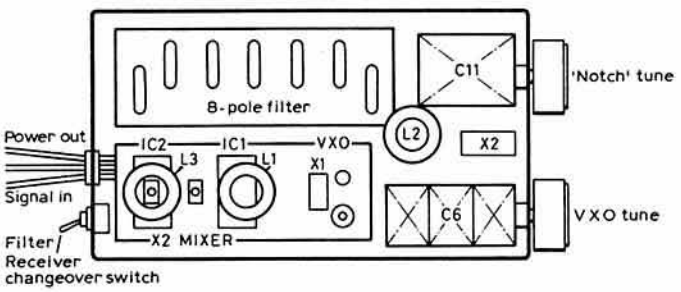

Fig 5. Component layout of the filter unit

Components list

R1, 11	1·2kΩ	**C1,4, 9, 12, 14, 15, 18**	0·1μF ceramic disc, 50V
R2, 10, 18, 19	100Ω	**C2, 3,13**	0·0μF cer disc 50V
R3, 4	560Ω	**C5**	Compression trimmer—part of C6
R5, 13	820Ω		
R6, 15	1kΩ		
R7	22kΩ	**C6**	60pF air-spaced miniature variable
R8, 9, 17	10kΩ		
R12,14	330Ω	**C7, 8**	150pF silver mica or equivalent
R16	120Ω		
R20	220Ω	**C10, 17**	60pF mica compression or equivalent
RV1	1kΩ	**C11**	100pF air-spaced variable
		C16	10μF tantalum 20V
L1, 3	(see text)		
L2	40μH 35G 0·5in ferrite ring	**ICI, 2**	Double balanced mixer-Motorola MC1496
X1	Crystal cut for 13,430kHz	**TR1**	BC107 or equivalent
X2	Colour tv crystal 4·43MHz		

covers may then be removed without disturbing the outboard filter connections. The filter is bolted to the existing recessed holes in the FT7B used for mobile attachment.

Use

In operation it will be found that two settings of the vxo control are most frequently used. One for cw (giving, in conjunction with the FT7B audio filter, a sharp passband centred on 800Hz) and the other, co-incident overlap but with very steep skirts, for ssb (both lsb and usb); these positions may be marked cw and ssb respectively. Variation about these limits will be found useful for difficult signal conditions where, for example, it may be necessary to tune a higher frequency on ssb to remove an annoying "rasp", or vice-versa if the QRM is high frequency.

The notch facility may be left outside the passband for normal use, but will come into its own if, for example, an annoying co-channel carrier needs to be removed (often the case on 3·5MHz). Tuning is quite sharp, and a null of some 30dB is provided. (Leaving the notch capacitor "all plates out" effectively decouples the facility).

Evaluation

Both the modifications described above have been in use for over a year and found to be completely satisfactory. Direct comparison with the author's old (valve) FR100B receiver under various signal conditions definitely gives the edge to the modified FT7B. □

REFLECTED POWER DOES NOT MEAN LOST POWER

(Continued from page 581)

example being discussed with the generator delivering its maximum power output to the load, but this only happens when the line's input impedance is equal to Rgen. Note that in Fig 8 Zo has been matched to Rgen without the use of an external Z-transformer (see Fig 4).

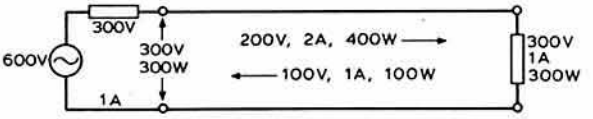

Fig 8. Circuit conditions at maximum power output

The author hopes he has managed to demonstrate in this article that *in a loss-less line* reflected power is not lost or wasted, but is redistributed in the circuit to accommodate the different values of impedance—the redistribution of power producing the ratio of voltage to current required by the various impedances. It is *only* when the transmission line is "lossy" that reflected power contributes additional loss as a result of a mismatched antenna element. □

A new concept in antenna traps for three-band beams

by W. G. BORLAND, G3NXM*

Introduction

In a previous article [1] the author described a two-element three-band beam, the traps for which incorporated high voltage capacitors. Unfortunately these are not manufactured now and an alternative make has not been found. Tubular capacitors such as are used in some commercial antennas could be made, and an article has been published describing the construction [2]; however, certain workshop facilities are required, including a lathe.

Some years ago it was discovered that "figure eight" twin lighting cable had a capacitance of about 1·2pF/in, and it was thought that some use could be made of this property. A coil of eight turns was therefore wound on a 21mm former, and various connections were tried. It was found that if it was bifilar connected, ie one wire at one end of the coil connected to the other wire at the opposite end of the coil, it resonated at 31·7MHz. However, experience showed that this type of cable was not suitable for rf except at low power, and the obvious alternative was 75Ω twin lead.

Two coils were wound using this twin lead, bifilar connected, and adjusted by means of a gdo and dfm to resonate at 28·8MHz. Another two were wound and adjusted to resonate at 21·2MHz. A dipole incorporating these traps was constructed and fed with as much rf at 14·2MHz as possible from a linear amplifier for 10min at a 70 per cent duty cycle. On examination it was found that the 21·2MHz traps were slightly warm, although those for 28·8MHz were still cold. This test was very severe and, on reflection, this type of construction using twin lead would probably be adequate for ssb, and certainly adequate for a transceiver. It is quite suitable for the traps in the parasitic elements, and has the advantage of being simple in construction. However, another set of bifilar coils were wound using 16swg enamelled wire with a slight space between the turns, and these remained cold.

Construction

Driven element

The coil formers are 12in lengths of 21mm o/d plastic overflow piping which is stiffened by inserting a piece of polyurethane painted dowelling. Fig 1 shows the construction of the traps. For 28·8MHz drill two 3mm diameter holes through the former at each end of the winding space as shown. These should be slightly angled to clear the turns on the opposite side. It is also advisable to file slight notches on the "top" and "underside" at 0·1in centres in line with the holes, as this helps to keep the turns evenly spaced. There is a space of 0·2in between the end notches on the "top" and the inner holes to allow a slight adjustment of the winding.

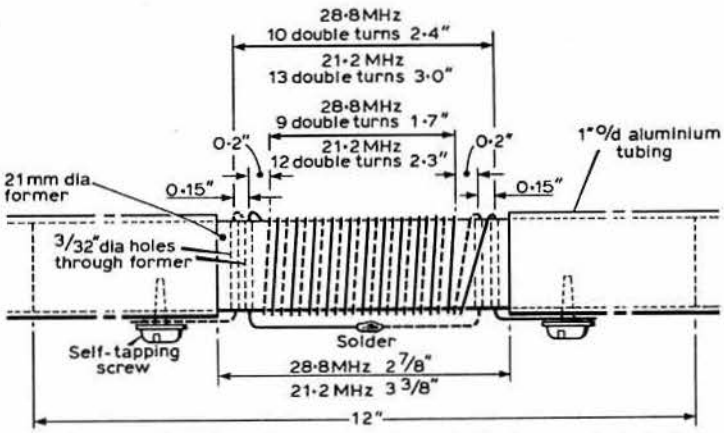

Fig 1. Details of the driven element traps. One winding is shown by a dashed line, and the other by a full line

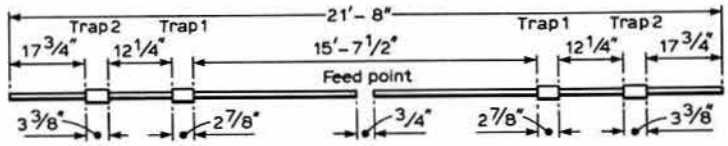

Fig 2. Dimensions for the driven element. Traps 1 resonate at 28·8MHz, and traps 2 at 21·2MHz

The wire is pushed through the outer hole at one end, leaving some spare. Wind on 10 turns of 16swg enamelled wire using every second notch, ie 5t/in, and terminate by pushing the wire through the inner hole at the other end. Then push another piece of wire through the inner hole at the first end and wind on another coil of 10 turns in-between the turns of the first coil, using the spare notches, and terminate by pushing the wire through the outer hole at the other end. The wires through the inner holes are then joined together, resulting in a bifilar coil. The wires through the outer holes are soldered to 4BA tags for connection to the aluminium tubing.

The coils are then checked with a gdo and dfm, and at this stage should resonate somewhat above 28·8MHz. If not, stretch the winding length. They should then be given a couple of coats of ignition sealer to keep the turns in position. Leave for several hours, preferably overnight, and then check for resonant frequency, which should be slightly above 28·8MHz—if they are checked before the sealer is completely dry the frequency will be too low. The frequency should then be reduced to 28·8MHz, and the easiest method of doing this is to paint a line of nail polish across a few turns, allowing it to run between them and then dry thoroughly. This increases the value of the dielectric constant between the turns, hence increasing the self-capacitance of the traps and reducing the frequency. If too much is put on it can be removed with nail polish remover. If the frequency happens to be too low, the end turns can again be stretched out, or some of the ignition sealer removed with carbon tetrachloride.

The 21·2MHz traps are wound in a similar manner, the only difference being that each of the windings is 13 turns, making coils of 13 double turns.

The driven element is constructed of 1in o/d aluminium tubing. The traps are connected to the tubing by means of 0·5in No 6 self-tapping screws through the solder tags and the tubing into the former. Make sure that any copper wire in contact with the aluminium has been thoroughly tinned, otherwise electrolytic action will take place. The ends of the formers can be wrapped with pvc tape to make a tight fit inside the tubing, and for stability a second self-tapping screw is used to fix the outer ends of the formers to the aluminium tubing.

Fig 2 shows the dimensions of the antenna used by the author. However, these can vary due to differences in construction, and the following procedure should be adopted. Cut the 1in o/d aluminium longer than the dimensions shown, and assemble a dipole with a one-turn link at the feedpoint. Using a gdo and dfm find the resonant frequency in the 28MHz band and then trim the inner pieces of the tubing until it resonates at 28·8MHz. Next trim the pieces of the tubing between the traps until it resonates at 21·2MHz. Finally trim the end pieces of tubing until the whole dipole resonates at 14·2MHz. The previous antenna [1] required end loading rods to reduce the overall length. These are not required now as the loading effect of this type of trap reduces the length sufficiently.

These traps must not be covered with insulating tape as this alters the capacitance and hence the frequency. The easiest method of weatherproofing them is to cut a length of 32mm plastic waste pipe, 4·5in long for the 28·8MHz traps, and 5·5in long for the 21·2MHz traps. These are then slipped over the traps and sealed to the tubing with some type of flexible sealant such as Sealastic.

Reflector

The same type of coil formers are used. For the 27·35MHz traps (five per cent lower in frequency than the driven element traps) drill two 5mm holes through the former at 1·75in centres and wind on eight turns of 75Ω twin lead, terminating it through the holes. The wires are bifilar connected—it is easy to see which one is which, one is copper and the other tinned. These coils should be checked with a gdo and dfm, and adjusted by compressing or expanding the turns until they resonate at 27·35MHz. They are then given a couple of coats of ignition sealer to keep the turns in position and, as twin lead is used, the frequency should not alter. The free ends of the wires are soldered to tags and connected to the tubing with self-tapping screws as before, again making sure that the copper wire is tinned where it is in contact with the aluminium.

The holes through the former for the 20·15MHz traps are at 2·25in centres, and there are 11 turns. Otherwise the construction is the same as the 27·35MHz traps. The traps can be wrapped with pvc tape and given a couple of coats of polyurethane.

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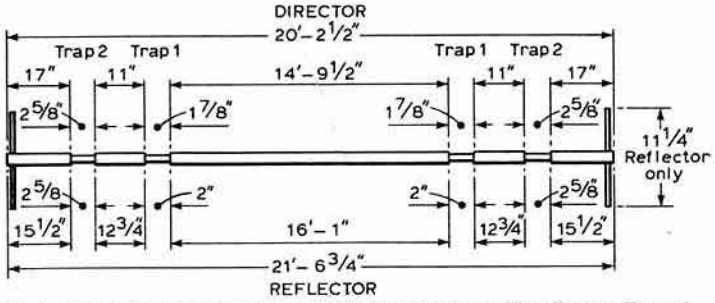

Fig 3. Dimensions for director and reflector elements. The director Traps 1 resonate at 30·25MHz and Traps 2 at 22·25MHz. The reflector Traps 1 resonate at 27·35MHz and Traps 2 at 20·15MHz. End loading rods are used for the reflector only

The reflector should be constructed as if it were a dipole. The lengths obtained by the author are shown in Fig 3, but again they should be made longer and trimmed to resonate at 27·35, 20·15 and 13·50MHz in a similar manner to the driven element. Unfortunately the overall length had to be limited to 21·6ft, so rods were used for end loading. These were 0·25in diameter, pushed through a hole drilled in the tubing and secured with a self-tapping screw. These rods were trimmed until the whole element resonated at 13·50MHz. Finally the two halves were spliced together with a short length of split and compressed tubing.

Originally this was a two-element beam, and the boom length raised some problems. An examination of graphs of gain, impedance and element spacing [3] showed that a compromise was necessary as this beam covered three bands. It was arbitrarily decided to make it 7ft, which is 0·1λ at 14·2MHz and 0·2λ at 28·8MHz. This seemed to work satisfactorily and many dx contacts were made, the results being equal to if not better than with the previous antenna. However, permission was obtained from the adjoining house owner for the antenna to overhang his garden slightly so a director was added.

Director

The traps are constructed in the same manner as the ones for the reflector, using 75Ω twin lead. The 10m traps have the holes at 1·25in centres and, with seven turns of twin lead bifilar connected as before, are adjusted to resonate at 30·25MHz. It will be found that these turns have to be tightly compressed. For 15m the holes are at 2·25in centres and, with 10 turns of twin lead, are adjusted to resonate at 22·25MHz. The dimensions of the director are also shown in Fig 3. Again it should be constructed as if it were a dipole, with the lengths of tubing being slightly longer and then trimmed to resonate at 30·25, 22·25, and 14·90MHz. End loading is not used. Finally the two halves are spliced together.

With a three-element beam the boom length and element spacing is even more of a compromise. Even manufacturers cannot agree, and when they do agree on some points they still differ on the position of the driven element. It was therefore decided to make the boom 12ft long with the director 5ft in front of the driven element and the reflector 7ft behind. In practice this seems to work satisfactorily.

Final points

The author's standard practice is to use a 1:1 balun at the antenna and feed it with 50Ω coaxial cable, the length of which is in multiples of a wavelength. The end of the cable at the transmitter therefore exhibits the same characteristics as are present at the antenna. The length used in this case was 91·25ft, which is two wavelengths at 14·2MHz, three at 21·3MHz and four at 28·4MHz, taking into account the velocity factor of the cable at 0·658.

On the 14 and 28MHz bands the swr varies from 1:1 to 1:1·6 right at the band edge. It is not so good on the 21MHz band, varying from 1:1·2 to 1:2. No doubt this could be improved by adjustment of the driven element/director spacing or slight adjustment to the director. This might alter the swr on the other two bands, but as this swr was not too bad, the antenna was not altered. In addition, swr meters vary. Six meters were tried, some home-built and some commercially built, and they all gave slightly different readings. Indeed, one showed quite a good swr on 21MHz.

Results have been very good, and with about 100W p.e.p. from a transceiver, reports of 5 & 7 have been received from both VK and ZL. And the cost was only about a quarter of the price of buying a three-band three-element beam.

References

[1] *Radio Communication* February 1981.
[2] *Short Wave Magazine* August 1979.
[3] *The ARRL Antenna Book*, 13th Edition, Chapter 4. □

A simple 150MHz + prescaler for digital frequency meters

by TONY BAILEY, G3WPO*

MANY READERS will have digital frequency meters that do not have high frequency capability, covering up to 10 or 30MHz only. This article describes a very simple miniature prescaler which will extend the coverage of such instruments to 150MHz minimum and, typically, 250MHz, with a typical input sensitivity of 40mV or better. And all in one 8-pin dil chip! Total cost is a few pounds only.

The ic used is an Hitachi HD10551 programmable prescaler, originally intended for synthesizer applications. This is of ecl construction and can be programmed for a number of division ratios, but is here fixed at 10:1. A 5V supply is required by the chip at around 50mA, derived from an on-board ic regulator powered from +12V. The whole unit is packaged in a small screened tinplate box, which will actually fit inside many counters.

Fig 1 shows the complete circuit of the module, and Figs 2 and 3 the pcb and layout. Constructors who do not want to make the pcb themselves can obtain one ready-drilled from the author, who can also supply all the other components and the box.

Construction is simple. Insert the connection pins from the underside (track side) of the pcb, push home with a hard tool, and solder. Then insert and solder the other components, taking care that the two semiconductors are inserted correctly. The HD10551 has a notch at the pin 1 end on one side of the package.

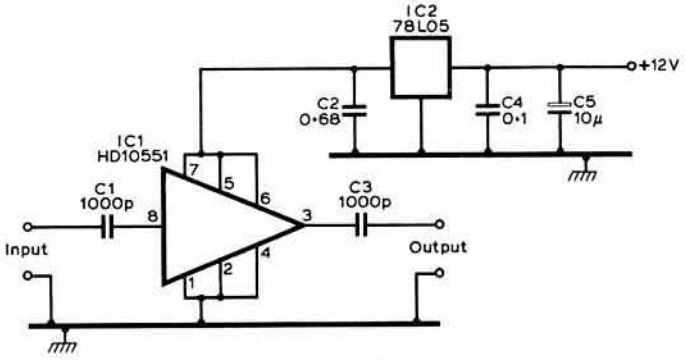

Fig 1. Circuit diagram

Place the pcb into the screening box (from the underside) and solder the sides of the case to the edges of the pcb with a hot soldering iron. Solder-in the 1,000pF feedthrough capacitor and the inside lead coming from it to the +12V connection pin. The module should be connected to the dfm using a short length of coaxial cable (UR95 or similar) and via a switch if it is desired to make the prescaler selectable. The input should also come in via coaxial cable from an appropriate socket.

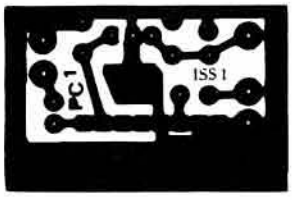

Fig 2. PCB track

Note that due to the division by 10, the existing decimal point indication on the counter will be incorrect, being displaced to the left by one digit, although it is easy to allow for this mentally. Alternatively an extra

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Components list

C1, 3	1,000pF miniature ceramic
C2	0·68μF tantalum 6V minimum
C4	0·1μF tantalum 15V minimum
C5	10μF miniature electrolytic 15V minimum
IC1	Hitachi HD10551
IC2	78L05
PCB	Type PC-1

Screening case. Part No 21-06050
Five 0·1in pcb connection pins
Length of UR95 or equivalent miniature coaxial cable
1,000pF solder in feedthrough capacitor

Components available from the author

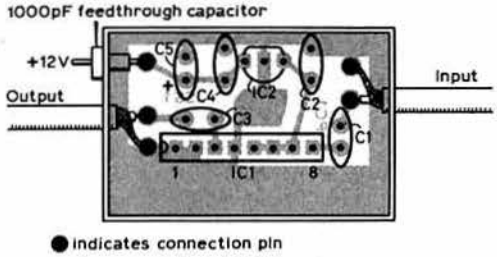

Fig 3. PCB layout

connection on the prescaler select switch can be used to move the decimal point to the right by one position if preferred.

It may be found that, with no input to the prescaler, there is sometimes a random frequency indication. This is due to the ecl construction and its biasing and will not affect the final reading, which will be accurate. □

A sidetone for the SB2M

by D. I. SILLARS, BSc, G4IKY*

Introduction

After struggling for a while with a manual key and a Mizuho SB2M, the author decided that it was necessary to have a sidetone oscillator in order to send cw satisfactorily. Many electronic keyers incorporate a sidetone oscillator, but because the transceiver is often used on business trips abroad —when space and weight are at a premium—an oscillator which would fit inside the case was required.

In order to simplify the project, no changes were to be made to the transceiver. Only additions were considered. The result was an oscillator built completely from the junk box and based on the well-known SN7400 integrated circuit.

The circuit

After some experimentation, the circuit shown in Fig 1 was built. This is based on the SM6DTN code practice oscillator described in "Technical Topics", *Rad Com* February 1974, p92. This is a straightforward oscillator using three of the four NAND gates in an SN7400 chip.

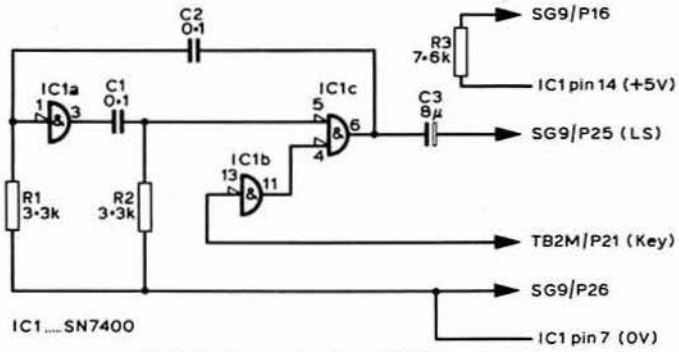

Fig 1. Oscillator circuit and SB2M connections

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Components list

R1, 2	3·3kΩ	C1, 2	0·1μF
R3*	7·6kΩ	C3	8μF
IC1	SN7400		

*Can be made from a 3·3kΩ and a 4·3kΩ resistor.

The external connections to the oscillator are:

(1) 0V supply from P26, board SG9—a handy zero volts point.
(2) 12V supply from P16, board SG9—this is present only in cw mode and when the t/r switch is in the transmit position. At all other times it is held at 0V. The voltage is reduced to the 5V used by ttl by a 7·6kΩ resistor in series.
(3) Loudspeaker output to P25, board SG9—this connection is in parallel with the receive audio output.
(4) Keying line to P21, board TB2M—this is normally open circuit and goes to 0V when the key is closed.

The resultant circuit has a current consumption of 13mA, which is well within the capacity of the positive voltage supply.

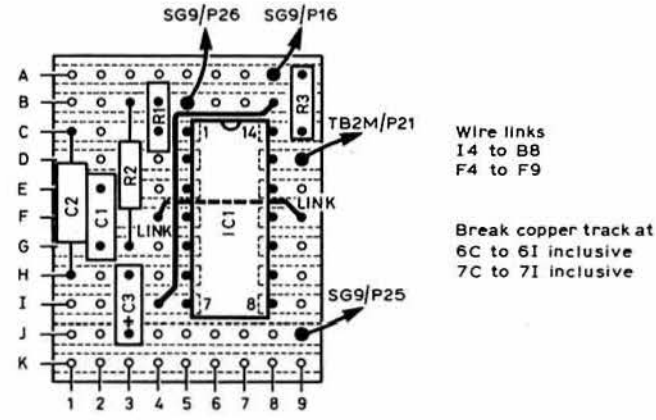


Fig 2. Circuit layout

Construction

The circuit is built on a small piece of Veroboard of 0·09in pitch, as shown in Fig 2. After construction it is easily tested with a separate loudspeaker and 12V supply before being fitted into the transceiver.

A piece of plastic foam the same size as the board and 0·25in thick is glued to the copper strip side of the Veroboard. The other side is glued to the metal chassis section which shields the antenna output socket.

The four connections to the pc boards are then made, leading the wires along the pre-existing runs. The position of the oscillator and connections are shown in Fig 3.

The transceiver is now ready for use as soon as the case is replaced.

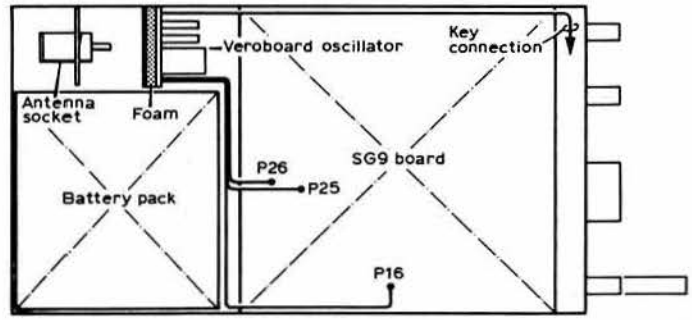


Fig 3. Fitting of oscillator

Conclusions

The addition of the sidetone oscillator has made the transmission of cw easier, and as far as can be ascertained to date has had no adverse effects on other aspects of performance.

One positive advantage of the oscillator design has been to give advance warning when nicad batteries need recharging, as the audio frequency falls with failing battery voltage.

The author can see no reason why the circuit cannot be used with other transceivers as long as the four connections can be made. The only constraints which perhaps need to be noted are:

(a) The positive supply does not need to be switched off on "receive".
(b) The key inputs should be 0V on one side and, on the other, 0V when closed and positive when open. □

TECHNICAL TOPICS

Pat Hawker, G3VA

WHITHER AMATEUR RADIO? This is a question which cannot be answered, and perhaps should never even be asked. For first you would need to define exactly what *is* amateur radio, and the number of definitions would be very large and they would differ greatly. Nevertheless, from time to time, we surely need to remind ourselves that amateur radio has, or should have, at least some serious objectives—though that does not mean that we should feel guilty at enjoying "radio-sport". The international ITU definition points to "self-training, intercommunication and technical investigations"—though I have never been quite clear to what extent these are intended as separate or linked objectives.

What does seem a pity, as I have written elsewhere, is that in recent years our licensing authority has been interested primarily in reducing the burden of administering and regulating the service rather than encouraging us to pursue the ITU objectives. Admittedly, amateur radio is not formal training, but then nor have amateurs sought educational subsidies. In bringing many thousands of people into a closer understanding of the technology of electronics and radio communications, in advancing the development of low-power radio communication, and in creating a valuable reserve of operating skills and expertise, one wonders if professional educationalists could have been much more successful. People learn best what they want to learn. But nobody is likely to be encouraged by the feeling that increasingly the licensing authority regards amateur radio as a "fun thing" to be tolerated primarily as a self-financing, revenue-collecting service and treated in the cavalier fashion of the notorious 12 February "schedule"—and the not much better one that we have now been saddled with. Who on earth, for example, feels that "dBW carrier power" is an improvement over dc watts input? Or even knows whether it means power supplied to the actual antenna element or to the transmission line.

In praise of solidstate

Over the past few months various items in *TT* may have been construed by some readers as suggesting: (1) the use of valves in transmitters is always better and more satisfactory than rf power transistors; (2) broadband rf amplifiers are unusable without antenna matching units; (3) virtually everything that has been developed in amateur radio since about 1939 has been a change for the worse! To those who may have gained such an impression, I can suggest only that they look again at the items concerned; in most cases these will be found to contain important qualifications or to apply in specific circumstances. Certainly I have no doubt that quite a lot of the current factory-made gear is extremely good, highly effective, and has features and performance beyond the wildest dreams of those of us who came into the radio communications field in the 'thirties. Indeed, it is precisely because many of the modern rigs are so easy to operate, so far beyond the capabilities of the kitchen-table workshop, so professionally engineered, and so costly (though often representing good value for money) that they are changing the whole nature of the hobby. I shall continue to advise the use of valves, pi or pi-L networks etc for *home-construction*, and warn readers of the problems that can and do still arise with solidstate, but there is little doubt that the trend is towards the all-solidstate factory-built equipment, whether or not this marks the beginning of the end of experimental amateur radio as originally conceived and practised.

Most of the letters I receive seem to support the line taken in *TT*. But not all. So, in fairness, let me put a contrary view. John Clarke, G3OWQ, feels that *TT* has been less than impartial and rather selective in including so many comments critical of modern trends. He writes:

"To read *TT* these days one might imagine that solidstate rigs are an inferior form of the art of transceiver engineering. I have just swapped my superb TS520S (the best bargain in transceivers ever) for a new Icom 730. Please tell your readers that they do not need an atu, as I operate all bands without one. Yes, 3·5 to 28MHz by means of switching from trap dipole to vertical as appropriate. Almost immediate QSY from bottom of band to top without tuning the power amplifier. Immediate QSY from band to band without tuning is a tremendous boon. No fall off in cathode emission when operating over prolonged periods, and no waiting on warm up when wishing to go on immediately.

"I have, inadvertently, transmitted minus the antenna and still have the original pa transistors, and I often, while experimenting, work into a load which is mismatched and manage to radiate quite well.

"I remember the same fatuous arguments about a.m. versus ssb in the 'sixties. Arguments which soon disappeared when all the antagonists eventually got their own ssb rigs. It sounds like sour grapes continually to give the impression that the new rigs are not worth acquiring. I am very pleased with mine and wish that you would indicate in *TT* that it is possible to operate such transceivers without either regretting the sale of the old valve rig or having to adopt any special techniques in the use of the new one."

Fair enough—although those who recall the ssb versus a.m. controversy could point out that not all the "fatuous" comments came from the diehard "pro-a.m." faction.

QRP for beginners

A columnist can never win. On the same morning that G3OWQ's letter arrived, so did one from Mike Perry, PA3ASC/G4HWZ, expressing disagreement with my belief that *extreme* QRP was not to be recommended to those without previous experience of two-way cw operating. Remember I was referring to transmitters of around 50mW input with crystal control. PA3ASC is a QRP enthusiast, and admits that it was the procurement of a 100W solidstate transceiver that nearly caused him to give up amateur radio (in part due to the Dutch two-point electricity wiring techniques and the high cost of ferrite rings in Holland). He writes:

"I hope you won't mind if I rock the boat a little and disagree with your suggestion that QRP is not for beginners. I went on-air about two weeks after I got my ticket when my HW8 was ready. This was kit-built and puts out about 1W of rf on 3·5/7/14/21MHz for cw only. It has a direct-conversion receiver, which means that the signal/QRM ratio is at least 3dB worse than a normal single-signal cw receiver, as it cannot separate the upper and lower sidebands.

"The first couple of weeks were spent using a makeshift antenna—quite fruitlessly. But once an atu and an swr meter had been built, it seemed that Europe was mine for the asking. My cw operating improved rapidly.

"In retrospect most of the initial difficulties were due simply to the lack of time needed to get a comprehensive antenna system erected, and little to do with QRP rather than QRO operation.

"In my opinion QRP provides an excellent introduction to operating an amateur station, because it makes the newcomer aware of certain important disciplines:

(1) It is virtuous to listen around before calling.
(2) The maximum power transfer theorem is not lightly to be disregarded.
(3) A well-sited and well-constructed antenna is the most important component in a radio station.

"Anyone can hook a wire up to a 100W 'rice box' and make contacts. It is quite likely that in practice he may be operating QRP in terms of effective radiated power. But change to higher power *after* six months on QRP and the world really is your oyster."

Avoiding Boilermaker's Ear

The reference in the April *TT* to the recent High Court case in which former intercept operators successfully sued the Attorney-General on the grounds that many years of listening on headphones had brought about severe impairment of hearing has prompted "Dud" Charman, G6CJ, to comment that this form of deafness is known "in the trade" as Boilermaker's Ear. He writes:

"It might appear that the obvious solution is to throw away the 'cans' and use a loudspeaker; however, there is much to be said in favour of headphones, at least for cw reception. With a loudspeaker the wanted signal has to compete with extraneous noise and room echo, and this is bound to reduce the resolvability of a weak signal already nearly buried in noise. I recall one station which used a small loudspeaker at the back of a hi-Q resonant cavity, where I had to keep my head in exactly the right position in order to read the signal. For speech there is more information content in the signal, so the choice may not be so important.

"As a simple experiment I put on my old tinplate (4,000Ω impedance) headphones and applied 1V rms at about 700Hz. It gave a comfortable level of sound, and represents 250μW input power; the audio power was probably much less. Then I put in attenuation in 20dB steps. At −60dB the sound was still audible above my threshold! The ear is an extremely sensitive machine. Yet I have heard people listening to signals near the threshold of pain and where one could hear the diaphragms rattling all over the room. Nobody would dream of treating a treasured microammeter in such cavalier fashion!

"Then again, if you chose to use 'phones, wear them a little forward, so that there is an air-pressure escape; if worn tight on the ears then a resonant cavity is formed which can boost the audio power greatly—they were designed that way. If you don't or can't provide a pressure escape, there is

a useful technique for improving reception using loudspeakers. Use two of these, one on each side of the receiver and feed them through an audio-frequency crossover network (*Rad Com* September 1975). This, together with a differential delay, is a spatial arrangement that will produce a beneficial stereo effect."

Polychlorinated biphenyls

The serious health hazard represented by contact with polychlorinated biphenyls has been mentioned several times in *TT*. This man-made chemical was widely used, from the 'thirties to the 'seventies, for such common applications as oil-filled capacitors and transformers; these ranged from very large industrial transformers to fluorescent lamp capacitors. It was only the result of a series of human disasters that led to the recognition (in some countries) of this very real hazard; polychlorinated biphenyl compounds can be absorbed through the skin or ingested (since it does not break down in food chains), and it has been linked with liver cancer, deformed babies and skin diseases. It was not until 1977 that manufacture of these chemicals was abandoned by British firms. Such compounds provided excellent insulation and coolants and reduced fire hazards; and were much cheaper than the silicones now commonly used to replace this dangerous material.

As we have noted previously, polychlorinated biphenyl compounds are still likely to be found in large high-voltage transmitting capacitors and transformers. Recently it was revealed in *The Observer* that some 150 gallons of polychlorinated biphenyl type oil were spilled when a large electricity-supply transformer was blown up in Belfast during 1981, although details of the incident were not released at the time.

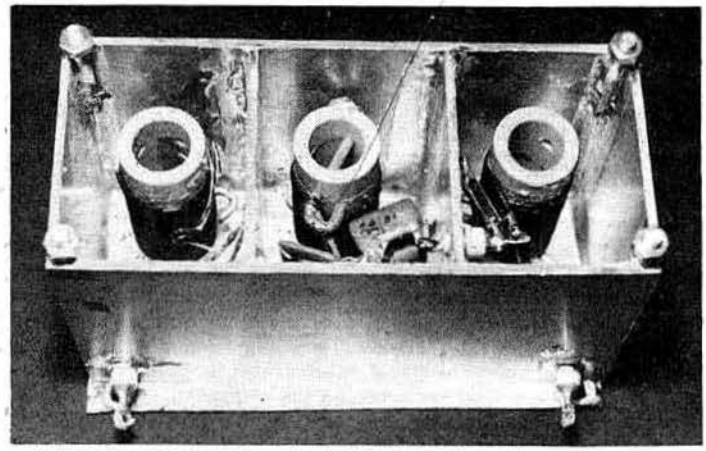
Precautions should be taken when dealing with (or disposing of) leaky oil-filled transformers and capacitors unless it is known for sure that these do not contain this chemical. Brian Castle, G4DYF, comments: "Recently I came across a leaking transformer and wondered whether it was necessary to dispose of this with great care. An industrial chemist suggested the following test to detect the presence of polychlorinated biphenyl compounds: 'Take a piece of plain copper wire. Put in a gas flame and burn off all dirt until the flame becomes clear. Allow the wire to cool. Dip it in the oil. Return the wire to the gas flame. If it burns *yellow*, it is ordinary oil. If it burns *bright green*, then these compounds are *probably* present. It is not a 100 per cent positive test, but if the flame burns bright green it will be wise to assume that the oil contains the compounds—deal accordingly, as it is better to be safe than sorry'."

PA0SE's "WARC79-10" converter/transmitter

Methods of getting going on 10·1MHz cw without replacing otherwise satisfactory equipment with one of the current "nine-band" hf transceivers continue to emerge. In *SWM* May 1982, P. C. Cole, G3JFS, describes the modification of a KW2000A for the new band, though unfortunately his arrangement involves losing an existing 200kHz band segment on a series of transceivers whose main practical drawback is the incomplete coverage of 21 and 28MHz bands combined with an absence of any spare crystal sockets and spare contacts on the waveband switch.

Dick Rollema, PA0SE, of *Reflecties* fame, has come up with an approach calculated to appeal to home constructors. His compact unit provides the combination of a self-contained hetrodyne-vfo transmitter providing a clean 10W rf output, full break-in facilities, together with a crystal-controlled receiving converter for use with any receiver tuning 3,700 to 3,750kHz. It is based on an ic mixer, discrete bipolar and field-effect

PA0SE's "WARC79-10" converter/transmitter for the 10·1MHz band



10·1MHz band-pass filter used in both the receive and transmit modes on PA0SE's "WARC79-10" converter/transmitter

transistors and two "vacuum transistors" or, in other words, an EF80 plus QQE03/12. PA0SE lists a number of reasons for returning to valves after a prolonged period of working with all-solidstate projects. These include: a useful stock available; use of power transformer from old broadcast receiver or audio amplifier; his firm conviction that for transmitters of more than about 2W output, valves remain the easiest and surest way of producing hf power. They withstand overloading, for example during antenna tune up; it is much easier to avoid parasitics; and it quickly teaches you once again to avoid touching high voltage circuits!

PA0SE acknowledges that the concept of using a receiver converter plus self contained transmitter may surprise those thinking in terms of the transverter concept. He accepts that a transverter would have been perhaps a more logical arrangement if 10·1MHz was intended as a multimode band, but he notes with approval that this narrow, shared band is being used only for hand morse and rtty. For cw the difference between a transverter and a transmitter amounts to little more than a vfo. If this is fitted it brings the bonus of independent tuning, full break-in (QSK) and a no-cost keying monitor.

Fig 1 shows the block schematic. Both incoming and outgoing signals pass through a bandpass filter (1) that reduces image and other spurious responses on receive, and out-of-band unwanted products etc on transmit. If required, a 20dB attenuator (2) can be inserted in the incoming signal path to minimize intermodulation products that may appear during the hours of darkness. The mixer (3) is a Plessey SL640 (or the lower cost SL1640 which is electrically similar). The injection signal for the mixer comes from a 13,850kHz crystal oscillator. The bandpass i.f. is thus 13,850 – 10,100 = 3,750kHz to 13,850–10,150 = 3,700kHz. The 3·5MHz "tunable i.f." receiver thus tunes the 10·1MHz band backwards. This could have been avoided by using a 6,400kHz crystal, but there is the danger in this case that 2 × 6,400 would result in a response tuning between 9,100 to 9,050kHz, a frequency too close to the required signal frequency to be much attenuated by the bandpass filter (4) (although the doubly-balanced mixer

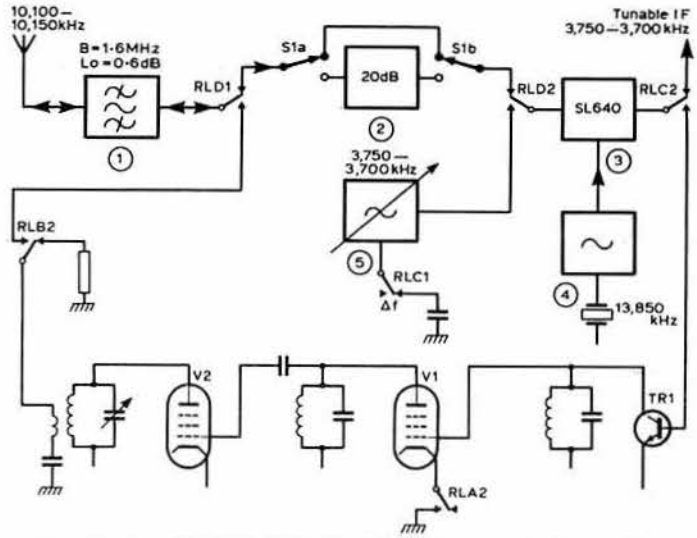


Fig 1. Outline of PA0SE's "WARC79-10" 10MHz converter/transmitter

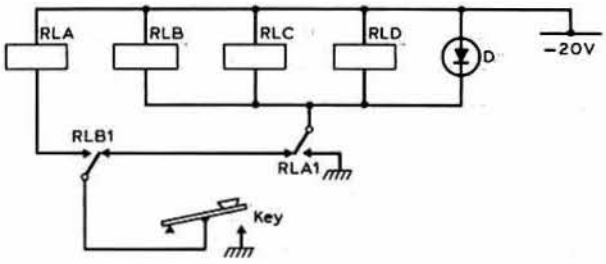


Fig 2. Arrangement of four transmit/receive relays key-operated for full break-in operation

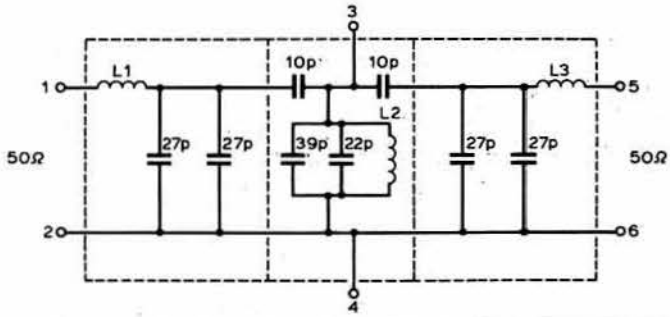


Fig 3. Details of PA0SE's 10·1MHz bandpass filter used in the "WARC79-10" for 10·125MHz, bandwidth 1·6MHz, insertion loss 0·6dB

copes with all but the strongest signals). While the choice of 3,750 to 3,700kHz as the tunable i.f. is arbitrary, it is advisable to avoid using the 3·5MHz cw section for this purpose because it would be impossible to distinguish between a wanted 10·1MHz signal and a strong 3·5MHz signal breaking through into the i.f..

On transmit the crystal injection oscillator is replaced by a vfo (5) which tunes between 3,750 and 3,700kHz, providing a mixer output signal tuning 10,100 to 10,150kHz and amplified by TR2 and then V1 and V2. The output from V2 is link coupled to the bandpass filter. Some output from the vfo leaks into the receiver to form a convenient keying monitor, but is so weak that the receiver remains at almost full sensitivity. Since the output frequency from the transmitter is well removed from the frequency of the receiver, there is little or no receiver desensitization and full break-in is possible without key-clicks. During reception an extra capacitor automatically detunes the vfo by about 20kHz by means of a relay contact RLC1. This capacitance can be "removed" by means of a push-button on the front panel, permitting silent tuning to a station.

The use of a vhf double tetrode with both sections in parallel (V2) was also arbitrary, representing the contents of PA0SE's junk box. An EL84 audio pentode has been successfully tried, producing some 9W output. Both the QQE03/12 (same as UK type QQ03/12) and the EL84 were found to require neutralizing. An output of 9–10W in the relatively "quiet" 10·1MHz band has so far proved entirely sufficient.

Transmit-receive switchover is accomplished by four relays each having two changeover switches; this provides good isolation between rf circuits. In Fig 2, closing the key first energizes relays B, C and D for transmit. Via contact RLB1 relay A is brought up. Contact RLA2 closes the cathode circuit of V1 (including a shaping filter). Relays B, C and D are now held via RLA1. Releasing the key causes contact RLA2 to open, and relays B, C and D are de-energized. During the changeover of RLA1 and RLB1 current through B, C and D is momentarily interrupted, but this results in a back emf causing current to flow via diode D, holding the relays long enough to prevent them being released too quickly.

Details of the bandpass filter are shown in Fig 3. Any attempt to make the bandwidth exactly equal to the 10·1MHz band would result in an unacceptable insertion loss, and a suitable compromise must be used. The filter shown has a measured passband of 1·6MHz and an insertion loss of only 0·6dB. It is a Butterworth design in constant-K configuration, but since the calculated midsection gave "impossible" values (0·0794μH and 3,183pF) a so-called Norton transformation was applied, permitting the use

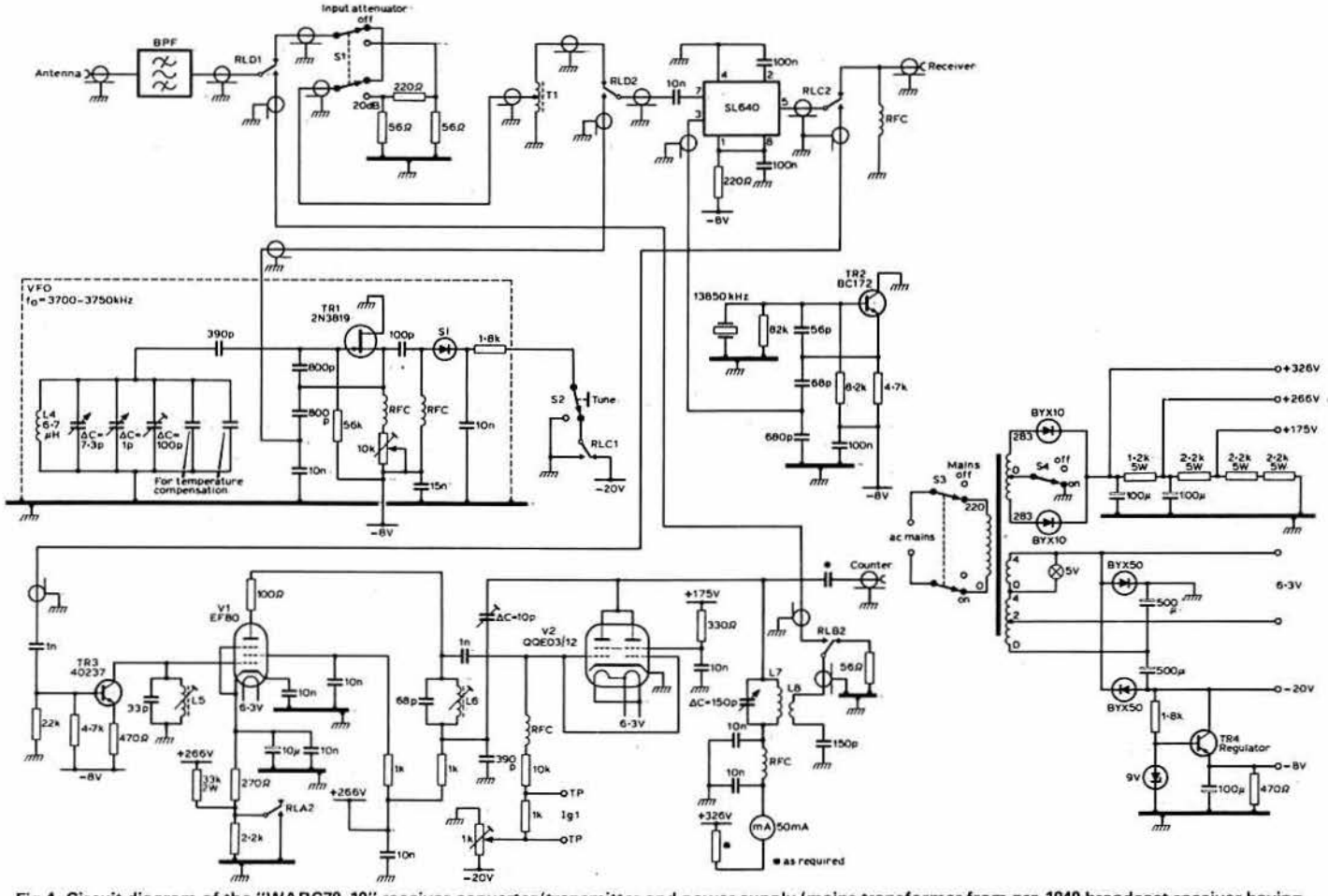


Fig 4. Circuit diagram of the "WARC79-10" receiver-converter/transmitter and power supply (mains transformer from pre-1940 broadcast receiver having 4V-heater valves!). An EL84 is an alternative pa valve

of the standard values shown. The approximations are permissible since slight deviations are not serious, provided the circuits resonate at the correct midband frequency (10,125kHz), which can be achieved by adjusting the coils. First, terminals 1-2 and 5-6 are left open and a gdo coupled to L2 which is pruned for resonance. Next, terminals 1-2, 3-5 and 5-6 are short-circuited, the gdo is coupled to L1 which is adjusted for resonance; similarly with L3. L1, L2 and L3 are wound with 21swg wire with slight spacing between turns (using a thinner wire as a spacing guide). Wind on an excess of turns and fix with epoxy glue (first unwinding the spacing winding). The formers are 0·5in ceramic tubes, but pvc tubing would be equally suitable; ferrite or powdered iron cores should be avoided as they can saturate on transmission, creating the harmonics that the filter is designed to suppress! The coils are trimmed to resonance by removing turns from the top ends. It will be found possible to pull them out of the glue without removing the remaining turns. The filter is mounted in a small box made of double-sided pcb with two partitions.

In supplying details of his equipment, together with an English translation of his notes, PA0SE clearly intends these as an "ideas source" rather than a project that would necessarily be copied in every detail. It provides an excellent example of how new and old technology, plus careful design and construction, and some original *thinking*, can still be put to very practical use among the factory-built equipments!

Emergency soldering tips

Many years ago (*RSGB Bulletin* May 1950, p377) "H.E.B." described a simple "emergency" technique for soldering together two wires without using a soldering iron that can also be used, for example, when repairing outside antennas.

The requirements are: a short piece of resin-cored solder, a piece of "silver paper" (aluminium foil), and a box of matches or a cigarette lighter. The procedure (Fig 5) is: (*a*) clean the wire ends, twist them together, and then wrap a short length of cored solder round them; (*b*) cover the whole with several layers of silver paper or foil, close up the ends, and place a lighted match or lighter flame under the wrapped joint and move it slowly backwards and forwards; (*c*) allow a few seconds for the joint to cool, remove the silver paper and (to quote H.E.B.) "surprise yourself with a perfectly soldered joint". H.E.B. pointed out that the real secret to success lies in wrapping the paper/foil on as tightly as possible with no air holes. The foil conducts heat to the joint as well as preventing oxidization and the formation of soot on the joint. It also stops the molten solder from running away. Better still, the dodge really works!

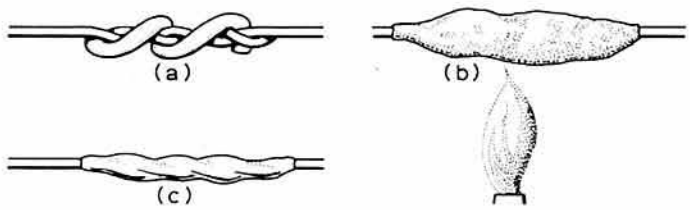


Fig 5. Why use a soldering iron? An old but still useful dodge for field days etc

A variation of this technique for field day use was given recently in *QST* (April 1982, p53, reprinted from March 1961). This is to prepare some pieces of thin solder in advance, by melting some on an iron and flicking it onto a flat surface, such as a sheet of aluminium, and then peeling it off. Then, to solder a joint where no iron is available, clean and join wires, apply flux, wrap the thin solder around the joint and apply a match or lighter flame. *QST* also reprints another soldering tip from 1961; this is to use a small 0·5-0·75in brush to remove solder droppings.

