RADio COMmunication

April 1982

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RSGB NATIONAL AMATEUR RADIO EXHIBITION
15-17 APRIL 1982

Journal of the Radio Society of Great Britain

CATRONICS FOR TRIO

ALL TRIO EQUIPMENT PURCHASED FROM CATRONICS NOW CARRIES 2 YEAR GUARANTEE

SEE ALL OUR PRODUCTS AT ALEXANDRA PALACE EXHIBITION

TS830S

WITH NEW BANDS

TS830S Brief Specification

Frequency Range:	9 bands, 160m-10m
Modes:	CW, USB, LSB
Final Power Input:	220 watts PEP (SSB) 180 watts DC (CW)
RX Sensitivity:	0·25μV at 10dB S/N
Catronics' Price:	**£694**

TS130S

WITH NEW BANDS

TS130S Brief Specification

Frequency Range:	8 bands, 80m-10m
Modes:	CW, USB, LSB
Final Power Input:	~200 watts PEP (SSB) ~160 watts DC (CW)
RX Sensitivity:	0·25μV at 10dB S/N
Catronics' Price:	**£525**

25W PEP version also available TS130V at **£445**

NEW TR2500

2M SYNTHESIZED PORTABLE

TR2500 Brief Specification

Frequency Range: 144-146MHz
Mode: FM
RF Output Power: HI = 2·5W, LO = 0·3W
Sensitivity: 0·2μV for 12dB SINAD
Display: LCD (4 digit)
Memories: 10 built in
Scanning: Band or Memories
Catronics' Price: **£207**

TR7730

2M COMPACT TRANSCEIVER

TR7730 Brief Specification

Frequency Range:	144-145·995MHz
RF Output Power:	HI = 25W, LO = 5W
RX Sensitivity:	0·25μV for 12dB SINAD
Memories:	5 (scanning)
Autoscan:	5kHz or 25kHz
Repeater shift:	+ / − 600kHz
Microphone:	500Ω with UP/DOWN + PTT
Catronics' Price:	**£247**

TS530S

BUILDING ON SUCCESS

TS530S Brief Specification

Frequency range:	9 bands, 160m-10m
Modes:	CW, USB, LSB
Final Power Input:	220 watts PEP (SSB) 180 watts DC (CW)
Receive Sensitivity:	0·25μV at 10dB s/N
Catronics' Price:	**£534**

TR9000

2M COMPACT ALL MODE

TR9000 Brief Specification

Frequency Range:	144-146MHz
Modes:	USB, LSB, FM, CW
RF Output Power:	10 watts
Sensitivity:	SSB/CW 0·25μV for 10dB S/N FM 0·25μV for 12dB SINAD
Frequency Control:	Digital, phase locked VCO
Memories:	5 built in
Scanning:	Auto−25/12·5kHz/100Hz
Catronics' Price:	**£359**

NEW TS780

ALL MODE 2M + 70CM

TS780 Brief Specification

Frequency Range:	144-146MHz 430-440MHz
Mode:	SSB (USB, LSB), CW, FM
RF Output Power:	10 watts. Only for FM: 10W (HI)/Approx. 1W (LOW)
Sensitivity:	SSB/CW 0·2μV for 10dB (S + N)/N FM 1μV for 30dB (S + N)/N
20dB quieting (FM):	Less than 0·4μV
Catronics' Price:	**£748**

TR8400

70cm FM SYNTHESISED MOBILE

TR8400 Brief Specification

Frequency Range:	430-439·975MHz
Channel Spacing:	25kHz
RF Output Power:	10W (HI) or 1W (LO)
RX Sensitivity:	0·4μV for 12dB SINAD
Memories:	5 (scanning)
Repeater shift:	± 1·6kHz
Catronics' Price:	**£299**

NEW R600

COMMUNICATIONS RECEIVER

R600 Brief Specification

Frequency Range:	150kHz-30MHz
Modes:	AM, USB, LSB, CW
Sensitivity:	<2MHz: 5μV >2MHz: 0·5μV for 10dB S + N/N on SSB
Digital Readout:	to 1kHz
Catronics' price:	**£235**

Illustrated leaflets on all above products available. Prices include VAT and carriage.

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We always have a good selection of used equipment in stock—ask for current list.

We are 300 yards from Wallington Railway Station (London Bridge or Victoria). Frequent buses from Croydon and Sutton. Three large car parks within 100 yards. **Credit sale facilities available on all equipment. Credit cards accepted.** Mail orders normally dealt with on day of receipt.

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

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NEW HF TRIO *pacesetter in amateur radio*

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 RIT 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

AMATEUR BAND TRANSCEIVER WITH 100kHz TO 30MHz GENERAL COVERAGE RECEIVER

LOWE ELECTRONICS Ltd

CHESTERFIELD ROAD MATLOCK DE4 5LE TEL 0629 2430/2817

NEW UHF VHF

The TR9130 is the new all mode VHF mobile or base station rig from Trio giving 25 watts output on 2 metres FM, USB, LSB and CW and now having a green LED display to make for easier mobile operation.

- 25 watts output on FM, SSB and CW.
- FM/USB/LSB/CW all mode operation.
- For added convenience in all modes of operation, the mode switch, in combination with the digital step (DS) switch, determines the size of the tuning step, and the number of digits displayed.
- Six memories. On FM, memories 1 through 5 for simplex or +600kHz offset, with the OFFSET switch. Memory 6 for non-standard offset. All six memories may be operated simplex, any mode.
- Memory scan. Scans memories in which data is stored. Stops on busy channels.
- Internal battery memory back-up. With Ni-Cad installed (not Trio supplied), memories will be retained approximately 24 hours, adequate for the typical move from base to mobile. A terminal is provided on the rear panel for connecting an external back-up supply.
- Automatic band scan. Scans within whole 1MHz segments (ie 144·0-144·999MHz), for improved scanning efficiency.
- Dual digital VFOs. Incorporates two built-in digital VFOs, selected through use of the A/B switch and individually tuned.
- Squelch circuit on all modes (FM/SSB/CW).
- Repeater reverse switch. For checking signals on the repeater input, on FM.
- CW semi break-in circuit with sidetone. Built-in, for convenience in CW operations.
- Digital display with green LEDs.
- Transmit offset switch for repeater shift.
- High performance noise blanker.
- RIT (Receiver Incremental Tuning) circuit. Useful during SSB/CW operations.
- HI/LOW power switch. Selects 25 or 5 watts RF output on FM or CW.
- Accessory terminal. A four-pin accessory terminal is provided for use with a linear amplifier or other accessory.
- Includes quick release mobile mounting bracket and up/down microphone.

TR 9130

TR 9130 All Mode Transceiver

Now, with the production of the TS780, the dual bander has come of age, giving the two band multimode facilities of the original concept, plus a wealth of additional operating facilities. Trio have again produced a rig which others cannot even copy.

- Full coverage of 2 metre and 70cm band. 144·00 to 146·00 430 to 440.
- All modes. Upper sideband. Lower sideband CW and FM. Also a position with which you will not be familiar FM CH. This gives the VFO a mechanical click stop feel and increments of 12·5 or 5kHz. Ideal for 2 metre and 70cm simplex working.
- Free running VFO with 2 speeds of frequency coverage, slow in 20Hz steps, fast in 200Hz steps. Add to the VFO a friction brake and ease of fine tuning is the result.
- Band scan in either 0·5, 1, 3, 5, or 10MHz widths.
- Memory scan. The rig can be instructed to scan either the 2 metre or the 70cm frequencies in the memories or to scan the total content.
- IF shift to move the receiver pass band without changing the receive frequency and give greater operability under crowded band conditions.
- Full repeater shift facility for either 2 metres or 70cm repeaters plus tone access and reverse repeater switches.
- Up down microphone supplied as standard.
- 13·8V DC or 240V AC 50/60Hz operation

TS 780

TS 780 £748.00 inc. VAT carriage £5.00

APPROVED TRIO DEALER

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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.

R600

R600 RECEIVER. £235.06 inc VAT carriage £4.50

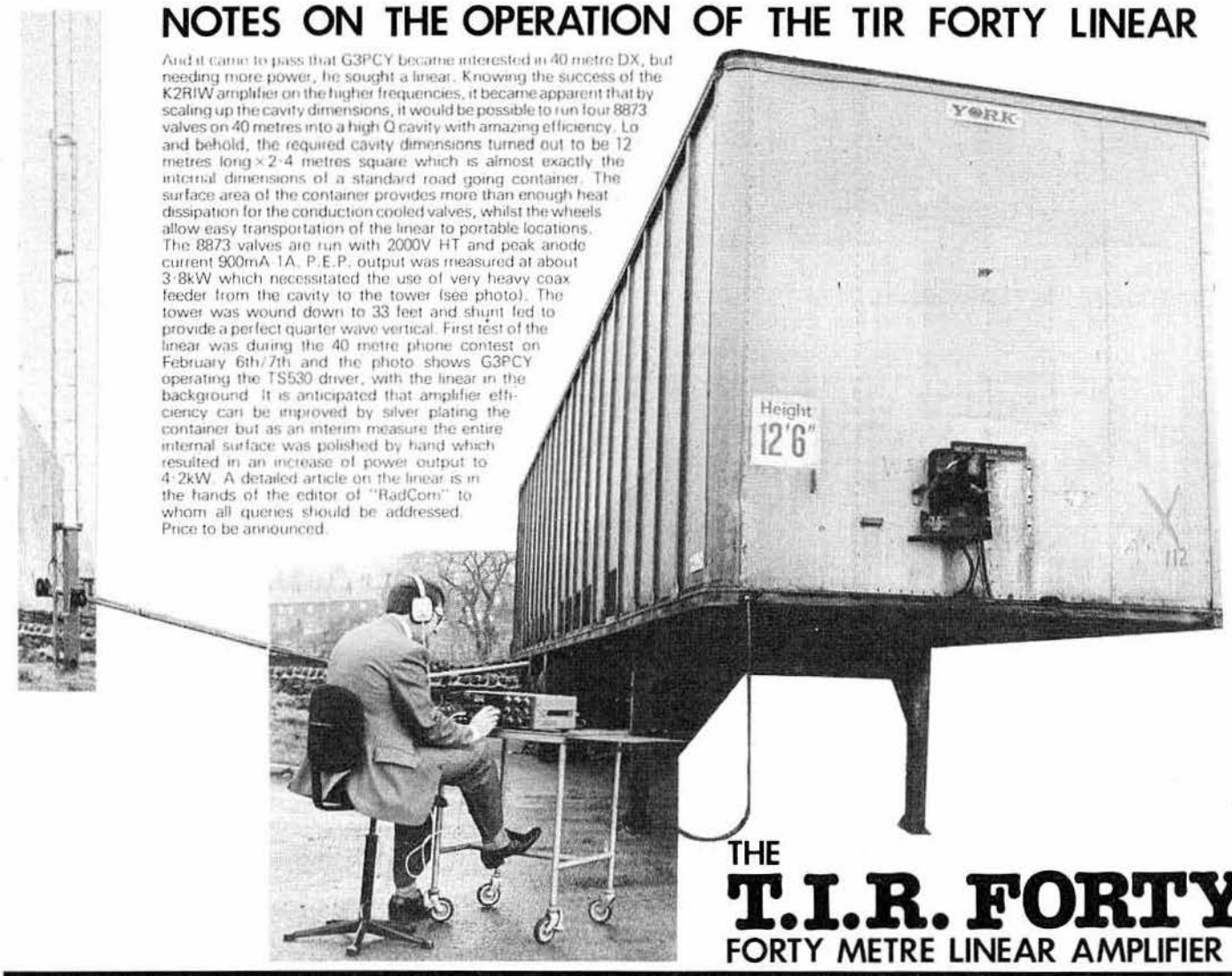
The R-600 is a high performance general coverage communications receiver covering 150kHz to 30MHz in 30 bands, at an affordable price. Use of PLL synthesized circuitry provides high accuracy of frequency with maximum ease of operation.

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.
- 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 240V AC, 50/60Hz. Selector switch on rear panel.
- 13·8V DC operation.
- Other features include carrying handle, headphone jack, and record jack.

NOTES ON THE OPERATION OF THE TIR FORTY LINEAR

And it came to pass that G3PCY became interested in 40 metre DX, but needing more power, he sought a linear. Knowing the success of the K2RIW amplifier on the higher frequencies, it became apparent that by scaling up the cavity dimensions, it would be possible to run four 8873 valves on 40 metres into a high Q cavity with amazing efficiency. Lo and behold, the required cavity dimensions turned out to be 12 metres long × 2·4 metres square which is almost exactly the internal dimensions of a standard road going container. The surface area of the container provides more than enough heat dissipation for the conduction cooled valves, whilst the wheels allow easy transportation of the linear to portable locations. The 8873 valves are run with 2000V HT and peak anode current 900mA 1A. P.E.P. output was measured at about 3·8kW which necessitated the use of very heavy coax feeder from the cavity to the tower (see photo). The tower was wound down to 33 feet and shunt fed to provide a perfect quarter wave vertical. First test of the linear was during the 40 metre phone contest on February 6th/7th and the photo shows G3PCY operating the TS530 driver, with the linear in the background. It is anticipated that amplifier efficiency can be improved by silver plating the container but as an interim measure the entire internal surface was polished by hand which resulted in an increase of power output to 4·2kW. A detailed article on the linear is in the hands of the editor of "RadCom" to whom all queries should be addressed. Price to be announced.



THE T.I.R. FORTY

FORTY METRE LINEAR AMPLIFIER

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

EMPORIUM NEWS

Good morning

Just arrived at work this morning after a night on the air with the Trio TS780. **Perfect operating pleasure.** I don't know how to say this but the production run model, and mine in particular, seems even better than the pre-production model that I had for that six weeks. **Sensitivity on 2 metre sideband is unbelievable** – better than 0·1μV for 10dB S/N and on 2 metres FM better than 0·2μV for 12dB sinad. **And the figures for 70cms are similar.** Anyway, whatever the figures may say the rig on the air feels right. To date EI and GM have been worked under not much better than flat band conditions.

Alan has returned from the Far East and I am sure you have noticed **the new Trio TS930S:** the general coverage receiver and amateur band transmitter. A transistorised rig complete with power supply all in one package. Well, I have told you before and I will say it again – **Trio may not be first with a new rig but their products are worth waiting for.** Price on the new transceiver will be announced as soon as possible.

With the advent of this rig, a natural progression from the reliable and much loved TS180S, Trio now have an HF line up second to none, starting with the TS130S/V and moving through the TS530S, the TS830S to the new Trio TS930S which completes the range.

For those of you who are the discerning owners of the Japan Radio Company's **NRD515 general coverage receiver,** you will be interested, I am sure, to find that the NHD515 memory unit giving 24 channels of memory has been developed further and is now available from Matlock at the same price as its predecessor. The new model is called **the NHD518** and has – wait for it, you will be amazed – **96 channel capacity.** Simply, the 96 channels are selected by a 24 position rotary switch, plus a bank of four pushbuttons. You have it, 4 × 24 is 96. And available at £198.00.

John has been at it again and has now produced a **mod sheet** for the **TS820S** to make this absolutely superb rig operate on **the new 10MHz band.** Send us a stamped addressed envelope and this information sheet will wing its way to you.

The TR2400 is still available at the reduced price of £140, carriage £5.00. These rigs are brand new and must represent the finest value for money in any handheld.

If you possess a new TR2500 we now have most of the accessories in stock, including the leather case. Remember, accessories are much in demand so please ring us before calling to make absolutely sure the item you require is in stock.

I must now make an apology to all XYLS and YLS. A lady has complained, and I, being the honourable and sensitive person you all know, hereby apologize for the FBOM of previous issues. Talking about the fairer sex, let me introduce Traci, the girl on the switchboard. For those of you not fortunate enough to visit Matlock I mention, in passing, that Traci, who doesn't wear stockings, **paints her toenails the most vivid red** – it brings out the gypsy in me!

Another **10MHz mod** from John, this time **for the TS520SE.** A bit complicated this one but a mod sheet is available – again a stamped addressed envelope will suffice.

For the chap with the TS520S, we have available a few VFO520S which are £73.50 each. I repeat, when these are gone there are no more!

The AOR245, 240A and 740A are still available at £178.00, £158.00 and £195 respectively and provide a very economical way of getting on the air. I use both a 240A and 740A. Both are not in the shack as that is well stocked with gear – no, I keep both rigs alongside the television and with them monitor the local net frequency. A useful addition to any person's equipment, **if only to find out which pub the lads are using!** And on those long summer evenings whilst the wives chat amongst themselves what better way of passing time whilst waiting for the steaks to be done to a turn on the recently purchased barbecue than to have a quick contact, either on the 2 metre or 70cm band.

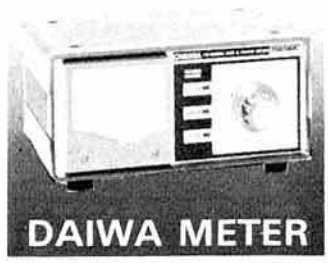
Also in the AOR range is the AR22 2 metre FM receiver. This little beauty covers 141 to 149MHz and will literally fit in your vest pocket. Again this is just the thing to enhance amateur radio. **Leave it with the wife** and rest assured that she will know your exact whereabouts all day long. What could be more convenient.

Two neat additions to any shack: The CN520A 1·8-60MHz cross needle power/SWR meter at £32.80 and the CN540 50-150MHz @ £35.00. Still going strong is the **UL1000 loop MW/HF amplified tuner** and, at a price of £39.50, for a serious short wave listener, the UL1000 is good value for money.

For those of you who want **a particular piece of second hand equipment** with the special Lowe guarantee and you are prepared to wait for it, then why not ring David – he's very well organized and now has a list of the better pieces of gear and a note of those who are looking for them, so why not give him a ring and put your name on his list? It will cost you nothing more than a 'phone call, then when your particular piece of gear is traded in, **the connection can be made.** Result: you get the gear you want and we promote a faster turnround in second-hand equipment.

Had two guys in the shop recently who did their own thing – they met in the car park, one chap wanting a second-hand rig bought the one direct from the other chap who, in turn, went on to buy a new rig. Satisfaction for all three parties and would you believe David provided them all with a cup of drinking chocolate.

Now that the weather is improving I am sure the younger ones of us, I include myself, are all set to get out on the hills with portable equipment. **A rig that instantly springs to mind is the Trio TR2300.** Now more than a well known piece of gear but an **"Amateur's Favourite"** I am sure you must know one of the 5000 owners of the TR2300 and its predecessors.



There is no point in me extolling the virtues of the rig. The full 2 metre coverage, the switchable channel illumination (just the thing to extend battery life), the reverse repeater switch, the included Nicad charger, case and carrying strap, the 1 watt of well modulated RF, the list goes on. Rugged and reliable and still at the price of £166.75. **Real value for money and just the rig for the newcomer to amateur radio.** The TR2300, the rig bought by many as their first rig and now a part of the family.

Anyway, that's about it for now as Bob in the workshop's AR88D has broken down and he wants me to write a letter to RCA regarding a warranty claim so, until next month, Gud DXes 73es FBYLS, XYLS, es FBOM, etc and especially to Kathleen.

ICOM

TRIED, TESTED AND TRUSTED

See revue in February Rad.Comm.

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

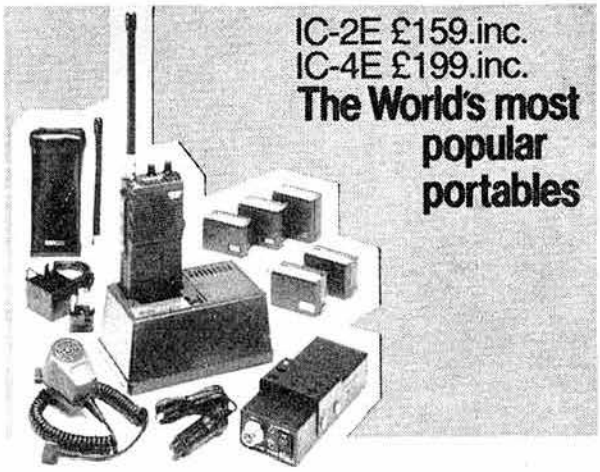
The main problem that the amateur of today has to deal with is deciding just which rig out of the many excellent products available he is going to choose. Technology is advancing at such a rapid rate and getting so sophisticated that many cannot hope to keep up. Some go too far!

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



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	IC12 3	cases	each 3 60
BC30	Base charger for above	39 00	All prices include VAT		

The IC4E is going to revolutionise 70 CM!

ICOM

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.

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.

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.

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.

Thanet Electronics

THE AMATEUR'S PROFESSIONAL FRIEND

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.

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.

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?

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

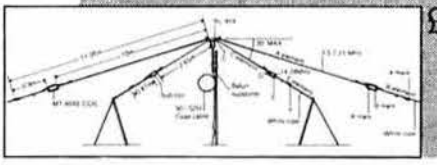
Free carriage on direct sales – call us.

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?

A new Trap Dipole!
£49.50.inc.



LOOK!!

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

NEW! £699.inc. with built-in VDU

Following the success of the Tono 7000E communications computer, we are now able to announce the arrival of a completely new machine on the market. The CWR 685 Telereader.

Brief features are – Transmits and receives (via a suitable transceiver) CW, RTTY and ASCII (optional) – Built in 5" green display monitor. It will handle the alphabet, numerals, symbols and special codes on CW.

Speeds – CW – 3 wpm to 50 wpm with automatic speed tracking RTTY and ASCII – 45·45,50,56·88,74·2,110 and 300 bauds. (300 bauds speed is possible when external modern or TTL input is used).

Input – AF input for CW, RTTY and ASCII from phone Jack (usable from 8 to 1000 ohms, 30 mV to 2V.

Display outputs – RF output and composite video output 1V P.P 75 ohms. 6 memories – 32 chrs each.
Printer interface – Centronic compatable parallel interface built-in.

Output for oscilloscope – RTTY and ASCII impedance 200K ohm 1V P.P

Number of characters display – 512 characters x 2 pages – total 1024

Power source – 13.8 V.D.C.
Complete with full size keyboard.

Receive only version CWR 680 – £189 inc.

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.

Thanet Electronics

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

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

ICOM

All prices inclusive of VAT.

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

MICROWAVE MODULES LTD

In this issue of *Radio Communication* we are briefly describing our entire range of top quality British-made products, so that our regular customers and the many newcomers to amateur radio can see for themselves the extensive range we have to offer.

Microwave Modules, formed in 1969, is a wholly independent British company manufacturing quality products to professional standards solely for the amateur market, and it is this dedication together with strong customer loyalty that has enabled us to go from strength to strength in expanding and diversifying our product range.

Please note the addition of various new products (marked ●) which are now in full production.

A full data sheet on each product is available on request.

MTV435 ATV TRANSMITTER

THE ENTIRE RANGE

MML144/100-S PA & PREAMP

MICROPROCESSOR PRODUCTS

● MM2001:	RTTY to TV converter	£169 ●	B
MM4000:	RTTY transceiver	£269	B
MM4000KB:	RTTY transceiver + keyboard	£299	D
MMS1:	Speech synthesised morse tutor	£115	B
MMS2:	Advanced morse trainer	£155	B
● MM1000:	ASCII to morse converter	£59 ●	A
● MM1000KB:	ASCII to morse converter + keyboard	£89 ●	C

AMATEUR TELEVISION PRODUCTS

MMC435/51:	70cm converter, VHF output	£34.90	A
MMC435/600:	70cm converter, UHF output	£27.90	A
● MTV435:	70cm ATV 20 watt transmitter	£149 ●	B

TRANSVERTERS

		Price inc VAT	Post Rate
MMT28/144:	2m down to 10m	£99	B
MMT70/28:	10m up to 4m	£115	B
MMT70/144:	2m down to 4m	£115	B
MMT144/28:	10m up to 2m	£99	B
MMT432/28-S:	10m up to 70cm with satellite shift	£149	B
MMT432/144-R:	2m up to 70cm with repeater shift	£184	B
MMT1296/144:	2m up to 23cm	£184	C

VARIOUS

		Price inc VAT	Post Rate
MMD050/500:	500MHz frequency counter	£69	A
MMD600P:	600MHz ÷ 10 prescaler	£23	A
MMDP1:	Frequency counter probe	£11.50	A
MMF144:	2m bandpass filter	£9.90	A
MMF432:	70cm bandpass filter	£9.90	A
MMV1296:	70cm to 23cm varactor tripler	£34.50	A
MMS384:	384MHz frequency source	£27.60	A
MMR15/10:	15dB 10 watt attenuator	£9.90	A

MMS1 MORSE TUTOR

STOP PRESS . . .
A NEW 24 PAGE CATALOGUE DESCRIBING THE ABOVE PRODUCTS IS NOW AVAILABLE . . .
Send 40p in stamps for your copy

LINEAR AMPLIFIERS

		Price inc VAT	Post Rate
● MML28/100-S:	10m 100 watt/switchable preamp	£129.95 ●	C
MML70/40:	4m 40 watt/preamp	£77	B
MML70/100 S:	4m 100 watt/switchable preamp	£129.95	C
MML144/30-LS:	2m 30W/switchable preamp (1/3W)	£65.00	B
MML144/40:	2m 40 watt/preamp	£77	B
MML144/100S:	2m 100 watt/switchable preamp	£129.95	C
● MML144/100-LS:	2m 100W/switchable preamp (1/3W)	£145 ●	C
MML432/20:	70cm 20 watt/preamp	£77	B
MML432/50:	70cm 50 watt preamp	£99	C
● MML432/100:	70cm 100 watt	£228.65	D
MML1296/10:	23cm 10 watt	£199 ●	B

RECEIVE PREAMPLIFIERS

		Price inc VAT	Post Rate
MMA28:	10m low noise preamp	£14.95	A
MMA144V:	2m RF switched preamp	£34.90	A
MMA1296:	23cm low noise preamp	£29.90	A

CONVERTERS

		Price inc VAT	Post Rate
MMC28/144:	10m up to 2m	£27.90	A
MMC50/28:	6m down to 10m	£27.90	A
MMC70/28:	4m down to 10m	£27.90	A
MMC70/28LO:	4m down to 10m/LO output	£29.90	A
MMC144/28:	2m down to 10m	£27.90	A
MMC144/28LO:	2m down to 10m/LO output	£29.90	A
MMC432/28-S:	70cm down to 10m	£34.90	A
MMC432/144-S:	70cm down to 2m	£34.90	A
MMC1296/28:	23cm down to 10M	£32.20	A
MMK1296/144:	23cm down to 2m	£59.80	B
● MMK1691/137-5:	1691MHz weather satellite converter	£115 ●	B

NOTE: A letter of authority must be obtained from the Home Office before using the MMK 1691/137-5

POSTAGE

The above prices include VAT but not postage. Please add postage to the above at the following rates:

UNITS 'A' = £1 UNITS 'C' = £3
UNITS 'B' = £2.50 UNITS 'D' = £4

MOBILE RALLIES—1982

OUR ENTIRE RANGE OF PROFESSIONAL QUALITY PRODUCTS WILL BE EXHIBITED AND ON SALE AT MOST OF THE MOBILE RALLIES AND EXHIBITIONS BY OUR OWN SALES TEAM. COME ALONG AND SEE FOR YOURSELF . . .

ALL MICROWAVE MODULES PRODUCTS ARE FULLY GUARANTEED FOR 12 MONTHS (INCLUDING PA TRANSISTORS)

Access BARCLAYCARD VISA

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BROOKFIELD DRIVE, AINTREE, LIVERPOOL L9 7AN, ENGLAND
Telephone: 051-523 4011 Telex: 628608 MICRO G

CALLERS ARE WELCOME, PLEASE TELEPHONE FIRST

HOURS:
MONDAY–FRIDAY
9–12.30, 1–5.00

WATERS & STANTON ELECTRONICS

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

THERE NOW FOLLOW 3 PAGES OF BARGAINS

ONLY AN APRIL FOOL WOULD IGNORE THESE
SEND NOW FOR THESE SPECIAL APRIL DEALS

START WITH THIS — — — —

2 METRE FM/SSB/CW 10 WATTS

£289

FREE CREDIT

* High/low power switch
* Dual VFOs
* Tone burst & 600kHz shift
* RIT & noise blanker
* 70cms option
* 4MHz wide option

— — — — AND BUILD UP TO THIS!

70cms EXPANDER £199 | DUAL BAND ALL MODES | PS750 AC PSU £66

With money getting tighter it's quite amazing that people will spend up to £800 in order to run all-modes on both 2m and 70cms Two separate all-mode rigs for 70cms and 2m may be a luxury but at a price. Not surprisingly more and more people are realising the true versatility in the M750E concept. Even the basic 2m all-mode M750E makes an £80 saving over the competition. Then for less than £200 you can enjoy all-modes on 70cms. That's half the price of any comparable all-mode rig. So forget the expensive options, get yourself an M750E set up and with the money you've saved, give the family a holiday—that's something that will meet with instant XYL approval!

FREE CREDIT ON ABOVE ITEMS

M750E £95 deposit + 10 monthly payments of £19.40
M750E + EXP 430 £160 deposit + 10 monthly payments of £32.80
M750E + EXP + PSU £183 deposit + 10 monthly payments of £37.10

OFFER EXPIRES 30th APRIL 1982

APRIL MONEY SAVERS

1kW 5-BAND DIPOLE with feeder

At last a 5-band dipole. Our unit is complete with 1kW traps, 14swg alloy wire, centre and end insulators, 50ft of UR43 with PL259, nylon rope and sundry wire clamps etc. Limited stocks at this price. These really are first class units that are beautifully finished and fully corrosive resistant.

80–10m
118ft long
£39
p&p £2

Ideal for use with WELZ AC38 ATU

NEW ADONIS MICS

Two new Adonis microphones for the modern generation of equipment. Both have high quality condensor inserts, feature up/down buttons for remote frequency control and have switchable response for FM/SSB. The 503 model also features a dual level compressor.

AM 303 £27.00 AM 503 £35.00

ADONIS HEADSET WITH MIC

At last, a quality headset and boom mic. purpose made by Adonis for Amateur Radio. Included is a Tx/Rx control box ideal for mobile operation with up/down frequency control buttons. Can equally be used for base stations and matches all current sets.

MM 202HM £39.00

AZDEN MOBILE SPEAKERS "006"

HEAR THE DIFFERENCE!
This speaker from Axden has been purpose designed for mobile operation. You will actually hear the improved clarity the moment you switch on. Send for yours today and enjoy easy copy.

£8.95 p&p 75p

AZDEN BOOM MIC

Keep both hands on the wheel and enjoy your mobile operation safely. With the Adonis Mex 55 you can do just that. It comprises a black anti-dazzle goose neck mic with fitting bracket for sun visor or bulk head mounting. Also included is a Tx/Rx control box for gear lever mounting. Highly recommended.

£25 p&p £1

COMPLETE MORSE TRAINING KIT

Following our successful offer last year, we've put together another little morse training kit. It comprises professional quality morse key, morse oscillator and RSGB morse code handbook. Send for yours today—it's a sound investment.

£19.95

WATERS & STANTON ELECTRONICS

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

TVI? KILL IT DEAD

If you suffer with TVI then here is your chance to kill it dead. The HP4A has been purpose designed for us in Japan. It includes a braid breaker circuit but with DC continuity for safety regulations. Almost no insertion loss yet 35db attenuation at 145MHz and over 70db at 30MHz makes it a sure fire cure. We supply the same filter to British Telecom on a regular basis—what better recommendation!

TRIO—FULL RANGE STOCKED

TS830S	160-10m transceiver 9 bands	£694.00 (5.00)
VFO230	Digital VFO with memories	215.00 (5.00)
AT230	All-band ATU power meter	119.00 (2.25)
SP230	External speaker unit	34.95 (1.50)
DS2	Optional dc pack for TS830S	43.95 (1.50)
DFC230	Dig fequency remote controller	179.00 (1.50)
YK88C	500Hz CW filter	29.60 (1.00)
YK88CN	270Hz CW filter	32.60 (1.00)
TS530SE	160-10m trans 200w pep digital	534.00 (5.00)
VFO240	External VFO	92.50 (5.00)
SM220	Station monitor scope	198.00 (5.00)
BS8	Pan display TS820/180/830	44.85 (.50)
BS5	As above for TS520	44.85 (.50)
R820	Amateur band receiver	589 (5.00)
YG455C	500Hz CW filter	61.00 (.50)
YG455CN	250Hz CW filter	65.00 (.50)
YG88A	6kHz AM filter	35.40 (.50)
TS180S	160-10m S/State transceiver	679.65 (5.00)
VFO180	External VFO	96.60 (1.50)
SP180	External speaker unit	36.80 (1.50)
AT180	Matching 200W antenna tuner	95.45 (5.00)
YK88C	500Hz CW filter	29.60 (.50)
YK88S	Second SSB filter option	29.20 (.50)
PS30	AC power supply for TS180S	88.50 (5.00)
TS130S	8 band 200W pep	525.00 (5.00)
TS130V	8 band 20W pep	445.00 (5.00)
DFC230	Dig frequency remote controller	179.00 (1.50)
TL120	200W pep linear for TS120V	144.00 (5.00)
MB100	Mobile mount for TS120/130	17.00 (1.00)
YK88C	500Hz CW filter	29.60 (.50)
YK88S	2nd SSB filter option	32.60 (.50)
VFO120	External VFO	85.00 (5.00)
SP120	Base station external speaker	23.00 (1.25)
SP40	New mobile speaker unit	12.40 (1.50)
AT130	100W antenna tuner	79.00 (1.50)
PS20	AC power supply TS120/130V	49.45 (5.00)
PS30	AC power supply TS120/130S	88.50 (5.00)
MA5	5 band mobile aerial system	88.75 (4.50)
TL922	160-10 metre 2KW linear	624.00 (5.00)
MC50	dual impedance desk microphone	25.75 (1.50)
MC35S	Fist microphone 50K impedance	13.80 (1.00)
MC30S	Fist microphone 500ohm imp.	13.80 (1.00)
LF30A	HF lowpass filter. 1kW	19.30 (1.00)
RD300	1kW oil filled dummy load	52.00 (1.50)
TS770E	2m/70cm all mode transceiver	785.00 (5.00)
SP70	External speaker unit	18.60 (1.00)
TR9000	2m synthesised multimode	374.00 (5.00)
TR9500	70cm all-mode	449.00 (5.00)
BO9	Base plinth for TR9000	34.95 (5.00)
TR7800	2m FM synthesised mobile	284.00 (5.00)
TR7850	40w version of above	314.00 (2.50)
TR8400	70cm FM synthesized	334.00 (2.50)
PS10	AC psu for above	64.75 (2.50)
TR2300	2M FM synthesised portable	166.75 (5.00)
VB2300	10W amplifier for TR2300	58.00 (1.50)
MB2	Mobile mount TR2300/VB2300	17.70 (1.00)
RA1	Rubber flexible antenna	6.90 (.50)
PS1200	AC power unit and charger	29.50 (1.50)
TR2400	2m FM synthesised handheld	198.95 (5.00)
SMC24	External speaker/mic	13.80 (1.00)
ST1	Base stand and quick charger	45.00 (1.50)
BC5	12V quick charger	18.40 (1.50)
SC3	Soft carrying case	11.50 (.50)
LH1	Hard leather holster	20.00 (.50)
PB24	Spare battery pack/charger lead	15.00 (1.50)
PL1	Spare power/charge lead	1.50 (.15)
R1000	Gen. Coverage Receiver	295 (5.00)
SP100	External speaker	26.90 (2.50)
HC10	Digital desk World Clock	58.75 (1.50)
HS5	Deluxe Comm. headphones	21.85 (1.00)
HS4	Standard headphones	10.35 (1.00)
DM801	Dip meter	60.00 (1.75)
TR7730	New 25W FM transceiver	247.00 (5.00)

VW3 SWR/PWR/FS METER 3-150MHz—RECOMMENDED

£11.95 + 60p p&p

NEW! AZDEN PCS300

FREE CREDIT!

3 WATTS
144-146MHz
12½kHz STEPS

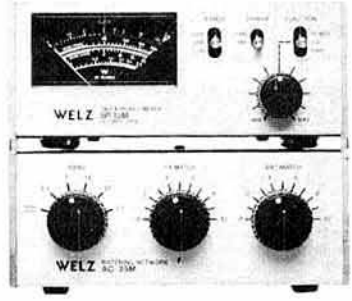
£184 inc AC charger

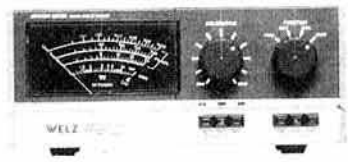
FREE CREDIT—Deposit £64.00
Balance 6 months £20.00

We've really broken the price barrier with this brand new unit from Azden combining all the features you've ever wanted in a hand-held at an incredible inclusive price. Incredibly powerful, it will give over 4 watts output in the high power mode with 1 watt in the low power position. Coverage is 144 to 146MHz in 12½kHz steps, ideal for UK use. Tone burst and 600kHz repeater shifts are all included for any repeater in Europe. The clear LCD display is a mine of information, indicating frequency, memory address, repeater shift, bar "S meter" reading, RF output and low battery volts. The front panel key pad is of superior construction with a piezo bleeper indicating key entry on every function.

Comprehensive scanning facilities include band scanning and memory scanning plus programmable upper and lower band limits, with pause and auto resume. Unlike most rigs the memory back-up is permanently connected as it draws a miserly 0·01ma! Other controls include programmable repeater shift, dial illumination, key lock, PTT lock etc. Deliveries of this amazing rig are due in February and at this price it's a real breakthrough. **In Stock Now!**

SOUND RF ENGINEERING FROM WELZ





SP15M POWER METER £29.00
Here's a real economy in line power meter, ideal for the HF/VHF operator. Maximum handling is 200 watts and forward/reflected power is directly read in 3 ranges: 0 2·5, 0 20W and 0 200W. Sensitivity is constant throughout the range 1·8-150MHz.

AC 38m 3·5-29MHz ATU £59.00
This is a must for solid state rig owners. Designed for coax feed, this ATU covers 8 bands 3·5 to 30MHz with a straight through position. Rated at 400 watts it will match anything between 10 and 300 ohms. Ideal for over 5 band dipole.

MODELS

SP200 1·8 160MHz 20W 200W 1kW	£59.00 (n.c.)
SP300 1·8 500MHz 20W 200W 1kW	£79.00 (n.c.)
*SP400 130 500MHz 5W 20W 150W	£59.00 (n.c.)

*Note: VHF model has 'N' sockets

PROFESSIONAL QUALITY SWR/POWER METERS NOW LEARN THE TRUTH

Welz VSWR/POWER meters are high quality instruments approaching laboratory accuracy. They are capable of providing extremely accurate measurements of both power and voltage standing wave ratio. Features include high sensitivity (2·5W full scale 1·8 500MHz), and completely flat response.

SEND SAE FOR COLOUR LEAFLETS

USE YOUR HEAD!

AZDEN PCS 3000

£219

FREE CREDIT!

The electronics versatility combined with mechanical forethought of design has made the PCS300 a remarkable package at an incredible price. Its eight channel memory combined with 3 modes of scanning add up to a most practical design. Then consider its 25 watts plus of output power and its detachable control head feature and you'll see how easily it beats the opposition. Then there is those little extras; whilst competitors offer up/down frequency control from the microphone, the PCS3000 has added to this a remote volume control and reverse repeater button all in the palm of your hand. Don't delay, send today for full colour brochure.

FDK MULTI 700EX 25W 2m FM

FREE CREDIT!

£199

Every so often a classic is born that outlasts and outperforms the competition. In FM radio the M700EX is just such a rig. Its 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 limited 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.

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Now with higher power

- * 6 xtal controlled channels
- * 600kHz repeater shift
- * S20 & S22 fitted
- * 2 Watt output
- * Ni-cad battery pack
- * AC mains charger

T1200 £179

- * 143-148MHz FM
- * 3 Watt or 1 Watt o/p
- * Programmable steps 5kHz-100kHz
- * 10 memory channels
- * Comprehensive scanning
- * Ni-cad battery pack
- * AC mains charger

YAESU—FULL RANGE STOCKED

FT101ZFM	160-10m 9 band transceiver	590.00 (5.00)
FT101ZDFM	160-10m 9 band transceiver	645 (5.00)
DIGT 101Z	Digital unit for	90.00 (1.00)
DCT101Z	DC adaptor	42.50 (1.00)
FV101Z	Remote vfo	112.00 (5.00)
FANT101	Fab for 101 series	13.80 (1.00)
FT902DM	9 band AM/FM transceiver	885.00 (5.00)
FT902DE	9 band transceiver	790.00 (5.00)
FC902	9 band atu, swr/pwr etc	135.00 (5.00)
FTV901R	Transverter fitted 2m module	285.00 (5.00)
430TV	70cm module for above	185.00 (5.00)
144TV	2m module for transverter	100.00 (1.75)
70TV	4m module for transverter	80.00 (1.75)
YO901P	Monitor scope with pan, adap.	330.00 (5.00)
YO901	Standard monitor scope	256.00 (5.00)
FV901DM	Remote vfo for 901	260.00 (5.00)
SP901	External speaker	31.00 (2.00)
FL2100Z	9 band 1200W linear	425.00 (5.00)
FT107	9 band solid state 100W	725.00 (5.00)
FT107DMS	As above but with memory	799.00 (5.00)
DMST107	Memory unit	92.75 (2.00)
FV107G	Remote vfo for above	98.50 (5.00)
SP107G	External speaker	29.90 (2.00)
FC107G	Aerial tuning unit	112.70 (5.00)
FP107	230V AC power module	101.95 (2.50)
FP107EG	As above in cabinet	113.00 (5.00)
FT707	8 band solid state 100W	549.00 (5.00)
FP707	230V AC power supply	125.00 (5.00)
FC707	Aerial tuner (unbalanced only)	85.00 (2.00)
MR7	Metal rack for above	15.70 (2.00)
MMB2	Mobile mounting bracket	16.00 (1.00)
FRG7	0-5-30MHz receiver	199.00 (n.c.)
FRG7700	SSB/AM/FM recvr. dig. readout	329.00 (n.c.)
MEM7700	Memory unit for above	90.00 (1.00)
Converters for above:		
FRV770A	118-150MHz in stock	69.75 (1.75)
FRV7700B	50-60MHz & 118-150MHz	75.50 (1.75)
FRV7700C	140-170MHz	65.95
FRV7700D	70-80MHz & 118-150MHz	72.45 (1.75)
FRT7700	Receiver aerial tuner	37.85 (2.00)
FF5	LF filter for above	9.95 (1.00)
FT480R	2m all-mode transceiver	365.00 (2.00)
FP80A	230V AC power supply	63.25 (2.00)
FL2050	50 watt linear	126.50 (2.00)
FT780R	70cm all-mode transceiver	449 (2.00)
FT290R	2m all mode portable	249.00 (2.00)
NC11C	AC charger	8.00 (1.00)
CSC-1	Carrying case	3.45 (.50)
MMB-11	Mobile mounting bracket	22.25 (1.50)
FL2010	10 watt linear for FT290	64.00 (2.00)
NC/WSE	2 amp hour ni-cad pack	20.00 (1.75)
FT208	2m synthesized portable FM	209.00 (n.c.)
NC9C	AC charger	8.00 (1.00)
FT708R	70cm hand-held	219.00 (n.c.)
FP4	230V/4amp psu	42.95 (2.00)
FP12	230V/12 amp psu	86.25 (2.50)
YP150Z	150W dummy load power meter	92.00 (2.00)
YH55	Standard 8 ohm headphones	9.95 (1.00)
YH77	Lightweight headphones	10.00 (1.00)
QTR24D	World Ham clock	28.00 (1.50)
YM34	600/50k ohm base mic 8 pin plug	21.45 (1.00)
YM35	600 ohm hand mic. up/down 8 pin p.	13.80 (1.00)
YM36	600 ohm as above (no up/down)	13.00 (1.00)
YM37	600 ohm hand mic. 8 pin plug	6.90 (1.00)
YE7A	600 ohm hand mic. 4 pin plug	6.90 (1.00)
YD844A	600/50k ohm base mic. 4 pin plug	25.30 (1.00)

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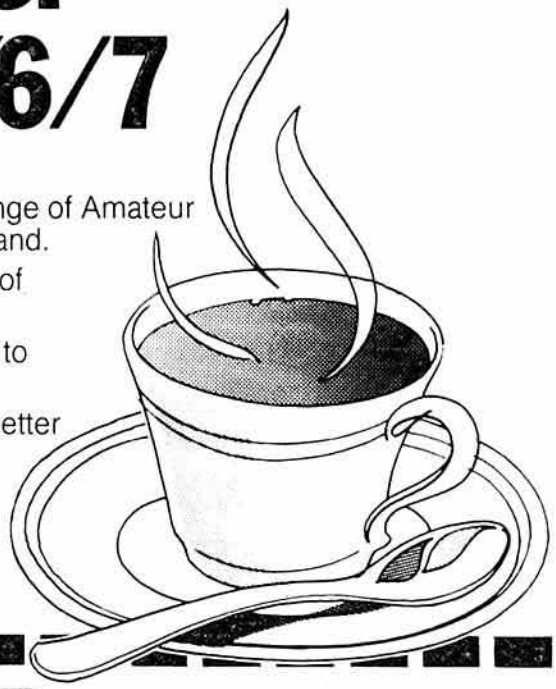

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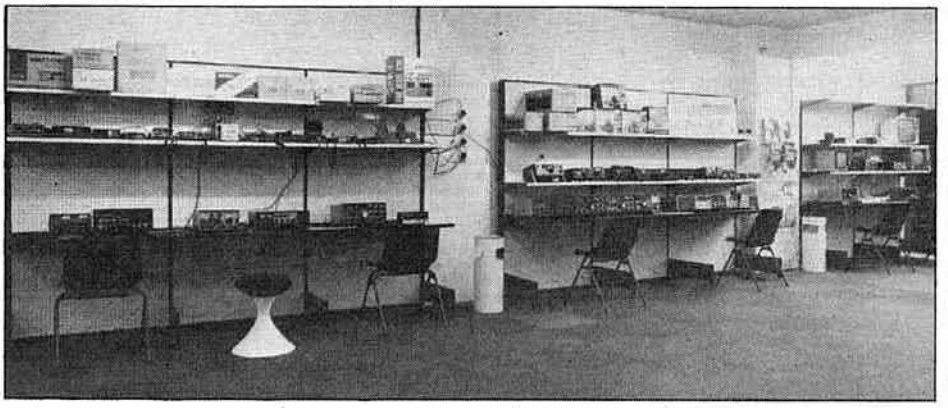

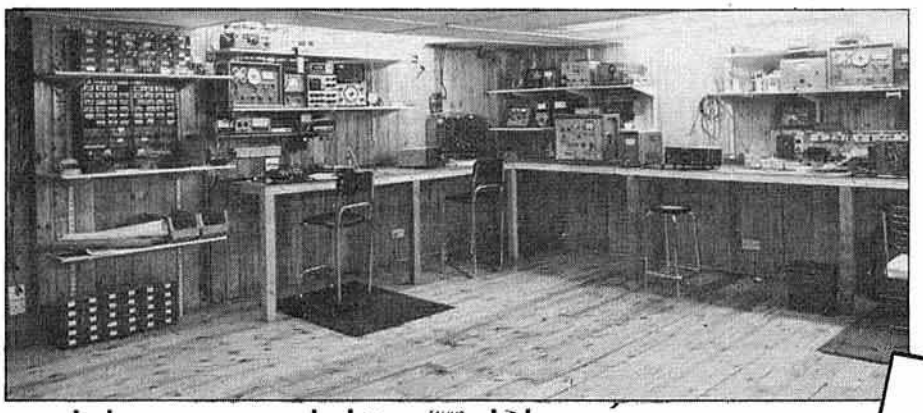

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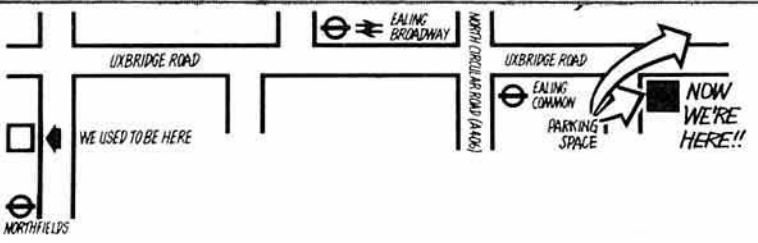
← *A look at the superb facilities in our servicing section.*

Phone for stock and delivery position on any of the above manufacturers' ranges and for up-to-date price information.



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TRIO		£	Carr.
TS830S	160-10m Transceiver 9 Bands	694.00	(—)
VFO230	Digital V.F.O. with Memories	215.00	(2.00)
AT230	All Band ATU/Power Meter	119.00	(2.00)
SP230	External Speaker Unit	34.96	(1.50)
DFC230	Dig. Frequency Remote Controller	179.00	(1.50)
YK88C	500Hz CW Filter	29.60	(0.50)
YK88CN	270Hz CW Filter	32.66	(0.50)
TS130S	8 Band 200W Pep Transceiver	525.00	(—)
TS130V	8 Band 20W Pep Transceiver	445.00	(—)
VFO120	External V.F.O.	85.00	(1.50)
TL120	200W Pep Linear for TS120V	144.00	(1.50)
MB100	Mobile Mount for TS130/120	17.00	(1.50)
SP120	Base Station External Speaker	23.00	(1.50)
AT130	100W Antenna Tuner	79.00	(1.50)
PS20	AC Power Supply - TS130V	49.45	(2.50)
PS30	AC Power Supply - TS130S	88.50	(5.00)
MA5	5 Band Mobile Aerial System	86.00	(5.00)
MC50	Dual Impedance Desk Microphone	25.76	(1.50)
MC35S	Fist Microphone 50K ohm IMP	13.80	(0.75)
MC30S	Fist Microphone 500 ohm IMP	13.80	(0.75)
LF30A	HF Low Pass Filter 1kW	17.90	(1.00)
TR9000	2M Synthesised Multimode	371.00	(—)
BO9	Base Plinth for TR9000	34.90	(1.50)
TR7800	2M Synthesised FM Mobile 25W	284.00	(—)
TR7730	2M Synthesised FM Compact Mobile 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	334.00	(—)
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	169.00	(—)
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 x 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)

TV INTERFERENCE AIDS			
Ferrite Rings 1⅛" dia. per pair		0.80	(0.20)
Toroid Filter TV Down Lead		2.00	(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)
Large Egg Insulators		0.50	(0.10)
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)

Please send total postage indicated. Any excess will be refunded.

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	(—)
MML144/100LS	2m 100W Linears (1/3WI/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	228.64	(—)
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	7cm 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	(—)

DATONG PRODUCTS			
PC1	Gen Coverage Converter H.F. on 2M	120.75	(—)
VLF	Very Low Frequency Converter	25.30	(—)
FL1	Frequency Agile Converter	67.85	(—)
FL2	Multi-mode Audio Filter	89.70	(—)
ASP	Auto R.F. Speech Clipper (Trio or Yaesu Plug)	79.35	(—)
D75	Manually controlled R.F. Speech Clipper	56.35	(—)
RFC/M	R.F. Speech Clipper module	26.45	(—)
D70	Morse Tutor	49.45	(—)
AD270	Indoor Active Filter (inc PSU)	42.55	(—)
AD370	Outdoor Active Filter (inc PSU)	56.35	(—)
MK	Keyboard morse sender	129.00	(—)
Codecall	Selective calling device (Link prog)	29.32	(—)
"	" " " (Switch prog)	29.32	(—)
HFA	Wideband preamplifier	27.60	(—)
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			
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

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Morse Tutor – new product

TEST EQUIPMENT			
Drae VHF Wavemeter 130-450MHz		24.95	(—)
FXI Wavemeter 250MHz MAX		33.00	(0.75)
DM81 Trio Dip Meter		59.75	(0.75)
MMD50/500 Dig. Frequency meter (500MHz)		69.00	(0.75)

Co-AXIAL SWITCH			
5 Way Rotary (H.F.)		10.95	(0.50)
2 Way Diecast (V.H.F.)		10.00	(0.50)
2 Way Toggle (V.H.F.)		6.50	(0.50)

HELICAL ANTENNAS			
2M BNC or PL259 (state which required)		4.50	(0.50)
2M Thread for TR2300 or FT290R (state which)		4.50	(0.50)
70cm BNC		4.50	(0.30)

YAESU			
FT1	Superb new HF Transceiver	1295	(—)
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)
FT101Z	160-10m 9 Band Transceiver (FM)	590.00	(—)
FT101ZD	160-10m 9 Band Transceiver (FM) Digital R.O.	665.00	(—)
DCT101Z	DC/DC Power Pack	42.55	(1.50)
FAN101Z	Cooling Fan for 101Z/ZD	13.80	(0.75)
FT707	8 Band Transceiver 200W Pep	569.00	(—)
FT707S	8 Band Transceiver 20W pep	485.00	(—)
FP707	Matching Power Supply	125.00	(5.00)
FTV707R (2)	Transverter - 2M	198.00	(—)
FV707DM	Digital V.F.O.	186.00	(—)
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	189.00	(—)
FRG7700	200KHz-30MHz Gen. Coverage Receiver	329.00	(—)
FRG7700M	As above but with Memories	409.00	(—)
FRT7700	Antenna Tuning Unit	37.00	(1.00)
FT208R	2M FM Synthesised Handheld	209.00	(—)
FT290R	2M Portable Synthesised Multi-mode	249.00	(—)
FT708R	70cm FM Synthesised Handheld	219.00	(—)
NC7	Base Trickle Charger	26.88	(1.30)
NC8	Base Fast/Trickle Charger	44.10	(1.50)
NC9C	Compact Trickle Charger	8.00	(0.75)
FBA2	Battery Sleeve for use with NC7/8	3.05	(0.50)
FNB2	Spare Battery Pack	17.25	(0.75)
PA3	12V DC Adaptor	13.40	(0.75)
FT480R	2M Synthesised Multimode	379.00	(—)
FT780R	70cm Synthesised Multimode (1.6MHz Shift)	459.00	(—)
FP80	Matching 230V AC Power Supply	63.00	(1.50)

FT290R	2M Portable Synthesised Multimode	249.00	(—)
MMB11	Mobile Mounting Bracket	22.25	(1.00)
CSC1	Soft Carrying Case	3.45	(0.75)
NC11C	240V AC Trickle Charger	8.05	(0.75)
FL2010	Matching 10W Linear	64.00	(1.20)
Nicads	2.2 AMP HR Nicads Each	2.50	(—)
FF501DX	H.F. Low Pass Filter 1kW	23.00	(1.00)
FSP1	Mobile External Speaker 8 ohm 6W	9.95	(0.75)
YH55	Headphones 8 ohm	10.00	(0.75)
YH77	Lightweight Headphones 8 ohm	10.00	(0.75)
QTR24D	World Clock (Quartz)	28.00	(0.75)
YM24A	Speaker/Mic 207/208/708	16.85	(0.75)
YD148	Stand Microphone Dual IMP 4 Pin Plug	21.00	(1.50)
YM34	As 148 but 8 Pin Plug	21.45	(1.50)
YM38	As 34 but up/down Scan Buttons	24.90	(1.50)

FDK VHF/UHF EQUIPMENT			
Multi 700EX	2M FM Synthesised 25W Mobile	199.00	(—)
Multi 750E	2M Multimode Mobile	289.00	(—)
Expander	70cm Transverter for M750E	219.00	(—)

STANDARD VHF/UHF			
C78	70cm FM Portable	219.00	(—)
CPB78	10W Matching Linear	67.50	(1.50)
C58	2M Multimode Portable	239.00	(—)
CPB58	25W Matching Linear	79.50	(1.50)
CM8	Mobile Bracket	19.95	(1.00)
CL8	Soft Carrying Case	6.95	(0.75)
C12/230	Charger	7.59	(0.75)

WELZ SWR/POWER METERS

SWR - POWER METERS			
Model 110	H.F/2M Calibrated Power Reading	11.50	(0.50)
SWR25	H.F./2M Twin Meter	11.50	(0.50)
UH74	2M/70	14.30	(0.50)
WELZ SP15M	H.F./2M 200W	29.00	(0.75)
WELZ SP200	H.F/2M	59.00	(1.00)
WELZ SP300	H.F./2M/70	79.00	(1.00)
WELZ SP400	2M/70	59.00	(1.00)
DAIWA SW110A	H.F/2M	35.00	(—)
DAIWA CN620A	H.F/2M Cross Pointers	52.80	(—)
DAIWA CN630	2M/70 Cross Pointers	71.00	(—)

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Your number one source for YAESU MUSEN

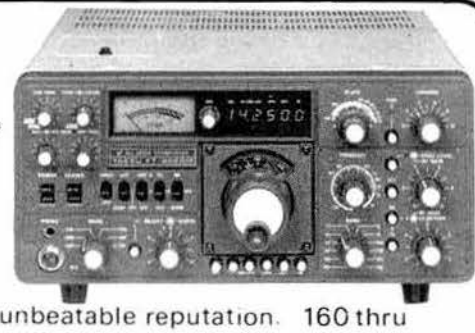
FT-ONE SUPER HF TRANSCEIVER

This is the latest and most exotic product from YAESU's superb design team. 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 95 dB! 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.

NEW! **FT-230R 25 watt 2metre FM mobile**

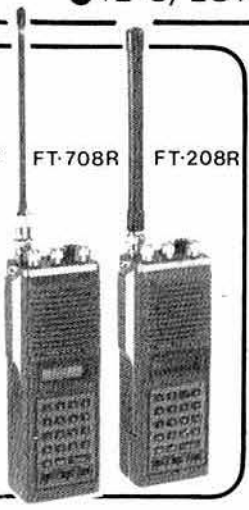
£239.00 Including VAT

- Two independent VFO's
- 10 memories
- Priority function
- Memory and band scan
- 12·5/25 KHz steps
- Large LCD readout.

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

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

NC8 Charger DC PSU



FT-480R High technology all-mode 2metre mobile

The most advanced 2 metre mobile available today – USB, LSB, FM, CW full scanning with priority channel, 4 memory channel, dual synthesized VFO system.

FT-780R
All-mode 70 cm mobile

4 memories, memory and bandscan from microphone, conservative 10 watts out – All the features of the FT-480 on 70cm.