Improved high-Q af filtering

An unusual approach to improving the performance of sharp, "active" audio filtering is described by Tom Cook, N3AXN, in *QST* (April 1982, pp33-36). He points out that filtering of this type has only limited ability to handle interference; marginally weak signals with heavy QRN cause problems; the high Q tends to make both noise and signal sound alike. His solution is to provide a form of noise blanking by using rectified pre-filter signals as one input of a differential amplifier, with the other input controlled by the voltage level of the filtered signal. In the absence of a signal the noise pulses more or less balance out, but with a wanted signal the output from the differential amplifier goes positive and this is applied to a voltage-controlled amplifier. The cw signals, it is claimed, emerge "above noise" at high Q settings even under heavy QRN/QRM. Fig 6 shows an outline of the arrangement. The complete circuit diagram is given in *QST*, but in brief it

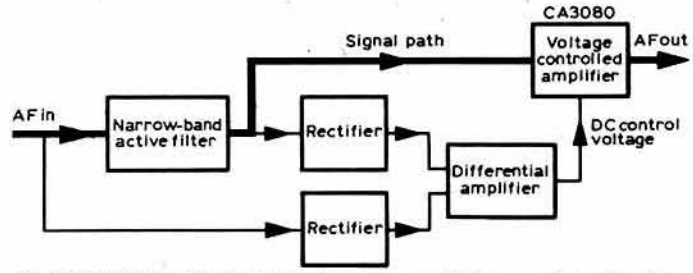


Fig 6. N6AXN's anti-noise arrangement to provide improved results with narrowband high-Q active af filter

uses two TL084 quad bi-fet op-amps and an LM324 quad op-amp, and the voltage-controlled amplifier is an RCA CA3080 operational trans-conductance amplifier.

Putting up vhf-uhf antennas

Recent years have seen a significant change in the antenna requirements for many newly-licensed amateurs. For hf operation the need is usually for substantial towers or masts capable of carrying beam arrays, or high mast or tree supports for wire antennas, or roof or side-of-house mounting for groundplanes and verticals. But for vhf and uhf operation—on which most newcomers (as Class B licensees) now launch their initial transmitting activities—the requirement is for antenna systems much closer to those needed for good uhf television reception. Many antennas of this type are mounted on chimney stacks, or similar high points, using mounting brackets, lashings etc—generally with relatively-short non-ferrous tubular masts, although these may include some 5m (17ft) masts. Because of the tv requirement there is a wide range of such fittings available, although they need to be used correctly and with knowledge on the part of the installer.

Not all television and vhf/fm domestic installations for broadcast reception are of a high standard (with severe gales usually leaving a trail of damage not unlike that reported in amateur radio practice). However, over the years a good deal of expertise has been acquired, and well-tested guidance provided by the main firms and trade associations involved—partly in an attempt to counter the poor standards of the occasional "cowboy" manufacturers and installers. Antennas should be put up to stay up.

For example, almost 10 years ago a "Code of Practice" was issued by the National Federation of Aerial Contractors (an organization that subsequently merged into the "Confederation of Aerial Industries". The latest 20-page edition of this code contains some sound guidance from which the following brief extracts are taken:

Masts, lashing and brackets. Parts of the antenna structure, such as mounting brackets, fixing bolts and most head clamps are often made of steel: this metal does not enjoy the natural protection of aluminium, and a separate protective finish is required . . . When an antenna is added to an existing installation, both the strength and suitability of the installation should be checked for it to take the additional stress.

Tubular masts. It is preferred that masts should be of non-ferrous metal. If steel masts are used it is necessary that they should have a hot-dip finish, to ensure that the inside is adequately protected. With all installations care must be taken that no water can be trapped inside the mast. This is particularly important where steel masts are used.

Mast diameter alone is no indication of mast strength. The wall thickness must be adequate. Recommended wall thicknesses etc are:

Maximum tube length	Tube diameter	Wall thickness (aluminium)	Wall thickness (steel)
1·8m (6ft)	25mm (1in)	1·2mm	1·2mm
2·5m (8ft)	32mm (1·25in)	1·6mm	1·2mm
3·0m (10ft)	38mm (1·5in)	1·6mm	1·2mm
5·0m (17ft)	51mm (2in)	2·0mm	1·6mm

Brackets and lashings. For welded brackets, good quality welds are essential, preferably with a welding process that produces a clean surface for final finishing. Take care that the wall or other surface is sufficiently strong to withstand the maximum loadings; avoid use of mortar courses for fasteners. Holes should be drilled to the correct diameter and depth for the chosen fastener (eg expansion bolt or plug-and-coach bolt). Where there is any doubt about the security of fixing, obtain professional advice. For very thin walls additional support and means of spreading the load over a large area may be necessary. Where brackets are used for wall mounting, one should be a tripod to support the vertical thrust, and they should be at least 500mm apart. Any guy wire should have proper provision for adjustment of tension. When fitting the mast to a bracket, nuts should be spanner

tightened, but avoid distorting the mast as this may result later in metal fatigue.

Chimney-mounted brackets. These are available in several types, and should be suitable for mast and antenna use. Lashing wire should be not less than seven strands of 1·2mm wire (or equivalent cross section); it should be galvanized and terminated by "whipped and thimble" or equally secure method. Use steel corner plates to protect brickwork. The top of the lashing bracket should be at least three courses of brickwork and not less than 250mm from top. A lashing bracket should have a minimum depth bearing of:

Masts up to 1·8m	150mm depth
Masts from 1·8 to 3m	300mm depth
Masts over 3m	double lashing with spread not less than 450mm

Wall-mounted brackets. These should be held by at least four expansion-type bolts, or through-bolted; bolts should enter the brick and not the mortar joint. For double brackets, spacing should be a minimum of 500mm. If mounted on wood, take care that timber is thoroughly secure, using coach screws or through-bolting.

Rotators. When light-duty rotators support more than one antenna (or a large array) consider using an alignment bearing. The minimum mast diameter is 33mm but 51mm is recommended. Preferably use heavy-duty mast and supporting bracket.

Coaxial cable fixing. Cables with a diameter of less than 10mm should have fixing points: *on masts,* no greater than 230mm apart; *on other vertical runs,* no greater than 750mm; *on horizontal runs,* no greater than 230mm. Do not deform cable by using staples etc. Bending radii of cable should not be less than that recommended by manufacturer (or not less than 10 times the outer diameter of the cable). Protect cable by taking it behind gutter, and use a drip loop at the point of entry, which should be via hole drilled downwards towards exterior of house in such a way that it will not damage cable, then seal hole.

It will be appreciated that these are just a few selected (and often paraphrased) extracts from the detailed CA1 booklet.

When installing any antenna, mast etc, or using ladders, great care should be taken to check the position of any overhead power lines and to give them a very wide berth. Even on the day I am writing these notes my newspaper reports the deaths of a father and son "as they adjusted the television aerial on their holiday caravan . . . the aerial touched an overhead power cable". Any work on roofs and ladders involves risk. Unexpectedly, I was reminded on-air a few weeks ago that my own inexperience (37 years ago) once caused me to fall right through a (fortunately low) roof. It *can* happen.

"Half-ugly" construction

Recent items pointing out that one-off pcbs tend to be a disincentive to home-construction and are often neither necessary nor in any way worth the bother, have prompted Steve Gilbert, G3OAG, to commend the virtues of "plain, unclad Veroboard and associated little pins". He writes: "This is fantastic stuff. Circuits can be made up using the component leads as connecting leads, using the pins where necessary as anchor points. In my view a pcb is essential only perhaps for those rf projects where a complete groundplane is required and obtained by using a double-clad board. The single-clad pcb is only a plain board with the bits wired together. With plain Veroboard the job can often be completed without even thinking about board layout, drilling holes etc. I always keep a couple of pieces in the shack. Then if I come across a useful-looking circuit I go ahead without any delay; point-to-point wiring, where needed, can be done with 22swg tinned-copper wire, using sleeving where required; ic devices are easily hard-wired."

Regulating high-current supplies

Dr Barry Kirkwood, ZL1BN, has commented on the 12V, 25A power supply unit described in *Radio Communication* (February 1982, pp135–6) by W. Blanchard, G3JKV. This was not a *TT* item, but the useful suggestions made by ZL1BN would apply generally to high-current units. He writes: "I have been experimenting with high-current units along similar lines to G3JKV's unit, but have found that it is possible to obtain much superior regulation, with virtually equivalent components, by 'wrapping around' the ic regulator. The arrangement shown in Fig 7 is based on one described by D. Roden, VK2BXF, in *Break-in* August 1979, and similar circuitry is also shown in the *National Linear Data Book* (1976) in the application notes for the LM317 (pp1–20).

"In Fig 7(a) Vreg is that of the ic regulator output, and the other parameters are as in G3JKV's psu. Regulation, however, is improved by putting the fuse in 'upstream' of the regulator (in any case the equipment being powered will usually have its own fuse in its power line). In such circumstances a thyristor 'crowbar' arrangement (Fig 7(b)) should be

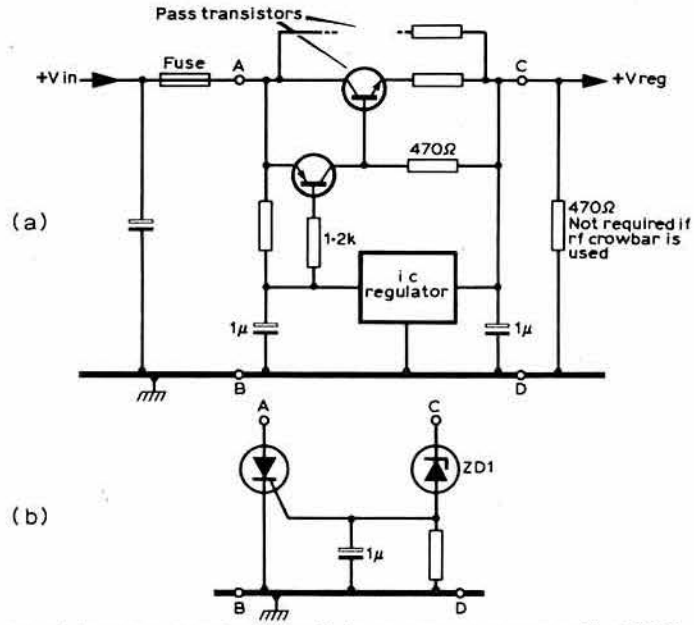


Fig 7. (a). Improved regulation for high-current psu as suggested by ZL1BN. (b) Thyristor crowbar arrangement requires thyristor of suitable power rating and acts to blow fuse F

connected between points A, B, C and D with a 1μF capacitor to prevent false triggering by transients.

"I would stress that these suggestions are not made in criticism of the G3JKV design but to encourage further development in this field. There are some other interesting possibilities. For example: (*a*) The pass transistor might usefully be connected in the negative rather than the positive line, as suggested some time ago by LA8AK in *TT:* Fig 8(a). (*b*) It might prove rewarding to study the effect of a separate feed to the regulator plus an npn driver so that the pass transistor would saturate before regulation is lost.

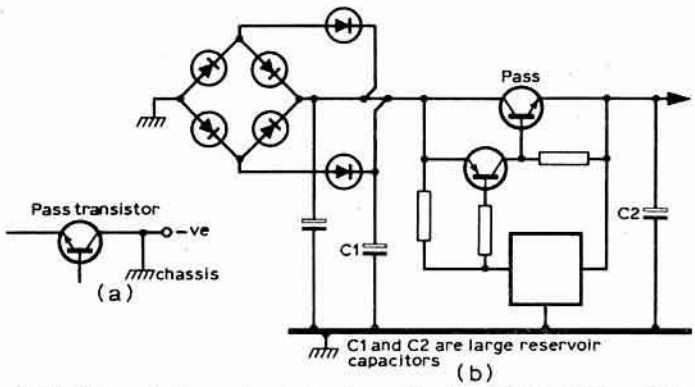


Fig 8. (a) "Inverted" pass transistors in negative line. (b) Use of "separate" bridge rectifier to supply regulator and driver

This could be good practice when using a psu with fluctuating loads (eg ssb/cw transceivers) since V_{in} to the pass transistors could then be lower (Fig 8(b) shows a possible arrangement). (*c*) Use of a separate transformer winding and bridge rectifier for the regulator and driver overcomes drop-out problems.

Feedback

Brian Phillips, G4DVF, endorses the comments of G3KKC that the G2DAF Mk2 receiver is still an excellent, viable design, though one which, in his case, has been further improved by using push-pull rf stage and mixer. He believes the only real component-availability problems are the four- and five-gang variable capacitors (he has followed G2DAF's solution) and the specified mechanical filter. For home-construction ("well worth the trouble") he comments on the much lower component-count than for comparable semiconductor designs, with enough space to use a reasonably-sized soldering iron. He admits he found winding 19 "push-pull' coils a fairly formidable task, but by no means an impossible one. G4DVF (Brian Phillips, Woody Nook, Petworth Road, Wormley, Godalming, Surrey) would be willing to share experiences with others who have recently tackled (or are tackling) the G2DAF receiver. □

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John Morris, G4ANB*

NEW CONTRIBUTOR APPOINTED

Commencing with the August issue, Ken Willis, BSc, MIEE, ARCS, G8VR, will take over from John Morris as contributor of *4-2-70*.

All items of vhf operating news should now be sent to Mr K. E. V. Willis, 11 Old Downs, Hartley, Dartford, Kent DA3 7AA.

Aurora

A few late reports of dx worked during the good aurora on 10 April arrived after last month's deadline. One correspondent—who forgot to give his name or callsign, but who I am fairly sure is GM4CXM (XP09g)—worked a very nice string of stations, including LA8UU (CT80j), DK1FGA (FJ26d), DJ9EV (EJ77g), DJ0JJ (EI12h), DK8SG (EI13j), SM5EFP (HT50b), OH2BBF (LT15b, a distance of 1,657km) and LA2PT (FT13b). Also heard was OK2VPB/P (JJ03f).

G3LTF, in Essex, described the aurora as one of the best he had ever heard in terms of dx availability for long periods. Among those worked were UP2BJB (LP square), SK7JD (IR), UK2RDB (MT), OH1AA (LU), SM5DFF (IS), OH0BA (KU), UQ2NX (MR), UP2BCL (LQ) and OH2BBF (LT). G3LTF described this last contact as "a gem", and a glance at the QTH locator map reveals why. On 432MHz G3LTF just missed working GM4JLY, due not to lack of signal strength but to frequency confusion caused by high doppler shift.

GM8OFV (YP05g) used 250W of ssb to a 16-element at 10m agl with a 3SK88 on receive to work 10 countries and 30 QTH locator squares between 1415 and 1900gmt. The best beam heading stayed just about due east for the whole opening. Despite a constant pile-up making it very difficult to decipher callsigns, GM8OFV worked many Continental stations, including DJ9EV (EJ square). A Czechoslovakian station was heard calling, but the contact could not be completed. A much shorter and weaker second phase at 2245gmt produced only G and GW contacts.

GM4CXM (?) also found a good event earlier in the month, on 2 April. The best dx were SM0IOT (JT52f), Y22QG (FM79h), LX1GR (DJ21g), LX1DB, OK2TU (IJ13e), OK1DPB/P (HK63f), OK1IDK (GJ28h) and OK1KRQ (GJ28h).

Moonbounce

G3WDG and G4KGC, in Towcester, have been carrying out more 432MHz eme tests using their small 4m dish, including participation in the ARRL EME Contest. On 4 April, during the first leg of the contest, "random" contacts were completed with DL9KR (16 Quagis), G4EZN (12m dish), OK3CTP (16 Yagis) and W1JR (16 Yagis). In the second leg on 1–2 May, G3LTF (5·5m dish), I5MSH (11m dish), YU2RGC (32 Yagis), OK1KIR (5m deep dish), N9AB and SM0ERR (8·5m dish) were worked, all but the last two on sked. Just after the contest, on 3 May, G3WDG worked DF7VX, who was using only four 23-element Yagis. This contact was not easy, as four Yagis to a 4m dish is "a bit of a marginal situation". G3WDG feels that having rotatable polarization on the dish feed to overcome Faraday rotation is a great help in making contacts using such a small system, and that having two operators is also useful.

G3LTF was also active during the ARRL EME Contest, using his 5·5m dish. During the first leg 24 stations were worked on 432MHz and seven on 1,296MHz. New ones on 432MHz included VK6ZT, HB9SV and F6ECI. A "gottaway" was KM4Q in the rare (for eme) state of Kentucky. In the months before the contest G3LTF worked many stations off the moon, including K9XY in Wisconsin, a new state, and K0UDZ who uses only four K2RIW type Yagis fitted with a bore-sighted tv camera for moon tracking!

Also during the contest, but this time during the second leg and down on 144MHz, GJ4ICD joined the growing band of operators who have worked K1WHS by eme. The cw contact was a 144MHz GJ-W "first". At times the signal from the massive 24-Yagi array of K1WHS reached 5dB above the noise in Jersey, despite "very bad" auroral conditions.

Beacons

The Home Office has approved the proposal for a 432·990MHz beacon at GB3ANG (YQ35c). The new unit came on the air on 17 May, running about 10W to an eight-element Yagi on a beam heading of 170°. The transmitter was built by GM8BJF. This "completes the set" at GB3ANG, where 70·060 and 144·975MHz transmitters are already operational. Reports would be welcomed by the beacon keeper, GM8BZX, QTHR. The new 70MHz beacon at GB3ANG, with its high-speed ms-style cw identification, seems to be proving effective, as its signals have been positively identified as far south as Kent.

Another complete set of vhf/uhf beacons is being planned for GB3CTC (XK64a). Along with site change requests for the 70·030 and 144·915MHz units, an application has been submitted for an additional transmitter on 432·970MHz. These various proposals are still working their way through the system at the time of writing. The 70 and 144MHz transmitters for GB3CTC are complete and just about ready to go as soon as approval is given, but some help with the hardware for 432MHz would be appreciated. What is needed is a 10 to 25W transmitter and associated power supply. An antenna and feeder cable are already available, as is a suitable crystal. As a challenge to any budding beacon builder, the transmitter will be housed in a 19in rack alongside commercial equipment sharing the same site, so the quality of construction and finish must be of the highest. Any offers of help would be gratefully received by G3UUT, QTHR.

Callsign changes have been approved to bring some of the few remaining GB3+2 beacons into line with the standard GB3+3 format. The Emley Moor station GB3EM (432·910MHz, ZN32b) is to become GB3MLE; and GB3SU (70·05MHz, ZN61a) has already changed to GB3BUX. The timetable for GB3EM changing is uncertain, but it should be within a few months at most. One other hardware change has also been made to GB3SU; the fsk identification shift has been increased to 170Hz in anticipation of future rtty identification.

Repeaters

After some more-troublesome-than-usual last-minute problems, vhf Phase 5 has finally been submitted to the Home Office to be considered for licensing. In vhf Phase 6, proposals for units in the Orkney Isles (GB3OC), Shetlands (GB3LU) and Paisley (GB3PA) are currently being vetted by the Repeater Working Group, and several other letters of intent have been received.

There is still no sign of uhf Phase 6 being released, but in the meantime the proposed channel for uhf Phase 7 proposal GB3YS (Yeovil) has been settled as RB2. The full list of units in the phase was given in last month's *4-2-70*.

Work is just starting on uhf Phase 8. Preliminary proposals have been received for rtty repeaters in Ealing, Leighton Buzzard and Martlesham; and for normal speech units in Basingstoke, Medway Towns, Pontefract and Rossendale Valley.

On 145MHz there are only three outstanding units which have been licensed but are not yet operational, and all three are expected to come on the air very soon—perhaps by the time this is published. They are the Lake District repeater GB3LD (R3, Ulverston) and the "Borders pair" GB3BT (R2, Berwick-Upon-Tweed) and GB3SB (R0), for which a site change to Duns is pending.

On uhf there are rather more outstanding units, perhaps because of a lower level of "public demand" to get them on the air. Of these, a site and channel change (to RB15) have been approved by the Home Office for the Oxford repeater, GB3OX, which is expected to come on soon. GB3TS (RB14, Middlesborough, Cleveland) became operational earlier this year.

The group originally sponsoring the north Devon uhf repeater GB3ND (RB14, Ilfracombe) have decided not to continue with the project. The RSGB would like to hear from anyone else who is interested in providing a uhf repeater service in the area.

GB3SH (RB11, Stockland Hill, Devon) was due on within days of this being written. GB3HC (RB6, Hereford) has been off the air for over a year due to the loss of its site. An alternative location has now been found and a site change request submitted to the Home Office. The hardware has also been overhauled, and if all goes well GB3HC should be back in August or September.

A new logic unit has been fitted to GB3VA (R4, near Aylesbury), the main object being to allow the repeater to give a "T" after a carrier-accessed over. Some fine tuning of the squelch threshold and deviation levels and detailed changes to the logic sequence have also been made. GB3VA is run by the

*c/o RSGB HQ, 35 Doughty St, London WC1N 2AE.

Aylesbury Vale RG, whose secretary, G3MEH, QTHR, can provide further details.

G2AYQ has written to "put right a misunderstanding" about GB3NC (R5, St Austell). Many mobiles travelling through the area say they are calling through the "North Cornwall" repeater, whereas the callsign actually stands for "Newquay Club", which built and maintains GB3NC. Indeed, the "North Cornwall" epithet is not only a misnomer, but also misleading, as the repeater is actually located towards the south of the county.

Repeater Working Group open meeting

The RWG Newcastle-Under-Lyme open meeting on 8 May attracted some 40 visitors. It seems that the day is past when repeater group representatives would travel hundreds of miles to attend a meeting, as most of those present were from the Potteries; with the notable exceptions of a representative from the Malvern Hills group and of course the RWG members themselves, some of whom had an 800km round trip.

The meeting had the usual format of an RWG member explaining some aspect of the RSGB's repeater co-ordination work, followed by questions and comments. There was no shortage of audience participation! Topics raised from the floor included: how to persuade newly-licensed amateurs to contribute to the repeater they use so often; whether the networks have grown big enough—or even too big; use of simple rather than complex control logic to relieve congestion; and interference to uhf repeaters from atv stations operating too low in the band or with too wide a bandwidth.

Two familiar questions from the floor were "Why don't you juggle with repeater sites and channels to get a more evenly distributed system?" and "Why doesn't the RSGB produce repeater service maps, repeater books and freely available repeater newsletters?". The problem with the former suggestion is that building the networks requires partnership, the Society taking care of licensing and overall co-ordination, with separate groups responsible for individual repeaters, and so the Society cannot just unilaterally "lay down the law from above" in this way. The second idea is fine—provided someone is prepared to come forward to put in the vast amount of time and work involved!

In a lighter moment one committee member wondered how one of the 33km squares used for uhf repeater planning could be exactly covered when radio signals tend to radiate outwards in a circle. This problem was instantly solved by a suggestion from the floor that the repeater should transmit square waves.

The next RWG open meeting will take place in Bristol in September. Details will be given nearer the time in *Rad Com, Repeater Report,* and on GB2RS.

IARU Region 1 dx records

Folke Rasvall, SM5AGM, the IARU Region 1 co-ordinator of dx records above 30MHz, has compiled the following table, arranged by band and propagation mode, of the best vhf/uhf dx worked by amateurs in the Region up to the end of 1981:

	Callsigns and locations	Mode	Date	Km
50MHz	ZB2BL (5°W 36°N)-JA1BK (Japan)		10/4/80	~11,000
70MHz				
tropo	GM3WOJ/P (XO26e)-GJ3WMR (YJ60e)	ssb	12/8/78	628
aurora	G3OSS (ZL40h)-GM3JFG (XR40c)	ssb	28/8/78	709
ms	G3SPJ (AL41a)-GM3JFG (XR40c)	cw	13/12/78	728
Es	G5MR (England)-CN8MG (Morocco)	cw, a.m.	25/5/60	~2,000
144MHz				
tropo	EA8XS (SO73d)-GD8EXI (XO77h)		4/9/81	3,025
aurora	G3CHN (YK61b)-LZ2KBI (LD24c)	cw	26/7/81	2,138
ms	GW4CQT (YL25d)-UW6MA (TH69c)	cw	12/8/77	3,099
Es	CT1WW (WB63b)-OD5MR (36°E 34°N)	ssb	28/6/79	3,864
F2/te	I4EAT (FE60f)-ZS3B (15°E 26°S)	cw	30/3/79	7,788
eme	SM7BAE (GP26d)-ZL1AZR (175°E 37°S)	cw	4/3/69	17,523
432MHz				
tropo	EA7PZ (XX05c)-I2KSX/8 (HY40h)	ssb	2/8/80	1,824
aurora	SM5CUI (IT09b)-UA3ACY (SP28j)	cw	9/11/75	1,260
ms	SK6AB (FR30c)-SM2AID (LZ32h)	cw	12/8/77	1,033
eme	I5MSH (FD17f)-ZL2BCG (172°E 41°S)	cw	6/10/79	18,437

This latest edition of the table took some considerable time and effort to compile because of the difficulties experienced by SM5AGM in finding out all the necessary information. Indeed, there are one or two contacts which I feel fairly certain have been bettered by UK operators, but SM5AGM cannot include new entries unless he receives the information. Perhaps vhf/uhf operators are just naturally modest.

Claims to have beaten any of the above records would be welcomed, and should be sent in the first instance to the UK record co-ordinator, G5UM, at 27 Ingarsby Lane, Houghton-on-the-Hill, Leicester LE7 9JJ. The information needed is band, date, propagation mode, transmission mode and the callsigns and locations of the two stations involved. For a contact to enter the record table, QSL cards must have been exchanged.

Expeditions

The Irish Radio Transmitters Society is commemorating its golden jubilee this year, and as part of the celebrations an expedition to VN and UN locator squares will be mounted from 9 to 13 August, coinciding with the Perseids meteor shower. The official Society callsign, EI0RTS, will be used, and operation will be on 70 and 144MHz. Skeds for 144MHz can be made on the 14,345kHz vhf net. Stations looking for 70MHz skeds should contact EI2CA, the IRTS vhf manager, who is operational on most Sundays on 7,060kHz ±QRM around 1115gmt. The same frequency will also be checked at 1230gmt each day during the expedition.

Members of the Derbyshire Hills Contest Group, including G8ROU, G8PNM and G8RDJ, will be operating from XM locator square in the county of Dyfed from 8 to 13 August inclusive. The callsigns and operating frequencies will be GW6APZ/P on 144·230MHz and GW8ROU/P on 432·230MHz—in both cases ssb. There may also be some operation on 144MHz horizontal fm and, if equipment becomes available, 1,296MHz ssb. On 144MHz the period 11–13 August will be reserved for ms operation. This trip is a repeat of a moderately successful expedition last year when the number of stations worked was very encouraging, despite lack of advance publicity. An sae to G8ROU, QTHR, will bring further details.

G4KUX, G4CJG and G8EEM plan to be operational on 70, 144 and 432MHz from QTH locator WR48e, 4km southeast of Dunvegan on the Isle of Skye, from 7 to 14 August, coinciding with the Perseids. The details are: GM4CJG/P running 150W to a four-element on 70·260MHz; GM4KUX/P running 400W to a 16-element on 144.260MHz for tropo ssb, 144·428MHz for ms ssb and 144·128MHz for ms cw; and GM8EEB/P running 50W to a 21-element on 432·260MHz. UHF will only be used if tropo conditions are good. No skeds will be made before the expedition, but the group will be active on the 14,345kHz vhf net daily, and possibly also on 7MHz if a net controller in southeast England is found.

By popular request GM8OEG, GM3ZXE and GM4JCM are making provisional plans to visit XS locator square for the Perseids. Operation will be mainly on ms, but tropo will not be ignored. The legal limit and HAG antennas will be used on 144MHz. On 432MHz only 10W will be available, unless some kind soul offers the loan of an amplifier. The 14·345kHz vhf net will be used for setting up skeds during the expedition.

Midlands VHF Convention

The 1982 Midlands VHF Convention will be held on 9 October at Wolverhampton Polytechnic, close to the railway station. The format will be similar to last year's very successful inaugural event, and those who remember the marathon trek between exhibition and lectures will be pleased to learn that the organizers have managed to find a new lecture theatre much more conveniently placed, just opposite the real ale stocked bar. There will be three lectures: "Microprocessor applications in radio communication", by R. Butterfield, G3VYB, of Microwave Modules; "Frequency synthesizers", by Peter Chadwick, G3RZP, of Plessey; and "Tropospheric scatter propagation", by Julian Gannaway, G3YGF. Long gaps between the lectures will allow for extended discussions or leg-stretching, and give time to look round the "small select" trade show.

Other attractions will include a measurements room stocked with modern professional test gear, a static exhibition of items of interest to vhf/uhf operators, and an early evening film show. Rooms will be available at cost for any groups wishing to organize special interest meetings. Lunchtime snacks and drinks will be on sale, and in the evening a buffet will be available.

The 1982 convention has all the makings of being once again a thoroughly enjoyable day out for the vhf/uhf enthusiast. Tickets for the convention cost £1 in advance or £1.25 on the door; and for the buffet £3.50 in advance or £4 on the door, if there are any left. Applications should be sent to Peter Burden, G3UBX, 28 Coalway Road, Wolverhampton, WV3 7LX. As demand may well exceed supply, early booking is a good idea.

Awards

Doug Parker, G4DZU, of Bradford has taken the IARU "Worked All Continents" award for operation on 144MHz eme. The six stations worked for the award were JA6DR, VK5MC, ZS5CY, KR5F, G5CSZ and YV5ZZ. G4DZU thus becomes the first G station to achieve 144MHz WAC using only moonbounce. The contacts with JA6DR on 9 April 1979, VK5MC on 21 May 1979, and YV5ZZ on 4 April 1982 may also be 144MHz "firsts" from the UK.

The Martlesham RS, G4BPO, has the annoying habit of working far too many stations during vhf/uhf contests, and to add insult to injury the

society has now started claiming awards for operation as G4BPO/P. The first batch of cards to reach the vhf awards manager contained enough verifications to bring 432MHz FMD Standard No 173, 432MHz 4-2-70 Squares 30/6 No 19, plus a Microwave Squares Award. There are promises —or should it be threats?—of more to come!

G8LZM in Cleveland has taken sticker No 6 for 10 countries and 40 squares worked on 432MHz to add to his basic 30/6 award No 18 taken two months earlier. On 144MHz G4MDZ, of Kent, missed out the lower levels and went straight to the 100/20 level, becoming No 14 in this category.

I have received one or two enquiries from new members about the RSGB vhf/uhf award schemes. The "Four Metres and Down", or "FMD", awards are given for working sufficient numbers of UK counties and recognized countries on 70, 144, 432 and 1,296MHz. In addition to "Standard" and "Senior" categories for each band, there is a "Supreme" award given for successful operation on three or more bands. The "4-2-70 Squares" awards are based on the number of countries and "big" QTH locator squares (as given by the first two letters of the locator) worked. There are several categories for each of 70, 144 and 432MHz, ranging from "not easy" to "practically impossible"! All RSGB vhf/uhf awards are also available to listener members on a "heard" basis. Award claims have to be fully supported by QSL cards. The full rules are published from time to time in *Rad Com*, most recently on p147 of the February 1982 issue.

Balloon Carrying Amateur Radio

April's *4-2-70* carried a description of the South African AMSAT project "BACAR"—"Balloon Carrying Amateur Radio". Dave Woodhall, ZS6BNT/G3ZGZ, has been intimately involved with BACAR since its inception, and has very kindly provided a massive amount of information about the history and current state of the project.

The first test flight took place on 30 January using two balloons, one to supply the main lift and a smaller one to help reduce the rate of descent. The flight package, built by ZS6ANL and ZS6BNT, consisted of a 144MHz beacon with fm telemetry measuring temperature, housed in a lightweight plastic drink bottle! The beacon power was switched between 200mW for 10s and 5mW for 50s. This was done to conserve battery power; to help in the recovery phase when df bearings would have to be taken close to the transmitter; and to test the power level needed for accurate telemetry collection during the flight.

After one or two hitches the balloon was launched and "'mission control centre" at the Johannesburg club was able to track the flight for about 150min until the main balloon burst at an estimated height of 24km. The only problem during the flight was failure of one of the temperature sensors. The package descended slowly and safely on its parachute, and after a massive df hunt was located on the roof of a house near Johannesburg.

The second test flight, on 27 February, was again very successful. On this occasion the telemetry gave battery voltage as well as internal and external temperatures, and worked well throughout the flight. After reaching a height of 33km, and flying an estimated 200km in a dog-leg path, the balloon burst and the package landed about 40km from the launch point in very hilly country. This gave the recovery team some problems with reflections confusing the df gear, but everything was eventually recovered safe and sound.

The first flight "in anger" took place on 10 April. The payload consisted of a sophisticated rtty multi-channel telemetry system monitoring various circuit and environmental parameters; 144MHz recovery beacon; and a 144 to 432MHz transponder. The last had a bandwidth of 30kHz, and was designed to be used in exactly the same way as the Oscar Mode J transponders. Total package weight, including the parachute, was 5kg, and four balloons were used to provide sufficient lift.

About 15min after launch and at an altitude of 4·5km the recovery beacon, set to operate only when the ambient temperature was above freezing point, switched itself off and BACAR was declared operational. The first contact was probably a three-way between ZS6UL, ZS6MC and ZS6BNT. Many other contacts were made through BACAR, and the 432MHz downlink was heard as far away as Salisbury, Zimbabwe.

The package rose to about 33km, where it is thought that one or two of the balloons burst. The remaining balloons had sufficient lift to keep the package in equilibrium for the next four hours—which was not the intended plan at all!

Eventually the telemetry indicated that the package was descending, and about 10h after launch contact with the package was lost. The following day a light aircraft flew around the descent area and detected strong signals, but two df teams dispatched to the area by road could hear nothing. The day after that another air search also failed to detect anything. At the time of writing the best estimate is that the balloon landed *somewhere* between Newcastle, South Africa, and Sydney, Australia. ZS6BNT bravely describes losing the package as a "slight disappointment" in what was otherwise a great success.

ZS6BNT has expressed his thanks to the very many individuals and companies who contributed time and materials to project BACAR; a list too long to reproduce here. He has given special thanks to Jan Smuts Air Traffic Control which provided unlimited assistance and even closed a whole section of air space to give the balloon safe passage!

Despite loss of the package, project BACAR will continue and new hardware is being prepared for the next flight in August.

As to the point of the exercise, I can do no better than quote ZS6STB: "It will be an opportunity to improve our vhf/uhf equipment, antennas, operating procedures and vhf df capabilities; not to mention the amount of *fun* everyone can have!"

30 and 10 years ago

"Capt. E. Clarke, G8AO, holds the first Marine Mobile Licence to be issued in this country, and has already made a voyage up the east coast from London signing G8AO/MM. To avoid disappointment, it should be pointed out that Capt. Clarke is restricted by the terms of his licence to communication with certain specified stations on 2 metres."—G2UJ in *Around the V.H.F.'s*, July 1952.

"Following a meeting held at the MPT on 7 April, Mr D. E. Baptiste announced at the VHF Convention that the Ministry would agree to a controlled experiment and would shortly issue a licence for this purpose. The licence is for an initial period of 12 months and allocates the callsign GB3PI."—from an article by G3SXK in *Rad Com*, July 1972, describing the first UK repeater.

Scatter

Ian Davies, G3KZR, picked up one point from the hints on Es operating given in May's *4-2-70*; use of the NATO phonetic alphabet (Alpha, Bravo . . .). He has found that many southern European stations still do not use it on any band, and has often found it wise to resort to the old "geographical" code to be understood in QSB or QRM.

The plea by GM4IPK in May's *4-2-70* for G stations to beam north more often provoked a response from G4KGC: "Using a smallish system from Northants my antenna is pointing N-NW most of the time. One thing happens to me, and countless others with small systems, time and again. One hears a GM station in QSO with a well equipped and sited station in the south at, say, S2 to S9 varying with QSB. After half an hour they sign and several Gs call. Having patiently waited your turn, using cw for calling, you attract the GM's attention, obtain all his details, and transmit your own. Of course, QSB is against you, because having 'got in' on a peak one is now in a fade and the standard answer is 'sorry, can't hear you any more', or sometimes 'please try again'. After two minutes at the most the GM signs, saying 'sorry but . . .', instead of 'I will listen for your report for two minutes or until the next peak brings signals up again'.

"During auroras things are not easy either, since with OH and UP2 on the band, us plain Gs are just QRM, and almost all GMs call 'dx only'. When it comes to QSLing there is frustration again. Frankly, my QSL return from all those lovely counties worked with so much sweat is almost non-existent.

"My plea to GMs: Give us more time on tropo; don't call 'dx only' all the time; and please QSL when our cards arrive, so we don't have to prevent the tenth Lothian (or wherever) station from working OH by calling him in the aurora, hoping he might perhaps QSL the county at last."

Despite being occupied by the arrival of a new baby, GM4CXM (XP09g) managed to fit in a little ms operation during the Piscids shower. Between 3 and 10 May he worked I3TJQ (GF41g), F1KFN (CF15a), OE5XDL (HI31a), F8OP (CG36f) and DL6NAA (FK59b), all on ssb.

Members of Crawley ARC are reported to be setting up an antenna test and measurement range using some of the techniques suggested by SM5CHK in his well received VHF Convention lecture. The club secretary is Derek Atter, G3GRO.

The 50MHz *Es* season to Gibraltar has well and truly opened, with the ZB2VHF beacon on 50·035MHz having been received regularly in the UK since 18 May. The first crossband contact of the season took place at 1155gmt on 20 May when GW3MHW on 14·280kHz worked ZB2BL on 50·035MHz, both stations using ssb.

BARTG has suggested that to avoid confusion around the rtty frequencies, stations using Amtor should spread downwards from 144·600 and 432·600MHz, while those using normal rtty should work upwards.

Final

Late news: The first reported 144MHz Es opening of the season occurred on 25 May. GI6FIW (XO31g) worked SM2JDU (KX12j) at 1605gmt and heard OH before the opening disappeared at 1615gmt.

Please send all news and views for the September issue to reach Ken Willis by 9 July (late news by 19 July) and for October by 20 August (late news by 30 August). Note the earlier than usual deadlines for September. □

FINAL FINAL

Producing *4-2-70* over the last couple of years has been stimulating, depressing, exciting, tedious, invigorating, exhausting, but above all very, very educational. The process has been enlivened by three changes of QTH and one of job! It has been fascinating to watch closely the development of vhf/uhf in all of its many facets. The only hard conclusions from this observation are that there are as many aspects to amateur radio as there are radio amateurs, and that nothing is impossible.

These pages have brought many new friends and, I hope, not too many enemies. I would like to thank all of the too-numerous-to-list correspondents who have kept me well supplied with news and comment. The good bits should be credited to them, while I accept blame for any errors and omissions. I wish my successor every success and enjoyment, and my final plea is that you keep him at least as well informed as you have me. Any reports which are sent to me during the changeover will be forwarded promptly.

Last of all, special thanks must go to two people who have had scant mention in *4-2-70*; Ian and Nadine White, G3SEK and yf, who have been unstinting with moral support, constructive criticism, practical advice and material help ever since that so recent, so distant yesterday when I first took up this pen.

73, 88, gl es gd dx,
John Morris, G4ANB

PS—I am about to change QTH again . . .

Thank you, John, for your sterling work in reporting the vhf scene with dedication and skill over the past two years. Your reputation as a first-class contributor is well deserved, and we hope to receive occasional technical contributions from you whenever time and circumstance permit. A. W. Hutchinson, editor

EPHEMERIS

Satellite news and views

R. O. Phillips, G4IQQ*

Phase 3B

It had been hoped at this time to report that the final pre-launch checks had been carried out on the Phase 3B satellite prior to its launch by the Ariane rocket from Kourou in French Guiana. Unfortunately problems have arisen with main payloads for several Ariane missions, which have resulted in a delay in the launch schedule. This is of course totally beyond the control of AMSAT, and it should be stressed that there are no difficulties with either the Phase 3B payload or the Ariane launcher. It is difficult to estimate when the launch will take place, but indications have been given that it is unlikely to be before September 1982 and may be as late as February/March 1983. Hopefully it will be possible to take advantage of the delay to obtain more information on the spacecraft and how to access it—such information has been somewhat scarce up to now.

UOSAT

The spring 1982 issue (No 37) of *Oscar News* carries a detailed report from Martin Sweeting, G3YJO, indicating that the majority of the commissioning of the spacecraft had been completed by the middle of March. Martin points out that the satellite has not in fact been "tumbling" in an uncontrolled manner—as had been indicated in this column—but has "a complex motion involving transverse spin around an inertial axis which results in a cone angle that oscillates as a function of the seasonal characteristics of the non-inertial orbit plane". All of the sub-systems that have been tested have provided excellent results, except for the 40keV particle detector which appears to have been damaged during the launch.

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Orbital predictions for Thursday 1 July 1982

Satellite	Orbit No	EQX time (gmt)	Deg W
Oscar 8	22,031	1701	337
RS3	2,384	1543	345
RS4	2,367	1643	358
RS5	2,363	1503	333
RS6	2,380	1542	344
RS7	2,370	1450	330
RS8	2,359	1520	336

It was therefore with considerable disappointment that news was received in mid-April of a major problem that had arisen with the programme. It would appear that during the loading of software into the spacecraft computer, a condition arose where the computer issued a false command resulting in the activation of both the 144MHz and 435MHz data beacons. In normal operation only one beacon is activated so that telecommand signals may be transmitted in the other band. However, with both beacons switched on, the telecommand receivers were severely desensed, making it extremely difficult to load the on-board computer with new instructions. At the time of writing, a search is being made on both sides of the Atlantic for a transmitting facility that could provide sufficient signal level at the satellite to overcome the desense of the receiver. Hopefully Martin and the team at the University of Surrey will manage to overcome this very considerable setback. There are a large number of anxious experimenters hoping for a successful outcome to the team's efforts.

New Russian satellite

There were a number of rumours towards the end of April of another contribution to the amateur satellite scene by the USSR. However, it was not until 17 May that a completely new type of satellite was placed into orbit. The satellite called ISKRA 2 (RK02) was literally placed into orbit by the crew on board Salyut 7, and thus has similar orbital characteristics to the two-man vehicle. Only limited information has been made available so far, but it is understood that the satellite contains a communications transponder with an uplink in the 21MHz band and downlink around 29·5MHz. Telemetry had been copied on the 29·578MHz beacon. The orbit is approximately circular, with an apogee at release from Salyut of around 350km corresponding to an orbital period of 91·3min. This is by far the lowest orbit of any of the recent amateur satellites, and due to the much greater drag factor experienced at this altitude it is likely that the life of the satellite will be limited to some six to eight weeks.

Satellite status reports

The other amateur satellites, all of which are of the transponding variety, continue to function well. AMSAT Oscar 8 keeps soldiering on, and provides particularly good signals on the 29MHz downlink of its Mode A transponder. There have been some noticeable reductions in the spacecraft temperatures and bus voltage which are caused by the longer periods of eclipse experienced by the satellite. With cautious use this should not give rise to any problems, provided the depth of discharge of the batteries does not exceed the critical value. Under these conditions it is particularly important to observe that Wednesday is a day of rest for the satellites.

The RS satellites (RS3–RS8) are also performing very well. It would appear that there is no transponder on RS3 and there is, as yet, no sign of the robot on this satellite being activated.

Other news

At the annual general meeting of AMSAT-UK, Arthur Gee, G2UK, was re-elected chairman for a further year, and Ron Broadbent, G3AAJ, agreed to continue his many roles including secretary, treasurer and editor. Orbital calendars are available from AMSAT-UK (c/o 94 Herongate Road, London E12) for all of the operational amateur satellites. These contain full details of the orbit number, equator crossing time and longitude for every orbit. The calendars are published every two months and cost £10 for a 12-month period (£7·50 to AMSAT-UK members). This price is for the UK only, and extra should be added to cover airmail where required.

As an experiment, the satellite information net held on 3,780kHz will also be open to operators on 144MHz who are able to call in on 144·280MHz ssb. Any comments or questions can then be fed into the net by the nearest station on 3·5MHz. The nets are held from 7pm Monday to Friday and from 10.15am on Sundays.

Finally

It is hoped that this column will be able to provide a reasonably up-to-date picture of events on the amateur satellite scene. Any news or experiences relating to the subject would be welcome and should be sent directly to the address at the foot of the preceding column. □

SSTV SCENE

P. Burnett, G4BLL*

Starting on sstv

Or the hitch-hikers' guide to the sstv galaxy (with apologies to Douglas Adams).

The post bag has recently carried an increasing amount of correspondence from newcomers to sstv all asking the same question: "How do I get started?" Although this question has been answered in various publications over the past few years, unfortunately it is not apparent to the newcomer to the subject just where the answer can be found. Therefore *SSTV scene* makes no apologies for reverting to basics in the interest of perhaps swelling the ranks of sstv enthusiasts.

The first essential, which many people seem to have difficulty in accepting initially, is that although sstv is a visual medium the pictures are made up from purely audio tones, and the bandwidth of an sstv signal is in fact less than that of speech—as the following comparison illustrates.

SSTV	Typical speech
Sync pulse frequency 1,200Hz	Low frequency 300Hz
Full black frequency 1,500Hz	High frequency 3,000Hz
Full white frequency 2,300Hz	

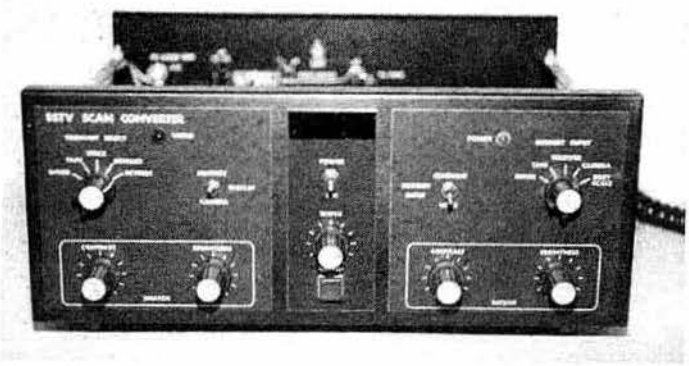
This then leads us to the realization that because we are dealing with audio tones absolutely no modifications are required to existing transmitters, receivers or transceivers. The tones are transmitted and decoded in exactly the same way as for a normal ssb or fm transmission, but with the *addition* of a scan-converter and fast-scan monitor or, alternatively, a long-persistence tube monitor to review the received picture. For transmission the sstv tones are fed directly to the microphone input of the transmitter or, usually more conveniently, to an audio input accessory socket in parallel with the microphone. For reception the incoming sstv signal is taken from the receiver loudspeaker terminals or 600Ω output socket.

The generation of an sstv video signal for inputting to the transmitter can be accomplished in a number of ways.

(1) Video from a fast-scan camera converted to slow-scan via a scan-converter such as the Robot 400 or Wrasse DL2RZ.
(2) Specially-designed sstv camera.
(3) Alpha-numeric display from a keyboard (or touch pad) such as the Robot 800, Wrasse, Tonna Theta, W0LMD, computer interface etc.
(4) Alpha-numeric display captions, simple drawings, schematics etc from a light-pen using the equipment as in (1).

In addition, any of the above signal sources may be stored on tape (domestic audio cassette or reel-to-reel recorder) for selective transmission at any time as and when desired.

For display of the generated or received sstv signal it is now common practice to use a scan-converter which (as the name suggests), by utilizing digital techniques and 65k of ram memory, converts the audio tones to the 625-line standard for display on a normal fast-scan monitor. However, it should be realized that the original slow-scan picture information is maintained—128 lines by 128 picture elements/line, ie 1:1 format and digitally 16 shades of grey—nothing is added and no extra detail is apparent just because of the change to fast-scan. The major advantage over the long-persistence tube type of monitor is that a constant brightness picture is displayed which can be viewed in full daylight, and which is "refreshed" every 8s or "wiped off" over 8s when a different picture is received. A slight disadvantage is that an effect known as "contouring" is produced, which is similar to a "painting by numbers" picture.



Front view of the Robot 400 built by G3LTZ

The home-construction of a scan-converter containing all necessary transmitting and receiving conversion circuitry has been an economical and technical possibility for the average amateur for some time, due to the general availability of the Robot 400 printed circuit board (from G4BLL) and the equivalent Wraase boards (the latter are only available fully assembled), and it is true to say that this now represents the most convenient entry into slow-scan television apart from the obvious alternative of purchasing a commercially-built unit.

Printed circuit boards for home-construction of a long-persistence tube monitor (receive only) are available, eg the G8CGK boards, but while the 5FP7 type of long-persistence tube may still be available from isolated sources, the scan-coils to fit these tubes (to the writer's knowledge) are practically unobtainable. In the writer's opinion it is now questionable if the end result justifies the not inconsiderable time and effort in home-brewing a monitor of this type, although it could still be considered an interesting technical exercise.

It is probably helpful to conclude this sstv newcomers' guide with reference to further reading matter, all of which can be recommended for the different approaches to the subject.

(1) *Slow-Scan Television Handbook*, Don C. Miller, W9NTP, and Ralph Taggart, WB8DQT. A *73* publication. This book is now out of date (and out of print), but if a copy can be obtained it still represents worthwhile reading as it discusses some of the early circuitry and basic principles of sstv.
(2) *The Complete Handbook of Slow Scan TV*, Dave Ingram. Published by Tab Books, No 859, and available from RSGB Publications (Sales). A more general treatise but quite thorough in its approach.
(3) "Slow-scan Television", *Amateur Radio Operating Manual*, 2nd edn, R. J. Eckersley, G4FTJ. A down-to-earth practical approach to setting up and operating an sstv station.
(4) "Slow-scan TV", *Amateur Television*, Chapter 9. C. Grant Dixon, G8CGK. A CQ-TV publication. Discusses some circuit techniques.

Constructing the Robot 400

The writer is happy to report that he is now getting feedback on the successful completion of several home-built versions of the Robot 400 utilizing the Robot printed-circuit board. G3LTZ comments: "Nice to see *SSTV scene* in *Rad Com* again—we have built two Robots here in Swindon, one by myself and the other by G3ETI." To prove the point he enclosed the photograph reproduced here illustrating a very professionally-finished unit. The letter continues with some interesting technical comments on building the unit: "—video sync level wrong on both—inadequate video range cured by changing Q11 to 2N706" and "—pulling at the top of picture frame—program U47 (50Hz) as 1, 2 and 4, not 1, 2 and 6". This modification is attributed to VK2AVZ. It would be interesting to hear if other constructors have encountered similar problems.

GM4FGS advises difficulty in obtaining the 711 voltage comparators and 3245 memory driver. Possible sources for these components are L.B. Electronics, 11 Hercies Road, Hillingdon, Middlesex UB10 9LS; and Tecnomatic, 17 Burnley Road, London NW10.

SSTV in general

A very welcome letter was received from C. Grant Dixon, G8CGK, giving an update of his sstv developments. The letter opens with the comment "I find that there is a growth of interest in sstv; I have myself now got two sstv-fstv converters. I have had the WB9LVI one for some time, but I have recently built the ZL1LH converter and I can strongly recommend this design. In the reverse direction I use the DL2RZ fast-to-slow converter, and I have built an interface which enables me to feed sstv pictures into the memory of the Triton computer—using a matrix of 4 by 4 dots for each pixel I can print the stored picture using a dot-addressable printer."

GM3KJF is now using the Wrasse equipment, and has a W0LMD keyboard surplus to requirements—contact him on Annbank 520580.

Many thanks to all correspondents who took the trouble to inform *SSTV scene* of their activities, enabling this extended column to be produced. Please keep up the good work!