FT-290R
All-mode
2 m portable

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

AGENTS

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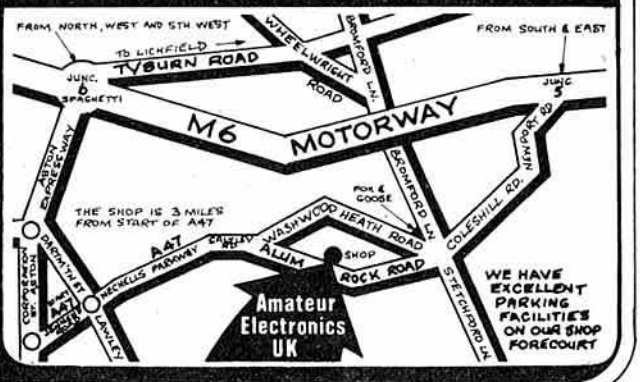


Amateur Electronics UK
508-516 Alum Rock Road·Birmingham 8
Telephone: 021-327 1497 or 021-327 6313
Telex: 337045
Opening hours: 9.30 to 5.30 Tues. to Sat. continuous – CLOSED all day Monday.

FT-ONE £1295 inc VAT @ 15%, Securicor–2 year guarantee–Free finance

★ All modes; AM, CW, FM, FSK, LSB, USB
★ Tx and Rx on opposite sidebands possible
★ Main dial; 10Hz resolution
★ Inbuilt keypad, direct digital entry to 100Hz
★ Tun/Scan Fast/Slow, Up/Down, Man/Auto
★ SSB; Variable bandwidth and IF shift
★ 300Hz, 600Hz, 2,400→300Hz, 6KHz, 12KHz
★ Receiver dynamic range up to 100dB
★ Two memory blanks (A & B) with 10 slots
★ ANY frequency storable ANY Tx/Rx split
★ RIT offset stored with memory channel
★ 100W RF, (50% duty FSK) all solid state
★ Mains and 12VDC Switch mode PSU
★ CW delay; adjustable to *full break in*
★ Electronic keyer built in‡. Drive level control
★ Digital readout to 100Hz Analogue marks
★ Dedicated digital readout of RIT to ±9·9KHz
★ Two large meters (+3 digitals and 12 leds)
‡ Option

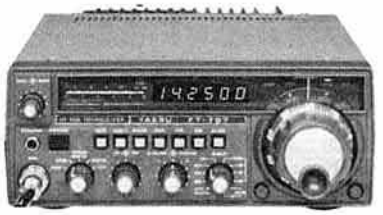
FT101Z £559 inc VAT @ 15%, Securicor–2 year guarantee–Free finance

★ 160-10 metres including new allocations
★ Variable IF bandwidth 2·4kHz to 300Hz
★ 8 pole filters for razor edge selectivity
★ Selectable CW fixed width CW-W and CW-N
★ Semi-break in with sidetone for CW
★ Digital plus analogue frequency displays
★ 6146B PA's with 6dB of negative feedback
★ 180W PIP and–31dB 3rd order intermod
★ RF speech processor fitted, adjustable level
★ VOX built-in front panel control
★ Wide dynamic range for big signal handling
★ High usable sensitivity, for those weak ones
★ Superb noise blanker, adjustable threshold
★ Attenuator: 0-10-20dB, front panel switch
★ AGC: slow-fast-off, front panel switchable
★ Clarifier (RIT) switchable on Tx, Rx or both
★ Low level transverter drive output facility
★ Universal PSU 110-234V ac and 12V dc
★ Incredible range of matching accessories
*6 models, Digital/Analogue–AM/FM options
*Option

FT107M £725 inc VAT @ 15%, Securicor–2 year guarantee–Free finance

★ 160-10 metres (inc. 10, 18 and 24MHz)
★ USB-LSB-CWW-FSK-AM multi-mode
★ Full broad band "no tune" power amplifier
★ 240W PIP. 75 per cent output at 3:1 VSWR
★ 12 memory channels with memory clarifier
★ Digital Memory Shift, for memory tuning
★ Up/down scanning control from the mic.
★ Variable IF width–16 poles of selectivity
★ Widths: 6kHz*, 2·4kHz→300Hz, 600Hz, 300Hz*
★ CW "fixed" widths CW-W-20 and CW-N*
★ Tunable Audio Peak (AFP) and Notch filter
★ Diode ring mixer for high Rx dynamic range
★ Noise blanker–panel adjustable threshold
★ AGC: slow-fast-off switchable from panel
★ Attenuator 0·20dB, plus RF gain on panel
★ RF speech processor fitted panel adjustable
★ Digital plus analogue frequency display
★ Meter: Vcc, Ic, AFC, Compression & SWR
★ Semi break-in with side tone. Vox built-in
★ Choice of built-in or separate PSU's
* Option

FT707 £569 inc VAT @ 15%, Securicor–2 year guarantee–Free finance



★ 80-10 metres (inc. 10, 18 and 24MHz)
★ USB, LSB-CWW, CWN, AM (Tx and Rx)
★ 100W PEP, 50% output at 3:1 VSWR
★ Full "broad band" no tune output stage
★ Excellent Rx dynamic range, power buffers
★ Rx Schotky diode ring mixer module
★ Local oscillator with low noise floor
★ Variable IF bandwidth–16 crystal poles
★ Bandwidths 2·4kHz → 300Hz, 600 or, 350Hz*
★ AGC: slow-fast switchable from front panel
★ VOX built-in and adjustable from front panel
★ Semi break-in with side tone for CW
★ Digital plus analogue frequency display
★ LED level meter reads S, PO and ALC
★ Convenient concentric AF, RF gain controls
★ Indicators for calibrator, fix, and ext VFO
★ Receiver offset tuning (RIT clarifier)
★ Advanced noise blanker with local loop AGC
★ 25kHz crystal calibrator feature
★ Internal, xtal or external VFO control
* Option

FT902DM £885 inc VAT @ 15%, Securicor–2 year guarantee–Free finance

★ 160-10 metres including new allocations
★ Variable IF bandwidth 2·4kHz to 300Hz
★ Audio Peak, notch controls independent
★ AM, FSK, USB, LSB, CW, FM (Tx & Rx)
★ Semi-break in. Inbuilt Curtis IC keyer
★ Digital plus analogue frequency displays
★ 6146B's with negative feedback
★ VOX built-in and adjustables
★ Instant write in memory channel
★ Tune-up button (10 sec, of full power)
★ Curtis Keyer–lambic, single or straight
★ Switchable AGC and RF attenuator
★ Optional; 350 or 600Hz CW, 6kHz AM filter
★ Clarifier switchable on Tx, Rx or both
★ Audio Peak and tunable notch filter
★ Plug-in modular, computer construction
★ Fully adjustable RF Speech processor
★ Ergonomically design with necessary LEDs
★ Incredible range of matching accessories
★ Universal PSU 110-234V ac and 12V dc
* Option

SMC SERVICE

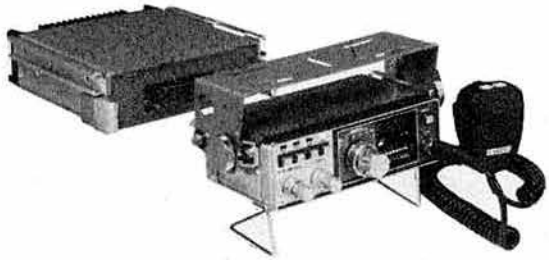
Free Finance on many items. Two year guarantee on Yaesu. Free Securicor on major Yaesu items. Access and Barclaycard over the telephone. Biggest Branch, Agent and Dealer network. Ably staffed, courteous, Service Department. "B Services" Securicor contract at £3.90!! Biggest stocks of amateur equipment in UK. Twenty-four years experience.

FREE FINANCE

On regular priced items from: Yaesu, Ascot SMCHS, CDE, HyGain, Channel Master, Hansen, SMC, MFJ,. KLM, Mirage and Hi-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 dealer selling the set. 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.



FT720RV £245 inc VAT @ 15% & SECURICOR

FT720 Control Head
- ★ Four easy write-in memory channels
- ★ Rx Priority channel (auto check)
- ★ Scanning, band/memory, empty/busy
- ★ Up/down tuning/scanning from mic.
- ★ Optically coupled tuning control
- ★ Manual and automatic tone burst
- ★ String LEDs for 'S' and PO, 7 status LEDs
- ★ 1½W of audio to internal/external speaker
- ★ 3·3 (4·3)" D × 6" W × 2 (2·2)" H

720RV 10W deck. **720RVH** 25W deck
- ★ 144–146MHz (144–148MHz possible)
- ★ 12½kHz synthesizer steps, 600kHz shift
- ★ 0·3μV for 20dB quieting
- ★ Rx 0·5A, Tx RV 3·5A, RVH 6·5A
- ★ 5·8 (6·5)" D × 6" W × 2 (2·2)" D

720RU 10W, 70cm, deck
- ★ 430–434MHz
- ★ 25kHz synthesizer steps, 1·6MHz shift
- ★ 0·5μV for 20dB quieting
- ★ Rx 0·5A, Tx 4·5A
- ★ 5·8 (6·5)" D × 6" W × 2 (2·2)" D

S72 Switching box
- ★ Pushbutton band change
- ★ Auto change of steps/splits

FT290R £249 inc VAT @ 15% & SECURICOR

- ★ 144–146MHz (144–148 possible)
- ★ Multimode USB, LSB, FM, CW
- ★ 2·5W PEP, 2·5W RMS/300mW
- ★ LED's, "ON AIR", "BUSY"
- ★ Moving coil meter for S & PO
- ★ Integral telescopic antenna
- ★ Width 2.4kHz & 14kHz—6dB
- ★ Optically coupled main tuning
- ★ 100Hz backlite LCD display
- ★ 10 memory channels
- ★ "Five year" memory backup
- ★ FM: 25kHz and 12·5kHz steps
- ★ SSB: 1kHz and 100Hz steps
- ★ Any Tx/Rx split with dual VFOs
- ★ ±600kHz split, 1,750kHz burst
- ★ Mobile bracket available
- ★ Matching 10W linear Amplifier
- ★ Up/down tuning from mic
- ★ AF output 1W @ 10% THD
- ★ 58(H) × 150(W) × 195(D) (1·3kg)
- ★ Rx: 70mA, Tx: 800mA (FM max)
- ★ 8 "C" Nicads or Drys (Internal)
- ★ 8·5–15·2V DC (External)
- ★ Scan on memory (±10kHz)
- ★ Long battery life SMC 2·2A/Hr

FT790R HERE SOON!

FT230R HERE NOW

FT480R (2m) FT780R (70cm)

- ★ USB LSB CW FM (A3j, A1, 13).
- ★ 30W PEP A3j, 10/1W out A1/F3
- ★ Bandpass filter no tune design
- ★ Bandwidth 2·4kHz & 14kHz @ −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

FT480R £379 inc VAT @ 15% & SECURICOR

- ★ 144–146MHz (143·5–148·5MHz possible)
- ★ Excellent dynamic range sensitivity
- ★ FM, 25, 125, 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

FT780R £449 inc VAT @ 15% & SECURICOR

- ★ NMOS four bit micro control
- ★ 430–434MHz (440–445MHz possible)
- ★ GaAs Fet RF for incredible sensitivity
- ★ 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

FT480R

1·6MHz shift now available

FT780R

FREE FINANCE AVAILABLE—TWO YEAR GUARANTEE

FRG7 £199 inc VAT @ 15% & SECURICOR

- ★ "Industry Standard" value for money Rx
- ★ 30MHz-500kHz in One MHz bands
- ★ SSB (LSB/USB), CW, AM
- ★ Sensitivity AM; 0·7μV 10dB S/N at 30%
- ★ Selectively ±3kHz at −6dB
- ★ Stability; 500Hz after 30 minutes
- ★ Triple conversion, drift cancelling
- ★ Direct frequency readout to 5kHz
- ★ Fine tuning control
- ★ AGC; DC amplified, 3 stage control
- ★ AF; Powerful 2 watts of audio
- ★ Forward facing internal speaker
- ★ Record socket "volume independent"
- ★ Well calibrated "sharp" preselector
- ★ AM automatic noise suppression circuit
- ★ Antenna Hi to 1·6MHz, 50 ohm to 30MHz
- ★ 3 position RF attenuator
- ★ 3 position AF filter (LP, WBP, NBP)
- ★ 110/240V ac and 12V dc
- ★ Lights; battery economy switch
- ★ Illuminated edge type "S" meter
- ★ 2 IC, 9 FET, 13 Tr, 16D (9Ge, 5Si, 2Z)
- ★ Weight; 7kg (without batteries)
- ★ Dimensions: 340 (W) × 153 (H) × 285 (D) mm
- ★ Optional battery holder available

FRA ACTIVE ANTENNA SOON!

FRG7700 £329 inc. VAT @ 15% & SECURICOR

- ★ Wide coverage, *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 500ohm to 2MHz, 50ohm to 30MHz
- ★ 20dB pad plus continuous attenuator
- ★ 110 and 240V ac and 12V dc option
- ★ Switchable speed A.G.C. system
- ★ Signal meter calibrated in "S" and SIMPO
- ★ FRT7700; 150kHz-30MHz. Attenuator etc.
- ★ FRV7700A; 118–130, 130–140, 140–150MHz
- ★ FRV7700B; 118–130, 140–150, 50–59MHz
- ★ FRV7700C; 140–150, 150–160, 160–170MHz
- ★ FRV7700D; 118–130, 140–150, 70–80MHz
- ★ FRV7700E 118-130, 140-150, 150-160MHz
- ★ FRV7700F 118-130, 150-160, 170-180MHz
- ★ FF5; 500kHz (for improved VLF reception)
- ★ MEMGR7700; 12 Channels (internal fitting)

FT208R (2m) FT708R (70cm)

- ★ 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 charge NiCad pack
- ★ 1,750Hz tone burst
- ★ Built in condenser microphone
- ★ 500mW AF to int/ext speaker
- ★ External speaker/mic available
- ★ Keyboard offers 16 tone DTMF
- ★ 168(H) × 61(W) × 39(D)mm
- ★ C/w NiCad pack, helical
- ★ Range of chargers, mounts etc.

FREE FINANCE

FT208R £209 inc. VAT @ 15% & SECURICOR

- ★ 144-146MHz (144-148MHz 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

FT708R £219 inc. VAT @ 15% & SECURICOR

- ★ 430-440MHz (440-450MHz possible)
- ★ 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

2 YEAR GUARANTEE

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Redcar	Simon	G4EQS	(0642) 480808
Buckley	Howarth	GW3TMP	(0244) 549563
Neath	John	GW4FOI	(0639) 55114/2942
Jersey	Geoff	GJ4ICD	(0534) 26788

ASCOT

These are a complete range of mobile antenna accessories developed and manufactured in the UK.

They are extremely rugged, designed to withstand extremes of weather using: fine stainless steel whips, A100 nylon bases, chrome plated brass ferrules, heat treated silver plated beryllium copper contacts and polished stainless steel shock springs.

From the list below, choose the base (¼, ⅜, ½) choose the whip (long or short) and the cable assembly required (cable or magnetic). Then add an accessory if required.

340	Base. Stand 1/4λ 60-550MHz	£2.30	£0.40
310	Base. Swivel 1/4λ 60-550MHz	£4.20	£0.40
344	Base. Sprung 1/4λ 60-120MHz	£6.50	£0.52
440	Base. Stand 5/8λ 145MHz	£2.70	£0.40
330	Base. Swivel 5/8λ 145MHz	£5.00	£0.40
341	Base. Sprung 5/8λ 145MHz	£7.30	£0.52
350	Base. Fine tune 1/2λ 145MHz	£7.30	£0.52
351	Base. Sprung 1/2λ 145MHz	£8.05	£0.63
057	Whip, tapered SS 127cms	£1.95	£0.98
056	Whip, parallel SS 63cms	£0.75	£0.75
085	Mount cable 5/8 & 1/4λ	£3.05	£0.63
085LR	Mount cable 5/8 & 1/4λ	£3.85	£0.63
092	Mount Mag. 5/8 & 1/4λ	£10.75	£0.86
084	Mount cable 1/2λ	£5.00	£0.63
088	Mount cowl 1/2λ	£5.75	£0.40
091	Mount Magnetic 1/2λ	£10.75	£0.86
089	Gutter clip adaptor	£5.00	£0.63
093	Boot lip adaptor	£3.80	£0.52

NB: PRICES INCLUDE VAT AT 15%
Carriage extra, mainland rate shown, max £1.73

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 1-1¼in 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	£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	£0.75

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

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.
1⅛in-2½in masts
Lower casting optional.

KR400RC
£90.85

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

KR500
£86.25

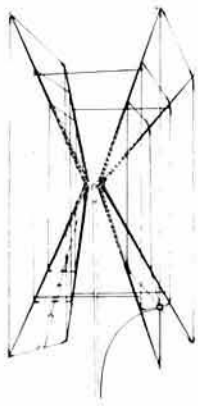
Elevation Rotator (180°).
Up to 50kg of Load.
1¼in-2¼in mast.
1¼in-1¾in boom.

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

Gem Quad



A light strong, boomless, quad antenna covering 10-15-20m. The centre spider is aluminium and the spreader arms (13·6ft and 2·2lb) are of a glass fibre tridectic construction. (Thin rods forming a triangle with tape criss-crossing for light, rigid, low wind resistance structure.)

The double cone shape offers optimum spacing between loops and maintains these critical measurements even under severe weather conditions. This optimum spacing provides "monobander" performance; high gain, maximum capture area, low angle radiation, low SWR and good F/B and F/S ratios. The toroidal balun supplied provides single 50 ohm coaxial feed on all bands, with no lossey coils, traps or switches.

2 element 18' × 18' × 9½'; TR 9½'; 8dB Gain; 25dB F/B
3 element As 2 ele plus 6·5 boom; 8·9dB Gain; 30dB F/B.
4 element As 2 ele plus 13' boom; TR 22'.

GQ2E	2 Ele Antenna	£142.60	£4.31
GQ3E	3 Ele Antenna	£215.05	£7.42
GQ4E	4 Ele Antenna	£286.35	£8.11
GQCK1	Conversion Kit 1 Ele	£72.45	£3.34
GQCK2	Conversion Kit 2 Ele	£143.75	£5.41
GQSPIDER	Centre piece (spare)	£30.19	£1.43
GQSPREADER	Spreader Arm (spare)	£11.33	£1.73

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

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

VERSATOWER

TELESCOPIC & TILTOVER RADIO TOWERS

BEST BUYS LOW COST TOWERS

NEW

18FT ONLY £119.00

28FT ONLY £179.00

With tiltover base for ease of installation. These are our latest light duty range.

Or for larger headloads and heights we recommend our post mounted series P60 shown on the far left.

STANDARD
Post mounting

13M20P40 40′ £436.43
13M20P60 60′ £533.83

HEAVY DUTY
Post mounting

16M20P60 60′ £718.06
16M20P80 80′ £1113.20

Twelve years of continuous development 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.*

The range encompasses towers between 25 and 120ft in 10, 20 or 40ft sections mounted on ground post, base plate, wall, fixed base or high speed trailer.

CB28 CB18

SEND NOW FOR SPECIFICATIONS/PRICES

'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.

10M10P30 Post mount	£388.36
10M10W30 Wall mount (LG1013W extra)	£373.18
10M10BP30 Base Plate (HD Bolts extra)	£411.13
10M10FB30 Fixed base (HD Bolts extra)	£360.53

NB: PRICES INCLUDE VAT (AT 15%)
DELIVERY EXTRA (distance dependent)

HANSEN

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

The Hansen range covers 20 quaity models with top-of-the-line the FS710. This is a flat frequency response, peak envelope power and R.M.S. 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 × 5¼"
Size Meter: 2 × 3¼"
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 × 5¼"

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 × 5¼"

FS7 £35.65

VHF/UHF WATTMETER & BRIDGE
FS7 145MHz & 432MHz 5, 20, 200W
Power RMS ±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 × 1¼"
coupler 3¼ × 2¼ × 1¼"

FS5E £32.20

INDEPENDENT TWIN METER
FS5E 3·5 150MHz 20, 200 & 1kW
Power RMS ±10%. SWR 1:1 5:1
Power Max: 1kW 3·5 30MHz
50W 50 150MHz
Size: 7 × 3 × 3¼". '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 RMS ±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 RMS ±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

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	½λ	150W	1·03m	£7.48
2H/PL	2m		(½λ)	50W	0·17m	£3.45
2QW	2m	0dB	½λ	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		(⅝λ)	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
70N2M	2/70	2·7dB 5·1dB	(½λ) 2 × ⅝λ	100w	0·89m	£14.38
25B	70cm	5·5dB	2 × ⅝λ	100W	0.9m	£11.50
35B	70cm	6·3dB	3 × ⅝λ	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
GCD SOCA	**Gutter Mount** deluxe cast type c/w 4 mtr cable assembly and PL259	£6.90
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: accessories £0.65, antennas £1.73

NB: PRICES INCLUDE VAT (AT 15%)

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Tel: Totton (0703) 867333, Telex: 477351 SMCOMM G, Telegram: "Aerial" Southampton
See preceding pages for complete addresses and phone numbers

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QSL cards for distribution should be sent to:
Mr E. G. Allen, G3DRN, QSL Bureau manager, 30 Bodnant Gardens, London SW20 0UD

ANNUAL SUBSCRIPTION RATES

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Associates under 18: £5.80.
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RADIO SOCIETY OF GREAT BRITAIN

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Registered office: **35 Doughty Street, London WC1N 2AE**

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Founded 1913. Incorporated 1926. Member society, International Amateur Radio Union

PATRON: HRH The Prince Philip, Duke of Edinburgh, KG

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.

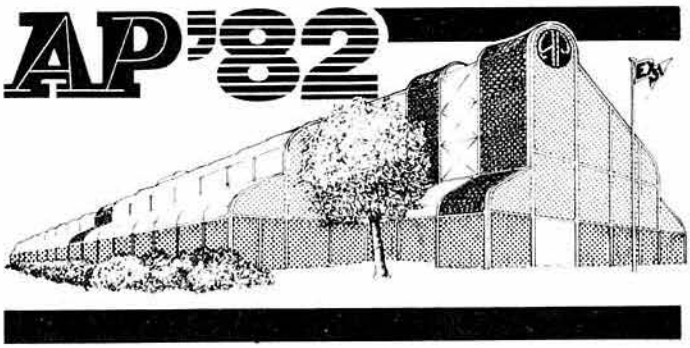
RSGB SUNDAY NEWS BROADCASTS

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	G8BA	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



Enclosed with this issue of *Radio Communication* is an insert concerning the RSGB National Amateur Radio Exhibition to be held at Alexandra Palace, London, on 15–17 April 1982. The exhibition will be about twice the size of last year's event, and we look forward to a superb showcase for amateur radio.

Details of the special British Rail travel offer were published in the March issue of *Radio Communication*, and many people have already taken advantage of this offer (which includes a substantial discount on accommodation at one of the classic railway hotels, the Great Northern at Kings Cross). We hope to "see you at Ally Pally", where there will be a large RSGB stand.

QTC
Amateur radio news

Region 19 ORM
The last Official Regional Meeting held in London took place 17 years ago. At the request of members in Region 19 (London north of the Thames and Hertfordshire) the regional representative, Ron Broadbent, G3AAJ, is planning a Region 19 ORM to be held later this year.

This will enable members in the region to ask questions of, and receive answers from, officials of the RSGB. It is envisaged that the programme would include a discussion period of about three hours, followed by a buffet dinner dance or disco.

G3AAJ invites members to write to him QTHR, or via RSGB HQ, giving support and/or suggestions for such an event—plus, of course, a date some six months hence from this month.

TVI
It has been brought to the notice of the HF Committee and the Interference Committee that the Ferguson TX10 television chassis has excellent immunity to rf interference. This chassis is also available for hire through DER, Radio Rentals and Multibroadcast.

Scottish Amateur Radio Convention & Exhibition 1982
This event, sponsored by the Aberdeen ARS, will take place on Saturday 11 September 1982, at the University of Aberdeen, where excellent facilities are provided. The exhibition area and two large lecture theatres have been booked, and although lectures have to be finalized, a wide range of topics will be presented.

A trade show is one of the attractions, and firms wishing to exhibit should contact Findlay Baxter, GM3VEY, 24 Hillview Crescent, Cults, Aberdeen, as soon as possible.

A dinner will be held in the evening.

"SKEYE"—Straight KEY Evening
The Edgware & DRS welcomes all cw operators to take part in this 3·5MHz cw event to be held on 29 April. It is not a contest but an opportunity to enjoy and encourage the noble art of brass-pounding. Start at 1900gmt; suggested frequencies 3,520 to 3,580kHz—QRP around 3,550kHz; call "CQ SKE".

Comments on the event will be welcome, particularly nominations for "best fist", "oldest key", "oddest key" etc. Contact John Bluff, G3SJE, QTHR; tel 01-204 1034 (evenings and weekends) or 01-836 0986 (weekdays).

Courses
The following courses will commence as shown at the Beckenham Adult Education Centre, 28 Beckenham Road, Beckenham, Kent:

(a) Short morse course (12 lessons) commencing 28 April, 7.30–9.30pm Wednesdays. No prior knowledge necessary;

(b) RAE course commencing 21 September, 7.15–9.15pm Tuesdays.

Further information from Steve Palmer, course tutor, at above address; tel 01-650 1383.

"Radio Waves" on Mercia Sound
Mercia Sound, the independent local radio station serving Coventry, Warwickshire and SW Leicester, has a regular weekly programme called "Radio Waves" for all those interested in radio communication. This goes out just after 10pm on Mondays on 1,359kHz and 95·9MHz, and is presented by Jim Lee, G4AEH, with assistance from Glen Ross, G8MWR, of the Coventry Technical College ARS.

Of the seven full-time presenters on Mercia Sound, G4AEH and one other are licensed amateurs, and a third is taking the RAE.

New club, Stanford le Hope
A group of licensed amateurs and swls has decided to form a club in the Stanford le Hope, Essex, area, and will be applying for affiliation as soon as the constitution has been drawn up. Anyone interested in joining the club is invited to contact Mr A. M. Taylor, G4KJI, QTHR; tel 03756 5057.

Proposed schools net
The King Edward's School ARS, based in Birmingham, would be interested to hear from any school group interested in forming a net. The KE ARS will be listening or active, using the club callsign G8ZKE on 144MHz ssb, at most midweek lunchtimes from the end of April until the examination period starts. Contact the club chairman, G4KXV, QTHR.

Can you help?
The Our Lady and Pope John School, Tower Hill Road, Corby, Northants, NN18 0TF (tel 0536 741832), is hoping to start an amateur radio club as soon as possible. They would be grateful for any surplus equipment which might give them a start, and any offers of help should be made to Sister Mary-Christa, head of physics.

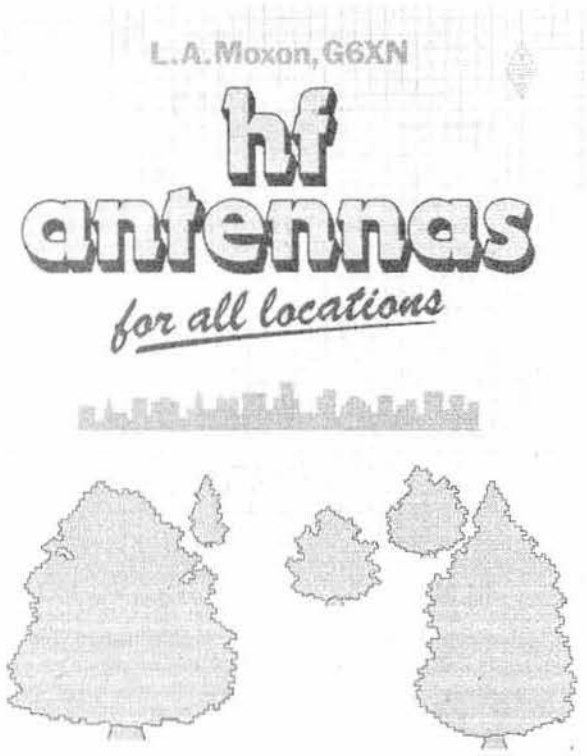
Computerized learning
Mr P. L. Newman, G4INP, author of the article "The Sinclair ZX80 microcomputer as a morse tutor" (*Rad Com* January 1982, pp36–7) has received several enquiries concerning conversion of the program to ZX81 Basic. He will be pleased to give any assistance with this conversion on receipt of an sae.

Two minor punctuation errors occurred in the program published with the above article, which may cause some confusion to users who are not very familiar with ZX80 Basic. On line 90 the letter S should be preceded and followed by semi-colons, not colons as printed; similarly on line 270 the letter B should be preceded by a comma, not a fullstop as printed.

Broadcasting jubilee
This year the BBC celebrates 50 years of broadcasting to the world; the Empire Service was opened in December 1932.

Before that, however, Gerald Marcuse, G2NM, had been licensed by the Post Office to transmit broadcasts to the Empire. With a view to a possible radio programme, George Zitterstein, G8ITS, is interested in tracing anyone who knew or worked G2NM, and would be grateful if they would contact him QTHR or on 01-638 5452.

Radio Fraternity Lodge
Mr Ron Butler, G2BUW, was recently installed as worshipful master of the Radio Fraternity Lodge of freemasons for 1982–3. The secretary of the lodge is Mr G. Wakefield, G5WG.



Another new book from the RSGB

HF ANTENNAS FOR ALL LOCATIONS

L. A. Moxon, G6XN

This thought-provoking new book is a major contribution to the state of the art from an acknowledged expert. It explains the "why" as well as the "how" of hf antennas, and takes a critical look at existing designs in the light of the latest developments. A wealth of practical information on the choice and construction of antennas to suit most locations and requirements is also presented.

Chapter titles: *Taking a new look at hf antennas; Waves and fields; Gains and losses; Feeding the antenna; Close-spaced beams; Arrays, long wires and ground reflections; Multiband antennas; Bandwidth; Antenna design for reception; The antenna and its environment; Single-element antennas; Horizontal beams; Vertical beams; Large arrays; Invisible antennas; Mobile and portable antennas; What kind of antenna?; Making the antenna work; Antenna construction and erection.*

264 pages; hardback; 246 by 189mm; 1982

Obtainable from

RSGB Publications (Sales)

Stolen equipment

From a flat in London N7 on 13 January: Trio TS700G, serial number 460877; Yaesu FT480R, serial number 01-040171, extensively modified internally; Liner 2 ssb transceiver; and miscellaneous 144MHz equipment, antenna, magmount, swr meter etc. Information to G8WKA or d/c Lee, Holloway Police Station, 284 Hornsey Road, London N7, quoting major crime number 227.

From a car in Cardiff on 27/28 January: Yaesu FT227R, serial number 8D050620. Information to GW4BIQ or Central Police Station, Cardiff.

Trio 2300, serial number 921137; Trio 2300, serial number 1030532. Information to G3KTL, or Cheadle Hume police on 061-480 7979.

From a van in Hayes, Middx, on 12 February: Multi 700EX, serial number 01005. Information to G3OZY, or Hayes police on 01-900 8055.

From a car at Wycombe General Hospital on 19 February: Standard 828, serial number 120028; add-on syn SY200, serial number 403120. Information to G4KCD, or wpc Wright on High Wycombe 23131.

From a vehicle on 16 February: Icom 245E, serial number 7106416. Information to Manchester City Police (Grey Mare Lane).

From a car on 15 February: FDK Multi Palm 2, serial number 02290A, crystalled for 16, 19, 20, 21, R0, R6; homebrew mobile boom microphone. Information to G6BIZ.

talkthru '82

An open meeting of the RSGB Repeater Working Group

Saturday 8 May 1982

The Post House Hotel, Clayton Road, Newcastle under Lyme, Staffs

(Adjacent to M6 junction 15. Talk-in on S22)

PROGRAMME

1.30pm	Introduction – "Repeaters in the Potteries and NW England"
2pm	RWG open meeting
3.30pm	Tea and exhibition. The cost of tea and sandwiches will be between £1 and £1.35
4pm	RWG open meeting
5.30pm	Meeting ends

Further information from Gordon L. Adams, G3LEQ, 2 Ash Grove, Knutsford, Cheshire WA16 8BB, tel Knutsford 4040.

Great Circle DX Map

Invaluable for the hf operator using a beam antenna, this map gives the true heading and distance of any dx station from London. Also includes time zones, latitude and longitude and dx prefixes. Printed in three colours and plastic laminated for extra durability.

760 by 620mm; 1979

Obtainable from RSGB Publications (Sales)

More nostalgia. Walter Ellis, G3HTM, as can be seen, is an old-timer who believes in home-brew. Aged 78, he received his first construction licence in 1921, and his full licence in 1951. He is still very active on all bands. *Photo:* G8ZTC

The RS amateur radio satellites of the Soviet Union

by PAT GOWEN, G3IOR,
European co-ordinator, AMSAT*

SINCE THE PREMATURE DEMISE of the Soviet-made RS1 and RS2 amateur radio satellites, the Moscow-based DOSAAF group, with engineer Alexander Papkov, UA3XBO, and group leader Leonid Labutin, UA3CR, has been very busy making six even more advanced RS radio spacecraft. For the past year the satellites have been tested by running them as 145-29MHz repeaters from the top of a block of flats in Moscow, from where the milliwatt level signals could be clearly copied in both Europe and the USA. While similar in the format of a letter prefix followed by two numbers of the predecessors, the frames had different prefixes and values to be decoded to meaningful values of telemetered information. In all, some 35 parameters were indicated by a variation in the prefix prior to the single letter. The 29·450MHz telemetry was invariably transmitted on each Saturday morning, and frequently the actual transponder would also be operational, permitting many Moscow area amateurs using a few milliwatts of power between 145·910 and 145·950MHz to be worked by calling them on the corresponding 29MHz space sub-band downlink frequency direct. This resulted in many QSOs by the author by this unusual method with many of the RA3, UA3, UK3, RZ3 stations close enough to the transponder. UA3CR was one of the stations worked, and he kindly supplied information to permit the decoding of the new frames of telemetry heard, which were published in the satellite media [1] in 1980.

On 29·320MHz a codestore message-handling system was running, which had a capacity of 100 characters. This was used at that time to draw attention to the tests running, saying ". . . CQ CQ CQ Transponder RS0 is testing rx 145·910/950MHz tx 29·410/450MHz Pse QSL via Moscow Box 88 RS3A . . ." Later, the robot auto-responder was being tested for its response, and while the author was unable to access this due to its terrestrial-bound 145·830MHz input, its output was demonstrated to him by one of the Moscow 144MHz enthusiasts calling into the system to effect an automatic QSO. On one occasion while the transponder was running, it demonstrated its superb sensitivity and low noise by successfully transmitting back on its 29MHz output a pass of the AMSAT-Oscar 7 Mode B satellite,with its few milliwatts per signal, over 2,000 miles distant.

UA3CR reported that at that time three such transponders had been made, and that a launch was awaited. However, shortly before the launch, six satellites in all, each with a transponder and beacons, and three of the six with robots as well, had been delivered to the launch agency. They in turn reported that a minimum of three of the satellites would be launched into space aboard a single carrier rocket, to place them all into an orbit very similar to that of the previous RS1 and RS2 radio satellites.

On 17 December 1981 the anticipated launch took place at 1030gmt, and the satellites were first heard at 1230gmt, having been ejected from the launch vehicle over Antarctica. No less than six separate satellites could be identified signing RS3, RS4, RS5, RS6, RS7 and RS8 in the 29·310 to 29·500MHz space sub-band! Within a few days of the launch, the transponders were switched on for testing, and all proved to be faultless. This was followed by switching on the robot auto-responders, and within a week many hundreds of amateurs around the world were communicating through the plentiful supply of Mode A amateur satellites.

*17 Heath Crescent, Hellesdon, Norwich, Norfolk NR6 6XD.

The orbits

Each satellite has a slightly different series of elements, each having been apparently individually released from the carrier rocket like passengers from a bus at a series of stops. Their average altitude was about 1,030 miles, in a close to circular pro-grade polar orbit, ie the other side of the pole to the Oscar satellites, and was, at this time, descending north to south in the evenings, and ascending in the mornings, the reverse of the Oscars. (This will change with time, as the progression of this type of orbit westerly is far greater than that of the sun-synchronous spacecraft.) At this height, the atmospheric drag is very small, and can almost be discounted, thus giving few problems with long-term orbital predictions. The satellites are, however, in an intense radiation belt which may give problems of cataract to the solar-cells, and possibly damage the depletion layers of the transistors and ics in time.

Table 1. Orbital elements for RS series radio satellites

Satellite (Callsign)	Apogee (km)	Perigee (km)	Period (min)	Increment (°W/orbit)	Inclination to Equator (°)
RS3	1,688·0	1,577·4	118·51919	29·75653	82·9592
RS4	1,691·5	1,640·5	119·39412	29·97548	82·9603
RS5	1,689·9	1,653·2	119·55581	30·01590	82·9629
RS6	1,690·9	1,592·5	118·71733	29·80614	82·9542
RS7	1,688·9	1,634·2	119·19707	29·92621	82·9629
RS8	1,693·4	1,657·1	119·76341	30·06783	82·9570

The elements in Table 1 are sufficient for a simple add-on program [2] that will give long-term future accuracy over a month or more when provided with a good reference orbit for each satellite [3]. For those needing precision, then the Keplarian elements (Table 2) are necessary, and a more complex program using a computer with some 16K of memory is needed. The W3IWI program is highly recommended for this, which may be further used with future satellites of even more complex orbits, [4].

The actual passage of the satellites between the horizons of a given station is dependent upon the equatorial emanation of the satellite, with orbits originating with equatorial passes of 7°W rising at 190° bearing 4min after the equator crossing time, going directly overhead to the UK 17min after EQX and finishing at 15° bearing 30min after the EQX time, giving 26min of use. Orbits emanating from EQX 160° will arrive at 345° bearing 29min after the time of EQX, be overhead 42min later, and go out at 175° bearing 56min after EQX. A section of all orbits, except those originating between equatorial crossings of 225° and 298° W, will be usable by the UK. The orbits already mentioned are excellent for contacts with Africa in the south, all Europe, and to VE7, 8, KL7 and UA9 and 0 in the north. Orbits emanating between 045° and 110° are ideal for W and VE at the beginning, while those starting at 200° to 210° EQX are excellent for W/VE from the start of the pass until the end, when the northeast coast of South America may be worked, plus the West Indies. EQXs from 310° to 330° and 80° to 120°W will give good contacts deep into Asia, including VU, AP, etc.

For adequate and accurate tracking, those without computers with azimuth and elevation printouts are recommended to use an equidistant polar map tracking system, as originally developed by Bill Browning, G2AOX [5]. A specific real-time tracker for the RS radio spacecraft that evidences the path and all areas workable in any one pass may be home-made [6], or well-produced ready-made Oscarlators are available from AMSAT-UK (details from the secretary, G3AAJ) or from W2GFF [7].

In practice, due to the high sensitivity of the transponders, it is not really necessary to employ a beam, as only 50W erp is required as the *maximum* necessary*. Thus the main use of a beam and knowing where to point it, and when—is for very low output levels, avoidance of unnecessary ground signal spread, investigation into refracted paths, and for sub-horizon scatter work into the satellites. The tracker also comes into its own in evaluating just when and where those rarer distant points are available.

*Effective radiated power (erp) may be calculated as the output power of the transmitter, less the feeder loss, plus the antenna gain; eg 10W output transmit, 3dB feeder loss, and 9dB gain antenna (six-element beam) = 10W at (9-3dB) = 40W erp.

Table 2. Keplarian elements for RS series 3-8

	RS3	RS4	RS5	RS6	RS7	RS8
Ref epoch	82-352·42821526	81-352·51786506	81-352·43615239	82-352·51220885	81-352·51617870	81-352·43778284
Der mean motion	4E-8	4E-8	4E-8	4E-8	4E-8	4E-8
Inclin	82·9592	82·9603	82·9629	82·9542	82·9629	82·9570
RAAN	278·6247	278·6053	278·6468	278·5724	278·5657	278·6150
Eccen	0·0059909	0·0018414	0·0008995	0·0051758	0·0022846	0·0017913
Arg of perigee	95·7099	143·1071	170·9112	107·1050	109·0146	147·6395
Mean anomaly	265·0726	217·1104	189·1955	253·5810	251·3076	212·3476
Mean motion	12·15563035	12·06632531	12·05025077	12·13529253	12·08658540	12·02909195
Element set	10	6	5	5	6	5
Rev # of ref epoch	12	13	12	13	13	12

The transponders

With the exception of RS3 the RS radio satellites have Mode A transponders, ie 145MHz up and 29MHz down, in the appropriate sections of the bands maintained for space communications. Each active transponder has a firmly-cut 40kHz bandwidth, with the lower 20kHz used for cw, the upper 20kHz for ssb, with a meeting ground for mixed and other modes in the passband centre.

The RS satellites show amazing sensitivity and signal-to-noise ratio, having been designed with the USSR power level of 5W input to a 10dB gain antenna in mind. With RS1 and 2, the transponders were frequently blocked by the high power users prevalent in Western Europe who had little idea how to employ a transponder with a limited power budget on a sharing system. For this reason the current run of transponders have a commandable 10dB attenuator that can be put into circuit by a ground signal when the satellites are in range of the high power user areas. Even so, signals of less than 1W erp from a hand-held TR2400 (1·5W to a rubber-duck antenna) have been clearly heard when the pads are indicated in circuit. Ten watts to a simple dipole or turnstile, or even a mobile whip, give an adequate signal, with the proviso that a problem high power user is not demanding the entire satellite. Unfortunately the presence of these inexperienced operators, called "alligators" (an alligator has a huge mouth and no ears), is all too prevalent, due to their lack of suitable receiving equipment and antennas on hf, and not realizing that they are grossly overloading the transponder. References to this, coupled with the means to overcome them, appear in [8].

The transponders possess linear and proportional non-inverting characteristics. There are beacons at the upper end of the downlink passband, and some have a beacon at the lower end also, either of which may be on, according to the command last given from the ground control. RS4, RS6 and RS8 have beacons at each end, while those with Robots, RS5 and RS7, have the higher beacon only. The uplink and downlink passbands are as shown in Table 3.

Table 3. Uplink and downlink passbands

Satellite	Uplink frequency	Downlink frequency	Beacons
RS3	(No active transponder)		29·321-29·401
RS4	145·860-145·900	29·360-29·400	29·360-29·403
RS5	145·910-145·950	29·410-29·450	29·331-29·452
RS6	145·910-145·950	29·410-29·450	29·411-29·453
RS7	145·960-146.000	29·460-29·500	29·341-29·501
RS8	145·960-146·000	29·460-29·500	29·461-29·502

Currently RS3 and RS4 are being kept for special research functions, RS5 and RS7 are mainly being employed for their robot use by amateurs, while RS6 and RS8 have their transponders on virtually continuously for amateur use on every day except Wednesdays, when all the satellite systems are for special educational, scientific and research use only, and general QSOs may not be made.

The telemetry

The telemetry from the satellites can appear on either of the two beacon frequencies, but will normally be found on the higher one. Despite the apparent limitation of the seven-letter prefixes, 35 parameters are sent in all, according to the additional prefix to the basic K, D, O, G, U, S and W series. When the satellite is in a passive mode the basic frame is sent, and may be decoded as shown in Table 4.

Table 4. RS satellite first channel

Letter	Content	Calculation
K	Output power	$0·2 \times N^2$ = op in milliwatts of transponder
D	Voltage of source	$n \times 0·2$ = power source in volts
O	Charge current	$20 \times (100 - n)$ = charge in milliamps
G	Zero level TLM calibration constant test level	Reading = 00 + / − 1 (to be correct = 0)
U	Gas pressure of sealed system	
S	Temp regulator	T = n = Temp of voltage regulator in C
W	Temp 29MHz transmitter cooling fins	T = n = Temp of 29MHz output stage in C

From this frame alone, a number of factors may be determined. If K is reading a defined figure above 00 then the transponder is active and functional. The battery state may be confirmed by D, while the charge rate from the regulator after the solar cell power source is shown by O which immediately indicates if the satellite is in sunlight or darkness. All readings may be referenced to the G line, which should always remain close to zero for the low limit level correctness. Channel U final calibration is still awaited, but it indicates the gas pressure in that part of the satellite sealed from the vacuum of space, and will normally read 21. S and W give direct readings in °C of the regulator and output stage heatsink. This frame is sometimes indexed by an E as an extra dit in front of each letter, particularly when the system is active and transponder on.

The second channel (Table 5) has a prefix of I, or often, when active, the extra dit, to prefix each letter with S, and will read IK, ID, IO, IG, etc or SK, SD, SO, etc and has different interpretations, although the first K stays the same.

Table 5. Second channel: prefix, I or (active) S, eg IK or SK, ID or SD etc

Letter	Content	Calculation
K	Output pwr transp	As previous
D	Zero adj of TLM	Figure given, eg 00 level correct
O	Beacon output pwr	$0·2 \times N^2$ = Beacon output in milliwatts
G	Sensitivity transp	N = − dB (regulated)
U	S-meter first receiver	$0·1 \times (N - 10)$ = S-units
S	S-meter robot receiver	As above
W	S-meter second service receiver	As above

O [IO or SO] now gives the output power of the beacon being heard. IG or SG indicates when the 10dB attenuator pad is inserted into the transponder receiver front-end to guard against the excessive powers used outside the USSR, and will read 10 + / − 1 when the 10dB pad is in circuit, and 00 or 01 when it is out. It is noticeable that when the attenuator is out, on those rare occasions when European QRO is not causing severe overload, the satellite can be accessed well below horizon by F2 scatter during daylight hours in the north, due to the incredibly high level of sensitivity then evidenced. The receiver S-meter may be read on the channel commencing with IU or SU, while if one is working the robot, one's own signal strength may be read off in S-units, thus not necessitating an RST from the automatic responders format on return, it being a single frequency device. IW or SW gives the second receiver's S-meter reading.

There is a third channel which normally commences with N when passive, or with the extra dit to give R prefix on the normal K to W run, but little has been heard of or known about this channel at the time of writing, apart from that K (now NK or RK) gives the transponder output again with the same calculation as before. When active as RS0 under test from the flat at Moscow, most channels were giving 00 readings, so perhaps this channel is not normally employed in the run.

The fourth channel (Table 6) has an A or R prefix to the run, and apart from AK or RK again giving the transponder output as before, the rest gives the various voltage levels used in the satellite's systems. By merely placing a decimal point between the two figures of the last six levels, an immediate check figure of the stabilized supply voltages is given.

Table 6. Fourth channel: prefix A (inactive) or U (active) eg AK or RK etc

K	Output power of transponder	As previous
D	9V transponder line	$0·1 \times N$ = transponder supply V in volts
O	7·5V transponder line	As above
G	9V first stabilizer	As above
U	7·5V first stabilizer	As above
S	9V second stabilizer	As above
W	7·5V second stabilizer	As above

Finally the fifth channel (Table 7), again has the same first figure as the transponder output. This time the frame is prefixed with M, or with the extra dit active as W, reading thus MK or WK, MD or WD and so on. MD or WD now gives the number of QSOs which have been made by the robot in its travels around the world, and it will be noticed by comparing the number before and after making a robot QSO that this has clocked up by one. The O channel indicates the power in the heating elements used in the satellites as part of the thermal design to help to keep the temperature environment within required limits as it transits between the intense heat of raw space sunlight and the deep cold of dark space.

Table 7. Fifth channel: prefix M (inactive) or W (active) eg MK or WK etc

K	Output power of transponder	As previous
D	On-board log	N = No of QSOs ± 1 (assumed on robot)
O	Heater radiation control	$N \times 0·1$ = watts, power of heating system
G	Robot input power	$n \times 20$ = power in milliwatts
U	Power of service channel	$n \times 20$ = nW (assumed to be transponder Wt)
S	Sensitivity pad of robot	N = − dB of robot receiver
W	Sensitivity of service receiver	N = − dB

G now gives the input power of the robot transmitter, but it is not clear what the service channel U is, unless it is to be the codestore system which was heard earlier when the units were under ground test.

S is the indication of the presence of the 10dB pad on the robot receiver input, showing 10+/−1 when inserted, and 00 or 01 when no attenuation is present. The robot works better with the attenuator in, as this helps to keep out some of the very severe interference being experienced by the receiver due to the presence of fm terrestrial transmissions that persistently invade the space band. The RS5 robot, which uses 145·825MHz, is invariably very badly affected by repeaters still using what was once the R9 channel prior to the IARU agreement to maintain a sub-band for space use, due to the critical problems caused by relatively strong signals that have plenty of room elsewhere.

W is not fully understood in its terminology of "service receiver" but is thought to be the command uplink or the codestore loading channel, to permit attenuation and thus avoid any QRM on the frequency used.

Since the earlier decoding formulas of these telemetry channels were supplied to the author by UA3CR, during the testing period, a few changes have been made, but are said to be minor. An update will be supplied when the final and full factors are known officially. The telemetry can be sent as any series of frames, any frame repetitively, or any single channel if a particular factor needs to be closely observed. In the latter case, the satellite RS number that normally concludes each frame will not be sent.

The robots

The robots aboard RS5 and RS7, and possibly RS3 also, are active single-frequency crossband repeaters coupled to an automatic calling and answering complex capable of responding to a given call, serializing QSOs, and holding a log for later space to earth retransmission. RS5 has its uplink on 145·826MHz (non-doppler-corrected) and its downlink on 29·331MHz, although it will be noted that a calling frequency of 145·830MHz is nominated by the system. RS7 has an uplink of 145·835MHz (though 145·840 is stipulated in the call) and its downlink on 29·341MHz. The RS7 robot will be referred to for a working example, although the format required is identical to both RS5 and RS7. RS7 is, in practice, easier to access, due to a few less problems from terrestrial fm in the spaceband in Western Europe.

Sometimes the channel is active, but the robot is not commanded on, in which case a single transponding channel is available. At times the 29MHz downlink channel will be running the robot's listing from its storage memory of the up to 64 stations it has worked on its orbits around the world, each in consecutive QSO order with the serialized contact number attached. The speed of transmission can vary between 12 and 45wpm and can be changed by the listener by sending a short stream of dots at the speed desired on the robot's uplink frequency, when the sending speed will adapt to that rate sent within the range limits.

The attenuator pad may be in or out, as indicated by the telemetry, and two different levels of power are available from the downlink transmitter according to programming command. The robots can either be set to accept calls at the same speed as the transmitted calling sequence, or can be commanded to vary their speed between 12 and 45wpm to match that of the calling station. In any case, the sequence when the robot auto QSOer is active is the same, and starts with the call from the satellite: "CQ CQ CQ de RS7 QSU FQ 145840kHz K" sent every minute. This 15s call is followed by a listening period of some 45s, and if nothing is heard the call will be repeated. The potential caller will have his transmitter ready on 145·835MHz less some 2kHz if the satellite is approaching, or plus some 2kHz if the satellite is receding, to allow for the doppler effect, and will have his beam pointing at the satellite. During the quiet period, the station may place his carrier on, and the tone—at the same audio resultant frequency as the "CQ" call heard—will come back as a steady carrier. If the carrier is broken, then more power or a more accurate beam bearing is desirable, otherwise the call to be made will have portions missing as Faraday rotation and multi-path take the signal sections out below the squelch level of the receiver in the robot. On no account should the carrier be placed on if another station is working the robot, or the keying return of the system will be blocked and his contact ruined.

Following the "K" at the end of the calling sequence of the robot, the user should now call at the same speed as the robot, once only, with good clean morse, in the following format: "RS7 de G3IOR AR", as an example. The "AR" must be sent as a continuous signal and not as separate letters or the return will fail to be activated. A "K" is superfluous and not required. If the call is sent too slowly, the satellite will come back with "QRQ QRQ" indicating that the call must be faster to comply. If "QRS QRS" is given, then the call must be sent slower. If the auto-speed response is commanded in, then the system will adapt to sender's speed with a short training period, and respond at the same speed between its limits of 12–45wpm. If blocking is present, normally due to fm presence, then the reply will be "QRM QRM". When definite parts of a call are recognized, the response may be "RPT RPT" or "QRZ? QRZ?" if it can identify that you are in there. In any of these cases of non-identified response, the calling sequence should be repeated, once only. When the complete calling sequence has been fully entered, as monitored on the downlink frequency, without any loss or QRM addition, the robot will reply as follows: "G3IOR de RS7 QSO NR 123 (for example). It will repeat this again, and then say "OP ROBOT TU FR QSO 73 VA" and await the next caller.

Remember that the robot can only handle one caller at a time, and if access is not obtained, then avoid QRM to the awaiting next caller. It is quite permissible to use power of greater than 50W erp if necessary to break the squelch level, as other stations are not being depressed as they would be when using excess power on the transponder, and it is better to be sure of an effective quick QSO rather than cause unnecessary QRM for the majority of a pass when others are patiently waiting. It is assumed that QSLs will be forthcoming from the RS3A command station for robot contacts, hence the read-out of the store sent down regularly when in range of the Moscow control source.

Operational

A few problems manifest themselves when using Mode A satellites, one of which is when stations use the space band for local QSOs at the high-end of the 144MHz band. When the muf is high, similar problems are evident on the downlink passband; with a large influx of cb-converted fm transceivers now invading the 29·310–29·500MHz space sub-band being unable to hear either the satellites or the users on ssb, cw, or any other mode other than fm. Further, when the muf is high, daylight passes are attenuated severely; the same F2 layers that give good refraction for earth-to-earth contacts now acting as a path limiter as the satellite signal has to come through the densely-ionized layers. Thus the signal can be very weak during the day, and severe tonal degradation can occur due to the multi-doppler effect on the signal as it multi-paths to the ground station. As 29MHz declines for terrestrial communications, it will improve for space work, so the band will be well employed for amateur QSOs and scientific work over the quiet sun years that soon will follow.

One of the biggest problems is that of inexperienced users having a poor low-angle receiving antenna on 29MHz, often with a receiver that is far from its best at 29·300–29·500MHz, and only able to get partial copy of the low-angle passes. They may well be using a high-gain low-angle antenna on the 145MHz uplink, which means that they will hear themselves weakly when the satellite is overhead and others stronger, but will not be hearing the satellite nor much of their own signal at low angles, when in fact they may be completely blocking the transponder for all other users. This can cause disappointment to many newcomers, and grave problems and frustration to many regular and established users. The obvious answer is to use a good high gain low angle 29MHz antenna, or a simple turnstile (crossed dipole) for the 145MHz uplink, thus equalizing the paths [8], [9], [10], [11].

It is possible to work five continents, over a hundred countries, and many thousands of different stations over these satellites, using only a basic 10W transmitter and a simple antenna system, regardless of terrestrial propagational anomalies. Advice, help, and general assistance, as well as listings of the rarer active stations and all other needed information, is given freely and willingly on the various AMSAT nets [3] to aid enjoyment of both the Oscar and this exciting RS series of satellites.

References

[1] RS satellite channels, "Satellite dx and propagation", Pat Gowen, G3IOR. *Orbit* June/July 1980.

[2] "Basic computer program for satellite EQX", Pat Gowen, G3IOR. *Oscar News* No 23, Autumn 1978.

[3] Reference orbits may be obtained on the following nets:

AMSAT European net (PA0DLO)	14·280MHz Saturdays, 1000gmt
AMSAT-UK net (G3RWL)	3·780MHz Sundays, 1015 local
AMSAT International net (WA2LQQ)	21·280MHz Sundays, 1800gmt
AMSAT International net (WA2LQQ)	14·280MHz Sundays, 1900gmt.

GB2RS, GB2ATG etc also give reference orbits on their broadcasts.

[4] "Basic orbits", W3IWI, *Orbit* No 6, March/April 1981.

[5] "Keeping track of Oscar, Bill Browning, G2AOX. A booklet of articles from *Rad Com*, a limited number of which is available from the editor upon receipt of an sae size 7½ by 10in.

[6] "A real-time tracker for RS", Pat Gowen, G3IOR. *AMSAT Newsletter* Vol 11, No 1 (March 1979) pp12–14.

(Continued on page 311)

EQUIPMENT REVIEW

Datong DC144/28 144MHz converter

by P. J. HART, BSc, G3SJX*

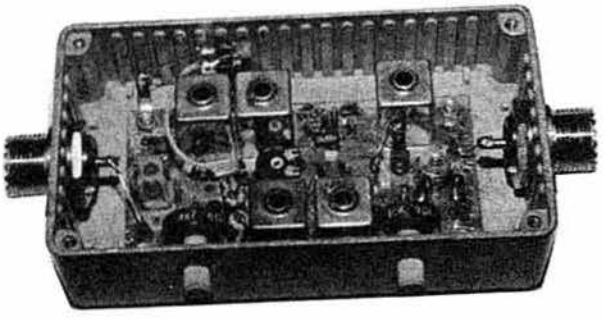
THE DATONG DC144/28 is a 144MHz converter for use with receivers tuning 28–30MHz. It has been designed for two principal applications: first, as a high-performance general-purpose 144MHz converter; and second, to be used in conjunction with the Datong PC1 general coverage converter to allow the hf spectrum from 30kHz to 30MHz to be tuned on a 28MHz receiver.

Description

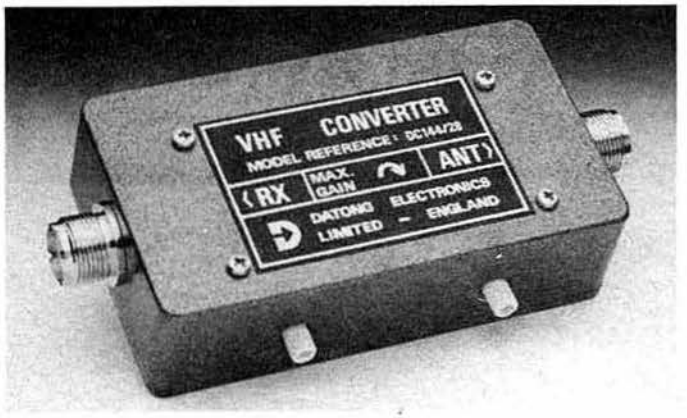
The converter is neatly constructed on a plated-through-hole glass-fibre pcb, and is housed in a sturdy diecast box measuring 11·3 by 6·2 by 3·1cm. The input and output connectors are standard SO239, and the power connector is a 3·5mm jack. The use of a jack for the power connector was not liked by the reviewer for the reasons given in the Datong PC1 review. A supply of 10 to 14V is required at a current of 100mA. An internal voltage regulator is incorporated.

The converter comprises an rf amplifier, mixer and post-mixer amplifier optimized to provide a low noise figure together with a wide dynamic range. Separate input and output gain controls are provided so that the user may set the overall compromise between sensitivity and strong signal handling depending upon the performance of the accompanying 28MHz receiver. Full details of setting these controls are provided with the converter.

A 3SK88 low noise dual-gate mosfet is used as the rf amplifier, with a single tuned circuit at the input and a bandpass pair of tuned circuits coupling the output to the mixer. The mixer is a single-ended balanced Schottky diode mixer with push-pull oscillator injection and input and output diplexing filters. The mixer achieves a low insertion loss and low levels of oscillator feedthrough. The post-mixer amplifier comprises a J310 wide dynamic range junction fet amplifier operating in grounded gate. The oscillator injection to the mixer is approximately +7dBm provided by a fifth-overtone 116MHz crystal oscillator and push-pull amplifier. The converter tuned circuits are screened to reduce as far as possible the level of 116MHz local oscillator signal present at the input and output sockets. This reduces the likelihood of spurious beats and responses when the converter is used with other equipment.



Interior view of the DC144/28 converter



Measurements

A Hewlett Packard 8568A spectrum analyser was used as the 28MHz receiver in conjunction with a low-noise preamplifier for noise figure measurements. A Rohde & Schwarz SKTU noise source was used for noise figure measurements, and Hewlett Packard 8640B signal generators for gain, spurious response and signal handling measurements. In all cases, unless otherwise specified, measurements were made with both gain controls at maximum.

Oscillator accuracy

The local oscillator in the converter was operating approximately 1·4kHz low in frequency.

Overall gain

At 145MHz the overall gain was measured as 19·5dB, reducing to 19dB at 146MHz and 18dB at 144MHz. At both 140 and 150MHz the gain had reduced to 6dB. The amount of variation provided by the input gain control was 11dB, and by the output gain control 15dB.

Noise figure

The noise figure was measured as approximately 3dB.

Spurious responses

The 29MHz feedthrough level from input to output was −43dB, reducing in accordance with the gain control settings.

The rejection of the image frequency at 86–88MHz was 66dB.

The 116MHz local oscillator feedthrough to the output was −40dBm, and to the input −48dBm. (−40dBm is about 2mV.)

Signal handling

Third-order intermodulation measurements were made by applying two equal amplitude signals with 50kHz frequency spacing to the input socket, and measuring the amplitude of the intermodulation products on the spectrum analyser. With two input signals of −30dBm the intermodulation products were at a level of 55dB below the level of the two applied signals. This corresponds to a third-order intercept point referred to the input of −2·5dBm, and when related to the 3dB noise figure in ssb bandwidths (2·5kHz) this corresponds to a spurious free dynamic range of 90dB. The reviewer is not aware of any other commercially available 144MHz converter with such a wide dynamic range.

Listening tests

The converter was used in conjunction with an FT101ZD hf transceiver and an eight-element beam. The converter was at least as sensitive as other 144MHz equipment owned by the reviewer, and no instances of signal overloading were experienced. No spurious responses or "alien" signals were received.

Conclusion

With a 3dB noise figure and 90dB dynamic range the Datong DC144/28 is one of the best 144MHz converters currently available. It is provided with two pages of operating instructions but no circuit diagram.

The current price of the complete converter is £35.65 incl VAT, and of the module (fully tested but less case and sockets) £28.75 incl VAT. A mains power supply is also available, model MPU, at £6.90 incl VAT.

The item used in this review was loaned by Datong Electronics Ltd, Spence Mills, Mill Lane, Bramley, Leeds.

*42 Gravel Hill, Addington, Croydon, Surrey.

EQUIPMENT REVIEW

Datong PC1 general coverage converter

by P. J. HART, BSc, G3SJX*

THE DATONG PC1 GENERAL COVERAGE CONVERTER is a receiving converter which enables the entire hf spectrum from 30kHz to 30MHz to be tuned on a 144MHz receiver. The PC1 has been designed to be compatible with the Datong DC144/28 144 to 28MHz converter, and the combination will allow the complete hf range to be tuned on a 28MHz receiver. Whichever system is used, the receiver is required to tune over a range of 1MHz. The 30kHz to 30MHz range is split into 30 separate bands, each 1MHz wide, selected by two decade switches on the PC1 front panel.

Description

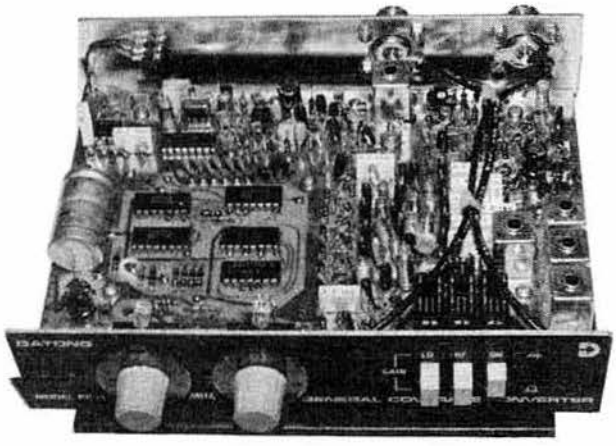
The PC1 measures 18·4 (w) by 4·4 (h) by 15·3cm (d) and weighs less than 1kg. It is housed in a smart anodized-aluminium wrap-around case, and the black front and rear panels are lettered in white. The case is somewhat susceptible to marks and scratches. The unit is well constructed and uses a single glass-fibre double sided pcb.

The front panel controls comprise two rotary switches illuminated by green l.e.ds to select the megahertz band, and three push buttons which select a switchable 12dB input attenuator, power on/off and switchable input filters for use below 1MHz. Two input filters are provided below 1MHz, one covering 30 to 500kHz and the other 500kHz to 1MHz. The rear panel carries SO239 input and output connectors and both impedance levels are 50Ω. The power connector is a 3·5mm jack, which was regarded by the reviewer as somewhat unsatisfactory—the power supply is momentarily short-circuited when the jack is connected or removed, and with the jack removed the tip is left "live" with +12V which could easily short against other metalwork or delicate electronics. The use of a short-circuit-proof power supply is essential. The converter requires a supply of 10 to 13V at 140mA.

Incoming signals pass through one of seven bandpass filters to the input of the mixer. The output of the mixer passes though a 144–145MHz bandpass filter to the input of the main 144MHz receiver. There are no additional amplifiers in the signal path. The mixer comprises a balanced parametric up-converter using varicap diodes with input and output diplexing filters. This type of mixer features very low noise, high dynamic range and signal conversion gain. However, losses in the input and output bandpass filters result in an overall signal loss of about 3dB for the whole converter. This loss is desirable, as the sensitivity of most 144MHz receivers is more than adequate for hf operation, and excessive gain would degrade the strong signal handling performance of the main receiver.

Local oscillator drive for the mixer is derived from a frequency synthesizer. Frequencies in the range 115 to 144MHz are required with 1MHz steps. A low noise fet vco is used with amplifiers to provide 10mW mixer injection. The reference frequency at 10kHz is derived from a 10·24MHz crystal oscillator.

The front panel bcd frequency select switches which control the synthesizer, also, through decoding logic, select the appropriate input bandpass filter. These filters are diode switched at a high current level of 50mA to ensure negligible generation of intermodulation products with high signal levels.



The PC1 with its cover removed

Measurements

For all the measurements apart from sensitivity, a Hewlett Packard 8568A spectrum analyser was used as the 144MHz receiver. Hewlett Packard 8640B signal generators were used—a single generator for measurements on sensitivity and spurious responses, and two coupled with a hybrid combiner for measurements on signal handling.

Oscillator accuracy

As received, the local oscillator when set to receive 28MHz was running 400Hz low in frequency. An internal trimmer is provided for fine adjustment of the reference oscillator.

Overall gain (loss)

The overall conversion loss depended on frequency and which filter was in circuit, and varied between 2·5 and 10dB. The lower loss figures (2·5–4dB) were obtained at the higher frequencies (20–30MHz), and the higher loss figures (8–10dB) were obtained at the lower frequencies (1·5–10MHz). The input attenuator (LO gain position) provided an extra 11 to 12dB loss across the frequency range.

Sensitivity

Due to the high noise figure of the spectrum analyser (approx 25dB), the sensitivity of the PC1 was measured in conjunction with the Datong DC144/28 144MHz converter and a low-noise preamplifier at 28MHz before feeding the spectrum analyser. An overall noise figure of 9dB was measured at 28MHz, rising to 13dB at 2MHz. As this is only about 4dB higher than the conversion loss, and the noise figure of the DC144/28 is about 3dB, very little noise is being generated in the PC1 mixer. A noise figure of 9dB represents a sensitivity of 0·2μV pd for 10dB signal-to-noise ratio in ssb bandwidths. These measurements show that the sensitivity of the 144MHz receiver will be the primary factor in determining the overall sensitivity.

Spurious responses

The 144MHz feedthrough level from input to output was measured as −65dB and was independent of the receive frequency.

With an i.f. of 144MHz, the image frequency falls in the range 258–288MHz. The image rejection was measured as −65 to −75dB depending on frequency.

Local oscillator feedthrough to the antenna socket was about −58dBm,

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and to the 144MHz output socket −61 to −64dBm from 1 to 30MHz and −46dBm on the lowest frequency range below 1MHz.

Internally-generated spurious signals were checked in conjunction with the DC144/28 converter and an FT101ZD transceiver. Only two spurious signals of any appreciable strength were found, at 10·24 and 20·48MHz at a level of S9. Other weak responses failed to move the S-meter.

In general, the PC1 converter appears to be very clean.

Signal handling

Third-order intermodulation measurements were made by applying two equal amplitude signals with 50kHz frequency spacing to the input socket and measuring the amplitude of the intermodulation products on the spectrum analyser. At 29MHz two input signals of −15dBm gave rise to intermodulation products at a level of 56dB below the level of the two applied tones. This corresponds to a third-order input intercept point of +13dBm.

Listening tests

Two separate listening tests were performed on the converter. The PC1 was used in conjunction with an FT221R 144MHz transceiver and a short wire antenna. The PC1 was also used in conjunction with the Datong DC144/28 converter, an FT101ZD tuned to 28MHz and a G5RV multiband antenna. In both cases, the PC1 performed well. The 12dB input attenuator was required on the lower frequency bands to prevent overloading of the main receiver. Overloading of the 144MHz receiver will always occur before any overloading of the PC1 is experienced, unless a receiver is used which has a third-order input intercept point greater than about +9dBm. The reviewer has never measured any commercially available 144MHz receiver which meets this specification. When used in conjunction with the DC144/28 converter and a 28MHz receiver, adjustment of the gain controls on the DC144/28 is required to achieve optimum dynamic range. In this case overload of the DC144/28 or subsequent 28MHz receiver will occur before overload of the PC1 is experienced.

When using transceivers as distinct from receivers, it is important to ensure that the transceiver cannot be switched to transmit when connected to the PC1. It is also worth remembering that valved hf transceivers, such as the FT101 series, will still provide appreciable rf power output up to 30s after the heater switch has been turned off.

Conclusion

The PC1 provides a convenient method of adding general coverage hf reception when a suitable 144MHz receiver is available, or in conjunction with the DC144/28 when a 28MHz receiver is available. The cost is somewhat lower than the purchase of an equivalent performance dedicated receiver. The PC1 is provided with three pages of installation and operating instructions but no circuit diagram. A mains psu and active antennas are available as optional accessories.

The current price is £120.75 incl VAT. The item used in this review was kindly loaned by Datong Electronics Ltd of Leeds.

The reviewer would like to thank G8GOJ and G3RQZ for their comments on the performance of the converter. □

THE RS AMATEUR RADIO SATELLITES OF THE SOVIET UNION

(Continued on page 308)

[7] This plotter is based upon your QTH, to give real-time positioning, azimuth and elevation angles, aos and los time, as well as range limits, and comes with full instructions and ready to use. Send $8 to W2GFF, QTHR, with your latitude/longitude.

[8] "Starting on OSCAR—some common problems", Pat Gowen G3IOR, *Rad Com* January 1978 pp38–41.

[9] Elevation graph, az-el system, and sloping dipoles. *Oscar News* No 3, pages 4–6.

[10] "Crossed dipoles for the uplink and downlink, and coaxial vertical for the 145/28MHz downlink", *Oscar News* No 1, p3.

[11] "Antennas for Oscar", Pat Gowen, G3IOR, *Oscar News* No 5, July 1974, pp8–11.

Acknowledgements

Grateful thanks to RSF, UA3CR, UW3AX, LZ1AB, SM0DZL and K1HTV for their help in passing information on the new satellites, to those who helped to get the word out, and to the DOSAAF group for their excellent work in the field of amateur radio satellites. □

NEW PRODUCTS

Adcola desoldering guns

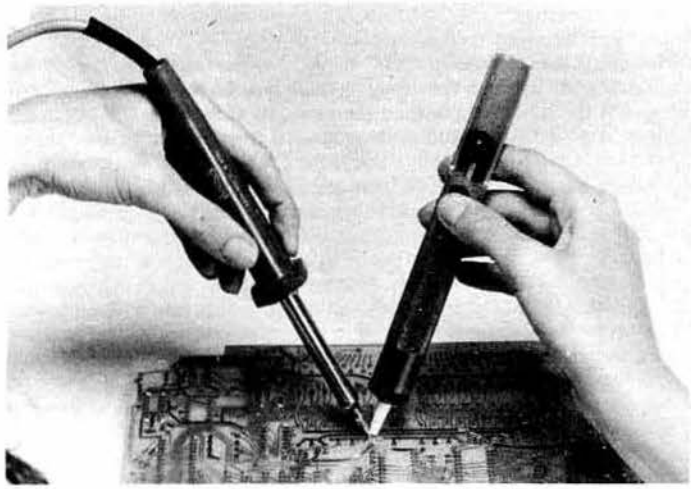
The Adcola desoldering gun is operated single-handed in conjunction with a soldering iron, and removes by suction all the molten solder from around a joint. It is ideally suited for use on pcbs, and has particular advantages over other methods of desoldering. Replacement and spare ptfe nozzles, which are retained by a simple thread method, are available at 72p each.

The guns are available in three sizes:

FM22, standard, nozzle size 12·7mm, 3·2mm diameter bore;
FM23, micro, nozzle size 25mm, 1·5mm diameter bore;
FM85, intermediate, nozzle size 17mm, 2mm diameter bore.

All cost £5·40 each, ex-works.

Further information from Adcola Products Ltd, Adcola House, Gauden Road, London SW4 6LH; tel 01-622 0291.



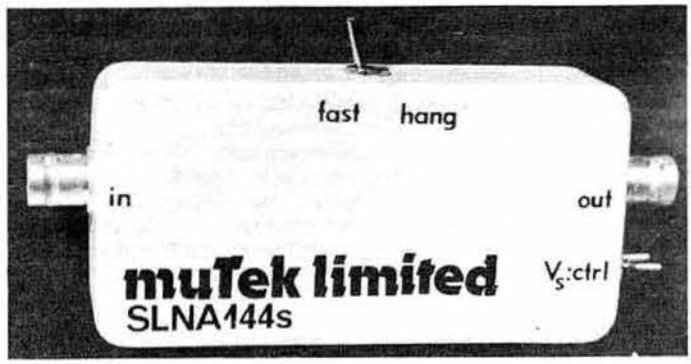
The Adcola desoldering gun in use

Mutek SLNA144s preamplifier

This switched low-noise preamplifier for the 144MHz band combines excellent rf performance and first-class bandpass filtering with a sophisticated switching control circuit. It is suitable for use with all currently-available transceivers.

The noise measurement is typically 1·2dB, the gain typically 15dB, the bandwidth 144–146MHz ± 1dB and greater than 40dB rejection at 130 and 160MHz. The switching control has rf sensing with switch selectable "fast" and "hang" modes, hand switching control—ground on transmit line, rf over-ride of hand switching control, and straightthrough operation with power off. The power requirements are 11–15V at approximately 50mA.

The instrument is contained in a 50 by 100 by 25mm diecast box, and costs £33.90 incl VAT, plus 60p p&p. Further information from Mutek Ltd, Bradworthy, Holsworthy, Devon EX22 7TU; tel 0409 24543.



The Mutek SLNA144s preamplifier

Microwave rf hazards

by D. S. EVANS, PhD, BSc, FIM, G3RPE*

RSGB microwave manager

Introduction

An earlier article [1] introduced the general topic of the safety or otherwise of rf sources such as transmitters. It was pointed out that a hazard could exist if parts of the body absorbed sufficiently large amounts of rf energy to cause overheating. By the very nature of the hazard, it is impossible to specify any absolutely safe or unsafe level of rf power with any precision. However, the main conclusion of the article referred to (as well as others of a similar nature) is that with typical amateur hf and vhf stations where the antennas are mounted well above ground level, the measured rf levels at points of close access generally are at least 100-fold down and up to several orders of magnitude lower than the standard "safe" level of 10mW/cm² even when using full legal power. In these practical cases, therefore, there clearly are few problems, and even arguments about what constitutes a "safe" level become somewhat academic.

However, the rf level associated with even relatively low-power transmitters can increase to an unacceptably high level as one gets close to them, and the article emphasized the care that must be taken in testing equipment on the bench with covers removed or with unscreened dummy loads. Handy-talkies, especially those using "rubber-duck" antennas, may represent a hazard if their power output exceeds a few watts.

While the same basic principles regarding rf hazards apply also in the microwave area, there are significant differences compared with lower frequencies. For example, microwave equipment is more often operated near ground level for various reasons; there is more experimental development of equipment; and, for a given transmitter power, the rf power density close to the antenna will tend to increase with frequency. For these and other considerations, the topic of rf hazards at microwaves is best dealt with separately and in perhaps more detail than at hf and vhf.

Anyone involved in safety matters, whatever the area, will be well aware how difficult it is to maintain a sense of perspective. The illogicality of many safety procedures bears testimony to this. It is all too easy to "play safe" and lay down over-restrictive rules which, at best, simply inhibit activity and, at worst, become discredited and then ignored. The objective of this article is to attempt to develop a code of practice appropriate for day-by-day use by amateurs which will reduce to a minimum the risk involved to operators and bystanders. This code is summarized below. It is followed by an outline of the nature of the hazard, and the technical background employed in developing the code.

Safe generating practices with microwave equipment

It is easy to demonstrate that the maximum rf power density associated with amateur microwave equipment will almost always be significantly lower than 10mW/cm² at even a short distance away from the antenna. Indeed, it would be rather difficult to produce a practical system in which this level was exceeded at any distance. In any case, equipment parameters can be specified to ensure that it does not. However, where the effective aperture of a system carrying rf is small, eg the open end of waveguide and in feeds for dishes, the density can be very high and at a hazardous level. Thus for practical systems amateur microwave equipment will almost always be safe at almost any distance outside the structure of the antenna, and almost always will present a hazard within the structure, eg between the feed and a dish or inside a horn antenna. Therefore the only real risk is to operators and others who have access within a very short distance of these components.

The following is an attempt to define a code of practice for the safe handling of microwave equipment in an amateur context.

1. It must be recognized that a potential hazard exists wherever equipment having a small effective aperture—such as the open end of waveguide and coaxial cable, horn and rod feeds—carries rf above a level ranging from 1mW at 24GHz to a few hundred milliwatts at 1·3GHz. As a guide, the input power should not exceed 2·5mW/cm² of area of the aperture if the maximum rf power density is not to exceed 10mW/cm².
2. For these small apertures, the maximum rf density is reached at a distance typically λ/10 to 1λ from the aperture, and falls rapidly by a factor of 100 at a distance of 1–10λ: the potential hazard therefore exists over a short range only.
3. When working in close proximity to equipment, it is highly desirable to reduce power levels to below those given in **1**. Where this is not possible, it is essential to dissipate the power in a screened load.
4. One golden rule should be to ensure *no* rf is present before looking down waveguide, because of the special vulnerability of the eye.
5. With high-power equipment, a hazard may exist through leakage of rf from loosely-coupled connectors and waveguide flanges, and from the coupled output of directional couplers. The power *reflected* from surfaces may exceed a safe level. Clearly, good practice demands care and discipline—and foresight.
6. It is strongly recommended that the rf power fed to a paraboloidal dish reflector should not exceed 2·5mW of its projected area. This will ensure that the rf power density will nowhere exceed 10mW/cm² except for the region between the feed and the dish. This limit corresponds to approximately 2W for a dish 0·3m in diameter, and 80W for a dish 2m in diameter, and therefore is unlikely to present any practical limitations to the design of equipment.
7. If the dish is fed using the Cassegrain system, then it is recommended that the power delivered to the antenna should not exceed 25mW/cm² of the area of the *sub-reflector*, or 2·5mW of that of the main reflector, whichever is the smaller value. In this case the leakage of rf around the sub-reflector should be less than 10mW/cm².
8. Care must be taken to ensure that the feed is placed in the correct position at the focus of the dish. If further from the dish than this optimum value, an image of the feed will be produced at a finite distance. The rf power density at this point may approach that at the feed and therefore be at an unsafe level. It is clearly good practice to align antennas using powers at the milliwatt levels as given in **1**.
9. If the power to an antenna is limited as in **5** and **6**, then the rf power density will be at a safe level everywhere other than in the region between the feed and the dish. As the power density at the feed may be very high, it is essential to limit access to this region, especially by those unfamiliar with the hazard. This can be achieved either by restricting access to the site or by raising the antenna so that its height at the centre exceeds 3m.
10. In the case of horn antennas it is recommended that the power level should be limited to 2·5mW/cm² of the area of the aperture. For most horns this is equivalent to $2 \times l^2$ where l is the length of the longest side of the aperture.
11. Higher power densities can of course be tolerated provided the operator of the equipment ensures that people cannot have access to these regions.

Nature of the hazard

As was pointed out in [1], the hazard associated with high rf levels is completely unconnected with radiation hazards associated with γ- or X-rays for example. It is simply that of heating of parts of the body following absorption of the radiation, and therefore is similar to the hazard of over-exposure to the sun or sitting too near a fire. The effectiveness of this form of heating is well demonstrated by the microwave ovens with which amateurs share the 2·3GHz band. The main factor affecting the degree of hazard is the power density of the rf intercepted by the body. Convenient units are either watts per square metre or milliwatts per square centimetre. A second factor is the frequency of radiation, which affects the proportion of incident radiation absorbed, the site of its absorption and the power density developed by a transmitter of a given output power. These factors will be discussed below.

The effect of controlled heating can be positively beneficial, as in diathermy treatment, but large doses or even an accumulation of doses can lead to permanent damage to body tissues without a person necessarily being aware at the time that this damage is being done. One of the more vulnerable organs is the eye: the viscous fluid within the eye is affected by heat in much the same way as the white of an egg, which is transparent at room temperature but becomes opaque when warmed. In the eye, as in the egg, the process is irreversible.

Physiological characteristics also affect the degree of hazard. Thus at lower frequencies the intestines tend to be vulnerable because this is the region in which heat is generated and, being not particularly well-endowed with nerves, the effect is not immediately felt. The eye is also vulnerable because it has no bloodstream to assist in dissipating any heat that may be generated, although the same effect will also be observed at extremities such as the fingers. The effect of frequency of the radiation is quite critical. Below about 150MHz the human body tends to become transparent to rf radiation and therefore there is no real problem. At vhf the radiation penetrates

*4 Upper Sales, Chaulden, Hemel Hempstead, Herts.

deeply into the body, and the more vulnerable parts are the internal organs. At 1–10GHz the energy tends to be dissipated in the skin and the organs immediately below the surface: at high power densities there is a sensation of warmth. Above 10GHz energy is absorbed in the surface layers, although it appears that a high proportion of the incident rf will be reflected.

There is a further effect which relates the absorption with the size of the organ and the wavelength of radiation. Radiation of a given density having a wavelength of 23cm, for example, will have less effect on the eyes which have dimensions of one or two centimetres than radiation of wavelength of 3cm, ie 10GHz.

Another potential influence of frequency is that of affecting the rf power densities likely to be produced in practice. For a transmitter of given power, the radiation density developed is roughly proportional to frequency. However, the amount of power that can be generated tends to fall by a corresponding amount, and thereby balancing the risk of a hazard.

Frequency is also important in the way it influences the design and use of the equipment. At lower frequencies, antennas have relatively low gain and coaxial cables have low loss: this means that antennas can readily be mounted high, usually tens of feet above ground level. At high microwave frequencies, however, there is a tendency to operate equipment near ground level. This is because antennas are so directive as to need some optical method for alignment, and cable losses so high that the antennas need to be mounted on the transmitters. These factors conspire to favour the antenna being mounted at head height, which is the least desirable from a safety point of view. Despite the complexity of the overall situation, nevertheless the majority of problems can be covered simply by specifying a maximum power level to which parts of the body should be exposed, and this is described in the following sections.

Specification of "safe" rf power densities

The previous section describes several of the factors affecting the degree of hazard. It is therefore not surprising that while all authorities agree that exposure to radiation having a density of more than 100mW/cm² is likely to be hazardous unless special clothing is worn, there is room for discussion on what constitutes a "safe" level. The Home Office and the Medical Research Council recommend a maximum density *for continuous exposure* of 10mW/cm². This figure implies some extra margin of safety in an amateur context, since exposure is unlikely to be classifiable as "continuous" or cover other than a small part of the body at one time. It is to be noted that some standards have allowed a maximum of 100mW/cm² for periods up to 6min of exposure.

On the other hand, it is to be recognized that much amateur equipment can be of an experimental nature and not necessarily fully instrumented. Unexpectedly high radiation densities due to a power amplifier starting to oscillate, or to poor design of antennas, suggest a need for added caution. It would therefore seem wise initially to adopt a temporary arbitrary lower maximum power density during initial experimentation—possibly 1mW/cm²—until the equipment is properly set up.

Table 1. Maximum power for 10mW/cm² not to be exceeded at open end of waveguide

Frequency (GHz)	Waveguide No	Internal dimensions (cm)	Maximum power (mW)
1·3	6	16·510 by 8·255	340
2·3	8	10·922 by 5·461	150
2·3	9A	8·636 by 4·318	93
3·4	10	7·216 by 3·403	61
5·7	12	4·755 by 2·215	26
5·7	14	3·485 by 1·580	14
10	16	2·286 by 1·016	5·8
24	20	1·067 by 0·432	1·2

Characteristics of the radiation pattern

It is useful to consider first radiators such as the open end of waveguides or the horn antenna, and then to move on to paraboloidal dish antennas. It can be shown that the pattern of radiation across the aperture is not uniform across a waveguide or horn in the H-plane, but follows a sine wave. Thus while the mean power across the aperture is simply P/A, where P is the power and A the area of the aperture, the peak power density is nearly four times this value, ie approximately 4P/A. The use of the latter value introduces a small safety factor which is increased by the use of the physical aperture for A rather than the electrical aperture.

The maximum power density is observed along the axis of the radiator, and falls to either side. In the case of paraboloidal dish antennas, a similar pattern is observed; the feed being designed so as to reduce the power density at the edge of the dish by typically 10dB. The maximum density is not, as perhaps would be imagined, at the aperture, but at a distance further from the dish given by $0.2D^2/\lambda$, where D is the diameter of the reflector in the same units as λ. This relationship is equivalent to approximately $A/4\lambda$, which value can be used as a convenient guide with other shapes of aperture.

Between the radiator and the point of maximum power density, the density varies in a sinusoidal manner at a level a few decibels lower than the peak value. Beyond the peak the density falls rapidly and reaches a value 20dB down at a distance given by $2D^2/\lambda$ (or $2{\cdot}5A/\lambda$), and thereafter falls at a rate set by the inverse square law. The overall pattern of power density normalized in terms of D^2/λ is shown in Fig 1 with reference to a peak density of 10mW/cm².

Open ended waveguide

As will become apparent, the radiation from the open end of waveguide represents probably the greatest risk in practice. It is compounded by the almost irresistible urge many people have to look into it.

The size of waveguide used at a particular frequency is set within fairly narrow limits: the broad width usually lies between 0·6 and 0·95λ, and the height usually is approximately 0·45λ. The value of A therefore is typically

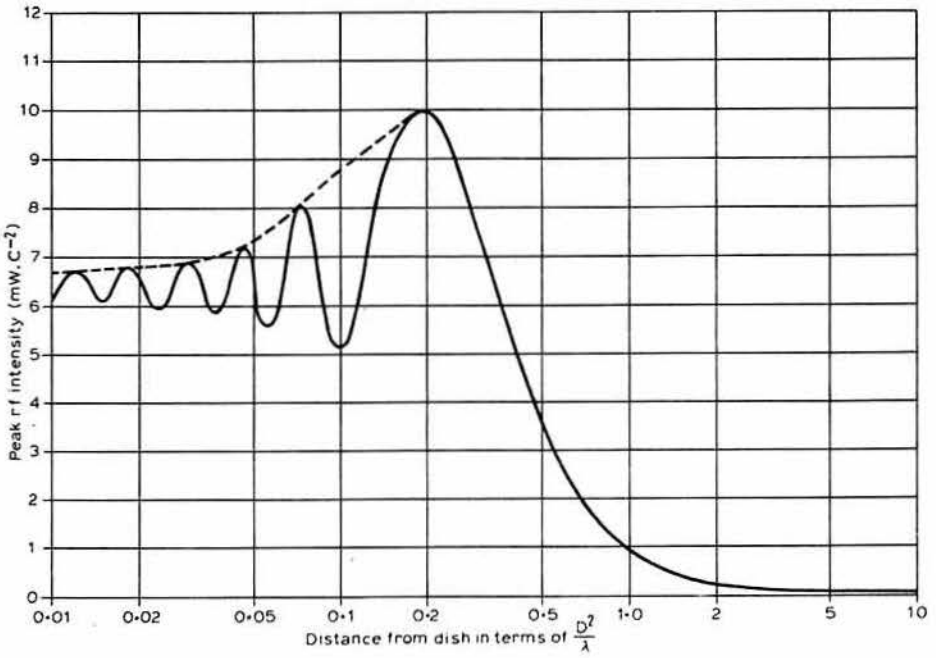


Fig 1. Peak rf density relative to 10mW/cm² as a function of distance from dish expressed in terms of D^2/λ, where D is the diameter of the dish and λ the wavelength of radiation, both expressed in the same units

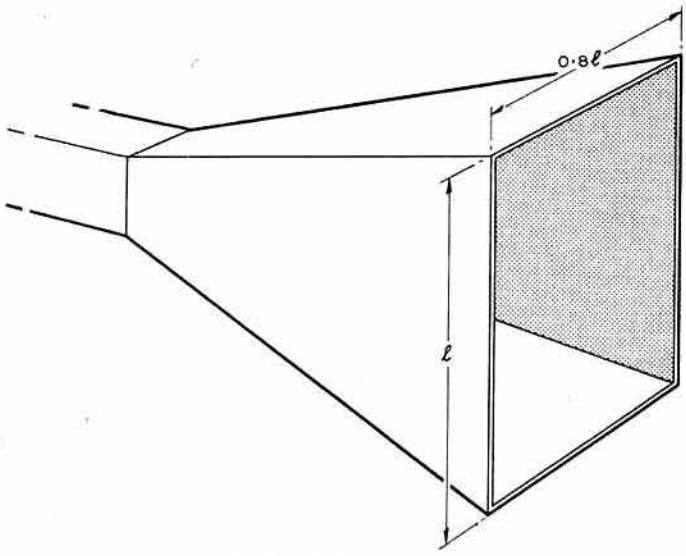


Fig 2. Typical horn antenna

$0{\cdot}27\lambda^2$—$0{\cdot}43\lambda^2$. The maximum power P that can be fed to the waveguide without exceeding 10mW/cm² peak rf power density is therefore $0{\cdot}67\lambda^2$—$1{\cdot}07\lambda^2$, where P is in milliwatts and λ in centimetres. The maximum density is measured at a distance $0{\cdot}13\lambda$—$0{\cdot}21\lambda$ in front of the aperture, and drops by a factor of 100 at a distance of $1{\cdot}35\lambda$—$2{\cdot}15\lambda$. The maximum powers that should be applied to typical waveguides at frequencies of amateur interest so as not to exceed 10mW/cm² are given in Table 1: they are seen to be at relatively low levels. This implies that in most cases the output of most transmitters constitutes a real hazard and therefore the waveguide should always be safely terminated in a screened load where access is permitted.

As an example, the maximum radiation density from a 100mW 10GHz transmitter based on WG16 reaches a peak value of 170mW/cm² at a distance of approximately 5mm in front of the waveguide aperture. However, this falls to 1·7mW/cm² at a distance of approximately 40mm from the waveguide aperture.

Horn antennas

In the form generally used by amateurs, Fig 2, horn antennas consist of a length of waveguide which is flared in both directions to produce an aperture having an aspect ratio of typically 0·8:1. The radiation density within the horn falls from a relatively high value at the throat of the horn to a low value at the aperture. For the peak radiation density anywhere *outside* the antenna not to exceed 10mW/cm², the power in milliwatts fed to the antenna should not exceed $2 \times l^2$ where l is the length of the longer side in centimetres. Because of their relatively large physical size relative to their gain, horn antennas tend to be used at frequencies of 10GHz and above. At that frequency a reasonably large horn would have an aperture of 30 by 24cm. The maximum power that could be fed to this antenna without exceeding 10mW/cm² at the aperture would be 1·8W, a very considerable power at that frequency.

The power density at the aperture is given by $5P/l^2$. For a medium size (10GHz) transmitter of output power 100mW, the density is only 0·6mW/cm², ie at a very safe level. The corresponding density at the throat increases to 170mW/cm², but this region is not easily accessible other than by deliberate action. For this reason, and the fact that they cannot be misaligned, horns tend to be a particularly safe form of antenna to use.

A feature of note is that as the aperture of the horn is increased so the gain of the antenna increases, and therefore the effective radiated power is raised. At the same time, the larger the aperture the lower the power density at the aperture, and therefore the safer the equipment becomes. We therefore have the perhaps surprising situation that, for a given transmitter output, it is possible to have the situation that the higher the radiated power the safer the equipment can become.

Paraboloidal dish antennas

This is the most popular form of microwave antenna. It consists of a paraboloidal reflector to which rf is fed by some form of feed placed at its focus. There are two areas of importance, which can be dealt with separately: the hazard associated with the radiation reflected by the dish and which will be at a maximum at some distance outside its focus; and the hazard associated with the region between the feed and the dish.

Reflected power. The pattern of radiation from a dish reflector is approximately a cone. This has an initial diameter equal to that of the dish, which increases with distance from the dish according to the beamwidth of the antenna. The radiation density across this cone is at a maximum at its centre, ie along the axis of the dish, and is designed to fall typically by about 10dB at the edge of the cone. Along the axis the peak radiation density is found near the limit of the near field, ie at a distance $0{\cdot}2D^2/\lambda$ from the dish, where D and λ respectively are the diameter of the dish and the wavelength of the rf expressed in the same units. Values for frequencies of amateur interest as a function of antenna size are shown in Fig 3.

The peak radiation density in most cases will be observed at distances of 1 to 10m from the dish, ie well beyond the focus. The peak radiation density corresponding to this reflected power is again given by the value 4P/A, where P is input power in milliwatts and A is the projected area of the dish in square centimetres. For this peak density not to exceed 10mW/cm², the maximum power should not exceed the values:

$P_{max} = 2D^2$ where P is in milliwatts, D (diameter) in centimetres

$P_{max} = 20D^2$ where P is in watts and D in metres.

This relationship, together with that for a maximum density of 1mW/cm², is shown as a function of dish diameter in Fig 4, with regions designated as "most safe", "safe" and "unsafe". Thus, for example, if a 1·5m dish is available, provided that the power fed to it does not exceed 44W, then nowhere outside the antenna structure will the power density be greater than 10mW/cm². It should be noted that this relationship is independent of frequency. This means in practice that a high degree of safe operation can be "built-in" a system by simply specifying its parameters. The above data of course presumes that the dish and feed are properly aligned: the effects of misalignment is discussed below. As was the case with horn antennas, for a given transmitter power, the larger the size of the dish the safer the equipment becomes, despite the fact that the effective radiated power is increased.

The hazard associated with the feed. It was shown in the previous section that provided the power supplied to a parabolic reflector was related in the way described to its diameter, then the radiation density could be held to a

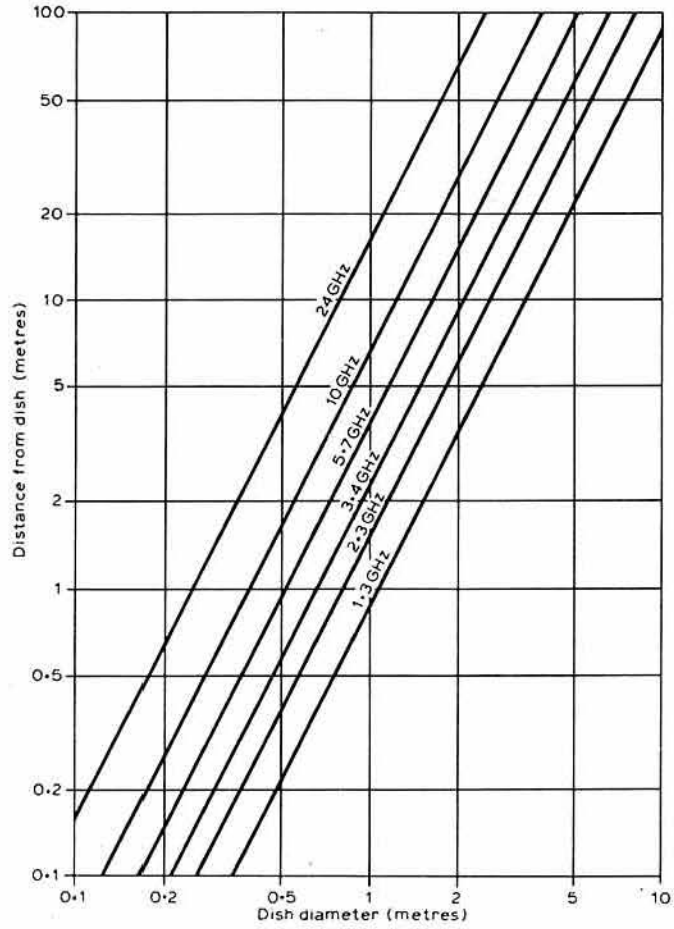


Fig 3. Distance from dish to point of maximum rf density as a function of frequency and dish size

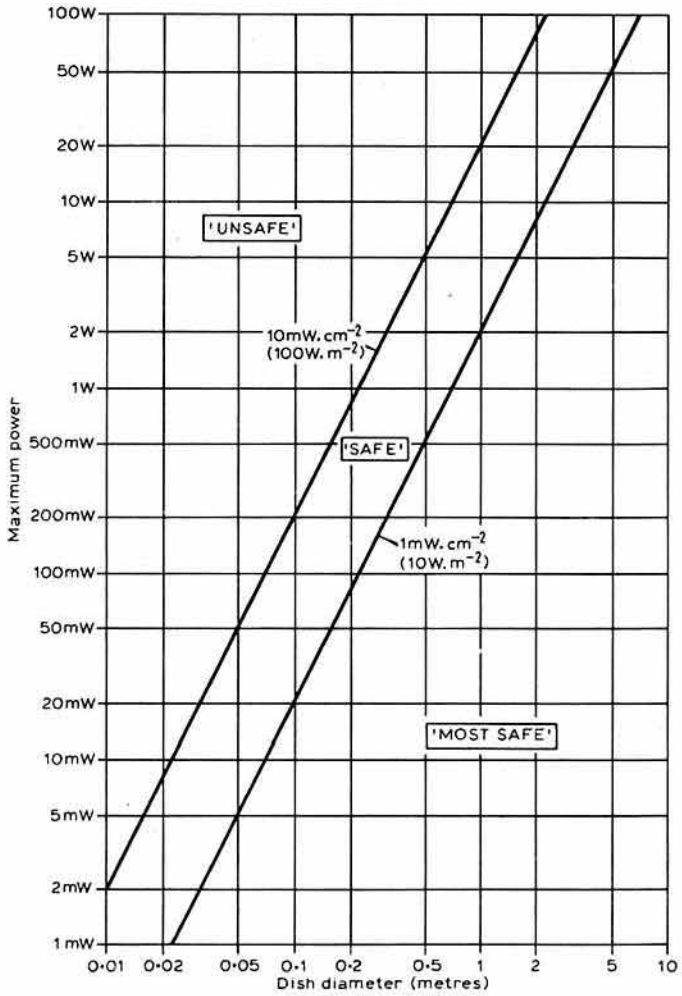


Fig 4. Maximum power to be fed to a dish so as not to exceed an rf density of 1 or 10mW/cm²

safe level anywhere outside the antenna. This could be achieved in practice without placing too restrictive limitations on the equipment design. For example, Fig 4 shows that the minimum size of dish to be used with a 2W transmitter should be 1m diameter if the radiation density external to the antenna structure is not to exceed 1mW/cm², or 20W if not to exceed 10mW/cm².

However, as the effective aperture of the feed supplying this power to the dish is usually much smaller than that of the dish, the radiation density associated with the feed will usually be at an unsafe level, and frequently at a hazardous level. The situation is somewhat similar to the horn antenna described earlier except that with a horn it is relatively difficult to physically reach the regions of high radiation density, whereas with a dish it is normally all too easy if the antenna is near ground level or not otherwise protected. The actual power density between the feed and the reflector will be set by the power of the transmitter and the dimensions of the feed. One of the simplest cases is that of the direct horn feed, in which the horn is mounted at the focus of the dish with its aperture directed at the dish. The actual dimensions of the feed depend on the frequency of operation and the ratio of the focal length of the paraboloidal reflector to its diameter, in the manner described in [2]. If it is assumed that access to the inside of the horn feed is prevented, then the maximum power that can be applied to the feed so as not to exceed a radiation density of 10mW/cm² as a function of the focal length/diameter (f/D) ratio of the dish and of frequency. These levels should be adopted if the system is to be operated at ground level for alignment.

Practical transmitters will normally generate significantly greater powers than those shown in Table 2. For a 1W transmitter at 10GHz, for example, the peak radiation density in front of a feed will be in the range of a few hundred milliwatts to a few watts per square centimetre depending on the f/D ratio of the dish. These levels are clearly unsafe, and it therefore makes good sense to operate the antenna in such a way as ensures that the operator and others cannot have access to that region of the antenna.

A popular second type of feed is the Cassegrain system, in which a horn

Table 2. Maximum power to be fed to a pyramidal horn feed as a function of f/D ratio for peak density not to exceed 10mW/cm²

Frequency (GHz)	Maximum power (mW) f/D = 0·25	f/D = 0·6	f/D = 1·0
1·3	370	1400	4500
2·3	120	440	1400
3·4	60	200	660
5·7	25	70	230
10	6	20	70
24	1	4	13

feed mounted through the centre of the dish radiates a sub-reflector which in turn illuminates the main reflector. With this system the main risk would seem to be spillage of rf around the edges of the sub-reflector. If this is to be limited to 10mW/cm², and the feed has a normal taper, in illumination of 10dB, then the radiation density at the centre of the sub-reflector must not exceed 100mW/cm². This is achieved if the power supplied to the antenna does not exceed 25AmW, where A is the area of the *sub-reflector* in square centimetres.

Calculations of radiation density around dipole-reflector combinations are difficult. There seems little doubt that stray radiation is likely to be at a somewhat higher level than with horn feeds, and therefore correspondingly greater precautions should be taken with this type of feed.

The effect of deficiencies in the antenna system

It is appropriate to refer briefly to a number of deficiencies in antenna systems which in some cases may lead to unexpected problems.

(a) Under-illumination of dish
In defining the maximum radiation density by the relationship 4P/A, the area A corresponds to the physical area of the reflector *assuming ideal illumination*. The use of a feed of too high a gain will result in under-illumination of the reflector so that its effective area is smaller than the physical area. This will lead to a higher power density close to the dish than would otherwise be expected.

(b) Over-illumination of dish
If the gain of the feed is too low, then an excessive amount of energy will spill over the edge of the dish. This will not be hazardous unless the power fed to the dish greatly exceeds the recommended value, as the density is normally designed to fall by typically 10dB between the centre and edge of the dish.

(c) Feed positioned inside the focus
If the feed is placed between the focus and the dish, the reflected beam will be divergent. As this will reduce the power density, this condition is relatively safe.

(d) Feed positioned beyond the focus
This is a potentially dangerous case because the reflected beam will tend to converge to a point some distance in front of the dish, with the risk that local power densities will approach those at the feed.

Rod array antennas

This case deserves to be considered as a separate situation. In general terms the stray radiation from this form of antenna would be expected to be greater than either horn antennas, or horn-fed dishes, and therefore greater precautions should be taken. It seems probable that the radiation pattern at a distance will be similar to that of a parabolic antenna of similar gain, and therefore the present design information will be relevant.

Other precautions

With high-power equipment it should be recognized that there are a number of other sources of hazards. For example, the leakage of rf from loosely-coupled connectors and waveguide flanges or the coupled output from a directional coupler may be at a sufficiently high level to represent a risk. In some cases, the power *reflected* from some surfaces may be at an unsafe level. It is obviously wise to recognize these possibilities and to adopt the same high standards of discipline for rf as amateurs obviously already do with other hazards such as high voltages.

References

[1] "RF hazards and the radio amateur", R. P. Blackwell, G8IZV, and I. F. White, G3SEK. *Rad Com* February 1982.

[2] *VHF/UHF Manual*, D. S. Evans, G3RPE, and G. R. Jessop, G6JP. RSGB.

TECHNICAL TOPICS

Pat Hawker, G3VA

IT IS NOT for *Technical Topics* to comment on the strange and convoluted events of February, involving *The London Gazette*, the Home Office and others. Hopefully by the time you read this all will have been peacefully resolved and we will have heard the last of an error-prone and technically-inept licence "schedule" that resembled a Rubik cube designed so that in no way could the pieces be sensibly aligned. Let us hope that what replaces it will be more successful, remembering that Erwin Rommel once said: "Failure cries out for explanation, but success, like charity, covers a multitude of errors". Meanwhile let us return to the (comparative) sanity of the technical scene.

Groundplanes again

Alan Boswell, G3NOQ, suggests that some readers may have been unnecessarily put off using vhf groundplane antennas by W6HPH's analysis in *TT* November 1981; this warned of a "3dB loss" compared with a vertical dipole. They may have gained the impression that half the total radiation is "lost" when a λ/4 radiator mounted over non-infinite radials is used. He stresses that dipoles and monopoles both radiate virtually all the energy fed to them, and to believe otherwise would contradict the fundamental laws of conservation of energy. Only a small part of the total energy would be accounted for by the cross-polarized radiation over a small groundplane, as mentioned by John Wilson, G8KIS.

G3NOQ considers that the λ/4 monopole with vehicle-roof groundplane forms an excellent omni-directional antenna ideally suited to vhf mobile operation. Although a vertical dipole theoretically is the better antenna (since it combines with its "image" in the ground to form a colinear array having a narrower beam in the vertical plane), for most mobile work this would be an impractical, unduly expensive, system. Though he admits to being surprised that the fixed vertical trap dipole has not found more favour among hf operators, as the full feed current does not flow into lossy earth (a point made last year in the earlier discussions on vertical antennas).

I hope I do nobody an injustice, but I have a sneaking feeling that G3NOQ may have rather misinterpreted W6HPH's analysis of the 3dB loss, or else that I have misunderstood G3NOQ's comments. The 3dB loss occurs only for radiation in the horizontal plane, and is made up for by additional radiation at higher vertical angles. Omnidirectional antennas frequently have appreciable gains or losses in specific planes by virtue of their vertical radiation pattern. This is seldom taken into account at hf, where the useful vertical angle radiation varies with height of the ionospheric layer etc. But, for example, vhf/uhf omnidirectional broadcasting antennas may have a colinear gain of over 10dB towards the horizon (or tilted slightly downwards). A uhf television station can have 1,000kW effective radiated power from transmitters providing only, say, 50kW peak output power.

One must, however, agree with G3NOQ that the whole subject of antenna gains and losses offers enormous scope for "sophistry, semantics and what is known in the trade as 'specmanship'—ie why say your antenna has a gain of 12dB when with some subtle redefinition you can say the gain is 18dB?"

It is all too true that the gain of any antenna depends on how you define gain—one reason why *QST* never allows advertisers to publish even a "claimed gain" figure for antennas!

Controlled-current-distribution antennas

Last year in *TT* June and October, an account was given of VK5NN's recent work on capacitively-loaded ("stretched") antennas for hf and vhf, exploiting the advantage of this technique as first described in detail in 1961 by "Dud" Charman, G6CJ (*ART*).

Harry A. Mills, W4FD, and Gene Brizendinge, W4ATE, have sent me extracts from two articles they wrote on hf "ccd" (controlled-current-distribution) antennas in *73 Magazine* (October 1978 and July 1981). The ccd antenna is basically a capacitively-loaded antenna stretched by a factor of two, as in the original EMI/G6CJ system, but with the addition of some capacitive end-loading (US patent 3,564,551 granted to W4FD). The use of

Table 1—CCD (stretched) antenna dimensions

Band (MHz)	Length (ft)	(m)	Section (in)	(cm)	No of sections	Capacitors (pF)	No of capacitors
1·8	560	(170·7)	140	(356)	48	1,560	46
3·5	280	(85·4)	70	(178)	48	780	46
7	140	(42·7)	35	(89)	48	390	46
14	70	(21·3)	17·5	(44·5)	48	195	46
21	46·5	(14·2)	11·5	(29)	48	130	46
28	35	(10·6)	8·75	(22)	48	97·5	46

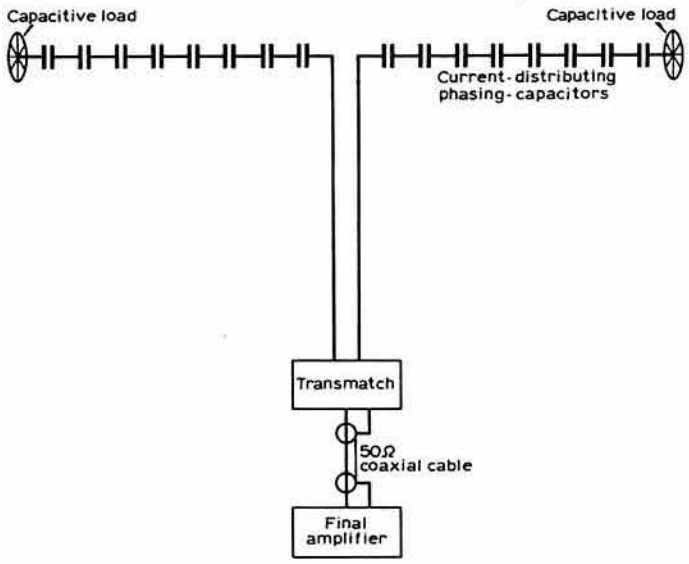


Fig 1. The "controlled-current distribution" antenna (stretched dipole) as described by W4FD and W4ATE. It seems likely that the end capacitative loading could be dispensed with without seriously affecting results

end-loading is claimed to further reduce dielectric and ground losses and lower the vertical angle of radiation while retaining the many advantages of stretched elements. It is felt that the following notes on the construction of such elements will prove useful to those whose interest in this system has been aroused and have the space to allow its exploitation.

Fig 1. shows a typical dipole element loaded in accordance with Table 1. For other capacitor values or frequencies the authors give:

Number of capacitors = f(MHz) × C(pF)/59·35
Number of wire sections(S) = number of capacitors plus two
Overall length (L) in inches = 984 × 12/f(MHz)
Length of wire sections = L/S

Twelve constructional hints were given, as follows:

(1) Select wire section lengths and capacitor values from Table 2 for the required band (measure to centre of insulators).

(2) Saw small insulators (0·6 by 1·75in, 15·8 by 44·5mm) from 0·13in (3·2mm) sheet plastic (or alternatively use 0·5in, 12·7mm plastic waterpipe both for insulation and to protect the capacitor).

(3) Match capacitors to within five per cent using only polystyrene, silver mica, mica or mylar (100V rating is adequate for 1kW).

(4) Connect the wire sections to the insulators, ensuring section lengths are accurate between centres of adjacent insulators.

(5) Scrape wire ends clean and solder well the capacitors across the insulators, omitting capacitor at the centre feedpoint.

(6) Build two simple end-loading 24in (61cm) diameter "wheels" of copper wire using for example No 10 stripped house wire for the rim and No 14 to 18 bare copper wire for eight "spokes". Carefully solder all joining wires.

(7) Carefully solder the centre of the wheels to the ends of the ccd element.

(8) Suspend the antenna (without feeder) about 6ft (1·83m) high, for resonating and testing.

(9) Connect a one-to-two-turn coil to centre feedpoint and couple a dip meter, vswr or noise bridge, and adjust the ccd length to resonate at the *low* frequency end of the band, removing or adding an equal number of complete wire/capacitor sections from each end as necessary.

(10) Remove test instrument and connect a 300Ω line between the ccd element and the antenna tuning unit (alternatively use coaxial cable with 4:1 balun at the ccd centre).

(11) Apply reduced power, and test to ensure that power is distributed to ends of antenna by using a small neon lamp or other rf indicator against the antenna. Start at the antenna centre and explore all sections towards each

end (if rf voltage indication is lost, it is probable that the last capacitor is poorly soldered or defective and needs to be replaced by another matched capacitor.

(12) Contact several stations with full power, before raising the ccd element to its final height. Note that the resonant frequency of the element will change by only an insignificant amount as the antenna is raised (one of the features of a capacitively-loaded element). If space is limited, erect as inverted-V dipole, or let antenna ends hang down etc. W4FD and W4ATE consider that such a λ/2 dipole (physically 1λ long) can form a very effective antenna, but point out that many other configurations are possible.

Antennas for 10, 18 and 24MHz

As expected, most forms of centre-fed 3·5MHz antennas appear to radiate effectively on 10·1MHz, especially centre-fed dipoles with open-wire or 300Ω transmission lines; the G5RV is also proving effective and popular. Ian Davies, G3KZR, notes an extension to this principle: He writes:

"Remembering the 'odd multiples' rule (ie common low-impedance feedpoint at the centre of wire as in λ/2, 3λ/2, 5λ/2, 7λ/2 dipoles) I found that all the new bands are odd multiples of a frequency somewhere between 3·38 and 3·63MHz. Thus a broadbanded 3·5MHz λ/2 dipole can be expected to work on the 3·5, 10·1, 18 and 24MHz bands."

G3KZR also mentions that on the 10·1MHz "D-day" he found that his 1·8/3·5/7MHz trap dipole did not work too well on 10·1MHz, and obtained better results feeding one side of the antenna against earth.

Getting on 10MHz

The availability of a 10MHz "WWV" standard frequency facility on many of the transceivers dating from before WARC 79 makes it relatively easy to modify such equipments for the 10·1 to 10·15MHz band for cw operation. Techniques for dealing with the popular FT101 series have been fully covered (*TT* November 1980, January 1981 and *ART7*). What about other models?

In *Amateur Radio* January 1982, Ron Cook, VK3AFW, shows how the FTdx401 can be modified for 10·1MHz, and his notes would be applicable to a number of other basically similar designs. In the case of his model it had previously been modified for 1·8MHz, and for 27MHz which was available until a few years ago to Australian amateurs. He writes:

"The modification to the FT101 involves adding capacitance to the driver stage so that the 14MHz coil is also resonated at 10·1MHz when the band select switch is in the WWV/JJY position. An extra contact must be added to the pa tank tap switch. This can be held in place by glue and/or a small nut and bolt. Then the tank coil must be tapped, circuits tuned and that's that." (Note this is a variation on the modifications described earlier.)

He continues: "For the FTdx401 all the necessary switch contacts are there but an extra coil must be added for the driver stage plate circuit. I keep a selection of ancient valve-type tv chassis from which I took a 7mm (about 0·3in) diameter coil and slug, complete with metal spring clip mounting similar to that of the other coils in the FTdx401. The original winding was removed and 20 turns of 24-gauge enamelled copper wire was wound on and secured with a few dabs of nail polish. A 22pF plastic dielectric capacitor was used to set the slug so that with the preselect control set for resonance on receive at 10·1MHz resonance was also achieved in the driver circuit.

"The coil was a sloppy fit in the spare hole in the bracket provided for the auxiliary bands in the 401, so a little glue was applied and allowed to dry. Flying leads previously connected to each end of the coil were trimmed and one connected to the unused WWV/JJY tab of switch S1h and the other to the B+ (ht) copper foil.

"Next a neutralizing circuit capacitor was fitted between the appropriate tag of S1J and earth; I used a 35pF (33pF nominal) silvered-mica capacitor. Then the pa: the 14MHz band was tapped (S1m) at six turns and the 7MHz at nine turns. Drawing a graph of turns against frequency showed that 7·5 turns were required for 10MHz, but as a half turn is inconvenient I decided to try seven turns. When the set was modified for 1·8MHz the two parts of the variable loading capacitor were connected in parallel. If extra pa tuning capacitance was required I could use S1k or else change the pa tap.

"Tests with dummy load showed similar meter readings and similar power output and efficiency to that on 7 and 14MHz. A slight adjustment to the slug in the new driver coil was required. The signal monitored on a receiver was clean.

"For units without an auxiliary band position or 10MHz WWV facility, an examination of the circuit may give you some alternative ideas. With some equipments, such as the FT200, you may be prepared to sacrifice one of the higher frequency bands and wind new coils on existing formers. Some of the older transceivers had a roll off in sensitivity on the higher bands, but this is not the case for 10MHz and could give such models a new lease of life."

New bands for HW101

Charles Bryant, GW3SB, notes that the Heath Company claims that over 30,000 HW101 transceiver kits have been sold—and a considerable number of these are still in use in many parts of the world, and others have been "rested" but available. He has devised a modification that provides all three new bands (10·1, 18 and 24MHz) but involves no mutilation of the equipment—which can, if desired, readily be restored to its original form. In effect it consists of adding a new crystal and coil for each of the new bands to the heterodyne oscillator valve. Component reference numbers, other than for the additional components, are those used in the original circuit diagram. GW3SB writes:

"As shown in Fig 2, S2A and B, with their associated components, are assembled in a small screened box with an internal screen between the wafers. This is placed alongside the HW101 transceiver and connected by short leads (one of which is miniature coaxial cable) fed through the ventilation holes in the bottom of the cabinet.

"The black lead passing through hole 'z' on the 'bandpass circuit board' should be unsoldered and rerouted through hole 'TP' to be attached to S1A, and the coaxial lead to pin 6 of V19A should be moved to S1B. It was originally intended that S1 should not be a separate switch but should be a fourth contact on S2A and B. It was found, however, that the length of the leads prevented satisfactory operation. S1 may most conveniently take the form of a miniature double-pole changeover relay, which may be controlled from an extra wafer on S2.

"By juggling with the slugs in coils L705, L704, L703, L702, L805, L804, L803 and L802, it is possible to tune to 24MHz with the 'driver preselector' near maximum capacitance, and 28MHz with the capacitor near minimum. Similarly, 18 and 21MHz can be covered together. But 7 and 10MHz present a problem as the capacitance swing is insufficient to tune both bands. The solution is that C703 should be disconnected from contact 9 of wafer 3R on the 'driver grid switch-board' and contact 9 should be joined to contact 8. Similarly, C803 should be disconnected from contact 9 of wafer 4R on the 'driver plate switch-board' and contact 9 should be joined to contact 8."