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MICROWAVES

Charles Suckling, G3WDG*

Activity on the east coast

The increasing microwave activity in Holland is helping to make the east coast an interesting place to be for microwave operation, especially during lifts. On 4 April, G4FRE/P operating at AL07a heard PA0DBQ at 10dB above noise, and ON4RUG at 4dB above noise on 10GHz. Later in the month during the 10GHz Cumulative Contest, operating at AM78f he heard PA2DOL (peaking 40dB above noise) at 210km, and worked G3LQR over a 24km path. On the same day, on 2,320MHz, he worked PA2DOL (CL-210km), PA0WWM (CM-205km), and heard the PA0QHN beacon. The G4FRE/P 2,320MHz set-up consists of a 23-element loop Yagi, a two-stage NE645 preamplifier followed by a DCODA interdigital converter on receive, and a DCODA 005 source at 386·6666MHz driving a pa, followed by a tripler and masthead doubler, giving 2W at 2,320MHz on transmit.

On 10GHz, G4FRE/P and G8HPU/P made good use of the lift in May. G8HPU/P, operating from AL07b on the 12th, worked PA0DBQ (CM) cross-mode (nbfm-ssb) and heard PA2DOL and the PA0DBQ and PA0MS/A beacons. The latter was audible on open waveguide! On the next day, the two beacons were again heard, as well as PA2DOL, who was 60dB above noise! On the 14th, G8HPU/P and G4FRE/P worked PE1BLE/A (BL), who was 10dB above noise on open waveguide. This station was using 0·5W rf output of ssb using a phase-locked klystron—a somewhat unusual system, but very effective.

During the May leg of the 10GHz Cumulative, G8HPU/P operated from Bawdsey (AM78f) and worked G3LQR, G4FRE/P, PE1BLE/A and PA2DOL (210km, two-way ssb). G4FRE/P operated from the Naze (AL17a) and worked G3LQR, G8HPU/P and PE1BLE/A.

G4FRE has come across a very useful map to aid microwave site selection. This is the 10 mile-to-the-inch OS "Physical Map of Great Britain", which has excellent relief markings (in different colours) and has ngr and latitude/longitude scales.

Universal frequency conversion scheme for the microwave amateur bands

When planning to build crystal-controlled equipment for the microwave bands, the usual procedure is to decide upon the i.f. to be used (usually 144MHz) and then build separate local oscillator chains for each band. The end result is (*a*) a lot of work, (*b*) several different local oscillator chains, all equally difficult to adjust and calibrate, and (*c*) large cost and bulk of equipment.

SM6ECR has spent some time with a calculator investigating an approach which is far more economical in effort and hardware, which he wishes to put forward as an alternative. His basic idea is shown in Fig 1. To generate the local oscillator for three of the microwave bands (1·3, 2·3, and 10GHz) only two crystal oscillators are required (84MHz and 65MHz). An extra crystal in the auxiliary chain (79MHz) gives the 5·7GHz band as well. Only one of the crystal oscillators (84MHz) needs to be extra stable; for example, the RSGB Microwave Committee drive source could be used to generate the 336MHz signal. Once this frequency has been set accurately, the calibration will be correct at the final output frequencies. The "main" local oscillator chain needs to generate significant power if high-level mixers are to be used, but this only has to be done once with this method.

The choice of a 288MHz i.f. is interesting for several reasons. Firstly it is not in an amateur band, thus avoiding the problem of i.f. breakthrough, which is becoming an increasing problem, especially in contests. The frequency is low enough to be generated easily (eg by a diode ring mixer) and amplified, and it is relatively simple to build low-noise amplifiers at this frequency to follow the receiver mixers. The use of a high i.f. could also relax the filtering requirements in the transmit/receive mixers, allowing simpler designs to be used than with a 144MHz i.f.; 288MHz is one quarter of 1,152MHz, and could also be used as part of a direct frequency multiplication system to other bands eg 3·4GHz. A disadvantage of course is that one cannot obtain commercial equipment for 288MHz. Mixing 144 to 288MHz is definitely not recommended!

*46 Windsor Close, Towcester, Northants

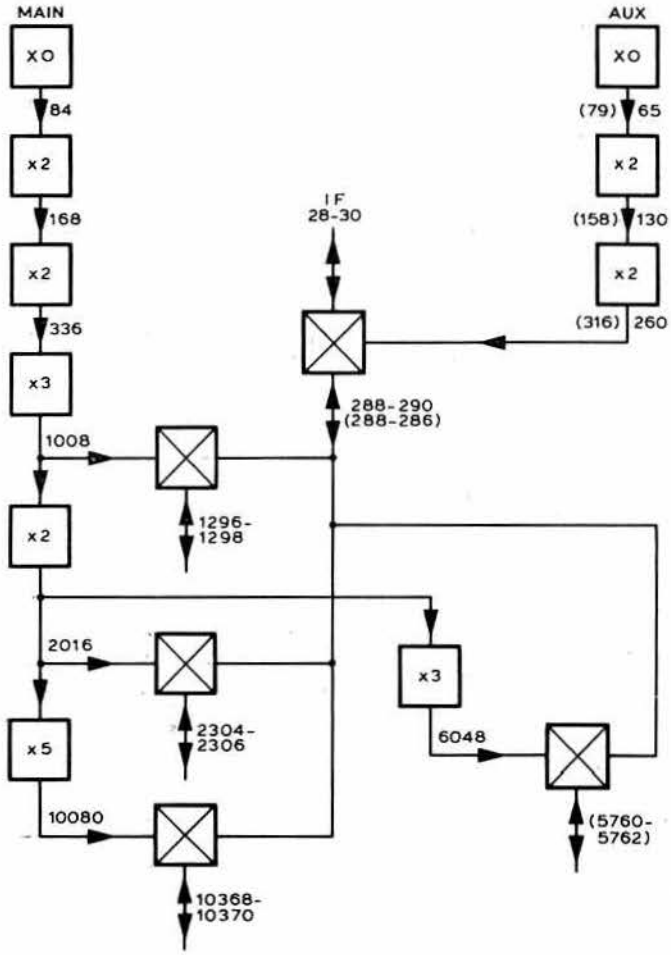


Fig 1. Universal frequency conversion scheme for the microwave bands

SM6ECR notes that other multiplication factors could be used in the "main" local oscillator chain, the main thing to aim for is approximately 0·5–1W at 1,008MHz. Directional couplers and attenuators could be used to set the local oscillator level to the correct values for the mixers. If the higher bands were not used initially, the unwanted power (which would be used in the complete system to be multiplied up for the next band) could be absorbed in a dummy load.

When the system is used for 5·7GHz, the local oscillator feeding the 28/288MHz mixer is placed on the high side, so that lsb is generated at 288MHz. The subsequent mixing to 5,760MHz restores the signal to usb, because the local oscillator (6,048MHz) is again on the high side. If lsb at 26–28MHz is available, and reverse tuning can be tolerated, the extra auxiliary crystal (79MHz) would not be required for 5·7GHz.

If a larger frequency coverage is required on the microwave bands than that provided by the 28–30MHz drive, the auxiliary local oscillator frequency could be changed (eg to generate 2,320MHz). Indeed, a frequency synthesizer could be used to generate the auxiliary frequency, as phase noise and jitter would not be multiplied, only mixed, thus giving a very flexible system indeed.

Beacon news

The 10GHz beacon GB3SWH (Bushey, N London) has recently been rebuilt and is now operational on 10,368·24MHz (crystal controlled). It runs 22mW output into a 6dBi gain omnidirectional antenna. G3JHM (Four Marks, Hants) has heard it 1dB above noise from a site near his home QTH over a very obstructed 80km path, and at 20dB above noise from Hindhead. It has also been received by G4KNZ from Great Windsor Park at 15dB above noise through trees, and by G3YGF/M while driving between Ickenham and Pinner in N London! Any further reception reports of GB3SWH would be most welcome; it should be audible without difficulty from the North Downs and the Chilterns.

The other UK narrow-band beacon on 10GHz, GB3BPO, has been proving very useful as a propagation indicator over the North Sea path to Holland during recent spells of enhanced conditions. A number of

(Continued on page 599)

SWL NEWS

Bob Treacher, BRS32525*

28MHz slp

Paul Crankshaw has sent details of the slps on 28MHz on 17 and 18 April.

SSB. Conditions were regarded by practically all entrants as being pretty dreadful, which was particularly disappointing as conditions 24h earlier had been good, and 24h later were reasonable—typical of 28MHz lately. Entries were well down when compared with the 7MHz competition—Paul was surprised to receive any at all, as at his QTH the band was totally dead for the duration of the competition.

The requirement to log the signal report given by the station heard has now been removed. However, in both events most stations did so, and to be fair to those stations the few who did not have been omitted from the tables although their scores have been acknowledged.

Only 17 countries appeared in the logs, and the results were:

			QSOs logged			
Posn	Station	Countries	15pt	10pt	5pt	Total
1	BRS48701/DL	11	5	0	9	1,320
2	BRS29909	6	11	0	0	990
3	RS49802	5	11	0	0	825
3	ARS42795	5	11	0	0	825
5	BRS48675	2	3	0	0	70
	BRS25429	14	35	0	3	7,560
	BRS44395	5	9	0	1	700

CW. Conditions were considerably better than for the ssb event, although entries were sparse. In all, 36 countries were logged, including VE1/Sable Is, XT2, 3B8 and 5H3.

			QSOs logged			
Posn	Station	Countries	15pt	10pt	5pt	Total
1	BRS30694	15	10	11	7	4,425
2	BRS29909	14	8	17	8	3,220
3	ARS42795	9	5	2	5	1,080
	BRS44395	26	13	24	24	14,430

SWL contests

David Whitaker, BRS25429, forwarded the results of the White Rose Society's second lower frequency band contest. There were 43 entries received for both the ssb and cw events. Congratulations to Chris Vermote and Alex Dodd, the two winners. It would be very encouraging if all 43 listeners now decided to enter the next RSGB hf contest that allows listener participation. How about it, and if not, why not? The White Rose Society's third contest will be on 29-30 January 1983—plenty of advance warning. The rules for the Cray Valley Society's 12th SWL Contest on 11-12 September are in "Contest News". This is the longest running swl contest in Great Britain, and probably the world, so please give it your support. Further details can be obtained from G4DFI, QTHR.

144MHz

The first signs of summer were noted on 13-14 May when there were tropospheric openings. In the south, it seemed that those on the east coast were favoured with the best of the conditions, which provided DL, PA0 and OZ, with one or two GMs in quite rare squares. CN square was the best your scribe could find on the band. Dave Whitaker, in Yorkshire, sent much the same story. His best dx was LA1EKO, BQ37g, and GM4LBE, ZU65f. He had just received a large batch of cards from the bureau which contained confirmations from last summer's activity on the band. The best was from LA6HL, CS09g, which provided country No 18 confirmed, and square No 38, and from EB4DF who confirmed YA square—that during an Es opening. Hopefully, more vhf reports will be forthcoming as the season unfolds.

QSL items

Card returns. Your scribe has been asked if it is possible to list some of those dx stations who seem **not** to reply to QSL cards, even if they are sent the desired number of ircs, an sae, and a pleading note as well! This is an area of concern for many swls, as the cost of sending cards direct is ever-increasing. Among those who appear not to reply to QSL cards are: A71AD, FM7WS, 6T1YP, 3C1AC, HZ1HZ, M1Y, KH6WF/KH8, 3D2BH, ZE6JL, FR7AI/T, VK0KC, ZL1AMO/C, 6O0DX and LU3ZY. Perhaps the inclusion of their calls here may prompt them to make amends.

Card techniques. G8TOK (ex-RS40217) has been on the receiving end of a large number of QSL cards from swls on the vhf bands, and comments on various inaccuracies which he has noted—in the hope that others sending reports to stations on vhf (and indeed hf) will avoid the same errors. The most common inaccuracies are to get the time and/or date of the QSO wrong. It can be most frustrating to the recipient of the card if he worked, say, 100 stations during good tropospheric conditions, and has to search the log for the QSO because the time is not accurately reported. It *must* be a good idea to set the shack timepiece by the "speaking clock", while if a date error occurs it must be doubtful whether a QSL card will be sent in return, as such a report simply is not accurate enough. The moral is to be legible and accurate. G8TOK also mentioned the newly-formed New Scotland Yard ARS, using G4NSY on all bands from 7-432MHz, who will acknowledge all accurate swl reports received.

DX addresses. Following the offer to provide dx addresses made by Norman Jennings, BRS48675, several other swls have offered to provide a similar service free of charge. Among them are: Norman Jennings—Rye, East Sussex, tel Rye 2530; Kevin Cooke—Cardiff, tel Cardiff 752636; and Peter Lincoln—Aldershot, Hants, tel 0252 317870. Choosing one near to you will keep telephone costs down.

SAEs. A reminder when sending stamped self-addressed envelopes—UK stamps are not accepted on letters posted in GD, GJ, GU and EI.

1982 HF COUNTRIES TABLE

Station	28	21	14	7	3·5	1·8	Total	Mode
BRS47745	161	179	178	112	109	29	768	ssb
BRS8841	173	164	190	113	90	14	744	ssb/cw
BRS46228	115	108	170	134	107	32	666	ssb
BRS44703	117	107	129	104	98	25	580	ssb
BRS25901	87	102	132	78	91	25	515	ssb/cw
ORS46084/7Q7	138	174	162	31	3	0	508	ssb
BRS1066	92	105	116	79	62	40	494	ssb/cw
BRS31440	118	85	106	74	67	27	477	ssb
BRS35509	107	83	127	72	70	4	463	ssb
ORS45992/7Q7	111	153	153	23	5	0	445	ssb
BRS45033	161	96	141	3	6	0	407	ssb
BRS30694	106	77	96	40	46	26	391	ssb/cw
BRS48675	68	91	100	49	36	18	362	ssb
BRS30493	47	89	112	40	31	6	325	ssb
RS45466	43	73	61	43	54	16	290	ssb
ARS50886	55	55	59	17	25	2	213	ssb
BRS25429	0	0	0	99	85	25	209	ssb

Keeping records

Several listeners have responded to the "knowing what you need" feature in the May *SWL news*. To enable you to choose the best system for your own needs, we will describe various systems in this and future issues.

Jim Dunnett uses index cards—one for each country (300 cards cost approx £1.50). On one side of the card is the all-time record, on the other, the yearly record. The cards are marked as follows:

	ALAND IS		OH0	Z-15							ALL-TIME
(a) Front	1·8	3·5	7	10	14	18	21	24	28	144	432	QSL
		√	√		√		√		√			√
	ALAND IS		OH0	Z-15							YEARLY
(b) Back	1·8	3·5	7	10	14	18	21	24	28	144	432	YR
							√		√			82

If soft pencil is used, the cards can be re-used in subsequent years by simply erasing the previous year's details. The column headings could be set up with a simple printing outfit, and each card could then be stamped instead of laboriously writing out the column headings 319 times!

DX swl

John Lord, ORS46084/7Q7, wrote after being mentioned by his fellow swl Stan Porter in previous features. John uses an FR7700 with an 18AVQ at 30ft, and a TA33Jnr at 65ft, inverted-Vs for 21, 7 and 3·5MHz, and a multiband doublet at 40ft.

DX news

Peter Norris, BRS47513, offered his 1·8MHz news as usual. Recent QSL card additions included GD5UG, GM4GPP (Shetland Is), OK1AVG, and ZB2GW who is carrying out trials with a 264ft wire antenna and will be pleased to send QSL cards for useful listener reports. OK1AVG commented that he responds to all incoming 1·8MHz cards. A change of QTH is likely for Peter, who has plans for an even better 1·8MHz receiving antenna. He has finished a switching system for his atus which enables him to switch from series to parallel tuning; his next project is to improve his earth system.

Bernard Hughes, BRS25901, reported speedy confirmation of XZ9A from JA8IXM in less than four weeks. Also of interest was AM01BKC, a special station operating for the World Cup football finals. QSL cards should go via EA1PJ, and UY4L via UA4LM.

*79 Granby Road, Eltham, London SE9 1EH

Archie Magrath, RS48064, had heard 90 countries when he wrote, the result of only a few months' listening. VP8ANT, 7Q7LW and 9M2GZ were his best catches during May.

Paul Crankshaw, BRS48909, copied ZD9BV on 28MHz for country No 281. Other notable callsigns logged in May included OA8CW, UA0ZDD, 6T1YP (see "Card returns"), 3X3JA, NC4U/J6L, ZL4OY/A and 4K1HK (Enderby Land, Antarctica).

Steve Muster still clings to his table-topping spot. He added VR6TC as his best dx for May. Also noted were CE7ER, 9L1DR, 9M8PW, and 9Q5ON.

Brad Bradbury, BRS1066, has purchased crystals for the new bands, and he should soon be QSX on 10MHz.

Howard Banks, BRS45033, has purchased an FT480R, and sat the RAE in early May. His FRG7 continued to "produce the goods" and he sent a list of interesting additions on 28 and 21MHz.

Robert Small, BRS8841, provided his usual thorough report on conditions in the early part of May. DF8MP/XZ, XZ5KNU/9, 3X3JA, 3X5DX and ZK2VU were his best prizes. The 3·5MHz band seems to have provided South American dx nightly, but 7MHz had been fairly poor, with only run-of-the-mill dx audible.

First-timers

Peter Lincoln, BRS42979, took up the hobby seriously some five years ago. His first receiver was a 110V valve receiver of American design which was soon discarded for a Grundig Satellit 2100. A DX300 which followed is still in use today as a back-up to an Eddystone 1570/3. Peter has added a 2kHz mechanical filter, a noise blanker, and an nbfm demodulator. He also has a full range of equipment for 144MHz reception. RTTY and sstv are also catered for by way of an MM2000 and a Wraase SC140 scan converter board. He uses a wide range of antennas, fed through a homebrew atu and preselector. Peter asked if rtty and sstv could be included in the annual table: as they are modes of transmission, there can be no reason for not including them.

David Traynor, BRS50190, joined the RSGB in January. His main interest lies in 14 and 21MHz, although occasional forays to the other bands keep his HRO and long wire content. He intends to sit the RAE in December, and was spending more time on revision work for the exam than on listening. However, several choice loggings were mentioned: VK9XT, W5VTH/KH8 and KH6ACD.

HF table rules

Several new members have asked about entry into the table. For those who have joined since December, when the rules last appeared, here are the basic requirements. The table reflects the number of countries, taken from the ARRL list, heard on each band between 1 January and 31 December 1982. You should note each new country and submit the totals for each band, total and mode(s) used before the *first* deadline date each month. The starting score is 200.

Finally

News, views, photos and comments to your scribe by Tuesday **13 July** for September; late copy by Monday **19 July.** □

MICROWAVES

(Continued from page 597)

Netherlands stations have noted a correlation between the GB3BPO 1·3 and 10GHz transmissions—when the 1·3GHz signal rises to 40dB above noise then the 10GHz beacon becomes audible. Reception reports of the GB3BPO 10GHz beacon should be sent to G4FRE.

The 10GHz beacon on Emley Moor is proving very useful to a number of stations in the North. These include G4APV, who can receive it from his bedroom window; G8GUH, who can also copy it from his home (on open waveguide); and G8AGN and G3PHO who can hear it near their home QTHs.

Netherlands amateurs also have a fairly extensive network of microwave beacons, details of which are shown in Table 1. Further information can be obtained from their microwave manager, A. Dogterom, PA0EZ, Eikenlaan 11, 1213 S G Hilversum, Holland.

First G-LA on 1·3GHz

On 12 May, G4BYV (Norfolk) worked LA8AK (DS) on 1·3GHz, which is believed to be the first-ever QSO between the UK and Norway on this band. Are there any prior claims?

During the same lift G4BYV also had 1·3GHz contacts with SM6GWA (FS) and SM6ESG (GR).

In a recent letter, which by coincidence arrived only a few days before this contact with G4BYV, LA8AK mentioned that he is now QRV on 432 and 1,296MHz, and was looking forward to his first G QSOs on these bands! On 1·3GHz he has 25–30W output and a 23-element Yagi.

He may also be able to help anyone looking for travelling wave tube amplifiers. In particular, he has been able to obtain twts to cover 1–3·7GHz (38dB gain, 25W output) and 5·7GHz (39dB gain, 15–20W output). The lower frequency type of tube has been in use for some time at SM6HYG's station with excellent results. Anyone interested should write to Jan-Martin Noeding, LA8AK, Voilelia 39/B, N-4620 Vaagsbygd, Norway.

Microwave talkback

Effective talkback is a great asset when making contacts on the higher microwave bands. The current standard is horizontally-polarized 144MHz ssb, with a recommended calling frequency of 144·33MHz. The RSGB Microwave Committee is currently reviewing the subject of microwave talkback, and would very much like to receive any comments on the effectiveness of the current standard, as well as suggestions for any changes.

Sun and moon location program

The writer has just compiled a sun and moon location program for the Hewlett-Packard HP41C calculator. The program calculates the elevation and azimuth of the sun or the moon to an accuracy of approximately 1 per cent, with time, date, and station latitude/longitude as the input data. He would be pleased to supply a listing of the program to anyone interested, on receipt of an sae.

Late news

The Derbyshire Hills Contest Group will be operating from XM80f in the county of Dyfed from 9 to 13 August inclusive, and hopes to be active on 1·3GHz ssb for this period if the necessary equipment can be obtained in time. Stations wishing to obtain further details should write to G8ROU, QTHR, and a final operating schedule should be available in late July, with details going out on GB2RS on 28 July or 1 August. □

Table 1. Netherlands microwave beacons (at 1 April 1982)

Callsign	QTH	QRG (MHz)	Po(W) to ant	Antenna Ga/dir	Antenna agl/asl(m)	Mode	Identification	QSL to
PA0EHG/A	CL48	1,296·875	4	6dB/omni	45/61	F1	Callsign every 40s	PA0EHG
PA0QHN	CM53	1,296·920	4	6dB/omni	20/20	F1	Callsign and QTH every 40s	PA0QHN
PA0ZM/A	DM65	1,296·975	5	20dB/(1)	12/34	F1	Callsign and QTH every 60s	PA0ZM
PA0TGA	CL20	2,320·97 (2)	1	10dB/NW 10dB/W	15/25	F1	Callsign and QTH every 60s	PA0TGA
PA0QHN	CM53	2,320·920	2	6dB/omni	20/20	F1	Callsign and QTH every 40s	PA0QHN
PA0MS/A	CL48	10,368·045	0·050	21dBi/NW (3)	45/56	F1	Callsign every 30s	PA0MS
PA0DBQ	CM72	10,368·10	0·040	20dB/W (4)	80/75	F1	Callsign and QTH every 30s	PA0DBQ
PE1BLE	CM55	10,368·20	0·010	14dB/SSW	35/35	F1	Periodic frequency shift	PE1BLE

Notes: (1) The beam direction of this beacon can be altered on request; normally NE.
(2) Provisional frequency. Exact frequency will be published later.
(3) The beam heading of this beacon can be changed upon request between SW and NW. Currently towards AM67.
(4) The antenna is a horn within a building. Internal reflections make reception possible over a wide area (up to distances of 60km).

THE MONTH ON THE AIR

John Allaway, G3FKM*

ARRL BULLETIN No 39 dated 3 May 1982 states that "Amateurs have been given more time to discuss proposals for wider phone bands and possible changes in operating privileges for the various licence classes. On 30 April the FCC released an order extending to 16 August the time for comments, and to 16 September the time for reply comments, in Docket 82 83. The docket proposes to extend the 14MHz phone band down to 14,150kHz. It also asks the amateur community for its views on expanding other phone bands and perhaps altering the incentives to upgrade."

Members may note particularly that a study is being made of the possibility of extending the USA telephony segments *on bands other than 14MHz*. They may share the writer's view that this may have little practical effect as far as UK amateurs are concerned—except on 7MHz. Earlier suggestions that 7,050 to 7,100kHz be opened to USA telephony are evidently still under scrutiny. The situation on this band is already difficult due to the many intruders using it, and any additional occupancy would seriously affect long-distance phone contacts from Britain with countries other than the USA. The position is being considered by the HF Committee, and the Society's views will be sent to the FCC. Individual amateurs (including those outside the USA) may also send their comments (preferably with an original and five copies) to: Federal Communications Commission, 1919 M Street NW, Washington, DC, 20554, USA. Your scribe would appreciate a copy too, please!

DX news

Spanish stations will continue to use the AM, AN, and AO prefixes with which they have marked the World Football Cup since 1 May. Those using AM are EA normally, ANs are usually EBs, and AOs are ECs. Another unusual prefix heard between 15 May and 15 June was IR0 which was used by Sardinian stations to commemorate the anniversary of the death of Giuseppe Garibaldi.

JW5IJ, JW7FD, JX5VAA and JX5BAA, all closed down on 28 April according to *DX-NL*, and have now been replaced by JW4GN, JW5EEA, JX1CY and JX3DH. The same bulletin also mentions that UA1PAM (in Franz Josef Land) is very active on Mondays from 1500 to 14,210kHz.

5V7HL is often to be found between 1600 and 2200 on 14,205, 21,305 or 28,600kHz ssb. He also appears sometimes on Sunday from 2100 on either 14,285kHz or 28,600kHz, and on Wednesdays from 2200 on the same frequencies. From Malawi 7Q7LW appears regularly on Wednesdays from 1700 on 14,190kHz. Other frequencies often used are 21,290 and 28,510kHz, where he operates from 1730 to 2000.

VE1AWS/1 should be on the air from Sable Is for most of the summer, and should be sought in the cw portions of all bands between 3·5 and 28MHz.

Macao seems to be heard much more these days, with CR9AN often being heard between 28,600 and 28,620kHz around 1200, and CR9UT frequenting 21,280kHz at a similar time. Philip Weaver, VS6CT, president of HARTS, keeps schedules on Thursdays at 1030 on 14,332kHz, and then moves to 14,307kHz. He also appears on 21,265 or 28,705kHz at 2330 on Saturdays.

Overseas news

Terry Miles has now received his Tanzanian callsign 5H3DM, and he has already been learning what it is like to be at the dx end of the pile-up. Calling "CQ" or "QRZ?" is to invite hundreds to call, and even if it is announced that at the end of contact his frequency will be changed or he is closing down he is still bombarded. Terry says that attempts to work by country are not very successful, correspondence on list operations is most interesting, and that those not in favour should try being at his end—but to take an ice-bag and plenty of aspirin! 5H3DM is the 23rd call issued since independence just over 20 years ago, and the 24th is Eric, 5H3FN (G3JCB), who will operate exclusively on cw. Bjorn, 5H3BH, lives very near Terry, and he, Terry and 5H3MO (in Tanga) are the three most active of the 12 or so currently active stations.

*10 Knightlow Road, Birmingham B17 8QB

Fr Paul Williment, 9M8PW (formerly G3TXW), the only station active at present from Sarawak

Fr Paul Williment, 9M8PW (ex-G3TXW), has also written concerning the list operation correspondence. He makes the following points.

(1) There is nothing he likes better than a full contact where a small bond of friendship can be cemented.

(2) There are times when a "CQ" beamed at Europe produces an enormous "pile-up". Under these circumstances Paul tries to find a competent European station to make a list because (a) with many high-powered European stations calling at once it is difficult for anyone to hear what he says but they can hear instructions from a local station, and (b) though he always listens for the weaker signals he often just cannot hear them through the bevy of loud signals. A QRP station will often be heard by the station taking the list.

(3) Paul joins in established nets (like those run by W7PHO) as he knows that contact with a rare dx station brings a lot of people a little joy and happiness.

(4) If list working was stopped his QSL manager and he would suffer less writer's cramp, but far fewer stations would have 9M8—and most of those who did not make it would be those who cannot afford towers and linears. Paul says that anyone looking for a contact outside a list should look for him after his Monday to Saturday schedules with G4DXC at 0830 on 14,265kHz, or on the cw bands.

More information from SU1ER. Ezzat says that there are four licence classes in Egypt: 1st Class (A) 100W dc all modes, 2nd Class (B) 50W dc all modes, 3rd Class (C) 25W dc cw only, and 4th Class (D) 10W dc cw only. Current stations are SU1AL (Class A), SU1BA (Class A), SU1CR (Class A), SU1ER (Class A), SU1KG (Class A), SU1KH (Class A), SU1MA (Class A), SU1IM (Class A) and SU1MI (Class A). QSL routes for some of these stations will be found in "QTH corner". SU1AH and SU1MR both have Class B licences. Ezzat is now active on Friday and Saturday between 1800 and 2100 around 14,260, 21,260 or 28,460kHz, as well as on most other days.

G4BWP is at present in Kuwait and says that the licensing situation is somewhat difficult as two different ministries are involved. Fortunately he has been able to befriend his neighbour 9K2BE, and act as second operator of the FT901D/FL2100B together with G6BQU. All contacts with either of the UK operators should be QSLd via G4GIR. Derek is happy to make skeds for 3·5 and 7MHz, but has problems when entering contests as he has to work at weekends. He is to be found on 28,650kHz on Saturdays at 1330, and at 1800 on 21,255kHz in the evenings.

Roger Crofts, G3UPK (and formerly ST2AY, ZB2AY, ZD8AY, VK6YA etc) is on a motoring holiday in S America and operating mobile with his newly-issued reciprocal licence PY1ZFX/M. He has been receiving good reports from the UK, and can be found around 14,270kHz at 2100. He will be in Brazil for several months before driving northwards to Alaska, and the whole trip will take about 18 months. He has already visited CE, CX and LU, but did not operate. He particularly wishes to record the great help and hospitality he has received from Rolf, PY1RO, and friends.

Chas Pyne, C53DF, has written to draw attention to an inaccuracy on page 238 of March *Radio Communication* concerning the union of Gambia and Senegal. Chas says that this is a common misconception and that in fact the two countries are still separate but that a confederation has been formed in which they have agreed to be one in a number of matters such as defence. Customs and financial union will probably follow in due course.

Maurice French, ex-G3ZXD, VP8PI, ZK1CI and VP5TCI, is now living in Wellington and on the air as ZL2BNJ. He has a TS120S, FT301D, AT320, Wilson SY33 beam for 14, 21, and 28MHz, a dipole for 3·5MHz and long-wire for 1·8MHz. He operates around 21,236kHz and 28,450kHz, and below 14,200kHz, and is pleased to make UK contacts. QSLs should go via NZART or to the address in "QTH corner".

Expeditions

G4JVG, G4WIA and G8IXG will be active from the Aland Is from 10 August for about one week. Callsigns will be G4JVG/OH0 etc, although G8IXG expects to have a G4 callsign before the expedition commences. The group will be active on all bands 1·8 to 144MHz, mostly on ssb (although cw ms schedules for 144MHz are welcome) and it is hoped to activate both an hf and a vhf station simultaneously for most of the time. Equipment will include a Drake T4XC and R4C plus linear amplifier, with dipoles for 1·8, 3·5 and 7MHz, and a triband beam on 14, 21 and 28MHz. On 1·8MHz power will be restricted to 10W and the band segments permitted, 1,820–1,845kHz and 1,915–1,995kHz. Anyone wishing to make a schedule is asked to write to D. Crisp, 2 Flaxman Close, Earley, Reading, or to G4JVG, QTHR. The same addresses should be used for QSL requests—in both cases please include an sae or ircs.

Details of the AD1S and N5DIM Pacific expedition are now to hand. The schedule is as follows: 4 to 8 August, Federated States of Micronesia (previously E Caroline Is, KC6); 8 to 11 August, Republic of Belau (formerly W Caroline Is, from Koror and Palau); 11 to 14 August, Saipan, Mariana Is (KH0); 14 to 16 August, Majuro, Marshall Is (KX6). Two stations will be operated on all bands 3·5 to 28MHz on cw and ssb. Expenses for the trip will exceed USA $4,000, and individual contributions of any amount are appreciated. Donations and QSLs should be sent to AD1S (see "QTH Corner").

An eight-man mountaineering and amateur radio expedition to Heard Is is being planned for January 1983 by VK6XI and N2DT. They are being sponsored by WIA (who will supply four sets of equipment and $7,000), NCDXF (who will donate $5,000), and IDXF (who will give $10,000). Total estimated cost will be $30,000, and it is hoped that others will make good the shortfall of $8,000 by sending contributions or pledges to WIA. The six mountaineers should take six weeks to climb the 10,000ft high volcano on the island, and this should allow the two radio operators about seven weeks of operation on all bands 1·8 to 28MHz on cw and ssb. Readers who join IDXF or who send donations to that body (Box 117, Manahawkin, NJ, 08050, USA) will be assisting the printing of QSLs and in closing any remaining gap in expenses.

Radio Amateur Prefix-Country-Zone List

This list, published by Geoff Watts (62 Belmore Rd, Norwich NR7 0PU) gives details of each country, its DXCC status, normal and special prefixes, ITU callsign block allocation, continent, *CQ* and ITU zone. It also contains full information on Antarctic stations, USSR club stations, and obsolete prefixes used in the past 10 years. Space is also left for adding new information as acquired. The cost is 60p, or by overseas airmail US $2 or five ircs.

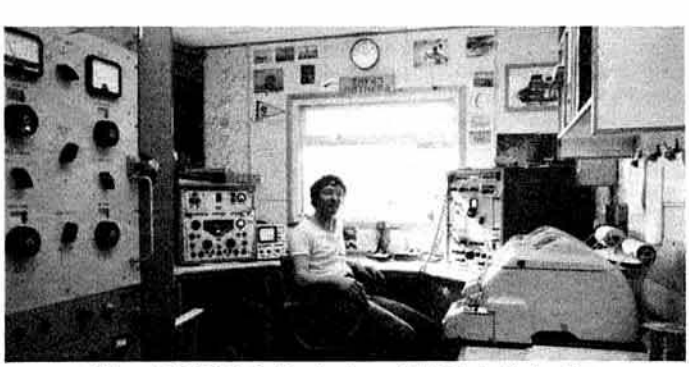
Welcome

The following overseas amateurs joined the Society during April: EI2EM, KT2X, K5AY, OZ1CVP, VP8LP, VP8PU, VS6BQ, YD1FID, ZC4GO, ZS5XX and 6Y5HN. New listener members were L. O'Reagan and J. Corless (EI), F. Proupin Fernandez (EA), W. Fagan (HB) and N. Hoyow (6Y5).

Awards

Catch Twenty Two Award

Issued by HARTS to those who supply verification of contact since 1 January 1980 with stations in countries through which the 22nd parallel of north latitude passes—a contact with Hong Kong being obligatory. There are three classes: Class 3 for QSOs with at least 15 countries, Class 2 with at least 20 countries, and Class 1 for contacts with all 25 countries. The countries are: VS6, CR9, BY, BV, XV, XW, XZ, S2, VU, A4X, A6X, HZ, ST, SU, 5A, TT, 5U7, 7X, TZ, 5T5, CN, C6, CO, XE and KH6. Send certified log details (not the QSLs) plus USA $7 or equivalent to the Awards Manager, HARTS, PO Box 541, Hong Kong. All awards will be sent out by airmail, and endorsement stickers will be issued for US $1. Please make cheques out to HARTS, and if sending Postal Orders please leave "Payee" blank.



Richard, VP8ANT, in his shack on Adelaide Is, Antarctica

QTH CORNER

AD1S	George Adkins, PO Box 32735, Oklahoma City, Okla, 73123, USA.
D68AAB	via G4DYO, 123 Reading Rd, Finchampstead, Wokingham, Berks RG11 4RD.
EJ0RTS	via EI7CC, P. R. Ball, 21 Doonamana Rd, Dun Laoghaire, Co Dublin, Eire.
FH8CB	PO Box 50, Mayotte, Indian Ocean.
IJ7JET	Box 136, I-74100 Taranto, Italy.
SU1AA	via SU1AL.
SU1AH	Ahmed Hasan Ahmed, Box 33, International Airport, Cairo, Egypt.
SU1AL	Loufty M. El Mahdi, 13 El Giza St, Giza, Cairo, Egypt.
SU1IM	PO Box 840, Cairo, Egypt.
SU1MI	PO Box 840, Cairo, Egypt.
SU1MR	Maggi Ezzat Ramadan (via SU1ER), Box 33, International Airport, Cairo.
VQ9PG	via WB4MTE, P. Skidmore Jr, 1612 Stone Av, Crossville, Tenn, 38555, USA.
VQ9VR	via W5TEH, V. L. Rosson, 3836 Avalon Av, Port Arthur, Tex, 77640, USA.
VQ9WB	via WD9GIG, G. Isely, 736 Fellows St, St. Charles, Ill, 60174, USA.
ZL2BNJ	M. French, 112 Allington Rd, Karori, Wellington 5, New Zealand.
3X3JA **3X5DX**	via JA1HGY, Nao Mashita, 2-4 Akosaka 8, Tokyo 107, Japan.
5H3AA	Box 79, N-9372 Gibostad, Norway.
5H3DM	T. Miles, PO Box 9112, Dar es Salaam, Tanganyika.
5H3MO	Box 1133, Tanga, Tanganyika.

Japan Century Cities

For confirmed contact with (or reception of) stations located in at least 100 cities in Japan. Separate awards are available for 200, 300, 400, 500 and 600 cities. Send list of QSLs listed in order of JCC reference number.

Japan Century Guns

As above but with cities replaced by "guns" (regional congregations of small towns and villages). Lists of cities and guns may be obtained from JARL, Award Section, 1-14-2 Sugamo, Toshima, Tokyo 170, Japan, by sending a request with three ircs. There are also Worked All Cities and Worked All Guns awards. Applications should consist of a QSL list giving callsigns, dates, bands and modes, certified by the awards manager of a national society or two other licensed amateurs, plus eight ircs or 10 ircs if airmail delivery of the award is desired. (If applying for more than one award the additional two ircs need only be included once). All contacts must have been made since 29 July 1952.

Heard All Continents (HAC)

This is also issued by JARL for confirmed reception of a station in each of the six continents. The fee is as mentioned above. Endorsements are available for 1·8 and 3·5MHz, and for sstv or rtty.

Contests

IARU Radiosport Contest

0000 10 July to 2400 11 July

1·8 to 144MHz, cw only, phone only, or mixed modes. Single- or multi-operator (the latter may use mixed-mode single-transmitter only). Each station may be worked once per band. Single-operator entrants may only operate for 36h, off times being at least 30min long and indicated in the log. Multi-operator stations must remain on a band for at least 10min at a time. Exchange RS/T and ITU zone number (UK is 27). One point for QSOs with own zone, three for those with same continent outside own zone, and five if in different continent. The multiplier is the sum of different zones worked on each band. Certificates to top scorers in each category in each ARRL section, ITU zone, and DXCC country. Achievement awards are available to those making 250 or 1,000 QSOs or working 50 zones (single-op only). Official log and summary sheets are available from ARRL, and forms CD-77, CD-175, and an ITU zone list are also available—please send large self-addressed envelope and return postage. Entries must be posted before 30 July to IARU HQ, Box AAA, Newington, Ct, 06111, USA.

International QRP CW Contest

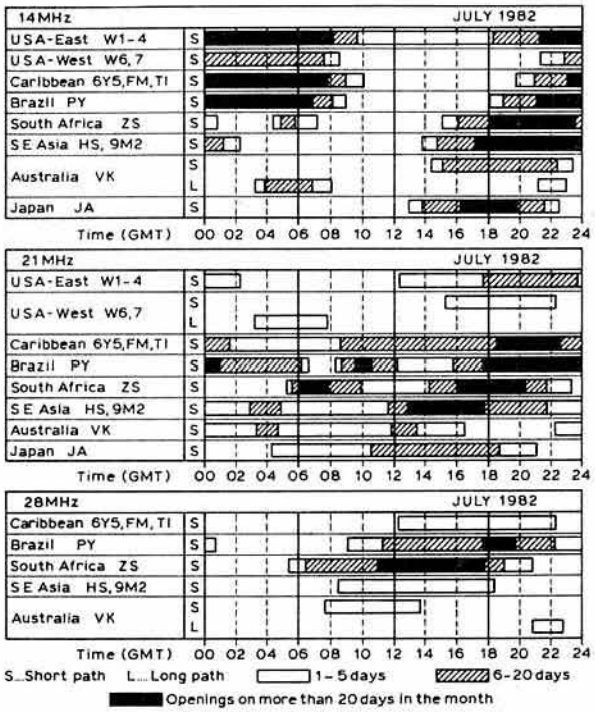
1500 17 July to 1500 18 July

Organized by the World QRP Federation, 1·8 to 28MHz. Single- and multi-operator classes (A) fixed station up to 2W input, (B) fixed station up to 10W input, (C) portable station up to 2W, (D) portable station up to 10W, and (E) stations over 10W input. Single-op stations must have an 8h rest period. Exchange RST, QSO number and class, and add "X" if crystal controlled. One point for QRP/QRO QSO, two if both stations are QRP. Stations may be worked once on each band for credit. Multiplier is one if other station in own country, two if on same continent, and three if elsewhere. All call areas within a country count as multipliers. QSO points/multipliers are doubled for crystal-controlled stations with not more than three crystals per band,

Propagation predictions

There will be little change in propagation during July compared with June. North America will only be heard occasionally, and traffic with South America will only be possible for a few hours on **28MHz**. Traffic with Africa will be certain during the afternoon, but will only seldom be possible with Asia and Australia. On **21MHz** contact with North America will not be certain on all days, but Central and South America as well as Africa and Asia will be heard with certainty. As mentioned last month, short-skip conditions will make European traffic possible on **28** and **21MHz**.

The main night-time dx band will still be **14MHz**, and during the day it will also be the main band for European traffic. The most favourable time for contact with western North America via the indirect path will be around 0400gmt, as at this time the great circle will co-incide with the dawn. There will be no change in propagation conditions on **7** and **3·5MHz** compared with June.



HF propagation study

Band predictions for July 1982

	28MHz	21MHz	14MHz	10MHz	7MHz	3·5MHz
GMT	000001111122	000001111122	000001111122	000001111122	000001111122	000001111122
	024680246802	024680246802	024680246802	024680246802	024680246802	024680246802
EUROPE						
Moscow	.....	.....22.	324555445786	865433334688	653111111367	42.....34
Malta	.....	....1...1321	634665556887	987544445689	886321112468	++3.....35
Gibraltar	.....	.....1.	411343343675	975654445789	887432222468	++4.....4+
Iceland	.....	.....	1...11..1243	632344333567	666432222346	443.....3
ASIA						
Osaka	.....	....11..1111	1..131112574	352	.....13.	.....
Hong Kong	.....	..1122112431	3...11113686	1.....365	132	.....
Bangkok	.....1..	..1222223552	51...1113688	3.....367	1.....135	2
Singapore	.....	1.2233223542	51..11113688	3.....368	1.....135	2
New Delhi	.....1..	1.2223224652	741...113688	62.....368	3.....146	3
Teheran	...111..122.	213433335774	8641..113689	851.....368	62.....146	3.....3
Colombo	...111..1...	112334335453	841...1113688	72.....368	4.....146	3
Bahrain	...11111132.	324433435775	9741..113689	851.....368	63.....146	4.....3
Cyprus	.....11.	1.2444434664	877544456799	985211123578	762.....257	53.....24
Aden	...112223321	534434456877	9861...13689	873.....368	74.....146	4.....3
OCEANIA						
Suva (S)	.....	.....11.	..2321.12551	..231....32.	.....	.....
Suva (L)	1.....31	4334.....75	.1562....162	..23.....23.	...1.....	.....
Wellington (S)	.....	.....1.	114421....64	..33.....152	..1.....2.	.....
Wellington (L)	1.....1	5433.....36	44661.....75	1243.....152	..11.....2.	.....
Sydney (S)	.....	..13211....1	212531111216	...2.....353	131	.....
Sydney (L)	1.....1	4212.....5	32362.....56	..131....153	...1.....31	.....
Perth	...111.....	2134432.....	63123111111.	41.....35.	1.....144	3
Honolulu	.....	.....11.	..2321.1231.	..331....1..	...1.....	.....
AFRICA						
Seychelles	...11122321.	424434456765	9751...13689	862.....368	74.....146	4.....3
Mauritius	...112223321	2.4545556876	8362.1.13689	873.....368	751.....146	42.....3
Nairobi	...111334421	524534557877	9873...13689	885.....368	762.....146	43.....3
Salisbury	1..111344521	612644557887	98751..12689	8862.....368	763.....146	44.....3
Capetown	....113444..	...55455684.	31.631.12687	86.3.....368	763.....146	44.....3
Lagos	1..111345641	642553457887	99862...2689	8863.....368	7731.....46	44.....3
Ascension Is	11123441	32..54446885	995431..2689	8863.....368	7741.....36	44.....3
Dakar	1...11133541	653463345886	998631...589	88631....268	7741.....36	44.....3
Las Palmas	.....11.	31.242343564	986765555799	997543222478	88521....157	552.....24
S AMERICA						
South Shetland	.....1334..	.....45685.	.....1.12584	4.1.....367	7531.....36	44.....3
Falkland Is	.....13233.	1....2455885	8221.1.12579	8752.....358	7741.....26	44.....3
Rio de Janeiro	1....1122331	642..4445786	998421..1379	88631....158	7741.....26	44.....3
Buenos Aires	1.....121331	6422.3355676	998611.11369	88631.....37	7741.....15	44.....2
Lima	11	52.131232356	99654111..26	88631.....3	6641.....1	34.....
Bogota	11	52.122222245	88653111..16	78631.....3	5641.....1	24.....
N AMERICA						
Barbados	11	52.123222356	9965311...37	88631.....4	6641.....2	34.....
Jamaica	.....	41..12111135	88543111...5	68631.....2	3641.....	.3.....
Bermuda	.....	41...2111135	8854311...26	78631.....3	4631.....1	.3.....
New York	.....	2....1.1.124	77432111..15	58631.....2	2631.....	.3.....
Mexico	.....	2.....1.123	56432111...1	37631.....	.431.....	.....
Montreal	.....	2.....23	76322111..25	57631.....2	2531.....	.2.....
Denver	.....	1.....1	4432...1...1	25531.....	.231.....	.....
Los Angeles	.....	1.....	23321..11..1	.3531.....	.131.....	.....
Vancouver	.....	.....	22331...1..1	.3531.....	..31.....	.....
Fairbanks	.....	.....	112321.11111	.1231.....	.....	.....

and QSOs with them count double points. Final score is QSO points from each band multiplied by multiplier for that band and then added to totals from other bands. Frequencies of activity will be around 1,810, 3,560, 14,060, 21,060 and 28,060kHz. DL-AGCW will provide awards for fixed station winners and QRP ARCI for portable stations on a worldwide and country basis. Fixed stations should send logs to Siegfried Hari, DK9FN, Spessertstr 80, D-6453 Seligenstadt, FR of Germany, and portables to W. Dickerson, WA2JOC, 352 Crampton Drive, Monroe, Mich, 48161, USA, within six weeks of the contest.

YO DX Contest HF

2000 7 August to 1600 8 August

3·5 to 28MHz, cw and ssb according to IARU bandplanning. Single-operator single- and multi-band, and multi-operator multi-band categories. Exchange RS/T and ITU zone (UK is 27). YO stations will also send two letters showing their county—there are a maximum of 41. (In YO2—AR, CS, HD and TM; YO3—BU; YO4—BR, CT, GL, TL, VN; YO5—AB, BH, BN, CJ, MM, SJ, SM; YO6—BV, CV, HR, MS, SB; YO7—AG, DJ, GJ, MH, OT, VL; YO8—BC, BT, IS, NT, SV, VS; YO9—BZ, CL, DB, GR, IL, PH, TR.) QSOs with YO count eight points, with stations outside own continent four points, and with own continent two points. Multiplier is the sum of ITU zones and YO counties worked on each band added together. Note that QSOs with one's own country do not count. Submit separate log sheets for each band showing band, date, time, report sent and own ITU zone (shown only at beginning of page), report received, if multiplier, points claimed. Enclose summary sheet and signed declaration that rules of contest and licence have been obeyed. Post before 8 September to Romanian Amateur Radio Federation, PO Box 05-50, R-76100 Bucharest, Romania. Stations who make at least 50 QSOs (including at least 20 with YO) will be sent an attractive award.

Around the bands

It is always good to come across praise for some of the individuals who take themselves off to remote parts of the world and give the rest of us interesting contacts. G3AJP, who operates under very restricted antenna conditions, wishes to thank Carl, ZK2VU, for looking for the 559 signals among the "5NN" variety—praise for an excellent operator which is well deserved.

Smithy, G8KG, is wishing that Cycle 21 would make up its mind, and reports as follows: "The full figures for April confirmed that mean solar activity had dropped by about 25 per cent as compared with February and March. Changes of this magnitude are by no means uncommon and with a monthly mean solar flux of 162sfu and an SIDC sunspot number of 122·5 the month cannot be said to have been a bad one.

"There are certainly some indications of a downward trend. On 21 May the daily solar flux had not been above 200sfu for more than 50 days while the 27-day average had fallen steadily for 70 days from 217 to only 147sfu. It must however be remembered that similar troughs in activity occurred around August 1980 and June 1981 and were followed by the resumption of very high activity. Only time will tell whether the same will happen again!"

The following kindly provided logs from which the next paragraphs were prepared: G2s BON, HKU, G3YY, G5JL, G3s AJP, BDQ, GVV, IMW, KSH, NWG, UKH, XBY, YRM, G4EHQ, GW4KGR, G4s LDS, LRS, and RSs 1066 and 30694.

Stations listed in italics were on A1A.

1·8MHz. 2200 *EX5AB, LA9LE, SM3CFV.* **2300** *UT5AB, UK2PCR, UK9ADY.*

3·5MHz. 0000 UD6DJH, UK9CAE. **0100** KR2N, 4U7ITU. **0400** 3X3JA. **0500** W2FOE, K4PI, 8P6OR. **0600** V2AN. **2200** *OJ0MR, UA9OM.* **2300** PY7WDB, *DJ6SI/5V.* **7MHz. 0000** 4S7XSG. **0500** PY, VK, ZL (to 0700), *KA3V/ZB2.* **1900** JA, *TN8AJ, 3X5DX.* **2300** *UL7GAY.*

10MHz. 0600 *VK2YK.* **0700** *VK, ZL.* **0900** *JA.* **1900** *JA5DQH.* **2000** *VK3MR, ZL3IS, ZS6BWF.* **2100** *DL7AEA/EA6, VP8ANT, 5Z4CS.* **2200** *4K1A.* **2300** *VE1ASJ, DL2GG/YV5, 5N0WRA.*

14MHz. 0200 AL7AW. **0400** W6-W7. **0500** EA9LZ, FG0GA, *HH2CL,* VK6ITU, OE1EHB/YK. **0600** WD8QGQ/KH7, *VK9ZR,* ZK1XP. **0700** J3AAB, *KH6IJ,* VK6ZX/LH, VK0AN, VP2MDS, *ZK1AF, ZK2VU,* 9M8PW. **0800** NC4U/J6L, VR6TC, ZK1YL, ZL4OY/A, 3D2BD. **1400** VK, ZL. **1600** *KA3V/EA9.* **1700** VU2AU. **1800** *NO2O/DU2,* VK, VS5DD, ZL, *4S7WP,* 9U5WR. **2000** JA. VP8ANT. **2100** C53CG, JY3CH, *G5RV/PY6,* DL2VK/ST3, TA1CT. **2200** FM0GA, KR4C/J6L, *VU2BK.* **2300** *XT2AW.*

21MHz. 0500 *BY1PK.* **0600** VK (to 1000). *VQ9QA,* ZL4OY/A. **0700** W6DMJ/KH6, VY1CJ, *DJ6SI/5V.* **0800** AH8AA, KL7Y. **0900** *HL0OB,* JA (to 2100), VK9ZR, *ZK2VU.* **1000** 8J6JCI. **1100** JW0P, ZB2GK, *ZK1AF, 9N1MM.* **1300** VE1AI/1, 8Q7BN. **1400** J2OZ. **1500** VP5RAC, VS5s DD, GA, 3X3JA. **1600** *BY1PK,* FB8WG, *4K1D,* 9J2NO. **1700** DU6SSB, *HZ1HZ, KH6CF,* VP8AOB (S. Orkney), VQ9WB, YB8AEG, 5N6ATT, 9M2DW. **1800** FR0FLO, HS5AID, JA1DNG/YI, *4S7AJG.* **1900** D68AAB, VQ9s PG, VR, *3X5DX,* 7Q7LW. **2000** A71s AA, AU, KH6IJ, JD1YAA, *KV4AD/PJ6,* 9N1MM. **2100** *J28CI.* **2200** VE5-VE7, W6-W7. **2300** All W, 4U1UN.