GW3SB warns that after modification care is needed not to tune to 8·6MHz. He writes: "Although 7MHz can be tuned near maximum capacitance, and 10·1MHz near minimum capacitance, *8·6MHz also tunes at an intermediate position.* A simple test will reveal such mistuning; if alteration of the crystal switch S2 does *not* change the signal being received, then the 'driver preselector' is wrongly tuned to 8·6MHz."

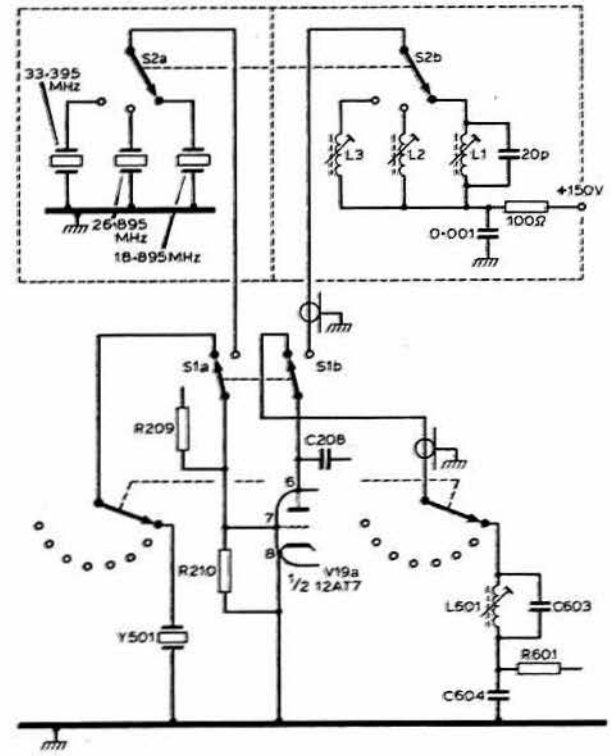


Fig 2. The modified hfo circuit of GW3SB's HW101 transceiver permitting operation on the 10·1, 18 and 24MHz bands. Third-overtone crystals are used with the coils wound on 7mm formers with the turns spaced the diameter of the wire: L1 9t, L2 8t and L3 6t

The GaAs mesfet and 3-5 technology

Recent years have witnessed something of a fall-off in the development of new forms of discrete silicon bipolar devices. Much of the current R&D work seems to be concentrated on various types of field-effect devices and what is termed "3-5 technology". One can see this in the increasing importance of devices based on gallium arsenide, GaAs, such as the "gasfets" or "GaAs mesfets". Recently, for example, attention was drawn (*TT* February) to the use of the little-known 3SK97, a GaAs dual-gate mesfet made since 1979 by Mitsubshibi Electric, primarily for use in uhf television tuners of improved performance. The 3SK97 is capable of providing a noise figure of about 1·3dB at 1GHz, and less than 1dB at 430MHz. In the USA these devices have a single-unit cost of around $5 and can be ordered direct by using a 60p international money order, or about half the price I quoted in February and a small fraction of the usual cost of the super low noise GaAs devices used at shf. Experimental GaAs mesfets capable of a 1·3dB noise figure at 12GHz (at room temperature), fabricated by direct ion implantation, have been reported by Hughes Aircraft. Devices already on the market (but still costly), can provide a system noise figure of about 4dB for the reception of the future generation of 12GHz direct broadcast satellites.

The term "mesfet" is derived from metal semiconductor field effect transistor, having a metal gate separated from the bulk of the semiconductor by a Schottky barrier. But this device family is only one aspect of the increasing use of "3-5" technology (Fig 3.) which implies the use of semiconductor materials made by using one or more of the Group 3 elements of the periodic table (boron, aluminium, gallium and indium) with one or more of the Group 5 elements (nitrogen, phosphorus, arsenic and antimony). While gallium-arsenide is the usual combination for improved microwave performance (in the form of fets, Gunn diodes, Impatt diodes), gallium-phosphide (GaP) is the 3-5 material used for light emitting diodes; indium phosphide (InP) used for millimetre microwave devices including Gunn diode oscillators and fet devices usable up to several hundred gigahertz; and also materials such as GaInAs and GaInAsP used at optical frequencies.

The fabrication techniques used for advanced 3-5 devices tend to be more demanding than silicon technology, and this is why their development has been relatively slow (J.B. Gunn discovered his oscillating diode as long ago as 1963) and many of the advanced devices are still at the costly experimental stage (although GaP l.e.ds show that 3-5 technology may not always be expensive).

In the laboratories single-chip GaAs power fets can provide a cw output of over 1W at 15GHz, though the low impedance and limited output tend to make it necessary to combine several devices to achieve powers up to about 5W. There is also increasing interest in producing microwave integrated circuits using GaAs, with firms such as Texas Instruments, Hewlett-Packard and Plessey all working in this field. TI have an experimental voltage-controlled gasfet oscillator with all components on the chip, covering 8·8 to 10GHz with 4mW output; also a three-stage amplifier around this frequency with 4dB noise figure 30dB gain. In the UK one of the main research centres for 3-5 technology is the Plessey "Allen Clark Research Centre" at Caswell, near Towcester.

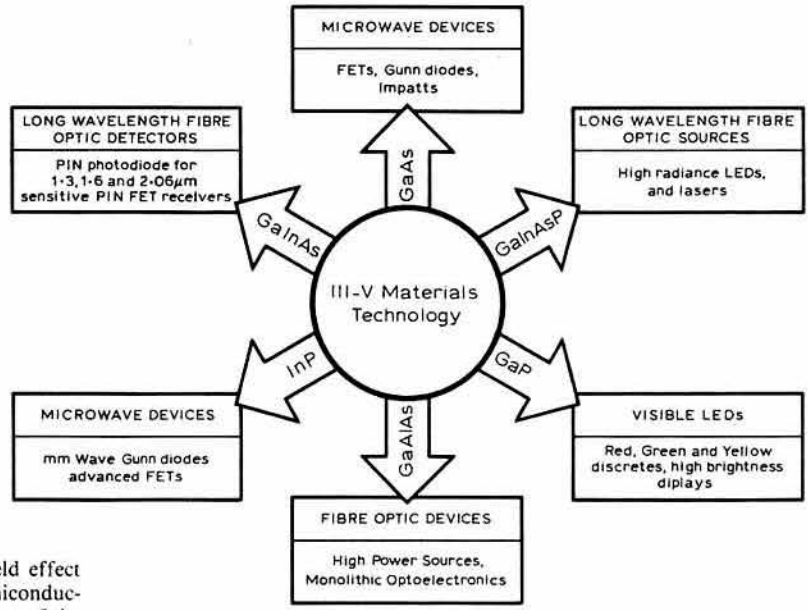


Fig 3. Applications of 3-5 semiconductor materials technology (based on a diagram in the 1981 Annual Review of Plessey's Allen Clark Research Centre).

The 3SK97 mesfet

Some additional information on the 3SK97 dual-gate mesfet as mentioned above and in the February *TT* has come from Geoff Toulalan, GW8AAP, and D. J. Robinson, G4FRE. Both have been using and investigating these interesting devices for some time since attention was drawn to them in various microwave newsletters and publications. Both admit to some surprise to find them being used for such a low frequency as 144MHz.

GW8AAP warns that it can be difficult to get optimum results from these devices. The manufacturer's data sheets include a page of handling precautions, including the usual need to avoid leakage potentials on the bit of the soldering iron and advice is also given that when soldering the devices into microstrip circuits this should be carried out promptly at temperatures below 250°C.

When biasing these devices the makers recommend the following procedure: (1) slowly adjust gate-to-source potential, V_{GS}, to about −1V; (2) gradually increase the drain-to-source voltage, V_{DS}, from zero to a desired value; (3) adjust the drain current, I_{DS}, to a desired value by controlling V_{GS}. It is also noted that because of the high gain there is a tendency for low frequency parasitic oscillation to occur when the device is biased. Such oscillation can usually be suppressed by adding an appropriate bias capacitor in the bias circuit between source and gate, or between source and drain, in parallel with the device. An arrangement for a 432MHz amplifier, believed to stem from JA6CZD, is shown in Fig 4.

G4FRE obtained two $5 3SK97s and some "ordinary" gasfets (MGF1400 and MGF1401) at $19 each. He reports: "I used the JA6CZD arrangement and obtained 0.9dB nf and 18dB gain at 432MHz (circuit figures, not total system figures; ie excluding converters etc, used in measurement). More recently G3XDY, using an alternative DL7YC stripline circuit, obtained 0·95dB nf and 20dB gain. All measurements with AIL Panfi with 15·2 enr, H-P noise head in rf screened room."

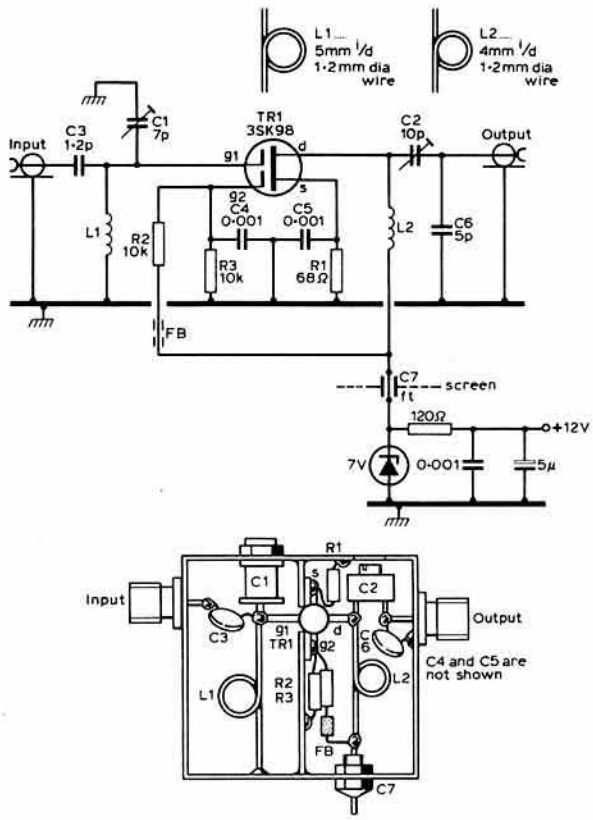


Fig 4. 432MHz low-noise preamplifier using 3SK97 GaAs dual-gate mesfet (JA6CZD design). Adjustments: set R1 for I_D of 20mA, C1 quarter-turn increase from maximum gain, and C2 maximum gain

The suppliers claim to have measured 0·6dB nf with 18dB gain (optimized bias voltages), and G4FRE feels that his and G3XDY's results are reasonable in view of the use of lossy (not glass) trimmers. The preamplifier serves as a useful standby, relegating his NE64535 amplifier, with its inherent "barn door" selectivity to 432MHz fm! He now has the choice of 0·5dB nf for $19 and 0·9dB nf (3SK97 costing $5). He comments that this makes the relatively little known 3SK97 mesfet good value. But apparently they are in short supply.

Consumer nicads

Although nicad batteries have been well established for many years in the amateur-radio and professional-equipment fields, it is interesting to see that a determined attempt is now being made to popularize them for the powering of consumer-type portable receivers, tape recorders and other household items. For example, direct replacements for the popular HP2 ("D"), HP7 ("A"), HP11 ("C") and the PPs (9V) batteries (made by Sanyo Electric) are currently being promoted by "The Economy Club" at prices which are roughly 8–10 times that of the standard units. When used with the appropriate charging units it is claimed that the nicads can be recharged at least 500 times (but see below), and that by spending more now the user saves a good deal of money in the long run.

In practice, of course, it depends on how much use is made of the equipment. As quoted in the advertisement, a zinc-carbon HP2 costs about 33p, a "long life" alkaline-type "Duracell" about 68p, compared with £2.80 for the sealed "D-size" 1,200mAh Sanyo Cadnica nicad, plus a multi-purpose charger at just under £10. There is no doubt that over the past few years the increasing cost of dry batteries has made rechargeable units an economical approach if you use battery-operated equipment regularly.

A recent survey article "Nickel-cadmium secondary cells" by A. S. Henderson (*Wireless World*) goes into the economics in some detail, showing that the break-even point for a portable tape recorder used for 1h/day can be as short as six months, based on nicad and charger-unit price levels slightly higher than those quoted above.

The author notes that nicad cells remain at their nominal cell potential (1·2V) for some 90 per cent of service life, offer roughly the same power capacity as the same sized dry cells, but slowly discharge when not in use (energy content drops to about half after nine weeks, and almost to zero after six months). This gradual discharge does no damage but it means that a nicad cell should be recharged at normal (0·1C) rate each three months, even if it is not being used.

Some useful advice is also given on four recognized charging rates (C = capacity of the cell): *trickle charge*, 0·01C on purely standby duty, or 0·02 to 0·05C with occasional load; *normal charge* 0·1C (10–14 hours, by which time cells should appear warm to touch but not hot); *fast charge* 0·3C to 1C for 1–3 hours (provided necessary precautions are taken against overcharging); *ultra-fast charging* as used by some model-control enthusiasts (as high as 20C) for up to 15min using a car battery and a length of resistance wire *but only with "great care and constant attention"*. Normal safe charging rate for a 9V PP3 substitute may be as low as 9mA. Constant-current charging is always advisable; a simple and useful such arrangement for charging at rates up to about 400mA, using a VK10KM vmos fet, was shown in the March *TT* (Fig 7, page 229).

Because of the 1·2V terminal voltage it may be necessary to replace four dry cells by five nicad cells; however, the terminal voltage of standard dry cells reduces fairly rapidly and in practice one-for-one substitution is often satisfactory.

A. S. Henderson suggests that although at least 500 charging cycles are usually claimed, this is unlikely to be achieved with stacked cells, unless the depth of discharge is limited to about 25 per cent of nominal capacity. If 100 per cent discharge is normal, he states, the expected working life may be reduced to only about 150 charge-discharge cycles. This is basically because nicad cells of a similar size are not identical in their actual capacity. When stacks are completely discharged, one or more cells tends to be reverse-charged by those of higher capacity, giving rise to excess pressure and reduction of working life due to the consequent venting. With high-current loads, connections should be soldered, taking care not to block the safety vent in the middle of the positive terminal.

As we have noted before, there comes a time when a nicad cell may develop an internal short-circuit and no longer take a charge. Flashing a heavy current through the cell for a fraction of a second often provides a cure. From Angus McKenzie, G3OSS, (who was given the tip by the well-known designer Peter Baxandall) comes the suggestion that a good way of administering a short sharp current pulse is to charge up a 5,000μF (10V) electrolytic capacitor and then connect this across the nicad cell (positive to positive). The pulse successfully breaks down the short-circuiting "whiskers", and G3OSS has found that after this treatment "failed" nicads will often take a normal charge.

Booster-regulator

Denis Taylor, G3FGC, draws attention to an ingenious system used in conjunction with the "remote control receiver" of the Fidelity portable, black-and-white television set (Model TVR120), as described in *Television* December 1981. The remote control receiver is a unit with about four ic devices that acts on the infra-red pulses from an armchair channel-selector control unit, but clearly the technique could have other applications. It provides a regulated power supply that continues to function even if the input supply dips below the threshold of the basic regulator. When this happens an inverter circuit automatically comes into operation and the unit forms a step-up regulator.

The system is shown in Fig 5, although the article does not indicate the voltages or currents involved. TR3 and ZD1 provide a conventional series regulator, with ZD1 being returned to chassis via TR5. Since TR5 is then saturated, it effectively short-circuits TR6 which remains inoperative. However, if the voltage across ZD1 falls below its threshold, TR5 is biased "off", the short-circuit across TR6 removed, and the inverter circuit formed by L2/TR6/TR4 etc comes into operation, boosting the voltage across the reservoir capacitor C411 to the point where ZD1 again conducts, switching the inverter off. The action then continues intermittently.

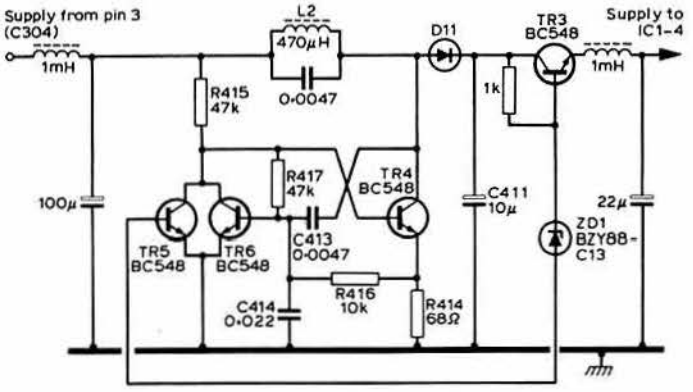


Fig 5. Booster-regulator system as used for the infra-red remote-control receiver of a Fidelity portable television set. With a low supply voltage the inverter (dc-dc) comes into operation

Hearing impaired?

A legal case involving questions affecting all those whose job or hobby involves many hours of listening to weak signals half buried in noise was fought out recently in the High Court. It was successfully claimed on behalf of three radio intercept operators (and the widow of a fourth) that constant monitoring of radio signals had been the cause of their severe hearing impairments. All had worked for GCHQ (Composite Signals Organization) for many years.

Damages amounting to £25,000 were awarded against the Attorney General, sued in his capacity as head of GCHQ.

Few amateurs spend an equivalent number of hours with headphones glued to their heads as professional intercept operators, nevertheless over the years they do often clock up an impressive number of hours. Quite a number of old-timers, when writing, have mentioned hearing deficiencies, often affecting one ear, though one would need to delve pretty deeply into the statistical evidence to see just how amateurs compare with non-amateurs. Many people as they grow older do suffer hearing impairments, just as many of us—initially with reasonable sight—need the assistance of glasses as the years pass, without this necessarily being caused by reading proofs!

But nobody who has listened on the lower frequencies with large antennas during static-prone summer evenings would feel inclined to underestimate the effects of continuous loud crashes in headphones. Fortunately, I believe the potential hazard can be minimized by using effective audio limiting, as provided, for example, by an anti-parallel (back-to-back) pair of diodes connected across the headphones and arranged so that limiting occurs at a reasonable level (if necessary by first stepping up the impedance of a low-impedance output socket) with germanium and silicon diodes used to take advantage of their different limiting potentials.

And, according to the press, at least one 65-year-old Hungarian-born Australian has successfully reversed an increasingly defective hearing: a doctor discovered and removed a cotton plug that had been inserted "temporarily" in his ear when he was treated for an ear infection at the age of five. Over the years it had built up a solid sound barrier!

The double stub notch filter

The use of stub and double-stub notch filters fashioned from lengths of coaxial cable has a long history, and typical arrangements have been included in many editions of *ART* etc, although few detailed response curves have been published for such filters. Such filters can be useful not only for tvi or bci (vhf/fm) suppression but also to prevent very strong Band 2 vhf/fm broadcast signals from overloading 70MHz front-ends etc.

Jan Martin Noeding, LA8AK, who, like most amateurs outside the UK, still has to cope with the problem of vhf Band 3 as the main television frequency in his locality, plus the additional possibility of his 144MHz transmitter causing Band 2 bci, decided to investigate the double-stub filter. A filter built around a uhf-tv-tuner box turned out to be easy to construct and stable in operation. Very deep notches can be achieved at 144MHz, and his efforts were directed at minimizing attenuation of the broadcast signals: Figs 6–8.

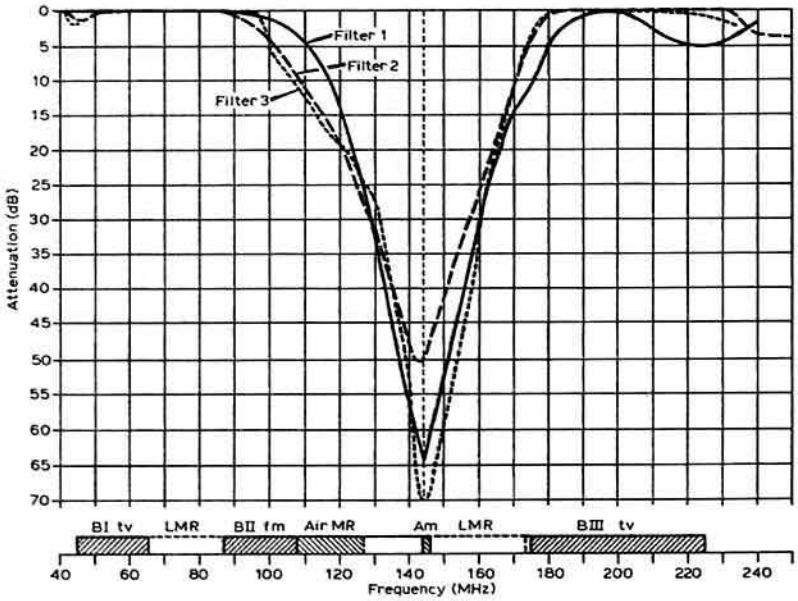


Fig 6. Response curve of three double-stub 144MHz notch filters. Filter 1 without channel optimization. Filters 2 and 3 optimized for minimum attenuation on Channel 2, Band 3, approximately 220MHz

Three filters were constructed and checked over the range 50–250MHz. Filter (1) was similar to the basic arrangement shown in *ART* without impedance optimization. Filters (2) and (3) both included channel optimization, but (2) was constructed with the Belling-Lee input connector in the box and with no "A-leg" cable, with the possible result of there being more stray coupling.

As shown in Fig 6, attenuation at the lower and higher ends of Band 3 is greater with the non-optimized Filter 1. Maximum attenuation of Filter 1 was over 60dB; Filter 2 about 50dB, and Filter 3 about 70dB. In practice a 50dB notch is usually adequate. When a filter is optimized for minimum attenuation at 220MHz the response around 175MHz is also improved. The theoretical way to optimize the filter is to extend the notch sections (D and F) with lengths E and G so that D+E and G+F both equal $\lambda/2$ for the specific channel frequency (in this instance 220MHz).

Optimization for Channel 5 (Band 1) was not attempted since it would require E and G to be 24cm in length, and would result in an unwanted notch at 206MHz. There is very little attenuation in Band 1 and not much in Band 2.

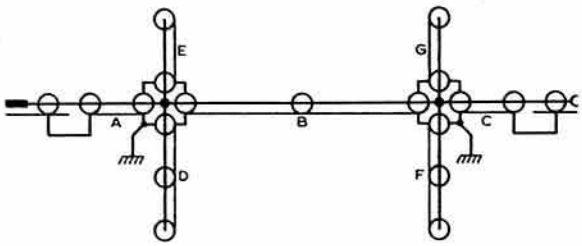


Fig 7. Double-stub notch filters for 144MHz. A and C 17cm, D and F about 33cm (adjust), B 34cm, E and G (used only for optimized filters) 12cm. Note that stub dimensions are affected by velocity factor of cable

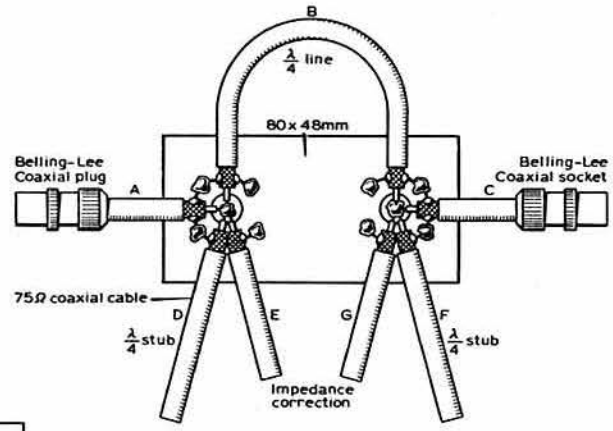


Fig 8. Mechanical construction of LA8AK's double-stub notch filters

It was found that if a stub is accidentally cut too short it is possible to add two twisted insulated wires to the end of the stub. For Filter 3, 5mm wires are connected at the end to tune the stub down from 150 to 144MHz.

A sweep measuring instrument was used to achieve correct alignment, but no claim is made for accuracy greater than 1–2dB as the instrument was intended for 50Ω systems whereas the filters were made for 75Ω feeders. Limit of measurement was about 70dB.

One final tip when tuning such filters. This is made easier by tuning one stub while short-circuiting the other; in this way each $\lambda/4$ stub can be tuned for about a 30dB notch, which is easier to control than the massive 60dB or so notch that can be achieved with this excellent type of filter.

Care of coaxial cable

Over recent months it has been shown that there is a good deal more to obtaining acceptably low losses when using coaxial cables, particularly at uhf, than might be thought. Radio-frequency cables should not be treated as though they were 50Hz power cables.

Basically it can usually be assumed that thicker cables have lower losses than thinner cables. But the dielectric between inner and outer conductors is increasingly important at the higher frequencies. The dielectric constant of solid polythene dielectric is 2·28 (air is 1·0). A mixture of air and polythene will thus have a lower dielectric constant, and thus lower uhf losses, than a solid dielectric. Foamed or cellular polythene has a dielectric constant of 1·5 and is widely used for television receiving antennas; the earlier semi-air-spaced cables used a helical polythene thread structure, but there is also a webbed form. Both the thread and web forms are very vulnerable to moisture ingress that can quickly ruin expensive lengths of cable.

Both for reception and transmission the losses in feeder cables represent a major factor in the overall performance of a station, particularly at uhf or vhf. The quality of the signals supplied to the antenna socket of a receiver determines the maximum signal-to-noise ratio that can ultimately be achieved; weak-signal losses in the cable cannot always be compensated for by more gain or processing in the receiver (unless in the form of a masthead amplifier). Similarly, on transmission, it is easy to throw away the bulk of all the rf power so expensively generated in the transmitter: remember, what matters is the amount of power effectively radiated from the antenna elements.

The attenuation figures for cables provided by the manufacturers are those for brand-new cables; the losses, particularly of semi-air-spaced cables (web, Fig 9, or spiral dielectric) will rise dramatically if moisture is permitted to ingress into any part of the cable, as it will tend to spread along the cable due to capillary action. But high losses can also be due to general deterioration, particularly of connectors.

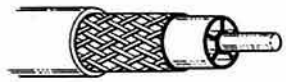


Fig. 9. Webbed form of semi-air-spaced coaxial cable as commonly used for fringe-area television reception, as an alternative to the spiral form of support for inner conductor

When handling and installing feeders do not pull a "kinked" cable sharply or you may puncture the internal dielectric or produce kinks in the centre conductor that affect the impedance to the extent of short-circuiting the conductor and braid; do not attempt to bend the cable sharply—a bend radius of five times the cable diameter is generally considered an absolute minimum. Good terminations to plugs and sockets or connectors are particularly important. A feeder that initially functions satisfactorily may fail later due to breaks in the conductor at the fixing screws, where the wire may have been nicked during wire-stripping at the time of installation. Feeder cable should normally be secured at intervals to prevent wear due to abrasion; but it is important to note that fixing staples should not be driven home too hard since this can easily damage the cable or cause reflections due to the effect on the impedance. Both sharp bends and tight staples tend to produce standing waves and significantly increase the attenuation; stapling at regular $\lambda/2$ intervals (or small multiples of $\lambda/2$) can have a marked effect.

Unless connectors are designed for crimping (and this is correctly carried out with a crimping tool) the coaxial plugs should be carefully soldered to the feeder cable rather than relying on a push-fit that may appear entirely satisfactory initially but which is likely to deteriorate later (sometimes forming a "diode" that can increase transmitter harmonics by "rusty-bolt" action). □

EPHEMERIS
Satellite news and views

R. O. Phillips, G4IQQ*

IT IS NOW SOME MONTHS since an up-date of activities in the area of amateur satellites was carried in the columns of *Radio Communication*. During that period the level of activity has been running at an all-time high, and all being well the future of the amateur satellite service, which looked rather bleak after the loss of the Phase 3A satellite, now seems quite secure for the foreseeable future.

Before describing the events of the last few months it is worth mentioning that Oscar 8, which was launched in March 1978, is still providing very good service through both the Mode A and Mode J transponders.

As will be well known to many amateurs by now, 6 October 1981 saw the launch of the amateur/scientific satellite constructed at the University of Surrey. A description of the spacecraft, which is now referred to as UOSAT-Oscar 9, was given by the project manager, Dr Martin Sweeting, G3YJO, in *Radio Communication* February 1981. The basic characteristics of the satellite when launched were essentially as described; however, there were a number of changes to the beacon frequencies and a complete list is given in Table 1.

Table 1. List of UOSAT-Oscar 9 frequencies

HF beacons	7,050, 14,002, 21,002, 29,510kHz
General data beacon	145·825MHz
Engineering data beacon	435·025MHz
UHF beacon	2·401GHz
SHF beacon	10·47GHz

The combination of the low orbit of the satellite, 555km, and its tumbling action before full attitude stabilization, has made it difficult to predict the orbital characteristics more than a few weeks in advance with any degree of confidence. It would therefore be wise, before trying to listen for the satellite, to obtain up-to-date information either from the recorded message service at the University of Surrey (Guildford 61202) or from the AMSAT-UK information nets (3,780kHz Monday–Friday at 1900 local, Sunday 1015 local; also 144·280MHz on Sunday at 1900 local time).

The next event of major importance occurred on 17 December 1981 with the simultaneous launch of no less than six satellites in the RS series. Detailed descriptions of the satellites, RS3 to RS8, appear elsewhere in this issue of *Radio Communication*, as well as in the winter 1981 issue of *Oscar News* (obtainable from AMSAT-UK†). It would appear that each of the satellites contains a Mode A type transponder, ie uplink around 145·9MHz and downlink around 29·4MHz, though at the time of writing there had been no indication that the transponder on RS3 was activated. In conjunction with the transponders, each satellite transmits a telemetry beacon on one of two switchable frequencies, either at the lower or upper edges of the downlink passband. Also, RS5 and RS7 carry "Robot" transponders which enable automatic cw contacts to be made with the satellite. Each complete contact is logged in the spacecraft's on-board memory, and at certain points on the orbits, details of all QSOs may be dumped on command from the control station in Moscow.

The fourth and final test flight of the European Space Agency's Ariane launch vehicle took place on 20 December 1981 from Kourou in French Guiana. The flight, which carried the MARECS-A satellite, was completely successful, and it is hoped that a similar result will be obtained in July when flight No 6 is due to launch the AMSAT Phase 3B satellite as a partner to the European Communications satellite ECS-1. Phase 3B will contain two communication transponders, one of which will operate in the new frequency allocation to the amateur satellite service at 1,260–1,270MHz. The provisional details of the transponder and beacon frequencies are shown in Table 2. The satellite is due to be placed in a highly elliptical orbit with an apogee of 39,000km (initially over the northern hemisphere) and a perigee of around 1,500km. More details of the spacecraft and its orbital parameters will be published closer to (or perhaps, to be on the safe side, after) the launch.

Table 2. Provisional frequency plan for Phase 3B satellite

Mode B	Uplink	435·175–435·025MHz
	Downlink	145·825–145·975MHz
	General beacon	145·8125MHz
	Engineering beacon	145·990MHz
Mode L	Uplink	1,269·850–1,269·050MHz
	Downlink	436·150–436·950MHz
	General beacon	436·020MHz
	Engineering beacon	436·040MHz

Anyone wishing to find out more about amateur satellites will have two opportunities if they are in London on the 26 or 29 April. First, on 26 April, a talk will be given by Richard Limebear, G3RWL, on the subject of "Amateur radio satellites". Then, on 29 April, Martin Sweeting, G3YJO, will give a talk entitled "UOSAT—a low cost spacecraft for professional and amateur scientists". Both talks will be held at the Institution of Electrical Engineers, Savoy Place, London WC2, starting at 6.30pm and 5.30pm respectively (tea will be available half an hour before each talk). Only just in time for this issue, the annual general meeting of AMSAT-UK will be held on Saturday 3 April 1982 at 1300 (1230 for lunch). The meeting is open to anyone interested in amateur satellites, but participation in the official business of the meeting will, of course, be limited to paid-up members. The venue is the Churchill Room of London House (opposite RSGB headquarters in Doughty St).

Finally, several requests on behalf of the growing number of users of the amateur satellites. The first concerns use of the top end of the 144–146MHz band; the January 1982 issue of *Radio Communication* (page 46) carried band plans for 144–146MHz and 432–440MHz (what happened to 430–432MHz?) indicating the various sub-bands recommended for use in the UK. These plans do not form part of the amateur licence and are therefore not in any way mandatory; however, they do represent a concerted attempt to enable us to get the most from the various bands allocated to the amateur and amateur satellite services. The sub-band 145·8–146MHz has been designated for amateur satellite use, and any non-satellite use can both block the input to some satellites and cause interference to the downlink signals from others. This is particularly true in the case of 145·825MHz—the frequency used for the UOSAT engineering/data beacon.

Two other remarks are directed to the satellite users themselves, who should, of course, be well aware of the rules. First, use only enough uplink power to provide an adequate signal on the satellite downlink—using more not only makes it more difficult for low-power stations to access the satellite but, in the case of the RS satellites, actually causes an attenuator to be switched in to the receive path. Second, it is essential to observe that, for Oscar 8 and RS satellites, Wednesday is reserved for educational purposes only; the satellites should not be used even if other stations can be heard.

Having made the above comments there is still plenty of scope for operation through the satellites, and anyone who has not yet heard an amateur satellite QSO need only listen on 29·3–29·50MHz, any evening (except Wednesday!) between about 1900 and 2130. □

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4-2-70

John Morris, G4ANB*

Beacons

The Home Office has agreed the new frequencies requested for the 70MHz beacons following the changes to the band (*4-2-70* February 1982). GB3SX (70·04MHz, AL71d) and GB3SU (70·05MHz, ZN61a) are now operational again. The new two-element beam fitted to GB3SX is designed to improve the signal strength to the north of the country, but with a sufficiently wide beamwidth for stations in Wales, the West Country and East Anglia still to receive a reasonable service. G4BPY has reported that the new arrangement is putting a much better signal into the Midlands than the old set-up. Reception reports for GB3SX would be welcomed by G3UUT, or the beacon keeper, G3DME.

The paperwork for the two new 70MHz units, GB3CTC (70·03MHz, XK76d) and GB3ANG (70·06MHz, YQ35c), is still working its way through the system, but one or both of these may be expected to come on the air during the next few months.

GB3GI (144·945MHz, XO41j) has been taken off the air for rebuilding. While it is off it is hoped to change to a GB3 + three-letters callsign; possibly GB3GIB. Callsign changes for GB3SU, GB3SX and GB3EM (432·910MHz, ZN32b) are also expected in due course.

GB3LER (144·965MHz, ZU65f) is back on the air. GB3LER runs 65W erp using a four-element Yagi beaming NNE, and is well worth checking when auroral conditions seem possible.

GW3MHW has passed on information from VE1YX concerning a new 50MHz beacon in Argentina. LU8MBL is reported to be operational on 50·246MHz using an omni-directional antenna.

Aurora

There were auroral openings on 144MHz on 31 January and on several days during the first fortnight in February. The 31 January event seems to have been mainly confined to UK working; G4ASR (YM76d), for example, worked GMs in YQ, YP, YR and WS locator squares.

A much more extensive opening on 1 February was noted by several correspondents and produced some excellent dx contacts. Some of the best results of the day were reported by G3LTF of Essex who worked SM0HAX (JT square), SM4COK (HT) and UQ2GFZ (NR) on 144MHz. The last contact represents a distance of around 1,750km. He was also very pleased to work GM3JFG (XR) on 432MHz by aurora. G3LTF would like to make more auroral tests on 432MHz, and has asked if a list can be compiled of Scottish stations who can run high power on this band and are prepared to move up from 144MHz during an opening. Would anyone like to put their name down for such a list?

GM4CXM (XP09g) worked a total of 50 stations and 10 countries on 144MHz during the 1 February event, including DF1CD (FH23j), Y23FG (FM69g), OZ3GW (FQ21a), SM0HAX (JT51b), F6APE (ZH57b) and GJ4JWA (YJ70h), plus many PA, ON and G stations. For G3BDQ near Hastings the best beam heading stayed at north from 1924 to 2021gmt. Among the stations worked on cw during this period were LA7KK (FU square), SM0HAX and SM4FXR (HT). The best for G4ASR (YM76d) was OZ4VV (EQ17a) while GM4IHJ in Fife worked several stations around Paris.

Smaller events on 3 and 4 February produced mostly G-GM contacts, although G8RZO on the Isle of Sheppey did collect a new square in the form of SK6HD (GS). G8LFB (ZL30f) also heard several Swedish stations on cw, including SM4IVE (HT68d).

Scottish operators seemed to fare best in the next 144MHz opening on 6 February. GM3CXM, for example, worked LA5IH (CU47j), SM4GVF (HT76a) and F6CEL (CJ41g) among others. Using a temporary antenna system, GM8OEG (YQ35e) found OZ1DPR (EP54e), F1BBD (BJ09b) and many PAs and DLs on ssb. A good catch for G4ASR was SM4IVE (HT68d).

GM8OEG found that influenza can have its side benefits when he was off work on 10 February and heard auroral signals from the DL0PR beacon (EO54c, 144·910MHz) at 1400gmt; although the illness did have the disadvantage of making his voice "tone A" even before the anomolous propagation got at it. Despite this handicap he managed to make many contacts including OZ9PW (EQ27j) and DD8KC (DK13a) before conditions faded at 1718gmt. On the same day GM4CXM worked SM0HAX and SM6AEK (GQ25b), and also heard UR2RQT working into West Germany and the Netherlands but could not raise him for a contact.

There was a weaker event on 11 February when GM4CXM caught SK7JD (IR14f) and HB9QQ (EH45e). GM4IHJ saw a visual event between 2015 and 2230gmt. Rather better openings on 13 and 14 February seem to have been similar to that on 10 February. On St Valentine's day G4ASR worked SM4IVE again, while on ssb the best for GM8OEG included DD9BM (EN76f) and F6EOQ (YI13c) between 1740 and 1936gmt. G4KLN in Leeds worked into WS, EU, HT and YI squares among others during the two days.

A weak opening on 17 February gave G4ASR a couple of GM contacts in YQ square. A much better event on 22 February allowed G4ASR to work many EI, GD, GM and SM stations, the best being SM5IDM (HT square) and SM0HAX (JT).

My thanks to everyone who supplied reports on this series of auroral openings. As usual all reports will be forwarded to the Propagation Studies Committee of the RSGB for detailed study.

Tropo

For those whose antenna systems survived the ice and snow there was plenty of fine dx to be worked around 14 January when Continental high pressure brought excellent tropo conditions on vhf and uhf to northern Europe, with OZ callsigns featuring prominently in many logs. This opening produced a veritable flood of band reports, most of which unfortunately arrived just after the deadline for last month's issue; no doubt mail delays due to the rail dispute did not help matters.

After seeing the weather forecast on 13 January panic ensued at the G4BVY/G4GFX QTH (YM79a), as the antennas were still down after the Christmas holiday and were frozen, buried in about 3ft of snow. Many buckets of hot water allowed erection of a 16-element Yagi (three-quarters of a 21-element Tonna!) at 10m agl for 432MHz and a 9-element Tonna at 9m agl for 144MHz.

Starting with the lower band, the phrase "string of OZs in EP, EQ, FP and FQ squares" occurred in several of the 144MHz reports, including that of G4GFX, whose 100W also pulled in SM6KKX (GR72j), SM6CMU (FR50b), SM6BCD (FR30j) and SM7JLJ (GQ square). Despite the disadvantage of being on the west coast, GM4CXM (XP09g) worked the same squares in Denmark with the addition of GP, and also SM6GDA (GR square). The same squares were worked once again by G8ZVW in Peterborough, who also heard the ON0AN and OZ3REE repeaters on fm.

One of the few reports of contacts to the south came from G4ASR (YM76d), who worked French stations in AJ, ZJ and AK squares on 14 January as well as the "standard" Danish squares. So far in 1982 G4ASR has worked EQ square by meteor scatter, tropo and aurora!

From 1244 to 1335 and 1747 to 2319gmt on 14 January G8XMP (ZN36a) worked many Continental stations. A spell on fm produced a series of contacts with PD0 stations. (The PD0 prefix is allocated to Netherlands Class D operators, who are allowed to use phone only with 25W maximum dc input on channels S10, S11 and S13-16.) The best dx on ssb for G8XMP included SM6AEK (GQ25b) at 2112gmt and DD7LP (EO36a) at 2316gmt, plus of course the by now mandatory OZ stations in EP, EQ, FP and FQ squares throughout the evening.

On the previous day G8UYQ (AM51g) was delighted to work GW8VEO (YN76f) at 2322gmt, as he was running just 1·5W to a colinear at 7m agl!

Moving up to 432MHz, G4BVY used 50W to work several West German and Danish stations, including OZ1FEF (EQ25c), OZ6CE (FP01d) and OZ1BJF (HP75f). A couple of weak Swedish stations were heard but not worked.

G6ADE (ZN45g) also stayed on uhf using a TS770E and a 21-element Tonna. Those worked during 13 and 14 January included OZ1BJF, OZ1FEF, SM7FMX (GP35j), SM7EYW (GP35k) and many other OZ, DL and PA stations. One particularly notable contact was with DL8HAV (EN20e) who was running only 1W output.

Despite ice on the antenna doing strange things to the swr, and sub-zero temperature in the shack, G4BPY (YM30d) worked OZ9SL (FP74g) on 432MHz at 1457gmt on 14 January followed by several DL, PA and OZ stations in the early evening.

G6CSY (AL41e) found many PA, DK and OZ stations on 144MHz, with DK and OZ on 432MHz. G6CSY also noted a lack of signals from France and Belgium on both bands.

On the atv front G3PTU in Huddersfield exchanged excellent fast-scan pictures with PA3BIC for 40min from 2130gmt on 14 January. The picture quality was so high that G3PTU could record the incoming video and

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retransmit it back to PA3BIC, and could see the callsign on a Polaroid photo held in front of the camera at the distant station.

The opening also produced a reversal of the natural order when G3LTF in Essex worked DF9LN (FO61a) first on 1,296MHz, following which the two stations moved down to 432MHz!

An opening to the south on 30 January gave G8RZO on the Isle of Sheppey a chance to work several stations towards the south of France, including F6ELI (ZE19j) and F1ETM/P (BE12a) on 144MHz. G8LFB (ZL30f) worked the same two stations as well as F1FBE (AD28c) and F1HI (AD37c) in the early hours of 31 January.

On 2 February GM4IHJ in Fife noted a typical marine duct or low-altitude temperature inversion which produced a line of smog 200m above sea level which gave 144MHz ducting from Fife to the Continent from about 1630gmt. At 1930gmt the top of the duct apparently lifted and, briefly, as the high spots lost the 144MHz dx, the band opened up to Norway and Denmark from all of lowland Fife and Strathclyde through to Glasgow. At 1808gmt on the same day G8LFB worked OZ2ZB/A (EQ36b) and at 2025gmt heard SK6HD (GS68j).

Another opening to the south on 9 February gave G4ASR (YM76d) a series of contacts with French stations, including QTH locator squares as far afield as ZE, AG and BH. The best for G8LFB included F1BUU (ZE08e) F1FVP (ZF square), F1EQE (ZF), plus many others in more northerly squares.

Repeater news

The 1982 batch of 432MHz repeater proposals, uhf Phase 7, continues to grow and now includes about 20 entries. Among those recently accepted in principle by the Repeater Working Group are units for Carlisle (GB3CA, RB13), York (GB3CY, RB13), Worksop (GB3DS, RB13), Gainsborough (GB3GH, RB15), Biggin Hill, Kent (GB3KB, RB0), Medway Towns, Kent (GB3MD, RB11), and Preston (GB3PP, RB15). In addition an rtty/data repeater has been proposed for Leicester (GB3GD, RB12). All of these proposals are subject to full vetting, and some of the callsigns or channels may be subject to change before the batch is submitted to the Home Office later this year.

The Oxford uhf repeater, GB3OX, has been licensed for some time, but is not yet operational. The responsibility for GB3OX has been taken over by the GB3WH group and now that the GB3WH/GB3VA exercise has been successfully concluded it is hoped that GB3OX may soon appear on the air In preparation for this a site and channel change (from RB4 to RB15) for GB3OX have been applied for and should hopefully be approved by the time this is published.

GB3HZ (RB4, High Wycombe) is expected to become operational soon. GB3SY (RB6, Barnsley) is off the air for rebuilding and a site change.

Following the closure of GB3WS (*4-2-70* November 1981) two separate groups have submitted viable proposals to take over the licence. Both proposals were notable for being extremely well presented and thoroughly researched, thus presenting the RWG with the dilemma of deciding which one to accept. Examination of the expected coverage maps revealed that the two units would have rather different service areas and would in fact be compatible with each other. Rather than trying to choose one or the other the decision was made to treat both as totally new proposals and to include them in uhf Phase 7. At the same time the licence for GB3WS will be returned to the Home Office.

One proposal is for a unit in Sudbury, and the other for Bury St Edmunds. The latter has been allocated the callsign GB3BE and Ch RB6.

The Sudbury unit will be proposed for Ch RB15, but just to complicate matters even further there is a slight problem with the callsign. The obvious choice is GB3SU, but this is dependent on the present GB3SU beacon on 70·05MHz first changing to a GB3 + three-letters callsign.

Meteor scatter

Meteor scatter continues to grow in popularity, especially of course during the regular and predictable meteor showers each year. The Quadrantids shower, which peaked on 3–4 January, attracted a good deal of activity. On GM6ALC's (XQ77e) first attempt at the mode he worked OZ1EYX (GQ square) by sked as well as two other OZ stations in GP square on random. GM4CXM (XP09g) completed skeds with OZ1EYX, DL7AFB (GM), YU3CAB (HG) and F1JG (CD).

Further south the best dx for G4ASR (YM76d) was a 1,870km contact with SM2CKR (KX12g). The longest burst during this contact lasted 20s at S3. Other contacts included YU3ULM (GF09j) and SM6CMU (FR50b). G3LTF in Essex completed exchanges with YU3ES (GF) and YU1EU (KE).

One of the best contacts of the shower was reported by GM4IPK (YP05h), who made a 2,205km contact with UA3LBO (QO21h). The sked was arranged for 2200–2400gmt on 3 January, and the contact was completed within the 2h with 26 reports each way. GM4IPK received 15 bursts and 8 pings, the best being a 3s burst at S4. UA3LBO received a 7s burst at S9 during his first listening period and was able to send R26 reports just 20min into the sked, but because of static rain in Scotland the contact took a little longer to complete.

This shower prompted GM4IHJ to raise a topic which has been about for some time; the possible relationship between meteor showers and sporadic-E. Whether or not there is a causal relationship between the two phenomena still seems to be undecided, but GM4IHJ made the following observation: "This winter's sporadic-E season was one of the poorest I have known—only three events reached 100MHz. I wonder if the very poor Quadrantids meteor shower was a coincidence or related factor?"

This is an appropriate point for a reminder that there are two "ms reference frequencies"; 144·100MHz for cw, and 144·400MHz for ssb Activity during showers can extend up to 26kHz above these frequencies (*4-2-70* August 1981) and these small portions of the band should be kept clear of non-ms operation.

Expeditions

A contest team from Hamburg will be operational on 144, 432 and 1,296MHz from the island of Heligoland, in DO locator square, for the German national contest on 1–2 May. The callsign on all bands will be DK0IK/P. Further operation is planned for the week up to 7 May. The operating frequencies will be 144·382MHz ssb; 144·022MHz cw; 432·162MHz ssb/cw; 1,296·162MHz ssb/cw. On all bands the group will be equipped with state-of-the-art equipment, including high-gain antennas and gasfet preamplifiers. The power output on the three bands, low to high, will be 500, 250 and 100W respectively. SSB and cw will be used, the latter being "preferred for serious dx". Tropo and ms skeds can be arranged on the vhf net on 14·345MHz, or by telephone during the expedition by calling the West German number 04725310.

The Cambridge University Wireless Society, G6UW, will be mounting an expedition to Jersey from 7 to 14 April. Operation will be on the hf bands plus 70 and 144MHz. Full details will be sent to GB2RS when they have been finalized.

Awards

Thanks to the arrival of a large batch of Continental QSLs G4IGO was able to jump straight from the 100 squares and 20 countries category of the 144MHz 4–2–70 Squares series up to the top 150/20 level, where he has taken sticker No 3. The breakdown by mode was 98 on ssb, and 52 on cw; with 75 of the contacts having been made by tropo, 13 by Es, 31 by aurora, and 31 by ms.

It is interesting to note just how many of the top award claims on 144MHz include cards for meteor scatter contacts, showing how effective the mode can be for reaching out to distant locations when conditions are otherwise at a low ebb. A case in point was provided by G8VR, who has taken sticker No 2 in the 144MHz 125/20 category. Of the 27 cards included in his topping-up operation no less than 20 were in respect of ms exchanges, all made on cw, including the rare 144MHz country of Andorra.

From G8TFI came a veritable shipping order of a claim. Included in the bulk package were enough cards to take 432MHz Four Metres and Down Standard No 170, 144MHz FMD Standard No 601, 432MHz 4–2–70 Squares 30/6 No 17 (the first G8T-- callsign holder to take this award) plus extra cards to take G8TFI from the 60/15 to the 80/18 level in the 144MHz 4–2–70 Squares series (again, the first G8T-- to reach this level).

Several other recent 144MHz award claims have also represented "firsts" of one sort or another: 144MHz 4–2–70 Squares 100/12 No 12 has gone to G8CXQ (first G8 + 3 in this category); 144MHz FMD Standard No 595 to G8ZOS (first G8Z--); and No 596 to G6AJA (first G6A--).

Finally, in the 144MHz FMD Senior category, regular correspondent G3BDQ has taken certificate No 180.

With his award claim G8VR reiterated his wish to initiate a "Meteor Scatter Annual Award". The views of other ms enthusiasts with regard to this proposal would be most welcome.

Repeater Working Group open meetings

The Repeater Working Group holds open meetings four times each year in locations all over the UK. Previous meetings have been held in Bath, Newcastle, Motherwell, Exeter, Barnsley, Nottingham, Birmingham, Cambridge and Warrington. In the past these meetings have only been publicised locally, but this policy has recently been changed and so I can now reveal that for 1982 meetings in Stoke-on-Trent, Bristol, Crawley and the east of Scotland are envisaged.

The meetings take place on Saturday afternoons and are open to all repeater builders and users. The format is usually a series of talks by RWG

UK 145MHz REPEATER NETWORK, MARCH 1982

Callsign	Channel	Location	Locator	Contact
GB3AE**	R5	Barnoldswick, S Yorkshire	YN18f	G3RXH
GB3AM**	R6	Longbridge, S Birmingham	ZM51j	G4KZH
GB3AR	R4	Arfon, Caernarfon, Gwynedd	XN79e	GW3MZY
GB3AS	R1	Caldbeck, Cumbria	YO15e	G3WJH
GB3AY	R2	15km S-E Ayr	XP48f	GM3KMG
GB3BC	R6	8km NNW Newport, Gwent	YL35a	GW8CQK
GB3BM	R5	Birmingham	YM50a	G8AMD
GB3BP	R6	Horsham, W Sussex	ZL79f	G4EFO
GB3BT*	R2	Berwick-upon-Tweed	YP10g	G3HDT
GB3BX**	R2	N Birmingham	YM30b	G4JLI
GB3CF	R0	Leicester	ZM24j	G4AFJ
GB3CS	R6	Blackhill, Motherwell	YP11a	GM3KMG
GB3DA	R5	Danbury, Essex	AL23b	G8NMP
GB3ELt	R0	Havering, E London	AL31b	G4GPO
GB3ES**	R7	Hastings, E Sussex	AK03d	G3ZFE
GB3EV**	R4	Appleby, Cumbria	YO38e	G3WJH
GB3FF	R4	Burntisland, Fife	YO66h	GM3KMG
GB3FR	R7	Old Bolingbroke, Lincs	AN61g	G3NNO
GB3GN	R7	Aberdeen	YR79f	GM4BYT
GB3HG**	R1	N Yorkshire	ZO55h	G4ATZ
GB3HH	R4	Buxton, Derbyshire	ZN61a	G3RKL
GB3HI	R4	Isle of Mull	XQ42g	GM3RFA
GB3HS	R2	Little Weighton, Humberside	ZN18g	G3KOC
GB3KN	R4	Nr Maidstone, Kent	AL54e	G3MDO
GB3KS	R1	Dover, Kent	AL67d	G3MDO
GB3LD*	R3	Ulverston, Lake District	YO65f	G3KLG
GB3LM**	R5	Lincoln	ZN68f	G8VGF
GB3LY	R0	Limavady, Co Londonderry	WP76a	GI3GGY
GB3MB**	R0	Manchester	YN39b	G3LEQ
GB3MH	R3	Malvern Hills, Worcs	YM79a	G3NUE
GB3MN	R2	Stockport, Cheshire	YN60c	G3LEQ
GB3MP	R6	Moel-Y-Parc, Clwyd	YN64a	G3LEQ
GB3NA	R3	Barnsley, Yorkshire	ZN33a	G4LUE
GB3NB	R1	Wymondham, Norfolk	AM36d	G8YAL
GB3NC	R5	St Austell, Cornwall	XK56b	G3XC
GB3NI	R5	Northern Ireland	XO32h	GI3TLT
GB3NL	R7	Enfield, N London	ZL30e	G8IUC
GB3PI	R6	Barkway, Herts	AM71f	G8MEI
GB3PO	R3	Martlesham Heath, Suffolk	AM77j	G3ZNU
GB3PR	R3	Perth	YQ53b	GM8KPH
GB3PW**	R3	Newtown, Powys	YM43b	G3UQH
GB3RD**	R3	10km W Reading, Berks	ZL45h	G4CCC
GB3RF	R7	Burnley, Lancs	YN19e	G3RXH
GB3SB*	R0	Nr Jedburgh, Borders	YP34f	GM4EZJ
GB3SC	R1	Bournemouth, Dorset	ZK21b	G3VPC
GB3SI	R1	St Ives, Cornwall	XK63j	G3NPB
GB3SL	R2	S London	ZL50j	G3PAQ
GB3SN	R5	Fourmarks, Hants	ZL75b	G8CKN
GB3SR	R3	Nr Brighton, Sussex	ZK20j	G4EFO
GB3SS	R0	16km SE Elgin	YR25g	GM4IAO
GB3TRt	R2	Torquay, Devon	YK33f	G4FCN
GB3TW	R5	Tyne & Wear	ZO12j	G8XDF
GB3TY**	R6	Nr Hexham, Northumberland	YP80d	G8VDM
GB3VA	R4	16km W Aylesbury, Bucks	ZL15j	G6NB
GB3VT	R1	Stoke-on-Trent	YN80e	G3LEQ
GB3WD**	R4	West Devon	XK40c	G4GWJ
GB3WH	R2	Near Swindon	ZL32f	G4DPA
GB3WL	R1	Hillingdon, W London	ZL38d	G3PAQ
GB3WR	R0	Mendip, Nr Wells, Somerset	YL67b	G3CQE
GB3WT	R7	West Tyrone	WO24c	GI3XCZ
GB3WW	R7	Carmel, Dyfed	XL30a	GW3VPL
GB3YJ	R7	Leamington Spa	ZM53e	G8IXE

Notes:
*Licensed, not yet operational
†Temporarily off the air
**Proposal stage, vhf Phase 5

members about the repeater networks and plans for the future, followed by questions from the floor about each particular topic. At the end is an "open forum" where RWG members answer questions on any repeater-related topic.

From the RWG point of view the meetings give an insight into what the "amateur-in-the-shack" is thinking, and give it an opportunity to explain why various policy decisions have been made. The meetings are usually informal and those attending say they have learnt something.

The first meeting of 1982 is being planned for 8 May in the Northwood Room of the Post House Hotel, Clayton Road, Newcastle-under-Lyme, Staffs (on the A519 just north of junction 15 on the M6). The meeting is being organized by the RWG in conjunction with the UK FM Group (Western), who are calling the event "Talkthru 82" and will be providing talk-in. Members of the UK FM Group (Western) will be talking about some of their recent projects at 1.30pm, and the RWG presentation will start at 2pm. The hotel has bar and buffet facilities for those wishing to eat beforehand, and refreshments will be available during a break in the meeting.

This is an ideal opportunity for those who say "the RSGB should have done this or that about repeaters" to come along and tell the RWG what they are thinking.

Japanese repeaters

Repeaters in Japan are expected to be authorized in the near future, and the Japanese national society, JARL, has announced new vhf and uhf band plans to accommodate them. The fm segments of 144 and 432MHz have been enlarged and the present beacon on 52·5MHz will be moved to 50·01MHz, bringing Japan into line with most of the rest of the world.

The RSGB, with its wide experience of repeater matters, provided a good deal of technical and licensing data during 1981, and this is reported to have been of great assistance to JARL in their negotiations with the Japanese PTT.

I cannot help feeling that there is a certain irony abut the fact that the country which has probably supplied more rigs to repeater users than any other is only just beginning to develop its own repeater networks, and that advice on this should be coming from one of their best customers, the UK!

Balloon Carrying Amateur Radio

I am indebted to Andy Ince, ZR1HF/G6BYP, for drawing my attention to an article in *Radio ZS* describing the South African AMSAT project "BACAR"—"Balloon Carrying Amateur Radio". The balloon will carry a 50kHz-wide transponder with input somewhere in the range 145·850-146MHz, and output in the 432MHz band; plus several beacons. Communication ranges of up to 1,000km are anticipated if all goes according to plan. The flight plan is described as follows:

"The balloon will be launched during the morning on either a Saturday or Sunday and the translator will be available for use a few minutes after launch. The balloon will climb to a height of 15 or 20km and hopefully fly for about 3h or more before bursting. The package will then descend at a safe rate on a parachute and land at a distance of up to 250km from the launch point. As the package is intended to be re-used a df transmitter will be activated on the way down and a 144MHz df hunt organized to recover the translator and goodies.

"We are all told that radio amateurs are nuts—now is your chance to prove that statement! What we need are a few dedicated guys who will stand on hills with big antennas, tweek a few knobs, jump in their cars, and drive like h--- for a few hundred kilometres to recover the burst balloon, parachute and a box of radio spares."

Three test flights were planned for the early months of 1982. If these were all successful up to one flight a month could be possible from April.

It will be interesting to hear the results of these experiments. There can surely be few other projects in amateur radio with quite the same combination of technology, aeronautics, dxing and df hunting!

30 and 10 years ago

"At a recent 144 Mc/s meeting in Norfolk a suggestion was made by the members present that stations in the greater London area should sign their calls on c.w. as well as on 'phone as many unidentifiable transmissions are heard coming from that direction."—G2UJ in *Around the V.H.F.'s*, April 1952.

"The primary aim of the UK FM Group is to promote the orderly growth of fm operation in the vhf and uhf bands, and to seek common standards as regards frequencies and transmissions. It recommends that frequency tolerance should be within 2kHz of the specified channel, with peak deviation limited to 3kHz, and an audio bandwidth of 3kHz. The use of audio compression ahead of the bandwidth determining stages of the modulator is also recommended."—G5UM in *Four Metres and Down*, April 1972.

Scatter

Following a generally favourable response from members the VHF Committee has confirmed the revised 70MHz band plan (*Rad Com* January 1982). In writing to support the new band plan G3YXZ also suggested that the present fm users on 70·480MHz should be encouraged to slide 5kHz down to the new "channel" on 70·475MHz. This would seem to be an eminently sensible idea, as it would allow many more contacts to be made with those using synthesized 25kHz spacing 144MHz rigs in conjunction with 144-70MHz transverters.

I have received a few enquiries about the Narrow Band Television Club, which was mentioned in a recent *4-2-70*. The NBTC can be contacted through its chairman, Mr D. Pitt, 1 Burnwood Drive, Wollheon, Nottingham NG8 2DJ.

G8RZO and G8RZP have been having problems with kamikaze racing pigeons which seem bent on impaling themselves on the 88-element multibeam. Rubber stoppers on each element help to lessen the blows, but

do not solve the problem. They would be interested in receiving any suggested cures.

G3LTF worked HB0QQ/P by eme on 432MHz on 9 January to bring his country total up to 35. The Liechtenstein station was high up in the mountains and had problems with antenna icing the previous night. Later the same day G3LTF completed 432MHz eme contacts with HB9BPQ (ex-G8BGQ), who replied to a "CQ" call, and K2UYH using ssb and cw.

The monster 144MHz array of K1WHS in Maine has given many operators with lesser systems their first taste of moonbounce. On 5 February G8VR needed only a single 16-element Tonna fed by a 4CX250 to work K1WHS on 144·03MHz by this mode.

G8WCE has written in support of the proposal by GM4IHJ in January's *4-2-70* that parts of the ssb and cw segments of 144MHz should be nominated for low power stations to call "CQ": "Replies only come when the other station would like to work Warwickshire, or hears the word 'QRP' and investigates further. A voluntary agreement between amateurs to leave a section uncluttered by high power 'CQ' calls would enable people to see just how far one can work using inexpensive equipment and simple antennas."

G4BPY would like to see more use of cw on uhf: "432MHz operators seem to suffer chronic paralysis of the tuning knob and acute atrophy of the morse key! How about a call for more 432MHz cw activity and use of 432·00-432·15MHz?"

G6BYP/ZR1HF spent a month after his arrival in South Africa trying unsuccessfully to make contacts on 144MHz. The problem was revealed by a photograph in an amateur magazine. On arrival G6BYP had automatically mounted his dx antenna horizontally, whereas everybody else was using vertical polarization!

Having contributed a very small portion to the new, second edition of the *Amateur Radio Operating Manual* I may be biased in recommending it. However, when the first edition, in which I played no part, was published it received general acclaim and the new, enlarged second edition contains all that was best in the first, brought bang up to date, plus much more. Over 50 pages of maps and data in the appendices alone means that this is one of the few books (along with the *Call Book*, log book, dictionary, thesaurus, 6502 machine code manual and TTL data book) that never leave my bench. If you want to find the answer to all those nagging little questions about band plans, anomolous propagation, QTH locators, life, the universe and everything, then the *Amateur Radio Operating Manual* is the place to look first!

With that "message from our sponsors" we come to the end of *4-2-70* for another month. Please send all contributions for June to arrive by **16 April** (late news by **26 April**) and for July by **14 May** (late news by **24 May**).

BOOK REVIEWS

Principles of Transistor Circuits by S.W. Amos. Sixth edition, 1981. Published by Butterworths, 331 + viii pages (222 by 160mm), 16 chapters, three appendices and index. £12.50 (casebound), £6.95 (limp covers).

This well-established and notably clearly written book (with a minimum of mathematics) by Stan Amos, formerly head of technical publications at the BBC's Engineering Training Department, was first published (by *Wireless World*) in 1959—and deservedly remains a standard text. It provides an introduction to the design of amplifiers, broadcast receivers and digital circuits. While the new edition includes additional material on integrated circuits and digital techniques, its main strength is in the treatment of the original discrete bipolar transistors; its main weakness, almost inevitable in a revision, is that the more recent devices are the more perfunctly covered. But it remains one of the best introductions to basic transistor circuits.

Semiconductor Data Book by A.M. Bell. 11th edition, 1981. Published by Newnes Technical Books, 175 + xiii + xi (blank for notes) pages (268 by 210mm). £5.50 (limp covers).

This is a completely new edition of the old *Radio Valve and Semiconductor Data Book* with main characteristics of some 10,000 devices presented clearly in alphanumerical order on large-format pages. There are some 85 pages of bipolar transistors; 12 pages of silicon fets; 15 pages of assorted diodes plus eight pages of zener diodes; as well as sections on light emitting diodes, photodiodes, unijunction transistors, triacs and thyristors. Then come lead identification diagrams and a 32-page list of "comparable" (ie near equivalents) types. Integrated circuits are not covered, and, as indicated by the change of title, thermionic devices have been abandoned. What can one say about a data book that has sold almost half-a-million copies over the years, except to say that it would be difficult to do without it? *G3VA*

SWL NEWS

Bob Treacher, BRS32525*

Here and there

G6IF was interested to see reference to Eric Trebilcock, BCRS195, in a recent column. He used to receive regular reports from Eric on his 7MHz signals around 1933. G6IF thought readers might be interested to know that between 1933 and 1935, with a power of 10W and a 66ft end-fed antenna, he worked VK, ZL, VS6, ZS, VQ8 (now 3B8), SU, YI, ZD2 (now 5N2), VU, CT3, W and VE, all on 7MHz cw. Is the band as good now?

Roger Pols, BRS31440, made three New Year resolutions: to become fully proficient in cw; to obtain the remaining confirmations for the DXLCA Award (available free to all RSGB members who provide proof of reception from 100 different DXCC countries); and third, to reach the magic 750 to get his entry into the all-time table.

While on the subject of the all-time list, G. S. Simpson, ARS41349, feels that the table should start with an entry figure of 600. Indeed, the entry score used to be 500, but the table grew too long and the more space the table takes up, the less space for news and comment.

G2AK sent your scribe a very complete reception report which he received from Nick Bainbridge, BRS32388. The report was in graph form and covered a period of 19min of G2AK's signals on 3·7MHz ssb. Licensed in 1926, G2AK remarked that this was the most comprehensive report he had received. Indeed, this was not the first time your scribe had received glowing accounts of Nick's reporting. He is to be congratulated on his painstaking efforts, which surely produce the desired QSL cards on a very regular basis.

Stan Porter, ORS45992/7Q, had got in touch with a fellow swl in 7Q land, courtesy of this column. They have their own contest for the year to see which of them can hear the most USA states on the five bands. As at early February, Stan had logged 48 of the 52 states. He thanks BRSs 42604, 47999, 49189, 49828 and G4DYF for making themselves known, and reports that his QSL return is 70 per cent.

Robert Small heard W5RRR operating from the Johnson Space Centre in Houston, Texas. He also heard NI4B from the Kennedy Space Centre in Florida, and an interesting QSO between VO3MEA (Newfoundland) and GB4MEA (Lands End) to celebrate the 80th anniversary of Marconi's first wireless transmission across the Atlantic. Brad Bradbury commented on S85H, the special prefix marking the 5th anniversary of the Republic of Transkei. Basil Woodcock had installed some new antennas for the winter dx season. Archie Magrath, RS48064, mentioned his local radio club at Birchington, Kent—the Radio Club of Thanet. The club holds a weekly net on Sunday mornings on 28,400kHz at 0930, and runs a slow morse transmission on Wednesday evenings at 1930 on 28,300kHz.

ZL1AH, ex-BRS2411, offered a dx station's view on the subject of QSL cards. Be patient! The fastest G-cards received by ZL1AH take on average about five months and that is good, because both bureaux are run efficiently. Some dx cards can take up to three years, so it follows that some licensed amateur or swl could wait anything up to six years to receive his QSL card. ZL1AH QSLs all swl reports, and suggests that sending a 29p postal order to most British Commonwealth stations would be a far cheaper way to QSL direct than by sending the more normal three ircs, but he advises people to check with a local post office first to make sure that the country actually accepts them, because one or two do not.

Bryan Johnson, BRS47999, has joined an RAE class and is studying hard. He sent a copy of the QSL card he had received from Tom Christian, VR6TC, who is a direct descendant of the 18th century Tom Christian of *Bounty* mutiny fame.

John Sutton, BRS35509, wrote this month's contribution at 0530. He has added an FL2 filter to his FRG7700 and FRT7700 and hopes that the addition will help him to pull some of the weaker dx stations through the QRM. John also reported the very quick QSL from VP8ANT's manager, G3ZAY. As mentioned before, all correct swl reports will be QSLd 100 per cent by sending the report and an sae to PO Box 146, Cambridge.

*79 Granby Road, Eltham, London SE9 1EH

1982 HF COUNTRIES TABLE

(Starting score 200)

Station	28	21	14	7	3·5	1·8	Total	Mode
BRS47745	88	106	120	101	98	26	539	ssb
BRS8841	114	80	133	87	71	8	493	ssb/cw
RS46228	79	76	109	87	65	0	416	ssb
BRS1066	69	68	94	60	56	37	384	cw
BRS44703	77	47	59	55	66	14	318	ssb
BRS31440	44	45	75	55	66	21	306	ssb
BRS35509	72	35	80	47	59	2	295	ssb
ORS45992/7Q	49	91	106	2	4	0	252	ssb
BRS25429	0	0	0	99	85	25	209	ssb
BRS48675	35	45	60	36	25	7	208	ssb

Norman Jennings, BRS48675, offers assistance to anyone who requires dx addresses. He has both 1982 *Callbooks*. For quick service, Norman's telephone number is Rye 2530.

Harold Moss, BRS18529, adds a touch of humour. He remarks that a QSL received from UK2BAS has a drawing of the operator watering the base of his tower—obviously to make it grow as tall as that of the guy next door!

G3LQI has advised that GB4SG will be active on all bands from 1 to 28 April, and especially on 23 April, St George's Day, mostly on cw. All swl reports will be acknowledged. QSLs to G3LQI or via the bureau.

Newcomers

Robert Roberts, RS44779, uses a Daiwa SR9 144MHz receiver. He has all the usual crystals fitted, but wonders why he can only hear signals on some of them. Reception of the vhf repeater system in Britain relies heavily on (a) your location and (b) the prevailing weather conditions. For example, if the receiving station is in a good location, he will likely hear more vhf repeaters under "flat" conditions than receiving stations situated in poor locations. Much depends on (b), as during good tropospheric conditions in summer many more repeaters will be capable of being heard. To give an example from your scribe's QTH—GB3SN in Hampshire on R5 is always audible, but it takes a "lift" to copy GB3BC in Bristol on R6. From this, listeners will be able to gauge the distances they ought to hear under "flat" conditions, given that all the other factors are equal, ie receiver, antenna, height asl etc. However, your scribe must add that when listening to repeater output channels all you are actually hearing is the repeater, *not* the stations working through them. To actually hear the stations direct you must tune the repeater input. A number of listeners are not aware of this, and it is worth pointing out, as transmitting amateurs will not QSL reception reports of their signals on repeater outputs, because you have not actually "heard" their signals.

Colin Watson, BRS46598, in Cumbernauld, Strathclyde, also prefers 144MHz fm reception.

Steven Muster, BRS47745, joined the Society in July 1981, and is yet another swl who runs an FRG7700. He hopes to sit the RAE later in the year, and he provided a good list of dx already heard in the first 10 days of 1982. Steve uses a system which it is hoped all other listeners adopt when submitting table scores. He only "counts" a station if he can hear that station give his callsign, ie not relying on the station he is working to repeat the callsign and copying it secondhand. As Steve says, this defeats the object. Some listener stations go further than that, by not "counting" a station unless they hear the signal report given by the station concerned. It is good to know that such additional "rules" are adopted. Steve is also brushing up on his morse and can copy 10-12wpm. This reaps rewards, especially on 1·8MHz, where he has heard 16 countries.

Maurice Graham, BRS32601, is a first-timer too, but is far from being a newcomer to the hobby. He was prompted into writing by the comments on QSLing habits. His return is 73 per cent, achieved in the main by direct QSLs and ircs. The odd ones get away, such as A7XD (your scribe is still waiting for one too), but Maurice comments that it niggles him when the same station is heard in QSO to say that he QSLs 100 per cent all cards received direct. Maurice uses a Drake SSR1 and an FR50B.

Arthur Cooper, BRS49021, who sat the December RAE, uses an FRG7 and a long wire.

Paul Thompson, RS49828, whose interest in radio started when tinkering with lengths of wire to improve the reception of a small transistor radio which used to cover some of top band in the days of a.m., now uses an AR88D and intends to take the RAE. He is interested in any signals he hears between medium wave and 32MHz, sends many reception reports, and has had a good many replies from amateur and broadcast stations alike.

David Mytton, BRS44798, was set on the amateur path by his uncle, G3PDT, who gave him a 19 Mk3 set. However, the bug bit and he now has an R1000 and 66ft wire, which brings in the dx extremely well judging by the stations David mentioned in his letter.

Phil Oakley joined the Society in January 1981. He uses a Sony ICF6700W receiver and a couple of dipoles. For the benefit of those who, like Phil, want to enter the countries table, the rules were in *SWL news* December 1981, and QSL cards are not required before an entry can be submitted.

Stewart Mackay, BRS48696, runs an FRG7 with 100ft of wire, and mentioned the interesting dx which gathers on the African Safari Net on 21·280kHz at around 1845 on Tuesdays.

VHF

One report of note this time, obviously reflecting the fairly poor conditions of January and February, from Iris Rabbitts, BRS42676. She reported several auroras and two tropo openings to southern France. Stations in East Anglia apparently had the best conditions on 2 February, with those in AM square receiving 59 reports from SM, while only one SM was heard, at 51, in north London. Iris offered dx from AD, BE and XH squares on 30 January, and GI8UPV in XO31g; GM6ALC in XQ77e; GI8YDZ in WP67b; and GM8MBP in YR60e via aurora on 1 February. On 4 February, also via aurora, SMs were heard in GT, HT and JT squares. Iris now has 27 countries heard on 144MHz, with 17 confirmed. Best dx QSL to date is EA8XS in SO square.

Lower frequency challenge

December's *SWL news* threw out a challenge to any listener who could log 175 countries on the lower frequency bands during January. The one catch was that 40 dx countries had to be logged on both 7 and 3·5MHz and a total of 10 countries on 1·8MHz. This must have been the reason why your scribe only received two entries—one which only just failed, and the other which gave the person concerned much pleasure in trying. The two entries are given below, and just to prove it *was* possible, your scribe's figures are shown too.

Station	7MHz		3·5MHz		1·8MHz	
	Eu	dx	Eu	dx	Eu	dx
BRS25429	47	52	48	37	20	5
BRS18529	26	14	31	18	13	1
BRS32525	47	47	50	43	23	2

Perhaps the next challenge will be a little easier and will prompt a few more entries.

DX review

G3ZAY passed on some information that will interest any listener who still requires a QSL card from Jersey Is. He is to lead a group of six Cambridge University Wireless Society operators on a dxpedition from 7 to 14 April, and they will QSL all correct listener reports. Operation will be on all bands from 1·8 to 144MHz, including 70MHz. The expedition is to commemorate the 50th anniversary of G6UW. QSL cards for GJ6UW, GJ3ZAY, GJ4LUN and GJ4LVH should be sent to the PO box quoted earlier for VP8ANT. The other operators will give their QSL information over the air.

The CQ 160 Contest produced much activity during the last weekend of February. Best dx reported was VP2E, logged at 0624 at good strength. KV4FZ at 0640 and 0118, W1-3, 8, VE1, EA8QL, EA8YV, EA9EU, plus rarer EUs, IR8ONU, F6FLT, GU2FRO and UC2XW were also heard. That contest really marked the end of the winter contest season on 1·8MHz and listeners must now sit back and wait patiently to pounce on any tasty morsels which might appear as a result of countries being allowed to use the band for the first time.

A few reports to mention briefly. Between them, Dave Whitaker, BRS25429, Robert Small, BRS8841, Steve Muster, BRS47745, Graham Powell, RS46228, Brad Bradbury, BRS1066, Brian Wainwright, BRS44703, and Paul Crankshaw, BRS48909, provided the following: **28MHz:** FO8AU, HK0EHM, JT1KAI, KB7IJ/KH2, LU5ZR, VK9NYG, K8WW/VP9. ZD8MW, 3V8AA, 3X1Z; **21MHz:** LU5ZI (South Shetland—via LU2A), UA0YAE (Zone 23), YJ8VU (via DK5EX), 1A0KM (via 10MGM), 3C0AC (via N4NX) and 4U1UN (via W2MZV); **14MHz:** CR9BH (via OH2BH), PA0VDV/PJ7, T30BO, 6E5BBB (XE), 9Y50VU (via W3EVW); and on **7MHz** plenty of dx to report: Dave Whitaker listed 15 countries in North America, 11 in Africa, nine in each of Asia and South America, and six in Oceania—all during January. It was difficult to choose the best dx, but these caught the eye—HS2AMZ, 9M2AE, HL4YJ, LU5ZI, FK8CR, VK9NS, ZL4OY/A, and A22BW. On **3·5MHz** C6ADV, VP8ANT, ZD7HH (via W4FRU), 3V8DX (via G3SVK) and 5N0HAS were heard. Enough there to whet the appetite and to send everyone scurrying through their logs to find out where they were missing out!

Finale

That is all for another month. Keep all the news and comments dropping through the letterbox at this end. Deadlines for **June** are Monday, **19 April** and late news by **26 April**. □

MICROWAVES

Charles Suckling, G3WDG*

Microwave contests

The rules for the 10GHz Cumulative Contest and the Microwave Contest are given in "Contest news" this month. As in previous years the *Microwave Newsletter* will carry month-by-month reports of activity as well as a list of stations' intended operating plans for the subsequent activity period. Anyone intending to operate in the contests will find this information very useful. The newsletter can be obtained from the general manager at RSGB HQ at £4 per annum.

Using the 2C39 valve under portable conditions

The 2C39 valve and its many variants (eg 3CX100A5 and 7289) remain the cheapest way of generating significant amounts of power on 1·3GHz and 2·3GHz. Since the valve is normally operated in grounded grid, the fact that the cathode and heater are connected together means that an isolated heater supply is required, or the valve cannot be biased correctly. When a mains supply is available this is not a problem, since a transformer can be used (with separate windings for each heater if more than one valve is used). However, when a single 12V dc supply is all that is available, providing isolated supplies is rather more difficult.

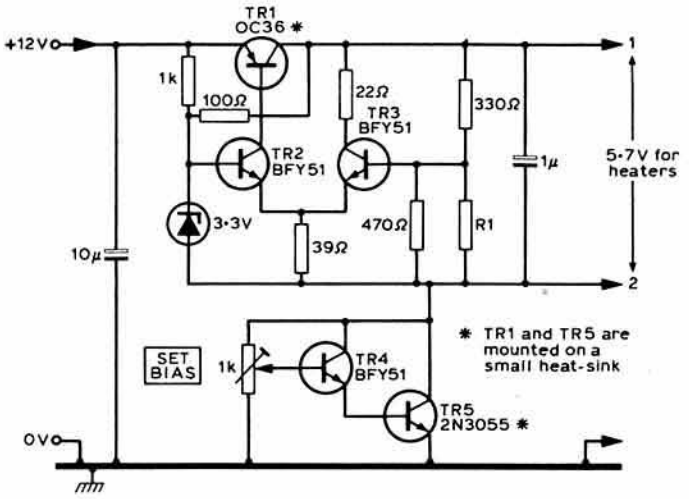


Fig 1. Circuit diagram of the G3ZUD 2C39 heater/cathode bias supply. Zener diode rated at 5W

Two correspondents have suggested solutions to this problem, which are described below. The first circuit, developed by G3ZUD, is suitable for use when one 2C39 is to be powered from a 12V source, and is shown in Fig 1. TR1, 2 and 3 form a stabilized supply for the heater; R1 should be selected on test to give the desired output voltage (5·7–6V). TR4 and 5 form a simple constant voltage reference for the cathode bias. The voltage at Output 2 can be varied from 1·5 to 6V and the corresponding voltage at Output 1 varies between 7·5 and 12V. Thus connecting the cathode to either output allows a wide range of cathode bias voltage to be used.

The second circuit was developed by GW8AAP, with some assistance from G3AVJ, and is shown in Fig 2. This uses a dc–ac inverter to produce the heater supply; the dc isolation between the windings of the transformer provides the necessary isolation of the heater/cathode from ground. One inverter circuit is required for each valve used.

The writer's version of this circuit worked well with the component values shown. Efficiency was good and the inverter would start reliably from

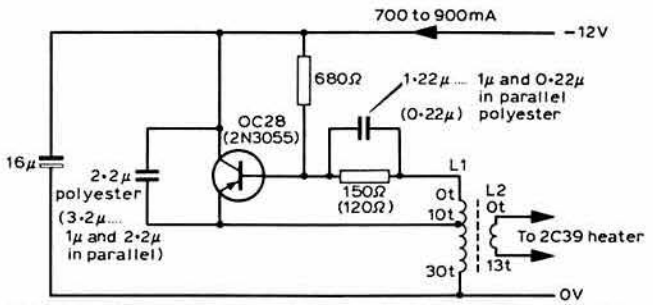


Fig 2. Circuit diagram of the GW8AAP 2C39 heater inverter power supply. L1 and L2 wound on LA1 or LA3 pot core. L2 (1mm enamelled copper wire) wound first, L1 (0·5mm ecw) wound second

"cold" under load. The values may need some adjustment, however, if different transistors or pot core are used. The transistor should be mounted on a heatsink.

Tropo openings

G4BYV reports that a spell of good conditions on 9-10 February gave rise to a number of interesting contacts. G3LQR worked G4MBS on 2·3 and 3·4GHz (for the first time on both bands), and G4BYV received S9 signals from GJ4JWA (YJ) and F6CER (BI) on 1·3GHz.

Activity map

G3JHM has for some time been compiling data on microwave paths covered in the UK and the near-Continent, which has now been produced as a computer-generated map. Much of the data have been derived from contest logs, but of course these do not include all paths covered. G3JHM would be grateful, therefore, to receive further information, which should include the ngrs of both stations' sites, the date, time and frequency, and any other comments such as the type of equipment used and details of the path (eg optical or non-optical etc).

Awards corner

G5UM has recently issued a number of Microwave Awards. These went to G4BYV (1·3/5), G4MAW (1·3/15) as well as a distance award, DK2ZF (1·3GHz distance award), G4KCT (1·3/10 and 1·3/15), G4LRT (1·3/20), G8FMK (1·3/10), G4BYV (2·3/15), and DK2ZF (1·3 and 10GHz distance awards). Two lady operators have also recently received Microwave Awards. They are G8SFI (1·3/5) and G8VRJ (1·3/5 and 1·3GHz distance award). G8VRJ's distance award was for a contact with DF3XU. He has been instrumental in giving a number of stations 1·3GHz distance award contacts, and the awards manager was interested to note his equipment: he uses four Eimac 8965 valves fed with 1·5kW input producing 350W of rf feeding a 2m diameter dish at 48m agl!

The vhf/uhf awards manager reminds readers that when submitting "follow-up" claims for the microwave QTH Squares Award, there is no need to send all the cards again—only the new ones, plus the complete check-list. Postal costs and the danger of losing cards are thus minimized.

Apart from sending out microwave certificates, another duty which G5UM performs is to issue certificates upon receipt of instruction from the VHF Contests Committee. Rarely is there any feedback from this, but recently G5UM received a greetings card from F8WN thanking all those who gave him contacts during the 1981 10GHz cumulative contest, in which he won the leading foreign station award. A pleasant change from the routine work.

G5UM also keeps track of all "first" contacts. Recently he received a claim for the first G–EI 10GHz QSO, made by G3YGF/P and EI2VDL/P over the 264km path from Winter Hill to the Wicklow Mountains. This contact was made on 26 May 1981, and unless there are any earlier claims will be recorded as the first G–EI 10GHz QSO.

Acknowledgement

The Microwave Committee would like to acknowledge that the design for the low-voltage-drop regulator described in "A high-performance uhf source for microwave applications" (*Rad Com* October 1981) was based on a design by Wood & Douglas. Wood & Douglas note that the use of a BD436 transistor in place of the BD132 specified gives an even lower minimum voltage drop. □

*46 Windsor Close, Towcester, Northants

THE MONTH ON THE AIR

John Allaway, G3FKM*

READERS OF THIS COLUMN outside the USA will note with alarm that ARRL Bulletin No 19 dated 11 February 1982 says: "FCC today adopted a combined Notice of Proposed Rulemaking and Notice of Inquiry on the subject of hf phone band expansion. The Commission proposes expansion of the 14MHz phone band by 50kHz, from 14,150 to 14,350kHz, with the new segment to be *available equally to licensees of General class and higher*". The bulletin continues to say: "FCC requests comments on several issues relating to phone sub-bands, among them the desirability of expanding other phone bands and the proper relationship between frequency and mode privileges and licence class".

When first proposed, the intention to expand the USA phone bands was sweetened by the suggestion that only Extra and Advanced class licensees would be permitted below 14,200kHz. We now see that the segment is to be made available to the vast majority of American amateurs. The effect of this load of high power telephony on the non-USA stations who at present take refuge in the area will be devastating. The RSGB has already forwarded its objections to the appropriate quarters.

Apologies to Ian Shepherd, G4LJF, yet again! His callsign was given incorrectly in both December and February *MOTA*s. Hopefully this third attempt will prove successful.

G3NOF and several others kindly supplied information about the former VS9HRV, and Don asks whether anyone knows where ZD4BT, who was on the air in August 1956, can be located?

A note from G8RZO, whose husband G8RZP acts as QSL Bureau sub-manager for the G4HAA-HZZ group. The couple have a new address which is correct in the 1982 *Callbook* and in January 1982 *Radio Communication*. Please write callsigns on the backs of all cards and number your envelopes —and cards are only kept for three months.

Expeditions

A letter dated 2 February from Iris and Lloyd Colvin said that they had just finished 19 days on the air from W6KG/PZ1 during which time they made 9,000 QSOs with amateurs in 155 different countries—some on the new 10MHz band. The country total was a record for them for a three-week operation. They lived and operated at the QTH of PZ1BU, and actually managed to operate at the same time as PZ1BU on some occasions with only minor mutual interference, even when on the same band. The couple's next move was to French Guyana as FY0FOL.

DX-NL reports that VK2BJL is likely to visit Mellish Reef for a four- or five-day stay early in May. The same source says that DL5BC and DL9BAF will be active from the Maldive Is from 25 March to 14 April. Their 8Q7 callsigns were not known at the time of writing. They will concentrate on 28,505kHz operations.

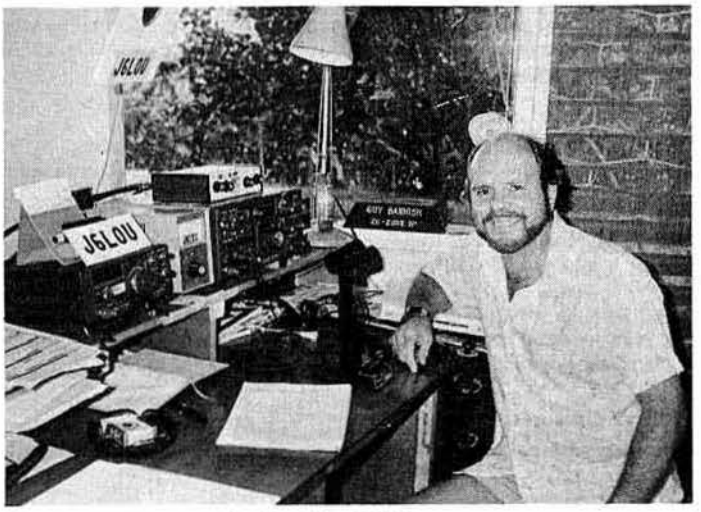
The *Long Island DX Bulletin* carries news of several forthcoming expeditions. The first is by J28AZ who is said to be aiming for an island in the Abu Ail group where he hopes to sign as J20A or J20Z between 17 and 23 April. The second is a visit to St Lucia by KR4C, WA4CDH, K4LTA and NR4S from 24 April to 5 May; their callsign will be J6LRA. Trindade Is activity by PY0RR is also forecast for one month from 27 March but no details of operator given.

DXCC listings

January *QST* listed full details of all those who have confirmed contact with more than 309 of the currently valid 318 countries on the DXCC list. Top UK stations mentioned are as follows (figures refer to "all time" countries worked, including the large number which have long ceased to exist). Mixed modes: GW3AHN (359), G3AAE (358), G3FKM, G3FXB, G4CP, G5VT (357), G2BVN (356), G2BOZ (351), G3HCT (350), G2FYT (348), GM3ITN (346), GI3OQR (339) and G5RP (335). Phone only: G5VT (357), G3FKM (353), GI3IVJ (349), G3NLY (335), G3JEC (334), G3LQP (331) and G3TJW (327). In the cw only section (which has not been in existence for very long) G4BUE is listed with 212, GM3YTS (201), GM3YOR (187), G3TXF (184), GM3LYY (177), G4BWP (145), G4EXD (126), GU5CIA, GW3GWA (111), G3VTT (107), G3GHY, G3XTT (102), G3YDX (101) and G3YBH (100).

Overseas news

Guy Barnish, G6FXU, became licensed in St Lucia in October 1979 as J6LOU. He acquired his G6 call by taking the RAE in St Lucia last May, but is now back in the UK and hopes to have a G4 call soon. He would like to express his thanks to all who helped him over the two years and were so patient during the frequent pile-ups which developed after he had a rag-chew. He met many friends over the air and hopes to talk to them again soon.



Guy Barnish, J6LOU

John Simons, G3ZVK, is presently in Kenya as 5Z4CX. He looks especially for UK stations on 14,020kHz between 1900 and 2000. He has a W3DZZ antenna hanging between palm trees at his location in Mombasa, and his equipment is an FT101B. He also operates on 7,070 or 7,010kHz after 2000. His address will be found in "QTH Corner".

Mike Townley, ZC4MT, has supplied a list of 29 ZC4 calls currently issued. Several of these have a three-letter suffix which indicates that they are club or group activities (ZC4UHF and ZC4VHF being beacons of course). The series ZC4 followed by the first suffix letter "Z" will in future be issued to visitors and reciprocal licence holders. Mike says that the East Cyprus Electronics Club is ZC4ESB and is using an FT107. It has 11 licensed members out of a total of 40, and he is secretary.

The Royal Omani ARS *Newsletter No 2* has been forwarded by Dave Jelly, A4XIJ. It is an interesting and well-produced document, and clearly shows that Oman is helpful and sympathetic to amateur radio. Patron of the society is HM Sultan Qaboos bin Said, president H. E. Karim Ahmad Alharemi, and chairman Muhammed A. S. Kharusi. A list of deleted callsigns includes A4Xs HH, HQ, HR, HU, HX, ID, IH and IL. New calls listed were A4Xs JI, JJ, JK, JL, JM, JN and CB—the last mentioned being that belonging to the recently formed Salalah Club station.

The South California DX Club will be holding its California International DX Convention on 17 and 18 April in Visalia. Visitors will include EA8AK, K5VT and OH2BH. Those interested should contact Don Bostrom, N6IC, 4447 Atoll Avenue, Sherman Oaks, Cal, 91423, USA. Hotel reservations should be made direct with the Holiday Inn, 9000 Airport Drive, Visalia (209 733-9000).

G3BDQ has relayed a message from Terry, G3NXR, who is now in Tanzania and on the air as 5H3DM. He is using an FT101ZD with a groundplane antenna, but hopes to have a tower and beam in due course.

DX news

G4KLP has provided the latest operating schedule followed by Tim Chen, BV2A/B. This is as follows: 2300 to 2400 Saturday on 14,025kHz as BV2A, or 14,218kHz as BV2B; 0000 to 0200 Sunday as BV2A near 28,030kHz or on 28,530kHz; 1200 to 1400 Wednesday as BV2A on 21,030kHz or 21,270kHz, and 1400 to 1600 as BV2A on 14,218kHz or BV2A near 14,025kHz. He

* 10 Knightlow Road, Birmingham B17 8QB

operates at other times at irregular intervals. Tim is concerned that many people are sending QSLs to the wrong person, USA cards go via K2CM and Japanese cards to JA2MOT, but all others should be sent direct and time allowed for a reply.

Ezzat Ramadan, SU1ER, in a message to G3OUF, says that he is usually on every Friday from 1600 to 2000 and on many other days near 14,210 or 14,220kHz using his Collins KWM2A and three-element beam. QSLs go direct to the address in "QTH Corner".

Those seeking contact with Qatar might look for A71AD who is on the air regularly between 21,280 and 21,290kHz from 1645. Another scarce station, YK1AO, is reported to frequent the 14,203–14,210kHz area after 1400, his location being Damascus. 9K2DR recently became a silent key, and his logs have been obtained by G4BWP who operated as second-operator at 9K2BE during February and March.

DX-NL says that the Amateur Radio Society of Thailand has now obtained formal permission for operation and that in examinations held last November 400 of the 500 entrants satisfied the examiners. More HS activity is expected!

Andy Repetho, assistant postmaster on Tristan da Cunha, is now licensed as ZD9BV. Donated equipment should have reached the island at the end of February. Andy is new to the amateur bands but proficient in commercial communication.

J28DL operates near 28,585kHz on most days around 1930, and J28DM on either 14,015 or 14,205kHz after 1530 or around 2200. The Cape Verde Is have now conformed to ITU practice, and amateur stations there are using the D44 prefix instead of D4C. 3B8CF, in Mauritius, has been worked about 5kHz above the low end of the cw bands on 3·5 and 7MHz, and in the lower 30kHz of 14, 21 and 28MHz. Details of his activity are given on 21,030kHz at 1700. Georges, FB8WG, had his beam damaged by gale force winds, but it is understood that this is now repaired and that he is active once more—a usual schedule time being 1500 when he meets W7PHO on 14,225kHz.

Confusion is being caused by the practice of the Nauru administration of giving the callsign C21NI to visiting expenditioneers. This was used recently by PA0GMM, and QSLs should be sent to his home QTH. September 1981 contacts were made by OE2VEL.

VK9ZH on Willis Is is on the air every Tuesday and Thursday around 0930 on 14,331kHz in the YL Open House net. VR6TC has been worked on 7,045kHz at around 0700, and is also reported to be on the air at 0745 on Sundays on or near 14,175kHz.

Lists

The *DX Bulletin* has published the text of the standard letter which it is said is being sent to those who write to the ARRL complaining about list operations. It reads as follows: "On behalf of the HQ and DX Advisory Committee, I would like to acknowledge your letter regarding list operations, a copy of which has been sent to each member of the DXAC. During 1978 and 1979 the DXAC studied the question of whether contacts made by list operations should count for DXCC credit. The conclusion was that they should count even though lists are *not* the preferred method of operation. An operating guideline was written and published in the September 1979 *QST*. I have attached a copy for your information. Please accept my apology for this form letter. The volume of correspondence coupled with my lack of a word-processor or secretarial service prohibits a more personal reply. The members of the DXAC are reviewing the letters being received, and your opinions are valued. Thank you for your concern and support of the DXCC programme." The letter is signed by Norm E. Myers, N9MM, corresponding secretary, DXAC.

China

Circular G1/82 from the IARU Region 3 Association contains some extremely welcome news in the form of a preface to the *Wuxidian*—the monthly radio magazine published in Beijing (Peking). The headline reads "Development of amateur radio activities authorized" and goes on to say that through the "active preparation made by departments involved, the Supreme Executive Council of China has officially approved the re-opening and development of the long awaited activities of amateur radio in China. Amateur radio stations to be established shall be organized on club system basis with a leader in charge. The first station to open will be in Beijing where conditions are already met for operation, then followed by other stations to be installed in the provinces, regions and cities. Possible sites envisaged for establishing amateur radio stations are various military physical educational schools, universities, colleges, youth culture centres, and science and technical institutions that will meet the objective requirements."

The article goes on to say that for the time being no permit will be issued to stations on an individual basis, and that the use of frequencies, extent of communication and activities will be, in general, along the lines established in the international amateur radio regulations. It will be able to promote technical exchanges with amateur enthusiasts both in China and foreign countries as well as to enhance the friendship between them. The last sentence says, "Presently the China Radio Sport Association is actively making preparation for this programme, and it will not be too long before BY1PK will be on the air." The article was written by Mr Cheng Ping, secretary-general of the Radio Sport Association of China.

Special mention should be made that this extremely happy event in amateur radio history has come about in no small way as a result of great efforts made by the Japan Amateur Radio League and their president, Mr Shozo Hara, JA1AN, in particular.

10MHz

G5XB, of the Intruder Watch, has supplied information on a spurious broadcast which has been causing some problems each evening around 1800 near 10,135kHz. He points out that as the amateur service is only a secondary user of the band, no complaints can be made about such interference. Research shows that Radio Cairo is probably responsible due to the co-siting of two transmitters—one on 9,805kHz and the other on 9,475kHz. The combination, carrying the modulation of both primaries, is believed to be the type known as "2A–B" ie 2 × 9,805–9,475. Unfortunately some jamming (apparently deliberate) is taking place and this is more than unfortunate as the signal has no intended audience. The trouble seems to be improving but Stan says that it is usually due to non-linearity in the system (rusty bolt effect) when energy strays from one transmitter to another.

Sierra Leone ARS activity day

In an effort to encourage more activity by Sierra Leone amateurs, the club is proposing to hold an activity day in which it is hoped to have at least six stations in operation. The event will run from 0900 8 May to 0900 9 May, and special callsigns in the series 9L1FD, 9L2FD, 9L3FD etc will be used. Activity will be centred around 7,060, 14,310, 21,300 and 28,600kHz. (*Tnx GM3YOR*).

Welcome

The Society is happy to welcome the following new members from outside Britain who joined during December 1981 and January 1982: C53AK, CT1AX, CT1WB, EA8ZS, EI6AIB, EI7EI, EI8AYB, F1BVM, F5YW, F6FOB, HE9CPV, I6ZCJ, K0RLM, K2KLV, OH5BD, ON6WR, ON7CL, PA0GAM, PD0EEZ, SM3JCQ, VE7BTX, VK3XBF, VS6JD, W1CFZ, W3MA, W3NQA, ZC4EPI, ZR1GW, ZS5DN, ZS6FP, 3D2RK, 4Z4TK, 5B4GL and 9H1BR. Unlicensed new members include: D. Hopley (9K), H. Capstick (ON), S. Caballe Micola (EA), S. Wah (VS6), P. Kearney (EI), H. Hutchinson (VE7), G. Gibor (ZS), R. Hung Shu Ming (VS6), R. Little (HZ), J. Doherty (EI), R. Barrow (9Y), and S. Jeannot (LX).

Contests

Helvetia Contest

1500 24 April to 1500 25 April.

1·8 to 28MHz. Exchange RS/T and serial QSO number with Swiss stations, who will also denote their canton by sending a two-letter code. The same station may be worked once on each band—only on one mode. There are 26 cantons: AG, AI, AR, BE, BL, BS, FR, GE, GL, GR, JU, LU, NE, NW, OW, SG, SH, SO, SZ, TG, TI, UR, VD, VS, ZG and ZH. Each QSO is worth three points, and the multiplier is the total number of cantons worked on each band added together. Indicate new cantons in log and include summary sheet, showing the scoring and full name and address in block letters as well as the usual declaration. Logs must be posted before 24 May and sent to TM USKA, K. Bindschedler, HB9MX, Strahleggweg 28, 8400 Winterthur, Switzerland. This contest is an excellent way of obtaining the necessary contacts for the Helvetia 26 Award (see "Awards"). In the 1981 event **G3ESF** led the UK entry with 15,408 points, followed by G4IQM (7,965), **GM3XNE** (7,425), G4EOW (5,832), G3RDQ (2,304), G2WQ (1,479), and GM3UWO (624).

The CQ M Contest

2100 8 May to 2100 9 May.

CW and phone. 3·5 to 28MHz. Same station may be worked on each band but once only—either on cw or ssb. Single-operator single- and multi-band, multi-operator single-transmitter, and listener sections. Exchange RS/T plus serial QSO number, and USSR stations will also send their oblast number. Contacts may be made with all countries, and one point is made for those with one's own continent and three with others. Own country may be

QTH CORNER

FY0FOL	Yasme Foundation, Box 2025, Castro Valley, Cal, 94546, USA.
H44SH	via AD1S, G. Adkins, 8517 NW 92nd St, Oklahoma City, Okla, 73132, USA.
PA0VDV/PJ7	via PA0VDV, J. van der Velde, Fazantenhof 57, 3755 ZA Eemnes, Netherlands.
SU1ER	E. S. Ramadan, 18 El Abnasi St, Manchiet El Bakri, Cairo, Egypt.
T2GMM **T30BO** **T32AE**	via PM0GMM, Tweeboomiaan 117, 1624 EC Hoorn NH, Netherlands.
VK9XM	(see VK9YM)
VK9XT	(see VK9XT)
VK9YM	via K1MM, PO Box 73, Framingham, Ma, 01701, USA.
VK9YT	VK3OT, S. Gregory, Box 622, Hamilton 3300, Vic, Australia.
VP8AJM	via K0JW, S. Wilson, 185 Flint Way, Broomfield, Co, 80020, USA.
ZD9BV	via W4FRU, J. Parrott Jr, 4640 Ocean View Av, Virginia Beach, Va, 23455, USA.
3C0AC	via N4NX, W. Barr, 305 Alpine Dr, Roswell, Ga, 30075, USA.
3C0BC	via K4PHE, R. E. Smith, 549 Southwind Drive, Lilburn, Ga, 30247, USA.
3D2VU	via DF7CC, Anna Bauer, Rain 3 B, D 8171 Gaissach, FR of Germany.
3V8DX	via G3SVK, G3XQU, or G4JDT, QTHR.
3X1Z	via W4FRU (see ZD9BV).
5H3BH	Box 4358, Dar es Salaam, Tanzania.
5Z4CX	J. Simons, P.O. Box 90661, Mombasa, Kenya.
9L1SL	via N3ADC, G. Silverman, 77 Homestead Rd, Levittown, Pa, 19056, USA.
9M8PW	via G4DXC, H. Rennison, "Riverdale", Beckfoot Lane, Bingley, W Yorks BD16 1LX.

worked for multiplier credit only. The multiplier is the number of countries worked on each band added together—the R-150-S list being used. This is essentially the DXCC list plus Oblasts 002, 013, 014, 056, 084 to 098 and 159 plus Novaya Zemlya, the Kuril Is and New Siberian Is. Listeners earn one point for reporting one station exchange, and three for logging both sides of a contact. If previous practice is followed (no rules have been received from RSF for this year's event) badges will be sent to those making more than 10 USSR QSOs. QSOs in the contest may also be used for credit when applying for the various USSR awards, provided that they are applied for when the log is submitted. Post entries by 1 July to Krenkel Central Radio Club, "CQ M" Contest Committee, PO Box 88, Moscow, USSR.

Port Talbot ARC HF Contest
0600-2400 9 May.
For GW stations and listeners only. Full details from GW4CAQ, 35 Lon Ogwen, Birchgrove, Swansea, W Glam.

Results of the **1981 French Contest** have been received. UK scores were **G3BTO** (150,881 points), G3ESF (126,144), G4IQM (70,992), and G3TXF (41,976).

Sincere apologies to the operators of **GU3HFN** whose score was inadvertently omitted from the list of British entrants listed on page 52 of January 1982 *MOTA*. This was particularly unfortunate as they came world fourth in the multi-operator single-transmitter section of the **cw event** with 2,348,264 points. Others in the same classification also omitted were **G4DAA** (2,172,702), **GW4BRS** (898,614), G3WTM (753,858), and G3UFY (690,039). In the **telephony section G4KPE** scored 1,495,728, **GW4BRS** 982,977, **GM2IA** 527,868, GM4DMZ 329,616, and GW4IQA 75,799.

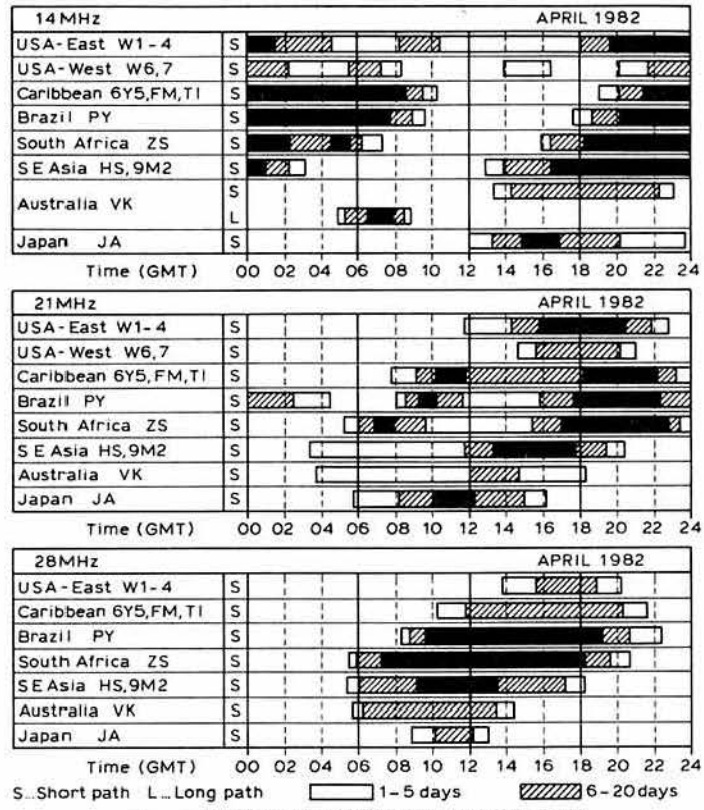
Awards

The Four from Forty Four Award
Issued by the Solomon Is Radio Society. This is an attractive coloured award and is available to those who have worked (or heard) at least four Solomon Is stations on or after 7 July 1978. Band or mode endorsements will be added if requested. Send log extracts (certified by two other amateurs or national society or radio club) showing date, time, band, mode and callsigns, plus £1, USA $2, or 12 ircs to: Awards Manager, SIRS, Box 418, Honiara, Solomon Is.

Helvetia Award
Another extremely attractive certificate for those who have worked and confirmed contacts with all 26 Swiss cantons since 1 January 1979. Send list and QSLs of stations worked (cw, phone, mixed, rtty or sstv) to award manager Walter Blattner, HB9ALF, PO Box 450, Locarno 6601, Switzerland. USKA does not ask for any fee for the certificate but it seems reasonable to enclose some ircs for return postage.

Worked Arctic Circle Award
Requires six contacts with members of the Radio Club of the Arctic Circle (Finland—the award information sheet lists 80 OH9 stations as members) or club station OH9AB. Six points are needed, one for each contact, and the same station may be worked on each band for credit. Contacts/reports must have been recorded after 1 January 1979, and certified log data plus QSLs for the stations claimed and 10 ircs should be sent to: Taneli Kolstrom, OH9VE, Rauhankatu 46, SF-96100 Rovaniemi 10, Finland.

Propagation predictions



Changes from winter to summer conditions become very marked during April. The difference between daytime and night-time frequencies will lessen as the season advances, and this will be most noticeable on **28MHz**. Traffic with North America will cease now and again, but traffic with South-East Asia, Africa and South America will be certain.

Conditions on **21MHz** are very favourable, and all continents will be heard with certainty although audibility will be less on paths which lie mostly in daylight. The main night-time dx band will be **14MHz**, even more so than in previous months. Distances covered will decrease on this band as the season advances. At the present time of the equinox there are practically no dx opportunities via the indirect path except for traffic with Australia.

Conditions for dx on **7** and **3·5MHz** will decrease in the coming months because of static and shorter nights. Local traffic on **3·5MHz** will only be interrupted in the early hours by the dead zone.

The provisional mean sunspot number for February 1982 was 162·6. The maximum daily number was 258 on 1 February, and the minimum was 97 on 23 February. The predicted smoothed sunspot numbers for March, April, May, June, July and August 1982 are 126, 124, 122, 120, 117 and 114 respectively.

Diplome des Terres Australes (DTA)
For confirmed contacts since 1 April 1946 with three of the French Austral countries (FB8W, FB8X, FB8Y and FB8Z). All cw or all phone—an "Excellence" endorsement is awarded if all four territories have been contacted. Send a list showing full QSO details from the cards certified by the awards manager of a national society (for RSGB this is G3KDB) plus 10 ircs, to A. Duchauchay, F6BFH, 21 rue de la Republique, 76420 Bihorel, France.

Scarborough Award
Details of this certificate were given in February *MOTA*. To help those looking for contacts with G4BP it has been decided that the call will be activated on 7MHz cw and ssb for two hours "before lunch" each Sunday.

Around the bands

G8KG's summary of the past month reads: "Cycle 21 continues to provide plenty of interest and surprises. Last month's report of a distinct drop in solar activity in January was written on the 27th of the month. Four days later the daily solar flux had shot up to 298 sfu, to peak at 301 sfu on 1 February, and to remain above 200 for two weeks.

"In fact February showed very high sunspot activity (provisional monthly number 162·6) and a high mean solar flux (monthly mean 215 sfu). There were major flares on many days in the month, and the geomagnetic field was disturbed on most days, so that the hf bands were rather unsettled and the full benefit of the high flux did not materialize.

"As mentioned some months ago, it is becoming increasingly difficult to forecast the progress of the present cycle. The smoothed monthly sunspot number has not fallen for the past nine months, during which period the smoothed monthly solar flux has in fact risen and is now higher than it was at sunspot maximum in the winter of 1979–80. Looking into the data with no preconceptions based on past cycles, it could be inferred that there is a peak still to come, but on past form this is unlikely."

The following sent in logs from which the next section was compiled: G2s BON, HKU, G3s, GVV, IMW, KSH, GM3LYY, G3s NWG, XBY, ZH1, G4EHQ, GW4KGR, G4LDS and RS1066.

Stations listed in italics were using A1A.

1·8MHz. 0000 *HB9CEY, UT5AB/UI8.* **0200** *EZ6ACC, UD6BW, UL7PBY.* **0300** *KV4FZ, NP4A.* **2200** *UL7PBY, UK9CET.*

3·5MHz. 0100 *W1BIH/PJ2, PA0VDV/PJ7.* **0400** 1A0KM. **0500** 4X6AG, **0700** CP6EL, FY0FOL, VP2MF. **0800** ZL3TZ, ZL4s AP, GS. **1900** VK2AVA, **2200** 3V8DX, **2300** UK0AMM, W1-W3, 5X5JL.

7MHz. 0100 *JX6VAA, PA0VDV/PJ7, UA0YAE, V2AU.* **0500** TF3KB. **0600** EL2BA, HC6XE, TU2EW, *VP2EAA, XT2AW.* **0700** HC1NEA, W6KG/PZ1, ZL4OY/A. **0800** *JW6OD,* ZL. **1500** *CR9HZ.* **2000** OH0XX, 5Z4CS. **2100** *ZD8* **2200** *CN, VP2E, VP9, 3V8DX.* **2300** 9H1BB.

10MHz. 0800 *VK, VP2EV, ZL.* **1400** *VK9YC.* **1800** *P29DH, ZS1LM.* **1900** *9J2TJ.* (G3GIO reports that 63 countries have now been recorded using this band).

14MHz. 0600 FO8BI. **0700** FK8DD, FO8HI, HL9DB, KH6s, W5VTH/KH8, KL7s, T30BO, VK0AN, YI1BGD, YJ8VB, ZL3PA/C, 3C0BC, 3D2VU. **0800** AH2AI, DU1MAT, T2GMM, VKs, VK9NR, ZLs. **0900** VR6TC, ZK1CG, ZLs, 5W1DQ. **1200** OE5JTL/YK. **1400** M1D. **1500** SU1ER, VS6CT, Ws (W. coast until 2000), *3A2ARM.* **1600** *4S7WP.* **1700** FH8OM, HS1AMB, *KH6CF,* VS5DD. **1800** A71AA, JT1AN, JT0AB, *KH6s, ZL1s, 3D2VU, 3V8DX,* 5H3AA, 8Q7BN. **1900** *PA0VDV/PJ7,* 3X1Z. **2000** *CN8CY,* LU5ZI, *VK9YB, VP2MCW,* VP8AJM. **2100** C53DF, VP8ANT, ZD7BW, 5V7HL. **2300** DU9RG, *V2AAW,* V3MS.

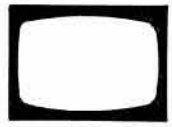
21MHz. 0800 C53AL, ZLs (until 1100). **0900** JAs (until 1100), VKs (until 1300). **1000** CR9BH, *KL7HT,* TYA11. **1100** HL9AA, JD1BAT, VK9ZH, 3V8DX. **1200** Ws (East coast until 2000). **1300** TL8CK. **1500** YCs. **1600** VQ9JB, Ws (West coast until 1900), 1A0KM, 6J5LM, 7P8BJ. **1700** S79ARB, 6E5MX, 9K2BE. **1800** EP2TY, *KN2M/J6L,* KH6NL, VE6-VE7s, VP2s, *VP8ANT.* **1900** J73PD, VP8AGY, ZD9BV. **2000** LU5ZI, VP8LP. **2100** K9MK/V2A.

28MHz. 0800 9G1GQ. **0900** J28DL, VKs (until 1200), VK9YC, *3X1Z.* **1000** FK8CL, OD5MN, VU2NP. **1100** AP2P, FY0FOL, VK9NYG. **1200** C53AP, FR7CG, VS6DT, W (E. coast until 2000), XT2DT, W6YB/3D6. **1300** *FO8AU,* LU5ZI, *K9LA/V2, VP2ED.* **1400** JY9RV, OH0XX, TL8DC, VK9YM, VP5SMX, ZD7BW. **1500** FR7CG, YB1AGG, 1A0KM, 3V8DX. **1600** S79MC, W6-W7s (until 1800). **1700** CE6CFX, *3X1Z,* **1800** FG7GT, FY7BW, *K9NK/V2A,* VP8QG, ZD9BV.

As usual, thanks are due to the following news sources for items extracted: the *Long Island DX Bulletin* **(W4UL/W2IYX)**, *DX News Sheet* **(Geoff Watts)**, the *Ex-G Radio Club Bulletin* **(W3HQO)**, *Long Skip* **(VE3EUP)**, *DX'press* **(PA0GAM)**, *CQ Magazine* **(W1WY)**, *DXNL* **(DL3RK)**, the *Lynx DX Bulletin* **(EA1QF/EA2JG)**, and the *DX Bulletin* **(K1TN)**.

All items for the **June** issue to reach the writer by **27 April** please—and for **July** no later than **26 May.** □

SSTV SCENE



P. Burnett, G4BLL*

SSTV Scene is alive and well!

Your sstv contributor offers his apologies for the non-appearance of this column over the past few months—a move to new premises, the address of which is given below, being the main reason. However, major renovation work and redecoration now being complete, the column should appear on schedule, ie every three months, from this month onwards.

Still more on the Robot 400

Sales of the Robot 400 pcb continue steadily, but unfortunately due to increased Customs charges and less favourable exchange rates the current price cannot be held beyond the sale of the last few remaining boards still available. The price for future supplies will be £72.50 each (no VAT). The good news is that the memory plane (16-off rams 4030/4060) with or without sockets can now be offered at a more attractive price level.

A number of queries have been received regarding the availability of the 36-way edge connector for the pcb. Unfortunately Robot will not supply this item direct, but it is available from Wyle Distribution, 9525 Chesapeoke Drive, San Diego, California 92123. The part number is Amphenol 143-036-01; or alternatively from Transam, 59-61 Theobalds Road, London WC1, tel 01-405 5240, at £3.90 each.

Procuring the odd-value close-tolerance resistors also appears to be causing problems for some constructors; eg R61 to R75 26·1Ω, use 27Ω and 820Ω in parallel. R88 and R101, 2,490Ω, use 2·7kΩ and 33kΩ in parallel, which will give a value of 2,495Ω. R87 and R100 4,990Ω, use 5·1kΩ and 220kΩ in parallel, which will give 4,984Ω.

Robot USA have once again confirmed that no major design changes are planned in the foreseeable future for the model 400. They consider that it represents a successful and well-proven design and is competitive with any similar equipment available. Further, since the FCC has permitted General Class operators in the USA to use sstv from 22 February 1982, Robot are in fact gearing up for increased production as this will give an effective 50 per cent increase in the radio amateur population now allowed to use sstv in America.

In common with much of the industry in the USA, Robot are also introducing an incentive purchase scheme which will run from 22 February to 31 May—on return of the guarantee card Robot will refund up to $100 on the purchase price of models 400 and 800, and if the two are purchased together the refund increases to $250! Although this offer is available through USA dealers only, Aero and General Supplies, the sole UK agents, have assured the writer that they will make a similar offer to purchasers of Robot equipment in this country, tel 0332 812446 for further details.

Colour sstv

In addition to the W9NTP-designed additional memory board available from G3GGJ for £38.50 (two boards are required to give full colour), a single pcb is now available from Interface Systems of Texas which uses three 64K single chip rams (the original 16-4K rams on the Robot 400 board are removed). The price of the new memory board is a mere $485!, which may have been subject to increase by the time this appears in print.

SSTV in general

The second edition of the "best selling" *Amateur Radio Operating Manual* is now available with Chapter 9 "Slow Scan Television" completely revised and updated. The book is available from RSGB Publications (Sales), 35 Doughty Street, London WC1N 2AE.

The excellent range of Wraase Electronics sstv equipment, the SC-422A converter and KB-422A keyboard, is now available through Amateur Radio Exchange, 2 Northfield Road, Ealing, London W13 9SY; 01-579 5311.

The writer has successfully incorporated the light pen design of G3OQD (see *Rad Com* December 1980) into his homebuilt Robot 400 scan converter. It enables callsigns to be written-up and pictures to be captioned without the use of a keyboard. The circuit was built on a small piece of circuit board measuring 3·5 by 4in which was incorporated within the body of the scan converter, only the pen itself being external.

An article entitled "Superimposed graphics and special effects", for the Robot 400, by Tom Hibben, KB9MC, appeared in the American amateur tv magazine *A5*. The modification is relatively simple and does not involve the use of a second memory. Anyone interested in receiving a copy of the article should send an sae to the address given below.