28MHz. 0800 4D7RLC. **0900** *VK,* VK6IV, VQ9SB, W6YB/3D6, OH1TD/4U (in YK). **1100** D68AAB, SU1BA, TA1AO, *VQ9CW,* 3X3JA, 4K1A, *4S7XS,* 8Q7AV. **1300** A4XIU, AP2P, DU1RD, P29MF, YB0AET, 8Q7BN. **1400** *3B8CF,* 5H3DM, 9X5SL. **1500** EP2TY, FH8CL, ST2SS, VQ9WB, *XT2AW,* 9U5WR, *9V1TL.* **1600** FR7CG, *H5AFU,* TL8CK, 6T1YP. **1700** *VE1AI/1,* VQ9JB, YB/YCs, *3X5DX,* 7Q7LW, 9M2FR. **1800** HS1AMH, S83H. **1900** VK9YC, 5H3BH. **2000** JA5EWQ (via LP), 8P6OR.

Thanks to all correspondents and also to the following for items extracted: *Long Skip* **(VE3EUP),** *DX'press* **(PA0GAM),** *CQ Magazine* **(W1WY),** *DXNL* **(DL3RK),** the *DX Bulletin* **(K1IN),** the *Long Island DX Bulletin* **(W2IYX),** *DX News Sheet* **(Geoff Watts),** and the *Ex-G Radio Club Bulletin* **(W3HQO).**

Please send all news for **September** issue by **22 July,** and for **October** by **2 September.** □

Amateur wireless in 1910

by ERIC A. PAYNE*

IN 1910 I was a boy at The Colchester Royal Grammar School, and at that time my parents subscribed to a very high-class periodical called *The Book of Knowledge* edited by Arthur Mee, and in the June issue there appeared an article, with diagrams, of a wireless installation. I showed this to my science master, who examined it with me and agreed that it would not be difficult to construct such a station and offered to help me.

The transmitter

In those days the ignition of cars was not by one coil with a single contact breaker but by a trembler, so that when the engine was turned to the "on" position there was a continuous torrent of sparks from the high tension output. This formed the basis for the transmitter, the coil being energized by a 6V accumulator via a morse key, which enabled telegraphic signals to be sent. The output leads from the coil were connected to a spark gap consisting of two brass balls mounted about 1cm apart on rods about 20cm in length which formed a dipole antenna.

We had no means of measuring the transmitted frequency, but purely by coincidence our antenna rods were of similar length to those of a modern broadcasting antenna. This antenna radiated equally in all directions, so to give it a measure of directivity and increase the range we mounted a parabolic reflector behind it. This reflector was made from a piece of curved corrugated paper into the grooves of which were inserted copper wires.

Signals were reinforced by connecting one side of the spark gap to an elevated wire antenna, while the other was connected to earth—usually via the mains water pipe which was invariably made of lead in those days. This meant that the transmitted frequency was very much lower, which in itself greatly increased the range from metres to tens of kilometres.

The receiver

As with the transmitter, similar antenna rods were used, but instead of being separated by a spark gap a coherer was inserted. This consisted of a glass tube into which two copper plugs were inserted and separated by a few millimetres; between these plugs filings of nickel and silver were scattered loosely. A worn single cell of about 1V and a very sensitive relay were connected across the coherer.

Ordinarily the filings were non-conductive, so no current flowed and the relay did not operate. When, however, the antenna rods were energized by the reception of signals from the distant transmitter, the filings seemed to arrange themselves—rather like seaweed left on the shore by a receding tide—and cohere to the extent that a current of a few microamperes passed so that the relay was operated. Once having closed the contacts on the relay, it was then possible for a local battery to ring a bell or operate any other telegraphic apparatus to record signals from the distant transmitter and communicate by means of the morse code.

Unfortunately, the filings once having cohered and rendered conductive, remained so until gently tapped; this was achieved by mounting the bell so that the hammer came in contact with the coherer tube when it rang, and this presented no problem.

As with the transmitter, a parabolic reflector was mounted behind the antenna rods but the increase in range was only marginal.

The range of this equipment was limited, the maximum being in the order of 50m. This left us dissatisfied, as our ambition was to communicate with our friends in other parts of Colchester, but fortunately the crystal detector, or cat's whisker as it was commonly called, came to our rescue. This consisted of a piece of silicon or galena clamped in a brass holder, which formed one electrode, while a thin wire pressing on the surface of the crystal formed the other. The electrodes were connected between the antenna rods in place of the coherer, and a pair of sensitive headphones was included in the circuit. This formed a highly-sensitive receiver, far exceeding the coherer, but it meant that reception was by ear in the headphones instead of by the ringing of a bell.

With the coherer, it was the signals which made the filings conduct, thus permitting a local battery to operate the bell, whereas in the case of the crystal it was the actual rectified received signal which was heard in the headphones. One advantage of headphone reception was that an experienced operator could discriminate between wanted and jamming signals, and he could also read the wanted signals despite atmospherics, which would have completely upset the coherer.

Conclusion

By 1912 there were some nine enthusiasts in the Colchester district, and regular communication was established between them. Gamages supplied the crystals and other accessories, and were very helpful to us all by providing advice as well as selling the equipment. They compiled and circulated free a very handsome leather-covered list of amateurs in the UK which some of us still retain today.

We were all required to be licensed by the GPO and were given callsigns consisting of three letters—mine was QCX. On the outbreak of war in 1914, our stations were dismantled by the Post Office and I remember very well my equipment being taken away in a handcart for storage. Some of us had erected very high antenna masts, and these we were requested to dismantle, but not before photographs had been taken to commemorate the epoch. □

*"Robins", Little Baddow, Chelmsford, Essex CM3 4SY.

RAE courses 1982-3

Brixton. Brixton College for Further Education, Ferndale Road, London SW4 7SB. Enrolment 6-9 September, 6.30-8.30pm. Details from R. McEwan Reid (course tutor), at the college, tel 01-737 2323-26.

Leamington Spa. Mid-Warwickshire College of Further Education, Warwick New Road, Leamington Spa. Enrolment 2-3 September, 9am-12 noon, 2-4pm, and 6-8pm. Course Thursday evenings, commencing 16 September, for 30 weeks. Details from C. A. Smith, c/o the college, tel 0926 311711.

Southampton. Bitterne Park School, Copsewood Road, Southampton. Enrolment 3 September, 7.30pm. Course Friday evenings, 7.30pm. Organized by Southampton RC, who meet at the school on Wednesday evenings, 7.30pm, when more details are available. Contact J. Compton, G4COM, QTHR, tel Southampton 693017.

Swinton. Pendlebury High School, Cromwell Road, Swinton, Manchester. Thursdays, 7.30pm, commencing late September. Registration details available early September from course instructor, P. Whatmough, G4HYE, tel 061-794 3706.

Looking ahead

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

11 September—Scottish Amateur Radio Convention & Exhibition, Aberdeen.
9 October—Midlands VHF Convention, Wolverhampton Polytechnic. Details from J. P. H. Burden, G3UBX.
14-16 October—11th ARRA Amateur Radio Exhibition, back at Leicester this year.
4 December—RSGB AGM, IEE, Savoy Place, London.

Morse code and rubber stamps

by J. R. G. BEAVON, G3PPR*

MOST AMATEURS will have had some contact with morse code; either as users or listeners, and many may wonder why it is like it is?

Samuel Morse was born on 27 April 1791 in the USA, the son of Jedediah Morse who was a strict Calvinist. Samuel was educated at Phillip's Academy, Andover, and at Yale, from where he graduated in 1810. From 1811 to 1815 he lived in England and studied painting, and from 1815 to 1825 was an itinerent artist—a profession hardly likely to please his Calvinist father. He settled in the city of New York in 1825—the same year in which it was discovered that a soft-iron core placed in a solenoid increased the magnetic field—and taught at New York University. He thought of the electric telegraph while returning from Europe in 1832, when he overheard a conversation aboard ship about electromagnets.

In 1835 his first working model was built, and by 1837 he was occupied full-time on the project. His code was developed in 1838; in 1843 he received money from the USA Congress; and his first telegraph line was built from Baltimore to Washington in 1844. Its use began with the message "What hath God wrought?" sent by Morse on 28 May 1844. The invention involved Morse in legal wrangles with partners he acquired along the way, and with rivals; it was not until 1854 that the problems were resolved by the USA Supreme Court granting him patent rights. Morse died in New York on 2 April 1872, and is supposedly remembered for his paintings, although many artists are not aware that he painted any!

Morse's original code was not that which is now used: C, J, L, O, P, R, X, Y, Z and the numerals were different, and C, O, R, Y and Z must have been tricky since they contained spaces *within* the letter code (Table 1). This code was unnecessarily complex, it used more variables than were needed to encode the English alphabet, because not only were the number and order of the dots and dashes important but variable dash length (T, L, 0) and spaced letters were used, all of which must have made the code quite hard to learn. The principal reason for the change to the modern code was that the original could not be used for European languages which use accented letters. The Continental morse code was introduced in Europe in 1851; it provided for accents, but also tidied up the code by relying only on the number and order of the dots and dashes, and by eliminating long dashes and spaces. The encoding of numerals was also improved.

* 26 St Catherine's Way, Sherborne, Dorset DT9 6DF.

Table 3. Percentage incidence of letters in English, and in G3PPR's "rubber-stamp" QSOs

	In English	In QSO		In English	In QSO
A	7·4	5·3	N	7·9	5·3
B	1·0	1·6	O	7·5	3·7
C	3·1	3·2	P	2·7	3·7
D	4·2	4·8	Q	0·3	1·6
E	13·0	10·6	R	7·6	9·0
F	2·8	2·1	S	6·1	9·0
G	1·6	2·7	T	9·2	5·9
H	3·4	2·7	U	2·6	5·3
I	7·4	5·3	V	1·5	0·5
J	0·2	0·5	W	1·6	2·1
K	0·3	1·0	X	0·5	2·1
L	3·6	5·3	Y	1·9	1·0
M	2·5	4·8	Z	0·1	0·5

For encoding English 36 symbols are needed—with seven more to include accented letters (although now that European languages do not use accents on capital letters this is not so necessary). Using up to four dots and dashes will give 30 symbols, while five dots and dashes will give an additional 32 symbols, thus there is plenty of choice for the logical construction of numeral codes and for the accented letters. Table 2 gives the possible symbols for up to five dot/dash combinations. As an aside, more complicated codes such as the computer eight-track code can be made error-detecting: used on punched tape it incorporates a parity track which is punched as necessary to give each symbol an even number of holes. If the tape reader finds an odd number, the tape is stopped. More complex codes can be made error correcting within limits, but at the expense of being slower to transmit or occupying greater bandwidth.

Once the number of symbols needed has been established, it is a matter of choice which letter is represented by which symbol. If the shortest symbols were used for the letters which occur most often, then the only anomaly in English is M. Table 3 gives the percentage incidence of letters taken from a sample of 50,000 from Government telegrams—whether this is typical English is another matter! This shows that M, at 2·5 per cent has a smaller incidence than O, yet is shorter. Apart from this the idea seems to fit, but perhaps we ought to analyse European languages instead, since the code was originally the Continental code. Also shown is an approximate analysis for "rubber-stamp" QSOs made from G3PPR, omitting callsigns. Here M is more common than O, so perhaps we are better off. Other notable differences are in R, S, U, X and Z, with Q of course taking the prize because of the Q-code.

So the code is not as random as at first it might seem. Those who are struggling to master 12wpm must be grateful that they do not have to learn Samuel Morse's original code!

Table 2. Possible morse symbols using up to five dot-dash combinations

Number of components	Possible symbols	Number of symbols
1	• —	$2^1 = 2$
2	•• —• •— ——	$2^2 = 4$
3	••• ••— •—• —•• ——• —•— •—— ———	$2^3 = 8$
4	•••• •••— ••—• •—•• —••• ——•• •—•— •——• —•—• ••—— —••— ———• ——•— —•—— •——— ————	$2^4 = 16$
5	••••• ••••— •••—• ••—•• •—••• —•••• •••—— ••—•— •—••— —•••— —••—• —•—•• ——••• ••——• •—•—• •——•• ———•• ——•—• —•——• •———• •——•— •—•—— ••——— ——••— —•—•— —••—— ————• ———•— ——•—— —•——— •———— —————	$2^5 = 32$

Table 1. The original and the Continental (modern) morse code

	ORIGINAL	CONTINENTAL		ORIGINAL	CONTINENTAL
A	•—	•—	S	•••	•••
B	—•••	—•••	T	—	—
C	•• •	—•—•	U	••—	••—
D	—••	—••	V	•••—	•••—
E	•	•	W	•——	•——
F	•—•	••—•	X	•—••	—••—
G	——•	——•	Y	•• ••	—•——
H	••••	••••	Z	••• •	——••
I	••	••	1	•——•	•————
J	—•—•	•———	2	••—••	••———
K	—•—	—•—	3	•••—•	•••——
L	———	•—••	4	••••—	••••—
M	——	——	5	———	•••••
N	—•	—•	6	••••••	—••••
O	• •	———	7	——••	——•••
P	•••••	•——•	8	—••••	———••
Q	••—•	——•—	9	—••—	————•
R	• ••	•—•	Ø	————	—————

RSGB SLOW MORSE PRACTICE TRANSMISSIONS

Alterations and additions to this list should be sent to the organizer Mr M. A. C. MacBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex

Clock time	Callsign	MHz	Mode	Town	Notes
Sundays					
1015	G3CGD	1·875	A1A/A3E	Cheltenham, Glos	
1100	G2FXA	1·910	A1A/A3E/J3E	Stockton-on-Tees	
1100	G3XJJ	3·535	A1A/J3E	Northampton	
1130	G3BLS	145·375	F2A	Osney, Oxford	[1]
1200	G4BFJ / G4DKK	144·625	F2A/F3E	Banstead, Surrey Tooting, SW London	
1200	G3PER	145·575	F2A/F3E	Heysham, Lancs	[1]
1200	G3HVI	145·250	F2A/F3E	Stoke-on-Trent, Staffs	[1]
1200	G3GNS	1·910 / 3·550 / 144·250	A1A / A1A / A1A	Locking, Avon	[13]
1400	G3LZV	145·250	F2A/F3E	Manchester	[3]
1830	G4GOC	145·250	F2A/F3E	Stoke-on-Trent, Staffs	[1]
1900	G3RLO	144·525	F2A/F3E	West Bridgford, Notts.	[1]
1930	G3LDW	144·160	A1A/J3E	Halesowen	[1]
2000	G3LZV	145·250	F2A/F3E	Manchester	[3]
2000	G4JBB	145·425	F2A	Birmingham	[10]
2030	G4MQX	145·250	F2A	Axbridge, Soms	[6]
2100	G4EWK	144·850	F2A	Burton-on-Trent, Staffs	[7]
2100	GW4LLE	145·525	F2A/F3E	Milford Haven, Dyfed	
2130	G3ORP	144·250	A1A/J3E	Maidstone, Kent	[16]
Mondays					
1100	G4IRI	3·550	A1A/J3E	Bolton, Lancs	
1830	G4ILD / G3ZQS	145·525	F2A/F3E	Rishton, Lancs / Darwen, Lancs	[1]
1830	G3GNS	1·910 / 3·550 / 144·250	A1A	Locking, Avon	[13]
1900	G3RLO	144·525	F2A/F3E	West Bridgford, Notts.	[1]
1930	G4BFJ / G4DKK	144·625	F2A/F3E	Banstead, Surrey Tooting, SW London	
1930	GI3SXG	144·100	A1A/J3E	Newtownards, Co Down	
1930	G4JIZ	145·350	F2A/F3E	Bakewell, Derbys	[1]
2000	G2FXA	145·525	F2A/F3E	Stockton-on-Tees	[1]
2000	G3LZV	145·250	F2A/F3E	Manchester	[3]
2000	G4IRI	3·550	A1A/J3E	Bolton, Lancs	
2000	G4JDL	144·250	A1A/J3E	Solihull, W Midlands	[2]
2030	G3ASR	1·875 / 144·175	A1A/J3E / A1A/J3E (lsb)	Harrow, Middlesex	[1] [12]
2030	G2FKO	145·525	F2A	Bideford, Devon	
2100	G3WOR	144·250	A1A/J3E	Lancing, Sussex	[14]
2200	G3GMS	145·250	F2A/F3E	Whitley Bay, T & W	[1]
Tuesdays					
1100	G4IAV	145·275	F2A/F3E	Atherton, G Manchester	
1200	G3GNS	1·910 / 3·550 / 144·250	A1A	Locking, Avon	[13]
1830	G4CWN	144·100	A1A/J3E	Stoke-on-Trent, Staffs	
1900	G3RLO	144·525	F2A/F3E	West Bridgford, Notts.	[1]
1900	G3ZRZ	1·975	A1A/A3E	Blackpool, Lancs	
1900	G4RS	3·565 / 145·525	A1A/J3E / F2A/F3E	Catterick, N Yorks	[1]
1930	G4IAV	145·275	F2A/F3E	Atherton, G Manchester	
1930	G4DAL	145·575	F2A/F3E	Lancaster, Lancs	[1]
1930	G4HTD	145·550	F2A/F3E	Plymstock, Devon	[5]
1930	G4BFJ / G4DKK	144·625	F2A/F3E	Banstead, Surrey Tooting, SW London	
2000	G3VHE	145·350	F2A	Swindon, Wilts.	[1]
2000	GM4ELV	144·250	A1A	Arrochar, Strathclyde	
2000	G4FEX	145·250	F2A/F3E	Horsley Woodhouse, Derbyshire	[1]
2030	G4MQX	145·250	F2A	Axbridge, Soms	[6]
2030	G3IRM	1·975	A1A/A3E	Bury St Edmunds, Suffolk	
2030	G3OHM/A	144·180	A1A/J3E	Birmingham	
2030	G3KGU	1·910	A1A/A3E	Theydon Bois, Essex	
2030	G2FKO	145·525	F2A	Bideford, Devon	
2100	G4EWK	144·850	F2A	Burton-on-Trent, Staffs	[7]
2200	G3AWL	144·110	A1A/J3E	Easington, Co Durham	[8]
Wednesdays					
1100	G4IAV	145·275	F2A/F3E	Atherton, G Manchester	
1830	G4ILD / G3ZQS	145·525	F2A/F3E	Rishton, Lancs / Darwen, Lancs	[1]
1830	G3GNS	1·910 / 3·550 / 144·250	A1A	Locking, Avon	[13]
1900	G3RLO	144·525	F2A/F3E	West Bridgford, Notts.	[1]
1900	G2ABC	145·250	F2A/F3E	Truro, Cornwall	
1900	G3ULY / G4EXD	3·583 / 145·475	A1A / F2A	Culgaith, Cumbria	[1]
1930	G4NNS / G4BFJ / G4DKK	144·625	F2A/F3E	Sunbury-on-Thames, Middx Banstead, Surrey Tooting, SW London	
1930	G4IAV	145·275	F2A/F3E	Atherton, G Manchester	
1930	G4JIZ	145·350	F2A/F3E	Bakewell, Derbys	[1]
1930	G4HTD	145·550	F2A/F3E	Plymstock, Devon	[5]
2000	G2FXA	144·250	A1A/J3E	Stockton-on-Tees	[1]
2000	GW4KDP	145·550	F2A/F3E	Barmouth, Gwynedd	[1]
2000	G3SWP	144·180	A2A/J3E	Doncaster, South Yorks	[1]
2000	G3LZV	145·250	F2A/F3E	Manchester	[3]
2000	GM3ZAS	145·550	F2A/F3E	Prestwick, Ayrshire	[3]
2030	G2FKO	145·525	F2A	Bideford, Devon	
2100	GW4LLE	145·525	F2A/F3E	Milford Haven, Dyfed	
2130	GM4HYF	28·350 / 145·375	A1A / F2A	SE Glasgow	[1]
Thursdays					
1100	G4IRI	3·550	A1A/J3E	Bolton, Lancs	
1830	G4GOC	145·250	F2A/F3E	Stoke-on-Trent, Staffs	[1]
1830	G4ILD / G3ZQS	145·525	F2A/F3E	Rishton, Lancs / Darwen, Lancs	[1]
1830	G3GNS	1·910 / 3·550 / 144·250	A1A	Locking, Avon	[13]
1900	G3RLO	144·525	F2A/F3E	West Bridgford, Notts.	[1]
1900	G4BNA	3·590	A1A	Swindon, Wilts	
1900	G3BLS	145·375	F2A	Osney, Oxford	[1]
1900	G3ZRZ	1·975	A1A/A3E	Blackpool, Lancs	
1900	G4RS	3·565 / 145·525	A1A/J3E / F2A/F3E	Catterick, N Yorks	[1]
1930	G4HTD	145·550	F2A/F3E	Plymstock, Devon	[5]
1930	G3ASR	1·875 / 144·175	A1A/J3E / A1A/J3E (lsb)	Harrow, Middx	[1] [11] [12]
1930	G4BFJ / G4DKK	144·625	F2A/F3E	Banstead, Surrey Tooting, SW London	[15]
2000	G2ACZ	1·819	A1A	Mablethorpe, Lincs	
2000	G3LZV	145·250	F2A/F3E	Manchester	[3]
2000	G3IRI	3·550	A1A/J3E	Bolton, Lancs	
2000	GM4ELV	144·250	A1A	Arrochar, Strathclyde	
2000	G4JDL	144·250	A1A/J3E	Solihull, W. Midlands	[4]
2030	G4MQX	145·250	F2A	Axbridge, Soms	[6]
2030	G2FKO	145·525	F2A	Bideford, Devon	
2100	G3WOR	144·250	A1A/J3E	Lancing, Sussex	[14]
2100	G4EWK	144·850	F2A	Burton-on-Trent, Staffs	[7]
2200	GM4HYF	28·350 / 145·375	A1A / F2A	SE Glasgow	[1]
Fridays					
1100	G4IAV	145·275	F2A/F3E	Atherton, G Manchester	
1830	G4ILD / G3ZQS	145·525	F2A/F3E	Rishton, Lancs / Darwen, Lancs	[1] [1]
1830	G3GNS	1·910 / 3·550 / 144·250	A1A	Locking, Avon	[13]
1900	G3RLO	144·525	F2A/F3E	West Bridgford, Notts.	[1]
1930	G4ILW	145·550	F2A/F3E	Gateshead, T & W	[1] [17]
1930	G4IAV	145·275	F2A/F3E	Atherton, G Manchester	
1930	G4JIZ	145·350	F2A/F3E	Bakewell, Derbys	[1]
1930	G3HVI	145·250	F2A/F3E	Stoke-on-Trent, Staffs	[1]
1930	G4BFJ / G4DKK	144·625	F2A/F3E	Banstead, Surrey Tooting, SW London	
2000	G3WOK	144·775	F2A	Hailsham, Sussex	
2030	G4MQX	145·250	F2A	Axbridge, Soms	[6]
2030	G2FKO	145·525	F2A	Bideford, Devon	
2200	G3AWL	144·110	A1A/J3E	Easington, Co Durham	[8]
Saturdays					
1100	G3LZV	145·250	F2A/F3E	Manchester	[3]
1200	G3GNS	1·910 / 3·550 / 144·250	A1A / A1A / A1A	Locking, Avon	[13]
1900	G3RLO	144·525	F2A/F3E	West Bridgford, Notts.	[1]
2000	G3LZV	145·250	F2A/F3E	Manchester	[3]
2000	G4JBB	145·425	F2A	Birmingham	[10]
2000	G4FEX	145·250	F2A/F3E	Horsley Woodhouse, Derbyshire	[1]
2030	G2FKO	145·525	F2A	Bideford, Devon	
2100	GW4LLE	145·525	F2A/F3E	Milford Haven, Dyfed	
2200	G3GMS	145·250	F2A/F3E	Whitley Bay, T & W	[1]

Notes

[1] Omnidirectional
[2] Horizontal to SE
[3] Vertical to S
[4] Horizontal to NW
[5] Vertical to E
[6] Vertical to SSW
[7] To SW
[8] To S
[9] To NE
[10] To NNE
[11] First and third Thursdays in each month
[12] Horizontal
[13] Reports to RAFARS Locking
[14] Horizontal to E and W
[15] Starting speed 12wpm
[16] Horizontal NE and SW
[17] Vertical to N

CONTEST NEWS

21/28MHz Telephony Contest 1982 rules—erratum

Receiving Section It is regretted that there was an error in these rules published in the May issue of *Radio Communication*. Rule 5 should read:

5. Logs. Log sheets to be headed; date/time gmt, callsign of station heard, *RS and number sent by station heard,* callsign of station being worked, bonus points, QSO points. A summary sheet showing multipliers heard on each band must be submitted. **NOTE:** In the column headed "station being worked", the same callsign may only appear **once** in every **five** contacts logged *except* when the logged station is a new multiplier for the receiving station.

432MHz and 1,296MHz Trophy Contest April results

The 1,296MHz event received the same level of support as last year, but 432MHz entries were well down. Regrettably, the view that "you just need a bigger club" is endorsed by the results, with location an important, but not primary factor, in successful vhf/uhf contesting.

The VHF Contests Committee Cup goes to G4MRS/P, the Martlesham group. In the single operator's section the winners and runners-up certificates go to G3JXN and G4KIY respectively.

The Council Cup was won by GW4LIP/P, the Parallel Lines Contest Group, with G4JAR/P, the Hadrabs Group, in second place.

Check logs were received with thanks from G3WHK, PE1ALA and DL4EA.

G5HD

1,296MHz TROPHY

MULTI-OPERATOR

Posn	Callsign	Points	QSOs	QRA	Best dx	Km	Power
1	G4MRS/P	10,093	58	AM67	DL3NI	418	400
2	GW4HWA/P	8,991	53	YN75	G3DAH	346	30
3	G4ALE/P	6,943	67	AL51	PA0PLY	352	300
4	G4JAR/P	6,653	53	ZK05	PA3BIY	462	70
5	G3UHF/P	3,762	29	ZN61	G4JAR/P	257	15
6	G3GHN/P	3,467	41	AL52	PA0WWM	301	30
7	G4DDC/P	3,294	40	ZL18	PA0WWM	341	40
8	G3WOR/P	2,212	26	ZK09	GU3KFT/P	338	1
9	G6BSE/P	670	10	AM64	G4ALE/P	106	4

SINGLE-OPERATOR

Posn	Callsign	Points	QSOs	QRA	Best dx	Km	Power
1	G3JXN	4,593	54	ZL39	PA0WWM	333	120
2	G4KIY	4,506	37	ZM40	PE1DCD	323	10
3	G3WHK	4,221	50	ZL49	PA0FRE	332	65
4	G8DKK	3,916	37	ZL08	PA0PLY/A	363	35
5	G8LMW	3,398	33	ZM24	G3WOR/P	201	300
6	G8GTZ	3,123	21	AM36	PE1DPX	342	150
7	G8GDZ	2,371	21	ZM41	G4MRS/P	219	30
8	G3VCT	2,180	32	ZL37	GW4HWA/P	225	50
9	G8IZV	1,526	18	ZL34	GW4HWA/P	212	20
10	G8AYY	1,517	16	ZM41	G4MRS/P	210	40
11	G8DIU	1,190	19	ZL59	GW4HWA/P	272	25
12	G8CXK	903	12	ZM56	G4MRS/P	148	0·3
13	G4GTH/P	881	10	YK19	GU8MNT/A	154	10
14	G4NBS	781	16	ZL48	G4MRS/P	144	1
15	G8KAX	635	14	AL32	G4JAR/P	109	3
16	G3UFW/P	352	8	ZL74	G4GTH/P	78	—

432MHz TROPHY

Posn	Callsign	Points	QSO's	QRA	Best dx	Km	Power
1	GW4LIP/P	2,019	201	YN75	DF4KT	737	400
2	G4JAR/P	1,942	201	ZK05	DF5KAG	569	400
3	G8TFI/A	1,890	192	AL45	DL7QY	684	400
4	G4MRS/P	1,675	163	AM67	DL7QY	684	400
5	G4LOJ	1,394	155	AL41	DC6KL	520	200
6	GW6GW/P	1,240	138	YL06	DJ9DL	692	100
7	G3ZWK/A	1,022	145	ZL38	DF3EE	515	200
8	G8ZHP	654	72	ZM29	DL4EA	522	120
9	G8NWR/P	639	113	ZM71	DG9DL	624	50
10	G8DDC/P	624	108	ZL18	DF3EE	526	50
11	G3GHW/P	420	78	AL52	PE1CQQ	433	40
12	G4KDL/A	392	46	AM49	DJ9DL	397	46
13	G3JXN	381	59	ZL39	DF3EE	506	120
14	GD2HDZ	345	33	XO68	G8TFI/A	465	400
15	G6APZ/P	286	52	ZN52	PA0FRE	430	10
16	G4JZF	263	65	YM30	DC6KL	520	200
	G6BSE/P	263	39	AM64	PA3BYI	317	10
18	G8ZPC	239	45	YN69	G8TFI/A	297	100
19	G3NAS	224	54	ZM31	GD2HDZ	250	100
20	G8GCP/P	217	51	ZK09	GW4LIP/P	305	10
21	G8OHM	213	55	ZM41	GD2HDZ	261	40
22	G3KUE/P	193	34	YO78	G8TFI/A	365	10
23	G8EDG/P	180	48	YM39	G8TFI/A	244	8
24	G8UIO/P	156	48	ZM73	GD2HDZ	310	10
25	G5UM	123	25	ZM35	ON4UG	324	10
26	G4DDL	112	32	ZL47	GW4LIP/P	244	8

432MHz LISTENERS SECTION

Posn	Station	Points	QSOs	QRA	Best dx	Km
1	BRS32525	149	52	AL41	G4KCT	285

IARU VHF/UHF Contests 1979 results

These extracted results have recently been received from UBA, the Belgian national society.

SEPTEMBER 144MHz VHF CONTEST

SINGLE-OPERATOR

Posn	Callsign	QSOs	Points	Posn	Callsign	QSOs	Points
1	OK1OA/P	527	182,280	34	G8SFI/P	298	69,423
2	DM2DXN/P	570	150,334	122	G8AZA	130	36,597
3	DM2ASI/P	552	129,199	212	G8GXE	106	20,459
4	SP9AFI/9	372	127,232	256	G8MHV	89	15,697
5	G4FDX/P	557	126,107	274	G4AGQ	102	14,507
12	G8NEY/P	429	99,725	276	GJ4ICD	467	14,221*

* Probable error in score.

MULTI-OPERATOR

Posn	Callsign	QSOs	Points	Posn	Callsign	QSOs	Points
1	F9FT/P	832	301,200	123	G4HGT/P	507	99,430
2	F1ANH/P	638	278,184	124	G4DZO/P	433	99,369
3	ON5FF/P	822	255,945	149	G2XU/P	397	87,725
4	OK1KIR/P	684	228,680	172	G4HRC/P	346	75,830
5	GW8BHH/P	736	224,890	185	G4DHF/P	361	72,438
14	G4BWG/P	677	197,660	223	G4DSP/A	267	62,143
16	G3PMH/P	669	195,519	229	G3WRS/P	259	61,420
20	G4BPO/P	742	189,955	236	G8JVM	342	59,008
28	G6HH/P	626	170,568	248	GW8PMW/P	316	56,156
34	G3ZIG/P	572	163,691	270	G8PHG/P	296	50,540
52	G4IJE	603	140,935	314	G8NWM	222	41,751
60	GW4ERP/P	590	134,748	340	G8MLO/P	256	35,825
88	GM3OUR/P	317	115,530	343	GU5DAT/P	—	35,639
102	GW8CSA/P	461	108,544	362	G3UES/P	236	31,492
112	G8KUC	421	105,591	391	G4AYM/P	185	24,896
116	G4APA/P	516	104,081	405	G8LVQ/P	160	22,542
117	G8GBY/P	480	103,152				

OCTOBER UHF CONTEST 432MHz

SINGLE-OPERATOR

Posn	Callsign	QSOs	Points	Posn	Callsign	QSOs	Points
1	DL7QY	256	57,639	143	G8AZA	23	5,571
2	DK3OL	273	38,047	173	G8NDP	34	3,974
3	F1DSQ/P	133	36,545	180	G3ZOI	35	3,794
31	G4CQR	121	15,562	191	G4HFO	20	3,177
59	G3TDG	92	11,555	194	G3PBV	18	3,124
124	G8KAX	53	6,503	228	G4GGV	18	1,726
140	G8EDG/P	—	5,607	246	G8LXY	22	1,204

MULTI-OPERATOR

Posn	Callsign	QSOs	Points	Posn	Callsign	QSOs	Points
1	F6CVN/P	316	105,617	28	GW3UBX/P	152	32,775
2	DK0UK	117	88,835	30	G8PMH/P	148	31,955
3	F6CTT/P	237	85,830	42	G4ALE/P	111	23,567
7	G4BPO/P	249	65,629	44	G3LCH/P	123	23,018
18	G8PUB/P	123	37,679	45	G4CCC/P	151	22,969
23	G3PIA	191	35,806	84	G4BWH	85	11,373

OCTOBER UHF CONTEST 1,296MHz

SINGLE-OPERATOR

Posn	Callsign	QSOs	Points	Posn	Callsign	QSOs	Points
1	DK2UO	82	14,091	19	G3TDG	33	3,928
2	DJ5BV	73	12,239	33	G3FYX	13	1,639
3	PA0EZ	70	11,155				

MULTI-OPERATOR

Posn	Callsign	QSOs	Points	Posn	Callsign	QSOs	Points
1	DJ3ZU/P	95	13,830	21	GW3ONP/P	27	4,811
2	G3XDY/P	54	11,703	27	G3LCH/P	17	2,439
3	DK0VL	50	10,332	30	G4ERX/P	10	1,910
9	G3PMH/P	45	8,338	34	G3SBV/P	12	1,354
20	G4GZI/P	37	4,921	42	G3ULT/P	8	616

OCTOBER UHF CONTEST 2,304MHz

MULTI-OPERATOR

Posn	Callsign	QSOs	Points	Posn	Callsign	QSOs	Points
1	ON7DV	26	2,254	6	G3XDY/P	9	1,146
2	PE0MAR/P	17	2,136	7	G3RQZ/P	5	722
3	DK0NA	10	1,877	12	G8ADC	3	98

UHF CONTEST OVERALL RESULTS

SINGLE-OPERATOR

Posn	Callsign	Points	Posn	Callsign	Points
1	PA0EZ	115,445	3	DJ5BV	76,319
2	DL7QY	108,329	18	G3TDG	31,195

MULTI-OPERATOR

Posn	Group	Points	Posn	Group	Points
1	Martlesham RS	135,604	23	HADRABS CG	47,229
2	DK0UK	107,315	25	Addiscombe ARS	37,557
3	OK1KIR/P	97,693	28	G3LCH	35,213
8	March & DRAS	73,645	30	Reading ARC	26,049
18	Wulfrun CG	56,830			

144MHz Trophy & SWL Contest rules

1400-1400gmt, 4-5 September 1982

The following general rules, published in the January 1982 issue of *Radio Communication*, will apply: 1, 2, 3, 4f, 5a, 6a, 7a, 9, 10a, 11a, 12b, 13-26.

All entries and checklogs to: VHF Contests Committee, c/o C. Sharpe, G2HIF, 20 Harcourt Road, Wantage, Oxon OX12 7DQ.

Stations wishing to enter both the RSGB and the IARU contest should score their logs in accordance with rules 7a and 7b.

The Mitchell Milling Trophy will be awarded to the leading multi-operator station; the Thorogood Trophy to the leading single-operator station, and the GM4HAM Trophy to the leading Scottish station.

VHF/UHF Listeners Championship 1981 results

Once again Bob Treacher, BRS32525, has secured the Hanson Trophy by a large margin, winning the swl section of every event he entered. BRS15822 is to be congratulated for making a determined effort with entries in all but two events, gaining him the runner's-up spot. Thanks go to all swl entrants for their logs, which always prove very useful in checking the transmitting entries. Perhaps the increasing interest in vhf listening noted by Bob in *SWL News* may result in more entries for the swl sections of this year's contests.

Station	Mar 144 MHz	Apr 432 MHz	Apr 1·3 GHz	May 144 MHz	May 144 MHz LP	Jun 70 MHz	VHF 70 MHz	NFD 144 MHz	NFD 432 MHz	Aug 144 MHz QRP	Aug 70 MHz	Sep 70 MHz	Total
BRS32525	683	140	–	29	468	–	–	1,217	228	472	–	1,971	5,208
BRS15822	436	125	288	–	209	171	35	751	–	179	109	1,021	3,324
BRS26003	359	–	–	–	–	–	–	829	–	–	–	1,002	2,190
BRS28198	292	131	–	–	240	97	–	–	–	128	–	–	888
BRS45400	–	–	–	–	229	–	–	–	–	–	–	–	229
BRS44997	128	–	–	–	–	–	–	–	–	–	–	–	128
BRS44115	72	–	–	–	–	–	–	–	–	–	–	–	72
BRS44631	–	–	–	–	–	–	–	–	–	56	–	–	56

IARU Region 1 VHF/UHF/SHF Contest rules

1. Eligible entrants. All licensed radio amateurs in Region 1 can participate in the contests. Multi-band entries from UK groups competing in the IARU Region 1 UHF/SHF contest, working from a single location and using one callsign on each band, will be accepted for the "all other stations" section of the contest. The contest entry should show which single callsign should be used in the final tabulation of the results. Contestants must operate within the letter and spirit of the contest and at no greater power than permitted in the ordinary licences of their country. Stations operating under special high power licences do so *hors concours* and cannot be placed in the contest proper.

2. Contest sections. The contest will comprise two sections for each band:
1. Single-operator station, operated by owner of the licence (no club stations).
2. All other stations.

3. Dates of contests.
VHF Contest: The contest will take place during 4 and 5 September 1982 on the 144MHz band.
UHF/SHF Contest: The contest will take place during 2 and 3 October 1982 on 432MHz and each higher band.

4. Duration of contest. The contests will commence at 1400gmt on the Saturday, and will end at 1400gmt on the Sunday.

5. Contacts. Each station can be worked only once on each band, whether it is fixed, portable, or mobile. If a station is worked again during the same contest, only one contact will count for points, but any duplicate contact should be logged without claim for points and clearly marked as duplicate. Contacts made via active repeaters or translators do not count for points. Any telephony contact made with stations generating in the cw (A1A) sub-band shall not count for points.

6. Type of emission. Contacts may be made on A1A, J3E, R3E, F3E. F2A may be used above 1GHz. Only one transmitter or transceiver may be used on each band at any time.

7. Contest exchanges. Code numbers exchanged during each contact shall consist of the RS or RST report, followed by a serial number commencing at 001 for the first contact on each band, and increasing by one for each successive contact on this band; this must be immediately followed by the QTH locator of the sending station (eg 59 003 GX24j or 579023 HG46e).

8. Scoring. Points will be scored on the basis of 1pt/km. The final claimed score must be shown on the first sheet.

9. Entries. Entries should be sent to the VHF Contests Committee, c/o the adjudicator for the RSGB contest on the same date.

10. Awards. The winner of each section will receive a certificate. The entrants compete for the following challenge trophies:

VHF contest: (a) The IARU Region 1 VHF Trophy, for the winner of Section 1. (b) The PZK Trophy, for the winner of Section 2.

UHF/SHF contest: (a) The Vittoria Alata Cup 1, for the winner of the 432MHz Fixed Section. (b) The Vittoria Alata Cup 2, for the winner of the 432MHz Portable/Mobile Section.

Overall winner: An overall winner of the IARU Region 1 UHF/SHF Contest will be declared. For this competition, the scores of the entrants will be combined, using the following multipliers:

432MHz	×1
1,296MHz	×5
2,400MHz	×10
Higher bands	×20

The entrant scoring highest will be awarded an IARU Region 1 Medal. The 1982 organizing society is the Polish national society, PZK.

ROPOCO 2 1982 rules

1. The general rules for RSGB hf contests, published in the January 1982 issue of *Radio Communication,* will apply.

2. Eligible entrants. All paid-up members of the RSGB resident in the British Isles holding a Class A licence. Single-operator entries only.

3. When. 0800 to 1000gmt, Sunday 29 August 1982.

4. Contacts. CW in the 3·5MHz band only. Entrants are requested to confine their operations to 3,510-3,590kHz. Send RST plus—for the first contact, entrant's own postal code; for the second and subsequent contacts, the postal code received in the previous contact. Contacts with European stations will not count for points.

5. Scoring. 10 points per contact.

6. Entries. Logs must be sent to M. Harrington, BRS20249, 123 Clensham Lane, Sutton, Surrey SM1 2ND, postmarked not later than Tuesday 14 September 1982.

7. Awards. Certificates will be awarded to the first, second and third placed entrants.

DF Qualifying Event South Manchester

Date: 25 July 1982
Map: OS Sheet 109, 1:50,000 series Manchester
Assembly: 1300bst for start at 1320bst
Location: Layby on A57, 0·25 mile south of junction with M63, ngr 748 972

Competitors requiring tea should notify Mr D. Holland, 32 Woodville Drive, Sale, Cheshire M33 1NF, tel 061-973 1837, home; 061-485 8505, office, not later than 18 July 1982.

DF Qualifying Event Salisbury

Date: 8 August 1982
Map: OS Sheet 184, 1:50,000 series, Salisbury and the Plain
Assembly: 1300bst for start at 1320bst
Location: Knowle Hill, adjacent to trig point, ng 036 232
Please approach from A354.

Competitors requiring tea should notify Mr A. Newman, 74 Victoria Road, Wilton, Salisbury, Wilts SP2 0DY, tel 0722 743837, not later than 1 August 1982.

BARTG Spring VHF/UHF Contest 1982 results

The weather and radio conditions were an improvement over last year's disasters. Some good dx was worked on 144MHz with the best dx being G3PIA/P to DB6JI at 553km. It now seems that more claims could be put in for the VHF/UHF Century awards from Ted Double (See *BARTG Newsletter* December 1981, p 30). The lack of activity on 432MHz was disappointing, most operators concentrated on the 144MHz section of the contests. At least all four active stations on 1·3GHz put in entries, that is the first and second placed in the multi-operator and single-operator contests. Come on all those who requested 1·3GHz rtty. It is nice to see some of the newer callsigns on rtty and putting in entries. There were more entries this year and generally the stations were more active.

All entries are checked and scored by the adjudicator and it seems that some entrants' computer scoring programs need looking at. One version of the program seems fairly accurate in a N-S path but can have errors of up to 20km when used on an E-W path. The first and second placed in each section received certificates.

Thanks to G8MWU for a useful check log and to all those active over the period, some who even took time-off working the concurrent RSGB uhf contest to work this contest. Total stations active 144MHz: 83 Gs, 4 GIs, 1 GM, 4 ONs, 4PA0s, 7 DL/DGs, 9 I1s and 1 F. 432MHz: 11 Gs; 1·3GHz: 4 Gs.

144MHz MULTI-OPERATOR

Posn	Callsign	Points allowed	Contacts allowed	Best dx	Km	QTH	Pwr	PA final	Ant	ASL (ft)
1	G4FOX/P	226	40	ON1RN/A, ON1GL/A	395	ZM26d	100	Transistor	16-el Y	755
2	ON6AR	202	24	G3PIA/P	418	CL63h	125	QQE0640	10-el Y	125
2	G8YHF/P	202	28	GM3UDJ	551	YK19a	100	Transistor	2x14-el Y	900
4	G3UUP/P	196	40	ON6AR	373	ZL26j	80	Transistor	2x16-el Y	350
4	G3PIA/P	196	32	DB6JI	553	ZL33h	100	4CX250B	16-el Y	800
6	G8GHU	183	25	ON6AR	491	YK38a	90	2C39A	8XY	200
7	G6CZV	129	29	G4EEV	223	ZM57l	40	Transistor	16-el Y	300
8	G3LRS/A	109	27	G3EMU/A	241	ZM25h	45	2N6084	6-el quad	160

144MHz SINGLE-OPERATOR

Posn	Callsign	Points allowed	Contacts allowed	Best dx	Km	QTH	Pwr	PA final	Ant	ASL (ft)
1	G3EMU/A	314	38	DF1ZE	540	AL76b	100	NAG	2x14-el Y	525
2	G8UVE/P	193	23	G3EMU/A	401	YO79c	100	Transistor	9-el Y	1,450
3	G3TDG	113	21	G8UVE/P	342	AL51g	10	Transistor	10-el Y	650
4	G8LWY	101	27	ON6AR	330	ZL49j	–	Transistor	8-el Y	10
5	G6CJI	99	19	G8YHF/A	324	ZN22c	100	Sota	10-el Y	600
6	G8SFM	95	17	G8VLL	263	YL39b	10	Transistor	16-el Y	600
7	G6EIT	74	16	ON6AR	311	ZL50c	90	Transistor	14-el Y	115
8	G8APB	71	13	ON6AR	381	ZL75b	12	Transistor	10-el Y	700
9	G4EEV	61	7	G8YHF/P	399	ZO58e	80	4CX250B	10-el Y	75
10	MJED	48	8	I1TXD	265	FE47b	12	Transistor	16-el Y	165
11	G8CDW	45	13	G8GHU	208	ZL30d	20	Transistor	4-el quad	100
12	G8DMX	25	5	G4LAA	210	XO21g	100	–	–	–

Check log only, G8MWU.

432MHz MULTI-OPERATOR

Posn	Callsign	Points allowed	Contacts allowed	Best dx	Km	QTH	Pwr	PA final	Ant	ASL (ft)
1	G3UUP/P	33	9	G8UVE/P	279	ZL26j	80	CM5012-A	4x8-el Y	350
2	G4CXJ/P	15	5	G3TDG	115	ZL33h	6	C10-12	21-el	800

432MHz SINGLE-OPERATOR

Posn	Callsign	Points allowed	Contacts allowed	Best dx	Km	QTH	Pwr	PA final	Ant	ASL (ft)
1	G3TDG	36	8	G8UVE/P	342	AL51g	40	2C39A	21-el Y	650
2	G8UVE/P	24	2	G3TDG	342	YO79c	100	Transistor	19-el Y	1,450
3	G8APB	15	5	G6BEP/P	93	ZL75b	50	Transistor	48-el MBM	700
4	G8LWY	11	5	G4CXJ/P	85	ZL49j	–	–	48-el MBM	10
5	G8CDW	1	1	G3TDG	37	ZL30d	10	Transistor	6d 8 Colin	100

1·3GHz MULTI-OPERATOR

Posn	Callsign	Points allowed	Contacts allowed	Best dx	Km	QTH	Pwr	PA final	Ant	ASL (ft)
1	G3UUP/P	189	3	G3TDG	77	ZL26j	1	Transistor	2x12-el slot	350
2	G8CUL/P	47	1	G3UUP/P	47	ZL33h	0·1	BF034	4x21-el Y	800

1·3GHz SINGLE-OPERATOR

Posn	Callsign	Points allowed	Contacts allowed	Best dx	Km	QTH	Pwr	PA final	Ant	ASL (ft)
1	G3TDG	155	2	G8APB	78	AL51g	35	2C39A	2x23-el	650
2	G8APB	143	2	G3TDG	78	ZL75b	4	BF068	2x23-el	700

Cray Valley RS 12th SWL Contest rules

The rules for this contest are the same as those published in the July 1981 issue of *Radio Communication,* with the exception that the event will take place on 11 and 12 September, and entries should arrive not later than 1 November 1982.

The address of the contest manager, to whom the entries must be sent, is Owen Cross, G4DFI, 28 Garden Avenue, Bexleyheath, Kent DA7 4LF. Copies of the rules may also be obtained from him.

RSGB Region 1 VHF Contest rules

0900 to 1700gmt. Sunday 26 September
Organized by and for members in NW England and Isle of Man.
Bands: Any three from 70, 144, 432, 1,296MHz.
Section 1. Multi-operator, fixed or /P. Separate callsign for each band, simultaneous operation. No QSOs within operator's own group count.
Section 2. Single-operator, fixed or /P. One to three bands from the four. /P operators may go up to 20 miles outside Region 1, stating that they are from the region in QSO.
Section 3. Operators in other regions are invited to enter logs, scoring only for Region 1 QSOs.
The following general rules, published in the January 1982 issue of *Radio Communication*, will apply: 2, 3, 5a, 6a, 11a, 12a, 13-19, and 21.
Scoring: A—70, 144 and 432MHz, as rule 7a; 1,296MHz, 1pt/5km, followed by **B, C,** and **D** in that order. **B**—multiply 70MHz score by three, 432MHz by four. **C**—According to antenna height asl, multiply band totals as below: 0-200ft by 2, 200-400ft by 1·8, 400-600ft by 1·6, 600-800ft by 1·4, 800-1,000ft by 1·2, 1,000-1,200ft by 1·1, 1,200ft upwards by 1·0. **D.** Add 10pt bonus for each Region 1 contact.
Cover: One cover sheet per entry, including ngr and antenna height asl.
Awards: Section 1, The G3SMM Shield; Section 2, The G2CIP Shield; both to be held for the year. Section 3, Leader's certificate.
Entries: To G2CUZ, 34 Sandbrook Road, Ainsdale, Southport PR8 3JE.