G3WW has informed *SSTV Scene* that in 1980 he worked 189 new sstv stations in 27 countries, but only 94 new stations in 21 countries in 1981. He also gave SM5EEP his first two-way colour sstv contact.

Finally, back to the Robot 400; a number of people have written requesting a copy of the complete manual. It must be emphasized that the manual is available only to purchasers of the commercial unit. Anyone requiring specific information is asked to send queries to the writer at the address below with sae please, or telephone him on 0484 710474.

SSTV Scene would like to carry more information and news of activity on the bands and latest developments; please write and let other sstv enthusiasts know what you are doing in sstv!

Late news flash

A5 magazine has proposed the use of additional frequencies for sstv in view of the General Class licensees now being permitted to use sstv. The proposed new frequencies are: 3,990, 7,290, 14·340 and 21·440kHz. The 3·5 and 7MHz frequencies are, of course, outside the British allocation. □

*7 Rydings Avenue, Brighouse, W Yorkshire HD6 2AJ.

RAYNET

G. Cluer, G4AVV*

IT WAS severe weather conditions in 1953 which first alerted the authorities to the value of amateur radio in times of national emergencies and which led to the formation of Raynet. During the winter months this year, Raynet has again showed that it has a role to play when the weather turns nasty. Gloucester Raynet, for example, was called out by the police in both December and January to report on snow depth, the state of the mains power supply and the state of the telephone network in an area of 60-mile radius centred on Cheltenham. The group reported 10ft drifts and gale force winds which had brought down power lines and made most roads impassable for days. They mention that their station in the police headquarters was operational within an hour of being called, which would be good timing in *normal* weather conditions.

On the same dates as Gloucester Raynet was operational, the SW Dyfed group was starting a nine-day spell of duty working for all the emergency services. They had two control centres (one manned 24h a day) and were responding to the needs of villages which had been cut-off completely by the snow and winds. They believe that a number of lives were saved by the action of Raynet and other emergency services.

Norfolk and NE Suffolk Raynet have, for a long time, had close links with their local Rover Rescue group—a group of owners of Land Rovers who (like Raynet members) put their hobby to use at times of emergencies. In December, in view of the worsening weather conditions, all eight of the Raynet groups in that area were put on standby together with the Rover Rescue members. The police were informed of the availability of 24 Land Rovers all equipped with Raynet equipment and personnel, and it was not long before the first call for help was received. For six hectic hours from 11pm the groups were involved in a number of incidents, and 40 people were rescued from snowbound cars. Two ambulances (one maternity case and one serious injury) were also assisted, and much information on road conditions and abandoned vehicles was passed. Twenty-four hours later the groups were again at work, this time working at the request of the county emergency planning officer. In all, nearly 50 Raynet members and 25 Rover Rescue members were involved.

At about the same time (Sunday 13 December) Cornwall and Devon Raynet were alerted due to the weather conditions, and Devon became operational during the afternoon and provided valuable information on road conditions until 0830 Monday. Dorset Raynet played a significant part in the emergency communications when operating on behalf of the Dorset Police whose radio system had developed a major fault; in excess of 50 messages were passed. The coastguard service approached Raynet for assistance, but Raynet could not help due to the present licence conditions. (This is being looked into by the Home Office and the RSGB). North Devon Raynet were fully operational during the evening of Monday and all day Tuesday when 12,000 homes were still without electricity and other essentials. Members set up a link to the county hall at Exeter, and passed valuable information regarding isolated homes etc.

Sunday 20 December saw Cornwall Raynet operational on behalf of the cepo in connection with the tragic disaster of the Penlee lifeboat. This has been fully reported by the media.

A few days after all this snow the problem became one of flooding. The Devon cepo involved the Raynet groups in Exeter and East Devon in the monitoring of flood levels, and a number of mobiles were deployed to report back on the state of the rivers in the area. A number of other groups all over the country were also called out at this time.

Apart from problems caused by the weather, a number of groups have been used for other types of emergencies. Warwickshire Raynet were involved at the time of a major gas leak in the village of Binly Woods near Coventry. East Sussex and South Sussex groups have both been involved in two different missing person searches, and a number of other groups, though not involved, have put themselves on standby in case they were needed.

Your scribe would like to thank those groups who have reported their activities to RSGB HQ on the new forms, and wishes to acknowledge reports not mentioned above from St Helens (Merseyside), S Kent, another report from Norfolk and NE Suffolk, SE London, Bury, more from Dorset and E Sussex and from the Solihull & Chelmsey Wood group. □

*12 Bingham Road, Addiscombe, Croydon CR0 7EB.

BOOK REVIEW

The art of electronics. Horowitz and Hill. Cambridge University Press, 716pp, £13.95.

I am prompted to write this review as I believe I have found the best self-teaching and reference book in electronics, after an arduous 10-years search!

As with many books, it starts with foundations, and it goes through the analogue and digital techniques of modern electronics. Like present-day electronics, it is digitally orientated. Some may be upset by the total exclusion of thermionic devices—I confess I found this a fresh approach; most electronics books show a triode in the opening pages which is offputting, when (for better or worse) a triode is a rare device.

The book is obviously written by those who use a soldering iron themselves. It is crisp with lots of valuable hints and amusing anecdotes. To get a flavour of the book, the following are quotes from the section on ttl and cmos devices. "The headings include *Logic Pathology — —, Nuisance Problems, Bizarre Behaviour — —* " "Here is the craziest of them all: 'You forgot to wire up the Vdd pin on a cmos chip, but the circuit works just fine. That is because it is being powered by one of its logic pins (via the input protection diode). You might get away with this for a long time, but suddenly, when the circuit reaches a state when all the logic pins are low, the chip loses its power and forgets its state . . . The trouble is that the situation may produce symptoms only occasionally and it can get you running round in circles until you figure out what is going on'."

As I only recently found this kind of fault myself I was very amused to read about it.

The beauty and fun of electronics shows through, I enjoyed the circuit ideas and, in particular, the schematics of bad and dud circuits guaranteed not to work! You have got to figure out why. These are very helpful and no doubt will stop you making similar mistakes.

There is little emphasis on mathematics, and when they are necessary it gives a fool's guide on how to make the calculations. It is pointed out that for most circuits precise calculations are not necessary. The book gives some data, a good index and bibliography. There is some emphasis on the use of an oscilloscope. I was taught by G3BGL some 13 years ago, and he told me that a radio amateur only needed two bits of test equipment, a grid dip oscillator and oscilloscope.

I strongly recommend this book, particularly to those who contemplate home-construction, or those who need to start considering present-day digital techniques for the first time. The radio frequency sections are a little limited, but as there are plenty of publications around that deal with this, I do not think it detracts from the value of the book. *G3WIP*

COUNCIL PROCEEDINGS

A brief report of the Council meeting held on 23 January 1982

Present: Dr E. J. Allaway (President, in the chair), Messrs R. G. Barrett, J. Bazley, R. Bellerby, P. F. D. Cornish, Dr D. S. Evans, Messrs K. A. M. Fisher, F. D. Hall, L. N. G. Hawkyard, Mrs J. Heathershaw, Messrs G. R. Jessop, I. J. Kyle, T. I. Lundegard, W. J. McClintock, B. O'Brien, H. S. Pinchin, D. M. Pratt (members of Council), D. A. Evans (general manager/secretary), A. W. Hutchinson (editor) and Mrs H. M. Allin (minutes secretary).

1982 President
Dr E. J. Allaway was proposed, seconded and elected as RSGB President for 1982.

1983 President
Mr O'Brien reported that he had contacted Mr D. E. Baptiste, who had intimated that he would accept the position of President in 1983 if so invited. It was thus the intention of Council to invite Mr Baptiste to become President in 1983 and to invite him to attend meetings in 1982 as an observer.

1982 Executive vice-President
Mr Barrett was proposed, seconded and elected as executive vice-President for 1982.

Vacancy on Council
An ordinary member vacancy having arisen on Council, it was proposed, seconded and agreed that Mr G. I. Knight, GM8FFX, runner-up in the last election, be appointed to fill this vacancy during 1982.

Financial report
Mr Cornish reported on (a) the accounts to 31 December 1981, (b) a detailed computer print-out on committee expenses for the first six months of the current financial year, (c) redemption of the 8½% Treasury Stock, (d) the legacy fund, (e) economies in *Radio Communication* printing, and (f) that RSGB Raynet Ltd had now been properly registered, but it was not intended that the company should trade.

General manager's report
The general manager spoke of the increased workload resulting from the increase in membership, which now exceeded 31,500, and of steps being taken to handle the increasing number of telephoned and written queries.

It has been reported in the media that the market in cb equipment had not "taken-off" as expected. The Home Office had stated that 100,000 cb licences had been issued in the first two months after cb was legalized. Council discussed these implications and various aspects arising from the legalization of cb.

Mr Evans referred to the reports of an amateur in contact with a station in Poland during the Christmas period. Reports from the Intruder Watch indicated that the "Polish" station was not actually located in Poland. The apparent illegality of this operation had given rise to concern, but the Home Office had advised that it would be most difficult to give advice to amateurs because of the delicate nature of the situation.

Commenting on a BBC Radio 1 programme on amateur radio, which included a live contact between his assistant, John Nelson, and the assistant general manager of ARRL, the general manager reminded members that any demonstration of amateur radio (live or recorded) needed to be cleared by the Home Office.

A short video tape demonstration was being prepared to demonstrate the potential of this medium of communication. The general manager saw many uses for an in-house unit capable of recording lectures and Society events and preparing programmes on Society activities.

Mr Evans raised the possibility of forming sections to cater for specific specialist groups within the Society, and said he would be discussing this with the Forward Planning Group.

It was also reported that the Bangladesh Amateur Radio League had applied for admission to the IARU, and Council voted in favour of this proposition.

Membership and representation
Waived subscriptions in respect of 12 members on the grounds of physical disability were noted by Council.

Council approved applications for affiliation in respect of the Amateur Radio & Electronics Club, Balzan, Malta; Blackwood & District ARS, Gwent; Britannia RN College, Dartmouth, Devon; Chesham & District ARS, Bucks; Civil Aviation Authority Radio Society, West Drayton, Middx; Clyde Valley DX Group, Strathclyde; Coleraine & District ARS, Co Londonderry; Derbyshire Hills Contest Group, Matlock, Derbys; Hastings Repeater Group; Marconi Space & Defence Systems Ltd Electronic & ARS, Portsmouth; Episkopi Amateur Radio Club, Cyprus; Evets Communications Ltd ARC, Derby; Harrogate College Radio Society; Midlands Electricity Sports & Social Club, Halesowen, W Midlands; Moorlands & District ARS, Cheadle, Nr Stoke-on-Trent; North Wakefield Radio Club; Racal Mobilcal/Tacticom Sports & Social Club, Reading, Berks; Sefton ARC, Liverpool; University of Aston ARS; Wenlock Amateur Radio & Electronics Society, Shropshire; and West Manchester Radio Club.

The appointments of the following area representatives were confirmed:

D. Anderson, GM4JJJ, Fife;
E. C. Baines, G6CQZ, Greater Manchester (NW);
M. A. Lawrence, G4JXO, Horndean & district;
D. Mason, G3ZPR, Poole;
M. J. Stevens, G3CPN, Bournemouth;
B. Thompson, G4KAR, Grimsby & district;
P. S. Valentine, GI3RKE, West Ulster.

1982 committees
The composition of these committees was discussed at length, and Council agreed the membership of them (as published immediately following these "Council Proceedings").

Fundamental changes in the structure of the Telecommunications Liaison Committee were suggested, and it was proposed that the committee be re-named the Licensing Advisory Committee and consist of the hf, vhf and microwave managers, RSGB Observation Service organizer, general manager, executive vice-President and two additional Council members. After considerable discussion this proposal was seconded and approved.

Representatives on outside bodies
The following were confirmed:

CCIR Study Group 2	M. Sweeting, G3YJO
CCIR Study Groups 5 and 6	R. G. Flavell, G3LTP
CCIR Study Group 10	D. A. Evans, G3OUF
BSI GEL 1/5 and GEL 1/30	R. S. Roberts, G6NR
EEL 25/6	R. S. Roberts, G6NR
GEL 1/9	R. G. Flavell, G3LTP
IERE Telecom Group	G. R. Jessop, G6JP
BSI EEL/23	D. S. Evans, G3RPE

Appointment of honorary officers for 1982
The following were agreed:

VHF manager	K. Fisher, G3WSN;
Trophies manager	P. Miles, G3KDB;
HF awards manager	P. Miles, G3KDB;
VHF awards manager	J. Hum, G5UM;
Video and tape library co-ordinator	D. Simmonds, G3JKB;
Observation Service organizer	D. Pratt, G3KEP;
Slow morse practice transmissions organizer	M. A. C. MacBrayne, G3KGU;
Aerial planning panel co-ordinator	R. W. Price, G4BSO;
Intruder Watch organizer	S. A. G. Cook, G5XB.

Donations
Dr Allaway drew attention to two recommendations arising from the meeting of the Finance & Staff Committee of 7 January 1982:

1. That the RSGB should make a donation of £250 to the Motor Neurone Research Fund in memory of Mr R. F. Stevens, G2BVN.
2. That the Society should make a donation of £100 to the UKFM Group in recognition of its exceptional efforts to provide a repeater service in the London area.

Both recommendations were accepted.

RSGB committees, 1982

(The President is an ex-officio member of all committees)

Education: G. C. Oxley, G8MW, (chairman); D. H. Adams, GW3VBP; G. L. Benbow, G3HB; L. E. Newnham, G6NZ; D. M. Pratt, G3KEP; W. A. Scarr, G2WS; C. V. Smith, GM4FZH; M. J. Topham, G8NUC; F. C. Ward, G2CVV.

Exhibition & Rally: N. Miller, G3MVV, (chairman); L. N. G. Hawkyard, G5HD; R. S. Hewes, G3TDR; R. A. Kingstone, G4HHB; W. J. McClintock, G3VPK; M. Shardlow, G3SZJ.

Finance & Staff: B. O'Brien, G2AMV, (chairman); R. G. Barrett, GW8HEZ; J. Bazley, G3HCT; P. F. D. Cornish, G3COR; D. S. Evans, G3RPE; J. Heathershaw, G4CHH.

HF: J. D. Kay, G3AAE, (chairman); J. Bazley, G3HCT; R. J. Eckersley, G4FTJ*; S. H. Jesson, G4CNY; D. J. Lawley, G4BUO; H. F. Lewis, G3GIQ; F. M. Smith, G8KGT; C. Thomas, G3PSM.

HF Contests: D. J. Andrews, G3MXJ, (chairman); J. Bazley, G3HCT; D. S. Booty, G3KKQ; G. C. Dobbs, G3RJV†; R. L. Glaisher, G6LX; M. Harrington, RS20249; E. C. Hodson, G3XTJ; D. J. Lawley, G4BUO; P. A. Miles, G3KDB; E. L. Mollart, RS10977†; J. H. Quarmby, G3XDY; R. J. Taylor, G4BEL†; R. A. Treacher, RS32525.

IARU: R. J. Hughes, G3GVV, (chairman); J. Bazley, G3HCT; S. A. G. Cook, G5XB; D. S. Evans, G3RPE; K. A. M. Fisher, G3WSN; C. E. Godsmark, G5CO; C. Thomas, G3PSM.

Interference: P. F. Jobson, G3HLF, (chairman); P. A. Braham, G4BYA; G. W. Brind, G4CMU; D. J. Collins, G2FLB; N. Foot, G8MCQ; S. Gabriel, G3HCQ; A. S. Kessler, G4DXA; J. E. Martin, GU3YIZ†; J. E. Swayne, G3BLE†; J. W. Swinnerton, G2YS; C. A. Webb, G4FWM†.

Licensing Liaison: J. Bazley, G3HCT, (chairman); R. G. Barrett, GW8HEZ; R. Bellerby, G3ZYE; D. A. Evans, G3OUF*; D. S. Evans, G3RPE; K. A. M. Fisher, G3WSN; D. M. Pratt, G3KEP.

Membership & Representation: R. G. Barrett, GW8HEZ, (chairman); K. A. Crouch, G8KEN; D. S. Evans, G3RPE; F. D. Hall, GM8BZX; L. N. G. Hawkyard, G5HD; J. Heathershaw, G4CHH; I. J. Kyle, GI8AYZ; W. J. McClintock, G3VPK; B. O'Brien, G2AMV; W. R. Parkinson, G3FNM; H. S. Pinchin, G3VPE.

Microwave: P. G. Murchie, G4FSG, (chairman); B. Chambers, G8AGN; S. J. Davies, G4KNZ; M. W. Dixon, G3PFR; D. S. Evans, G3RPE; J. N. Gannaway, G3YGF; H. Griffiths, G4CNV†; D. T. Hayter, G3JHM†; C. J. Morcom, G3VEH†; H. W. Rees, G3HWR; C. W. Suckling, G3WDG; P. E. F. Suckling, G4KGC; M. H. Walters, G3JVL.

Propagation Studies: R. G. Flavell, G3LTP, (chairman); L. W. Barclay, G3HTF; T. Damboldt, DJ5DT†; W. M. Dunell, G3BYW; G. H. Grayer, G3NAQ†; M. Harrison, G3USF†; M. R. Lee, G3VYF; C. E. Newton, G2FKZ; J. O. N. Spurling, G4AQI; A. Taylor, G3DME; M. H. Walters, G3JVL.

Raynet: B. L. Goddard, G4FRG, (chairman); W. R. Andrews, G3RLE†; M. G. Barker, G8CAC; J. T. Barnes, GI3USS†; E. R. L. Bassett, RS16075; E. Batts, G8LWY†; J. A. Birley, G3PYN†; S. J. Brennan, GW3ZXI†; G. Cluer, G4AVV; W. J. Colclough, G3XC; D. F. Digby, G8DHQ†; D. E. Garrington, GM3RFA†; G. A. Griffiths, G3STG†; J. Heathershaw, G4CHH; S. B. Jebb, G6AJF†; R. P. Jeffries, G4KAR†; G. R. Jessop, G6JP; D. J. Lankshear, G3TJP†; B. O'Brien, G2AMV; H. S. Pinchin, G3VPE; I. Shaw, G3KWT†.

Technical & Publications: D. S. Evans, G3RPE, (chairman); D. G. Cutts, G4FAW; R. J. Eckersley, G4FTJ*; M. H. Emmerson, G3OQD; J. N. Gannaway, G3YGF; P. J. Hart, G3SJX; A. W. Hutchinson*; R. O. Phillips, G4IQQ; H. W. Rees, G3HWR.

VHF: C. J. Morcom, G3VEH, (chairman); M. S. Appleby, G3ZNU; A. H. B. Bower, G3COJ†; G. Cluer, G4AVV†; M. Dennison, G3XDV; T. P. Douglas, G3BA; K. E. S. Ellis, G5KW†; K. A. M. Fisher, G3WSN; B. L. Goddard, G4FRG†; A. G. Hobbs, G8GOJ†; J. Hum, G5UM†; R. W. L. Limebear, G3RWL†; W. J. McClintock, G3VPK; J. R. Morris, G4ANB; P. G. Murchie, G4FSG†; G. Shirville, G3VZV†; G. M. C. Stone, G3FZL; A. J. T. Whitaker, G3RKL†; I. F. White, G3SEK.

VHF Contests: F. Mathews, G8ACJ, (chairman); D. J. Andrews, G3MXJ†; D. S. Booty, G3KKQ†; L. N. G. Hawkyard, G5HD; W. J. McClintock, G3VPK; M. Pharaoh, G3LCH; J. H. Quarmby, G3XDY; C. Sharpe, G2HIF; G. M. C. Stone, G3FZL; P. E. F. Suckling, G4KGC; R. J. Taylor, G4BEL.

† Corresponding member
* RSGB staff

OBITUARIES

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

Mr D. B. Bishop, G4FDH
Doug Bishop died on 15 January aged 57. His main interest was mobile working on 1·8MHz and his transmissions from remote sites provided many otherwise unobtainable squares for members of the WAB net. He was a member of the RSGB and the British Rail ARS in whose nets he often participated.

Mr A. Hargreaves, G5CI/G6NV
Alan Hargreaves died on 13 November 1981, aged 72. He was first licensed as G5CI in 1930, and was relicensed after the second world war. He had been active with many clubs, most recently as a founder member of Chippenham & DARC. He operated on all hf bands and was known for his impeccable cw and dry humour.

Mr G. W. Lawrence, G3RLI
George Lawrence died on 23 January, aged 61. He served with the Royal Signals in India during the second world war. Latterly he was only active on 144MHz.

Mr R. E. Lewis, G3PC
Roy Lewis died on 26 January, aged 70. During the last war he had served in the long range desert group with other radio amateurs. He founded the Chichester ARS, and as headmaster of a Chichester school, many of his pupils joined the society.

Mr J. MacPherson, GM3XO
John MacPherson died on 14 January. He was a keen member of FOC and a fine cw operator. He worked with radios in the Navy during the second world war.

Mr D. E. Price-Jones, GW5SA
David Price-Jones died on Christmas Day 1981, aged 78. He had been licensed for many years, first appearing in the *RSGB Callbook* in 1927 as 5JB. In recent years he had been active mainly on 3·5MHz, and could often be heard in QSO using his native Welsh.

Mr R. H. Roling, GW6WM
Mr Roling died on 10 January, aged 78. He joined the society at 16 as a listener. He became involved in the subject professionally and during the second world war was a "secret listener". He operated mainly on 1·8 and 21MHz cw, and was always willing to help newcomers.

Mr H. L. Shuttleworth, ZL4IO
Bert Shuttleworth, who died on 24 February, was an ex-RAF radio officer. He had been a regular contributor to the NZART magazine *Break-in*, and provided material for the first edition of the *VHF/UHF Manual*. He had been a member of the Society for many years, and was also active in the Amateur Radio Emergency Corps in New Zealand.

Mr G. Tagg, G8IX
George Tagg died on 29 January. He joined the Royal Navy in 1914 and served in it through to 1920. During this time he was stationed at the Naval WT station in St Johns, Newfoundland, and communicated with Alcock and Brown during their memorable flight across the Atlantic. On leaving the Navy he joined the Post Office as a telegraphist. He also joined the RNWAR and became an instructor with the local Sea Cadet Corps. During the second world war he was seconded to the Air Ministry as a high-speed telegraphist. He later rejoined the GPO. In 1960 George became one of the original band of amateurs with Navy connections to join the newly-founded RNARS. He became its first chairman, serving in that post until 1962, and the contents of his little "black book" were responsible for many of the members who currently occupy the RNARS membership list!

Also:

Mr H. H. Billington, G3YNQ, on 26 May 1981;

Mr J. Dunlop, GM3LEY, on 27 November 1981;

Mr S. M. P. Forrester, RS4872, in November 1981;

Mr H. G. Harvey, RS41999 in September 1981;

Mr R. Lindsay, GI8PJV, on 16 December 1981;

Mr I. M. Mitchell, G4AJH;

Mr L. V. Mussi, RS40236;

Mr R. Roberts, G2HIL/9K2DR, on 14 January;

Mr R. C. Salmon, RS46750, on 18 August 1981;

Mr E. Smith, GW8CRY, on 1 February;

Mr P. M. Taylor, RS48218; and

Mr P. Tinto, G3ELO, on 21 January.

YOUR OPINION

PLAIN SPEAKING
The Editor
Radio Communication

Sir—The debate on the use of Q-code on telephony has raged periodically in your columns for a very long time—certainly during the 25 years I have been reading them. As with most debates, neither side enjoys a monopoly of virtue; but it is interesting that so many of those who dislike Q-code become so excited about it. And they are usually the ones who seem eager to impose their opinions on the rest.

Most professional and amateur activities have their own jargon: it can be a very useful form of "shorthand". It becomes tedious and offensive only when its use is excessive or affected. G4MBY (January 1982) cites just two examples: QSO and QRT. I doubt if many more are used on 144MHz fm—possibly QTH, QSY, QRM and QRN. What exactly are "all the abbreviations and codes" which, he says, "many new G6s get completely tongue-tied trying to remember"? How often does one hear a station talking "entirely in Q-code and jargon"? Such a feat would make fascinating listening. Arguments are not strengthened by exaggeration.

We have all endured lengthy, repetitive, boring signing-off ramblings such as G4MBY describes. But he is confusing jargon with verbosity—and that's a *different* debate!

Gordon Moore, G3MCY (Ex-ZC4GM)

OPERATING ON 144MHz
The Editor
Radio Communication

Sir—I read the letter from GW3YTL (*Rad Com* January 1982) with interest, and can only say that Cliff presents a very one-sided view. Repeaters, as I understand it, are primarily for mobile operators. As a field engineer covering the whole of Scotland and parts of England, operating 144MHz fm the while, repeaters have given me hundreds upon hundreds of contacts, and made me many friends, impossible without, not to mention a number of occasions when I have been able to summon rapid help in road accidents, plus giving road directions to visiting amateurs temporarily lost in our fair country.

I should like also to mention GB3HI, the 144MHz repeater on the island of Mull. This repeater has enabled large numbers of GM8s and GM6s to contact each other, these contacts being impossible otherwise, due to the mountainous nature of the country. And legal cb couldn't help either!

On the matter of simplex channels—rubbish! If anyone is tuning a vfo while operating mobile, I hope that they will be driving away from me, not towards me! If Cliff prefers vfo control at home—no problem. Tune the vfo to 145·5MHz and call "CQ". When someone answers, retune the vfo to 145·525, 145·550 etc. Or try cw or ssb at the shallow end—no channels there.

The 144MHz band is 2MHz wide—room for cw, ssb, fm, vfos, channels, repeaters, and lots more besides.

A. M. Fraser, GM3AXX

AND FINALLY
The Editor
Radio Communication

Sir—I fear that amateur radio is in danger of being split straight down the middle by the type of letters from GM3YTL and G4MBY (*Rad Com* January 1982).

To refer to "those G8s and G6s" as glorified cbers is not only patronizing but downright pompous. Surely newly-licensed amateurs need encouragement and guidance by the more experienced amateurs to fully understand what amateur radio is all about. Dismissing "those G8s and G6s" as not "true" amateurs (whatever a true amateur is) will only serve to cause a rift in amateur radio itself.

I spent eight months studying hard for the RAE, I have to wait a further two or so months for the results, and probably a further month for a callsign (if I pass). In all this time I have never spoken a single word over cb, even when legal, yet being a keen swl I had to endure the frustration of high-power cbers dxing all over my favourite 28MHz band, all the time dearly wishing for an amateur to come up, blast them out and really show them what it is all about; needless to say, it never happened. Where were you when I wanted you? Surely this is the type of thing that should be concerning you, not the type of amateurs who use repeaters or the way certain amateurs talk over the air. Whether or not you or I agree, repeaters and jargon are things amateurs quite obviously enjoy using, and therefore surely should be accepted as a part of amateur radio in the "true" amateur spirit.

Finally, if the inference is that G6s and G8s are second-rate members of the hobby, that makes me, being an RS, a fourth-rate member apparently, being beaten into third place by cb. Despite *my* views I am only 25, waiting for my RAE results, have passed my morse test, and any one of half a dozen licensed amateurs (including some G3s) will vouch for my enthusiasm and dedication to amateur radio. It is these amateurs who have helped and encouraged me that has proved what a fantastic bunch of people radio amateurs really are, please don't spoil it, live and let live. By the way, GW3YTL and G4MBY, no hard feelings.

Dave Shirley, RS46900

A NO FRILLS CW TRANSCEIVER
The Editor
Radio Communication

Sir—In a quarter of the time it takes G4AOK to "badger dealers" to get him a Japanese cw transceiver (*Rad Com* January 1982), he could build himself a "no frills" transmitter to use with the communications receiver he doubtless already possesses. Not only would he save a great deal of money, but he would then deserve credit for the contacts he makes.

In recent months I have found no difficulty in working world-wide with a simple home-made cw transmitter which certainly has no frills, operates with 35W input and uses a fixed dipole antenna.

Is the amateur movement approaching extinction as we limit our activities to the mere knob-twiddling of machines built for us by the real experts—the Japanese designers and engineers?

Membership of the RSGB continues its gratifying rise, but it seems that fewer and fewer of its members remain interested in the experimental aspect of amateur radio upon which our Society has been founded.

Bill Scarr, G2WS (hon member)

Sir—On the above subject, recently raised again by G4AOK, I am a little surprised that no-one has mentioned the Ten-Tec Century 21 cw transceiver. I obtained one of these two years ago for a good deal less than a multi-mode hf transceiver.

Admittedly, 30 or 40W rf output may not be fashionable nowadays, but I can still raise the odd W6 with this rig using 90ft of wire strung up the garden between 8 and 25ft off the deck!

Rod McMillan, G2CWY

SUBSCRIPTION COSTS
The Editor
Radio Communication
Sir—I am writing to express my concern regarding the rising cost of membership of the RSGB, particularly for those of us who are retired and have to exist on a very limited income. There must be many members who would agree that the subscription rate of £14.50 is now just too much for retired members to pay, and that there should be a lower rate of subscription for pensioners.

The present ruling that one must have 15 years continuous membership in order to qualify for the pensioners' reduced rate should be reconsidered, and a move made to reduce this to say, five years or less, thus allowing many to remain in membership of the Society at reduced cost, instead of having to resign because they can no longer afford the fees. In adhering to the present rule, those responsible seem to lose sight of the fact that there are those who do not become radio amateurs till late in life for many varied reasons, and will not be able to complete 15 years membership before passing on. Because of the high cost of living, such as heating, lighting, rates etc, these people will be forced to resign from our Society because they simply cannot afford to remain members at the full subscription rate.

I am aware of some who will this year resign when their membership renewal subscription becomes due, and there must be many more. It is a pity that such enthusiastic members have to leave the Society, just because it does not give them the same consideration that it does to others on low incomes, such as students etc. Is it too much to hope that the RSGB may give special consideration to the older members?

W. T. S. Terry, G4LUT

GB2RS NEWS
The Editor
Radio Communication
Sir—May I make a plea for all amateurs to avoid the frequencies used by the RSGB news readers for the short time that they are needed. It is necessary for the news service to have, for only an hour or so, an exclusive frequency. I am thinking of 144·250MHz ssb which on a recent Sunday, was almost obliterated by a local amateur (a G3+3 who should have known better) working in the contest.

In my poor location I use reception of the South Devon broadcast as a pointer to the quality of conditions. On the Sunday mentioned it was deep in amongst other signals and not heard at all. But conditions were not that bad!

In closing, I would thank the news readers, G3FZL and G3VAG, in the Surbiton area, for their sterling work. I hope they realize how much they are appreciated.

R. H. Biddulph, G8DPS

SLOW MORSE
The Editor
Radio Communication
Sir—I wonder if I might use your columns to express sincere thanks and appreciation to those members who devote so much time and effort in slow morse practice transmission weekly or nightly.

It has been almost entirely due to such broadcasts from G3RLO that I and many others have in the past few months overcome the rather daunting task of learning the morse code. Tony transmits every evening and cheers up the tedium with a unique mixture of verse and other oddities which no local station can rival. The rumour that his pupils are thereafter limited to Boz and Kipling however alone at 12wpm is entirely false!

Jeremy Boot, G4NJH

Mobile rallies calendar

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

18 April—Lough Erne ARC Mobile Rally, Killyhelvin Hotel, near Enniskillen, Co Fermanagh. Talk-in on S22. Full hotel facilities, boat trips of island town, tour of NT property, trade stands, bring & buy, component suppliers stall, video film for Harmonics. Further information from GI6EHE, tel 0365 4905, or GI4CZW, tel 0365 4500.

25 April—Drayton Manor Mobile Radio Rally, organized by the Midland ARS and the Stoke-on-Trent ARS, at Drayton Manor Park, nr Tamworth, Staffs, on the A4091. Open 11am. Talk-in on 144 and 432MHz. Attractions include trade stands, PO, BM/CB Repeater Group, Raynet, flea market, refreshments, zoo etc. Details from Norman Gutteridge, G8BHE, 68 Max Road, Quinton, Birmingham.

25 April—Swansea ARS Rally, The Patti Pavilion, adjacent to St Helens County Cricket Ground, Swansea, on A4067. Open 10.30am to 5pm. Talk-in on S22. Bring & buy, bookstall, licensed bar, refreshments, good car parking. Details from GW4HSH, tel 0792 404422.

9 May—Lincoln Hamfest, organized by the Lincoln Short Wave Club, on the Lincolnshire Showground. Details to be announced. Contact J. R. Hunt, G3PVU c/o the club at the City Engineers Club, Central Depot, Waterside South, Lincoln.

16 May—Swindon & DARC Rally, Park School, Marlowe Avenue, Swindon, Wilts. Open 10am. Talk-in on 144MHz (S22) and 432MHz (SU8 or on GB3TD if possible). Ample car parking, refreshments, attractions for the whole family. Details from K. A. Saunders, G8SFM, QTHR, tel 06668 307.

23 May—Parkenaur Rally. Details from RR15, J. T. Barnes, GI3USS.

23 May—Barry College of Further Education RS Mobile Rally, Barry Memorial Hall. Open 11am-5pm. Talk-in on S22. Equipment for junk stand will be accepted from 10am. Bar and food available. Details from Peter Truberg, GW4JOG, tel 0222 763015.

23 May—The Northern Mobile Rally, The Great Yorkshire Showground, Harrogate. 10am-6pm. Ample car parks; bar; refreshments. Many attractions for the xyl and junior ops. Facilities for the disabled. Lectures etc. Further details from G8KRU, 14 Fieldhead Road, Guiseley, Leeds LS20 8DT. **Please note change of venue.**

30 May—Hull & DARS Mobile Rally, Hull University, Cottingham Road, Hull. Open 12am to 4pm. Details from H. Cunliffe, G6DUL, 142 Hall Road, Hull HU8 8SB, tel 0482 447355.

30 May—Plymouth RC Mobile Rally, School Hall, Tamar Secondary School, Paradise Road, Millbridge, Plymouth, Devon. Details from Julie Butcher, G4HKZ, QTHR, tel 0752 338417.

30 May—East Suffolk Wireless Revival, Sports Ground, Ipswich Area Civil Service Sports Association, Straight Road, Ipswich (adjacent Suffolk Show Ground). Attractions include transceiver clinic, antenna testing range, flea market etc. Further details later. Requests for stand space to George Spencer, G6CRN, 83 Tuddenham Avenue, Ipswich, Suffolk, tel Ipswich (0473) 218285. Other enquiries to Jack Toothill, G4IFF, QTHR, tel Ipswich (0473) 44047.

13 June—Elvaston Castle Mobile Rally, Elvaston Castle Country Park, 5 miles south-east of Derby on the B5010. Organized by the Nunsfield House ARC. Opens 10am. Talk-in on 144 and 432MHz. All the usual facilities including full on-site catering facilities. Further details from Ian Cage, G4CTZ, QTHR, tel Derby 71875 or 799452. Trade enquiries to Mr R. Woolley, G4HIJ, QTHR, tel Ashbourne 43241.

13 June—RNARS Mobile Rally, HMS Mercury. Open 10am to 5.30pm. All usual trade stands, and arena events. Talk-in on S22, 432MHz, and 3,660kHz after 0830. Raffle and picnic facilities. Details from A. G. Walker, G4DIU, 103 Torrington Road, North End, Portsmouth PO2 0TN.

20 June—Denby Dale & DARS Mobile Rally, Shelley High School, Skelmansthorpe, Nr Huddersfield. Open 11am. Talk-in on S22 and SU8. Details from J. Clegg, G3FQH, QTHR.

27 June—Longleat Mobile Rally. This will be the City of Bristol RSGB group's 25th event. Entertainment by The Bristol Unicorns Youth Band. There will be a mast erection contest, involving teams of four entrants, the winners of which will be awarded the "Longleat Trophy" presented by Lord Christopher Thynne. It is hoped that the President of the RSGB will attend. Preliminary enquiries for trade stands to, and further information from, B. L. Goddard, G4FRG, tel 0272 848140.

27 June—Rolls Royce ARC Mobile Rally, Rolls Royce Sports & Social Club, Barnoldswick (six miles south of Skipton, 12 miles north of Burnley, access from A59 and A56). Open 11am-6pm. All usual facilities—trade stands, refreshments, talk-in etc. Details and applications for booking forms etc from L. Logan, G4ILG, c/o 19 Fenton Avenue, Barnoldswick, Colne, Lancs BB8 6HB, tel Barnoldswick 812288.

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—Sussex Mobile Rally, Brighton Raceground. Open 10.30am-5pm. Special event station GB2SMR will be in operation. Many attractions including free minibus trips to Brighton beach. Free parking. Bring the family for a day by the sea. Details from G3VBE, QTHR.

18 July—Cornish Rally, Technical College, Camborne, Cornwall. Details from Andy French, G8TUJ, 12 Pentalk Road, Camborne, tel 0209 717343.

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 Mobile Rally. Details to follow.

29 August—BARTG Rally, Sandown Racecourse, nr London. Details from sec Edward Batts, G8LWY, 27 Cranmer Court, Richmond Road, Kingston-upon-Thames, Surrey.

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.

Special event stations

GB4SG, 1-28 April
Details of this station from G3LQI.

GB2SG, 8-14 April
This station celebrates the 75th anniversary of the Rolls-Royce Silver Ghost, and will be operated at Rolls-Royce Motors Social Club by licensed members of the company. It is also planned to run the station in June on dates coinciding with the Silver Ghost breaking and achieving a new world endurance record. Planned operation is on 3·5 to 28MHz, and on 144MHz. A special QSL card will be available and sent via the bureau; direct QSL cards should enclose sae/ircs. Further details and direct QSL cards from Dr Bryan Roe, G4LVR, QTHR.

GB2TM, 18 April
This station will operate at the Birchington hq of the Radio Club of Thanet on the occasion of the Isle of Thanet Marathon Race. Operation on 144MHz ssb and hf bands. Details from G8HLG, QTHR, tel Thanet (0843) 54154.

GB2DUR, 27-29 April and 1 May
The station is to celebrate the 150th anniversary of Durham University. It will operate on all bands, 3·5-30MHz, 144 and 432MHz. Details from C. A. Weir, G4MWQ, c/o Durham University R&ES, Dept of Applied Physics & Electronics, University of Durham.

GB2SCF, 1-3 May
The Home Counties Amateur Television Group, Burnham Beeches RC and Langley College of Further Education are joining forces to produce a demonstration of amateur radio and television for the Slough Centenary Canal Festival, at Bowyers Field, alongside the terminal basin of the canal, about half a mile north of the town centre and Slough rail station. All interested amateurs are welcome. There will be hf, vhf and 432MHz amateur high definition television operation. Slow scan tv will also be in use on the hf bands. Special QSL cards will be issued. Information from John Betts, G4HMG, QTHR, tel Iver 651652.

GB2HGS, 1-8 May
The station will commemorate the 75th anniversary of the founding of Hampstead Garden suburb. Special QSL cards will be sent to all contacts. Operation will be on top band, 3·5, 7, 14, 21 and 28MHz ssb, and 144 and 432MHz fm. It will be situated at the Institute, Central Square, London NW11. Details from D. L. St George, 8 Amiens Hill, London NW11 6ET.

CONTEST NEWS

VHF NFD 1982 rules

As last year, VHF NFD will have open and restricted sections. This year notification of site will be required to enable representatives of the VHF Contests Committee to inspect stations, see rule 2. The 70MHz section of the contest will be run as two separate events, the first phone only, the second cw only, with a break during the night. Stations may be contacted once during each session, and the total score for 70MHz is the sum of the scores in each session. This should ensure a high level of activity throughout. With the larger numbers of contacts now being made on 1·3GHz, the scoring system on this band can be brought in line with the others, so radial ring scoring is used throughout.

Figures in square brackets refer to the general rules for vhf/uhf contests published in the January 1982 issue of *Radio Communication.*

1. Duration. From 1400gmt 3 July to 1400gmt, 4 July 1982.
2. Site notification. Each group intending to compete must send details of the site to be used to: VHF Contests Committee, c/o F. Mathews, G8ACJ, Easedale, Woodway, Merrow, Guildford, Surrey GU1 2TF, to arrive not later than Friday 11 June 1982. Details must include name of the group, callsigns to be used, national grid reference, and sufficient access information for an inspector to be able to locate the site. Entries will only be accepted from groups who have notified their site information.
3. Bands. Up to four separate stations can be used, operating on the 70, 144, 432 and 1,296MHz bands. Only one station can score or give points on each band. Single-band entries on 144MHz will not be accepted. Stations operating on 70MHz must use phone only during the period 1400-2300gmt, and cw only during the period 0600-1400gmt, and should close down in the period 2300-0600gmt.
4. Operators. Any RSGB member or group of members operating from the British Isles (excluding Eire) may enter. Two groups operating from the same site may combine their scores subject to rules 3 and 5.
5. Stations. All the stations forming one entry must operate from within a circle of 1km radius centred on the operating position of any of the stations. Proof of permission to use a site may be required. All equipment, including antennas, must be installed on the site during the 24h preceding the contest, or during the contest. Only portable accommodation can be used to house the stations. The site may not be used for any transmitting activities by the group or member during the five days before this time. Stations may not use public mains supply. Power for all equipment must be derived from an on-site generator or battery.
6. Scoring. Contacts will be scored by the radial ring system [7a]. Scores from the two 70MHz sessions will be added to give the final 70MHz score.
7. Contest exchanges.
(a) Contestants must exchange both callsigns, signal reports, serial numbers, QTH locator and QTH [12a].
(b) On 70MHz, one scoring contact with a given station can be made in each session. Serial numbers start at 001 in each session.
(c) On 144, 432 and 1,296MHz, only one scoring contact can be made with a given station [11a].
(d) The 1·3GHz station may operate on any other band for the purposes of arranging a contact, but the exchange of contest information must take place on 1·3GHz only, and may not be interrupted by recourse to another band. CQ calls on another band should clearly be "for 1·3GHz only".
8. Sections. There will be two sections:
(R) Restricted section:
(i) The power output on any band may not exceed 25W p.e.p. or cw.
(ii) The height of any antenna may not exceed 35ft agl.
(iii) Only one antenna per band may be used (eg no stacked or bayed arrays).
(O) Open section: as per licence.
9. Inspections. All stations are subject to inspection by members of the VHF Contests Committee or nominated representatives. Should the inspector be unable to locate the site due to inadequate or incorrect information being given, the entry will be disallowed. In the event of a last minute change of site, it is the responsibility of the members of the group to make suitable arrangements for the inspector to find the new site. The inspector's brief will be to ensure that that the rules and spirit of the contest are being observed.
10. Entries.
(a) All entries must be postmarked not later than 26 July 1982.
(b) Separate sets of log sheets and 427 cover sheets are required for each band.
(c) A summary sheet 4422 must also be completed. Otherwise the scores on each band will be listed, but the total will not appear in the overall results table.
(d) Entries must be addressed to; The Chairman, VHF Contests Committee, Easedale, Woodway, Merrow, Guildford, Surrey GU1 2TF.
11. Other rules. The following general rules will also apply: 5a, 8b, 9, 10a, 12a, 13-26.
12. Awards. The Surrey Trophy will be awarded to the overall winner in the Open section, the Arthur Watts Trophy to the overall winner of the Restricted section, and the Tartan trophy to the leading Scottish entry. Certificates of merit will be awarded to winners and runners-up in all sections.

432/1,296/2,304MHz Contest rules

1400-1400gmt, 1-2 May 1982 (Times as per IARU recommendation)
Multi-operator stations may operate concurrently using different callsigns. Individual band and overall tables will be published.

On 432MHz scoring will be by the radial ring system, and at 1pt/km on the other bands.

The following general rules, published in the January 1982 issue of *Radio Communication* will apply: 1, 2, 3, 4d, 5a, 6a, 7a & 7b, 8b, 9, 10b, 11a, 12a, 13-26.

All entries and check logs to: VHF Contests Committee, c/o W. J. McClintock, G3VPK, Maple Leaf, Great Braxted, Witham, Essex CM8 3EJ.

144MHz Low Power Contest rules

0900-1700gmt, 2 May 1982
The transmitter output must not exceed 25W p.e.p..

The following general rules, published in the January 1982 issue of *Radio Communication,* will apply: 1, 2, 3, 4e, 5a, 6a, 7a, 8a, 9, 10a, 11a, 12a, 13-26.

All entries and check logs to: VHF Contests Committee, c/o G. M. C. Stone, G3FZL, 11 Liphook Crescent, Forest Hill, London SE23 3BN.

144MHz Contest rules

1600-1600gmt, 22-23 May 1982
The following general rules, published in the January 1982 issue of *Radio Communication* will apply: 1, 2, 3, 4f, 5, 6a, 7a, 8a, 9, 10a, 11a, 12a, 13-26.

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

10GHz Cumulative Contest rules

0900-2000gmt, 25 April, 16 May, 20 June, 11 July, 8 August, 19 September
Three activity periods will count towards the final score. Entrants unable to be active for three periods are strongly encouraged to send in logs, as a record of their activity, but will not be eligible for an award. Such logs will be included in the table of results.

During each activity period, a station may change location once (see general rule 5b). For the purpose of this contest the "location" is defined as any point within 5km of a fixed point. Contestants may start from a new location for each activity period.

Entries from stations outside the UK will be accepted, whether or not they are RSGB members.

Stations operating from inside the UK must list on the cover sheet the national grid references of all sites used.

Crossband contacts will count for half-points (general rule 10b). A full contest exchange should be given on both bands, including location information, report and serial number. General rule 21 also applies to crossband contacts.

Awards will be made to the winner; the runner-up; the leading non-crystal-controlled station using less than 100mW rf output; the leading fixed station (home QTH); the leading non-UK station; and the highest placed station who has not won an award before in this event. In addition, the leading station will receive the Alpha Award.

Except where modified above, the following general rules for vhf/uhf/shf contests, published in the January 1982 issue of *Radio Communication,* will apply: 1, 2, 3, 4a, 5b, 6a, 7b, 8a, 10b, 11b, 12a, 13-26.

All entries and checklogs to: VHF Contests Committee, c/o Dr C. W. Suckling, G3WDG, 46 Windsor Close, Towcester, Northants NN12 7JB.

Microwave Contest rules

0900-2000gmt, 25 April, 16 May, 20 June, 11 July, 8 August, 19 September
The following bands will be active on these dates: 2·3GHz—25 April; 3·4GHz—19 September; 5·7GHz—16 May and 11 July; 24GHz—20 June and 8 August. Each band will be scored separately and each band leader will receive a certificate. In the case of 5·7 and 24GHz only the higher scoring day will count, although logs should be sent in for both activity periods if possible.

During each activity period, a station may change location once (see general rule 5b). For the purpose of this contest the location is defined as any point within 5km of a fixed point.

Entrants operating inside the UK must include the national grid references of all sites used on the cover sheets. A separate cover sheet is required for each band entered.

Crossband contacts will count for half-points (general rule 10b). A full contest exchange should be given on both bands, including location information, report and serial number. General rule 21 also applies to crossband contacts.

Except where modified above, the following general rules for vhf/uhf/shf contests published in the January 1982 issue of *Radio Communication* will apply: 1, 2, 3, 4a, 5b, 6a, 7b, 8a, 9, 10b, 11a, 12a, 13-26.

All entries and checklogs to: VHF Contests Committee, c/o Dr C. W. Suckling, G3WDG, 46 Windsor Close, Towcester, Northants NN12 7JB.

Low Power Contest 1982 rules

1. Aim of contest. To encourage QRP operation.
2. Eligible entrants. Single-operator stations only. UK entrants must be fully paid-up members of the RSGB.
3. When. Sunday 18 April 1982, 0700 to 1100gmt and 1300 to 1700gmt.
4. Sections. (a) British Isles stations using 5W input or less.
(b) Overseas stations using 5W input or less.
5. Frequencies. 3·5MHz and 7·0MHz bands only.
6. Mode. CW (A1) only.
7. Contest call and exchange. CQ QRP. Exchange RST and serial number starting at 001, plus input power, eg 569 001 3W.
8. Scoring. 15 points for each completed contact with another QRP station. Five points for all other contacts. Overseas stations may only claim points for UK contacts.
9. Logs. Separate logs must be submitted for each band. All exchanges to be shown.
10. Declaration. Each entry must be accompanied by the following declaration: "I declare that my station was operated in accordance with the rules and spirit of the contest and in the event of any dispute the decision of the Council of the RSGB will be final". The declaration must be signed and dated.
11. Address for logs. RSGB HF Contests Committee, c/o Mr D. S. Booty, 139 Petersfield Avenue, Staines, Middx TW18 1DH, England.
12. Closing date for logs. Logs must be postmarked not later than 10 May 1982.
13. Awards. The 1930 Committee Cup will be awarded to the leading station in section (a). Certificates of merit will be awarded to the leading three stations in each section, and to the highest placed entrant in each section using 1W input or less.

Region Round-up CW Contest rules

The HF Contests Committee hopes that the level of activity for this year's contest will be greater than that in 1981. The event is designed to be a short, snappy affair on 7 and 3·5MHz. Why not have a go and surprise yourself at how easy it is. The top three entrants in each section, including the swl section, will receive a certificate.

TRANSMITTING SECTION

1. The general rules for RSGB hf contests, published on p56 of the Januarv 1982 issue of *Radio Communication*, will apply.

2. Eligible entrants. All paid-up members of the RSGB resident in the British Isles (G, GD, GI, GJ, GM, GU and GW) holding a Class A licence. Single-operator entries only.

3. When. 0700-1200gmt, Sunday 16 May 1982.

4. Contacts. CW only in the 7 and 3·5MHz bands. IARU Region 1 band plans must be observed. Entrants are requested to confine their 3·5MHz operation to the segment 3,510-3,590kHz.

Reports: RST and serial numbers, starting from 001, must be exchanged, followed by R and the number indicating the operator's RSGB region—eg 599001 R07. (The composition of RSGB regions is given on p61 of January 1982 issue of *Radio Communication*.)

Section A: Up to 150W input.

Section B: QRP—up to 10W input.

5. Scoring. Three points for each completed contact with a station within the British Isles (G, GD, GI, GJ, GM, GU, GW). Each station may be contacted for points only once on each band. The final score is the total points on each band, added together and then multiplied by the total number of RSGB regions worked on each band added together.

6. Entries. Separate log sheets must be used for each band, with the claimed score for each band clearly shown. It would help the adjudicator if standard log sheets (HFC1) were used. A cover sheet summarizing the overall entry (preferably form HFC2) and a signed declaration must accompany the logs, which should be sent to RSGB HF Contests Committee, c/o R. A. Treacher, BRS32525, 79 Granby Road, Eltham, London SE9 1EH, postmarked no later than *Monday 31 May 1982.*

RECEIVING SECTION

1. The general rules for RSGB hf receiving contests, published on p56 of the January 1982 issue of *Radio Communication*, will apply.

2. When. As transmitting section.

3. Operation. As transmitting section.

4. Logging. A station may only be logged once in the column headed "Station heard" and not more than 10 times in the column headed "Station worked" on each band. When both sides of a contact are heard, only one station may be claimed for points. Entrants should log the callsign of the station heard, report, serial No and region given by that station, and callsign of the station being worked. Three points can be claimed for each correctly logged contact. Other details as transmitting section.

5. Entries. As transmitting section.

DF Qualifying Event Oxford

Date: 25 April 1982
Map: OS Sheet 164 1:50,000 series, Oxford
Assembly: 1300bst for start at 1320bst
Location: Shotover Plain, ngr 565 063

Competitors requiring tea are asked to notify Mr P. Bradley, 60 Weyland Road, Headlington, Oxford OX3 8PD, tel 0865 61808, home, 0865 44988, ext 198, office, not later than 18 April 1982.

DF Qualifying Event Mid-Thames

Date: 9 May 1982
Map: OS Sheet 176, 1:50,000 series, West London
Assembly: 1300bst for start 1320bst
Location: A404, car park Chorley Wood Common, ngr 033 967

Competitors requiring tea are asked to notify Mr C. Wells, 56 Haydon Drive, Eastcote, Pinner, Middlesex HA5 2PN, tel 01-868 1196, not later than 2 May 1982.

Details of rules etc of RSGB top band df events may be obtained from E. L. Mollart, G6AGE, 17 Spinfield Mount, Marlow, Bucks SL7 2JU.

70MHz CW Contest results

Once again the conditions for this contest were very poor. Apparently the morning produced openings with QSB, and by the afternoon conditions had dropped to "abysmal" compared with the lift of two days earlier. Stations in both the north and south complained of no activity between the regions. The propagation was definitely east-west with the EI stations accounting for points.

Entries are down on the two-section contest of 1981. Some stayed the full time, others managed only 1h and thanks to these for submitting contest logs. Congratulations to G4ANT, the East Anglia Contest Group station, operated singly by G3MPN using a 10-el Yagi at 70ft asl, and 50W input to a 640A.

General things which the adjudicator observed included that the 640A is ubiquitous as a final stage and for transverting from 28MHz. G3TUX used 28MHz to 144MHz and then down to 70MHz, and wire dipole in the roof. A number of operators bemoaned their being "no beacons" for checking the equipment and band conditions prior to the contest. *G8ACJ*

Posn	Callsign	Points	QSOs	QTH	Best dx	Km
1	G4ANT	420	48	AM27	EI9Q	572
2	G3UKV	328	46	YM28	EI9BG	409
3	G3UVR	300	39	YN55	G3DAH	362
4	G3KUE/P	291	37	YO78	G3ZRF	358
5	G4MEJ/A	222	48	ZM77	EI2CA	377
6	G3PSP	188	42	ZL29	EI9Q	460
7	G4ENB	175	39	ZL08	G3JYP	326
8	G3BOC	164	24	YM16	G4ANT	325
9	G3TBK	160	36	ZN77	G3JYP	210
10	G3NPI	152	36	ZM76	G3KUE/P	250
11	G3LVP	148	35	AL33	G3KUE/P	330
12	G4ENA	143	25	YL29	G4EKT	278
13	GW3LDH	128	22	YN76	G4ANT	300
14	EI2CA	121	11	WM10	G4ANT	480
15	G3JEQ	117	34	ZL59	G3KUE/P	335
16	G3OIC	115	27	ZM41	G4ANT	223
17	G3VIP	111	21	ZN40	EI2CA	395
18	G4EKT	110	18	ZN10	G4ENA	278
19	G5UM	101	27	ZM35	G3KUE/P	172
20	G3VNO	99	21	YN39	G4ANT	258
21	G3FIJ	75	17	AL05	G3UVR	313
22	GM3TAL	69	7	YO73	G4ANT	496
23	G3TUX	47	19	ZL77	G3AWZ	142
24	G4FKI	41	21	AL31	G3UKV	210
25	G3LXP	38	12	ZL19	G3APY	157
26	G4FRE	37	11	AM76	G3JEQ	134
27	G4HYG	12	5	YN38	G3IKR	140

Thanks for check logs from G2DHV and G3ENY.

Second 1·8MHz Contest 1981 results

With activity increased in the British Isles over last year and plenty of European participation the result was a quite successful contest. There were more entries this year than last from the home countries with a slight increase in the overseas section.

GW3NYY has won the event this year, improving on his position of seventh in the 1980 contest. He made 157 contacts with 57 carrying bonus points. Last year's winner, G3RPB, has to be content with the runner-up position on this occasion, making 162 contacts of which 51 carried bonus points. Third, and laying one hand on the Maitland Trophy, is GM3ZSP. As to whether his other hand will help lift the award will be known when the results of the First 1·8MHz Contest of 1982 are known. GM4IPS may challenge him for the honour, being only 14 points behind.

The "First time" certificate goes to G3ZRS, who made 111 contacts with 49 bonuses included. Examination of the results table shows a good number of entries for the "First time"—let us hope this trend continues.

The standard of log keeping was generally good and the dreaded unmarked duplicates which usually cause problems, with the attendant loss of points, were nearly non-existent, despite the adjudicator's efforts to track them down!

Comments were few except for "Good contest—enjoyed it", "keep rules as they are" and the like. One or two entrants suggested an extra hour could be added due to the now considerable European participation. There were comments about some very strong signals on the band and one case of key clicks.

Check logs received from G3SNX, G4KGG, OZ1LO and UA3ET are gratefully acknowledged by the Contests Committee. *BRS20249*

BRITISH ISLES SECTION

Posn	Callsign	Points	Posn	Callsign	Points
1	GW3NYY	756	26	G3CCZ	470
2	G3RPB	741	27	G2MJ	443
3	GM3ZSP	736	28	G3GC	413
4	GM4IPS	727	29	G3VRY	411
5	G3SYM/A	703	30	G3YMC	405
6	G3PDL	696	31	G3BPM	394
7	G3HVX	677	32	GW3JI	378
8	GM4ALK	673	33	G3KSH	362
9	G3IGW	662	34	G3BGM	335
	G3XTT	662	35	G3ZJK	327
11	G3RBP	661	36	G3HTI	325
12	G3OAY	659	37	G4AEM	313
13	G3OZF	621	38	G3ZRZ	305
14	G3PSM	583	39	G4EBK	301
15	G3ZRS	565*	40	GW4IUK	298*
16	G3KHZ	560*	41	G4KKZ	278*
17	GW4BRS	554*	42	GM3ZRT	277
18	G3KKQ	520	43	G4ECI	266
19	G4ELZ/P	510	44	GM3WTA	256
20	G3ZGC/A	509	45	G3GMM	238*
21	G4DDL	505	46	G8QZ	232
22	G4BYG	485	47	G3FV	228
23	G3FKH	481*	48	G4BUO	146
24	G4BLX	480*	49	G4IPR	107*
25	G4BOU	476			

OVERSEAS SECTION

Posn	Callsign	Points	Posn	Callsign	Points
1	DL1BU	438†	15	UT5AB	217
2	UP2BAW	406†	16	DK0DL	213
3	DK3KD	385†	17	UB5UKO	187
4	OZ1W	373†	18	UA3DJN	166
5	OK1DFF	353†	19	UB5UKW	159
6	UR2RRJ	351†	20	UA3AGG	127
7	UA3LEO	279†	21	UP2BEN	126
8	F9KP	262†	22	UO5ODB	113†
9	OL4BBP	256	23	OK2BQU	111
10	DJ3XD	251	24	UB5VK	99
11	YU7JDE	250†	25	PA2CHM	92†
12	UB5WAL	245†	26	OL4AXT	73*
13	UB5WF	240	27	YU7SF	32
14	DK5XF	218	28	LZ2CW	16†

*Entry for "First Time" award
†Certificate winner

CW Contest November 1981 results

This contest has again found a very favourable reception and another high log entry with good scores was the result. A few comments from the logs will illustrate this: "Keep this contest alive—it is very enjoyable—no complaints!", *G3BDQ*; "A good contest which we thoroughly enjoyed . . . operating standards were generally very good", *G4CJG/P*. Good operating skills are the key to success in this contest, more so than multi-operator or portable QTH advantages, and a surprising number of single-operators took on the challenge of the strenuous 24h section.

The rule regarding the exchange of full QTH information brought mixed reactions. Some operators obtained very detailed information from Continental stations, others criticized this rule and preferred QTH locator-only in RSGB contests which coincide with contests on the Continent. G3POI's opinion is representative of others: "Please QRA only otherwise a waste of time working UK stations".

Conditions on the whole were described as "poor, regarding the high pressure", *G4MDZ*; G4AYM/P however observed that ". . . lifts occurred during which some dx was worked", similarly the G4MEZ/A group noted ". . . good openings to the east". Lucky in this respect was GM4CXM, who worked two Spanish stations at exceptional distances of 1,428 and 1,429km.

The winners and runners-up are indeed to be congratulated on their good results. Checklogs have been received with thanks from G2DHV, G4EMT, DK3UZ, G3JRM and G4KGC. *G4KGC*

SINGLE-OPERATOR 24h

Posn	Callsign	Points	QSOs	QRA	Best dx	Km
1	G4DCV	1,162	126	AL67d	DJ9YE	579
2	GM4CXM	597	45	XP09g	EA1TA	1,429
3	GW3NYY	536	52	XL40b	DL0WU	776
4	G4MBY	30	12	YL38c	GW3UCB/P	169

MULTI-OPERATOR 24h

Posn	Callsign	Points	QSOs	QRA	Best dx	Km
1	G3MEZ/A	2,048	211	ZM77a	DJ5DT	700
2	G4MDZ	1,210	124	AL76b	DJ9YE	594
3	G4LAD	645	118	ZN12j	DL0WU	664

SINGLE-OPERATOR 6h

Posn	Callsign	Points	QSOs	QRA	Best dx	Km
1	G3POI	1,394	96	AL51g	DK5AI	530
2	G3BDQ	1,068	86	AK04f	DK4MM	654
3	GW3UCB/P	1,000	100	YN75f	DL6WT/A	828
4	G4IYA	982	100	AL43f	DJ6DT	606
5	G4CVI	958	89	AM76c	F6CJG/P	711
	G3NNG	958	95	ZL23f	DF7DJ	639
7	G3TBK	499	72	ZN77g	PA0GN/A	475
8	G4ERG	469	63	ZN28b	DL0WU	584
9	G3VIP	418	48	ZN40j	DL0WU	557
10	G5UM	275	50	ZM35b	GI4LKA	395
11	G4APL	266	46	ZL60j	EI2CA	449
12	G4HSS/P	263	40	YN67a	ON4HU	523
13	G4GGV	206	36	ZL37g	DL6WT/A	625
14	G4FKS	184	34	ZN13h	G4DCV	360
15	G4KLN	167	31	ZN23a	F6KBF/P	462
16	G4DLB	155	30	ZM74g	F6DWG/P	354
17	G4KLQ/A	140	33	ZL19e	PA0MS/A	400
18	G5HD	111	15	XK09d	G3TBK	338

MULTI-OPERATOR 6h

Posn	Callsign	Points	QSOs	QRA	Best dx	Km
1	G4BPO	1,105	100	AM77j	F6CJG/P	710
2	G3ORA/P	569	67	YL68h	PA0MS/A	560
3	G4CJG/P	467	57	YO20c	F6KBF/P	586
4	G4AYM/P	453	61	YL29a	DL0WU	657
5	G3PWN	328	45	ZO80h	F6KBF/P	481
6	G4IGY	215	33	ZN10f	F6KBF/P	457

432MHz and 1,296MHz Cumulative Contests 1981 results

Conditions during the two cumulative contests were not particularly good, although both events had spells of good propagation and, for those entrants who were skilful enough to use these brief periods to advantage, some very reasonable contacts were to be made. Comments on the cover sheets were few but the arrangement of having the two contests taking place on the same evenings seemed to be well-received, although a few operators would have liked an earlier finish, while others wanted a gap between the two contests in order to provide time to change bands.

Logs were generally of a high standard but it seemed that some entrants only sent logs for the sessions that were to be included in their final score, which made cross-checking more difficult than usual.

Certificates and congratulations go to the two leading stations in each event.

G3LCH

1,296 MHz

Posn	Callsign	Points	QTH	Power	Best dx	Km	Antenna	Sessions
1	G4HWA/P	10,788	ZL53	250	G4KCT	288	4 × 15/15	567
2	G4FRE/A	10,010	AM76	150	HB9AMH/P	691	4ft dish	456
3	G8DKK	6,965	ZL08	40	HB9AMH/P	757	2 × 25eqly	247
4	G3ZUD/P	6,943	ZM13	250	G3JVL	225	6ft dish	456
5	G3TDG	6,144	AL51	35	–	–	2 × 23ey	456
6	G4MHC	5,715	YM79	25	G8VLL	258	23ey	367
7	G3WHK	5,486	ZL49	65	G4KCT	290	4 × 23ey	456
8	G4LRT	4,300	ZM45	35	G3JVL	181	qly	345
9	G4KGC	4,273	ZM65	130	G4KCT	199	27eqly	367
10	G8GDZ	3,955	ZM41	30	G4FRE/A	216	–	457
11	GW8HZK/P	3,062	YL05	1·5	G4KIY	214	15/15y	135
12	G8FMK	2,919	ZL26	20	G4CCH	195	27ey	356
13	G8DIU	1,694	ZL59	25	G4MHC	166	23ey	123
14	G8KAX	859	AL32	3	G4HWA/P	117	qly	467

Check logs gratefully acknowledged from G8ABI/A, G8CXK, G3TQF.

432MHz

Posn	Callsign	Points	QTH	Power	Best dx	Km	Antenna	Sessions
1	G8RZO	1,037	AL45	350	DF7VX	535	88emb	246
2	G4APA/P	801	YN79	100	F1QV	802	19ey	234
3	G8TFI	760	YL29	400	DF3EE	645	16e	456
4	G8ZHP	755	ZM29	150	PE1DPX	437	68emb	346
5	GW8AAP/P	723	YN65	100	F1FHI	682	46emb	234
6	G3TDG	699	AL51	40	–	–	21ey	456
7	G8RZP	687	AL45	320	PE1COQ	397	88emb	135
8	G3WHK	671	ZL49	100	G3BW	412	2 × 21ey	456
9	G4LRT	653	ZM45	400	DJ6MB	590	2 × 18e	346
10	GW8HZK/P	636	ZL05	100	G4LDJ	307	88emb	245
11	G4MHC	586	YM79	50	HB9AMH/P	873	16ey	456
12	G4JZF	551	YM30	18	F1BOF/P	944	48emb	456
13	G4FRE/A	491	AM76	60	HB9AMH/P	691	18epb	456
14	G8FUO	487	ZL47	180	G3BW	–	48emb	456
15	G8FMK	457	ZL26	40	G4DGU	255	11ey	457
16	G8DKK	453	ZL08	70	HB9AMH/P	757	21ey	247
17	G8EGG	442	ZL77	90	G4KCT	305	16ey	345
18	G8OHM	408	ZM41	25	G3BW	275	88emb	345
19	G3LRS/P	373	ZM13	6	G3PBV	284	21ey	156
20	G4DDL	369	ZL47	8	G8SFI	283	19ey	457
21	G8GXE	364	ZL48	50	–	–	88emb	234
22	G3OUL	335	YN46	200	G4FUF	349	2 × 21ey	267
23	G4CMU	325	ZL60	4	G3KMS	298	18ey	456
24	G3REQ	317	YN55	100	G8RZO	345	14ey	246
25	G3ZWK	304	ZL38	250	F1SA	488	46epb	345
26	G8IEM	268	ZK05	40	F1BOF/P	738	13eqly	345
27	G8MKD	255	ZM41	60	G8PNN	300	48emb	345
28	G4HAY	229	ZL30	10	G8REQ	262	18ey	245
29	G8PBV	228	YK32	50	F1BOF/P	765	23ey	346
30	G3XEB	222	ZL10	10	G4DGU	315	48emb	456
31	G8KAX	219	AL32	90	G4DGU	328	15ey	123
32	G8ACR	216	ZM41	10	G8RZO	214	18ey	456
33	G5UM	212	ZM35	10	GD2HDZ	266	14ey	256
34	G8ABI/A	171	ZL39	–	–	–	–	457
35	G8XBH	162	ZL50	10	G4DGU	303	48emb	245

Check logs acknowledged from G8CXK/P and G3RSD/P.

21MHz CW Contest 1981 results

The number of entries rose by 50 per cent over last year's total, and in fact exceeded the level of the 1979 entry. Despite the record entry conditions were generally reported as no more than fair, with the band never opening fully to the USA. Several overseas participants commented on the lack of G stations, and towards the end of the 12h had great difficulty finding new ones to work.

Unfortunately the new rule penalizing excessive unmarked duplicates took its toll: the logs of G3OAY and EA3BHA both contained more than five unmarked duplicates, and therefore had to be disallowed. Many other scores were reduced substantially because of lack of attention to duplicate cross-checking. There were also some inaccuracies in claiming multipliers – VO1 and VE1 count as the same country. On the other hand many Gs will find that their final score exceeds that claimed, as over half of those who worked UK1PGO did not realize he was in Franz Josef Land, and therefore counted as another multiplier.

The response to the suggestion that 28MHz be included in the 1982 contest was an overwhelming "No!", and the committee is happy to keep the contest in its present form.

G4BUO

BRITISH ISLES SECTION

Posn	Callsign	Points	Posn	Callsign	Points
1	G3MXJ*	82,335	27	G3RPB	28,200
2	G3NOM*	78,116	28	G3ESF	27,945
3	G3OZF*	75,457	29	G4EOF	27,133
4	G3HVX	73,740	30	G4JKW	24,863
5	G3PVA	71,520	31	G3JFF	24,816
6	G3PSM	70,866	32	G3WPH	24,299
7	G3RAU	67,555	33	G4COU/A	24,141
8	G4FNL	59,640	34	G3JJG	23,436
9	G3FKH	59,059	35	G3CCZ	23,408
10	GM3YOR	54,150	36	GM3RAO	18,463
11	G5PQ	49,390	37	G3XQX	17,570
12	GM3OXC	48,165	38	G4KGK	15,855
13	G3SNX	45,968	39	G3BXN	14,945
14	GM4EJI	44,496	40	G3VQQ	13,884
15	G5MY	40,924	41	G3DQL	12,818
16	G2QT	40,333	42	G3JQJ	11,438
17	G4IUF	39,350	43	G3AWR	11,375
18	GW3MPB	39,024	44	G2HDR	7,279
19	G3YAR	37,779	45	G6GH	5,616
20	GM4KGJ	36,771	46	G3ZDW	5,568
21	G3SXW	36,288	47	G4HON	5,376
22	G3YEU	35,751	48	G3NKS	3,894
23	G3KSH	31,535	49	G2AJB	3,402
24	G3VNC/A	30,804	50	G4KWU	913
25	G8BM	29,302	51	G3OLU	572
26	G4HPS	28,681			

QRP BRITISH ISLES SECTION

Posn	Callsign	Points	Posn	Callsign	Points
1	G4FDC*	16,132	4	G5DEH	8,128
2	G3VMY*	12,886	5	G3KKQ	8,075
3	G4CZB*	10,770	6	G3CWL	1,170

OVERSEAS SECTION

Posn	Callsign	Points	Posn	Callsign	Points
1	UA3DLN*	5,865	60	EA2CR	1,980
2	UB5LAE*	5,824	61	OK3ZWX	1,920
3	UB5QAV*	5,712	62	UA3DIW	1,860
4	UW1YY	5,577	63	JF2VDY	1,815
5	YU7NGO	5,376	64	YU3TOJ	1,710
6	YU7QDT	4,942	65	SP4PBI	1,692
7	UA3EZ	4,680	66	UM8MDX	1,674
8	UK5OBE	4,589	67	JA2CPD	1,672
9	YU3EO	4,446	68	LZ1FI	1,611
10	EA7ALG	4,363	69	PY4ZO	1,580
11	UA3UAC, OH1FM	4,356	70	UL7GAA	1,488
			71	OH8TU	1,390
13	OH6MK	4,303	72	HA3NS	1,280
14	ZB2EO	4,158	73	OK1AOU	1,215
15	SM5DAC	4,140	74	OH1CI	1,161
16	OK1AGN	3,960	75	OZ1HXL	1,152
17	YU1OVU	3,927	76	VK2AYD	1,080
18	UB5ECN, UA9FCI	3,861	77	ZL2TX	1,070
			78	UB5ICS	1,024
20	UA9XAB	3,744	79	Y55XH	1,008
21	EA5YU	3,640	80	PA0UV, JA3WKE	972
22	UP2BIM	3,588			
23	K2PZ, UA1LM	3,564	82	HA3KNA	966
			83	OH3RF	963
25	OK1TN	3,540	84	OH5OZ, EA5TX	945
26	UJ8JAS	3,471			
27	UB5ZAT	3,420	86	VK4XA	912
28	SP5DDJ, LA9XG, UA9CAL	3,399	87	EA9JG	889
			88	UK1PGO	868
			89	HA3NU	840
31	SP5BR	3,396	90	PY1VT	822
32	CN8CY	3,360	91	ZL2BR	810
33	UQ2PP	3,240	92	PA0CLC	712
34	SP2AVE	3,201	93	UA3TAM	693
35	UA9FGJ	3,024	94	Y41XH	612
36	OK1AXB	2,937	95	JA3OS	609
37	OZ5KU	2,886	96	PA0VLA, UC2AW	594
38	OK1DGN	2,880			
39	YU7SF/M	2,838	98	JA8CJY	560
40	VO1AW	2,808	99	DA1SD	544
41	SM0KV/0	2,772	100	EA3PE	540
42	OH5UO	2,760	101	YU7OCZ	525
43	LA4XX	2,706	102	JH2CJW	456
44	OK1DVK	2,640	103	YU7ORQ, OH2BQG	414
45	UC2SE	2,580			
46	ZD8TC	2,532	105	OK2KNN	360
47	EA3CRX	2,430	106	Y38ZB	336
48	YU3HAM	2,310	107	OK2SPS	270
49	UB5VAW	2,295	108	PY2BPR	255
50	JE1CKA, OK1KZ	2,250	109	SP9EPF	234
			110	JR4CCG	225
52	UA9CIQ	2,220	111	UA9UCK	210
53	OZ1LO	2,160	112	JG1GWE	190
54	OH7NW	2,106	113	JH1MTR	168
55	OH6AS, OH5RZ	2,070	114	OK2BJU	81
			115	W1OPJ	72
57	JH0BBA	2,060	116	OZ1DKG	12
58	OH5BE, W1CNU	2,040			

Contests calendar

3 April	1,296MHz Trophy *(Rules in March issue)*
3-4 April	BARTG Spring VHF/UHF *(Rules in March issue)*
4 April	432MHz Trophy & SWL *(Rules in March issue)*
4 April	ROPOCO 1 *(Rules in March issue)*
11 April	Stevenage & DARS 144MHz FM *(Rules in March issue)*
10-11 April	CARF Commonwealth Phone *(Rules in March MOTA)*
18 April	144MHz CW *(Rules in March issue)*
18 April	Low Power *(Rules in April issue)*
24-25 April	4th HM King of Spain Trophy *(Rules in March MOTA)*
24-25 April	Helvetia *(Rules in April MOTA)*
25 April	DF Oxford *(Rules in April issue)*
25 April	Microwave Cumulative *(Rules in April issue)*
25 April	10GHz Cumulative 1982 *(Rules in April issue)*
1-2 May	432/1,296/2,304MHz *(Rules in April issue)*
2 May	144MHz Low Power *(Rules in April issue)*
8, 16, 24 May, 1, 8 June	BATC Summer Cumulative *(Rules in April issue)*
8-9 May	CQ-M *(Rules in April MOTA)*
9 May	Port Talbot ARC HF *(Rules in April MOTA)*
9 May	DF Mid-Thames *(Rules in April issue)*
16 May	10GHz Cumulative 1982
16 May	Region Round-up
16 May	LF Phone (WAB) (Rules for all WAB contests obtainable from D. Roberts, G4FOO, 12 Chestnut Ave, Cranwell, Nr Sleaford, Lincs NG34 8HT)
22-23 May	144MHz *(Rules in April issue)*
23 May	DF Rugby
5-6 June	NFD *(Rules in February issue)*
13 June	70MHz & SWL
20 June	10GHz Cumulative 1982
20 June	DF Dartford Heath
26 June	AGCW-DL VHF/UHF CW (Rules in March *4-2-70*)
26-27 June	1·8MHz (Summer)
27 June	VHF 2m/70cm Phone (WAB) *(See note after 16 May LF Phone)*
3-4 July	VHF NFD *(Rules in April issue)*
11 July	DF Coventry
11 July	10GHz Cumulative 1982
18 July	3·5MHz Field Day
25 July	DF South Manchester
8 August	DF Salisbury
8 August	10GHz Cumulative 1982
15 August	70MHz Trophy & SWL
22 August	DF Slade
29 August	ROPOCO 2
4-5 September	144MHz & SWL
4-5 September	IARU 144MHz
4-5 September	SSB FD
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*)
2-3 October	IARU VHF
10 October	21/28MHz Phone
17 October	21MHz CW
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) *(See note after 16 May LF Phone)*
13-14 November	1·8MHz (2nd)
5 December	144MHz Fixed

QRP OVERSEAS SECTION

Posn	Callsign	Points	Posn	Callsign	Points
1	OK3CGP*	3,487	13	OK1KPX	1,863
2	UA1FV*	3,058	14	SM2JSN	1,512
3	OK1DKW*	3,014	15	OH3NJ/2	1,272
4	DK5RY	2,928	16	SM6HQK	1,188
5	OK2BMA	2,832	17	DF4RD	984
6	4Z4NUT	2,736	18	JA2TK	816
7	UA9CBR	2,508	19	OH3MP	714
8	UA9AFG	2,277	20	KL7IBT	357
9	Y22PM	2,268	21	OH6CK	300
10	OH5TF	2,220	22	UA0JAD	144
11	SM0FSM	2,079	23	JA0BMS/1	63
12	SM6AWA	1,980	24	JK1LUY	3

* Certificate winners.
Disqualified (Rule 7): G3OAY, EA3BHA.
Check logs and late entries received from HE9EVI (swl), OZ1BII, UB5UKO, UA6APP, K2FE, YU1RS302 (swl), UA1ZEX/U5J, UB5GBN, UA3ST, G3DYY, OK1US, UM8MAZ, HA4XX, Y21DH/A, UK9SAY, G3JKS, G5EAD.

BATC Summer Cumulative 1982 rules

Dates: 8, 16, 24 May and 1, 8 June.
Times: 1900-2200gmt each day, ie 8pm-11pm bst.
Scoring: Logs must be entered per band operated – a maximum of three sessions will count for points – if you operate more please enclose details for checking purposes.
a) Two-way QSO on 432MHz: 2 points/km.
b) Two-way QSO on 1·3GHz: 8 points/km.
c) Two-way QSO on 10GHz: 16 points/km.
Multi-op stations may only use one callsign – only one location may be used during the contest. Crossband QSOs must be entered in the log for the transmit band. One-way contacts may be made with "receive-only" stations for half points.
Exchanges: The following data is to be exchanged:
1) Code-group, which consists of four digits, individually chosen by each entrant ie: 1865 or 9732. All four numbers must not run consecutively. *The code group must be exchanged in video only.* A different code-group should be used for each session.
2) Call, QTH locator, report, serial number-starting at 001 each session, this data to be exchanged via video or phone.
Should one of the stations fail in receiving the picture of the other, the scores of both stations should be halved. 144·75 and 144·17MHz are well-known atv calling channels. Please QSY from these frequencies as soon as a QSO is established.
Contacts: The same station may only be contacted once per band on each night.
Logs: Logs must include postal address, locator and station details (including code-groups used in each session) and should be mailed not later than 30 June 1982 to: Graham Shirville, G3VZV, 18 Church End, Milton Bryan, Milton Keynes, Buckinghamshire MK17 9HR.

Verulam ARC Contest 1981 results

SECTION 1
1·8MHz TRANSMITTING

Posn	Callsign	QTH	County	QSOs	Points	Counties	Total
	GB2VER	St Albans	HFD	112	112	41	4,592
1	G5BK/A	Brimpsfield	GLR	90	99	37	3,663
2	G4HXC	Nuneaton	WKS	66	75	35	2,625
3	G3UJV	Barnet	HFD	67	76	31	2,356
4	G4JUN	Leicester	LEC	48	57	28	1,596
5	G3SJE	Harrow	LDN	43	52	20	1,040
6	G4CQF	St Albans	HFD	30	39	15	585
7	G3GC	Wembley	LDN	25	34	14	476
8	G3WFM	Potters Bar	HFD	27	36	10	360
9	G4HKA	Harpenden	HFD	21	30	9	270
10	G4EFE	Newbury	BRK	13	22	11	242
11	G3VRG	London N11	LDN	9	18	5	90
12	G3LXP	St Albans	HFD	10	19	3	57

1·8MHz RECEIVING

Posn	Station	QTH	County	QSOs	Points	Counties	Total
1	BRS48181	Chorley	LNH	55	64	37	2,368
2	BRS28198	Northiam, Rye	SXE	54	63	31	1,953

SECTION 2
144MHz TRANSMITTING

Posn	Callsign	QTH	County	QSOs	Points	Counties	Total
1	G5BK/P	Sudeley Hill	GLR	196	196	44	8,624
2	G8HWD/A	Norwich	NOR	179	179	39	6,981
3	G8WAQ	Gerrards Cross	BKS	135	135	39	5,265
4	G8RXK	Sarratt	HFD	117	126	34	4,284
5	G8TVL/A	Potten End	HFD	114	123	34	4,182
6	G8ZHP	Morton Bourne	LCN	110	110	37	4,070
7	G8NNJ	Romford	ESX	109	118	31	3,658
8	G4HLX	Harwell	OFE	78	87	28	2,436
	GB2VER	Caddington	BFD	93	93	25	2,325
9	G8KAX/P	Hornchurch	ESX	83	83	27	2,241
10	G8RZA	Ilford	ESX	67	76	21	1,596
11	G8UQN	St Albans	HFD	66	75	19	1,425
12	G6GGE	Chiswick	LDN	55	64	22	1,408
13	G3PZF	St Albans	HFD	50	59	19	1,121
14	G6DVL	Chelmsford	ESX	43	52	18	936
15	G8VRO	Watford	HFD	40	49	18	882
16	G8XSG	Sandridge	HFD	49	58	15	870
17	G3SJE	Harrow	LDN	36	45	14	630
18	G3LXP	St Albans	HFD	34	43	14	602
19	G8ZVW	Peterborough	CBE	26	35	15	525
20	G4EFE	Newbury	BRK	24	33	15	495
21	G3GC	Wembley	LDN	23	32	14	448
22	G6EYR	London Colney	HFD	25	34	11	374
	G3WFM	Potters Bar	HFD	25	34	11	374
24	G6BQJ	St Albans	HFD	27	36	9	324
25	G6CSY	Orpington	KNT	15	24	7	168

144MHz RECEIVING

Posn	Station	QTH	County	QSOs	Points	Counties	Total
1	BRS15822	Clapton E5	LDN	50	59	20	1,180
2	RS28198	Northiam, Rye	SXE	48	48	24	1,152

Checklogs were gratefully received from G3VRG (London) and PA0THT (Enschede).
Condolences to Jackie Breakspear, G8RZO, who entered the contest but whose logs were lost in the post. This was particularly unfortunate, as her claimed score would have put her in first place in the 144MHz section.

Looking ahead

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

4 April – Northern Amateur Radio Societies Association Exhibition, Lancaster Suite, Belle Vue Leisure Park, Manchester.
15-17 April – RSGB National Amateur Radio Exhibition, Alexandra Pavilion, London.
28 May – RSGB Region 1 lecture, Manchester.
19 June – RSGB HF Convention, Belfry Hotel, Oxford.
11 September – Scottish Amateur Radio Convention & Exhibition, Aberdeen.
9 October – Midlands VHF Convention, Wolverhampton Polytechnic. Details from J. P. H. Burden, G3UBX.
4 December – RSGB AGM, IEE, Savoy Place, London.

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 A1A 3·550 A1A 144·250 A1A		Locking, Avon	[13]
1400	G3LZV	145·250	F2A/F3E	Manchester	[3]
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	1·915	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	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]
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	G4ILW	145·450	F2A/F3E	Gateshead, T & W	[1]
1830	G3GNS	1·910 3·550 144·250	A1A	Locking, Avon	[13]
1900	G3RLO	144·525	F2A/F3E	West Bridgford, Notts.	[1]
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 A1A 3·550 A1A 144·250 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

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. Basic unchanged information on other affiliated organizations will be published in the July 1982 issue.

RSGB affiliated organizations are requested to report all programmes and news items to their regional representatives regularly. Information for inclusion in the **June** issue should reach them by **16 April**, and for the **July** issue by **14 May**.

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.

REGION 1—RR W. R. Parkinson, G3FNM, 141 Norris Road, Sale, Cheshire M33 3JR. Tel 061-973 1472.

Accrington (North Western Repeater Group)—15 April, 8pm. The Globe Bowling Club, Willows Lane, Accrington. Contact H. A. Aspinall, G3RXH, for further information.

Ainsdale (AARC)—13, 27 April. Ainsdale Scout HQ. Sec Norman Horrocks, G2CUZ, tel 0704 77604.

Barnoldswick (Rolls-Royce ARC)—7 April (The meeting will commence with a short revue of RSGB Region 1 activities by the RR Roland Parkinson, G3FNM, to be followed by Ron Myers, G8LUL, talking on modern receiver technology), 8pm. Rolls-Royce Sports & Social Club, Barnoldswick. Sec Leslie Logan, G4ILG, tel Barnoldswick 812288.

Blackburn (East Lancs ARC)—6 April (Talk and slide show on Antarctica, by Ron Smith, G3SVW, ex-VP8LK), 4 May (To be announced), 7.30pm. The Shadsworth Leisure Centre, Blackburn. PRO Norman Jenkin, G4CGT, tel 0254 75037.

Blackpool (B & Fylde ARS)—6 April, 4 May. Contact Jim Newland, G5ND, tel 0253 64508, for venue and programme.

Bolton (B&DARS)—7, 21 April (Technical lectures), 14, 28 April (Activity nights). Horwich Leisure Centre. Sec Dave Molyneux, G6AEK, tel Atherton 877921.

Bury (BRS)—13 April ("Wood & Douglas Products", introduced by Fred Starkey, G8TJG), 6, 20, 27 April (Informal meetings for construction, morse or club station operation), 7.30pm. Mosses Community Centre, Cecil Street, Bury. PRO David Hensby, G8TKD, tel (daytime) Whitworth 2213.

Leyland (LHARG)—19 April ("Getting going on OSCAR & NOAA satellites", by Dave Duff, G3VYV), 7.30pm. Leyland Library, Lancastergate, Leyland. Sec Arthur Jolly, G4JCO.

Liverpool (L&DARS)—6 April ("Contests '82", a discussion evening), 13 April (The president's quiz), 20 April ("The nature of sunspots"), 27 April (Pre-RAE, question and answer session), 4 May ("RTTY and the micro", by W. G. Marsden, G8TIW), 8pm. Conservative Rooms, Church Road, Wavertree. Sec Eric Grossmith, G3WOH, tel 051—426 3701.

Manchester (South Manchester RC)—2 April ("Another interesting hobby", by Tom Ardern, G3LJF), 9 April (Club closed), 16 April (Home-built equipment contest), 23 April (Discussion evening—subject, vhf contest techniques and equipment), 30 April (Talk by the winner of the home-built equipment contest), 8pm. Sale Moor Community Centre, Norris Road, Sale. Informal meetings Monday evenings in the club shack in the community centre. Sec Dave Holland, G3WFT, tel 061-973 1837.

Manchester (West Manchester RC)—The RR is very pleased to welcome this new club to the "news" column. All meetings are held Wednesdays, 8pm. Atherton & Tyldesly Scout HQ, Shuttle Street, Tyldesly. 14 April (Mr A. Edwards, G8WXR, will talk on Raynet). Tuition classes for the RAE and morse are on Mondays, commencing 19 April and every second, third and fourth Monday thereafter. The elected officers are chairman, Glenn Maxfield, G6FEV; treasurer, Eddie Cooper, G8ZWH; secretary, Dennis Tennant, G4KCA.

Preston (PARS)—1 April ("Air traffic control systems", by Derek Ashworth), 15 April (To be announced), 29 April ("Club quiz", by Jack Edwards). St Mary Magdelene Church Hall, Faringdon Lane, Ribbleton, Preston. Sec George Earnshaw, G3ZXC.

Salford (SUCS)—The society has now moved to the new shack located on the top floor of the Clock Tower, the Pavilion, Castle Irwell Students Village. Wednesday afternoons, from 1.30pm. Forthcoming events include discussion of arrangements for VHF NFD. The chairman, Paul Wells, G4GMV, is asking former members of the University Electro Society, ex-G3VJU, to contact direct QTHR or SUCS Students Union, University of Salford, University House, University Road, Salford M5 4WT.

St Helens (StH&DARC)—1 April (Final preparations evening for the club's stand at the NARSA Exhibition on 4 April), 8 and 15 April (Construction evenings for the club construction project—vhf/uhf wavemeter), 22 April (HF night-on-the-air), 6 May (First 2m df foxhunt of the season), 7.45pm. Conservative Rooms, Boundary Road, St Helens. Morse practice each evening from 7.15pm. Club net, Sunday mornings, 11.30 on 145·225MHz. Sec Paul Gaskell, G4MWO, ex-G8PQD, tel St Helens 25472.

Stockport (SRS)—14 April ("CW contest operating techniques", by Ray Unsworth, G3WPF), 28 April ("Bragger's night"), 8pm. Blossoms Hotel, Buxton Road, Stockport. Sec Stan Aspinall, G3VSA, tel 061-437 1437.

Thorton Cleveleys (TCARS)—2 April (Films by ARRL—"World of amateur radio" and "This is amateur radio"), 9 April ("Natter night"), 16 April (Discussion on contests to be entered this year), 23 April (Talk by Harry Gregory, G3GIY, subject to be announced), 30 April (Talk on geology by Gerry Vallely), 8pm. Thornton Cleveleys Sports Centre, Victoria Road, Cleveleys. Attention is drawn to the change in time and day of club night. This was agreed at an EGM on 22 February and took effect from 5 March with the result that the dates for the published March programme had to be ammended. Sec Mrs Jen Ward, G8YOK, tel Poulton-le-Fylde 890114, tenders apologies to members who visited on the wrong night.

Warrington (UKFM Group Western)—1 April, 6 May, 8pm. Grappenhall Community Centre, Bellhouse Lane, Warrington. Sec Gordon Adams, G3LEQ, tel 0565 4040.

Wirral (WARS)—7 April ("My year as RSGB President", a talk by Basil O'Brien, G2AMV), 16 April (Annual dinner dance at the Heatherlands, Thurstaston, tickets £6.50 from the hon treasurer), 21 April (Yes, another sale of surplus equipment!), 5 May (Equipment demonstration), 7.45pm. Minto House School, Birkenhead Road, Hoylake. Sec Gordon Lee, G3UJX, tel 051-677 1518.

Wirral (W&D ARC)—14 April (Talk and demonstration on Yaesu equipment by Amateur Radio Exchange), 28 April ("DF techniques", a talk by Phil O'Ryan, G8WWF, and Eric Turner, G4IRG), 8pm. Concourse Sports Centre, West Kirby, Wirral. The new sec is Gerry Scott, G8TRY, tel 051-630 1393.

REGION 2—RR D. S. Smith, G4DAX, Red Roof, Goathland, Whitby, North Yorks YO22 5AN. Tel 094-786 333.

Barnsley (UK FM Group Northern)—4 April, 2 May and 6 June, 7.30pm. The Royal Hotel, Church Street, Barnsley. Sec G8PLJ. GB3SY on RB6 has been shut down prior to its move to Worsbrough Common, Barnsley (QRA ZN33e).

Halifax (H&DARS)—First and third Tuesdays in each month, 4 May (JOTA discussion). Claremount Liberal Club, Belgrave Avenue, off Claremount Road, Halifax. Sec G4LEC, tel 0422 33080. Club net S21 on second and fourth Tuesdays at 7.30pm.

Hornsea (HARC)—Wednesdays, 14 April ("Meteor scatter", by G3CHH), 8pm. The Mill, Mill House, Attic Road, Hornsea. Sec G4MWE. The club has changed its name to Hornsea Amateur Radio Club to avoid confusion. Club projects include 144 and 70MHz transverters, led by G3PWN.

Leconfield (Army School of Mechanical Transport ASMT/RCT ARS)—A new club. Tuesdays and most lunchtimes, Signals Division, Normandy Barracks, Leconfield. CW classes, 1900h Fridays. Contact club sec Dick Atterbury, G6ESO, Signals Div, Normandy Barracks, Leconfield, for up-to-date information.

Pontefract (P&DARS)—1 April (Discussion evening), 15 April ("Introduction to rtty", by G4HYD), 29 April (Film evening), 13 May (Visit to Emley Moor), 27 May ("Making printed circuits", by G3HCX and G4DTO). Preparations for the component fair in March are complete and the club is keyed up for the event. Details from G4ISU, tel 0977 72784.

Scarborough (SARS)—Mondays, 7.30pm. Scarborough Cricket Club, North Marine Road, Scarborough. Sec G4JAQ, tel Scarborough 862638. At the recent AGM G4JAQ was confirmed as sec, and G4EEV as treasurer.

Wakefield (W&DARS)—6 April ("Raynet", by G3KWT), 20 April (AGM), 4 May (Junk sale), 8pm. Holmfield House, Denby Dale Road, Wakefield. Sec G4BLT. Tel Wakefield 255515.

Wharfdale Repeater Group—Sec G3KKP. At an open meeting of the group held at Otley Chevin on 21 January, the repeater engineers were complimented on the continued reliability of the 432MHz repeater. The treasurer explained the need for raising the sub from £2 to £3 (a problem common to most societies). G4GCP, the technical officer, detailed experimental changes to GB3WF, and added that the paperwork for GB3LA had been sent to RSGB.

York (YARS)—Fridays except the third in each month, 7.30pm. United Services Club, Micklegate, York. Sec Keith Cass, G3WVO. The club put a station on the air to commemorate the 150th anniversary of the York Medical Society, and preparations are well advanced for a number of other demo events including GB2GYS at the Great Yorkshire Show.

REGION 3—Acting RR H. S. Pinchin, G3VPE, 61 Cole Bank Road, Hall Green, Birmingham B28 8EZ. Tel 021-777 1320.

Birmingham (Midland ARS)—20 April (Films—"World of amateur radio"; "Manufacture of junction transistors"), 7.30pm. 294a Broad Street, Birmingham B1 2DS. Sec G8BHE, tel 021-422 9787.

Birmingham (South Birmingham RS)—Thursdays (HF night on the air), Fridays (Construction and morse classes), 7.30pm. 5 May ("Servicing modern equipment", by Dennis Darwood, G3YKQ), 7.45pm. Hampstead House, Fairfax Road, West Heath, Birmingham B31 3QY. Sec G8RGQ, tel 021-459 8312.

Bromsgrove (B&DARC)—9 April, 23 April (QRP meeting), 8pm. Avoncroft Art Centre, Bromsgrove. Club net Wednesdays, 144·850MHz, 8pm. Sec G4HFP, tel Stourport (02993) 3818.

Coventry (CARS)—9 April (No meeting), 16 April (Audio visual lecture), 23 April (Night on the air), 30 April (Visit—to be confirmed), 7 May (Night on the air), 8pm. Baden Powell House, 121 St Nicholas Street, Radford, Coventry. Sec G4HRY, tel Coventry (0203) 618648.

Hereford (HARS)—16 April (Constructional contest), 7 May, 8pm. Civil Defence HQ, Gaol Street, Hereford. Sec G4CNY, tel Hereford (0432) 3237.

Malvern Hills (MHRAC)—13 April ("The early days of amateur radio sideband", by Geoff Bagley, G3FHL), 7.30pm. The Red Lion Inn, St Ann's Road, Great Malvern. Sec G4GFX, 9 Wyche Road, Malvern, tel Malvern (06845) 62900.

Shrewsbury (Salop ARS)—8 April ("Satellite communication", by John Hough, G8CWK), 15 April ("Japanese morse"—talk), 22 April (Natter night), 29 April ("Video transmitters", by Steve Mitchell, G8JMJ), 6 May ("Video demonstrations", by Bill Kitching, G4FBZ), 8pm. Albert Hotel, Smithfield Road, Shrewsbury. Sec G6AKE, tel Shrewbury (0743) 66969.

Solihull (SARS)—20 April, 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.

Stratford-upon-Avon (S-upon-A & DARC)—5 April (AGM and film show), 24 April (Special event station to celebrate Shakespeare's birthday), 26 April (Discussion on club activities and contest plans), 7.30pm. Bearley radio station. Talk-in on S22. Programme sec G6CWK, tel Stratford (0789) 68863.

Wolverhampton (WARS)—5 April ("Canals of the West Midlands", by K. Thompson, G8ZZU), 12 April (No meeting), 19 April (Club project—receiver alignment aid), 26 April (Natter night), 8pm. Wolverhampton Chamber of Commerce & Industry, 93 Tettenhall Road, Wolverhampton WV3 9PE. Sec G8EDG, tel Wolverhampton (0902) 763617.

Worcester (W&DARC)—3 May (No meeting), 10 May ("Printed circuit board construction techniques", by Dave Davies, G4EYJ), 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.

Derby (D&DARS)—7 April (Junk sale), 14 April ("The other side of the microphone", a talk by John Stiles of Radio Derby), 21 April ("Engineering in miniature", a talk by Dennis Chaddock), 28 April (Technical film show), 7.30pm. Morse classes Tuesdays and Thursdays. Historic section every third Friday in month. 119 Green Lane, Derby. Sec Jenny Shardlow, tel Derby 556875.

Grimsby (GARS)—5 April (Junk sale), 19 April ("Propagation", a talk by G4KAL), 26 April (Basic

amateur radio), 3 May (Open night), 7.30pm, Cromwell Social Club, Grimsby. Sec Trevor Matthews, G3RGC, tel Grimsby 884060.

Hinckley (HARES)—7 April ("My experiences as a pow in Siam", by Tom Douglas, G3BA), 7.30pm. John Cleveland College, Room H8G, Butt Lane, Hinckley. Sec Norman Geary, G8STX, tel Hinckley 632778.

Lincoln (LSWC)—14 April (Hamfest update and G5FZ "on the air"), 28 April ("QSLs and the stories behind them", a talk by G3XYP), 7.30pm. City Engineers Club, Central Depot, Waterside South, Lincoln.

Mansfield (MARS)—2 April (Talk on WAB Award), 7.30pm. New Inn, Westgate, Mansfield. Sec John Coates, G4GYU, tel Mansfield 27257.

Melton Mowbray (MMARS)—16 April (Quiz evening led by G8RBY), 7.30pm. St Johns Ambulance Hall, Asfordby Hill, Melton Mowbray. Sec Richard Winters, G3NVK, tel Melton Mowbray 63369.

Newark (N&DARC)—1 April (Junk sale), 6 May (Film and talk on NFD), 7.30pm. Palace Theatre, Appleton Gate, Newark. Sec J. R. Hiscock, G4MDV.

Nottingham (ARCON)—1 April (AGM), 8 April (Forum), 15 April (Talk), 22 April (Activity night), 29 April (Foxhunt), 7.30pm. Sherwood Community Centre, Mansfield Road, Nottingham. Sec Mike Shaw, G4EKW.

Scunthorpe (SARC)—6 April (Talk on "DX working and meteor scatter", by G4GZA), 13 April (Radio control of models), 20 April ("The early days of GB3HS", a talk by G3TEU), 27 April ("Rag chewing on 15 & 10", by G4GZB), 4 May (Natter night), 7.30pm, Grange Farm Hobbies Centre, Franklin Crescent, Scunthorpe. Sec Joe Sheardown, G8TIY, tel Scunthorpe 732438.

REGION 5—RR J. S. Allen, G3DOT, 77 Rosslyn Crescent, Luton LU3 2AT. Tel 0582 508515, evenings, or 582 21151, ext 303, daytime.

Bedford (B&DARC)—Club shack, Ravensden. Further details from sec G8ATI.

Cambridge (C&DARC)—9 April (No meeting), 16 April (Antenna shop, plus "How to tune a rice box"), 23 April (Talk on "Slow-scan television"), 30 April (Informal meeting and morse class), 7.30pm. Coleridge Community Centre, Radegund Road, Cambridge. Sec G8JKV.

Greater Peterborough (GPARC)—22 April ("50 years of amateur radio", by G4OO), 7.30pm. Southfields Junior School, Stanground. Sec G8ZVW.

Leighton (LLRC)—5 April ("A history of Leighton Buzzard", by Mr V. Willis), 19 April (Aerials Part 2, "So you thought you were safe up the mast", by G6BOZ), 7pm. Vandyke Community College, Room A64. Sec G8GIK.

Shefford (S&DARS)—1 April (Claude, G2DPQ), 8 April ("Troposphere", by G8TSH), 15 April ("HM prisons", by Mr Ball), 22 and 29 April (Visit to Eastern Gas HQ at Potters Bar). Sec G4DAQ.

St Neots (SN&DARS)—11 April (Fox hunt in conjunction with the Bedford club, G8ZQO is the fox on 145·225 and you need OS153), 26 April ("How television works", by Mr G. Fulham of Hitachi). Sec G4FOH.

Wellingborough (Nene Valley RS)—A recently formed club, for further information contact G6CZV or G6CPX.

REGION 6—RR F. S. G. Rose, G2DRT, 84 Cock Lane, High Wycombe, Bucks HP13 7EA. Tel Penn (049481) 4240.

Aylesbury Vale (AVRS)—20 April ("CRO and its uses", by G8AYM). Elmhurst Youth Centre, Fairfax Crescent. Sec M. J. Marsden, G8BQH, tel 0296 64783.

Bracknell (BARC)—Second and fourth Wednesday in each month. Details from sec Peter Zollman, G4DSE, tel Bracknell 53911.

Dick Ramsey, G3ARM, president of the Guildford & DRS (centre), with trophy winners in the society's annual construction contest. The winner was Mick Worsfold, G8XCY (r), with his 10GHz transceiver; followed by Stan Casperd, G3XON (l), with his first microchip project, a flashing callsign badge

Burnham Beeches (BBRC)—First and third Monday in each month, 5 April (A talk on RSGB meetings), 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.

Harwell (HARS)—20 April (Meeting: speaker to be announced), 7.30pm. The East Wing Room of AERE Social Club. Sec Ann Stevens, G8NVI.

Maidenhead (M&DARS)—1 April (Talk: "Repeaters", by G4CCC), 20 April (Talk: "Radio Astronomy", by G3UKS). The Red Cross Hall, The Crescent, Maidenhead. Sec John Patrick, G3TWG. Tel Bourne End (06285) 25275.

Milton Keynes (MK&DARS)—19 April (HF aerials, (please note change of date)), 10 May (Bring & buy sale). Lovatt Hall, Newport Pagnell. Sec D. Higgs, G8TTK.

Newbury (N&DARS)—13 April (All members please attend). Sec Merton Vaslet, tel Newbury (0635) 46078.

REGION 7—RR Pat Walker, G8HMG, 12 Browlow Road, Redhill, Surrey RH1 6AW. Tel Redhill 64035.

Addiscombe (AARC)—Tuesdays, 9pm. The Woolsack, 154 Gloucester Road, Selhurst, Croydon. The club is essentially interested in contests. Sec Peter Hart, G3SJX, tel 01-656 9054.

Ashford (Echelford ARC)—12 April (Bring and buy night), 29 April (AGM), 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, 6 April (Lyell Herdman, G6HD, talks on early days in vhf), 8pm. The Pop-in Parlour, Graham Road, Bexleyheath. Sec P. Conduit, G4KCZ, tel Crayford 524096.

Cray Valley (CVRS)—First and third Thursdays in each month, 1 April (AGM), 8pm. Christchurch Centre, Eltham High Street, Eltham SE9. Sec Peter Clark, G4FUG. At the constructional contest on 18 February the Reigate Cup was won by Chris Whitmarsh, G8CIU. Second prize went to Brian Herbert, G2WI.

At a special meeting of the Racal-Decca ARG on 4 February, a Datong Morse Tutor (kindly supplied by Bredhurst Electronics) was presented to the RAIBC. Mrs Frances Woolley, G3LWY, honorary secretary of RAIBC, is here seen receiving the equipment from group chairman Barry Harmer, G3EWJ, watched by (l to r) Pat King, G3PVA; Don Raine, G8EIT, Robin Sykes, G3NFV, secretary of the group; and Harry Butler, G4JSW

Croydon (Surrey Radio Contact Club)—5 April (AGM), 19 April (RAE revision session), 8pm. TS Terra Nova, 34 The Waldrons, Croydon. Sec Ray Howells, G4FFY.

Guildford (G&DRS)—9 April (Natter night), 23 April (AGM), 28 May (Aircraft black boxes), 8pm. Model Engineers HQ, Stoke Park, Guildford. Sec Helen Davies, G8SXB, tel Aldershot 20384.

Kingston (K&DARS)—21 April (Keith Orchard talks on short and medium wave broadcasting), 19 May ("Metal bashing", by Don Shepherd), 8pm. "Alfriston", 3 Berrylands Road, Surbiton. Sec Robin Pellatt, G4LJI, tel 01-399 8113.

New Cross (Clifton ARS)—Fridays, 8pm. The upstairs room of the New Cross Inn, Clifton Rise, London SE14. Sec Reg Hinton, 42 Sutcliffe Road, Welling, Kent, tel 01-301 1864.

London (London UKFM Group)—Meets bi-monthly at the Marquis Cornwallis, 31 Marchmont Street, London WC1. Details from J. Parkins, G8KVP, 71 Elphinstone Road, Walthamstow E17 5EZ.

Redhill (Reigate ATS)—20 April (AGM), 18 May (Louis Varney, G5RV, talks on aerials from 1927), 8pm, at the Constitutional & Conservative Club, Warwick Road, Redhill. Sec Chris Barnes, G8FEE, 25 Hartswood Avenue, Reigate RH2 8ET.

Sutton & Cheam (S&CRS)—30 April (AGM). Details of meetings available from George Brind, G4CMU, tel Burgh Heath 54497.

Tolworth (Decca ARG)—First Thursday in each month, 8pm. The Decca Sports & Social Club, Kingston Road, Tolworth. Sec Robin Sykes, G3NFV, tel Leatherhead 72587. On 4 February the Racal-Decca ARG presented to the RAIBC a Datong morse tutor (kindly supplied by Bredhurst Electronics).

REGION 8—RR K. A. Crouch, G8KEN, 14 Victoria Road, Capel-le-Ferne, Folkestone, Kent CT18 7IR. Tel 0303 55241.

Biggin Hill (New club)—Now very active, RSGB affiliation has been applied for. Last Tuesday in each month, 27 April (Calibration of members' equipment), 8pm. Biggin Hill Memorial Library. Details from Ian Michell, G6EMW, 37B The Grove, Biggin Hill.

Brighton (B&DARS)—Every second Wednesday, 7 April ("UOSAT", by G3XUS), 7.45pm. 47 Cromwell Road, Hove. For more information contact the programme sec, tel Brighton 739841.

Canterbury (EKRS)—6 May ("Don't just sit there, improve it", by G3MDO), 7.30pm. The Dominican Hall, Canterbury. Details from Derek, G8ELS, tel Herne Bay 5629.

Chichester (C&DARC)—First and third Monday in each month, 5 April (AGM and contest for home-constructed equipment), 7.30pm. There is a club net on 145·275MHz (S11), Wednesdays, 1900 local time. Other details from S. Talbot, G8FCX, tel Littlehampton 5082.

Crawley (CARC)—14 April (Informal meeting, a sandwich, beer and rag-chew at QTH of G3MER/G3MSK), 8pm, 28 April (Junk sale), 7.30pm. Trinity United Reform Church Hall, 1 Field Drive, Crawley. CW classes are also in progress. Details from David Hill, G4IQM, tel 0293 882641.

Dover (SEKYMCAARC)—7 April (AGM and presentation of awards), 14 April (Natter night and the new committee will meet), 21 April (Safety in the shack), 28 April (The popular 10min talks by four volunteers), 5 May (Natter night and committee meeting), 7.30pm. Please if possible attend the AGM as it is your chance to state your views and maybe suggest new ideas for the coming year. YMCA, Leybourne Road, Dover. Talk-in for visitors on GB3KS or S20 to start with. Details from G3VSU or G8EGT.

Hastings (HERC)—Wednesdays, first in each month (Committee meets at 479 Bexhill Road), second, fourth and fifth (Micro night, at 479 Bexhill Road), third (Main meeting at West Hill Community Centre), 21 April (Junk auction), 7.30pm. Details from G8VEA, tel Hastings 216516.

Horsham (HARC)—1 April (Spring junk sale), 18 April (144MHz foxhunt), 6 May ("Automatic test equipment", by G4EUG). All meetings except foxhunt are at the Guide Headquarters, Denne Road, Horsham. Further information from G3NPF.

Maidstone (MYMCAARC)—Fridays, please note no meeting 9 April as it is Good Friday, 23 April (RAE forum), 8pm. First and third Fridays (Beginners). Details from Graham Edy, G4AXD.

Sittingbourne—Yet another new club gets under way in the Region 8 area. This one has been formed to accommodate amateurs in the Sittingbourne area. It is being run on a monthly basis from a room hired at the Sittingbourne Town Hall. Meetings begin at 8pm. 19 April (Andy, G8SUY, is giving a talk on amateur tv). Further information can be obtained from the acting secretary, Brian Hancock, G6AZZ, tel Minster 873147.

Thanet (RCT)—9 April (Talk on repeaters), 23 April

(Quiz), 8pm. Birchington Village Centre. This club is putting on a special event station, GB2TM, on 18 April on the occasion of the Isle of Thanet Marathon Race. Club callsign is G2IC. Details from Ian Gane, tel 0843 54154.

Worthing (W&DARC)—6 April (Denzil, G3KXF, VK2BXF), 13 April (Construction contest), 25 April (Les, G8HY), 27 April (Club construction project part 2), 4 May (Practical use of test equipment), 7.30 for 8pm. Pond Lane Amenity Centre. More information from sec Joyce Lillywhite, tel Worthing 63062.

To all club members, if your club has not been listed above ask your secretary why not? Please note that information can only be entered in club news if it is received by the dates given in the information box at beginning of club news. *73s RR8.*

REGION 9—RR W. J. Colclough, G3XC, Highview, Indian Queens, St Columb, Cornwall TR9 6LL. Tel 0726 860485.

Camborne (Cornish RAC)—1 April (AGM followed by a talk "Electricity and the recent blizzard", by Keith Harding, G3XFL), computer section: 19 April ("RTTY transmitting and receiving", by Alan Stevens, G4BHC). SWEB Pool, Camborne. The February meeting, which was specially arranged, unfortunately was somewhat of a disaster. At the last minute the firm demonstrating the video equipment was not able to attend. However at the eleventh hour a non-member filled the breach using his own video camera etc. He showed some film made from a hidden camera of the reactions of some of the customers of his pet shop when asked to assist in transferring a python from a transit case to a cage. On opening the transit case it was found to be empty! The above demonstration was preceded by a potted talk entitled "History of video recording", by Bert Hammett, G3VWK.

Exeter (EARS)—5 April ("Any questions"), 7.30pm. Community Centre, St Davids Hill, Exeter. First, third and fourth Monday in each month (Informal). The Scout Hall, Emanuel Road, Exeter. Details from pro Geoff Draper, 1 Carlyon Close, Heavitree, Exeter EX1 3AZ.

Newquay (N&DARS)—7 April (Slow scan talk and demonstration by Johnny Brown, G3LPB), 21 April (As the school will be closed a Raynet exercise has been arranged by Ted Warne, G3YJX, group controller for mid-Cornwall. All are welcome and full details are available from Ted), 7.30pm. Treviglas School, Newquay. Details from G4GFY.

North Devon (NDARC)—Please note: with effect from the date of this publication, meetings will be held on the fourth Wednesday in each month, in *odd* months, 7.30pm, at Bideford Community College, Abbotsham Road, Bideford, and in *even* months, 7.30pm, Pilton Community College, Chaddiford Lane, Barnstaple. New officers from the AGM were chairman, Les Hawkyard, G5HD; sec, George Hughes, G4CG; assistant sec, C. B. Searle, G4LST; treasurer, G. Beal, G4FLU; and committee, A. A. A. King, G8NME, and J. F. Fennel, G4HQG. Details from sec G4CG.

Saltash (S&DARC)—2 April (A talk entitled "Sparkling wines", by Len Leonard, G4UZ. Len's previous visit to the club in 1977 is still fondly remembered (bring your own glasses)). 16 April (RSGB video tapes "The world of amateur radio"). Toch H, Burraton, Saltash. Details from Kevin Hall, 12 Rashleigh Avenue, St Stephens, Saltash, Cornwall PL12 4NS.

Torbay (TARS)—24 April (AGM at club HQ, all members are asked to attend), 7.30pm. Bath Lane, rear of 94 Belgrave Road, Torquay, Torbay. Regular contact is made with the twin town of Hamlin at 1000h on 14MHz every Sunday morning. Home Office approval has now been received for the site change of the club repeater, GB3TR. No firm date can be given for the switch on as all the experts have full-time jobs and only limited spare time. Details from sec Hugh Davies, G4DZH, tel Paignton 523063.

REGION 10—RR P. A. Jones, GW4HAT, 68 Pastoral Way, Tycoch, Swansea SA2 9LY.

Blackwood (BARS)—Fridays, 7pm. Oakdale Comprehensive School, Oakdale, Blackwood, Gwent. Club net 144·675MHz, Tuesdays, 7pm. Club call GW6GW. New sec Wynn Wright, GW8UAM.

Bridgend (B&DARC)—Second Wednesday in each month, 7.30pm, NCB Social Club, Tondu, Bridgend. Club call GW4LNP. Club net 145·325MHz, 7pm, Wednesdays. Sec Peter Lynn, GW8WCI, tel Bridgend 861115.

Cardiff (CRSGBG)—Second Monday in each month, 7.30pm. Pantmawr Inn, Pantmawr Estate, Cardiff. New sec Dave Thomas, GW3RWX.

Port Talbot (BSCARS)—Thursdays, 7.30pm. BSC Sports & Social Club, Margam. The club is promoting an hf contest for the benefit of licensed Welsh stations, on Sunday 9 May between 0600 and 2400gmt. Further details of this contest from GW4CAQ. Club details from Reg Bray, GW4ESV.

Swansea (SARS)—First and third Thursday in each month, 7.30pm. Lecture Room 'N', Applied Sciences Block, Swansea University College. Club Net each Sunday, 1000gmt, 28·530MHz ± QRM. Net controller Cen, GW4BIQ. All other licensed stations in the locality are welcome to join in. Club members are very busy arranging the forthcoming Swansea Rally and would welcome support from the local amateur community. Details from Roger Williams, GW4HSH, tel Swansea 404422.

RR10 wishes to report the formation of a new club in the Carmarthen area. Meetings every other Friday, 7.30pm. Further Education Centre, Carmarthen. Licensed amateurs in the area are urged to give this new club their support. Further details from Alan Hemmings, GW3SWQ.

Club secretaries please note that RR10 requires up-to-date information for this feature. He is not clairvoyant regards clubs' activities so let him have news promptly!

REGION 11—RR B. H. Green, GW2FLZ, 1 Clwyd Court, Tan-y-Bryn Road, Colwyn Bay, Clwyd LL28 4AH. Tel 0492 49288.

Colwyn Bay (Conwy Valley ARC) (GW6TM)—8 April (Talk by Norman Hendrick, G3CSG, on Japanese morse), 28 April (Subsidiary meeting), 13 May (Talk by J. S. Owen, GW3QN, on wartime secret listeners), 7.30pm. Green Lawns Hotel, Bay View Road, Colwyn Bay. Sec J. N. Wright, GW4KGI, tel 0745 823674.

Dolgellau (Meirion ARS)—1 April (AGM), 7.30pm. Royal Ship Hotel, Dolgellau. Sec Mrs Jean Jones, GW4KYK, tel Tywyn 710402.

Rhyl (R&DARC)—8 April, 7.30pm. 22 April (DF hunt). Ambulance Station, Rhyl. Sec B. Jones, GW8OYT, 6 Rhodfa Maes Hir, Rhyl, Clwyd, tel 0745 37284.

REGION 13—RR A. B. Givens, GM3YOR, 41 Veronica Crescent, Kirkcaldy, Fife KY1 2LH. Tel 0592 200335.

Glenrothes (G&DARC)—Wednesdays and third Sunday in each month, 18 April ("SSTV", by Dick Wilson, GM4BIT (please be prompt as Dick has a long journey to visit the club)), May (Plans are under way to organize a car treasure hunt, details later), 7.30pm. Clubrooms, Provosts Land, Leslie, Fife. Details from GM8ZTV, tel Kirkcaldy 203582.

REGION 14—RR V. J. Kusin, GM4HCO, 109 Weymouth Drive, Glasgow G12 0EL.

Ayr (AARG)—Fridays, 9 and 23 April, 7.30pm. The Leisure Centre, 24 Wellington Square, Ayr. Details from GM3THI.

Dumfries (D & Galloway REC)—First and third Mondays in each month, 7.45pm. Cargenholm Hotel, New Abbey Road, Dumfries. First Monday each month is a social and chat night, third Monday, lectures, demos and films. Details from GM4NNC, ex-GM8TKA.

Helensburgh (HARC)—First and third Wednesdays in each month, 7.30pm. The club's new address is John Logie Baird School, Churchill Estate, Helensburgh. Details from GM6ALC.

Glasgow (West of Scotland ARS)—Fridays, 30 April (Lecture "The other man's shack", by GM4ZCT). 7.30pm. Morse classes for beginners. 22 Robertson Street, Glasgow. Details from GM4JDU.

Motherwell (Mid-Lanark ARC)—Fridays, 2 April ("Lighthouse radio systems", by GM3VBB), 16 April ("Amateur fast scan tv", by GM3ULP), 7.30pm. Wrangholm Hall Community Centre, New Stevenson, Motherwell. Details from sec GM3ULP.

Sterling—New radio club: any amateurs interested in starting a radio club in Stirling please contact Doug Fleming, GM2BWF, 6 The Clachan, Ashfield, Dunblane, tel 0786 824207.