Contests calendar

1 July	Canada Day *(Rules in June* MOTA)
3 July	Young Operators Field Day *(Rules in June 4-2-70)*
3-4 July	VHF NFD *(Rules in April issue)*
10-11 July	IARU Radiosport *(Rules in July* MOTA)
11 July	DF Coventry *(Rules in June issue)*
11 July	10GHz Cumulative 1982
17-18 July	International QRP CW *(Rules in July* MOTA)
18 July	3·5MHz Field Day *(Rules in June issue)*
25 July	DF South Manchester *(Rules in July issue)*
1 August	432MHz Low Power *(Rules in June issue)*
7-8 August	YO DX HF *(Rules in July* MOTA)
8 August	DF Salisbury *(Rules in July issue)*
8 August	10GHz Cumulative 1982
15 August	70MHz Trophy & SWL *(Rules in June issue)*
22 August	DF Slade
28-29 August	All Asian (CW) *(Rules in May* MOTA)
29 August	ROPOCO 2 *(Rules in July issue)*
4-5 September	144MHz & SWL *(Rules in July issue)*
4-5 September	IARU 144MHz *(Rules in July issue)*
4-5 September	SSB FD *(Rules in June issue)*
11-12 September	Cray Valley RS 12th SWL *(Rules in July issue)*
19 September	10GHz Cumulative 1982
19 September	DF National Final, Colchester/Chelmsford
25 September	AGCW-DL VHF /UHF CW *(Rules in March* 4-2-70)
26 September	RSGB Region 1 VHF *(Rules in July issue)*
2-3 October	IARU VHF *(Rules in July issue)*
10 October	21/28MHz Phone *(Rules in May issue)*
17 October	21MHz CW *(Rules in May issue)*
October/ December	432MHz Cumulatives
October/ December	1,296MHz Cumulatives
6-7 November	144MHz CW
6-7 November	Marconi Memorial CW
7 November	LF CW (WAB) *((Rules for all WAB contests obtainable from D. Roberts, G4FQO, 12 Chestnut Ave, Cranwell, Nr Sleaford, Lincs NG34 8HT)*
13-14 November	1·8MHz (2nd)
5 December	144MHz Fixed

Special event stations

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

9-11 July, GB2CMJ
This station will be operated by the Chiltern ARS in conjunction with Marlow Scouts. Details from G3NCL, tel High Wycombe 712020.

10-11 July, GB2DTS
The station will operate at Dagenham Town Show on all the hf bands, using cw, ssb and rtty, on 144MHz, fm and ssb, and on 432MHz atv. Barking R&ES will be running the station, and details may be obtained from their sec, at 80 Lyndhurst Gardens, Barking, Essex IG11 9XZ.

10-17 July, GB2FS
The Stamford ARS will operate the station at Stamford Festival. Details from J. A. Wilson, 7 Sutherland Way, Stamford, Lincs PE9 2TA.

13-15 July, GB2GYS
York ARS will operate the station from the Great Yorkshire Show, Harrogate, on Stand 562 in the Jubilee area of the showground. Operation will be on all hf bands and 144MHz fm. Special QSL cards will be sent via the bureau. Direct QSLs will not be answered without an sae. Details from G3WVO, QTHR.

20 July, GB2ABC
The station will be run by the Abergavenny & Nevill Hall ARC at the Abergavenny & Border Counties Show. Details from D. F. Jones, 2 Dalwyn Houses, Llanover Road, Blaenavon, Gwent NP4 9HY.

24-25 July, GB4WAM
Warrington ARC will be holding a charity amateur radio marathon. All bands will be attempted with the objective of working countries for points on hf and counties for points on vhf/uhf, the total points being the marathon sponsorship. Special QSL cards will be available through the bureau. Details from M. W. Mansfield, G6AWD, QTHR.

24-25 July, GB4LCS
This station will operate on all bands during the Lambeth Country Show, Brockwell Park, Herne Hill SE24. Special QSL cards will be sent to all contacts via the QSL Bureau. Details from Roy Hatherway, G3JHI, QTHR.

GB2NIS, 28July-6 August
The station will be part of the Scout jamboree at Castle Archdale, Co Fermanagh, which celebrates the 75th anniversary of the Scouts. It will be active on all bands, and it is hoped to have it active on sstv, radio teleprinter and amateur satellites. Special QSL cards will be available. Details and sked arrangements from Dr David Hutchinson, 8 Oakglen, Antrim BT41 1JR, Northern Ireland, on receipt of an sae.

31 July, GB2FAA
Yeovil ARC will be operating the station for the RNARS, to whom they are affiliated, at International Air Day, RN Air Station Yeovilton, Yeovil, on the Naval Communications stand. Details from G3NOF, QTHR, tel Yeovil (0935) 24956, or G4DEP, QTHR, tel Langport 250629.

11-14 August, GB4RSC
This station celebrates the 25th anniversary of the Sutton Coldfield RS and will operate on hf and vhf bands during the exhibition at the society's headquarters, Central Library, Sutton Coldfield. A special QSL card will be issued. Visitors will be very welcome. Further details from Harry Griffiths, G3BOQ, QTHR, tel Aldridge 52667.

14-15 August, GB2YFT
The station, operated by Yeovil ARC, will beat Yeovil Festival of Transport, Barwick Park, Yeovil, Somerset, on the A37. Details from G3NOF, QTHR, tel Yeovil (0935) 24956.

20-23 August, GB4DAR
The station is to celebrate the 21st anniversary of Dudley ARC, and will operate from Dudley Zoo. It will be on the hf bands and 144MHz. There will also be a small display with the RSGB promotion pack. Details from Alan Johnson, G4FWR, QTHR.

21 August, GB2MSS
The station, operated by Yeovil ARC, will be at the Mid-Somerset Show, Shepton Mallet, Somerset. Details from G3NOF, QTHR, tel 0935 24956.

28 August, GB4BOD
The station will operate at the RAF Binbrook Open Day. It will be on hf on cw and rtty, with two hf phone bands; 144MHz fm, ssb, cw, and rtty; 432MHz fm and ssb; and fstv and sstv on hf. Talk-in will be on 145·400MHz (S16). There will be special QSL cards.

Mobile rallies calendar

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

11 July—Worcester & DARC Annual Mobile Rally, the High School, Ombersley Road, Droitwich. Talk-in on vhf and uhf. Attractions will include "strawberry fields", fancy dress competition, model aircraft and static displays by local organizations. Details from rally manager Tony Blissett, G8NSL, 26 Cherry Orchard, Holt Heath, Worcester, tel Worcester 620507.

18 July—Pembroke & DARC "Bucket & Spade Party". The Regency Hall, Saundersfoot. Open 11am. Talk-in on 144 and 432MHz. Details from GW3XJQ, tel 09945 267.

18 July—Cornish Rally, Technical College, Camborne, Cornwall. Details from Andy French, G8TUJ, 12 Pentalk Road, Camborne, tel 0209 717343.

18 July—Sussex Mobile Rally, Brighton Raceground, Racehill, Brighton, Sussex. Open at 1030h. Special event station, GB2SMR, will be operating talk-in on S22 and 432MHz. All the popular attractions, including mini bus rides to the beach. Free on-site car parking for 4,000 cars. Further details available from G. Miles, G3VBE, 65 Montgomery Road, Hove, Sussex, tel Brighton 778546.

25 July—Anglian Mobile Rally, Stanway School, Colchester, Essex. Open 10am-5pm. Talk-in on 144MHz. Further details from G3YAJ, tel 0206-39 3938.

25 July—Scarborough ARS Mobile Rally, The Spa Ocean Room, on the sea front. Open 10.45am. Talk-in on S22 and GB3NY (RB0). Usual attractions including bring-&-buy, plus 50th anniversary events. Help given to RAIBC members by prior arrangement. Further information from G4JAQ, QTHR, tel 0723 862638.

1 August—RSGB National Mobile Rally, Woburn.

8 August—25th Annual Derby Mobile Rally. Lower Bemrose School, off Derby Ring Road, just follow signs. Talk-in on 144MHz fm. Open 11am-5pm. Free spot prizes, free admission, parking. Many new attractions, plus all the old favourites. Details from Mike Darn, 22 Reservoir Road, Brockwell, Chesterfield S40 4HF, tel 0246 202690.

15 August—Preston ARS 14th Annual Mobile Rally, Walton-le-Dale County High School, Brindle Road, Bamber Bridge, Preston (1 mile from M6 junction 29). Open 11am. Talk-in on 144MHz fm S22. Usual attractions including the popular bring & buy stall. Refreshments. Free entry and parking. Details and enquiries from Mrs D. Stevens, 13 Arrowsmith Close, Hoghton, Preston PR5 0DV, tel Hoghton (025485) 3304.

22 August—Bromsgrove & DARC will be holding their picnic this year at Avoncroft Art Centre, Bromsgrove. Talk-in on S22. On site parking. Licensed bar. Refreshments. Attractions for the whole family. Details from J. F. Burford, c/o the Art Centre.

29 August—BARTG Rally, Sandown Racecourse, nr London. Details from sec Edward Batts, G8LWY, 27 Cranmer Court, Richmond Road, Kingston-upon-Thames, Surrey.

29 August—Torbay Mobile Rally. ITT Social Centre, Old Brixham Road, Paignton. Talk-in on S22 from 1000h. Ample free parking. Trade stands and used equipment stall, draws. RSGB book stand. Hot meals and bar facilities. Details from G4DZH or G2CWR. Trade stand footage applications from G4DZH, tel 0803 523063.

12 September—Fifth Telford Mobile Rally, Telford, Shropshire. Extended layout, about 40,000 sq ft. Varied attractions. Full catering and licensed premises on site. Over 60 stands. Free entrance and parking. Further details from G8DIR, tel Shrewsbury 64273; G8UGL, tel Telford 584173; or G3UKV, tel Telford 55416; all QTHR.

12 September—Vange ARS Mobile Rally, Nicholas School, Basildon, Essex. 10am-5pm. Talk-in on S22 with callsign GB4VMR. Many attractions including trade stands, bring & buy, raffle, door prize and refreshments. Details from Albert Smith, G4FMK, QTHR, tel 0268 683805.

19 September—Peterborough R&ES Mobile Rally, the Wirrina Sports Stadium, Bishops Road, Peterborough. Situated on the river embankment with plenty of car parking space. Open 10.30am till 5pm. Details from D. T. Wilson, G4KSW, 4 Conway Avenue, Peterborough, tel Peterborough 76238.

26 September—Harlow Mobile Rally, Harlow Sportcentre, Hammarskjold Way, Harlow, Essex. Bar, restaurant, parking, bring & buy, trade stands. 11am to 5pm. Details from Phil, G8FRG, QTHR.

3 October—Great Lumley ARCS Rally, Community Centre, Great Lumley, Nr Chester-le-Street, Co Durham. Open 11am. Talk-in on S22. Usual attractions including bring and buy. Further information from Max Hanaghan, G8HPW, QTHR, tel 078324 3946.

CLUB NEWS

The following is the latest information received by RRs from RSGB affiliated societies, clubs and groups in time for inclusion in this issue, plus basic unchanged information on other affiliated organizations which was last published in the January issue. Unchanged details will be published again in January 1983.

RSGB affiliated organizations are requested to report all programmes and news items to their regional representatives regularly. Information for inclusion in the **September** issue should reach them by **10 July** and for the **October** issue by **21 August.**

Club programmes are given in order of date, subject time and place of the 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.

COMPOSITION OF RSGB REGIONS

Region 1	Cheshire, Cumbria, Greater Manchester, Isle of Man, Lancashire, Merseyside.
Region 2	All that part of Humberside north of River Humber, North Yorkshire, South Yorkshire, West Yorkshire.
Region 3	Hereford and Worcester, Shropshire, Staffordshire, Warwickshire, West Midlands.
Region 4	Derbyshire, all that part of Humberside south of River Humber, Leicestershire, Lincolnshire, Nottinghamshire.
Region 5	Bedfordshire, Cambridgeshire, Northamptonshire.
Region 6	Berkshire, Buckinghamshire, Oxfordshire.
Region 7	Greater London south of River Thames, Surrey including that part of London north of the Thames administered by Surrey.
Region 8	Kent, East Sussex, West Sussex.
Region 9	Cornwall, Devon.
Region 10	Dyfed, Gwent, Mid Glamorgan, Powys, South Glamorgan, West Glamorgan.
Region 11	Clwyd, Gwynedd.
Region 12	Grampian, Highland, Island Authorities, Tayside
Region 13	Borders, Fife, Lothian.
Region 14	Central, Dumfries and Galloway, Strathclyde.
Region 15	Northern Ireland.
Region 16	Essex, Norfolk, Suffolk.
Region 17	Isle of Wight, Channel Islands, Dorset, Hampshire, Wiltshire.
Region 18	Cleveland, Durham, Northumberland, Tyne & Wear.
Region 19	Greater London north of River Thames, Hertfordshire.
Region 20	Avon, Gloucester, Somerset.

REGION 1—RR W. R. Parkinson, G3FNM, 141 Norris Road, Sale, Cheshire M33 3JR. Tel 061 973 1472.

Area representatives in Region 1

G. L. Adams,	G3LEQ	Knutsford
E. C. Baines,	G6CQZ	Bacup
A. M. Cooper,	G3TKD	Chester
B. Donn,	G3XSN	Liverpool
I. F. M. Duthie,	G8TCJ	Carlisle
J. R. Fogg,	G8UZZ	Wirral
F. Harrison,	G3XII	Leyland
J. Heywood,	G4IAL	Stockport
N. Horrocks,	G2CUZ	Southport
N. Jenkin,	G4CGT	Darwen
G. Lancefield,	G3DWQ	Preston
A. B. Langfield,	G3IOA	Manchester
R. J. B. Morgan,	GD3KGC	Isle of Man
R. F. Redhead,	G4FXG	Poulton-Le-Fylde
E. A. Thorne,	G3ART	Crosby, Nr Maryport

Accrington (North Western Repeater Group)—Third Thursday in each month, 15 July. Globe Bowling Club, Willows Lane, Accrington. Sec Howard Aspinall, G3RXH.

Ainsdale (AARC)—6, 20 July, 3 August. Ainsdale Scout HQ. Sec Norman Horrocks, G2CUZ, tel 0704 77604.

Barnoldswick (Rolls-Royce ARC)—First Wednesday in each month, 8pm. Roll-Royce Sports & Social Club, Barnoldswick. Sec Leslie Logan, G4ILG, tel Barnoldswick 812288.

Blackburn (East Lancs ARC)—First Tuesday in each month, 6 July (No details of meeting), 3 August (No club meeting). 7.30pm. Shadsworth Leisure Centre, Blackburn. PRO Norman Jenkin, G4CGT, tel 0254 75037.

Blackpool (B&Fylde ARS)—6 July, 3 August. Refer to sec Jim Newland, G5ND, for venue and programme, tel 0253 64508.

Bolton (B&DARS)—7, 21 July (Formal lecture programme), 14, 28 July (Activity nights), 8pm. Horwich Leisure Centre, nr Bolton. Sec Dave Molyneux, G6AEK, tel Atherton 877921.

Bolton (BTC ARC)—Details from sec, c/o Electronics Dept, Bolton Technical College, Manchester Road, Bolton.

Bolton (Norweb ARC)—Information from C. J. Moulding, G4HYG, c/o Sports & Social Club, Norweb Electricity, Manchester Road, Bolton BL3 2QN.

Bolton (Red Rose RS)—Details from sec Geoff Mollison, G8VCW, tel Bolton 21424.

Bury (BRS)—13 July (Surplus equipment sale), 6, 20, 27 July (Informal meetings), 7.30pm. Mosses Community Centre, Cecil Street, Bury. Details from David Hensby, G8TKD, tel (daytime) Whitworth (070685) 2213.

Carlisle (Border Television ARC)—Details from sec, Border Television Ltd, Television Studios, Carlisle, Cumbria.

Chester (C&DRS)—Tuesdays, except first Tuesday in each month, 13 July (Visit to Moel-y-Parc), 20 July (Lecture on slow scan tv), 27 July (Use of computers for ham radio), 8pm. YMCA, Old Palace, Vicars Lane, Chester. Club officers are president, D. Wardle, G3EWZ; treasurer, G. Williams, G8RLV; sec, Chris Hopley, G8ICT.

Congleton (CARC)—Details from RS42758, 156 Holmes Chapel Road, Congleton, Cheshire CW12 4QB.

Crewe (South Cheshire ARS)—Meetings at RAOB Social Club, Earle Street, Crewe. Information from B. G. F. Roe, G4LVR, tel 0270 665661.

Douglas (IoMARS)—Mondays, fortnightly, Keppel Hotel, Creg-ny-Baa, nr Onchan, Isle of Man. Sec Colin Matthewman, GD4FWQ, tel 0624 22295.

Eccles (E&DRC)—Tuesdays, 8.30pm. White Swan, Worseley Road, Swinton. Club calls are G3GXI and G8GRI. President, Arnold Moss, G8VF; chairman/acting sec Chris Harrison, G8KRG, tel 061 797 0031.

Leyland (LHARG)—Second Monday in each month, 7.30pm. Rose & Crown, Ulnes Walton, Leyland. Sec Arthur Jolly, G4JCO.

Liverpool (L&DARS)—Tuesdays, 8pm. Conservative Rooms, Church Road, Wavertree, Liverpool. Sec Eric Grossmith, G3WOH, tel 051-426 3701.

Liverpool (Sefton ARC)—First and third Wednesday in each month, 8pm. Liverpool Prison Officers Club, Hornby Place, off Hornby Road, Liverpool 9. Sec Len Gurney, G4LBJ, tel 051-523 6077.

Liverpool (UoLARS)—The society meets informally in the shack at the top of the Old Union Building, 2 Bedford Street North, Liverpool 7. Further information from sec Peter R. Jones, GW6AJK, c/o UoL Students Union.

Macclesfield (M&DRS)—13, 27 July, main and informal meetings respectively. St Andrews School Hall, Bedford Road, Macclesfield. Sec Steve Webb, G3TPW.

The president of the Thornton Cleveleys ARS, Mark Denny, G6DN (right), with society chairman Dave Ward, G8KBH, on the occasion of his 90th birthday. The society presented him with a digital clock and a birthday cake. *Photo:* **G3FIF**

Manchester (ICLR&ES)—Information from sec, c/o 4TB, International Computers Ltd, Wenlock Way, West Gorton, Manchester M12 5DR.

Manchester (M&DARS)—7, 14, 21, 28 July, 7.30pm. Newton Heath Community Centre, 203 Droylesden Road, Newton Heath, Manchester. Sec John Dent, G4LRR, ex-G8OWY, QTHR.

Manchester (MUARS)—Informal meetings most lunch-times and Wednesday afternoons in the shack on the first floor on the north side of the Students Union Buildings. Thursday evenings in UMIST Union Bar. Chairman John Hampson, G4LPO, c/o Amateur Radio Society, University Union, Oxford Road, Manchester M13 9PR.

Manchester (Openshaw TCRC)—Information from the college, Whitworth Street, Openshaw, Manchester M11 2WH.

Manchester (South Manchester RC)—2 July (80-10m activity night), 9 July ("Understanding receiver specifications", by Tim Winter, G4AOK), 16, 23, 30 July (Programme to be arranged), 8pm. Sale Moor Community Centre, Norris Road, Sale. Informal meetings Monday evenings in the club shack. Sec David Holland, G3WFT, tel 061-973 1837.

Manchester (UMIST RS)—During term time, Wednesday afternoons, in the shack on L floor in the Main Building, Thursdays at 9pm in the UMIST union bar. Further information from Duncan Wheelhouse, G8TRP, c/o Radio Society, UMIST Union, Box 88, Sackville Street, Manchester M60 1QD.

Manchester (West Manchester RC)—Wednesdays, 8pm. Atherton & Tyldesly Scout HQ, Shuttle Street, Tyldesly. Sec Dennis Tennant, G4KCB.

Maryport (Solway Radio Club)—At the agm on 31 March the following were elected: chairman, F. Chidlow; treasurer, Allen Thorne; sec S. R. Miles, 6 Mill Street, Maryport. He reports an influx of new members intending to obtain their amateur radio licence and the club is giving instruction in radio theory and morse. Meetings are at the Educational Settlement, Castle Hill, Maryport. For more details contact the sec.

Ormskirk (ORC)—Contact sec Kevin Higgins, G4IGX, 8 Delph Top, Greetby Hill, Ormskirk L39 2DX, tel Ormskirk 75546, for further information.

Penrith (Eden Valley RS)—Stuart Marsh, G4JHV, the new sec reports that interesting and varied programmes are arranged for the monthly meetings held on the third Thursday in each month, 7.30pm. Two Lions Hotel, Great Dockray, Penrith, Cumbria. Club net Thursdays, 7pm, on 3·650 MHz. For details tel sec 0768 88260.

Preston (PARS)—8 July ("QRP night", by Jim Hill), 22 July (No information available). St Mary Magdelene Hall, Faringdon Lane, Ribbleton, Preston. Sec George Earnshaw, G3ZXC.

St Helens (StH&DARC)—1, 8, 15, 22, 29 July, 7.45pm. Conservative Club, Boundary Road, St Helens. Sec Paul Gaskell, G4MWO, ex-G8PQD, QTHR, tel St Helens 25472.

Salford (Dial House RS)—Wednesdays, 5.30pm. Dial House, 21 Chapel Street, Salford. Details from sec, Manchester Central Area Sports & Social Club, c/o M43, Dial House.

Salford (UoSCS)—Wednesday afternoons from 1.30pm. Shack on the top floor of the Clocktower, The Pavilion, Castle Irwell Students Village. Contact Paul Wells, G4GMV, c/o SUCS, Students Union, University of Salford, University Road, Salford M5 4WT.

Stockport (SRS)—Second and fourth Wednesdays in each month, 8pm. Blossoms Hotel, corner of Bramhall Lane and Wellington Road, Stockport. Sec Stan Aspinall, G3VSA, tel 061-437 1437.

Thornton Cleveleys (TCARS)—2 July (Talk on plastics by Jack Duddington, G4BFH), 9 July (Discussion of the club construction project), 16 July (Review of HF and VHF Field Days), 23 July (Operation of the club station), 30 July (Natter night), 8pm. Thornton Cleveleys Sports Centre, Victoria Road, Cleveleys. Sec Mrs Jen Ward, G8YOK, tel Poulton-le-Fylde 890114.

Wallasey (St Dunstan's ARS)—Information from E. C. John, G3SEJ, 52 Broadway Avenue, Wallasey, Merseyside L45 6TD.

Warrington (Racal Communication RS)—Information from sec, c/o Racal Communications Ltd, Chesford Grange, Warrington, Cheshire W81 4RH.

Warrington (UK FM Group Western)—1 July, 5 August, 8pm. Grappenhall Community Centre, Bellhouse Lane, Warrington. Sec Gordon Adams, G3LEQ, tel 0565 4040.

Warrington (WARC)—6 July (Foxhunt and barbecue), 13 July (RSGB video film), 20 July (Learning Basic), 24/25 July (Charity marathon, special callsign GB4WAM), 8pm. Grappenhall Community Centre, Bellhouse Lane, Warrington. Operation of G4CDA on Sunday lunch-times from the clubhouse at the same QTH. Officers for current year are chairman, Mike Mansfield, G6AWD; treasurer, Guy Wood, G8NRF; sec Ron Staples, G3MMD.

Warrington (10th Warrington Scout Group ARC)—Information from sec, c/o 41 Highfield Avenue, Great Sankey, Warrington, Cheshire WA5 2TW.
Wigan (Douglas Valley ARS)—1, 15, 22, 29 July. Shevington Conservative Club, Shevington, Wigan. Sec Dave Harrison, G4NDJ, 3 Hallcroft, Birch Green 2, Skelmersdale, Lancs WN8 6QB.
Wigan (WCTARC)—Information from J. R. Hesford, Dept of Electrical Engineering, Wigan College of Technology, Parsons Walk, Wigan WN1 1RR.
Winsford (Mid-Cheshire ARS)—Wednesdays. Cotebrook Village Hall, off the A49 near Tarporley. Sec Rick Dodd, G8PNL, tel Winsford 57766. Net night Tuesdays, on 144·200MHz.
Wirral (WARS)—7 July (Demonstration of vhf equipment by Gordon Adams, G3LEQ), 21 July (Yes, it is another surplus equipment sale!), 7.45pm. Minto House School, Birkenhead Road, Hoylake, Wirral. Sec Gordon Lee, G3UJX, tel 051-677 1518.
Wirral (W&DARS)—14 July (Trio and other radio equipment—demonstration by Lowe Electronics Ltd, Matlock), 21 July (Provisional date for the annual barbecue), 28 July ("Winners Revenge" df hunt), 8pm. West Kirby Concourse Sports Centre. Sec Gerry Scott, G8TRY, tel 051-630 1393.
Woodford (RATEC)—Mondays, 8pm. British Legion, Moor Lane, Woodford, Cheshire. Sec Bob Marsh, G8TYH, tel 061-439 1422.

REGION 2—RR D. S. Smith, G4DAX, Red Roof, Goathland, Whitby, North Yorks YO22 5AN. Tel 094-786 333.

Area representatives in Region 2

P. N. Butterfield,	G4AAQ	Pontefract
K. R. Cass,	G3WVO	York
K. M. Cleary,	G4ATZ	Boston Spa, Wetherby
J. Clegg,	G3FQH	Huddersfield
I. R. Firth,	G3WWF	Leeds
J. R. Simpson,	G3CAA	Scarborough
M. J. Topham,	G8NUC	Bradford

Barnsley (B&DARS)—Mondays, 7.30pm. The Warren, Warren Quarry Lane, off Park Road, Barnsley. Sec G4JKW.
Barnsley (UK FM Group Northern)—4 July, 1 August, 7.30pm. The Royal Hotel, Church Street, Barnsley. Sec G4LUE.
Bradford (UoBARS)—Thursdays, 7.30pm. N10, Main Building. Sec G8GOV. Net frequency 145·275MHz.
Denby Dale (DD&DARS)—Second and fourth Wednesday in each month, 7.30pm. Pie Hall, Denby Dale. Sec J. Clegg, G3FQH.
Doncaster (Ex-DMIoHEARC)—Mondays, 8pm. Thursdays (Informal). Royal Naval Association, North Bridge, Doncaster. Sec R. Lane, G8VLO, tel 59747. Club call is G3UER.
Goole (G&DARS)—Mondays, 7.30pm. The Grammar School, Boothferry Road, Goole. Out of term-time the club meets at the Chamber of Commerce Building, Boothferry Road, Goole. Chairman G3VBI.
Halifax (Northern Heights ARS)—Wednesdays, 7.45pm. Bradshaw Tavern, Bradshaw, Halifax. Sec G4CMK.
Halifax (H&DARS)—First and third Tuesdays in each month, 7.30pm. Clairmount Liberal Club, Clairmount Road, Halifax. Sec G4LEC, tel 0422 33080.
Harrogate Repeater Group—Details from chairman, G4ATZ.
Hornsea (HARS)—Wednesdays, 8pm. The Mill, Mill House, Attic Road, Hornsea. Sec M. Willerby, G4MWE.
Hull (H&DARS)—Fridays, 8pm. RAE classes are held at 9pm, Fridays. West Park Recreation Centre, Walton Street, Hull. Sec G6DUL, 142 Hall Road, Hull HU6 8SB, tel 0482 447355.
Hull (HUR&ES)—1.15pm. Room 313B, University Union Building, Cottingham Road. Sec G8RPZ.
Leconfield (Army School of Mechanical Transport ASMT/RCTARS)—Tuesday evenings and coffee at lunchtimes. Signals Division, Normandy Barracks, Leconfield. CW classes, 7pm, Fridays. Sec G6ESO. Address as for club.
Leeds (White Rose RS)—Wednesdays, 8pm. Moortown Rugby Football Club, Moss Valley, Alwoodly, Leeds 17. Club net 8pm, Thursdays, 3·775MHz or 21·35MHz depending on propagation. Sec G8UYZ.
Leeds (L&DARS)—Mondays, 8pm. Old Hall Golf Club, Woodhall Lane, Calverly, Leeds. Sec G6CNP, tel 0532 56702.
Mexborough (M&DARS)—Fridays, 7pm. Harrop Hall, Dolcliffe Road, Mexborough. Sec G3ZHI, tel Rotherham 814911.
Otley (OR&ES)—Tuesdays, 8pm. Back of Courthouse Street, Otley. Sec Jack Annakin, G8DFZ.
Pontefract (P&DARS)—8 July ("The G4JHQ frequency meter", by G4JHQ), 22 July (2m foxhunt), 5 August ("Construction of 2m df antennas", by G4AAQ), 19 August ("Converting cb gear for amateur use", by G3VTD). The Carleton Community Centre. Sec G4ISU.
Ripon (R&DARS)—Thursdays, 7pm. Quarrymoor Recreation Centre, Harrogate Road, Ripon. Sec D. J. Barker, c/o Sgts Mess, 38 Engr Reg, RE, Claro Bks, Ripon, N Yorks.
Scarborough (SARS)—Mondays, 7.30pm. Scarborough Cricket Club, North Marine Road, Scarborough. Sec G4JAQ, tel 862638.
Sheffield (SARS)—Third Monday in each month, 8pm. Sheaf House Hotel, Bramell Lane, Sheffield. Sec G4APV.
Sheffield (BSARS)—7.30pm. Tinsley Sports & Social Club, Bawtry, Sheffield. Sec G3XSI, tel Sheffield 51417.
Wakefield (North Wakefield RC)—Thursdays, 7.45pm. Carr Gate Working Mans Club, Wakefield. Sec G3SPX. A new club with 67 members already. The club call is G4NOK and a shack is being built.
Wakefield (W&DARS)—13 July ("Computer graphics", by G4BLT), 10 August (Quiz), 8pm. Holmfield House, Denby Dale Road, Wakefield. 27 July (Car treasure hunt, start 7.30pm from Holmfield House). Sec G4BLT, tel Wakefield 255515.
Wharfdale Repeater Group—Sec G3KKP.
York (YARS)—Fridays except the third in each month, 7.30pm. United Services Club, Micklegate, York. Sec Keith Cass, G3WVO.

REGION 3—Acting RR H. S. Pinchin, G3VPE, 61 Cole Bank Road, Hall Green, Birmingham B28 8EZ. Tel 021-777 1320.

Area representatives in Region 3

W. F. M. Hahn,	G3UOL	Coventry
J. K. Harvey,	G4IVJ	Birmingham
S. H. Jesson,	G4CNY	Hereford
B. A. Jones,	G8ASO	Worcester

Atherstone (AARC)—8 July ("History of radio", by Fred Ward, G2CVV), 15 July (Informal meeting and night on the air), 7.30pm. The Tudor Centre, Coleshill Road, Atherstone. Sec G4IAG, tel Fillongley (0676) 41814.
Birmingham (Midland ARS)—20 July ("Recording techniques", by R. W. Mitchell, G4KVC), 7.30pm. 294a Broad Street, Birmingham B1 2DS. Sec G8BHE, tel 021-422 9787.
Birmingham (Slade RS)—First Friday in each month, 7.45pm. The Kingsbury Road Community Centre, 75 Kingsbury Road, Erdington, Birmingham B24 8QH. Sec G4FGF, tel 021-770 3474.
Birmingham (South Birmingham RS)—Thursdays (HF night on the air), Fridays (Construction and morse classes), 7.30pm. 4 August (Natter night), 7.45pm. Hampstead House, Fairfax Road, West Heath, Birmingham B31 3QY. Sec G8RGQ, tel 021-459 8312.
Birmingham (University of Aston ARS)—Informal meetings Mondays and Fridays during term, 1pm. Sumpner common room. RAE and morse classes available. Chairman G4GJL, Sec G8ZEZ, c/o Electrical Engineering Department.
Birmingham (University of Birmingham ARS)—Fridays during term, 7.30pm. Tuesdays (RAE classes), 7.30pm. Club room gatherings every lunchtime during term, second floor Students' Union (above shop). Sec Dave Thomas, G4HHJ.
Bromsgrove (B&DARC)—9 July (Talk on photographic equipment), 23 July (QRP meeting), 8pm. Avoncroft Art Centre, Bromsgrove. Club net Wednesdays, 144·850MHz, 8pm. Sec G4LVK, tel 021-445 2088.
Burton-on-Trent (B-on-T&DARS)—Wednesdays, 8pm. Stapenhill Institute, Main Street, Stapenhill, Burton-on-Trent. Sec G3ACR, tel Burton (0283) 43118.
Cannock Chase (CCARS)—Thursdays, 8pm. Bridgtown War Memorial Club, Union Street, Bridgtown, Cannock. Sec G8HZP, tel Cheslyn Hay (0922) 416419.
Coventry (CARS)—9 July (Night on the air), 16, 23, 30 July (Open meetings), 6 August, 8pm. Baden Powell House, 121 St Nicholas Street, Radford, Coventry. Sec G4HRY, tel Coventry (0203) 618648.
Coventry (CTCARS)—Mondays, 7pm. Winfray Annexe of Coventry Technical College. Sec G8ISJ. All visitors welcome.
Dudley (DARC)—Second and fourth Tuesdays in each month, 7.45pm. Central Library, Dudley. Sec Norman Rock, 28 Conway Close, High Acres, Kingswinford, Brierley Hill DY6 8PT, tel Kingswinford (0384) 277617.
Hereford (HARS)—First and third Friday in each month, 8pm. Civil Defence HQ, Gaol Street, Hereford. Sec G4CNY, tel Hereford (0432) 3237.
Kidderminster (K&DARC)—Alternate Tuesdays, 8pm. Aggborough Community Centre, Hoo Road, Kidderminster. Sec G8WOX, tel Kidderminster (0562) 61584.
Lichfield (Chad RC)—Alternate Wednesdays, 8pm. The Naval Club, Burton Old Road, Lichfield. Sec G4ESK.
Malvern Hills (MHRAC)—Second Tuesday in each month, 7.30pm. The Red Lion Inn, St Ann's Road, Great Malvern. Sec G4GFX, 9 Wyche Road, Malvern, tel Malvern (06845) 62900.
Much Wenlock (Wenlock ARES)—Second and fourth Wednesday in each month, 8.30pm. Raven Hotel Club Room, Much Wenlock. Sec Denzil Jones, RS48112, Shasta, 12 Portland Drive, Walton Hills, Much Wenlock, Salop TF13 6EY, tel Much Wenlock (0952) 727269.
Redditch (RRC)—Second and fourth Thursdays in each month, 8pm. WRVS Centre, Ludlow Road, Redditch. Sec G3EVT, tel Alcester (0789) 762041.
Rugby (RATS)—Wednesdays, 7.30pm. Cricket pavilion entrance to B Building, Rugby Radio Station, A5 trunk road, Hillmorton, Rugby. Sec G4ECO.
Shrewsbury (Salop ARS)—Thursdays, 8pm. Albert Hotel, Smithfield Road, Shrewsbury. Sec G6AKE, tel Shrewsbury (0743) 66969.
Solihull (SARS)—20 July ("New 2m repeaters in the Birmingham area—GB3AM and GB3BX", by the repeater group), 7.30pm. The Manor House, High Street, Solihull. Club nets (G3GEI), Fridays, 9.30pm on 1,960kHz and (G8ZLJ), Sundays, 9pm on S19 or next lowest vacant channel. Morse classes available. Sec G4JDL.
Stafford (North Staffs Poly ARS)—Wednesdays during term, 2pm. Lab D2. Sec G. S. Yemm.
Stoke-on-Trent (North Staffs ARS)—First and third Monday in each month (Lectures, etc), other Mondays (Natter nights, Raynet and club station, G4BEM), 7.30pm. Harold Clowes Community Centre, off Dawlish Road, Bentilee, Stoke-on-Trent. Sec G8FGR, 61 Westacre, Bucknall, Stoke-on-Trent ST1 6AF.
Stoke-on-Trent (SonTARS)—Thursdays, 7.30pm. 2a Racecourse Road, Oakhill, Stoke-on-Trent. Sec G4IMV, tel Newcastle (0782) 613207.
Stourbridge (StARS)—19 July ("50 years of radio", by Frank Bills, G3CLG), 7.45pm. Library, Longlands School, Brook Street, Stourbridge. Sec G8JTL, tel Lye (038482) 4019.
Stratford-upon-Avon (S-upon-A&DARC)—Second and fourth Monday in each month, 7.30pm. Bearley radio station. Talk-in on S22. Programme sec G6CWK, tel Stratford (0789) 68863.
Sutton Coldfield (SCRS)—12 July (Preparations for exhibition week), 26 July (Final preparations for exhibition week), 7.30pm. Central Library, Sutton Coldfield. Club net Mondays, except on meeting nights, 145·2MHz, 8pm. Sec G8TUR, tel 021-353 2061.
Tamworth (TARS)—Second Monday in each month (Formal meeting), 8pm. Riverside Meeting Rooms, Lichfield Street, Tamworth. Other Mondays (Informal). Club Shack, Whitacre Heath, near Kingsbury. Club net Wednesdays, 145·375MHz, 9pm. Sec G4BKA, tel Tamworth (0827) 283952.
Telford (T&DARS)—7 July (G3ZME on the air), 14 July ("Power supplies and pas for vhf and uhf", by G4NKC), 21, 28 July, 4 August, 7.30pm. Phoenix Centre, Webb Crescent, Dawley. Sec G8UGL, tel Telford (0952) 584173.
Walsall (WARC)—21 July, 4 August (Final plans for GB2WAS station), 8pm. Forest Community Centre, Hawbush Road, Leamore, Bloxwich. Club net Fridays, 28·025MHz cw, 8pm, and 3·70MHz ssb, 9pm. Sec G4GKC, tel Walsall (0922) 31675.
Warwick (Mid-Warwickshire ARS)—First and third Tuesdays in each month, 8pm. 61 Emscote Road, Warwick. Club net Mondays on non-meeting days, 145·350MHz, 8pm. Sec G8RZR, tel Warwick (0926) 499730.
Willenhall (W&DARS)—Alternate Wednesdays, 8pm. Saracens Head, Bloxwich Road South, Willenhall. Sec G4FAQ, tel Wolverhampton (0902) 730300.
Wolverhampton (WARS)—Mondays, 8pm. Wolverhampton Chamber of Commerce & Industry, 93 Tettenhall Road, Wolverhampton WV3 9PE. Sec G8EDG, tel Wolverhampton (0902) 763617.
Worcester (W&DARC)—11 July (Droitwich rally), 2 August ("Use of microprocessors in amateur radio", by club members), 8pm. "Odd Fellows Club", New Street, Worcester. Sec G8TZE, tel Tewkesbury (0684) 293890.

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

Area representatives in Region 4

B. Bennett,	G3EAM	Lincoln
T. J. Riggott,	G4MFU	Leicester
J. Shardlow,	G4EYM	Derby
J. A. Sheardown,	G8TIY	Scunthorpe
B. Thompson,	G4KAL	Grimsby

Bolsover (BARS)—Wednesdays, 8pm. The Angel Hotel, Bolsover. Sec David Brocklehurst, G8KIF, tel Chesterfield 811666.
Derby (D&DARS)—Wednesdays, 7 July (Bring & buy sale), 14 July ("Crime prevention", PC Holden of

Derbyshire police), 16 July (Vintage night), 7.30pm. 119 Green Lane, Derby, Sec Jenny Shardlow, tel Derby 556875.

Derby (Nunsfield House ARG)—Fridays, 7.45pm. Nunsfield House, Boulton Lane, Alvaston, Derby. Sec Ian Cage, G4CTZ, tel Derby 799452/71875.

Eastwood (Notts & Derby Border ARC)—Tuesdays, 7pm. Sunnycroft Scout Rooms, Derby Road, Eastwood. Sec Graham Bromley, G8YXW, tel Alfreton 834308.

Grimsby (GARS)—Alternate Mondays, 12 July ("How to tackle df hunts", by G3HTI), 26 July ("Antennas", by G3PDL), 7.30pm. Cromwell Social Club, Grimsby. Sec Trevor Matthews, G3RGC, tel Grimsby 884060.

Heanor (SE Derbyshire ARS)—Tuesdays, 7.30pm. South East Derbyshire College, Ilkeston Road, Heanor. Sec G6ETO, tel Langley Mill 3753.

Hinckley (HARES)—Wednesdays, 7.30pm. John Cleveland College, Butt Lane, Hinckley. Sec Norman Geary, G8STX, tel Hinckley 632778.

Ibstock (IARS)—Tuesdays, 7.30pm. Hastings Arms, Ibstock. Sec Steve Haywood, G8UZQ, tel Ibstock 62158.

Leicester (LRG)—At the recent agm revisions to the constitution were agreed and this has allowed a significant change in size and constitution of the group's committee. All subs are now due in April, and membership lapses after three months if not paid. This has dropped the membership from over 300 to under 200. Officers elected were: G3STG, chairman; G4MTP, treasurer; G4AFJ, sec; G4FZL, engineering manager; and G3PVG, G4EPN and G4MGG. Sec Geoff Dover, G4AFJ, tel Nottingham 875200.

Leicester (LRS)—Mondays, 7.30pm. Sundays, 10.30pm. Gilroes Estate Cottage, off Groby Road, Leicester. Sec Paul Elliott, G4MQS, tel Quorn 43024.

Lincoln (LSWC)—Second and fourth Wednesday in each month, 7.30pm. City Engineers Sports & Social Club, Waterside South, Lincoln. Sec Chris Jones, G6AJL, contact via club.

Loughborough (L Falcon ARC)—Fridays, 8pm. Brush Sports & Social Club, Fennel Street. Sec G8BUB, tel Shepshed 3558.

Louth (L&DARS)—First Wednesday in each month, 7.30pm. Church Rooms, Eastgate, Louth. Sec Chuck Turner, G8ZVF, tel Grimsby 822482.

Mansfield (MARS)—First Friday and third Tuesday in each month, 2 July ("This is ham radio", film), 20 July (Social meeting), 7.30pm. New venue: Victoria Social Club, Princes Street, Mansfield. Sec Duncan Walters, G4DFV, tel Mansfield 648679.

Matlock (Derwent Valley ARS)—First Monday in each month, 8pm. Matlock Training College, Chesterfield Road, Matlock. Sec Bob Burbeck, G4NOB (QTHR as G8ELN).

Melton Mowbray (MMARS)—Summer vacation until 17 September, Third Friday in each month, 7.30pm. St John Ambulance Hall, Asfordby Hill, Melton Mowbray. Sec Richard Winters, G3NVK, tel Melton Mowbray 3369.

Newark (N&DARC)—First Thursday in each month, 7.30pm. Palace Theatre, Appleton Gate, Newark. Sec Roger Hiscock, G4MDV.

Nottingham (ARCON)—1 July (Prep for VHF NFD), 8 July (Prep for exhibition at Henry Melish School), 15 July ("Low band dx", by G3SJJ), 22 July (Activity night), 29 July (144MHz foxhunt), 7.30pm. Sherwood Community Centre, Woodthorpe House, Mansfield Road, Nottingham. Sec P. Chapman, G4IJL, tel Nottingham 623828.

Scunthorpe (SARC)—Tuesdays, 7.30pm. Grange Farm Hobbies Centre, Franklin Crescent, Scunthorpe. Sec Joe Sheardown, tel Scunthorpe 732438.

Skegness (S&DARS)—First and third Tuesday in each month, 7.30pm. The White Swan, Burgh-le-Marsh, Skegness. Sec Alvis Else, RS47976, tel Stickney 329.

Spalding (S&DARC)—First Friday in each month, 8pm. Maple Room, White Hart, Market Place, Spalding. Sec Sylvia Kilshaw, tel Boston 69235.

Wigston (WRC)—First and third Friday in each month, 7.30pm. United Reform Church, Wigston Magna. Sec Tim Riggott, G4MFU, tel Leicester 712570.

REGION 5—RR J. S. Allen, G3DOT, 77 Rosslyn Crescent, Luton, Beds. Tel 0582 508515, or at work 0582 21151 ext 303.

Area representative in Region 5
L. Critchley, G3EEL Peterborough

Bedford (B&DARC)—Wednesdays, 7.30pm. Club House, Ravensden, three miles north-west of Bedford. Sec Julian Wanden, G8ATI.

Cambridge (C&DARC)—Fridays, 7.30pm. Coleridge Community College, Radegund Road, Cambridge. Sec Dave Leary, G8JKV.

Cambridge (CUWS) (G6UW and G6CUW)—Mondays (Informal), 8.30pm. St John's College Buttery Bar. Chairman A. C. R. Stickland, G4LUN; sec T. J. Gleeson, G8TUG.

Members of the RAF ARS who held their annual get-together at the Drayton Rally on 25 April 1982. L to r: standing—G4AJD, G3VIJ, G3FQH, GW4FRH, G4HRV, G4EJU and G4FQO; seated—G3OCG, G4AYD, G2FIX, G3JJW, G3FPY and G3COY. *Photo:* G4AJD

Corby (CARG)—Fridays, 7.30-9pm. Hightrees Scout Centre, The Nook, Corby. Sec P. Richardson, G8MLA. Meetings usually informal with occasional demonstration of members' radio equipment.

Dunstable Downs (DDRC)—Fridays, 8pm. Chews House, Dunstable. Chairman Dick Joyce, G3WLM; sec Clive Asquith, G4ENB.

Leighton Linslade LLRC)—Mondays, twice monthly, 12 July (Talk by Dave Williams "The internal combustion engine design"), 7-10pm. Closed during August. Vandyke Community College, Room A64, Vandyke Road, Leighton Buzzard, Beds. Sec John Hart, G8GIK.

Luton (Kent Process Controls ARC) (G4KPC)—First Wednesday in each month, 8pm. The Club House, Tenby Drive, Luton. Chairman, G3JZW; sec, G3DOT. Club is open to all amateurs in the Brown Boveri Kent Companies. July meeting will be preparing for the company "open day".

Peterborough (GPARC)—Fourth Thursday in each month, 7.30pm. Southfields Junior School, Stanground, Peterborough. Sec G8ZVW.

Peterborough (PRES)—Third Friday in each month. The Scout Hut, Occupation Road, off Lincoln Road, Peterborough. Chairman, G3EEL; sec, G4KSW.

St Neots (SN&DARS)—Mondays fortnightly, 12 July ("Building simple aerials", by G6EDB), 26 July (Informal open evening), 9 August (Treasure hunt), 23 August (Video evening), 7.30pm. Horseshoe Inn, Oford Darcy, Nr Huntingdon. Chairman, G8GRT; vice-chairman, G8YCI; sec, G4FOH; press officer, G6EDB.

Shefford (S&DARC)—Thursdays, 1 July (Preparing for VHF NFD), 8 July ("What went wrong on VHF NFD!"), 15 July (A night on the air), 22 July (Natter night), 29 July (DF hunt), 8pm. Club closed during August, opening on 2 September. The Church Hall, Shefford. Chairman, G3DOT; sec Brian, G4MEO.

Wellingborough (Nene Valley RC)—Wednesdays, 8pm. The Royal public house, Knox Road, Wellingborough, Northants. Sec G6CPX.

Thanks to all the club secretaries who have supplied the above information.

REGION 6—RR F. S. G. Rose, G2DRT, 84 Cock Lane, High Wycombe, Bucks HP13 7EA. Tel Penn (049481) 4240.

Area representative in Region 6
C. Sharpe, G2HIF Wantage

Aylesbury Vale (AVRS)—15 July (Talk and demo of radio control model aircraft by members of Aylesbury Model Flying Club), 8pm; in the saloon bar. Sec M. J. Marsden, G8BQH, tel 0296 641783.

Bracknell (BARC)—Second and fourth Wednesday in each month. Details from sec Peter Zollman, G4DSE, tel Bracknell 53911.

Burnham Beeches (BBRC)—First and third Monday in each month, 8pm. St John Ambulance HQ, Slough. Sec G4LQD, tel Farnham Common 3286.

Chesham (C&DARS)—Last Thursday in each month, 8.30pm. The Whitehill Centre. Please note new sec J. Allridge, BS49181, tel Chesham 786935.

High Wycombe (Chiltern ARS)—Last Wednesday in each month, 28 July ("AMSAT-UK", by G3AAJ), 8pm. Sir William Ramsay School, Science Block Lecture Theatre, Hazelmere. Talk-in on S22 from 7.30pm. Details from G3NCL, tel High Wycombe 712020.

Harwell (HARS)—17 July (DF hunt and barbeque, to replace normal Tuesday meeting for July). Details from Ann Stevens, G8NVI.

Maidenhead (M&DARS)—1 July (Black box clinic), 3-4 July (VHF NFD). Sec Roger Hemmings, G3VCT, tel Bourne End 21036.

Milton Keynes (MK&DARS)—Lovatt Hall, Newport Pagnell. Sec D. Higgs, G8TTK.

Newbury (N&DARS)—Details from G4JAL, tel Newbury (0635) 46078.

Oxford (O&DARS)—Please contact new sec Richard Talbot, G4IWZ, Rush Common House, Dorchester Crescent, Abingdon, Oxon, for meeting details.

Oxford (OURS)—Contact G4KGA, Oriel College for meeting details.

Reading (RARC)—Please note new sec is R. A. Brown, G3SCZ, tel 0734 414393, or 861567.

Vale of the White Horse (VWHARS)—July (AGM). Treasurer's note—subs due. Sec Ian White, G3SEK, tel 235 812584.

REGION 7—RR Pat Walker, G8HMG, 12 Brownlow Road, Redhill, Surrey RH1 6AW. Tel Redhill 64035.

Area representative in Region 7
L. V. Mayhead, G3AQC Camberley

Addiscombe (AARC)—Informal meetings on Tuesdays, 9pm. The Woolsack, 154 Gloucester Road, Selhurst, Croydon. Sec Peter Hart, G3SJX. Tel 01-656 9054.

Ashford (Echelford ARC)—Second Monday and last Thursday in each month, 8pm. The Hall, St Martin's Court, Kingston Crescent, Ashford, Middlesex. Sec Anton Matthews, G3VFB. Tel 01-892 2229.

Bexleyheath (North Kent RS)—First and third Tuesday in each month, 8pm. The Pop-In Parlour, Graham Road, Bexleyheath. Sec Pelham Conduit, G4KCZ.

Biggin Hill (BHARS)—Last Tuesday in each month, 20 July (Broadcast reception surveys), 8pm. Biggin Hill Memorial Library. Sec Ian Mitchell, G6EMW, tel Biggin Hill 75785.

Cray Valley (CVRS)—First and third Thursdays in each month, 8pm. Christchurch Centre, Eltham High Street, Eltham SE9. Sec Peter Clark, G4FUG.

Croydon (Surrey Radio Contact Club)—First and third Mondays in each month, 16 August (Barbecue at Terra Nova). The second meeting each month is an informal discussion with an opportunity to practice cw, 8pm. TS Terra Nova, 34 The Waldrons, Croydon. Sec Ray Howells, G4FFY, tel 01-642 9871.

Crystal Palace (CP&DRC)—First and third Saturday in each month, 8pm. All Saints Church Parish Rooms, Church Road, South Norwood SE25. Sec Geoff Stone, G3FZL, tel 01-699 6940. Please note the new meeting place at the Church Road junction with Beulah Hill.

Guildford (G&DRS)—Second and fourth Friday in each month, 8pm. Model Engineers HQ, Stoke Park, Guildford. Sec Helen Davies, G8SXB, tel Aldershot 20384.

Guildford (GRG)—The group maintains the uhf repeater GB3GF, and meets on the first Thursday in each month. Anchor & Horseshoes, Burpham, Guildford. Sec Dave Surey, G8GIA, tel Woking 22679.

Kingston (K&DARS)—Third Wednesday in each month, 8pm. Alfriston, 3 Berrylands Road, Surbiton. Sec Robin Pellatt, G4LJI, tel 01-399 8113.

Redhill (Reigate ATS)—Third Tuesday in each month, 20 July (Junk sale), 8pm. Constitutional & Conservative Club, Warwick Road, Redhill. Sec Chris Barnes, G8FEE, 25 Hartswood Avenue, Reigate RH2 8ET.

Sutton & Cheam (S&CRS)—Details of meetings available from George Brind, G4CMU, tel Burgh Heath 54497.

Bob Tillin, G3MES, president of the Sutton & Cheam RS, proposing the toast of the RSGB at the annual dinner of the society. Executive vice-President Bob Barrett, GW8HZ (left), represented the RSGB. *Photo:* **G3LCH**

Thames Ditton (Thames Valley ARTS)—First Tuesday in each month. 6 July (Talk by John Pegler, G3ENI), 8pm. Thames Ditton Library, Watts Road, Giggs Hill, Thames Ditton. Sec Julian Axe, G4EHN, tel 01-946 5669.

Tolworth (Decca ARG)—First Thursday in each month, 8pm. Decca Sports & Social Club, Kingston Road, Tolworth. Sec Robin Sykes, G3NFV, tel Leatherhead 72587.

Wimbledon (W&DRS)—Second and last Friday in each month, 8pm. St John Ambulance Hall, Kingston Road, Wimbledon SW19.

Club secretaries! Even if you do not have a newsletter, please try to let me know your programmes for *Rad Com.* A phone call will do, but by the date shown at the top of this section please. *RR7.*

REGION 8—RR K. A. Crouch, G8KEN, 14 Victoria Road, Capel-le-Ferne, Folkestone, Kent CT18 7IR. Tel 0303 55241.

Area representatives in Region 8

J. Brooker, MBE,	G3JMB	Haywards Heath
G. D. Edy,	G4AXD	Maidstone
J. C. Greenhow,	G3PEY	Tunbridge Wells
K. J. Homewood,	G8NPC	Hastings

Brighton (B&DRS)—Every second Wednesday, 7.45pm. The main concern will be preparation for the 18 July Sussex Mobile Rally at the Racecourse. New venue is now YMCA, Marmion Road, Hove. Details from programme sec Godric Goodrich, G4NLA.

Burgess Hill (Mid-Sussex ARS)—Alternate Thursdays, 7.30pm. Marle Place, Leylands Road, Burgess Hill. Details from Jack Brooker, G3JMB, tel Hassocks 4965. (No club programme received.)

Canterbury (East Kent RS)—First and third Thursdays in each month. New venue called The Cabin, Kings Road, Herne Bay. Details from Derek, G8ELS.

Chichester (C&DARC)—First and third Mondays in each month, 7.30pm. Spitfire Social Club, Tangmere. Details from S. Talbot, G8FCX, tel Littlehampton 5082. (No club programme received.)

Crawley (CARC)—All information will have to be obtained from D. L. Hill, G4IQM, tel 0293 882641. (No club programme received.)

Dartford (DHDFC)—Details given of club events on club nets, ie 1,930kHz Sundays, 10.30am, and Tuesdays (S13.) Information from Alan Birchmore, G4BWV. (RR8 has not yet received anything from this club.)

Dover (SEKYMCAARC)—Wednesdays, 7 July (Natter night plus exhibition planning), 14 July (Dover Harbour Board), 7.30 for 8pm. YMCA, Godwynne Road, Dover. Information on RAE classes from G4EGQ, morse lessons and general information from G3VSU or G8EGT.

Eastbourne (Southdown ARC)—First Monday in each month, 5 July (Open air meetings at Butts Brow), 2 August (Audio circuit design). Chasley Home, South Cliff, Eastbourne. Details from sec, tel 0323 643463.

Gravesend (GRS)—Mondays, 7.30pm. Windmill Tavern, Shrubbery Road, Gravesend. Details from F. Donavan, G4ALD. (No details ever received from this club.)

Hastings (HERC)—21 July (Aerials and swrs). First Wednesday in month (Committee meetings at 479 Bexhill Road), second, fourth and fifth Wednesday (Micro nights at 479 Bexhill Road), third Wednesday (Main meeting at West Hill Community Centre), all at 7.30pm. Details from programme sec Alan Beecher, G8VEA, tel Hastings 216516.

Horsham (HARC)—First Thursday in each month, 8pm. Guide HQ, Denne Road, Horsham. Contact Tony Wadsworth, G3NPF.

Kent Repeater Group—The group is responsible for GB3KS (Dover), GB3KN (mid-Kent), both on 144MHz, and GB3CK (Charing), GB3EK (Margate), GB3NK (Wrotham), and GB3SK (Folkestone), all on 432MHz. Information from G3MDO.

Maidstone (MYMCAARC)—Fridays, 8pm. "Y" Sports Centre, Loose Road. First and third Fridays (For beginners). All information from G4AXD.

Medway (MARTS)—Fridays, 9 July (BBC producer on local radio), 7.30 for 8pm. Details from Ruby Sivyer, tel Medway 61927, after 6pm. She will also give details of special callsigns in use for the club's diamond jubilee this year. RR8 would like to thank all club members for the evening when he attended the club in May.

Sussex Repeater Group—This group is responsible for GB3SR and GB3BP on 144MHz. GB3BR, GB3HO and GB3NX on 432MHz, and GB3WX, GB3CP and GB3HM on 1·3GHz. Details from G4GNX.

Thanet (RCT)—2 July (Mini talks), 16 July (Talk on rtty), 30 July (Talk on Raynet), 8pm. Birchington Village Centre. Details from Ian, tel 0843 54154.

Tunbridge Wells (West Kent ARC)—9 July (Junk sale). Formal meetings have now finished until after the summer but the informal meetings, ie natter nights, continue at the Drill Hall, Victoria Road, Tunbridge Wells, as usual. G4DYF has succeeded in losing the job of secretary, and that will now be done by Peter Reeve, G4GTN. G4DYF will be continuing as the programme sec so details can be obtained from G4GTN or G4DYF.

Worthing (W&DARC)—Tuesdays, 6 July (Question time and post mortem of VHF Field Day), 13 July (G4KIT, Eric, on ZL Special), 20 July (Quiz), 27 July (G4HSY, Derek), 7.30 for 8pm. Pond Lane Amenity Centre, Worthing. Details of these and other events from Joyce Lillywhite, tel Worthing 63062.

There are still a lot of clubs not bothering to send me details of their club or events and I still get clubs who send me details well after the dates given at the beginning of "Club News". They then complain that I am not doing my job. If you do not send me the details I cannot make them up for you! *73 RR8.*

REGION 9—RR W. J. Colclough, G3XC, Highview, Indian Queens, St Columb, Cornwall TR9 6LL.

Area representatives in Region 9

B. H. Body,	G8JML	Truro
A. C. Courtney,	G8XIP	Exeter
H. G. Hughes,	G4CG	Barnstaple
L. G. Mays,	G2CWR	Paignton
A. E. Warne,	G3YJX	Wadebridge

Camborne (Cornish RAC)—First Thursday in each month, 1 July (Rally arrangements and "The computer club entertains"), 7.30pm. SWEB Club Room, Pool, Camborne. President A. H. Hammett, G3VWK; chairman D. W. Blackford, G3NPB; vice-chairman P. Lock, G8HTE; sec J. J. Vinton, G6GKZ; treasurer P. Smart, G8XAI. Cornish net weekdays, 3·714MHz, 1000h, Sundays, 144MHz ssb net, 144·275MHz, 1030, and 3·692MHz, 1100h. Cornish award manager E. Bowden, G2AYQ, sae for details. Contact pro S. Rodda, G6DFE, 1/2 Penrose Terrace, Penzance, tel 0736 3948 or 3524.

Exeter (EARS)—Second Monday in each month, 12 July (Talk on synthesizers by G8CKC), 7.30pm. Community Centre, St David Hill, Exeter. Informal meetings first and third Mondays, The Scout Hall, Emmanual Road, Exeter. Chairman Alan Cox, G8TKL; sec Francis Stower, G6FGS; treasurer Michael Judd, G8WWX. Contact pro Geoff Draper, 1 Carlyon Close, Heavitree, Exeter EX1 3AZ.

Exeter (EUARS)—Sundays during term-time, 2.30pm. Room 225, Applied Science Building, North Park Road, Exeter. Contact Miss Bellchambers, G8ZPJ, Devonshire House, Stockers Road, Exeter EX4 4PZ.

Exmoor (ERC)—Thursdays, 8pm. Loughrigg, East Street, South Molton, Devon. Contact sec Dave Jones, G6CHZ, 6 Priory Close, Pilton, Barnstaple, Devon, tel 0271 2724. Club call G8SSS.

Exmouth (EARC)—Alternate Wednesdays, 7.30pm. Science Dept, Rolle College, Exmouth. Chairman Alec Jefford, G8GON. Contact sec Mrs J. Nicholson, G8XRR, 20 Palm Close, Exmouth, Devon, tel Exmouth 77263. Club call G4HOB.

Newquay (N&DARC)—Alternate Wednesdays, 7.30pm. Treviglas School, Newquay. Chairman Bob Lawrence, G4LDA; treasurer Brian Pearce, G8GOR. Contact sec Pat King, G4GFY.

North Devon (NDARC)—Odd months, fourth Wednesdays, 7.30pm. Community College, Abbotsham Road, Bideford, Devon. Even months, fourth Wednesdays, 7.30pm, Community College, Pilton, Chaddiford Lane, Barnstaple, Devon. Assistant sec C. B. Searle, G4LST; chairman Les Hawkyard, G5HD; treasurer Geoff Beale, G4ELU; committee A. A. A. King, G8NME, J. T. Fennel, G4HQG. Contact sec George Hughes, G4CG, tel Barnstaple 3683.

Plymouth (PRC)—Alternate Mondays, 5 July (Debrief rally and field days, What went wrong?), 19 July (Talk by Chris, G4DGU, of Mutek Ltd, subject, receivers in general), 7.30pm. Tamar School, Paradise Road, Millbridge, Plymouth PL1 5QW. President Steve Rance, G3WL; chairman E. McConaghy, G4KXZ; vice-chairman, G6EQM; sec Ivor Budding, G4GWK. Contact pro Peter Connor, G8XTE, tel 075537 319.

Plymouth (PPARS)—During term 12h per day. Contact Jeff Key, G8VTW, ARS, Plymouth Polytechnic Students Union, Drakes Circus, Plymouth, Devon.

Saltash (S&DARC)—First and third Fridays, 2 July (Barbecue and vhf night at Kitt Hill), 16 July (Treasure hunt, assemble outside club room), 7.30pm. Toch H, Burraton, Saltash. President Harry Griffiths, G2DFH; chairman Dave Bunce, G8VJB; treasurer Colin Squires, G3XCS; pro R. S. Pridham, G4BVB. Contact sec Kevin Hale, ARS47699, 12 Rashleigh Avenue, St Stephens, Saltash, Cornwall PL12 4NS.

Torbay (TARS)—Fridays, 7.30pm. Last Saturday in each month, special meeting, 7.30pm. Bath Lane, rear of 94 Belgrave Road, Torquay. President Les Mays, G2CWR; chairman D. Webber, G3LHJ; treasurer F. White, G4FLW. Nets Monday, Wednesday, Friday, 3·5MHz, 1030h, and Saturday, 1000h, 3·756MHz. At the agm on 24 April Freddy Bolton, G3VTQ, retired after many years as chairman, during which time his tireless efforts have greatly helped to improve the status of the society, thank you Freddy. Sec Hugh Davies, G4DZH, also retired from his work, and his effort on behalf of the society will be greatly missed. Contact pro Les Mays, G2CWR, tel Paignton 558714.

Treverbyn (English China Clay RC)—Alternate Mondays, 7pm. Pentewan Labs, Pentewan Road, St Austell, Cornwall. Chairman B. Rabey, G8NYR; sec M. Porter, G8NXM; treasurer T. Watts, G8NYA; pro J. Redfern, G8HSZ; RSGB rep C. Golley, G4JYF. Contact Jack Redfern, G8HSZ, tel 0726 3647.

REGION 10—RR P. A. Jones, GW4HAT, 68 Pastoral Way, Tycoch, Swansea SA2 9LY.

Area representative in Region 10

A. J. Glassford,	GW3ACF	Port Talbot

Aberystwyth (ARSGBG)—The club meets at The Bay Hotel, on the seafront, Aberystwyth, approximately every six weeks. Next scheduled meetings are 13 July and 24 August. Details from Simon Mee, GW4CTV, tel Aberystwyth 828365.

Barry (BCoFERS)—Thursdays, 7.30pm. Barry College of Further Education Annexe, Weycock Cross, Barry. Club calls, GW3VKL, GW4BRS, GW6BRC. Details from John Share, GW3OKA, tel Cardiff 702455.

Blackwood (BARS)—Fridays, 7pm. Oakdale Comprehensive School, Oakdale, Blackwood, Gwent. Club net 144·675MHz, Tuesdays, 7pm. RAE classes are run at each meeting. This club does not meet during school holidays. Club call GW6GW. Sec Wynn Wright, GW8UAM.

Bridgend (B&DARC)—Second Wednesday in each month, 7.30pm. NCB Social Club, Tondu, Bridgend. Club net 145·325MHz, 7pm, Wednesdays. Club call GW4LNP. Sec Peter Lynn, GW8WCI, tel Bridgend 861115.

Cardiff (CRSGBG)—Second Monday in each month, 7.30pm. Pantmawr Inn, Pantmawr Estate, Cardiff. Club call GW5BI. Sec Bill Moss, GW4GWS.

Loughor (LAR&EC)—Tuesdays fortnightly, 7.30pm. Loughor Scouts Hall, Heol Caetynewydd, off Pengry

Road, Loughor. Club call GW4HVJ. Sec Tim Griffin-Thomas, GW8TYS, tel Gorseinon 893392.
Newport (NARS)—Mondays, 7pm. Brynglas House, Brynglas Road, Newport. Club call GW4EZW. Details from Barry Green, GW4HYZ.
Pembroke (PRSGBG)—Last Friday in each month, 7.30pm. The Defensible Barracks, Pembroke Dock. Club call GW2OP. Sec Martin Shelley, GW3XJQ, Sunray, Pendine, Dyfed SA33 4PD.
Port Talbot (BSCARS)—Thursdays, 7.30pm. BSC Sports & Social Club, Margam. Club call GW3EOP. Sec Reg Bray, GW4ESV, tel Briton Ferry 821993.
Powys (PARC)—Thursdays, 7.30pm. The Cricket Pavilion, Montgomery. Club call GW4HVN. Sec Mike Smith, GW4DWX, tel Welshpool 2068.
Swansea (SARS)—First and third Thursday in each month, 7.30pm. Lecture Room N, Applied Sciences Block, Swansea University College. Club net every Sunday, 1000gmt 28·530 or 28·310MHz if QRM high. Net controller Cen, GW4BIQ. Club call awaiting authorization. Sec Roger Williams, GW4HSH, tel Swansea 404422.
West Wales Repeater Group (GB3WW)—The committee are very anxious that this repeater should remain operational, but its present support from a small percentage of users will inevitably mean a review of its role as an important facility for the amateur population of West Wales. The group is solely self-supporting and relies only on the donations and subscriptions of users. All users are encouraged to support this repeater, annual fees £3, payable 1 September, half-yearly, £1.50, which is a small amount to pay for use of such a highly reliable repeater. Further information from Steve Bleaney, GW3VPL, tel Briton Ferry 812361.

RR10 would like to hear from other RSGB groups and affiliated societies who do not appear in the above listing, for inclusion in a subsequent issue. Club secretaries please note this is the latest information received. Any errors must be notified accordingly.

REGION 11—RR B. H. Green, GW2FLZ, 1 Clwyd Court, Tan-y-Bryn Road, Colwyn Bay, Clwyd LL28 4AH. Tel 0492 49288.

Area representatives in Region 11
E. C. Jones, GW4JPP Tywyn
J. Lawson-Reay, GW8WFS Llandudno

Bangor (University College of North Wales ARS)—The Rockets Room, Room 261, School of Electronic Engineering Science, Dean Street. Sec I. Wylie, G6CCJ, Room B402, Neuadd Emrys Evans, Menai Avenue, Bangor, Gwynedd.
Colwyn Bay (Conwy Valley ARC) (GW6TM)—8 July (Club meeting or foxhunt), 7.30pm. There will be a special meeting on 22 August for a demonstration of equipment by David Monkhouse of Lowe Electronics, 2.45pm. Green Lawns Hotel, Bay View Road, Colwyn Bay. Excellent talks by Norman Kendrick, G3SCG, and Stewart Owen, GW3QN on last-war experiences have been enjoyed by the members. Sec J. N. Wright, GW4KGI, tel 0745 823674.
Dolgellau (Meirion ARS)—1 July (Talk on radiotelescopes), 7.30pm. Royal Ship Hotel, Dolgellau. Sec Mrs Jean Jones, GW4KYK, tel Tywyn 710 402.
Rhyl (R&DARC)—8 July (Talk entitled Behind the screen"), 22 July (Junk sale), 7.30pm. Ambulance Station, Rhyl. Sec B. Jones, GW8OYT, 6 Rhodfa Maes Hir, Rhyl, Clwyd, tel 0745 37284.

RR11 requests information from other club secretaries in the region for inclusion in future "Club News".

REGION 12 New RR to be appointed.

Area representative in Region 12
R. M. Grant, GM4DQJ Scone

Aberdeen (ARS)—Fridays, 7.30pm. New clubrooms, 35 Thistle Lane, Aberdeen (at the rear of 35 Victoria Street), which is near to Holburn Junction. On 11 September the society will be sponsoring the Scottish Radio Exhibition and Convention, at Aberdeen University. There will be a raffle for a colour tv, and a series of lectures are being arranged. Details from GM3VEY, tel Aberdeen 868263. Details of club from sec GM4BKV, tel Aberdeen 691716.
Dundee (Kingsway TC ARC)—Tuesdays, 6.30pm. Electrical Laboratory, Kingsway Technical College, Old Glamis Road, Dundee. Details from sec, GM4JCY.
Elgin (Moray Firth RS)—No details of meetings or club officials notified. Last known sec GM8YMY.
Invergordon (Easter Ross RC)—Wednesdays, 7.30pm. 100 High Street, Invergordon. The club callsign is GM4MFL and RAE classes and morse classes are available. Programme details from GM4DKL.
Kirkwall—Members meet frequently to discuss amateur radio and allied subjects. Details from GM3IBU.
Perth (P&DARG)—Tuesdays, 8-11pm. Perth City Sports & Social Club, Leonard Place, Perth. The premises are licensed for the sale of alcohol and the meetings are anything but "dry"! The club maintain the Perth repeater GB3PR and contributions to help maintain the repeater are always welcome. Details of meetings etc from sec GM8RYZ.
Shetland (Lerwick RC)—Wednesdays, 7pm. Isleburgh House Community Centre, Lerwick. Members can use the club premises at other times. Details from sec GM4BBI.

There are a number of other clubs in the area who do not notify details of meetings etc. Will all club secretaries please give details of their clubs to the new regional representative when that person is appointed. Some clubs close during the summer months, especially clubs who meet in educational establishments. Visitors should contact the club sec or other amateur in the club area to establish times of meetings to avoid an unnecessary journey.

REGION 13—RR A. B. Givens, GM3YOR, 41 Veronica Crescent, Kirkaldy, Fife KY1 2LH. Tel Kirkaldy (0592) 200335.

Area representatives in Region 13
D. G. L. Anderson, GM4JJJ Dunfermline
J. McVicar, GM8GEC Musselburgh

Berwick-upon-Tweed (B&DARS)—First and third Fridays in each month, 7.30pm. Details from GM8YPI, tel Eyemouth 50492.
Borders Repeater Group—The group administers the two 144MHz repeater projects, GB3BT (Berwick-upon-Tweed), and GB3SB (Scottish Borders). Meetings are held in Kelso as and when necessary. Details, GM4CXP, tel St Boswells 2795, or G3HDT, tel Berwick-upon-Tweed 88260.
Dalgety Bay (Marconi Space & Defence Systems ARC)—Details from GM4HBG, tel Glenrothes 771057.
Dunfermline (DARS)—Second Wednesday in each month, 7.30pm. CCTV Studio, Pittencrieff School, Maitland Street, Dunfermline. Details from GM3CIG.
Edinburgh (E&DARC)—Tuesdays, 7.30pm. City Observatory, Calton Hill, Edinburgh. Details from GM3RFQ.
Edinburgh (Ferranti Recreation Club AR Section)—Membership is restricted to company personnel. Details from GM8JKG, tel 031-441 5684. Visits by other clubs by prior arrangement.
Edinburgh (GB3ED Repeater Group)—Details, GM3GBX, tel 031-447 2611.
Edinburgh (Heriot Watt UARC)—Wednesdays, 2.30pm. Mountbatten Buildings, 31-35 Grassmarket, Edinburgh. Details, GM4JFS, tel 031-339 1104.
Edinburgh (Leith Nautical College ARC)—Thursdays, 6.30pm. Leith Nautical College, 24 Milton Road East, Edinburgh 15. Although principally intended to further interest within the college, the club would welcome local radio amateurs and short wave listeners as members. Details from Michael Gathergood, GM4KFK, Halls of Residence, Leith Nautical College.
Edinburgh (Lothians RS)—Details from GM8BJF, tel 031-447 5527.
Glenrothes (G&DARC)—18 July, 15 August, 7.30pm. Clubrooms, Provosts Land, Leslie, Fife. Details from GM8ZTV, tel Kirkcaldy 203582.
St Andrews (UoStAR&ES)—Details from Physics Department, North Haugh, St Andrews.

Club secretaries, please check that the above information is correct as this is the latest received and in many cases is very dated. Changes should be sent to RR13, along with programmes, news and photographs for inclusion in "Club News".

REGION 14—RR V. J. Kusin, GM4HCO, 109 Weymouth Drive, Glasgow G12 0EL.

Area representative in Region 14
J. G. Gaughan, GM4FEO Helensburgh

Ayr (AARG)—Fridays, 7.30pm. The Community Leisure Centre, 24 Wellington Square, Ayr. Details from GM3THI.
Dumfries (D&G REC)—First and third Monday in each month, 7.30pm. Cargenholm Hotel, New Abbey Road, Dumfries. Details from GM4NNC.
Falkirk (Stirlingshire ARC)—First Tuesday in each month, 7.30pm. Details from GM6CRQ, 2 Mayfield Mews, Falkirk.
Glasgow (West of Scotland ARS)—Fridays, 7.30pm. 22 Robertson Street, Glasgow. Details from GM4JDU.
Greenock (G&D ARC)—Details from GM3XNJ.
Helensburgh (HARC)—First and third Wednesday in each month, 7.30pm. John Logie Baird School, Churchill Estate, Helensburgh. Details from GM6ALC.
Irvine (Cunninghaeme & DARC)—Thursdays. The Community House, Irvine. Details from GM3JOB.
Kilmarnock (K&L ARC)—Tuesdays, 7.30pm. The Broomhill Hotel, London Road, Kilmarnock. Details from GM3ZRT.
Motherwell (Mid-Lanark ARC)—Fridays, 7.30pm. Wrangholm Hall Community Centre, Jerviston Street, New Stevenson, Motherwell. Details from GM3ULP.
Stranraer (SARC)—Stranraer Community Centre, Lewis Street. Details from GM8RUG.

REGION 15—RR J. T. Barnes, GI3USS, Whitegables, 95 Crawfordsburn Road, Bangor, Co Down BT19 1BJ. Tel 0247 3948.

Area representatives in Region 15

D. F. Campbell,	GI4NKD	Craigavon
J. Chapman,	GI4LVC	Magherafelt
C. J. T. Corderoy,	GI4CZW	Enniskillien
A. T. Hamilton,	GI4HVI	Castlerock
H. M. Irvine,	GI3TLT	Newtownards
W. P. McMichael,	GI4LKA	Greenisland
S. G. Moore,	GI8YTH	Belfast
J. A. Porter,	GI3GGY	Londonderry
C. S. Robinson,	GI4JDX	Belfast
P. S. Valentine	GI3RKE	Omagh

Ballyclare (East Antrim ARC)—Second Tuesday in each month, 7.30pm. Carntall Hall, Carntall Road, Mossley. AR GI4LKA. Sec GI4JXM.
Ballymena (BRC)—Thursdays, morse class, 8-9pm; Club meeting, 9pm. Sundays (Club get-together) 3pm. 70 Nursery Road, Gracehill. 19 September (Mobile rally). Details from sec GI4HCN.
Banbridge (Mid-Ulster ARS)—5 December (AGM), 3pm. GI4BAC QTH. Details from GI4NVD.
Bangor (B&DARS)—First Friday in each month except July and August, 8pm. Sands Hotel, Seacliff Road, Bangor. Details from sec GI4JTF.
Belfast (CoBYMRC)—Tuesdays, 7pm; Saturdays, 2.30pm. 12 Wellington Place, Belfast. Sec Paul McTaggart, 4 Thirlmere Gardens, Belfast BT15 5EF.
Belfast (Queens UoBRC)—37 Fitzwilliam Street, next to Students Union. Club station GI3LLQ/GI6FQB on all bands, 3·5 to 432MHz. RAE and morse tuition available. Activities include electronics and computing. Details from chairman GI4MAC, sec GI4LGP, or GI6AGB, GI4FVM, GI6ETD and GI8MUO.
Larne (L&DARS)—Newly formed and will be applying for affiliation. Wednesdays, 6.30-9.15pm. Larne Tech College, Room 270. Morse classes available. RAE class in tech college. Programme being arranged. Details from sec GI4CPP.
Lisburn (Lagan Valley ARS)—Second Monday in each month, 7.30pm. Rathvarna Teachers Centre, Pond Park Road, Lisburn. Sec GI8SXN.

REGION 16—RR T. D. Howe, G3PLF, 18 Vange Hill Drive, Basildon, Essex SS16 4DD. Tel 0268 24453.

Area representatives in Region 16

F. R. Howe,	G3FIJ	Colchester
R. W. Howe,	G3PLB	Basildon
L. V. G. Turner,	G4CUT	Chelmsford

Braintree (B&DARS)—First Monday in each month (Informal), 8pm. Third Monday in each month (Formal), 7.45pm. Braintree Community Centre, Victoria Street. Details from Alan Williams, G6CIV, tel Silver End 83516.
Bury St Edmunds (BStERS)—Third Tuesday in each month, 7.30pm. Guildhall, Guildhall Street. Details from John Munro, G3GBB, 29 Angel Hill, Bury St Edmunds.
Chelmsford (CARS)—First Tuesday in each month, 6 July (Demonstration of tv studio techniques, Part 2), 3 August ("Radio aeronautical navigation systems" by G3KTF) 7.30pm. Marconi College, Arbour Lane. Details from Andrew Mead, G4KQE, tel Silver End 83094.
Colchester (CRA)—Thursdays fortnightly, 7.30pm. Colchester Institute, Sheepen Road, 25 July (Anglian Mobile Rally, Stanway School, Colchester). Details from Frank Howe. G3FIJ, tel Colchester 70189.
Felixstowe (FARC)—Tuesdays (Informal), 8pm. Felixstowe Golf Club. Details from John Hobin, G3XIX.
Great Yarmouth (GYRS)—Last Thursday in each month, 7.30pm. 67 Southdown Road, Great Yarmouth. Details from Tony Besford, G3NHU.
Harlow (H&DRS)—Tuesdays, 8pm. Mark Hall Barn, First Avenue. Details from Cilla Mann, G4KVR, c/o Mark Hall Barn, First Avenue, Harlow.
Haverhill (H&DRS)—Fridays, 7.30pm. Copse Hall Farm, Steeple Bumpstead Road. Details from Dave Hickford, G4MVK, tel Haverhill 61207.
Ipswich (IRC)—Second and last Wednesday in each month, 14 July (DF hunt), 28 July (Not yet decided), 8pm. Club Room, Rose & Crown, Norwich Road. 11 July (Demonstration station at Woodbridge Regatta). Details from Jack Tootill, G4IFF, tel Ipswich 44047.
Loughton (L&DARS)—Fridays fortnightly, 8pm. Loughton Hall, Rectory Lane. Details from B. Capon, G8UBH.

Lowestoft (L&DARC)—Fridays, 7.30pm. North Suffolk Teachers Centre, Lovewell Road. Details from Terry Weatherly, G3WDI, tel Lowestoft 63216.
Martlesham (MRS)—First Wednesday in each month, 7 July ("RF hazards", by G3SEK), 7.30pm. British Telecom Research Labs, Martlesham Heath. Visitors are always welcome but must first contact G3ZNU for security clearance.
Norwich (Norfolk ARC)—Wednesdays, 7 July (Informal), 14 July ("Super regen receivers", by G8MJQ), 21 July (Informal), 28 July (Fox hunt briefing), 7.45pm. Crome Community Centre, Telegraph Lane East. Details from Paul Gunther, G8XBT, tel Norwich 610247.
Southend (S&DARS)—Fortnightly, 8pm. St Michaels Church Hall, Sir Walter Raleigh Drive, Rayleigh, Essex. Details from A. Adams, G3YOA.
Stowmarket (SDARS)—First Monday in each month, 5 July ("Weather and propagation",, by G4BJO), 7.30pm. Red Cross Hut, Station Yard. Details from Jim Lowe, G8SCB, tel Needham Market 721296.
Thurrock (TARC)—First and Third Tuesday in each month, 8pm. Grays Park Hall, Orsett Road, Grays. Details from G3KMD.
Vange (VARS)—Thursdays, 1 July (Junk sale), 8 July (Talk by G3PLB), 15 July (Discussion on next programme), 22 July (Solo G4ELM), 29 July (Station on the air), 7.30pm. Main Hall, Barstable Tennants Community Association, Long Riding, Basildon. Details from Mrs D. Thompson, 10 Feering Row, Basildon, SS14 1TE.

REGION 17—RR H. G. Cunningham, G8FG, 235 Station Road, West Moors, Wimborne, Dorset BH22 0HZ. Tel Ferndown (0202) 876018.

Area representatives in Region 17

P. G. Brooker,	G3WXC	Isle of Wight
M. A. Lawrence,	G4JXO	Portsmouth
J. F. Martin,	GU3YIZ	Guernsey
D. I. Mason,	G3ZPR	Poole
A. D. Morrissey,	GJ3YLI	Jersey
A. C. A. Newman,	G2FIX	Salisbury
P. J. Sterry,	G3CBU	Basingstoke
M. J. Stevens,	G3CPN	Ferndown
G. S. Symons,	G3DSS	Sturminster Newton
G. M. Taylor,	G8HVY	Weymouth

Andover (ARAC)—Second Wednesday and third Tuesday in each month, 8pm. Wolversdene Club, Love Lane, Andover. Sec G3KVX.
Basingstoke (BARC)—Third Wednesday in each month, 21 July (The G6CJ aerial circus on video tape), 7.30pm. Chineham House, Popley, Basingstoke. Sec G6CPA, tel Tadley (07356) 4964.
Basingstoke (UK FM Group Southern)—First Wednesday in each month, 7.30pm. Chineham House, Popley, Basingstoke. Chairman Mike Payne, G3ZRM, tel Aldershot (0252) 26108.
Bournemouth (BRS)—First and third Friday in each month, 2 July ("Police communications", by Mr Duthie), 16 July ("Receiver low noise rf amplifier, design techniques", by Christopher Bartram), 7.30pm. Kinson Community Centre, Kinson, Bournemouth. Sec G4EKE, tel Ferndown (0202) 877945.
Chippenham (C&DARC)—Tuesdays, 7.30pm. Chippenham Sea Scouts HQ. Sec G8UGY, tel Bromham (0308) 850289.
Fareham (F&DARC)—Wednesdays, 21 July (RTTY systems), 28 July (Natter night), 7.30pm. Porchester Community Centre. August (Portable operations during period of community centre close down). Sec G4ITG, tel 0329 234904.
Fareham (HMS Collingwood ARS)—Wednesdays, 7.30pm. Details from sec G8OWJ, tel Fareham (0329) 234139.
Farnborough (F&DRC)—Second and fourth Wednesday in each month, 14 July (Post VHF NFD analysis and natter night), 28 July ("PCB manufacture", by G6CMG), 7.30pm. Railway Enthusiasts Club, Access Road, off Hawley Lane (near M3 bridge). Sec G4BJQ, tel Farnborough (0252) 43036.
Gillingham (Blackmore Vale ARS)—Second Tuesday in each month, 13 July ("Raynet", by G3JAW), 7.30pm. Sherman Chemicals, Station Road, Gillingham. 8 July (Bring and buy sale). Sec G3WRV.
Guernsey (GARS)—Tuesdays and Fridays, 23 July (Talk on vhf/uhf propagation), 8pm. The Lodge, La Corbinerie, Oberlands, St Martins. 10 July (Summer dinner, The White House Hotel, Herm. GU2FZC and GU8HT guests of honour, (celebrating their 80th birthdays)). Sec GU6CLY, tel 0481-21197.
Guernsey (GRSGBG)—9 July (Area meeting on the occasion of the visit of RR17. Civil Defence Headquarters, La Corbinerie, Oberlands, St Martins), 8.30pm. Further details from AR GU3YIZ.
Horndean (H&DARC)—Second Thursday in each month, 7.30pm. Merchiston Hall, Horndean. Sec G6GBM, tel Horndean (0705) 593429.
Jersey (JAEC)—Second Wednesday in each month, 8pm. The Communication Centre, St Brelade. Sec Mrs M. Smith, tel 0534 23248.
Jersey (JARS)—Sundays, 10.30am. Fridays, 8pm. Le Hocq Tower, St Clement, Jersey. Sec R. R. Ford, tel 0534 41131.
Poole (PARS)—Last Friday in each month, 7.30pm. Poole Technical College. Sec G8ZCG, tel Broadstone (0202) 693986.
Portsdown Hill Repeater Group—Sec G8GNB, tel Titchfield (03294) 41456.
Portsmouth (Marconi E&ARS)—Last Tuesday in each month, 8pm. Broad Oaks Canteen, Portsmouth Airport. Details from G8NEH, tel 0705 738067.
Portsmouth (P&DRS)—Thursdays, 7.30pm. Portsmouth Community Centre, Malins Road, Buckland. Sec G3JZV.
Salisbury (SR&ES)—Tuesdays, 7.30pm. Grosvenor House, Churchfields Road. Sec G2FIX, tel Wilton (072274) 3837.
Southampton (SARS)—Wednesdays, 7.30pm. Bitterne Park Secondary School, Dimond Road, Bitterne. Details from G4LDK, tel Bursledon (042121) 3451.
Southampton (SUARC)—Tuesday evenings. Informal meeting every lunchtime in the Clubroom, Old Union Building. Sec A. C. Talbot, The Radio Club, JCR Post, The University, Southampton.
Southampton (Waterside Short Wave Club)—Fourth Tuesday in each month, 7.30pm. Blackfield Community Centre, Blackfield, near Southampton. Sec G6DLJ, tel Fawley (0703) 891975.
Swindon (SDARC)—Thursdays, 7.30pm. Park School, Marlowe Avenue, Swindon. Sec Ian Browne, tel Swindon (0793) 485564.
Weymouth (South Dorset RS)—First Tuesday in each month, 6 July (Aerial miscellany), 18 July (Possible mobile picnic), 7.30pm. Civilian Canteen, Army Bridging Camp, Wyke Regis. Sec G3ZGP, tel Weymouth (0305) 812893.
Wimborne (Flight Refuelling ARS)—Sundays, 7.30pm. Flight Refuelling Social Centre, Wimborne. This newly-formed club would welcome new members from the Wimborne district. Details from Mike Owen, G3VFY, tel Wimborne (0202) 882271.
Winchester (WARC)—Third Saturday in each month, 8pm. The Scout Log Cabin, Stockbridge Road. Sec G6FBR, tel Winchester 66764.

REGION 18—RR W. A. Ricalton, G4ADD, 4 South Road, Longhorsley, Morpeth, Northumberland NE65 8UW. Tel Longhorsley 259

Consett (C&DARC)—Mondays, 7.30pm. RAFA Club, Sherburn Terrace, Consett. Sec G8WEJ.
Durham (DURES)—Physics Dept, Science Site, Durham University. Details from sec Mark Puddephat, Oswald 299, Gray College.
Easington (EAR&EC)—Tuesdays and Thursdays, 7.30pm, Easington Village Workmen's Club. RAE and morse tuition if required (the club has a good pass record). Details from sec G4GXI.
Great Lumley (GLAR&EC)—Alternate Wednesdays, 7.30pm. Great Lumley Community Centre. Sec G8HPW.
Hartlepool (HRH)—Mondays, 7.30pm. Methodist Church Hall, Frange Road. Sec G3NWU.
Middlesbrough (Post Office ARC)—All amateurs welcome, but first contact sec G8CDP.
Middlesbrough (Teesside Repeater Group)—Last Tuesday in each month, 7.30pm. 196 Marton Road, Middlesbrough, Cleveland. All amateurs and swls invited but first contact sec G8MBK.
Morpeth (Northumbria ARC)—Thursdays, 7.30pm. Old Telephone Exchange, Ellington. Sec Ian Gibbs, G4GWB, tel Morpeth 790417.
Newcastle upon Tyne (T&WRG)—Now no formal meetings. AGM Sept-Oct. Sec G8XDF.
Prudhoe (TARC) 6, 27 July, 10, 31 August, 7pm. Active all bands, cw instruction each night. Hotel meals or drinks available. Falcon Hotel, Prudhoe, Co Durham. Sec G4IZW, tel 0632 678828, evenings.
Redcar (East Cleveland ARC)—Fridays, 7.30pm. RAE classes held. Advice to newcomers given. RAFA Club, Newcomen Terrace, Redcar. Pro G4KIR.
Sunderland (SRAS)—Mondays, Thursdays, 7pm. Sundays 9.45am. RAE and morse tuition. The Brewery Buildings, Westbourne Road. Sec Ian Batley, G8TKU, tel Sunderland 72746.
Tyneside (TARS)—Mondays, 7.30pm. Community Centre, Vine Street, Wallsend. Sec James Dingwall, G4ILW, tel 872661.

REGION 19—RR R. J. C. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ. Tel 01-989 6741.

Area representatives in Region 19

W. G. Dyer,	G3GEH	London
L. D. E. Light,	G3KDL	Wembley
P. J. Marcham,	G3YXZ	Watford, Herts
B. H. J. Pickford,	G4DUS	Rickmansworth
J. H. Sleight,	G3OJI	Ware
T. J. Tugwell,	G8KMV	Stevenage

Barking (BR&ES)—No report from this club in over six months. Meets at Westbury School, Ripple Road, Barking. Club publicity officer T. Parker, 2d Hubbards Chase, Hornchurch, Essex. Details also from G8IZN, tel 01-594 2471.
Cheshunt (C&DARC)—Wednesdays, 7 July (Natter night), 14 July (Junk sale), 21 July (Natter night), 28 July (144MHz portable operation on Baas Hill Common, Broxbourne), 8pm. Church Rooms, Church Lane, Wormley, Nr Cheshunt. Details from Bob Gray, tel Dane End 254.
Chingford (Silverthorn RC)—No input for over three months. Fridays, 7.30pm. Hill House, Simmonds Lane, Chingford E4. Sec G4AJA, tel 01-529 2282.
Chiswick (ABCARC)—20 July (Ferrite-cored balun transformer—discussion opened by G3IGM), 7.30pm. The Committee Room, Chiswick Town Hall, High Road, London W4. Sec G3GEH, tel 01-992 3778.
Ealing (E&DARS)—No input. Tuesdays, 8pm. Northfields Community Centre, Northfields Road, London W13. Sec Ted Batts, G8LWY.
Edgware (EDRS)—3-4 July (VHF Field Day at Hatfield School), 8 July (To be announced), 22 July (Informal meeting). The Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. Sec H. Drury, tel 01-952 6462.
Grafton (GARC)—This club is seeking new members, and has asked the RR to help, but they have not sent a copy of their current programme for this issue. Fridays, 7.30pm. The Five Bells Pub, East End Road, East Finchley, London N3. Sec J. Chambers, G4IBK, tel 01-346 5841.
Harrow (RSH)—Fridays, 8pm. Harrow Arts Centre, High Road, Harrow Weald. Details from Peter Marcham, G3YXZ, or G4AUF, tel 01-868 5002.
Havering (H&DRS)—No input. Wednesdays, 8pm. Fairkytes Arts Centre, Billet Lane, Hornchurch, Essex. Sec A. Negus, tel Upminster 24059.
Ilford (IRSGBG)—No input. Thursdays, 8pm. 50 Mortlake Road, Ilford, Essex. Sec B. Seager, 8 Maxey Gardens, Dagenham, Essex.
London (Post Office HQARG)—No input. Weekly net Wednesdays, 8pm, local 3·750 for PO and BT folk. Sec G3TIS, tel 01-836 1222, ext 2602. Details from J. A. Clarke, Room 521, Electra House, Victoria Embankment, London WC2. Only open to Post Office members.
London (Imperial College ARS)—No input for six months. Last known contact G4MIK, tel 01-589 5111, ext 1301, daytime.
St Albans (Verulam ARC)—Fourth Tuesday in each month, 27 July (1,296MHz repeater working), 8pm. Charles Morris Memorial Hall, Tyttenhanger Green, St Albans, Herts. Informal meetings are held on the second Tuesday in each month at RAFA HQ, New Kent Road, St Albans. Publicity manager, Peter Hilderbrand, G3VJO, tel Redbourne 2761.
Shelburne (SRC)—No input. Thursdays, 7pm. Shelburne Youth Centre, Hornsey Road, London N7. RAE courses available. Sec T. C. Clark, G4BZW, tel 01-249 1843.
Southgate (SARC)—8 July ("Telegraphic communications—pro and am", by G3RWL and G3ZVW), 8pm. St Thomas' Church Hall, Prince George Avenue, Oakwood, London N14. Sec John, G8EWG.
Stevenage (SDARC)—First and third Thursday in each month, 15 July (Station on the air), 8pm. British Aerospace Dynamics, Site B, Staff Canteen, Argyle Way, Stevenage. Sec T. Bailey, tel Stevenage 62860. This society hopes to produce a newsletter in June, look out for a copy, get one by attending and giving some support to your local club.
SW Herts UHF Group—The group's 10GHz beacon GB3SWH was back on the air as of 22 April and is going well after its rebuild. Signals as far as Alton, Hants, have been worked. Anybody with 10GHz gear is welcome to "book in", to Peter, G3YXZ. Gifts of cash are always welcome from users and others.
Wanstead (ELRSGBG)—No meetings in July or August. Details from Ray Matthews, G8VDD, tel 01-550 2579.
West Drayton (LT District Line ARC)—This club seems to be no longer operative.
UK FM Group—Details from G8KVP, tel 01-531 0866, or Pat, G8LZA.

REGION 20—RR B. L. Goddard, G4FRG, 2 Greenfield Park, Portishead, Bristol BS20 8NQ. Tel 0272 848140.

Area representatives in Region 20

R. W. Marshall,	G4ERP	Bishops Cleeve
E. A. Perkins,	G3MA	Gloucester
J. Thorn,	G3PQE	Weston-Super-Mare

(contined on page 619)

MEMBERS' ADS

CONDITIONS OF ACCEPTANCE

These subsidized 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 *Rad Com* to the advertiser: this will automatically provide proof of membership and should not be more than two months old. No acknowledgement of receipt will be sent, and advertisements not clearly worded or punctuated, or which do not comply with the conditions of acceptance, will be returned. No correspondence concerning this service will be entered into.

Trade or business advertisements, even from members, will not be accepted for "Members' Ads" but 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.

Warning. Members are advised that they should, as far as possible, ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The "purchase" of goods legally owned by a finance company could result in the "purchaser" losing both the goods and the cash paid.

The current rate is £1 for 40 words or less: advertisements containing more than 40 words will cost an additional £1 for every additional 40 or less words. Each advertisement must be accompanied by the correct remittance, either as a cheque or postal order made payable to Radio Society of Great Britain.

Closing dates in 1982 for issues in brackets, are **15 July** (September), **25 August** (October), **23 September** (November), **21 October** (December), **18 November** (January 1983), **16 December** (February 1983).

Post to: MEMBERS' ADS, RSGB, 88 BROOMFIELD ROAD, CHELMSFORD, ESSEX CM1 1SS
Do not post to RSGB HQ or Advertising officer.

FOR SALE

Yaesu 101ZD fm, FC902, brand new, £750. Tel Derby 557705.

Facsimile machine, 180rpm, 75 l/in, a.m., easily modified electrically for Meteosat, £80. Fax tx, 120rpm, fm incl xtal sync unit, suitable for amateur use without mods, modern unit, £120. G8NFU, QTHR. Tel Erith 37033.

Nascom 2, one year old, owner lost interest in computing, Veroframe, power supply, ram B board, Nas-sys 3, zeap, Nasdis, debug, chess graphics in eprom, all relevant documentation, £345. Would consider part exchange for unmodified FT221R, suffix D. Tel Chester (0244) 533051.

Valves, tx and rx, all types, clearing private collection, new and used, all tested, boxed, 10p to £2. Tel 01-890 2258.

Mosley TA33Jr tribander, must be collected, £40. AR22 rotator, control box damaged, £25 plus postage. G3JBU, QTHR. Tel 0604 401800.

RTTY TDMS ATM 5B, 6B, £25 each. Creed 444, punch, reader, 45/50/75 baud gears, Creed 75R, 75K3 printers (enquire). Creed 6S6 tape reader, £20. ATM AP67981 filter unit fs morse, £3. ATM AP66863 psu for FSR1/FSY1 tu, £4. Pye 2m rtty/cw tx, spare tx, £5. Mobile 2m a.m. tx/rx, £2. Heathkit HO10 rtty/ssb monitorscope, £25. Heathkit 1012U 5in lab scope, £30. Many copies *RTTY Journal*, 1967-79, unused HC6U xtals, 38·666, 27·500, 9·000MHz, £1 each. SSM1 sstv monitor, £120. Ferrograph 4A tape recorder, £30. G2FUD, QTHR. Tel 061-928 1321.

Quartz 16, fitted S20-24, S0, 145·8, R3-7, mobile bracket, manual, boxed, £90. Tel Newcastle 811062.

Complete station: Trio TS520SE, fitted cw filter, VFO520S, AT200, SP520, cw users and service manuals, two years old, vgc, orig packing, £495. G3JFF, QTHR. Tel 0705 593994.

FT101B, exc cond, two new valves, full coverage, fan, £200. KW107 atu, offers. Multi-mobile antenna, 10-80m, offers. GW3YPF, QTHR. Tel 0248-680 630.

Azden PCS300 fm handheld, 144-146MHz, 12·5MHz steps, charger, nicad pack, earphone, stand, outputs 1 or 3W band, eight-memory scanning, under warranty, mint, £175. Heath HD1410 iambic keyer, handbook, all leads, mint, £45. Tel 0373 64694 (Bath area).

450 odd valves, untested, all types: rf, af, tv etc, about 10 per cent boxed, £35 ono. Two working magneto Bell vintage field telephones, set F, offers? Buyers must arrange or pay carriage. G4MRE NOT QTHR. Tel Kenilworth (0926) 511842.

Heathkit hf station: SB401 tx, SB303 rx, matching spkr, swr meter, all in exc order, £250. G4KXF. Tel Leighton Buzzard 376060, after 7pm.

Trio TS820S, cw filter, £435. Workshop manual, £10. VFO820, £65. Drake MN2000 atu/power meter, 2kW, £140, or £625 the lot. G4CHP, QTHR. Tel Swainsthorpe 470365.

Icom IC280E 10W fm 2m mobile, digital readout, scanning, £150 ono. Pye uhf Westminster W15U, 6ch, RB2, RB4, RB10, RB13-14, SU8, £95 ono. G3WPO gdo kit, £16. Some other small items. G3YBY, QTHR. Tel Shepton Mallet (0749) 4191, or 0925 39668.

UV eproms, 5V, 2532, £2. 2716, £1. Fully tested, p&p, 50p any quantity. Drake TR4C, MS4, hb psu, £200. Rotator AR40, £20. Collection preferred. G3VMK, QTHR. Tel 0602 635170.

Yaesu Musen FRG7, inbuilt digital frequency meter, exc cond, £140 ono. Datong PC1 gen cov converter, hardly used, £65. Stephens James Mk2 multi tuner, £12. Genuine reasons for sale. C. P. Carpenter. Tel 01-656 9453, evenings.

Yaesu FR101S rx, ssb, a.m., mains, batt, 160-80-40-20-15-10m, £250 ono. Barlow Wadley XCR30 Mk2 ssb a.m., 500kHz, 30MHz, £70. Eddystone power Unin-cat, 924, solidstate, mains to dc, £5. Tel 01-998 3057.

SB200 linear, new, £195, or part exchange Atlas or similar small hf tx/rx. GJ3AME. Tel Jersey 54186, after 6pm.

FT480R, incl mobile mount, manual, orig packing, immac cond, £310 ono. G6BTJ NOT QTHR. Tel 01-560 4351 (West London).

Complete station: FL50B tx, FR50B rx, FV50B vfo, 3-el beam for 10, 15, 20m, mic, dummy load, swr/power meter, three-way switch, all connections, £200. Tel Northampton (0604) 491309.

G4MH minibeam, 10m, 15m, 20m, comp except for rotator, with cable, £55. Transformer, 240V, 50Hz in, 115V, +20A out, in metal case, suitable contractor, £20. G3DWS. Tel 021-475 6267.

FT480R, Yaesu 2m multimode, nine months old, hardly used, power supply, £315. G4CDE NOT QTHR. Tel 01-660 5689.

Trio TS700G vhf multimode, additional switchable preamp fitted, all fixed channels xtalled, vox unit for same, £340 ovno. G6CSJ. Tel Godalming (04868) 4491.

Yaesu FT290 for exchange Trio TR2300 or fm mobile (requiring cash adjustment), 70cm converter, MMR432/144, as new, £15. ZX81 with ip op port, sound, games, morse, books, etc, £65 the lot. G6ASA, QTHR. Tel Sutton Courtenay (Oxford) (023-582) 249.

FT227RA, ARE scanner, comp with mic, mobile mount, mobile antenna, £170 ono. EMI oscilloscope type WM16, 5in crt, uses plug-in amplifiers, £35. Amplifiers, £5 each. Marconi standard sig gen type TF867A, 15kHz-30MHz, £20. G3JTQ, QTHR. Tel 0990 26764.

2m G2BCX 16-el Yagi, exc high gain antenna, as new, £30. Buyer collects. 2m fm tx board with xtals, £15. HC25/U 8MHz xtals, £5. New 4X150D, £15. New 4CX250B, £20. G8RWG, QTHR. Tel Camberley (0276) 32195.

RTTY: send and receive on your Sharp MZ80K. Programme on cassette with full details and circuit diagram of simple universal interface, £7.50. A. Sinclair, 35 Prestonfield Avenue, Edinburgh.

Telequipment scope, D32, dual beam, beam two dim, otherwise good cond, £35. Clark pump-up mast, 30ft, accessories, £75. IC22 2m fm mobile, five repeater, four simplex, £80. Teletype ASR33, as new, £120. Consider swops. W.H.Y? G4FYY, QTHR. Tel Crawley 514788.

Trio TS830S, six months old, still under warranty, cabinet never opened, £600. CDE Ham 2 rotator, unused, £100. Versatower 30ft wall-mounted lattice tower, new, unused, comp with masthead rotary bearing, £250. Buyers collect. G3MRP, QTHR. Tel 021-783 4771.

Station sale due to overseas posting: FT290, MM432/144 converter, MM144/25 linear amp, swr meter, antennas, coaxial, plugs, etc, all good cond, used little, all for £350 or will split. Tel Tony, Stratford-upon-Avon 720612.

IC202, orig model, mint cond, comp packing, accessories, £95 ono. 28V 2A psu, in solid metal box, £8 ono. PW speech processor, in high quality Vero box, meter, £5. G8PPE, QTHR. Tel Kidlington 4526, after 5.30pm.

Converters, MMC144/28LO, £20. MMC432/28S, £25. Hygain Thunderbird TH3/3 tribander, £65. Trio VFO520, needs attention, £25. Whatton, G4DCV, 55 Kingsdown Road, St Margarets-at-Cliffe, Dover. Tel 0304 840671, office, or 0304 853089, home.

Discone antenna, 50 to 480MHz, used little, £20. G3JBU, QTHR. Tel 0604 401800.

Hygain 204BA 20m, £80. Hygain DB1015A 10/15m duobander, P60 tower, £45 ono. Homebrew tuner unit with built-in swr bridge, condensers and coils alone worth £100, £50. Buyers collect. G4GI, QTHR. Tel 0522 720366.

Storno handheld CQP531R, 4m fm 3ch 1W op, comp orig packing, two new nicads, mains charger, helical, spkr/mic, xtalled on new fm calling 70·45MHz, exceptional cond body, worn remote, £80. G4MBZ, QTHR. Tel Farnborough 516637, evenings.

TS180S, all filters, PS30, SP180, MIC35, £550. IC240 mic and mobile mount, £100. Kokusai MF455 10K filter, £10. Advance E2 sig gen, £15. G3GGK, QTHR. Tel 0954 210374 (Cambs).

HW100, Shure 444 mic, HP23A psu, modded to HW101 standard, service manual, recent overhaul by Heathkit, £100. J. Lemon, G4FYJ, QTHR. Tel 01-606 9911, ext 3109, work, 01-733 7417, home.

Nascom 1, 60K, N2 keyboard, Gemini Mother, ram 64, eprom/rom boards, system housed in smart Kenilworth case, Nascom Basic, professionally built, documents, would reluctantly split, £560. N2 graphics rom, unused, £15. G8BIR. Tel Bristol (0272) 510699, home, 774048, work.

FDK700EX multi, new, over-optimistic geriatric unable to cope with exam, £170 ono. Tel 01-360 5428.

Marconi sig gen, 500kHz to 30MHz, a.m./fm, variable mod/dev, £30. AKG D2021E1 mic, XLR calibration charts, £70 each. G8BIR. Tel Richard, Bristol (0272) 510699.

Exchange new unused Wolseley Webb 19in self-propelled rotary mower, cost £300, for amateur radio tv equipment of value around £250, anything considered. Trio R1000, mint cond, atu, £240. Jaybeam 2m 4-el quad, £14. Tel Astwood Bank 2282.

Oscilloscope type 13A dual beam, £15. Packard gamma counter scaler timer, three off, analyser, one off, teletype driver, one off, £20 each. 3pH 1hp motor, £5. C. Langham, G8XWH, QTHR. Tel 01-764 2033.

Hartley 13A scope, spare tube, please collect. PCS 300 Azden, new April, £160. All as new. Heathkit IT5283 signal tracer, manual, £25. RCA vom, 115V, instructions, £8. G3MLP, QTHR. Tel Peterborough (0733) 63851, anytime.

1,296MHz, £15 each item. 15/15 Jaybeam, MM varactor, MM converter, 144 i.f., DC0DA three-stage preamp, filter, Mutek LNA645-35, Mutek MRF901 gain block, stripline filter. G3SPJ, QTHR. Tel 01-311 8405.

432MHz 21-el Tonna, £15. Electronic Developments 2C39 linear, integral psu, £80. MM transverter, 432/28S, £75. MMC 144/28LO, £15. MMA28, £10. Heath HD1410 iambic keyer, £25. G3SPJ, QTHR. Tel 01-311 8405.

Xtals for TR2200G etc, tx/rx, R6, £1 each. One 18,050kHz, one 14,944·4kHz, £1 each. PA3 preamp, £3. MM400KB, new, £275. Ikegami monitor, £65. MM 5W tx, a.m. faulty, cge, £8. G8ESK, QTHR. Tel Bradford 45611.

Parabolic dishes, 4ft diameter, high quality construction, in light alloy, £15 each. Buyer collects. G8AVX, QTHR. Tel 021-745 6796, evenings.

FT101 Zulu analogue WARC, nine bands, fitted fan, 600kHz cw filter, mic, three months old, £604 new, cw/ssb only, going QRT, sensible offers please. G6FB, QTHR. Tel Cosham (Hampshire) 370087, anytime.

Sommerkamp TS788DX multimode 10+11m mobile and base station, digital frequency readout, 100W output remote control mic, comp with 14AVQ antenna, £300 ono. G4HTX NOT QTHR. Tel Bedford 43348, after 5pm and weekends.

FT480R, psu, 5/8 whip, mobile tr, scan control box, boom mic, mobile mount, £285. SOTA 100W linear, preamp, £80. G8YTF NOT QTHR. Tel 061-633 7987.

IC240, vgc, power leads, mic, manual, orig packing, Bell mains psu, Jaybeam 2m colinear, brackets, UR43 coaxial lead, N plug, comp, £135. G4JKF, QTHR. Tel 0474 61296.

Tono Theta 7000 communication computer, sends and receives cw, rtty, ASCII, £385. Trio TS520, used little, £325. Toshiba 6JS6C matched pair, £8. 7360, unused, £6. Trio cw filter YG3395C, new, £17. G3NZT, QTHR. Tel Newby Bridge (Cumbria) (04483) 31550.

Free Sony TCU30 stereo cassette deck, must collect, needs repair, AD270 active antenna, mpu, £20. Sanyo hi-fi spkrs, stands, £40. DOI 2X teleconverter (Pentax-K kit), £15. World atlas (W. H. Smith), £3.50. Tel Steven, 01-514 3904.

Trio 9R59, vgc, only modification the addition of a voltage stabilizer, £40 plus carriage or collect. G3CRH, QTHR. Tel 05436 6364, after 6pm.

Avo meter Mk2, £40. Sig gen LO50A audio, £20. Taylor oscilloscope, 23A, £20. Heathkit solidstate voltmeter 1M17U, £35. Heathkit oscilloscope, 10-12U, £35. Tx/rx kit, 144MHz, unfinished, £50. Avo Minor multimeter, £20. Valve tester 177US, with manual, £25. Racal SA520 digital freq meter, £25. Valves, box 200, all types, £75. Chips, SN7400s, 80/80, A1360, 8086, £80. Cmos CD4001s, 4013, 4023, rams OC35-36, ASZ17, magazines, roms 2101, 2, AD149, OC16, resistors, all types, thyristors, cabinets, 8085, 8255, 8251, SL403A, capacitors, electrolytic 50μA meters, comp key BD transistors, BC108, 9, 7, BC183, 4, OC70, 1, 2, 3, valves, all types, pots, speakers, transformer MTA6, 6A60V, £10. Diodes, zeners. G6CPD. Tel 01-789 7656.

Helston (Cornwall) detached house, three beds, 25ft lounge/diner, kitchen, bathroom/wc with shower, 23ft garage/store, caravan space, 0·25 acre landscaped plot, higher part of town, 40ft Versatower with planning permission, TH3, 8-el crossed Yagi, super ham QTH. G3UQE, Ferndale, Troubridge Road, Helston, Cornwall.

Yaesu FT208R, NC8 quick/standard charger, eight months old, used little on transmit, exc cond, orig packing, £180 ono. Tel Leicester (0533) 59615.

IC2E, as new, charger, car cord, batt case, £95. G8GSY. Tel 01-855 6088, SE London.

FRG7, 2K40 filter mod, £140. MMC70/28 4m converter, £20. MMC432/28 70cm converter, £22.50. Buyer inspects and collects or can be sent via post or rail at buyer cost. G8UZC, QTHR. Tel 01-579 2424, 10am-4pm only.

KW2000E, ac psu, G-multiplier, £250 ono. Prefer buyer collects. Pair QY3125 valves, ceramic B5F holders, £10. Panel meter, 300mA, £2. TNC plugs (0·25in cable), 75p each. Mains cvt 100VA, £5. Pye vhf antenna filter, 132-174MHz, £10. G4GCJ, QTHR. Tel 0908 644253.

Unica UR1A gen cov rx, 530kHz-30MHz, 2m by converter, fully fm across all bands, rf gain, bfo, fine tune, mains/12V, ideal for swl, only £49. G4NXV NOT QTHR. Tel Flitwick (Beds) 712260.

FT101 five-band, 80-10, extra cw filter, used little, mint cond, £250. G3JDG, QTHR. Tel Harpenden (05827) 61086.

TR9000, comp BO base, matching mains power supply, mobile mount, etc, used little, mint cond, never used mobile, only reason for sale interest wained 2m, £350 ono. G2ACZ, QTHR. Tel Mablethorpe (05213) 3233.

Uniden 2030, 12ch, extra xtals, £75. 2m λ/4 wave, gutter mount, £3. Nytech CTA252 Mk1 stereo tuner amp, £120. G3RKH, Ordsall Rectory, Retford. Tel 0777 702515.

Trio R1000 rx, manual, orig packing, vgc, owner buying tx/rx, xtal calibrator, £200. All carriage extra. GM4KOO, QTHR. Tel 05576 249.

Video Genie home computer, cw programs, handbooks (seven), swop for hf mobile rig, 120S or similar. Cash adjustment either way. Must be vgc. G4JBU, QTHR. Tel Dave, 021-552 2853.

FLDX400, £160. FRDX400, good cond, £140. Eddystone 7304, immac cond, £100. FT101ZD, incl fan, only two months old, £625. Genuine reason for sale. G4DCI, QTHR. Tel Nottingham 231430.

FT101E, 160-10m, exc cond, approx three years old, cw manual, less mic, first £350. Buyer collects or can arrange delivery at extra cost. Sinclair ZX81 computer, 16k ram, two books, *Machine Code/Companion*, £100. G4EGA. Tel 061-456 6183.

FDK Multi 2700, all mode, £200. MM4000 rtty tx/rx, £220. Tuning 'scope, £38. ATM tuning aid V, £15. Standard TF867 sig gen, £25. Venus SS2 sstv monitor, fs conv camera, £120. G8XCF, QTHR. Tel 0253 404459, after 7pm.

Drake TR7/PS7, immac TR7 and mains psu, full gen cov facility, a.m. filter, comp with workshop manuals, unmarked orig packing, £680, no offers. Sneap, G3ZYC, QTHR. Tel 0773 43363, office hours.

Schomandl FD1/FDM1 freq meter, £60. Marconi TF1064/5 sig gen, £45. Dymar 880 hb fm, unmodded, £45. SF1 12-way charger, £15. 5MHz HC6U, £1.20. S22 44MHz, £1.20. HC18U. R1155F, £25. CCTV lenses, new, £25. *Wanted:* Pye Whitehall, or bits. G8EPR, QTHR. Tel Bewdley 403773.

KW2000A, mains psu, Shure mic, vgc, KW serviced, £210. SEM Z-Match, 80/10, as new, £40. 12AVT vertical ant with instructions, £20. G3OAZ, QTHR. Tel John, 0256 65126.

FRG7, mint cond, fine tune, no mods, manual, £150 ono. KW2000A mobile psu, £30 ono. *Wanted:* FT7 with mains psu. G8YLF, QTHR. Tel John, 01-777 2340.

Yaesu FR101, ham and broadcast bands, all filters, 6 and 2m converters, £215 ono. Exatron stringy floppy tape for TRS80 computer, comp with tapes and some programs, £100. G4AON, QTHR. Tel Dave, 037 781 367, after 6pm.

Complete hf station: FT101, hb linear, KW Z-Match, vswr bridge, spare mic, key, low pass filter, £400. G3VCM. Tel Plymouth 500459.

KW2000A, exc cond, £185. Solatron db scope, £65. TC7 incl 2m conv, £35. TC10 2m multimode tx, £35. TC12 200MHz counter, £45. 18AVT/WB, £30. AR22 rotator, £20. G8AEV 2m conv, £10. Jaybeam 2m 10-el, £15, plus shack clearance, 1,500V transformers, unused hd pcbs, tx tuning caps, linear coil formers, valves (new 807s), books, magazines, mass of components, sae brings list. All collect or pay carriage. G4FRV, QTHR. Tel Hoddesdon 64285.

TR2300, carrying case, battery charger, helical whip, £110. Ringo Ranger ARX2, £10. Variable pu, 6-14V, 2·5A, £15. G8VOQ, QTHR. Tel Dewsbury 460245.

External vfo for TS520 or TS520SE, mint cond, £10 ono. GI4JCB, QTHR. Tel Belfast 743153.

Sota EDL144 2m linear, £95. Jaybeam D15 1,296MHz Yagi, unused, £20. MM1,296/28 converter, £20. MM432/28 transverter, £55. Carriage extra. G4GEE, QTHR. Tel 0203 614779, evenings.

Lincolnshire: superbly appointed modern detached bungalow in 3/4 acre mature grounds, near golf course, planning for 60ft tower, good take off. Details from G3ZY. Tel Woodhall Spa 52793.

Transverter MMT 144/28, GPV5 2m colinear ground plane antenna, both still boxed, never been used, unwanted retirement gift, £100 the lot. G4MKK, G8ZHH, QTHR. Tel 051-480 0240.

CCSI (conduction cooled 4CX250B), new beryllium link, £15. *Wanted:* Eimac 4CX250B, 4CX250R, 4CX350A, 4CX350F. GJ4ICD, QTHR.

2m linear, two 4CX250Bs, easy 400W rf, £195. Triband 2-el minibeam, £45. Approx 140ft URM74 low loss coaxial, £15. 2,000-15,000-0-1,500-2,000V 1A transformer, £40. G4CXJ, QTHR. Tel 0993 71781.

Powerful rotator, will turn anything, built like a battleship, unstrippable gearbox, comp with automatic control, based on great circle map, any offer considered, phone and haggle. GW3YJL, QTHR. Tel Tredegar (049525) 2049.

FRV7700 converter, 118/130, 140/150, 150/160MHz, as new, orig packing, manual, £50 ono. Pocketfone PF1 rx, xtals SU8, RB4, £2 each. Morse decoder, Elektor, single letter/number readout, £10 ono. Electronic keyer DA1, £5 ono. PF1 tx/rx chassis, spares, £1 each. G3XLL, QTHR. Tel Mellis 596.

Cushcraft ATB34 hf Yagi, 10/15/20m, boxed, brand new, never been assembled, £159. Buyer collects or pays Securicor. G3OFK, QTHR. Tel 0734 733674.

Yaesu FRDX400S 160-2m rx, £150 ono. Yaesu FLDX400 tx, £150 ono. Both in vgc. Europa B 2m transverter, vgc, £50 ono. Lots spare valves for tx and rx. GW8ZZQ NOT QTHR. Tel 0286 5322, after 6pm.

Coutant psu type ASA1500, 5B stab at 10A, handbook, vgc, £15. Avo 40MHz, vgc similar to Avo 7, £25. Prefer buyer inspect and collect. Tel Tony, Besworth (0203) 318301, after 5pm.

204BA antenna, brand new, never erected, £170. Kleinschmidt composite set comprising printer, tape reader, punch on own desk, £80. GI4AHP, QTHR. Tel 0232 661748, after 6pm.

IC240 2m fm mobile, 22ch, programmable, exc cond, £95. G3SEY, QTHR. Tel 051-733 7910, Merseyside.

IC225 2m fm mobile tx/rx, 80ch synthesized, full repeater wkg, vgc, £135 ono. G3RRA, QTHR. Tel 0276 25040.

KW Viceroy 3, mint, 6146Bs, lpf, mic, co relay, £80. Yaesu YO101 monitor scope etc, handbook, leads, new, £110. USA Patrolman 2m fm rx, batteries or 115AC adaptor, mint, £20. Cash and carriage. G3OSH, QTHR. Tel Ilminster 3349, after 7pm.

Heathkit RA1 amateur bands, £40. Lafayette HA600A 150kHz-30MHz, £40. Pocketfones PF1, RB0, RB4, RB11 xtals, £20. Breaking U10B Cambridge for spares, xtals etc, Jaybeam 14-el Parabeam, £25. G4GUN NOT QTHR. Tel Taunton 79169.

Icom IC22, six repeater, four simplex, R0, R5, R7 reverse, 144·48, 144·5, automatic timer on repeaters, accessories, handbook, £85. M5 Starphone, SU8, spare xtal RB14, manual, £35. Buyer inspect/collect. Carriage at cost. G8AKX, QTHR.

Yaesu FT290R portable multimode, £190. MMT28/144 2m transverter, £50. Both vgc. Two Lunar 2M10-150P linear pa boards, 25W drive for 300W p.e.p., unused, as received from USA, £65 each. G4IZH, QTHR. Tel 0632 567780.

Standard C7800 10W uhf mobile, £190. IC2E 2m portable, £110. Lunar 2m 80W pre/power amp, £70. All vgc, boxed. G8WVV. Tel Cambridge (0223) 314855, working hours.

FT101ZD, fm, Mk3, fan, mic, 12 months old, this rig offered for exchange: required are KW separates, KW204, KW202, any KW ancillary equipment, must be mint, Daiwa SR9 2m rx, vfo, channels, £35 ono. G4KKG, QTHR. Tel Yeovil (0935) 25327.

TR7010 ssb tx/rx, Trio, 144·1-144·35, 8W, Wood & Douglas preamp, pin diode protection, mic, leads, mobile mount, handbook, orig packing, all good, any demo, £90. Must collect. Tel 01-640 6020.

50Ω carbon resistors, new, suit coaxial construction, 250W, in oil, £18. Scope OS2, sig gen RF1U, handbooks, £20 each. *SWMs* 1958-63, *Radio Communication* 1968-9, hb, £3 each. 1976-81, not hb, £2 each. Prefer buyer collects. G3PVD, QTHR.

Icom IC215, 2m fm tx/rx, 15ch, R0-7, S16, S18-23, manual, etc, £75 ono. Icom IC202S 2m ssb/cw tx/rx, 144·0-144·4, 145·8-146·0MHz, manual, carrying case, orig packing, £100 ono. G4MEE NOT QTHR. Tel Fleet 21176, weekday evenings.

Yaesu FT208R handheld, mint cond, over one year's guarantee left, comp with helical, carrying case, YM24A spkr mic, NC7 base charger, NC9C minicharger, orig packing, £185. Stolle 2050 rotator, brand new cond, £28. G6BBS, QTHR. Tel Cosham 388488, evenings.

Clearance: Amassed remnants, ie Thermionics 6C4X3, E88CC, new, EL91, 12AT7X3, 50p each. Others, books, ARRL *Basic Foundations of OV, Fundamentals,* ARRL, three drills over 1/4in, dummy load, 10W screened, discs, 45rpm. G8BWI, QTHR.

432MHz transverter by QM70, 28MHz input, solidstate 10W rf out, worked FMD Senior award, £40. *RSGB Bulletin, Radio Communication,* 1960-81, most in Easibinders, offers? G3OHC NOT QTHR. Tel 021-352 0199.

Partridge Supermatch Joymatch atu, Joystick vfa, nine months old, perfect cond, accept best cash offer or swap any rx. RS48495. Tel 764 6767, evenings.

IC215 fm 3W, tx/rx, nicads, charger, fitted S20-22, all repeaters, exc portable but surplus to requirements, 50Ω Morganite resistor type 701 dummy load, 50W continuous, 100W ssb, lot, £99. G3AKG, QTHR. Tel Caversham (0734) 476718.

Leicester: corner plot semi, cavity and roof insul, ch, three beds, two fitted robes, corner bath, shower, stone feature fireplace, outbuilding, brick garage, store, shack 13 by 11, masts left if reqd, £21,950. G3ZFQ, QTHR. Tel 0533 864723.

HB; similar to KW Vanguard (Geloso vfo), 2+807s mod, pa, 80-10m, separate power supply for each section, set and supply large. *Wanted:* S-meter for FR100B, good cond. Callers only for tx. G4BWS, QTHR. Tel Orpington 73474.

50ft fixed radio mast, triangular tubular construction, 4ft walk around stage at top, new cond, further details and drawing on request. G8WDH. Tel Hungarton 310, after 6pm.

Yaesu FT225RD, £525 ono. Icom IC255E, £210 ono. Trio TR2300, £130 ono. All comp and as new, in orig boxes, AKG D900E rifle mic with comp set of accessories, £150 ono. G8YUR. Tel 01-804 0734.

Sig gen, Marconi TF995A/5, covers 1·5-220MHz a.m./fm, £95. Transistor tester CT537, £30. Megger electronic, £30. Buyer collects. 38 Nelson Street, Rosyth, Fife. Tel 0383 413723.

Icom IC260E 2m multimode, £295. 5/8 whip (2m), magmount, £9. Stereo cassette deck, Dolby, memory, £25. G4FRO, QTHR. Tel Pilning (Bristol) 3422.

Yaesu FT290R, multimode portable, together with FL2010 10W linear, MMB11 mobile bracket, carrying case, all boxed, nearly new, £280. Yaesu SC1 station console for FT480R and 780R, psu, lcd, clock, tone encoder etc, £95. G6FKG. Tel Herne Bay 64054, evenings/weekends/daytime Ansaphone.

Eddystone 888A ham bands rx, vgc, prof maintained, revalved, spare valves, manual, £70 cash. Buyers collect. J. Wharton, RS48139, 24 Lindale Gardens, South Shore, Blackpool FY4 3PG. Tel Blackpool (0253) 402824.

CW receive program for ms, up to 1,000wpm, machine code, OK any Z80 micro eg, ZX81, TRS80, records in memory, instantly finds any burst, replays at desired speed, listing with circuits for interface, £2. G4IDE, QTHR. Tel Wolverhampton 781760.

BC348O rx, fair cond, no mods, T47/ART13 tx, comp, similar cond, £60 pair. Would consider split. *Wanted:* Circuit diagram Collins 180L2 ant tuner. G6BTO, QTHR. Tel 0342 832646, office, 0342 810226, home, after 6.30pm.

ATU SSTT4, rated 300W, three ant sockets, incl wire posn meter, fwd/refl power, £20 ono. Consider swop for twin swr/pwr meter, similar Hansen SWR50B. Vols

1 and 2 *Admiralty WT* handbooks, fb cond, 1947, offers? G4KGT, QTHR. Tel 01-920 8142, business.

FRG7700, cond as new, £260, or will exchange for FT200 and digital frequency meter. Keith Dickens, 26 Knaves Castle Avenue, Brownhills, Walsall, West Midlands. Tel Brownhills 376366, evenings, weekends.

1155A, rx 80, 40, 20 with psu, £25. 1155L, rx 160, 80, 40, 20 psu reqd (seen wkg), £15. 62 set tx/rx, 1·6-10MHz a.m./cw, psu reqd (seen wkg), £15. DX40 tx, 80-10, a.m./cw good wkg order, £45. BC221 freq meter, £10. Buyers inspect/collect, or carriage extra. G4EHT, QTHR, Lichfield, Staffs.

Trio 2200GX, nicads, charger, case, helical telescopic, handbook, five simplex, seven repeater, good wkg order, £80. Tel Newby Bridge (Cumbria) (0448) 31344, after 7pm.

TRS80 computer, 16k, level 2 software, books, etc, £230. Catronics CT600 rtty system for above computer, boxed, leads, etc, £99. Icom IC211E 2m multimode, RM3 remote controller, £290. All exc wkg cond. G8TQO, QTHR. Tel Hastings 457513, evenings.

Radio Communication from June 1980 to May 1982 inclusive, exc cond, bargain at £10 ono. Fold-down pram, bargain, £10 ono. Tel 01-472 7272.

FT101Z, 2yr old, immac cond, fan, mic, orig packing, used little, going mobile, £400, or exchange TS130S in similar cond. No rubbish please. G4JGT, QTHR. Tel 0326 313688, evenings.

Hygain rotator, controller, 120ft coaxial etc, in nose cone, Swan Hornet 4-el beam, damaged but repairable, £45. Set of 20 TR4C valves, mostly new, incl six pas, £18. *Wanted:* Atlas 210/15. G3JTY, QTHR. Tel 0202-622 142.

Yaesu FT301SD 160-10m, 10W, digital, used very little, £350. MCR1, comp, £20. R1155A, unmod, £30. T1154, £15. SX28, £30. BC728C, comp, £25. 7/APNI radio alt, indicator, switch, TR1143A, good cond, £35. G3GMW, QTHR. Tel Peterborough 67741.

FT101ZD, new bands, mic, fan, spare driver, pa valves, mint, £450. Buyer collect or arrange carriage. G4HZD, QTHR. Tel 0905 426323, office hours.

Trio TS180, WARC bands, two ssb filters, narrow cw filter, rec service, £550. Trio PS30, £60. Trio VFO180, £60. All three, £650 plus carr. Paul Barker, G4HPS, QTHR. Tel Sunderland 226883.

Magazine clearance: 1954-71 *Radio Constructor, Practical Wireless, Practical Television,* mostly complete volumes, at £2. Stamp collection disposal: mainly GB and Commonwealth, George 6, fraction of catalogue prices, some Victorian, request lists either item, sae please. G3YOG, 19 Hatters Lane, Berwick-on-Tweed.

FT227RB, handbook etc, £130. FRG7, £140. MMC144/28 converter, £15. PF1 Pocketphones for 70cm conversion, £15. PF2UB, £35. Starphone SF1, £30. G6FCP. Tel 0472 813450.

Yaesu FT107M, WARC, DMS, internal psu, no fsk but fm, squelch modification fitted, matching beige atu FC107, WARC, eight months old, cost new £1,000, accept £700. Tel Mike Curtis, 01-445 2091, evenings.

FT480R, brand new, used only few times, packing, manual, etc, £300 ono. ASCII ASR33 teletype, 110 baud, paper tape punch/reader stand, £90. DAI colour computer, new, unused, 48k, £400. Tel Great Wenham (Suffolk) 311665, after 8pm.

KW204 tx, £160 ono. 1kW hf linear, atu, £120 ono. IC22A, £110 ono. Heathkit RA1 rx, £35 ono. MM atv converter, £25. BC221 frequency meter, £20. Many other items, mainly homebrew. Tel Winkfield Row (Berkshire) 2260.

KDK2025 Mk2, as new, still under guarantee, £140 ono. Collins 46159 rx, £30 ono. G4LDT, QTHR. Tel 0632 551045.

KW2000B ac psu, dc psu, manual, good cond, £200 ono. FT202 6ch handheld, helical, case, manual, charger, some extra xtals, £85 ono. *Wanted:* TS120 or similar hf mobile rig. G4MMI, G8TYW, QTHR. Tel 0273 833559 (Sussex).

Drake TR4C tx/rx, 300W p.e.p., AC4 power supply, RV4C remote vfo, all good cond, unmodified, £380. Drake 1·5, 6MHz, filters for R4C, £24 each. Cameras and photographic equipment. Tel for list. G4LW, QTHR. Tel Trowbridge (Wilts) 3166.

HW8 15-80m QRP cw tx/rx, great results using indoor dipole, prefer 2m meteor scatter so open to offers, or exchange for ETM4C keyer or Heathkit SA5010. GM4CXM, QTHR. Tel 041-942 6657.

FT75, FV50B vfo, ac and dc psus, £125. ICI keyboard, full qwerty, numeric and func pads, no information, £15. D. A. Davies. Tel 0248 600949.

Pair of FT202R handheld 6ch tx/rxs, fitted S20-22, toneburst switch, nicads, flexi antenna, £80 each (incl post) or both together, £75 each. Tel Thursford (032877) 423.

Tandy rotator, comp, fair cond, buyer collects, £30. Tel 051-648 4189.

Pair Pye Pocketfones, PF1, wkg on RB4, toneburst, new nicads, hb constant current charger, circuit diagrams etc, £30. STE Arac 102, 144MHz/28MHz, all mode rx, matching psu/spkr, £60. G8PQG, QTHR. Tel Dave, Oxford (0865) 67165, evenings and weekends.

Trio/Kenwood TS530S, MC30S mic, workshop manual, four months old, in perfect cond, this is the tx/rx used for my review in July *Practical Wireless*, £495. G3KLF. Tel Fareham 236906, weekends or evenings only please.

Yaesu FT201 hf tx/rx, orig packing, manual, 80-10m, 100W output, fan, mains, 12V built-in, ssb, cw, a.m., fm, £320. G4FBA NOT QTHR. Tel Pontefract (0977) 701622.

Lowe SRX30 gen cov rx, mint cond, reason for sale now lucky owner of FT1, £100. G4FTO, QTHR. Tel 0326 74469, evenings, after 8pm weekends.

Pye Cambridge AM10D, 6ch, converted to fm, xtalled on R6, S22, £45. SMC 78F 2m antenna, two low band Cambridge AM10Ds for spares/repair. Buyer collects. 38 Nelson Street, Rosyth, Fife. Tel 0383 413723.

Creed 75RPK teleprinter, cond good, manual, £35. Creed 6S6 auto tx, £5. CV89 tu, manual, £15. Catronics tu, ST5 rx, only £35. Scott, 38 The Gardens, Whitley Bay. Tel 0632 527141.

MM2000 rtty to tv converter, bargain at £120. LAR vhf omni-match, as new, £20. G6ADC, QTHR. Tel Coventry (0203) 412201.

Mosley A215 2-el beam, 10/15m, never assembled, list £86, accept £45. Regretful clearance of magazines but urgently need space: *Radio Communication,* 1969-80, *SWMs,* 1960-81, *Practical Wireless,* 1961-80, offers? Buyer collects. G3NJP, QTHR. Tel Cranbrook (0580) 714482.

TR9000, mint cond, orig packing, mobile mount, £310 ono. G4MFK, QTHR. Tel Evesham 831010.

Custom-built teak louvre-fronted floor-standing cabinet containing television, 22in colour tv, fully assembled but unaligned, all relevant magazines, £300. Tel Cambridge 843771.

FRG7, mint cond, no mods, £110. Buyer collects. Reason for sale gone G4. Tel Chipping Sodbury (Bristol) 318528.

IC202E 2m ssb MML144/25 16-el Tonna, all in good cond, £220. *Wanted:* FT101, FT200, W.H.Y? Going hf. G8MGT. Tel Mark, Leeds 892852.

FDK Multi 700EX, 12 months old, vgc, all comp, no mods, £150. ZX81 computer, only two months old, still under guarantee, vgc, all comp, £55. No offers. G4AQV. Tel Leicester 552809, after 5pm, any day.

Extel AB31 receive only electronic teleprinter, two speeds, £195. G8MPG, QTHR. Tel 025-481 3182.

IC2E, 10MHz coverage, incl HM9 hand mic, BP3 9V, BP4 7·5V, homebrew 12V converter (BP4), mains charger, λ/4 helical, two cases, exc unmarked cond, orig packing, cost today over £200, will accept £150. G6BJA. Tel Andy, 0226 82290, day, 41943, evenings.

National NCX5 tx/rx, 3·5 to 30MHz, good mechanical cond, requires alignment, psu components, some spare valves (incl pa), spare NCX5 cabinet, £85. Desk mic, 50k, £3. Carriage extra. GM8FM, QTHR. Tel 031-339 4125.

Yaesu FRG7, exc cond, fine tune, unmodded, £125 ono. G3UZI, QTHR. Tel Horsham (0403) 66327.

TS770E, two years old, used very little, immac, £500 ono. Lentek moving coil phono cartridge preamp, perfect, £20. G8AFA, 2 Eastlands, Yetminster, Sherborne, Dorset. Tel 0935 872011, evenings/weekends.

Icom IC290E, brand new, in orig wrap, scanning mic, £315 incl Securicor delivery. GW4ACO, QTHR. Tel 0492 55240.

ZX81 personal computer, power supply, as new, £45. Thurnall interface, connects ZX81 to tx/rx, extra connector, £10. Books for Sinclair: *ZX81 programming for real applications,* £4.50; *Hints and tips for the ZX81,* £3.50. G4DIB, QTHR. Tel 01-467 9033, evenings.

B40D rx, £50. 1475 rx, £35. LF freq counter for spares, all valve, £9. Solartron scope for spares or repair, £10. KW Viceroy, vgc, £45. All above wkg. G3JTU. Tel 03272 2909, after 6pm.

Trio 7200S, mobile, fitted all repeaters, S8, S14, S19-23, 10W, 1W, can be fitted with plug-in vfo for full coverage. G6EWZ. Tel Coventry 454539.

Creed 7B, £25. 54 reader psu, £25. BC454, £5. Type 1475, £20. HRO, £20. CT84, £20. Vanguard 2m tx/rx, £30. Other items. Most require attention, prices negotiable. Tel Bedford (0234) 52720.

Pye vhf base station: PTC 2701/2 tx/rx, cabinet, £15. Valve bfo, 0-10kHz, £10. VHF tv pattern generator, £5. Valves: GU50, U18/20, 5R4GY, VR150/30, EL38, lots more, all new, boxed, many secondhand, offers? Tel Mark, Atherstone (Warks) 3874.

KP202 6ch portable, nicads, charger, case, λ/4 whip, R6, S16, S20, S22, £80 ono. λ/2 mobile whip, gutter mount, £10 ono. Both above, £80 ono. Microwave Modules converters, 70cm-2m, 2m-hf, 2m preamp, all in case, homebrew psu, £50 ono. G6EDS NOT QTHR. Tel Flitwick 712743.

TR7730, 2m fm, good reason for sale, eight months old, carriage arranged with sale, £190. GM8XZY, QTHR. Tel 03335 608.

Standard C8800 2m mobile, 15W out, five memories, autoscan, 5/25kHz channel spacing, 144/146MHz, vgc, orig packing, £175. G4HHA, QTHR. Tel 0473 79935.

Kenwood TS120S, MC35, £330 or with PS30, £395. G2VJ, QTHR. Tel 021-706 0744.

TR2300, nicads, charger, boxed, £130. Icom IC202S incl Oscar xtal, £125. MML144/25 linear, boxed, £35. ZX80, £30. *Wanted:* TS520. G8ONN, QTHR. Tel Exeter 66830.

Semi-detached dorma bungalow, three beds, full gas central heating, garage, planning permission for 60ft tower, £19,000. Please tel for more details. L. J. Stubbs, 96 Coleridge Way, Crewe, Cheshire. Tel 0270 581657, after 6pm.

P60 Versatower, £250. Two 16-el Tonnas, phasing harness, six months old, £60. MM 2m transverter, as new, £70. Sota 100WT linear, £70. Homebrew 13·8V 12A psu, £20. G4DBX, QTHR. Tel 0270 581657.

KW Supermatch atu, perfect, £100. G3WWO, QTHR. Tel Smallburgh 745, evenings after 7pm.

SEM Tranzmatch tuner, 160-10m, Ezitune built-in, very versatile, can cure tvi both ways, £45. FRT7700 atu, exc performer, £25. Both items under six months old. Tel 05086 2923.

Trio 520SE, mic, 18 months old, mint, used only as second rig, super job, tunes on any band in 30s, orig packing, £375 ono. 8XY beam, PMC, PM2C harness, as new, £20. G5FH, QTHR. Tel 04252 5974, evenings.

Daiwa CN620A, 1·8-150MHz, swr, power meter, three ranges, 20W, 200W, 1kW, as new, £40. MMA144V 144MHz rf switched preamp, £25. 144MHz pa, 10W in, 40W out, £25. G6ABT, QTHR. Tel Abingdon (0235) 23034, after 6pm.

FT208, mint, still under guarantee, cw charger, spare batt, £185. Pye Cambridge 6ch, fitted R3, S20-21, vgc, handbook, £55. Need QRK for hf gear! Inspect/collect or will deliver 25 mile radius. G4IYQ, QTHR. Tel Brighton (0273) 415291.

TA33, good wkg order, £50 ovno. Alan Gray, G4DJX, QTHR. Tel St Albans 54190, after 6pm.

FDK Palm 4 70cm handheld, nicads, charger, in orig packing, fitted 6ch, £90 plus carr. G8NRJ, 122 Stradbroke Road, Lowestoft, Suffolk. Tel Andrew, 0502 4122.

Racal RA117E, late model, offers, or exchange station monitor ext vfo, hf linear, or transverter suitable TS820, TS830S series or 2m rig. W.H.Y? Anything considered. GW3VVC, QTHR. Tel 0248 714655.

FT101B tx/rx, comp leads, mic, etc, £299. Prefer buyer to collect but Securicor possible. SEM 70cm preamp, £8. Poulter, G3WHK, QTHR. Tel 01-330 5795, after 6pm.

56 range avo electronic testmeter, seven-band avo oscillator, 95kHz-80MHz, GEC miniscope oscilloscope, case, 6V dc or 250V ac, timebase 30Hz-80kHz, sig amplifier, all with manuals. IEE journals 1959-82, valves in boxes. State wants. Offers? Tel Luton 29470.

KW2000E, psu, Shure desk mic, £250. G4LVI, 39 Sandy Lane, Stretford, Manchester M32 9DB. Tel 061-865 2535.

HQ1 and mast, moving to London flat so selling HQ1 hybrid beam antenna, 3·5-28MHz, £75. Sturdy 2-sect aluminium tubular mast, 34ft, £55. Both nine months old. G4LFH, QTHR. Tel Dursley (S Glos) (0453) 3359.

Sony CRF320 professional rx, as new, few months old, applied for G4, quick no haggle sale, £450 or straight swop for FT101ZD. G8YGU, QTHR. Tel 0642-211685.

IC2E, boxed, comp as new, incl/M converter, £110. Datong FL1 audio filter, exc cond, £35. MM 432MHz varactor tripler, £12. G8SAF, QTHR. Tel 0723 581052.

TS770E dual band multimode, 10W out, all modes on both bands 2m-70cm. Reverse repeater mod, can be changed if required, £575. G4BIA, QTHR. Tel 0580 892026.

TS820, £425. KW2000A, £160. KW107, £60. CD1400 scope, £75. MM432/144R transverter, £110. 18-el Parabeam, £10. TR2300, psu, £155. MM4000 rtty trans, kb, £240. Advance sig gen, 150kHz-220MHz, £30. Buyer collects or carr extra. Thompson, G3WQM, QTHR. Tel 0904 793672.

Yaesu FT221RD 2m multimode tx/rx, YC221 display, mic, £350. FC707 atu, £70. FV707 digital vfo, £130. SP901 spkr, £20. Datong FL2, £60. Daiwa 1001 auto atu, £100. All items mint. Collect or carriage extra. G4IOT, QTHR. Tel Folkestone 76063.

Xtals, xtals, xtals: large quantity HC25U 30-44MHz, £1 each. Receive for Multi U11 repeater channels, incl RB11, RB13, RB15, input channels, £1.50 plus p&p. 1MHz, marine model control, HC6U etc. SAE for lists. G4JUK. Tel Cheslyn Hay (0922) 415374.

100 radio books incl *Radio Constructor* 1947-69, *Practical Wireless* 1950-80, *Short Wave* 1947-70, also No1, 1937. *RSGB Bulletin* and *Radio Communication* 1947-current issue. Eastwood, G4GS, 2 Manley Road, Oldham, Lancs. Tel 061-624 1956.

FT101E, cw filter, db mixer, £370. NAG 2m linear, 400W, new pa valve, £350. MMF432/28S transverter, £95. CBM 2040 floppy disc unit, £370. Any offers

considered—some more than others! G4IGZ,QTHR. Tel 0282 697511, weekdays, 9-5pm.

KDK FM2015R 144MHz mobile, four memories, scanning, 15W and 1W, £135. G3XNH, QTHR. Tel Godalming 29757.

Standard C8800, 2m transceiver, mobile bracket, £170. G4HLT. Tel Mike, Beaconsfield 6094.

ZX81, Sinclair built, 32k ram, incl psu, all leads, manual, book, software worth over £30 incl chess, all for £98. G4LCV, QTHR. Tel Brighton (0273) 605704, evenings/weekends.

Mosley Elan 3-el 10/15m beam, £65 ono. G3SJH, 9 St Peter's Road, Birmingham 17. Tel 021-427 1115.

Homebrewers' bargains! Valves: 813s, £5. Bases, £1. 832As, £5. Bases, £1. 6146s, £3. 2×6JS6C, matched pair, £7.50. 12BY7A, £2. PL509s, £2. 2×PT15 (for T1154 tx), £10. Transformers: 275-0-275V 150mA 5V/3A, 6·3V/5A, £3. 350-0-350V, 160mA, 5V/3A, 6·3V/3A, 6·3V/3A, 6·3V/8A, £5. 400-0-400V, 150mA, 6·3V/2·5A, 6·3V/4A, £5. 500-0-500V (current unknown but huge), 5·25V/6A, £5. 1,650-0-1,650V 180mA, £6. 6·3V/8A, £4. 0-12-15-20-24-30V, 1A, £2. 0-19-25-33-40-50V, 2A, £4. Ditto 4A, £5. Meters: Various types, eg 50μA, 1mA, 50mA, 100mA, 150mA, 300mA, 1A, 3·5A rf, 5A rf, 750V, S-meter, 300V ac, 50A ac, prices £1-3. Variable capacitors, wide-spaced: 150pF, £3. 2 by 200pF, ganged, £5. 2 by 100pF, differential, £3. Antenna wire, 140ft, hd copper, 14swg, £5. All items new or vgc. G4GXM, QTHR. Tel for further details, Hitchin 53001.

KW2000E, £195. KW1000 linear, £175. KW100 Q-mult, £15. KW103 meter, £15. KW spkr, £10. Trio TS2300, £130. QM70 2m linear, £45. Frequency meter TS174U (sim BC221), £25. Shack clearance G2DWI (silent key), buyers collect. G2FXO, QTHR. Tel Bristol 621073.

Shibaden SV700 video tape recorder, £75. IC215 2m tx/rx, 3W, 15ch, xtalled 8ch, C nicads, £99. Pye W15FM, 10ch, xtalled on R7, £79. SF1, nicad, xtalled SU8, £40. Storno 500 lb, £35. G4JUK, QTHR. Tel Cheslyn Hay (0922) 415374.

10A 13·8V Phihong regulated psu, £35. 20A ex-computer psu, 13.8V, comp, £25. GEC RC650M a.m. hi-band 6ch boot mount mobile tx/rx, comp with spkr, mic, control box, cable, £25. G8YBD, QTHR. Tel 0706 67153.

880/2 Eddystone, 30 band high grade comm rx, just revalved and re-aligned, £350, or exchange for 100MHz dual trace scope or decent rf/af sig gen, or Bird Termaline wattmeter. B. Glynn, 46 Alexander Park Road, Muswell Hill, London N10.

Eddystone 840C gen cov rx, £55. Good cond Liner 2 ssb tx/rx, matching mains power supply, £100. G4ITS, QTHR. Tel Gloucester 67725, evening or weekends.

Collectors' items: Osram Music Magnet 4. Philips 634A 1933 "Super Inductance", Stentorian Junior loudspkr, Ekco radio U49 (1940), Philips 580A (1935), AYF radio altimeter, indicator, limit sw, test set 16 for above, some plugs, cables. Comp clearance. Going overseas permanently, offers. G8AXC, QTHR.

TR9000 multimode tx/rx, SP120 spkr, B09 base system, PS20 power supply, headphones, orig packing, literature, £325. Tel 0633 614034.

PET computer morse send or receive programs, £5 each. *Wanted:* HF lo-pass filter. MSF clock. FV901DM. SP901. FT901 a.m. filter. Thruline elements 250H, 250C, 25C. Microscope slides, accessories etc. Fax receiving equipment. Info Burroughs 2000 punch type 560. G3AZI, QTHR. Tel Preston (0772) 37815.

TS830S, 16 months old, in exc cond, YK88C, filter option fitted, comp with service manual, MC30S mic, £600 ono. G4CEB, QTHR. Tel Reading 415725, evenings and weekends.

Icom IC202 2m ssb tx/rx, good cond, handbook, orig packing, £95. Teletype ASR33 terminal, comp with floor stand, incl ASCII keyboard, printer, 110 baud, RS232 interface, good cond, prefer buyer arranges collection of this item, £95. G8PNX, QTHR. Tel 0742 745850.

Unfinished Maplin vdu board, all major chips, 4116 rams for 16-page memory, uhf output, choice of baud rates etc, £25. Several keyboards, ASCII, serial and parallel outputs, sae for details. Mike Ganley, 4 Walnut Grove, Trowbridge, Wilts BA14 0HR.

Dentron MLA2500 linear, £550. TS130S, £385. 25A hd 12V regulated pu, £55. All in new cond. Will consider 830S in part exchange. G4DRF. Tel 0526 52965.

MMT 1,296/144 transverter, £140. 23cm 27-el quad loop antennas, £14. Power dividers, £10. 23cm high-Q break, £2. MMT 70/144 transverter, £80. MML 100W 4m linear, £85. All exc cond. New teleprinter rolls, £1, £1.50, £2 each. G4ERX, QTHR. Tel 0277 225736.

Atlas 210X, as new, £220. Trio TS700, vgc, £185. Unused Mullard L454 amp, 23-60MHz, continuous pi-tune, three 4-125As in final, £50. Two ex-equipment 4CX250Bs, new boxed valveholders, £10 each. G3LBG, QTHR. Tel 0702 521561.

IC255, 18 months old, exc cond, used daily, fault free history, £170. G8VHL, QTHR. Tel Goole (0405) 69130, after 7pm.

Complete station: suit new G4, FR400SDX, FL400, SP400, all cables, spare valves, in orig packing, exc cond, £275 ono. Heath counter IM4100, factory calibrated, price today over £150, sell for £80 ono. GM4EVK, QTHR. Tel 0505 690712.

Magnum rf speech processor, matching Drake 3-4 series of FT101, 15 page manual, £25. 101Z a.m. board, new, £5. G4ISB, QTHR. Tel 061-766 5265.

Shack clearout: Heath frequency counter IM4100, incl period, freq, events, factory calibrated, cost today over £150, sell for £80. FR400SDX, FC400, SP400, abolutely mint, spare valves, cables, orig packing, £275. GM4EVK, QTHR. Tel 0505 690712.

Any collectors interested? Rebuilt Hallicrafters SX28, most spare valves. Philips 660 m/l/sw rx, about 1937, both wkg, offers. Pollitt. Tel 0322 864157.

TS130S, VFO120, PS30, cw and ssb filters, £520. G3REO, QTHR. Tel Coniston 329.

FR400SDX, FL400, SP400, comp station, all cables, spare valves, incl finals, in orig boxes, manuals, immac cond, in daily use, no mods, offers around £275. Carriage extra. GM4EVK, QTHR. Tel 0505 690712.

RTTY video system tx/rx, HBR Electronics, £150. Homebrew 2m tx/rx, 6ch fm, £60. Adonis mobile mic, £10. G-whip multi-mobile, 80, 20, 15, 10m, never mobile, £25. MM dfm, 500MHz, £50. G4EMV NOT QTHR. Tel Peter, Bagshot (0276) 75928.

Xtals: HC6U, 1·75, 1·93, 3·276, 4·194, 8·042, 8·054, 9·447, 10·0, 10·023, 10·024, 10·619, 11·155, 12·133, 12·2, 12·5, 14·2, 24·258, 44·7666, HC25U, 9·095, 10·619, 38·603, 75p. 10kHz, 100kHz, glass, £1.25. Cathodean 9MHz ssb filter, £8. G8HIO, 57 Westmead, Woking GU21 3BS.

Wood & Douglas 6ch 10W 70cm fixed/mobile, in 6·5 by 4·5 by 2·5in diecast box, 5ch fitted, well-built, looks good, works well, £120 ono. G4EAB. Tel Teesside (0642) 581035.

Collector's item: ex-WD tx/rx WSC12, 24V psu, all cables, mic, headset, wkg order, in orig unmodified cond, £25. *Wanted:* Handbook for Eddystone 358X rx. G4MNB, ex-G8IHY, QTHR. Tel 0793 826325, evenings and weekends.

Icom IC22A 2m fm tx/rx, 10W, all repeaters, eight simplex, £95. Prefer buyer collects. G4BWW, QTHR. Tel Southport (0704) 29036.

CW keyboard (proper keyboard, not membrane type), homebrew from *QST* magazine, professional finish, £40. Creed 7BRP, surplus to requirements, room needed, £20, or swap w.h.y? *Wanted:* cross monitor for rtty or crt DH391, ICP1 tube. G4KDZ, QTHR. Tel 0375 78783.

IC240 2m fm synthesized, good cond, incl power lead, mic, manual, bracket, orig packing, £120 ono. Codar RQ10X Q-multiplier/filter, int psu, 455 i.f., suit KW, £5. 2114L, 450ns, 55p. G8HIO, 57 Westmead, Woking, Surrey GU21 3BS. Tel 04862 20435, anytime.

Trio TR2300, nicads, charger, boxed, as new, £130. Collins 75A4 mech filters, F455JOS/15, offers. *Wanted:* Collins 51J4 mech filters F500B 14/31. G3UFI. Tel Peter, Hastings (0424) 753949, evenings and weekends.

FDK Multi 700E, reasonable cond, new pa module, fitted 18 months ago, mobile mounting bracket incl, no mods, unboxed, £100 ono. G8TVV, QTHR. Tel Gosforth (0632) 842495.

Triband beam, DX33, 2kW rating by Western Electronics, incl BL86 balun, £60. 18V 20A 240V primary transformer, unused, ideal low voltage high amp power supply, £12. Both items buyer collect or arrange transport. G3DOG, QTHR. Tel Walton-on-Thames 26076.

ZX81, 16k ram, psu, manual, cassette recorder, will exchange for 2m or 70cm amp. Tel Whitehaven 61389.

HW8, recently serviced by Heath UK, £95, no offers. Buyer arranges collection. G4ERT, QTHR.

Exceptional example G2DAF rx, cw filter, msf, £100 ono. G4MWN. Tel Melton Mowbray 64678.

TR7010 2m ssb/cw tx/rx, orig packing, handbook, mobile mount, accessories, extra xtals, never used mobile, no mods, vgc, offers over £100. G4EUE, QTHR. Tel Atherstone 66386, evenings and weekends.

KW2000, 10-160m, good cond, wkg order, recently serviced, comp with ac/dc power supply, mic, genuine reason for sale. G4NRI. Tel 0203 312889.

WANTED

Good price paid for copy of *Antenna Theory and Design* vol 2, by H.P. Williams, G6GED, Beaumont Road, St Judes, Plymouth PL4 9EB. Tel 0752 25508.

128 set, comp, sack phones, key, etc, wkg. G4KJJ, QTHR. Tel Wilmslow 531058.

FR50B, Heathkit HR10B, RA1. Eddystone slow motion dial assembly. Can collect 100 mile radius Manchester. Tel Brian, 061-794 4423.

For the Wireless Museum: radio books, magazines, catalogues, QSL cards, Gamages catalogue, morse keys, components, any old knobs! 150 mile xtal set. Collection arranged, Details please to hon sec G3KPO, QTHR. Tel Ryde 62513.

FL2100Z, nine bands, G3NQX. Tel Kendal (0539) 28166.

Xtals about 24·03MHz. Prefer HC18/U or HC25/U. G8JAI, QTHR.

Buy/borrow for copying: workshop manual for FDK Multi 11. J.B. O'Kane, 1 Whinfield Road, Prestwick KA9 2BQ.

AR88D, good cond, with ls, very fair price paid for exc rx. Will collect mid-southern England. G8BU, QTHR. Tel Fordingbridge (0525) 53883, evenings.

Eddystone EC10 alignment instruction. 9J2BO, Box 98, Kazembe, Zambia.

AR40 rotator and controller, in good order. G3CPM, QTHR. Tel 0386 852753.

Help required for an RAIBC member. Amateur/radio electronics magazines, USA or British, for building and constant reading, will pay postal costs, unable to collect as housebound. Write anytime, even months later. P.J. Turner, 51 Weyland Road, Witnesham, Ipswich, Suffolk.

FT75 vfo, any cond, cash waiting. Good price for decent unit. Three wanted. Brass cw keys, heavy types preferred, cash waiting. G4IZW, QTHR. Tel 0632-678828, anytime.

Circuit diagrams and/or any other information on Eddystone 870A rx and Codar RQ10 multiplier, all postage and copying costs refunded. Mersereau, Crucible Theatre, Sheffield. Tel 0742 760621.

Morse key. Second advert. Has no-one got a good key for sale? Solid brass type, Marconi, BPO, Navy, W.H.Y? Must be in first class cond. G3SIH, QTHR. Tel Melksham (0225) 703443.

Marconi TF995/A2 sig gen. Good price paid for suitable unit. GW4BCF, QTHR.

2m transistor linear, 2W in, 10W out, for 12V operation, or circuit diagrams. Circuits for 70 and 23cm rx, tx. Information or diagrams for parabolic dishes and waveguides. Will pay photocopies, postage. G. Obree, GM6GPK, 77 Loudoun Road, Newmilns, Ayrshire KA16 9HQ.

Manual/circuit for oscilloscope AP68622, miniature CT52, serial No ML400/1953 to buy or borrow please. G4KQB, QTHR. Tel Ipswich 75316.

Set of glass fibre spreaders for boomless quad. GW3VLU, QTHR. Tel 0222 707257.

Harvey Wells Bandmaster, and Johnson Adventurer or Navigator. G6AB, 44 Preston Road, Holland-on-Sea CO15 5JX.

Teleprinter for morse to connect to Trio 9R59DS, receiver price please. Secondhand teleprinter for new swl, Cash or exchange teleprinter for darkroom gear plus camera, 135mm lens. N. Beadsworth, RS49461, 2 Lapwing Way, Clooney Estate, Waterside, Londonderry, N Ireland. Tel 46871, anytime.

FRG7 for elderly keen swl listener, will collect in Cambs area. G4NBU. Tel Winchester 69155, evenings.

TenTec Century 21 cw tx/rx. Would consider any other hf single or multiband cw tx/rx, medium power. G3JIC, QTHR.

Meter, 500 microamp (or less), state size/shape. *For sale:* mains transformers, meters, state wants. Parker, 133 Station Road, Cropston, Leicester LE7 7HH.

Still trying to get information on the ATAL 228 2m tx (manufactured by STE Milan approx 1977). Copy of manual required urgently (or photocopy), will reimburse any expenses. Phil Marshall, G8GWH, QTHR. Tel Bristol 47057.

FC901 or FC902. Phones YH77. Mini beam or components. G4LJO, QTHR. Tel 0934 732345.

Suitcase or miniature tx/rxs; any spares, incomplete or damaged sets. WS62 with transistorized psu, WS (Canadian) No 29 connecting leads, etc. Army tx No 53. Any commercial/military mains a.m. fone tx or tx/rx. Taylor, G3UCT, QTHR. Tel Fleet (02514) 6998.

Info and mods for KW2000E, KW202, KW204, in good cond. EA3BKZ, Salvador Caballe Micola, Roca i Roca No 69, Terrassa, Barcelona, Spain.

Avo type 3 sig gen, manual or circuit. Will return after photocopy. G4BUP, QTHR.

Tubular ferrite rod, 0·25-0·5in internal diameter. G3IPV, QTHR.

Bearcat BC250FB or BC220FB rx. Reasonable price. Will collect. Tel Greg, Walsall 648401.

Belcom FS1007P, the one in the wooden box, 16CHA scanning tx/rx, must be orig first class cond, no rust, please phone, equipment may be faulty, but mechanically 100 per cent. Ask for John, G8BIH, Alton (0420) 82739, evenings or weekends.

Pair Brown's Type A headphones. Vintage radio etc. G3AOS, QTHR. Tel 061-980 2415.

Hallicrafters linear amplifier model HT41, manual, buy or borrow, info (or spare if available) on 7094 pa bottle used in this equipment. GI3UVX, QTHR. Tel Larne (County Antrim) 6220, evenings.

Desperately needed! Can some kind soul find a conversion kit for Racal RA17 rx vfo, as furnished with new RA66 visual display unit? I will make it worth your

while. John Knight, W6YY, Box 3, La Canada, California, USA 91011.
Early QSL cards still needed for research, most pre-1930 and all pre-1925 especially wanted. Send for appraisal. All postage refunded. No dirty, torn, or bent cards please. All Antarctica QSL cards welcome. G3BDQ, Whitefriars, Friar's Hill, Guestling, Hastings TN35 4EP.
DX60B, HW16, Sphinx LG300RF, BC453/458 HRO, S640 Commander Hambander, SP400, HQ140X, AR77E, S27/36A, SX28A, 9MHz ssb filter MF455-10CK. *SWM/Bulletins/PW/QST*, 1937-41. *For sale or exch:* FT480R for good scope, af/rf sig gen or w.h.y? G3ICH, QTHR. Tel 0823 680234.
Q-multiplier, i.f. 475kHz, G2BVN valve circuitry using Electronique potted coils. Muirhead slow motion dial, as fitted wavemeter W1646, or of larger diameter. G4EJT, QTHR. Tel Great Missenden (02406) 4694.
Drake MS4 ext loudspkr or Yaesu SP120 or similar. Tel Cushing (05086) 2923.
Manual and/or circuit diagram for Tektronix oscilloscope. type 515A. Price etc to W.H. Facey, 40 Newton Road, Bideford, Devon EX39 2LL.
Mk214 tx, info required. RTTY suitable for hf. Details to G4HVK, QTHR. Tel 021-353 3896.
455kHz Q-mult, plus details of any/all mods on Trio 9R59DS. Graham Parry, BRS50834. Tel 01-864 7762.
Components for G3ZPB SL1600 multimode tx/rx (*Radio Communication* Oct 1977) or part-built pcb. *For sale: SWM* Jan 1960-Dec 1962, *Radio Communication* July 1959-June 1967, £3 per year plus p&p. G3LMP, QTHR. Tel St Albans 60809.
Handbook or circuit for tech model TE65 vvm. Can anyone help please? Expenses refunded. G3PEK, QTHR. Tel 0244 300897.
Trio 2200 or 2200GX, external cond immaterial as long as electronics comp and wkg. Damaged facia acceptable. No accessories or mic required. Consideration given to similar rig from other manufacturer. W.H.Y? Please phone with details. GM3WCS, QTHR. Tel 0383 26456.
HF cw/ssb tx/rx or tx, eg KW2000, KW204, KW Viceroy or w.h.y? Anything moderately priced considered. Can collect in area. G4JUC. Tel 01-777 3379.
Tower for expanding antenna farm, any type considered, have transport, have cash, any distance considered. GM8DMZ, QTHR. Tel Ayr 53225.
Codar AT5 tx, matching ac psu, in mint cond, perfect working order, no mods, or possibly KW160 tx in similar cond. Top price paid for a good rig. Details to N. Richardson, 2 Edna Road, Maidstone, Kent ME14 2QJ.
Transformer, 1,500-0-1,500V at 1A or anything that will give about 2000V dc at 800mA-1A when rectified, for QRO linear. GM3WCS, QTHR. Tel 0383 26456.
Preselector, Codar PR40. MPP tripod. G8WAS. Tel Romford 42309.
14-el 2m Parabeam. TH5 or TH6 similar. Transformer 7·5V, 21A ct, ht transformer, 1,700V)0·5A. VAC cap variable, 10-300pF, 10kV. 6502, 32k dynamic ram board. Rotator AR44, Ham 4 similar. Tel 0555 892540, or 0698 458977.
Pye PF70 pocketphones type PF2AMB, vhf low band, a.m., must be comp, clean, in good cond, no mods. G4GCB. Tel Peter, Belper (Derbys) 6851.
Ohmite RB2 direction indicator, potentiometer. Another potentiometer in black, round moulded case, 2·75in diameter. Ex WD, full 360° rotation. FG2427/2, six terminals inside cover. S16 xtals for Icom IC215. G3MBL, QTHR. Tel 01-445 4321.
Atlas 180, 210 or similar hf rig for mobile use. G-whip and coils or w.h.y? G4DMS, QTHR. Tel Towcester (0327) 50632.
YG3395C cw filter for TS520S, reasonable. G3HIH, QTHR. Tel 051-226 4212, evenings.
Thirties *Radio Pictorial Weekly* magazines. Current vintage price offered. G3YNN, QTHR.
KW E-Zee Match. G5MXV, 81 Trinity Street, Gainsborough, Lincs. Tel 0427 3663.

CLUB NEWS

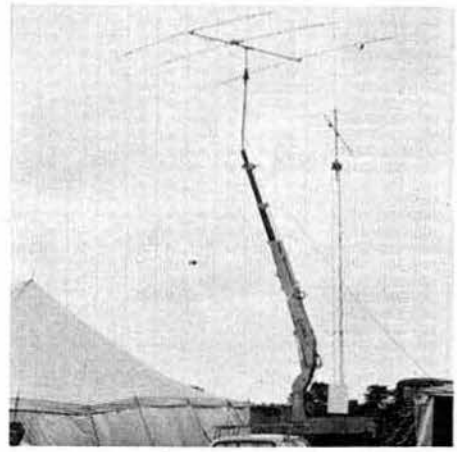
(Continued from page 614)

Bristol (BARC)—Tuesdays, 7.30pm. c/o YMCA, Park Road, Kingswood, Bristol. RAE and cw classes. Club station G3TAD active on club nights. Details from Trevor Cockram, G8GFZ.
Bristol (Brunel TCRS)—Welcomes licensed students to operate the club station, G4FNB. Student swls welcome. Details from Students Union c/o Brunel Technical College, Cabot House, Ashley Down Road, Bristol BS7 9BU.
Bristol (BRSGBG)—26 July, 7.30pm. Queens Building, Bristol University. Details from Chris Short, G8GLQ, tel 0272 621253.
Bristol (North Bristol ARC)—Fridays, 7.30pm. c/o Self-Help Enterprise, Braemar Crescent, Northville, Bristol. Main project at present time is up-grading the club's equipment. A new hf transceiver and a 432MHz converter are to be purchased giving the ability to operate on all bands, from top band through to 432MHz. Details from Ted Bidmead, G4EUV, tel 0272 691685.
Bristol (Shirehampton ARC)—Fridays, 7pm. Twyford House, Shirehampton. RAE classes and morse instruction each week. Lectures, films and df hunts are planned. Club's hf/vhf station G4AHG is active on club nights. Details from Ron Ford, G4GTD.
Bristol (UoBAR&CS)—For information contact Mark Posen, G6DYY, c/o Students Union, Bristol University.
Bristol (432MHz Repeater Group)—Details of GB3BS and membership enquiries from Steve Bailey, G4MCQ.
Cheltenham (CARA)—First Thursday and third Friday in each month, 1 July ("Why bother with vhf?", by Tom Douglas, G3BA), 16 July (Computer/natter night), 5 August ("A fresh approach to aerials", by G3GWW), 7.30pm. Old Bakery, Chester Walk, Clarence Street, Cheltenham. Details from John Holt, G3GWW.
Cheltenham (Smiths Industries RS)—Third Wednesday in each month, 7.30pm. Club House, Newlands, Bishops Cleeve, Cheltenham. Details from Roger Hawkins, G8UJJ, c/o 101 Tonysfield Road, Bishops Cleeve, Cheltenham, tel 0242 672175.
Gloucester (GARS)—Thursdays, 7.30pm. Chequers Bridge Centre, Painswick Road, Gloucester. Informal meetings and cw practice most Thursdays. Late details will be announced on GB2RS. Members should note that the centre will be closed during August. Details from Tony Martin, G4HBV.
Mendip Repeater Group—GB3WR, GB3UB and GB3VS. Details of these repeaters and applications for membership from Steve Gardner, G8GMZ.
Portishead (Gordano ARC)—Fourth Wednesday in each month, 28 July (Mike Blake, G3OUK), will be giving a talk on radio interference), 8pm. The Ship Hotel, Down Road, Portishead. Details from John Davies, G3LJD.
Weston-super-Mare (WSMARS)—Third Monday in each month, 7.30pm. Rugby Club, off Drove Road, Weston-super-Mare. Details from G3BLO or G3PQE, tel 0934 22712.
Yeovil (Y&DARC)—Thursdays, 1 July (VHF/NFD briefing for July), 8 July ("VHF propagation", by G3MYM), 15 July ("A way of measuring aerial input impedance", by G3MYM), 22 July ("Ideas for direct conversion receivers", by G3MYM), 29 July (Natter night), 7.30pm. Building 101, Houndstone Camp, Yeovil. Joe Phillips, G3KSK, was elected chairman of the club at the recent agm, and club attendances averaged 50-60 members per meeting. G3CHM and G8YEO are on the air Thursdays between 7.30pm and midnight. Details from Don McLean, G3NOF, tel 0935 24956.

If your club or group is not included above, please ask your secretary to send me the details as mentioned at the beginning of "Club News". *RR20*

TB3 ant/mobile

The 1981 Epworth Agricultural Show was rapidly approaching. We had the special event licence, GB2EAS, but no mast to support our beam antenna. Our kind provider of previous years was no longer able to supply his mast.



The TB3 ant/mobile on site. ***Photo:*** **G4HZN**

What could be done? The good reputation of the Scunthorpe Amateur Radio Club seemed to be at stake.

Then, inspiration came to G6CQQ, "Let's look at one of our firm's cranes". This great idea was "engineered" with a minimum of time and trouble: a scaffold-tube extension to carry the rotator was simply fitted into a socket on the crane's jib, and on the big day the rotator and antenna were installed while the jib was horizontal.

There was a gasp of amazement from onlookers as our TB3 beam described a giant arc and rose to 38ft in just 30s. It only remained for G6CQQ to lock the jib in its vertical position; we were told that, should our rotator fail, he could help by "slewing" the mast through a full 360°!

Did this impressive system work effectively? Well, the first phone contact of the day was ZL1AFU with a 5/6 report. A bystander, complete with eye-ball badge, asked, "How far can you get out?" Our truthful reply to him was, "Not a lot better than this!" *G4GZB*

Barging about with a tv camera

The early-May Bank Holiday saw a large group of amateurs, mainly from the Home Counties Amateur Television Group, the Burnham Beeches Radio Club, and the Langley College of Further Education, joining forces for a demonstration of amateur radio and television at the Slough Centenary Canal Festival. The event was held on a windy sports ground alongside the Slough basin of the Grand Union Canal. A fine assortment of radio and television equipment was installed in a marquee loaned by the local Scouts, and the 70ft narrow boat *Lancing*—used to give trips for the public—was fitted out with a mobile colour television station. During the three-day event this provided excellent pictures in the marquee, even when the boat was two or three miles away at the far end of its trip.

G4CRJ, G8MMY and G8MMF provided a fine display of microwave 10GHz television, also in full colour. At one stage G8MNY was persuaded to climb to the top of the Army's absailing tower, from where he transmitted excellent pictures of the showground—part of the deal was that he came down the fast way, complete with army crash hat and absailing gear.

Other pictures were taken from G4HMG mobile transmitting from the Queen Mother Reservoir at Datchet. *G4HMG*

Mike Brown, G8VMH; Dave Chislett, G8YCK; Carroll Thorn; and Eileen Chislett, G6EIL, chairman of Burnham Beeches RC, in view at GB2SCF. ***Photo: Slough Observer***

LOWE in LONDON

With an increasing amount of our business coming from the South of England, in particular around the London area we have, for your convenience, opened a shop in the city – not out in the suburbs but only three minutes' walk from Kings Cross Railway Station.

Now you have the opportunity to see and try out our full range of amateur, aircraft, marine and shortwave equipment before you purchase.

The shop is open from 9.30am to 5.30pm Tuesday to Friday and 9.30am until 5.00pm on Saturday.

To check whether an item is in stock before your visit ring Andy on 01-837 6702 – however, please remember that all mail order and telephone sales are still being handled from Matlock.

For your added convenience, Andy is able to accept payment by Access, Barclaycard or, of course, by our very own Lowe Card.

All items purchased from London carry the renowned Lowe Electronics' guarantee and the London shop and its customers are backed by the now well-known facilities here at Matlock.

So, pay a visit to Lowe in London, situated on the lower sales floor of the Hepworth's shop at the corner of Pentonville and Caledonian Road.

tony & andy the london lads

the backup team at matlock

LOWE electronics

MAIL ORDER
BY TWO WAY FREEPOST

Send 50p for our bumper bundle literature

All items advertised in stock at time of going to press.

SWR POWER METERS

SWR 25	3·5-150MHz twin meter	12.96
OSKERBLOC 200B	3-200MHz 20/200/2000W	41.00
TET P220	3-30MHz 2000 Watts	56.75
Yaesu YS 200	1·8-150MHz 200 Watts	46.50
Yaesu YS 2000	1·8-60MHz 2000W PEP/RMS	61.80
Reece UH 74	50-542MHz 10 Watts	17.25
Reece T4359	144/435 MHz 100 Watts	32.50
Hansen 601MH	1·8-30MHz PEP/RMS 2000W	44.85
Hansen FS7	144/432 - 200 Watts	35.65

TET ANTENNAS

HB 33SP	3 El Tribander 10/15/20 mts	189.23
MV5BH	Vertical 10/15/20/40/80 mts	71.25
MV3BH	Vertical 10/15/20 mts	40.25
MV4 BH	Vertical 10/15/20/40 mts	49.50
SQ22	Stacked 2 el Swiss Quad 144/146 MHz 16dB GAIN 20db F/B	55.67
SQY08	6 Element Quagi 2 mts	44.68
SSL 720	Stacked 2 x 9 element Yagi 2 mts	74.65
MLA4	Loop Antenna 80/40/15/10 mts 4 Elements of 1·8 mtrs	105.60

VAT inclusive. Carriage £4 per item.

MONITOR RECEIVERS

DAIWA VHF - Scan and VFO Control		49.00
AR 22 SYNTHESISED 2 metre Receiver		79.00

DATONG

PCI G/C converter HF on 2 metre	120.75
VLF very low frequency converter	25.30
FL1 frequency agile audio filter	67.85
FL2 multimode audio filter	89.70
ASP/B auto RF speech processor (Trio)	79.35
ASP/A auto RF speech processor (Yaesu)	79.35
D75 manually controlled RF Sp/Processor	56.35
RCF/M RF speech clipper module	26.45
D70 Morse tutor	49.45
AD270 indoor active antenna	37.95
AD370 outdoor active antenna	51.75
MPU1 PSU for above	6.90

ROTATORS

Skyking SU 4000	88.50
ART 3000 hd	88.50
KR 400RC	92.50
KR 400 1wr bkt	10.35
Hirschmann 250	45.00
AR 40	65.00
2" KS 065 bearing	16.50
1½" S100 bearing	16.50

MORSE KEYS

HK 707	Straight up/down keyer	10.99
BK 100	Semi-automatic mechanical bug	22.12
MK 702	Up/down keyer on marble base	24.50
MK 702	Manipulator	24.50
Mk 705	Squeeze paddle on marble base	21.72
EKM 1A	Morse code practice oscillator	10.50
MK 1024	Automatic memory keyer	135.13
EK 150	Semi/automatic keyer	74.00

DESK MICROPHONES

SHURE 444D Dual Impedance	33.00
SHURE 526T Mk II Power Microphone	46.00
ADONIS AM502 Compression Mic 1 O/P	39.00
ADONIS AM601 Compression Mic + Meter 1 O/P	49.00
ADONIS AM802 Compression Mic + Meter 3 O/P	59.00

DAIWA

CNA	1001 Auto ATU 200W RMS	139.00
CNA	2002 Auto ATU 1kW RMS	192.00
CN	620A RF Power Meter 1·8 to 150MHz 1kW	54.00
CN	630 RF Power Meter 140-450 MHz 200W	69.00
SR11	Scanning Receiver	49.00

ANTENNAS

Wide range in stock including JAYBEAM - HYGAIN-GOTHAM TELECON-HOKUSHIN ¼ ETC ETC

Bantex ¼ mobile whip complete antenna	9.99
Bantex ¼ W mobile whip complete antenna	3.99

MOBILE SAFETY MICROPHONES

ADONIS AM 202S Clip-on	20.95
ADONIS AM 202F Swan Neck + Up/Down Buttons	30.00
ADONIS AM 202H Head Band + Up/Down Buttons	30.95

HY-GAIN ANTENNAS

12AVQ	Vertical 10-20m inc	43.13	1.73
14AVQ/WB	Vertical 10-40m inc	58.08	1.73
18AVT/WB	Vertical 10-80m inc	90.85	1.73
14RMQ	Roof mounting Kit	30.48	1.73
18V	Vertical 10-80m inc	31.97	1.73
18HT	"HY Tower" 10-80m	320.85	12.54
103BA	3 Ele Yagi 10m	60.38	1.73
105BA	3 Ele Yagi 10m	112.70	3.16
153BA	3 Ele Yagi 15m	74.75	2.36
155BA	5 Ele Yagi 15m	135.13	4.77
203BA	3 Ele Yagi 20m	159.85	3.97
204BA	4 Ele Yagi 20m	217.35	5.87
205BA	5 Ele Yagi 20m	281.75	7.59
402BA	2 Ele Yagi 40m	201.25	5.23
DB10/15A	3 Ele Yagi 10-15m	146.05	3.91
TH3JNR	3 Ele Yagi 10-15-20m	159.28	2.47
TH2MK3	2 Ele Yagi 10-15-20m	136.85	2.59
TH3MK3	3 Ele Yagi 10-15-20m	205.85	4.66
TH5DXX	"Thunderbird" 5 Ele	228.85	5.41
TH6DXX	"Thunderbird" 6 Ele	281.75	6.97
HYQUAD	2 Ele Quad 10-15-20m	240.35	4.89
18TD	Dipole Tape 10-80m	80.39	2.30
BN86	Balun 1:1 3·30MHz	15.53	1.15
LA1	Lightning Arrestor	TOS	.75

VAT inc. Carriage shown for mainland only

ANTENNA PARTS AND KITS

Includes the worlds finest traps - Unidilla, which are **guaranteed for five years** no condenser used - no blow up possible. Precision moulded coil forms with stainless hardware - aluminium irridite finish - fully waterproofed and suitable for **wire, verticle and beam antennas,** rated at 2.5Kw and weigh only 4oz per trap - available for 7MHz (KW40) 14MHz (KW20) 21MHz (KW15) and 28MHz (KW10) - **£14.99 + 50p p&p** VAT included.

The BALUN - The Unidilla W2AU is famous because **it's the best,** same rating as the traps and has a built in **lightning arrestor** - available 1:1 and 4:1 - get it right first time with the W2AU Balun - **guaranteed for five years - £14.99 + 50p p&p** VAT included.

THE KITS - AMCOMM 40 - 1 pair KW40 Traps, 1 PL 259, 1 W2AU Balun, 1 pair insulators and of course 120ft soft drawn copper wire - coverage 80 - 10 metres. Full instructions included - **£37.50** including carriage and VAT.

AMCOMM 20 - 1 pair KW20 Traps, 1 W2AU Balun, 1 PL 259, 1 pair insulators and 65ft soft drawn copper wire - coverage 40 - 10 metres, full instructions included. **£33.50** including carriage and VAT.

AMCOMM 15 - 1 pair KW15 Traps, 1 W2AU Balun, 1 PL 259, 1 pair insulators and 40ft soft drawn copper wire - coverage 20 - 10 metres, full instructions included. **£31.50** including carriage and VAT.

AMTECH

New improved range Made in England

AMTECH 300B - To suit all coaxial and random wire antennas - 160 - 10 metres, 300W PEP. **£44.95** including VAT and carriage.

AMTECH 200B - Random wire ATU rated 200W PEP, will tune virtually any wire over 160 - 10 metres - excellent for base, mobile or temporary QTH - **£31.95** including VAT and carriage.

AMTECH 100B - Miniature mobile impedance match, ideal for that difficult matching when mobile - rated 180W PEP and has switched positions. **£17.95** including VAT and carriage.

AMTECH FM7 - Transform your FRG 7 or any receiver to FM. Small easily installed PCB with 455KHz/IF. **£13.99** including VAT and carriage.

YAESU RANGE

FT1	General coverage transceiver	POA
FT102	Price on application	
FT101ZFM	160-10m 9 band transceiver	590.00
FT101ZDFM	160-10m 9 band transceiver	645.00
DIGT 101Z	Digital unit for	90.00
DCT101Z	DC adaptor	42.50
FV101Z	Remote vfo	112.00
FAN1101	Fab for 101 series	13.80
FT902DM	9 band AM/FM transceiver	885.00
FT902D	9 band transceiver	790.00
FC902	9 band atu, swr/pwr etc	135.00
FTV901R	Transverter fitted 2m module	285.00
430TV	70cm module for above	185.00
144TV	2m module for transverter	100.00
70TV	4m module for transverter	80.00
YO901P	Monitor scope with pan adap	330.00
YO901	Standard monitor scope	256.00
FV901DM	Remote vfo for 901	260.00
SP901	External speaker	31.00
FL2100Z	9 band 1200W linear	425.00
FT107	9 band solid state 100W	725.00
FT107DMS	As above but with memory	799.00
DMST107	Memory unit	92.75
FV107G	Remote vfo for above	98.50
SP107G	External speaker	29.90
FC107G	Aerial tuning unit	112.70
FP107	230V AC power module	101.95
FP107EG	As above in cabinet	113.00
FT707	8 band solid state 100W	549.00
FP707	230V AC power supply	125.00
FC707	Aerial tuner (unbalanced only)	85.00
MR7	Metal rack for above	15.70
MMB2	Mobile mounting bracket	16.00
FRG7	0·5-30MHz receiver	199.00
FRG7700	SSB/AM/FM recvr dig readout	329.00
MEM7700	Memory unit for above	90.00
Converters		
FRV7700A	118-150MHz	69.75
FRV7700B	50-60MHz & 118-150MHz	75.50
FRV7700C	140-170MHz	65.95
FRV7700D	70-80MHz & 118-150MHz	72.45
FRT770	Receiver aerial tuner	37.85
FF5	LF filter for above	9.95
FT480R	2m all-mode transceiver	365.00
FP80A	230V AC power supply	63.25
FL2050	50 watt linear	126.50
FT780R	70cm all-mode transceiver	449.00
FT290R	2m all mode portable	249.00
NC11C	AC charger	8.00
CSC-1	Carrying case	3.45
MMB-11	Mobile mounting bracket	22.25
FL2010	10 watt linear for FT290	64.00
FT208	2m synthesized portable FM	209.00
NC9C	AC charger	8.00
FT708R	70cm hand-held	219.00
FP12	230V/12 amp psu	86.25
YP150Z	150W dummy load power meter	92.00
YH55	Standard 8 ohm headphones	9.95
YH77	Lightweight headphones	10.00
QTR24D	World Ham clock	28.00
YM34	600/50k ohm base mic 8 pin plug	21.45
YM35	600 ohm hand mic up/down 8 pin p	13.80
YM36	600 ohm as above (no up/down)	13.00
YM37	600 ohm hand mic 8 pin plug	6.90
YE7A	600 ohm hand mic 4 pin plug	6.90
YD844A	600/50k ohm base mic 4 pin plug	25.30

MICROWAVE MODULES

MMT144/28	2M Transverter for HF Rig	99.00
MMT432/28S	70cm Transferter for HF Rig	149.00
MMT432/144R	70cm Transverter for 2M Rig	184.00
MMT70/28	4M Transverter for HF Rig	115.00
MMT70/144	4M Transverter for 2M Rig	115.00
MMT1296/144	23cm Transverter for 2M Rig	184.00
MML144/25	2M 25W Linear Amp (3W I/P)	59.00
MML144/40	2M 40W Linear Amp (10W I/P)	77.00
MML144/100S	2M 100W Linear Amp (10W I/P)	129.00
MML144/100LS	2m 100W Linears (1/3W I/P)	145.00
MML432/20	70cm 20W Linear Amp (3W I/P)	77.00
MML432/50	70cm/50W Linear Amp	119.00
MML432/100	70cm 10/100W Linear Amp	169.00
MM2000	RTTY to TV Converter	228.64
MM4000	RTTY Transceiver	269.00
MMC50/28	6M Converter to HF Rig	27.90
MMC70/28	4M Converter to HF Rig	27.90
MMC144/28	2M Converter to HF Rig	27.90
MMC432/28S	7cm Converter to HF Rig	34.90
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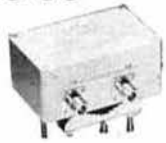

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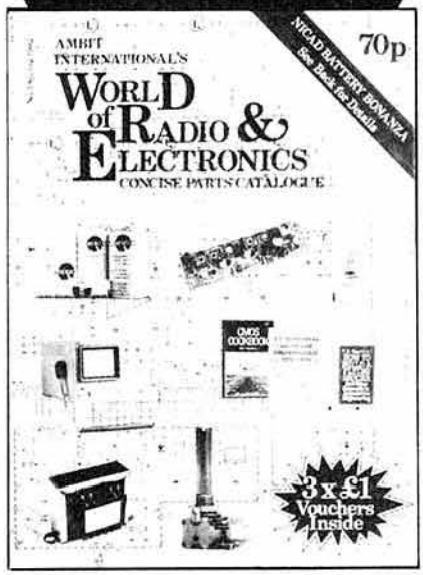

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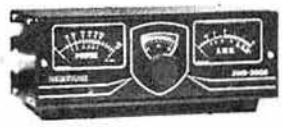

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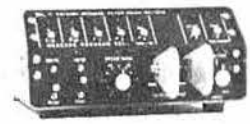

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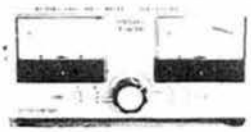

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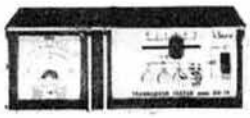

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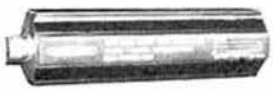

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New

MODEL DF
DISPLAY UNIT

DOPPLER DIRECTION FINDER

Model DF is a direction finding attachment for use with existing narrow band FM receivers and transceivers.

Two units, the display unit and the special antenna combiner convert your NBFM transceiver plus four omnidirectional antennas into a radio direction finder. A built-in r.f. activated antenna relay diverts the transceiver's output to the normal antenna during transmit or when the DF attachment is switched off.

Features

- Works with any existing narrow-band FM receiver or transceiver. No modifications are needed. The only connections required are to the external speaker and antenna jacks.
- Gives a clear directional readout on a circular array of sixteen bright green LEDs.
- Display holds last reading when signal drops out.
- Very easy to use and install.
- Only a single coaxial cable needed between display unit and antenna combiner.
- Professional quality at remarkably low cost. Display unit uses two PTH circuit boards. Gasket sealed combiner unit houses two conventional double-sided PCBs.

Applications

Model DF costs between ten and a hundred times less than conventional RDF systems, and therefore opens up new application areas for both professional and hobby users. Possible applications include:- VHF amateur radio, Citizen's Band radio, aircraft spotting, tracking gliders and light aircraft, locating lost model aircraft, private mobile radio systems, coastal and marine radio, tracking and locating anti-social radio operators, locating 'tagged' animals in the wild, helping to identify or trace unknown transmissions, law enforcement.

MODEL DFA2 COMBINER UNIT

A complete system needs the display unit and the antenna combiner plus four antennas mounted at the corners of a square spaced apart by 0.05 to 0.3 wavelengths.

For fixed station use, four dipoles are suitable while four magnetically mounted quarter wave whips are ideal for mobile use. Depending on the choice of antenna, the system will operate from 20 to 200 MHz.

Suitable magmount quarter wave whips are available from Datong for VHF use.

***BASIC DF SYSTEM** (Model DF display unit with Model DFA1 combiner) **£125.00** + VAT **(£143.80)**

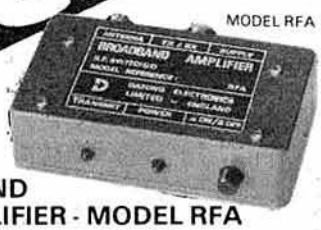
***DF SYSTEM**, as above but with mobile version of combiner, Model DFA2 (as DFA1 but fitted with magmount and 4 metre coaxial downlead terminated with PL259 plug) **£131.00** + VAT **(£150.70)**

COMPLETE MOBILE DF SYSTEM (Model DF display unit, Model DFA2 combiner, and four Model MA1 quarter wavelength magmount antennas cut for 145 MHz): **£173.50** + VAT **(£199.50)**

* Antennas not included

New

MODEL RFA



WIDE BAND PREAMPLIFIER - MODEL RFA

Eliminates separate tuned preamplifiers for each band.

Model RFA improves the sensitivity of any receiver or transceiver working in the range from 5 to 200 MHz. It connects in series with the antenna and built-in r.f. activated relay switches the pre-amplifier out of circuit during transmit or when the power is off.

Features:

- Extra wide bandwidth saves the cost of separate narrow band preamps.
- Handles strong signals without overload thanks to special low-noise negative feedback technique. Intercept point better than + 20dbm.
- Low noise figure.
- Carefully chosen gain level minimises receiver overload and cross modulation.
- R.F. activated bypass relay allows easy use with transceivers.
- Rugged diecast aluminium case with SO239 connectors and PTH printed circuit board.

Applications

Application areas include:- weak signal reception of all amateur and satellite bands from 5 MHz up to 200 MHz, long distance reception of VHF FM Broadcasts and VHF TV Signals, CB transceivers, private mobile VHF radio transceivers, reception of marine and aeronautical bands, VHF scanner receivers, compensating for signal loss in long antenna feeders.

The wide bandwidth of Model RFA makes it ideal for use with broadband antennas and scanner receivers.

Broadband Preamplifier, Model RFA: £25.50 + VAT **(£29.32)**

New

MODEL S
"CODECALL"

"CODECALL" SELECTIVE CALLING DEVICE - TAKES THE FATIGUE OUT OF LONG TERM MONITORING

"Codecall" is ideal wherever there is a need to monitor a well used radio channel for one particular call over long periods. "Codecall" gives the same convenience as a telephone bell, in that the receiver remains totally silent while monitoring. It therefore causes no disruption to other activities.

In fact the user can totally disregard the radio until a loud bleep from "Codecall" warns that the desired signal has been received. The loud intermittent bleep then continues, unless cancelled, for over ten minutes after the call is received.

"Codecall" ensures that the communications channel remains at full efficiency at all times. Without "Codecall" the desired call often blends into the general chatter and is missed by the listener, especially when the volume has been reduced to cut down the radio's nuisance level.

Features

- Each "Codecall" unit acts as a call generator and a call receiver.
- No electrical connection is needed at the transmitter, simply hold "Codecall" next to the microphone.
- At the receiver simply plug "Codecall" into the external speaker jack.
- Over four thousand different codes virtually eliminate the chance of false alarms.
- Internal 9 volt battery has long life since no current is used while monitoring a squelched channel.
- Works over any voice link, whether FM, AM, or SSB.
- Codes selected by either three 16-way switches (Model S) or by altering twelve internal wire links (Model L).
- Compact: only 4 x 2.4 x 1.05 inches.

Two Versions

Model S (as illustrated) has three 16-way rotary switches on the front panel giving a total of 4096 combinations immediately available. Model L has no switches, instead the code is set by altering twelve wire links inside the case.

Both models can be used in the same system. The switched version (Model S) is ideal where frequent code changes are required, whereas the linked version (Model L) is suitable where codes are not likely to be altered often, or for unskilled users who might accidentally set the wrong code.

Note: when used by UK Radio Amateurs all transmissions must be identified as required by the licence conditions.

"Codecall" Model L (Link programmed): £24.00 + VAT **(£27.60)**

"Codecall" Model S (Switch programmed): £25.50 + VAT **(£29.32)**

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★ See text for details.

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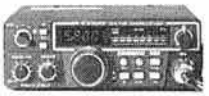

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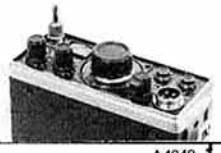

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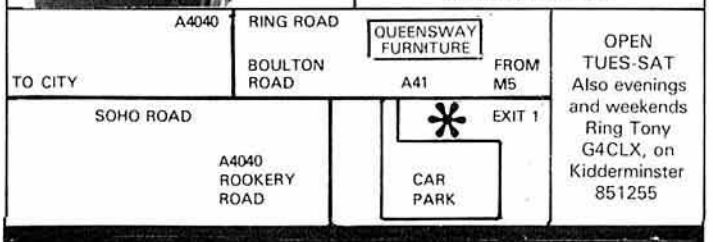

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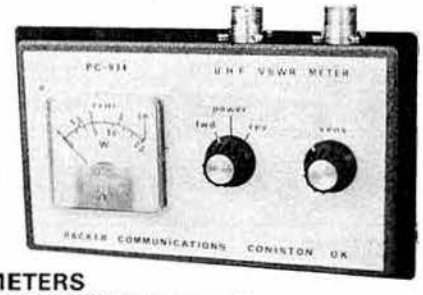

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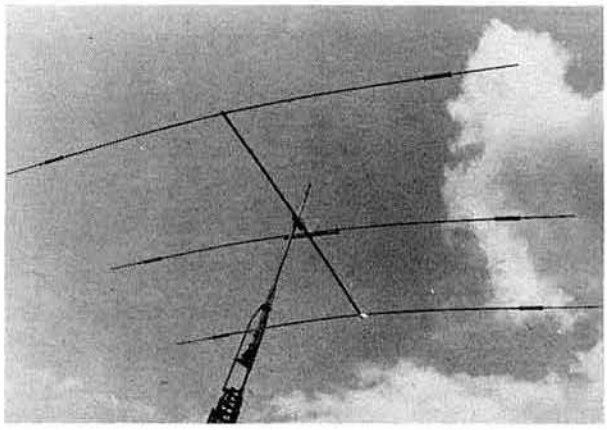

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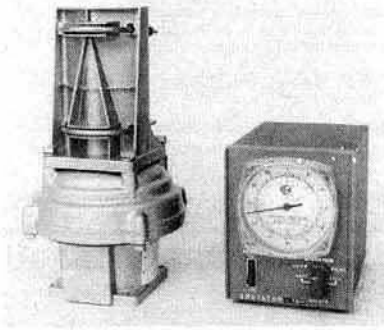

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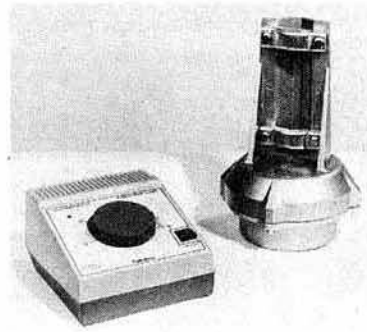

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LF30A	HF Low Pass Filter 1kW	17.90	(1.00)
TR9130	2M Synthesised Multimode	395.00	(—)
BO9	Base Plinth for TR9000	34.90	(1.50)
TR7800	2M Synthesised FM Mobile 25W	257.00	(—)
TR7730	2M Synthesised FM Compact 25W	247.00	(—)
TR2300	2M Synthesised FM Portable	166.00	(—)
VB2300	10W Amplifier for TR2300	58.00	(1.50)
MB2	Mobile Mount for TR2300	17.71	(1.50)
RA1	Flexible Rubber Antenna for TR2300	6.90	(0.50)
TR2500	2M FM Synthesised Handheld	207.00	(—)
ST2	Base Stand	46.00	(1.50)
SC4	Soft Case	12.19	(0.50)
SMC25	Speaker Mic	14.49	(1.00)
PB25	Spare battery pack	22.30	(1.00)
MS1	Mobile Stand	28.20	(1.00)
TR8400	70cm FM Synthesised Mobile Transceiver	299.00	(—)
PS10	Base Station Power Supply for 8400	64.00	(2.00)
TR9500	70cm Synthesised Multimode	449.00	(—)
R1000	Synthesised 200KHz-30MHz Receiver	297.00	(—)
SP100	External Speaker Unit	26.90	(1.50)
HC10	Digital Station World Time Clock	58.80	(1.50)
HS5	Deluxe Headphones	21.85	(1.00)
HS4	Economy Headphones	10.35	(1.00)
SP40	Mobile External Speaker	12.40	(1.50)

ICOM			
IC730	HF Mobile Transceiver 8 Band	586.00	(—)
IC720A	HF Transceiver & Gen. Cov. Receiver	883.00	(—)
PS15	Power Supply for 720A	99.00	(3.00)
IC251E	2M Multimode Base Station	499.00	(—)
IC25E	2M Synthesised Compact 25W Mobile	259.00	(—)
IC290E	2M Multimode Mobile	366.00	(—)
IC2E	2M FM Synthesised Handheld	159.00	(—)
IC L1 2/3	Soft Cases	3.50	(0.50)
IC HM9	Speaker/Microphone	12.00	(0.75)
IC BC30	230V AC Base Charger and Hod	39.00	(1.50)
IC BC25	230V AC Trickle Charger	4.25	(0.75)
IC CP1	Car Charging Lead	3.20	(0.50)
IC BP2	6V Nicad Pack for IC2E	22.00	(1.00)
IC BP3	9V Nicad Pack for IC2E	17.70	(1.00)
IC BP4	Empty Case for 6 × AA Nicads	5.80	(0.75)
IC BP5	11.5V Nicad Pack for IC2E	30.50	(1.00)
IC DC1	12V Adaptor Pack for IC2E	8.40	(0.75)
IC ML1	10W Booster	49.00	(1.00)

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Ferrite Rings 1⅛" dia. per pair	0.80	(0.20)
Toroid Filter TV Down Lead	2.50	(0.50)
Low Pass Filter LP30 100W	3.95	(0.50)
Trio Low Pass Filter LF30A 1kW	17.90	(1.00)
Yaesu Low Pass Filter FF501 DX 1kW	23.00	(1.00)
HP4A High Pass Filter TV Down Lead	5.95	(—)

ANTENNA BITS		
H1-Q Balun 1:1 5kW pep (PL259 Fitting)	9.95	(0.75)
T Piece Polyprop Dipole Centre	1.00	(0.30)
Ceramic Strain Insulators	0.40	(0.10)
Small Egg Insulators	0.40	(0.10)
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75 ohm Twin Feeder - Light Duty - Per Meter	0.16	(0.04)
300 ohm Twin Feeder - Per meter	0.14	(0.04)
URM67 Low Loss 50 ohm Coax - Per Meter	0.60	(0.20)
UR76 50 ohm Coax - Per Meter	0.25	(0.05)

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R517	Airband Handheld	49.50	(1.00)
AR22	Amateur Band synthesised handheld	89.00	(1.00)
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DL60	PL259 connector 60W max	8.80	(0.75)
DL60N	N type connector 60W max	16.50	(0.75)
WELZ CT300 1 kW max		42.95	(1.50)

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BNC Socket to PL259	1.75
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Codecall	Selective calling device (Link prog)	27.60	(—)
"	" " " (Switch prog)	29.32	(—)
RFA	Wideband preamplifier	29.32	(—)
MPU	Mains power unit	6.90	(—)

MORSE EQUIPMENT			
MK704	Squeeze Paddle	10.50	(0.50)
HK707	Up/Down Key	10.50	(0.50)
EKM1A	Practise Oscillator	8.75	(0.50)
EK121	Elbug	29.95	(0.50)
EKM1A	Matching Side Tone Monitor	10.95	(0.50)
EK150	Electronic Keyer	74.00	(—)

ROTATORS			
KR250	Kenpro Lightweight 1-1½" mast	44.95	(2.00)
Hirschman	RO250 VHF Rotor	49.95	(2.00)
9502B	Colorotor (Med. VHF)	49.95	(2.00)
KR400RC	Kenpro inc lower clamps	99.95	(2.50)
KR600RC	Kenpro inc lower clamps	139.95	(3.00)

DESK MICROPHONES		
SHURE 444D Dual Impedance	33.00	(1.50)
SHURE 526T Mk II Power Microphone	46.00	(1.50)
ADONIS AM502 Compression Mic 1 O/P	39.00	(—)
ADONIS AM601 Compression Mic + Meter 1 O/P	49.00	(—)
ADONIS AM802 Compression Mic + Meter 3 O/P	59.00	(—)

MOBILE SAFETY MICROPHONES		
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ADONIS AM 202F Swan Neck + Up/Down Buttons	30.00	(—)
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FXI Wavemeter 250MHz MAX	33.00	(0.75)
DM81 Trio Dip Meter	59.75	(0.75)
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2M Thread for TR2300 or FT290R (state which)	4.50	(0.50)
70cm BNC or thread	4.50	(0.30)

YAESU			
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FT902DM	160-10m 9 Band Transceiver	885.00	(—)
FC902	All Band A.T.U.	135.00	(1.50)
SP901	External Speaker	31.00	(1.50)
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FT101ZD	160-10m 9 Band Transceiver (FM) Digital R.O.	665.00	(—)
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FV707DM	Digital V.F.O.	203.00	(—)
FC707	Matching A.T.U./Power Meter	85.00	(1.00)
MR7	Metal Rack for FT707	15.70	(1.00)
MMB2	Mobile Mounting Bracket for FT707	16.10	(1.00)
FRG7	General Coverage Receiver	199.00	(—)
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FRG7700M	As above but with Memories	409.00	(—)
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FT290R	2M Portable Synthesised Multi mode	249.00	(—)
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NC8	Base Fast/Trickle Charger	44.10	(1.50)
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FNB2	Spare Battery Pack	17.25	(0.75)
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CSC1	Soft Carrying Case	3.45	(0.75)
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Nicads	2.2 AMP HR Nicads, Each	2.50	(—)
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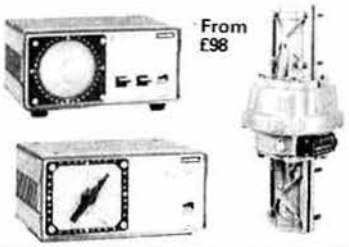

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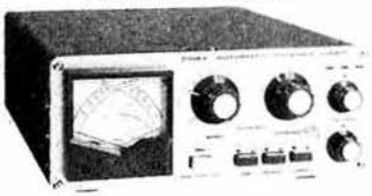

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DM801	Dip meter	60.00	(1.75)
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YAESU

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FT208	2m synthesised portable FM	209.00	(2.50)
NC9C	AC charger	8.00	(1.00)
FT708R	70cm hand-held	219.00	(2.50)

ICOM

IC730	HF mobile transceiver 8 band	586.00	(5.00)
IC720A	HF transceiver and gen. cov receiver	883.00	(5.00)
PS15	Power supply for 720A	99.00	(5.00)
IC251E	2m multimode base station	499.00	(5.00)
IC25E	2m synthesised compact 25W mobile	259.00	(5.00)
IC290E	2m multimode mobile	366.00	(5.00)
IC24G	2m FM mobile 10w	169.00	(5.00)
IC2E	2m Fm synthesised handheld	159.00	(2.50)
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IC HM9	Speaker/microphone	12.00	(0.50)
IC CP1	Car charging lead	3.20	(0.50)
IC BP2	6V Nicad pack for IC2E	22.00	(1.00)
IC BP3	9V Nicad pack for IC2E	17.70	(1.00)
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The optimum synthesizer steps for SSB/CW or FM operation are very different. That's why Yaesu gives you the flexibility of two synthesizer steps per mode: 100Hz or 1kHz per step on SSB and CW, and 12½kHz or 25kHz per step on FM. When changing modes from SSB/CW to FM, your FT290R is automatically set to the nearest standard channel when you start scanning or tuning.

TEN MEMORY CHANNELS
As many as ten frequencies may be stored into memory, for instant recall. The priority feature allows you to check a favourite frequency every few seconds, with automatic halting (FM mode) when the channel is clear or busy, as desired. Memory backup is provided by a built-in lithium cell, with an estimated lifetime of five years.

DUAL VFO SYSTEM
The FT290R features a digitally synthesized dual VFO system which provides tremendous flexibility in day to day operation. For example, one VFO may be set up in the SSB portion of the band, and the other in the FM sub-band, for immediate QSY when changing modes.

CONVENIENT FEATURES
Among the many features adding to the convenience of the transceiver is a built-in telescoping antenna, a high-performance noise blanker, a high/low power switch, and a battery condition meter. A clarifier (offset tuning) allows you to follow unstable or Doppler-shifted signals.

FULL LINE OF ACCESSORIES
See your authorised Yaesu dealer for details of the quality line of accessories. These include the YM49 remote speaker microphone with scanning controls; MMB11 Mobile Mounting Bracket; FL2010 2 meter 10 watt amplifier, FLC11 Leather Carrying Case; and the CSC1 Vinyl Carrying Case, Nicad C-Cells and a Battery Charger. Stop by and try the FT290R today!!

GENERAL

Frequency coverage:
144-146MHz

Modes of operation:
SSB (USB, LSB), CW and FM

Synthesizer steps:
SSB/CW: 100Hz, 1kHz
FM: 12·5kHz, 25kHz

Power requirements:
8 × C size dry batteries
8 × C size Nicad cells
External: 8·5-15·2V DC
Memory backup: lithium cell

Current consumption:
70m A on receive;
800m A on transmit (2·5W RF, FM)

Dimensions:
58(H) × 150(W) × 195(D) mm, 1·3 kg

TRANSMITTER

Power output:
2·5 watts at 12 volts

Carrier Suppression:
Better than −40dB

Spurious radiation:
Better than −60dB

Unwanted sideband suppression:
Better than −40dB

Tone burst frequency:
1750Hz (other models)

Frequency response:
300-2700Hz (−6dB)

FM Deviation:
± 5kHz (max)

Microphone impedance:
600 Ohms

RECEIVER

Intermediate frequencies:
1st IF 10·81MHz (SSB & FM)
2nd IF 455kHz (FM ONLY)

Sensitivity:
SSB/CW: 0·5 μV for 20dB S/N
FM: 0·25 μV for 12dB SINAD

Selectivity:
SSB/CW: 2·4kHz at 6dB down
4·1kHz at 60dB down
FM: 14kHz at 6dB down
25kHz at 60dB down

Image rejection:
Better than −60dB

Audio output impedance:
8 Ohms

Audio output:
1 watt @ 10% THD

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