The chairman of the Mid-Ulster ARC handing to Gerry Eakins a cheque for £600, being the proceeds of the 1981 Parkanaur Mobile Rally. The rally is held in memory of Stan Eakins, GI3VFW, son of Gerry, and the proceeds go to the Stan Eakins Memorial Fund. L to r: D. F. Campbell, GI4NKD, 1982 club secretary; Rev T. G. Eakins, OBE, BA, principal of the Thomas Doran Training Centre; R. Copeland, GI8KXU, club chairman; and F. B. Edmondson, GI8RJW, 1981 club secretary

REGION 15—RR J. T. Barnes, GI3USS, Whitegables, 95 Crawfordsburn Road, Bangor, Co Down BT19 1BJ. Tel 0247 3948.

Following information is latest received

Banbridge (Mid-Ulster ARC)—First Sunday in each month, 8pm. QTH of GI4BAC. Details from new sec GI4NKD.

REGION 16—RR T. D. Howe, G3PLF, 18 Vange Hill Drive, Basildon, Essex SS16 4DD. Tel 0268 24453.

Braintree (B&DARS)—5 April (Informal), 19 April ("Freedom", by G4MOV), 8pm. Braintree Community Centre, Victoria Street. Details from Alan Williams, G6CIV, tel Silver End 83516.

Chelmsford (CARS)—6 April ("PCB care and repair" by Marconi Co), Marconi College, Arbour Lane. Details from Andrew Mead, G4KQE, tel Silver End 83094.

Colchester (CRA)—1 April (Film evening), 29 April ("Microprocessor applications", by Gordon Roberts). Colchester Evening Institute, Sheepen Road. Details from Frank Howe, G3FIJ, tel Colchester 70189.

Harlow (H&DARS)—Thursdays, 7.30pm. Slow morse classes on club nights. Mark Hall Barn, First Avenue. Details from Cilla Mann, G4KVR, c/o Mark Hall Barn, First Avenue, Harlow.

Ipswich (IRC)—7 April (Closed), 14 April ("Motor racing at club level", by G4LSP), 28 April (AGM). Club Room, Rose & Crown, Norwich Road. Details from Jack Tootill, G4IFF, tel Ipswich 44047.

Norfolk (NARC)—7 April (AGM), 14 April (Informal/cw tuition), 21 April (Visit to Radio Norfolk), 28 April (Informal/cw tuition). Crome Community Centre, Telegraph Lane East. Details from Paul Gunther, G8XBT, tel Norwich 610247.

Vange (VARS)—8 April (Junk sale), 15 April (Construction contest), 22 April ("10GHz", by G4ELM), 29 April ("Freedom", by G4MOV). Main Hall, Barstable Tennants Community Association, Long Riding. Details from Mrs D. Thompson, 10 Feering Row, Basildon SS14 1TE.

REGION 17—RR H. G. Cunningham, G8FG, 235 Station Road, Westmoors, Wimborne, Dorset BH22 0HZ. Tel Ferndown (0202) 876018.

Basingstoke (BARC)—17 April (Construction practice for the amateur), 7.30pm. Chineham House, Popley, Basingstoke. Sec G6CPA, tel Tadley (07356) 4964.

Bournemouth (BRS)—2 April (Super junk sale), 16 April (Video film by Dud Charman, "Antennae"), 7 May ("Aids for the blind", by George Day, Martin, Linda, and Dr Arthur Bryant), 7.30pm. Kinson Community Centre, Kinson. Sec G4EKE, tel Ferndown (0202) 877945.

Guernsey (GARS)—Tuesdays and Fridays, 8pm. The Lodge, La Corbinerie, Oberlands, St Martin. The Society is very pleased that 16-year-old RAE course instructor GU6BGI's six pupils achieved passes in 11 of the 12 RAE papers they sat in December. GARS member Tim Hodkinson will be licensed as Britain's youngest when he reaches 14 in June. Sec GU6CLY, tel 0481 21197.

(Continued on page 348)

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 Member's 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 acknowledgment 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 **21 April** (June), **19 May** (July), **17 June** (August), **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 representative

FOR SALE

Trio 9R59DS rx, manual, mint, £48. Datong filter FL1, mpu, ac adaptor, mint, £40. Hygain 3-el 10m beam, 103BA, BN86 balun, new cond, £40. All carriage extra. G4GIZ, QTHR. Tel Earby 2776.

TS520SE, handbook, orig packing, perfect cond, £390. HF5 vertical antenna, £30. G4HKE. Tel Medway 253019, evenings/weekends.

Equipment of the late GW3GHC: Drake TR7/PS7/RV7, £800. Trio TS700, £250. HD 60ft Westower, DX33, rotor etc, buyer dismantles/transports, £500. HB hf amp, 2X4CX250, psu, £50. YD148 mic, £10. HRO, £10. Hansen SWR3, £5. 2m a.m. tx psu, £20. All buyer collects. GW3MRT, QTHR. Tel 0222 751228.

KW Atlanta, comp with external vfo, Shure mic, spare valves, manual, £250. *Wanted:* hf mobile rig, FT7, TS120V or similar, would part exchange for above. G4JCY, QTHR West Sussex. Tel 0444 451522.

Icom IC251 multimode fm/ssb/cw 2m tx/rx, couple months old only, as new, ac/dc psus built-in, Icom mic, Isopole colinear, £415. Buyer must collect. Genuine reason for sale. G8VKM, 4 Ripley Drive, St Annes, Lancs. Tel 0253 729998.

40W 70cm 12·5V transistor, 6·5dB gain, type SD1488, brand new, data sheet, surplus to requirements, £20. GD3EIG, QTHR. Tel IoM (0624) 781336.

Morse: send and receive on your PET computer, programs on cassette, cw interface details, £5. *Wanted:* zoom for Pentax. Pair 10GHz short range tx/rxs. Thruline elements, 250H, 250C, 25C. FT901 a.m. filter. Microscopy items. G3AZI, QTHR. Tel Preston 37815.

Zycomm Z5800 5W 2m handheld, incl remote mic/spkr, base charger, helical antenna, £145. 15W 2m linear, Wood & Douglas, £15. 7/8 2m antenna with gutter mount, £10. Cragg. Tel Dunstable (0582) 601401.

HF linear SB200, £225. 2m fm tx/rx IC22A, 10W, £95. GW3COI, QTHR. Tel Abersoch 2675.

FRG7 rx, mint cond, manual, Amtech 200 atu, only 12 months old, £130 ono. Reason for sale, going G4. Tel Portishead 849443.

New Storno 700 6ch uhf mobile radiotelephone, £130. Burns frequency standard (locks to Droitwich), £40. 12V dc mobile power supply for Drake tx/rx, unused, £40. Storno 600 12ch radiotelephone, 136-174MHz fm, £120. Western Electronics peak power wattmeter, fitted in Yaesu extension spkr cabinet, £45. Trio R1000 communication rx, unused, £220. Nicad battery pack for Storno 600 portable, £20. *Wanted:* Rotator and balun suitable for TA33 3-el beam. CW and a.m. filter for Yaesu 901. G4HYQ c/o Little Hedges, Matching Green, Harlow, Essex. Tel 027-982 291.

FT200 with power supply and extra xtals, good cond, £190. G3IJ, QTHR. Tel Aldershot 310132.

Scope EM102 portable dual beam, dc to 15MHz, operating instructions, probes can be used from 12V dc or 240V ac, offers. GM4BAE, QTHR. Tel 041-332 7751, prefer buyer collects.

Katsumi Globalman electronic keyer, used once only, £20. Adonis compressor mic model AM802, three outputs, £37. G3ZJU, QTHR. Tel 01-527 4492.

Uniden 2020 deluxe, 80-10m tx/rx, separate filters usb/lsb/cw, 200W p.e.p., digital display, all accessories, one owner, £275. G4FAS, QTHR N Cheshire. Tel 061-437 7784.

Icom IC2E 4MHz (144-148), BP4U, nicads, spkr, mic, flexi-whip, as new, charger, £160 ono. G4EZZ NOT QTHR. Tel Derek, 01-863 0633, evenings/weekends.

FL1 audio filter, £40. *Wanted:* FL2 filter. G4LW, QTHR. Tel 3166.

ITT Starphone M5 mobile uhf tx/rx, suitable for 70cm conversion, Drake "C" line auxiliary xtals, tel for details. G3PVX, QTHR. Tel 01-866 6432, after 7pm.

40ft Alumast, comprising 4 by 10ft sections, hinged base, top plate, winch, £160 ono. Fujica ST605N slr camera, good cond, £50. 200mm telephoto lens, £18. G8KIF, NOT QTHR. Tel Chesterfield (0246) 811666 after 6pm.

Renaddress 200 Super, block, Anderson addressing machine, plastic frames, typing master sheets, carbon sheets, transfer fluid, £75 ono. G4AGR, QTHR. Tel Bishop's Stortford 724041.

TS520, late model, 12V, mic, box, etc, immac, £325. IC240 22ch, 2m fm, 10W, 12V, £110. FRG7 cw ssb mech filter, £135. TR2200GX 6ch 2m fm, £90. All prices ono. GM3WOJ, QTHR.

Uniden 2030 12ch 2m fm, R0, RR0, R3-7, S19-23, cw mobile mount, manual, £75. G4LBH. Tel Luton 415846.

Pye Cambridge, boot mounting, modified as self-contained 2m fm tx, incl Pye manual, unused Garex fm detector, five xtals, £35. Tel David, 0620 2143, or 86573.

70cm TR3200 fm tx/rx, 12 xtals fitted, RB0, RB2, RB4, RB11, SU8, SU18, SU20, 5/8 whip, extra mic, charger, case, nicads, £140. G8MLC, QTHR. Tel Cowes 293038.

KW202, first class cond, good dx job, preselector, notch, peak, etc, matching spkr, spare set of new valves, handbooks, £100. Sorry, cash and carry. G3RY, QTHR Stockport.

TR9000, 1yr old, immac, used as base station, £300 ono. Starphone M5 mobile 3ch, RB4, 7W, £50. Pye dash Cambridges, two off, modified to 2m fm, immac cond, auto tb, no rocks, £45 each. G4CAJ, QTHR. Tel Hinckley 611914.

Yaesu FT207R handheld, two nicads, charger, λ/4 spkr/mic, £130. Trio TR7200G 20W, three rep, five simplex, £90. Trio 7010 ssb, fully xtalled, mint, comp, £120. Rotel tuner amp, 20W, £60. G6DAW. Tel 01-854 4926 (S E London).

Universal pcb servicing support, two-off, £5 each. Reslo ribbon mic, stand, cable, £5. Wharfedale concrete column spkr, £5. Revere 16mm cine camera, three lens turret, editing table, Titler holdall, spare cassettes, as used on Tigris voyage, £50. Plumbicon XQ1072, new. G3EFK. Tel Downland 51212.

FT200/FP200 psu, £200. HW32A/HP23A psu, £75. Buyer inspect/collect. All first class cond. Lots of bits and pieces, offers. G3MCA. Tel 0689 56497.

Sony ICF 6800W rx, built-in antennas, 29 shortwave bands, fm, mw, mains or battery operated, low consumption, world-wide coverage, very selective, remarkable sensitivity, Sony retails at £407, reluctant forced sale, £295 ono. Tel 01-876 5163.

Electronic keyer G3HKZ model, comp with paddle, black base, £25. Straight key ball bearings, £2. Both plus postage at cost. Garner, Barbon, Aigburth Hall Road, Liverpool L19 9DG. Tel 051-427 1903.

IC215, fitted S19-23, R0-7, S8, S32, spare xtals RR6, UOSAT, flexi and telescopic antennas, mobile mount, 15W linear, £99. IC215 mains psu, £5. PF2UB, fitted SU8, RB14, five nicads, 10-way Pye charger, 12V adaptor, λ/4, spkr/mic, leather case, £70. 4CX250B, new Eimac, £15. 8122, £8. Cathodeon 1·4MHz usb filter with xtal, £5. 130MHz end fed dipole, new, £5. Small items, postage £1, others at cost or buyer collect. G8JHE, QTHR. Tel Newmarket (0638) 720545, after 6pm.

Trio 9R59D, all radio constructor articles on modifications, stabilizer valve fitted, £35. Radar 3in oscilloscope, Radar type 303, by Waveform, £10. Purchaser to collect. Howson, 1 Chapel Lane, Broughton, South Humberside. Tel Brigg (0652) 53809.

FT200/FP200, £200. Palm 2, £80. Liner 2, £75. 4-el quad, £12. HK1B keyer, £7. Creed Envoy tty, £10. G4IFB. Tel 01-642 1465.

Datong FL1, instructions, £31 incl carriage. 12V nife battery, 10 cells, each 8in high, 4in wide, 3½in deep, weight together 70lb, will deliver Merseyside, £30. G3UJX, QTHR. Tel 051 677 1518.

MM28/144 transverter, new, unused, £75. Yaesu YC35D, 300MHz counter, £45. Datong rf audio processor module, diecast box, new, unused, £20. G3LBT, QTHR Essex. Tel 0268 412177, after 8pm.

Yaesu FT707, fm, FP707, FC707, FV707, mobile mount, eight months old, in pristine cond, worth £1,050, genuine offers around £800. Trailer tent with side awning, electrics, extras, £225 ono. G4NHJ, QTHR. Tel George, 01-804 5975.

Samson ETM3C electronic keyer, as new, virtually unused, £40 ono. G3FQX, QTHR. Tel Winchester 63906.

Yaesu FT707, £480. YM38 mic, FP707 matching power supply, £90. FC707 atu with swr dummy load, £70. Used little, as new, all with manuals and orig packing, genuine reason for sale. Tel 0706 46982, day, 57013, night.

CCS1 (conduction 4CX250B), new beryllium link, £25. P&P, £1. *Wanted:* small, good, deviation meter. GJ4ICD, QTHR.

Trio 2300, used little, mint, accessories, £135. FR50/FL50/FV50B, connecting leads, many spare valves, unmarked—sorry will not separate, £175. Buyers to inspect and collect. G4BNB, QTHR. Tel 01-504 3260.

Datong MK keyboard, £109. Multi U11, full of xtals, £150. Multi 11, £85. Multi 700E, £120. MML 432/20, £55. Carr extra. G3TUX. Tel Chris, 0428 3229, anytime.

Quad Hygain, 10, 15, 20m, good cond, £80 or exchange MMT432/144 transverter. Buyer collects. G3VXZ, QTHR. Tel Maidenhead 27350.

HF linear amplifier, old but trusty KW500, prefer buyer collect but possibility delivery (negotiable), incl circuit, instructions, £150. G3OLU, QTHR. Tel 0376 23429.

FT221 2m tx/rx, £290. TenTec 580 delta, hf bands, 200W tx/rx, cw filter, £430. Rees Mace marine rx, 60kHz-30MHz, eight bands, £25. CMOS keyer with built-in paddle, £40. G3OMK, QTHR. Tel 0509 61778.

Pocketphone Pye PF1T/R, two pairs, nightcall plug-in charger/amp, nicads, RB10, RB10/R, spare xtals, manual. Tel 01-949 2317.

Drake R4C, exc cond, 1·5 and 28 xtals incl, £235. Heathkit SB620 spectrum analyser, as new, all i.f. mods incl, £35. Comdel CSP11 speech processor, £20. G4AXS, QTHR. Tel Barham (E. Kent) (022782) 381.

FT202R, MC1 charger, remote mic/spkr, boxed, mint cond, £90 ono. G3VES. Tel Luton 422905/424590.

Exchange cw rtty keyboard, worth £125, for a 3-el beam for 20m. Tel Nottingham 257396.

Heathkit HW8, HWA71 psu, June 1981, £140. Trio R1000, £240. G4MPK, QTHR. Tel Leatherhead (0372) 375514, days or evenings.

B40 rx, £25. Redifon R145 rx, 0·25-24MHz, £20. Telford TC7 with 2m converter, £25. KW bandspread converter, 80 through 10m, 4·6MHz i.f., £10. WW Dolby noise reducer £35. G8EZE, QTHR. Tel Witney (0993) 4890, evenings.

MMT70/144 transverter, £75. Tonna 16-el 144MHz antenna, £25. Jaybeam 46-el 70cm multibeam, £18. G3NAS, QTHR. Tel Aldridge 53718.

2,304MHz converter, 144 i.f., £15. TU10B second world war atu, museum item in orig cond, offers.

Wanted: DET22, DET29, microwave triodes. P. K. Blair, G3LTF, QTHR. Tel 0279 415051.

Shack clearance: FDK750E, £200. 70cm EXP430, £155. Custom Special 599RX/599TX, £300. FDK700EX, £125. Vespa, £70. Apple 2 system (ITT2020), many extras, £900. *Wanted:* Collins/Racal rxs 75S3C or similar. G3IWB, QTHR. Tel Southend-on-Sea (0702) 586086.

SEM Easitune 75Ω, boxed, SO239S plugs, cost £30.65, sell £21. New valves 6JB6A, matched pair, new, unused, £8. Beam antenna book, fourth edn, W6SAI, £1.50. G2UZ, QTHR. Tel Leeds 784074.

Daiwa SR9 2m fm rx, orig packing, £30 ono. G8ZAG, QTHR. Tel 062-982 3072.

TR7500, £150. 40W homebrew 2m amp, £10. *Wanted:* Pye oscillator boards, 6ch, part No AT26819, and 10ch part No AT26820 for uhf Westminster W15U. Offers to GW4HAT, QTHR. Tel Swansea (0792) 290770.

Ex-WD R107 rx, frequency range 17·5/7, 7·25/2·9, 3·0/1·2MHz for 240 ac and 12V dc with workshop manual, wkg order, offers. Tel Manston (Kent) 368.

Trio cw filter YK88C for TS120/130 etc, £15. MM converter MMC432/144S, £15. Star 200 ham band rx, £15. Plus post/carriage. G4IIL. Tel Brighton 607737.

FT227R, no mods, handbook, mobile mount, £120. *Wanted:* HQ1 mini beam, consider damaged. G3XVN, QTHR. Tel 0630 4607.

FT101ZD Mk3, fm tx/rx, only a few months old, absolutely mint cond, incl fan, patch leads, etc, boxed, Shure 526T/2 mic, approx 100ft RG8 foam coaxial, £630. Tel Longfield 2494.

Yaesu FT207R, nicads, charger, spkr/mic, used little, £140. 5/8 whip, mag mount, new, £10. Dymar tx/rx, 3ch, three nicad packs, £15. Three-way antenna selector, £5. Morse code records, £4. Rechargeable soldering iron, £12. Grundig yacht boy radio, £25. Tel 021-360 9307.

FT707, £470. FT280, same as 480R, £295. Pye Cambridge 2m fm, £70. Top band transverter, £80. Tel 0269 860649.

Western Alumast 30ft, fixed base, almost new, £175. Mosley TA33JR hf beam, £55. Moving to new (smaller) QTH so NOT QTHR. R. N. Brown, G3WPT, 65 Staining Rise, Staining, Blackpool PY3 0BV. Tel 0772 633822, office hours.

TA32 Junior, £30. Buyer collect. Datong rfc speech clipper, £25. G2HKW, QTHR. Tel Chandlers Ford (04215) 65566.

Transformer 620/450/0/450/620V 345mA, many low voltages, ideal for big linear, yours for £10 if collected from Bournemouth. G3WPB. Tel 0202 644546.

Yaesu FTDX401, 560W input, two spare sets pa, £220. Magnum 4m transverter, 100W, £50. Telford TC7 28MHz multimode rx, £20. Datong rf clipper with piptone, £35, Katsumi mic compressor, £10. Daiwa CL66 atu, £40. EDL 432MHz 50W linear, 2C39A, £35. Two 12-el XY 432MHz Yagis, £20 each. All ono. G8UUE, QTHR. Tel Bristol 507056.

CT64 terminal, full RS232, 56 station kb, ASCII, alpha lock, two-page memory, 32 or 64 char/line, screen reversal and highlighting, 9in high defn monitor, full doc, perfect, £150. Paper tape reader teletype 14D, £10. G3IUZ. Tel Berkhamsted 4194.

Yaesu 7700 rx, memory matching atu, vhf converter, covers 2m, new June 1981, all packings, bargain, £375. Part exchange Yaesu 101ZD, with cash. Bradbury, Longridge, Milton Road, West Adderbury, Banbury, Oxon. Tel Banbury 810372 or 53802.

Kenwood Trio R820 rx, mint cond, used very little, the best ham rx, SP230 filtered spkr, ill-health reason for sale, no boxes, buyer collects, £350 for quick sale. Barker, 30 Scarisbrick Road, Levenshulme, Manchester. Tel 061-224 2822.

1.296MHz interdigital bandpass filter, p6·8 *VHF/UHF Manual,* bnc connectors, £19.50. G3VVB, QTHR. Tel Mevagissey 842368.

Pye Cambridge 2m fm 10W, toneburst, 6ch, cf, rev cf, S20-23, manual, spares, etc, B'ham xtals (R5), on air demo, £60 ono. G8CER. Tel Market Harborough 880178.

Trio 7500 mobile mount, boxed, £145. Icom IC22A, all repeaters, four simplex, £60 or exchange either, with cash adjustment, for FT290, C58 or similar. G6BGW, QTHR. Tel 061-665 1722, after 6pm.

Spring cleaning! FT101ZD with WARC kit, fan, FC901, SP901, TR2400, ST1, λ/4 whip, CPU2500R, keyboard mic, stepper, B&W DM11 hi-fi spkrs, all fb, boxed, must be sold, offers. G4IAC, QTHR. Tel Bracknell 24277 or Knowle 78218.

Drake TR3 with RV3 remote vfo, homebrew power unit, handbook, spares, incl set of pa valves, £200 ono. Prefer buyer to inspect and collect. G3UBE, QTHR. Tel 061-330 9538, evenings.

Heath HR1680 ssb/cw rx, good clean cond, perfect wkg order, Joystick antenna, atu, £150 the lot. Buyer collects or pays carriage. Robert Scott, 4 River Bank Road, Conon Bridge, Ross-shire, Scotland IV15 9RJ.

Silent key sale: IC202S, £129. Icom IC402, £169. Both incl case, used Oscar. Heathkit HW8 hf QRP 80-15m cw, £80. Heathkit 2031 fm handheld, fitted S20, S22-23, R4, £60. All ono. G8POC. Tel Clive, Cumnor (Nr Oxford) (08676) 2823.

Eddystone EC10 Mk1 gen cov rx, good cond, manual, £50 ono. Electrolytic capacitors, professional grade screw terminal, unused, 15,000μF, 63V, £2.50 each. 1,500μF, 100V, £1 each. G8OSY, QTHR. Tel Whiteparish (07948) 286.

Trio TS700G 2m multimode tx/rx, comp with matching Trio vox unit, six fixed channels fitted, mains or 12V, mint cond, piptone, manual, orig packing, £275. ASR33 teletype, in good wkg order, offers. G4JXU, QTHR. Tel Basingstoke 28241, after 6pm.

FR50B amateur bands rx, buyer collects, £40. All-wave Marconi domestic rx, in good wkg order, 1940s era, £8. G3SSJ, QTHR. Tel Alresford 3816.

Yaesu FLDX400 tx, FRDX400 multimode rx, matching spkr, rx fitted with 2 and 4m converters, £250. G3XCS, QTHR. Tel Saltash (07555) 2082, evenings and weekends.

SRX30D, unwanted gift, new, used couple hours, £150 ono. TR2300 1W portable tx/rx, charger, dc lead, 5/8 mag mount, £130 ono. Prefer collected. *Wanted:* coaxial relay, 12V dc for 100W cw. ARTH2 valve. G3KXF NOT QTHR. Tel Lancing 64599.

Yaesu FRG7, digital readout, 0·5-30MHz communication rx, boxed, as new, £150 ono. Yaesu rf o/p meter, three ranges, 0-150W, YP150, boxed, as new, £50 ono. Yaesu FLDX400, FRDX400, 160-10m tx/rx (2m conv), vgc, £300 ono. Tel Newbury 48626, evenings.

Hammarlund HX50, less mains trans, for spares or renovation, handbook, £45. Used with superb psu giving 600V, 300V, 6·3V ac-200V, double choke inputs, 6m capable of "moding" to higher voltage for linear, both collect or arrange carriage, £50. Mullard industrial, boxed, new QQVO640A, £9. Others same series, new valves for HX50, HQ170, HQ180 gear. SAE enquiries. G8GI, QTHR. Tel Stamford (0780) 4204.

Icom IC255E, 25W fm, operated only since September 1981, still under guarantee, all orig packing, fittings, £185. Philips N1700 video cassette recorder, four tapes, can be demonstrated, buyer collects/pays carriage, £185. Two Burndept BE471 uhf handhelds, four nicad packs, two heavy duty charging stations, xtalled for 445·675MHz, ideal for 70cm or commercial application, £350. Will p/exchange any/all for FT480R, 100W 2m linear, and cash adjustment. G6FKG. Tel Andy, Herne Bay 64054, evenings/weekends/daytime Ansaphone.

TS120V, cw filter, AT130, mic, psu, exc cond, £365 ono. *Wanted:* FT290R. James Morecroft, G8OOC, 107 Fulham Palace Road, Hammersmith, London W6 8JA. Tel 01-748 8021.

Trio 2200GX, S20-23, R3-4, R7, all accessories, £90 ono. BC221 wavemeter, mains psu, £5. Jaybeam halo, £2. 2m 5λ/8 whip, £2. Sinclair ZX81 16k ram, two games cassettes, mains psu, £90. G4DBW. Tel Bob, Swanley 64356, after 6pm.

Trio 7200G 2m fm tx/rx, 10W, fitted 13ch, not used mobile, comp, exc cond, manual, £80 ono. Edukit microprocessor trainer, manual, £15. G3KZU, QTHR. Tel Oxford (0865) 63000/63428.

Hallicrafters HT32B tx, 100W, 80-10m, ssb/cw/a.m., 2 × TT21 in final, super dxer, solidly built to last forever, room needed so £125. Carriage by arrangement. G3HCM NOT QTHR. Tel 0203 473698.

TS130S, A1 cond, £375. RTTY package consisting Catronics CT100 terminal unit, CD300 vdu, Clare Pendar Baudot keyboard, £120. DM2 3·5 digit battery powered bench type multimeter, mains adaptor, £20. G3XHX, QTHR. Tel Liskeard (0579) 43749, after 7pm.

Azden PCS2800 scanning 10m fm tx/rx, 10W digital display, six memory channels, rpt, offset, comp as new, manual, £130 ono. G3KZU, QTHR. Tel Oxford (0865) 63000/63428.

Trio hf rx, JR310, 80-10m, vgc, £95 ono. Dajwa vhf fm 2m rx, £25 ono. Icom IC290E 2m multimode, vgc, £335. Tel 0723 863969, evenings.

FL50B tx, 80-10, ssb/cw/a.m., FV50 vfo, works well, £80. FR50B rx, 80-10, £75. DX40 tx, 80-10, vfo, a.m./cw, £45. Codar AT5 tx, psu, £25. BC221 freq meter, £15. Prefer buyers inspect/collect or carriage extra. G4EHT, QTHR Lichfield, Staffs.

Jaybeam MBM48/70, £15. D15/1296, £18. Both above assembled, varnished but unused. MBM46/70, used, £8. Hygain 12AVQ vertical, still boxed, £24. Will deliver 25 miles radius. G3LRP, QTHR.

Marconi sig gen TF995A/2M, 1·5-220MHz a.m./fm, manual, £95. G8OSY. Tel Whiteparish (07948) 286.

TR7500 λ/4 mag mount, orig packing, £160. TS510 hf tx/rx, PS510, handbook, homebrew atu, £200. G4KJJ, QTHR. Tel Wilmslow 531058.

FRG7 gen cov rx, mint, front cover, battery holder, £150 ono. FR50B ham band rx, calib, 10MHz, no mods, £70 ono. GM4MTI. Tel 0631 62536, or 0631 62965.

Icom IC2E, comp with case, λ/4 whip, mains charger, £125. FRG7, mint cond, ssb filter, £135. Two MMC144/28 converters, £15 each. Trio 2300, comp with case, mains charger, nicads, five months old, £145. G6DBS. Tel Burgess Hill 43972, after 7pm.

FL2100B hf linear amp, £230 or part exchange for 2m all-mode rig or Icom IC202SE amp. W.H.Y? G3NQX. Tel Kendal (0539) 28166.

Icom IC730 incl cw filter, PS20 mains power supply, spkr, brand new, £635. GW4ACO, QTHR. Tel 0492 55240.

Pye Cambridge a.m., two glider channels, £65. Westminster fm, five 2m channels, £75. TR2200G, nicads, charger, 10W rf amp, £115. TS120S, vfo, atu, power supply, £550. All vgc. GU3HKV, QTHR. Tel 0481 47278, 6-7pm only.

Trio 2300. orig packing, nicads, case, charger, reverse repeater, exc cond, £120. Vibroplex orig lightning bug, exc, £25. *Wanted:* Samson ETM2/3 keyer or similar. G3ZZD. Tel Tunbridge Wells (0892) 34117.

FRG7, 2m converter, psu, 2m Ringo Ranger, property of deceased swl, £150 the lot. Contact G3XYI, QTHR. Tel Derek, Maldon (0621) 55923.

RTTY rectifier 66B, 160-80+80, £15. Rectifier 26B 80+80, £10. Low pass filter, 4B, £2. TG988 unit, £2. Auto tx head, £5. G8PIT. Tel Poole (Dorset) (0202) 707013.

Exchange FT101 hf rig, FC301 atu, YD844 mic, Yagi, vert antennas for 2m multimode or 2m ssb rig. G8VSE. Tel John, Mundesley 721358.

TR2400, as new, fitted + and − repeater shifts, no toneburst board fitted, ST1 base charger requires 115V supply, hard leather holster type case, nicads, helical, £200. TR2300, nicads, case, £110. FT200/FP200, all 10m, 201 mic, £180. Garex 4m a.m. tx/rx tunable receive, 6ch transmit, £20. AR88D, £35. BC221M freq meter, homebrew psu, £15. Mosley vertical trap dipole, 20-15-10m VT3JR, £10. G4EUL. Tel Tony, Beyton (Suffolk) (0359) 70434.

Vega Spidola, USSR portable radio, lw, mw, vhf-fm, six sw bands, vgc, uses 6U2s, with circuits, £10. Buyer collects or plus parcel post at cost. Bunney, 33 Cherville Street, Romsey, Hants. Tel 517497.

Liner 2, 2m ssb rig, mounting bracket, mic, manual, preamp fitted, £80. "Mini" battery tape recorder, £5. *Wanted:* 2m colinear. G4APB, 107 Bysing Wood Road, Faversham, Kent ME13 7RH.

TR2300, nicads, case, carry strap, mobile mount, orig box, £135 ono. IC202E, nicads, charger, strap, boxed, £95. MM 70cm atv converter, £18.95. MM 2m converter, £12. *Wanted:* FT290R, 2m multimode, fault free! G8WUM, QTHR. Tel Disley 4840.

Property of late GM3XZA: KW2000A, mains, battery psus, handbook, Z-Match. *Amateur Radio Handbook,* third edition, May 1965, offers. GM3YAN, QTHR.

Icom IC202E, recent Icom service, 25W pa/preamp, £150. Drake R4A incl 160, all 28, £125. Trio 2300, 10W pa, £150. ETM2, £20. NB for R4C, £25. All in exc cond. Tel Mold 740101, evenings/weekends.

Surplus to requirements: Microwave Modules MMC432/28S converter, £24 ono. T. O'Brien, G3DNR, 46 Bromstone Road, Broadstairs, Kent CT10 2HT. Tel Thanet 63641.

Swap my TR7800 and AR240 and base p/supply for Uniden 2020, FT220, FT221R, FT225R, TS700S, TS700G or any base multi. *Wanted:* any type radio mags. I can't collect, am wheelchair disabled. Please write Turner, 51 Weyland Road, Witensham, Ipswich IP6 9ET.

FT221R, good cond, £290. GI4BTG, QTHR. Tel Glengormley 49277.

Trio dip meter, 700kHz-250MHz, in seven bands, still in sealed packing, cost £60, sell £40. G6DWO. Tel Portsmouth 731722.

IC24G, 2m fm tx/rx, superb mobile rig, as new, no mods, £135. Daiwa SR9 2m fm monitor rx, £35. DM600 (Trio) gdo, £50. 12V psu, £20. All ono. G4IYU, QTHR. Tel 021-520 6628.

Trio 2300, incl nicads, helical, carrying case, reverse repeater fitted, exc cond, £130. Nick Ash, G6ASH, QTHR. Tel Malvern (068-45) 3970.

Liner 2, perfect, £45. G3WBN, QTHR. Tel 01-654 2761.

IC255E 2m fm 25W, mint, box/packing etc, £165. C78 70cm fm portable, 1W, mint, box, etc, £170. Blue Bird 10m gp antenna, used once, £15, G4QF, QTHR. Tel Romford 47998.

Detached bungalow: three beds, two lounges, one leaded bay, other 17 by 12ft, kitchen, bathroom, Dolphin shower, separate wc, integral garage, gardens front rear, full gas ch, insulated loft, some double glazing, rear overlooking field, pleasant rural setting, four miles Leigh, five miles Bolton, near M6, M61, M62, good vhf site, carpets incl, garden shed, shack, £34,000 ono. G4IAV, QTHR.

AR30 rotator, control box, 60ft five-core cable, £30. G3VDG, QTHR. Tel 0632 533605.

KW2000, ac, dc psus, KW EZee-Match, KW103 swr meter, mic, hb processor, manuals, £140. Taylor 31A oscilloscope, manual, £25. G-whip duo-bander, 80-160, £10. Prefer buyer to try and collect. G4BWJ, QTHR Sussex. Tel 0273 779914.

FT101, £280. TS700, £230. BRT400, £60. G3EJO, QTHR. Tel 021-373 1350.

SEM Z-Match, £25 ono. Dummy load, 200W continuous, 600W maximum, £25 ono. *Wanted:* TA31, TA32, or TA33. Constructional details for small, simple cheap oscilloscope. Tel Grays (Essex) 71475, evenings.

Communications computer Tono Theta 7000E, Baudot ASCII cw send/receive, new £400 ono. Monitor power pack available. G4CHP, QTHR. Tel Swainsthorpe 470365.

Pye uhf base station, R460/T461, wkg on su toneburst, good clean cond, manual, £45. GEC ROT300 printer, baud rate 110, 150, 300, wkg, good clean cond, manual, quiet operation, suit micro/rtty, buyers collect. G4GLP, QTHR. Tel Camberley 24706.

HW12A, Heathkit 80m singleband ssb tx/rx, psu, spkr, mic, leads, handbook, £60, or exchange for 2m transverter. MM 2m converter, 4-6MHz i.f., £10. G4KKG, QTHR. Tel Yeovil (0935) 25327.

TS520SE 160-10m tx/rx, 1½yr old, one owner, £385. DG5 frequency counter, plugs direct into above rigs, usable for external frequency counting, £80. Both mint, handbooks, orig cartons, could deliver 50 miles Bath area. Tel 0373 64694.

Trio JR310 usb/lsb a.m./cw 80-10m, as new, in original packing, fitted narrow filter, xtal calibrator, coaxial, phono antenna sockets, £90. G4IAV, QTHR. Tel 0942 870954.

Trio 2300, nicads, rev repeater, £120. MML144/25 linear amp, £30 or £140 the pair. Will consider exch for hf equip. G3RVX, QTHR. Tel Bath 859195.

FDK Quartz 16 10W 2m fm tx/rx, fitted 15ch, vgc, £95. Skyleader Super Clubman, 2ch, radio control, comp with extra xtals, vgc, £60. G4NMA, G8PXL, QTHR. Tel Stevenage 56621.

FT221R, Mutek front end fitted, £325 ono. Shure 444 desk mic, hardly used, £20. G8KPZ, QTHR. Tel Alan, Otford 3986.

12AVQ antenna, triband vertical, comp with ground planes, instruction manual, £20 ono. Tel Chorley (Lancs) 74451.

Stop tvi: quantity of high pass filters (fit to tv down lead), £2.50p each incl postage. 4-el 2m quad, £8. G3ZIG, QTHR. Tel Dereham 4634.

Lowe SRX30D gc rx, purchased summer 1981 by swl who died autumn 1981, price with Amtech atu, £150. Buyer collects or pays carriage. Contact G3YDZ, QTHR. Tel 0502 65922.

Standard C58 144MHz portable ssb/cw, fm, nicads, charger, carry case, as new, packing, will deliver 50 miles, £210. G4FBK, QTHR. Tel 01-864 1412.

KW2000E, manufacturer overhauled, mains psu, TH3 ant, rotor, control box, G3BXI tower, owner moving, three bedrooms, semi-detached, lounge, dining room, extended kitchen/breakfast room, purpose-built garage/shack/workshop, gas central heating, double glazing. G3LZE, QTHR. Tel 01-886 0351.

KW2000E, ac and dc psus, manual, exc cond, orig packing, Z-Match, swr pwr meter, 6146Bs fitted, spare valves, £250. 2200G, fully xtalled, mic, nicads, charger, mobile bracket, 4-el quad, 13·8V 3A psu, orig packing, £150. BRS34230, 103 Lime Grove, Close, Leicester LE4 0UF.

TR7010 2m ssb/cw tx/rx, 8W rf, 144·100-144·335MHz, incl mobile bracket, exc cond, £110 ono, G4CZZ, QTHR (1982 *Callbook* only). Tel 0908 502207.

FT480R Yaesu multimode, immac cond, six months old, used little, orig packing, £320. Datong morse tutor, switched continuous morse mod, still under guarantee, six months old, £40. G6CTF. Tel Lichfield 52214.

KW2000B, psu, Shure mic, £190. Trio JR599 rx, £160. Viceroy Mk3A, slight fault, £50. 14AVQ vertical, £15. G5RV antenna, £6. SAE for full details, no phone. Prior appointment for callers. G3WXT, QTHR.

Eddystone rx 730/4, immac cond, £100 ono. Two command rxs, BC453 Q-fiver, BC454 medium wave, exc cond, psu, spares, £35 lot. Buyer collects. *Wanted:* FL110 linear amp. G3NJP, QTHR. Tel Cranbrook (0580) 714482.

HF5V five band ant, £40. Trio 120V, vgc, £300. Atal vfo 2m tx, Atal 2m, 70cm, 10m rx, £200. Standard 146A, £70. Shibaden bw rr, ½in video recorder, six tapes, £150. G8KMU, QTHR. Tel 0922 22878, after 6pm.

FT290R 2m multimode, portable/mobile, new cond, case, handbook, orig packing, guarantee, £210 ono. Part exchange considered. High current nicads, £15. Morse code decoder board (*Elektor*), auto tracking, exc copy, full info, £18. Tel Swindon 771153.

House forces sale FLDX500, FRDX500 hf tx/rx, 240W, matching spkr, base mic, all filters, 2/4m converters, £275. G4MH minibeam tribander, immac, £65. Sota 144MHz 100W base linear, preamp, ac psu, superb, £120 ono. *Wanted:* 2/70cm transverter. G4ISN, QTHR. Tel 0509 67309, evenings/weekends.

144MHz scanning rx, MR1000A, handheld, xtalled S16-23, + S8, R0, comp with charger, helical, vgc, £30 ovno, or (part) exchange for 4m equipment. RSGB morse cassette stage one, £2.25. G3ACC morse book, £1. G6EUJ NOT QTHR. Tel Matthew, 05095 4163, evenings.

Trio R300 communications rx, £15. Mizuho KX2 atu, £20. MR110 10ch vhf fm auto monitor, £35. MM 144MHz converter, £20. Tel Dudley 57798.

Icom IC22A, all repeaters, S17-23, 5/8 antenna magmount base, £110. G3ZIV, QTHR. Tel 0757 638503.

Icom IC451E 70cm multimode, hardly used, perfect cond, orig packing, £150 off list price. G3OJZ, QTHR. Tel Folkestone 58685.

Trio 2200GX, 12 popular channels fitted, auto toneburst, Beta night light, rubber duck, nicads, charger, in orig cond, £85. G4ARO, QTHR. Tel 0293 27288.

Datong asp, rf processor, Datong ac ps, cost £86, sell for £55. Microwave Modules 2m converter, 12-14MHz i.f., as new, £15. Heath HA201A fm linear kit, needs finishing, £12. Tel 01-455 5039.

Drake R4C, T4XC, MS4 psu/spkr, three filters, three extra xtals, TV3300 low pass filter, £650. G4GHG, QTHR. Tel 0703 37050.

FT200, FP200, mic, manual, 10m, good cond, £210 incl pkg and carriage. GI4MXV NOT QTHR. Tel Antrim 3850.

KW Viceroy 80-10m tx, 180W p.e.p., extra half lattice filter, handbook, separate power supply, £60. Trio JR500SE rx, 80-10m, WWV, handbook, £70. Lafayette HA350 rx, 80-10m, WWV, £60. Both exc cond. G3RHR, QTHR. Tel 0423 504292.

Heathkit tx DX40U, vfo, B40D rx, latest mini valve version, 1kHz xtal filter, single sideband, fsk converter, fb hf cw station, £120. G4MDQ. Tel North Anston (Sheffield) 566301.

Nascom 32k NAS3/T4 basic, zeap, debug, Nasdis, toolkit, Naspen in eproms tape compatible NAS1/NAS2, self-contained rtty/ASCII unit, tuning oscilloscope built-in, many programs rtty, QRA, etc, fully cased, video monitor, offers. G4IVN, QTHR. Tel 0493 728194.

Microwave Modules MMT432/144R transverter, as new, £150. Sinclair ZX81, comp, £45. Both items post paid. G8LGE, QTHR. Tel W Yorks (0924) 825025.

Atari video games unit, four cartridges incl Space Invaders, £90 ovno. Jaybeam 4-el 4m antenna, £7. Kenwood QR666 gen cov rx, needs slight realignment, hence £35. G6ETA. Tel Chestfield (Kent) (022779) 3262, evenings only.

FT221, 2m multi-mode tx/rx, exc cond, orig packing and receipt, unmodded, £275. Going hf. Consider part exchange for hf equipment. G4HHA NOT QTHR. Tel Ipswich (0473) 79935.

Akai 4000DS tape recorder, supply of tapes, £75. Yaesu FT208R, £180 ono. G8ZVE, QTHR. Tel 0533 848789, office hours.

Ferguson 9000 20in colour television, remote control, stand etc, vgc, could deliver north London, £160. Liner 2, works OK, modified, £60. PW Winton 50 + 50W very good quality hifi amplifier, perfect, £110. Tel Dave, 01-360 0210, after 6pm.

Yaesu 2m multimode, FT480R, FP80 psu, late model, not used/M, £350. Yaesu YH55 headphones, £6. Western PM2001 vhf power meter, p.e.p./rms, £25. Up/down morse key, WT No 2, £4. G8BWR, QTHR. Tel 0926 498388.

IC211E base station, 2m tx/rx, boxed, as new, £260. Adonis 502 compressor desk mic, as new, £20. TR7800 mobile 2m rig, six months old, under guarantee, boxed, as new, £225. G4MUJ. Tel Lancing 3102.

Eddystone 940 rx, 0·48-30MHz, immac, orig packing, spare 5ft new valves, Codar PR30 preselector, £130 ono incl carriage. Tel Tenby (0834) 3057.

TR9000 2m multimode, 10 months old, immac, boxed, £310. Matching PS20 power supply, £35. SU4000 rotator, £50. Jaybeam 5/5 slot, £10. Tel Ipswich 52892.

National Panasonic DR48 communications rx, 1·6-27·5MHz lw, mw, vhf, digital readout, bfo battery/mains, £110. Regency M100E synthesized scanner, 66-88, 144-148, 148-174, 440-512MHz fm, mobile mounting bracket, mag mount, antenna, boxed, £110 or p/ex for TRS80 equipment or IC2E. Tel 0704 893803.

FT227R 2m tx/rx autoscan etc, £140 ono. MM 70cm transverter 2m i.f., £85. *Wanted:* C78, FT708R or TR3200. G3NPZ, QTHR. Tel Fareham (0329) 283736.

Icom IC201 2m ssb/fm tx/rx, mains, 12V dc, vfo, repeat, reverse repeat shifts, etc, £240. Shure 444 desk mic, grey, £16. Eddystone EC10 gen cov rx, £60. Pye Westminster W15AM on 170MHz, £55. G6CHY. Tel Cromer (0263) 512736.

88mH toroids, American open type, suitable BARTG tu, ST5, ST6 etc, available mid-April, £2 each. PLLs, 25p post & packing. Chris Pedder, G3VBL, "Thorncliffe", 5 Royalty Lane, New Longton, Preston, Lancs PR4 4JD. Tel Preston (0772) 612289.

HRO rx, four bandspread coil units, power supply, spkr, good wkg order, £30 plus carriage. Chorley, 7 Foxfield, Everton, Lymington, Hants. Tel Milford-on-Sea 5231.

Microwave Modules converter MMC/1296/28, £20. Preamp MMA/1296, £20. Varactor tripler MMV1296, £25. Heathkit oscilloscope IO18U, £35. Electronic switch S3U, £15. Transistor tester IT121, £20. Transformers 500V 180mA, £5. 450V 180mA, £5. G2FCA, QTHR. Tel Newport Pagnell 613523.

Trio TS520, vgc, £330. Pye pocketphones tx/rx on RB0, charger, £40. QM70 2m conv, 10m i.f., £11. Bauer keyer paddle, not iambic, £7. *Wanted:* Drake R4C/T4XC or rx only. G4DYC, QTHR.

TS130S, PS30, AT130, mobile helical antenna MA5 comp, HS5 headphones, MC305 mic, mobile omnimatch, orig packing, no split, as new, £645. EK121D keyer, EKM oscillator, £33. HK707 key, base, £10. G4MYH NOT QTHR. Tel 092-681 4253.

HF5 antenna, HF5R radial, £50. Western PM2000 power meter, £30. SEM Z-Match, £30. G4GIX, QTHR. Tel Godalming 29283.

Bargain: must sell my immac TR2200GX soon, hence only £65, incl case, nicads, charger, helical, λ/4 whip etc, fitted S18, S20-23, R2, R4-7, exc cond, compare with prices elsewhere. G4JCX, QTHR. Tel Saltash (07555) 3503.

Yaesu FT221RD 2m multimode, mint cond, no mods, buyer collects, £300. G8MES. Tel Sheffield 468171.

IC215, £100. 15ch, R1-6, S15-23, hb nicad charger, HRO rx, six coil packs, no psu, £35. BC221 fr, counter, psu, £20. G4GBZ, QTHR.

Heath SB101 cw/ssb SB200, matching linear, spkr to match, as new, professionally built fb rig, 1kW cw, 1,200W, ssb, £350 ono. W. F. Poole, G3DUF, Leacroft Farm, Colyton, Devon. Tel 0297 52823.

Honeywell ASC AA keyboard, £15. 144MHz preamp, as new, £18. 144MHz magmount whip, £7. Pye test equip type TM1A, £10 ono. Buyer collects. Property late G8RUW. G4DYC, QTHR. Tel Dereham (Norfolk) 858164.

Liner 430, 70cm ssb, £150. JR500S, hf rx, £160. IC240, 2m fm, 80ch, £150. Linear, ampere, 80W op, £90. PF1 plus nitecall, batts, RB13-14, £50. Offers acceptable. G8HWZ NOT QTHR. Tel Tamworth 872171.

R1000, perfect cond, mains and battery equipment, indoor antenna cable, all modes, instruction book, £200. Tel Cosham (Hants) 387943.

Alkai high speed key, £3.50. 2m halo antenna, offers. Stolle type RZ100 rotator support bearing, £10. Homebrew 10m delta loop antenna, coaxial cable, successfully operated by late G4LDM, offers around £60. G4MYH NOT QTHR. Tel 092-681 4253.

Exchange Canon A1 power winder "A", Canon 35-70 zoom alloy, gadget bag, etc for 2m multimode or hf rig or sell comp, £325. Tel Carlisle (0228) 35177.

Trio 7500, £145. GW3WWN, QTHR. Tel Neath (0639) 50880.

Microwave Modules rtty conv, MM2000, £150. MMD 050/500MHz freq counter, £50. MM432/144R 2m-70cm linear transverter, new, £150. MML144/100 100W linear amp, £100. MBM 88/70cm beam, new, £39. G4DYC, QTHR. Tel Dereham (Norfolk) 858164.

TS120S 80/10m 200W approx, 10h use, covers never removed, as new, £330. AT120 antenna tuner, 80/10m, matches TS120, no mods, £45. Lunar HF3 100 L2 160/10m, 10W drive, 100W out, less than 1h use, preamp, no mods, ideal for TS120V, FT7 etc, £100. Pye Cambridge AM10B Garex board, R6, S20-24, absolutely comp, incl carrier, manual, etc, exc cond, £55. PSU ICL, about 25A, perfect order, £45. G4GDM, 51 Borrowdale Road, Bebington, Wirral, Merseyside. Tel 051-334 1819.

Silent key sale: FRG7700, memory, £320. FRV7700D, £51. FF5, £7. Realistic DX302, £200. Headphones, £5. AD270 active antenna with psu, £40. All equipment is less than eight months old. G8HDA, QTHR. Tel 0952 812591.

Liner 2 144MHz extended range switch, modified for 70cm transverter use, £60. 70cm Modular Electronics transverter for Liner 2, £45. Power supply for above, £10. RCA 2N3055 branded 39251 transistors, 45p each, prefer inspection/collection equipment. G8HHI, QTHR. Tel Yateley (0252) 871555.

Ex-govt test gear, all good cond, mains leads, CT373 oscillator distortion meter, £12. CT38 (plus box of spares), avo, vvm, £10. CT436 oscilloscope, £50. Other items: "Fracmo" motor, geared slow motion outlet, £10; Eagle vvm, £5; Philips bw portable tv, £45, National bw portable tv, £25; Aiwa AD6400 Dolby hi-fi cassette deck, £95. G4AXS, QTHR. Tel Barham (E Kent) 381.

New telescopic tubular aluminium mast, 10ft lowered, extending to 37ft, suitable for vhf/uhf arrays, £180. Jaybeam 5Y/2M Yagi, new, £8. Q4/2M quad, used 18 months, £10. Hygain TH3JNR, balun, £80. G8XTU. Tel Doncaster (0302) 535626.

Heathkit SW717 mf/hf rx, four bands, S-meter, bfo, £60. Ward, RS48537, 24 Snowdon Drive, Fareham, Hants.

IC240 2m fm mobile rig, exc cond, mainly used base station, all accessories, manual, orig packing, £120

ono. G8CCI, QTHR. Tel Kidlington 3420. weekends or evenings only.

Trio TR9000, 2m multimode, six months old, mobile mount, £325. Jaybeam 10XY2M crossed Yagi, £28. Hoxin 7/8 whip, gutter mount, fixings, £14. Reason for sale, going hf. G6DVX, QTHR. Tel Stanford-le-Hope (Essex) 42312, after 6.30pm.

Silent key sale: HW100, psu, compressor mic, £110 ono. Wavemeters class D Mk2, manual, £7. LM13 charts, £10. B40 manual, £10. R1155 for spares, *Wireless Telegraphy* 1938 vol 1, vol 2, *Radio Handbook* 11th edition, *RSGB Handbook,* 1940, offers. G3KTH, QTHR. Tel Droitwich 774624.

Trio R820 rx, in pristine cond, comp with accessories, handbook, offers around £450. Tel 0579 43174, evenings.

Nascom 2 in microcase, 32k ram, zeap, Nas-sys3, -dis, -pen, -debug, toolkit, manuals, extensive software, £395. Liner 2 ssb tx/rx, matching Belcom psu, £75. Philips vcr and tapes, £50. Gresham Lion six-digit presettable batch counter, £35. Tel Braintree 24845.

Belcom LS102L, new December 1981, fm, usb/lsb, a.m., cw, 26/30MHz, 4/10W output, digital readout, solidstate tx/rx, 12/14V input, instruction manual, cost £270, accept £220. G8KS, QTHR. Tel 0323 21919.

Sinclair ZX80, 16k ram, comp, old 20in Bush tv if buyer collects north London area, £70. G2CWY, QTHR. Tel 01-445 2508.

Xitex MSR100 cw/rtty tx/rx, various interfaces possible, mint cond, £85 pp. Tel 0463 41211.

FT301 cw psu and mic, £400. Any trial or test welcomed. G3JYT. Tel 01-850 7881.

Drake R4C, T4XB, AC4 ps, MS4 spkr, all xtals, cw filter, ok new bands, £495. T4XC tx/rx, AC4 ps, 300W RV4C remote vfo, £395. 2m Parabeam, £18. Cossor 3in oscilloscope, £20. Prefer buyer test collect. G4LW, QTHR. Tel Trowbridge 3166.

FR101 rx, digital readout, 2m, 6m converter boards, 11m xtal fitted, manuals, used little, £300. G2AQJ, QTHR. Tel Salisbury 25929.

FT221 2m tx/rx, all mode, vgc, orig packing, receipt, several xtal channels, going hf, £275, or will consider part exchange with hf equipment. G4HHA NOT QTHR. Tel Ipswich (0473) 79935.

Icom 720A, PS20 power supply, both eight months old, mint cond, £750 ono. McNeil, 15 Bath Terrace, Blyth, Northumberland. Tel 06706 2608.

FT7B 10-80m solidstate, no mods, 100W, £300. TR7010 2m ssb, 10W, no mods, £90. 6800 computer, c/frame, hb, kb, less vdu card, fully documented, £85. HF tx/rx, Helford based, incomplete, £90. Demo on all. Collect. Tel 01-640 6020.

Trio TS510, PS510, SEM Z-Match, swr meter, HK708 key, antenna switch, all leads, all vgc, recent pas, £180 the lot. G4HXD, QTHR. Tel 0287 22848.

Icom IC701, power supply, mic, £500, plus carriage. Yaesu FT101 Mk2, fan, cw filter, spare valves, semiconductors, £275, plus carriage. G3FPQ, QTHR. Tel 0420 23168.

TR2400, exc cond, as new, SC3 carrying case, orig boxes, £160. G4KUC. Tel John, 061-427 5931.

Liner 2, exc cond, orig packing, offers? UK101 rtty software, hardware, details, £7.65. QTH distance calculator, £3.25. *Wanted:* UK101/6502 software for cw receive and/or Amtor. G4HHT, QTHR. Tel Coventry 610408.

Kenwood TS120S, as new, £350. KW2000A, mains psu, £150. G2VJ, QTHR. Tel 021-706 0744.

TR2300 2m fm, 12 months old, incl nicads, case, manual, charger, etc, 2m colinear, UR67, 16k ZX81, programs, move to university forces sale, offers. Prefer buyer collects. GI6BET. Tel Belfast 681700, evenings.

Adana eight-five printing press, comp with 20kg various type, £125 or swap for fm 2m handheld, or W.H.Y.? Richard Hodge. Tel 0292 57517 (Ayrshire).

Murphy 12V psu, 5A, £10. ICL 12V psu, 8/10A, £16. 2m 80W linear, preamp, lunar, £90. PA3 preamp, £3. SD306 preamp, £4. IC202S, £120. Pocket cassette rec/calc/clock, small, £10. Mobile mount for FT290R, £10, plus postage. G8ESK. Tel Bradford 45611.

IC280E 10W fm mobile digital readout scanning, £150. Pye uhf Westminster, W15U, six channels, RB2, RB4, RB10, RB13-14, SU8, £95. 2m 40W pa, £15. Some other small items. G3YBY, QTHR. Tel Shepton Mallet (0749) 4191, tel 0925 812808.

30ft mast with tower support, comp with rotator, control gear, £100. Microwave Modules morse talker, £25 off list. G4JKP. Tel Leicester (0533) 899958.

Yaesu FT480R multimode, boxed, as new cond, recovered stolen rig forces sale of this tx/rx bought in November 1981, £310 ono. TS520 dc/dc 12V supply, hardly used hf, £250. G8MYH NOT QTHR. Tel 01-337 4168 (north Surrey).

FTDX560 tx/rx, 500W, 3·5-30MHz, can add three new ham bands, very stable fet vfo cw filter, many spare valves, £150. G3CFR NOT QTHR. Tel Wentworth 3595.

Summer is coming! Why buy a new handheld when you can have my Trio TR2400 for £140? 144-148MHz, nicads, charger, etc, vgc. G4CJO, QTHR. Tel Tony, Portsmouth (0705) 660682.

Eddystone EC10, 550kHz-30MHz rx, as new cond, ideal swl, 9V supply, new atu, £95. G4ILR, QTHR. Tel Pymore 341.

Eprom programmer for PET computer, 240V mains powered, 2532, 2716 eproms, 2732 with adaptor, cw program on tape cassette, connectors for PET IEEE port and mains, zero insertion force socket fitted, £35. G8AZI, QTHR. Tel Preston (0772) 37815.

FDK Multi 700EX 25W fm base mobile, 5/8 whip, magmount, as new, orig packing, cost £217, first £170. G4JTK, QTHR. Tel 051-356 1757.

Yaesu FT707, FP707, FC707, mint cond, boxed, used little, £600 ono. *Wanted:* Yaesu YO901 and bandscope. Tel Nigel, 021-707 3684.

Swan 100MX, mobile tx/rx, £175. SEM iambic keyer, £15. Boomless aluminium quad spiders, £10. Boom type aluminium quad spiders, £10. Tapered blue zip glass quad spreaders for boom type quad, £25. GW3CF. Tel Prestatyn 3627.

Tx Heathkit DX100U, a.m., phone, cw, output 140W, 10-160m, manual, £30 ono. Buyer collects. GM4MCP, QTHR. J. McPherson. Tel 041-956 2662.

70MHz from your 2m rig, Microwave Modules transverter, £70. 70-28MHz i.f. converter, £15. *Wanted:* specimen slides for microscope. Info on Burroughs 2000 tape punch (type 560?). Thruline elements. Zoom 200mm Pentax. Two speed gearbox for Creed 75. G3AZI QTHR. Tel Preston (0772) 37815.

ARAC102 2-10m a.m., fm, ssb, cw, rx ASAP154 psu, spkrs, good cond, £90 cash. Buyer collects. Brown, BRS36829, 1 Perryn House, Bromyard Avenue, Acton W3 7JD. Tel 01-749 0322.

KW Vanguard 160-10 a.m. cw manual, £50. Microwave Modules MMT432/144R repeater shift and reverse, £110 ono. Write first with sae. Charles Cotter, c/o Kerjons Green, Chagford, Devon.

FT901DM, £575. FV901DM, £190. YO901 with bandscope, £235. All shiny and perfect. G2RO, QTHR. Tel Kingsbridge (Devon) 580616.

1924 *Practical Electricians* pocket book, H.T. Crewe, MImechE, £5. *Admiralty Handbook Wireless Telegraphy* 1931, £5. *Radio Amateurs Handbook,* ARRL, 1959, £4. Paper condensers, three 10μF, 1,000V dc, wkg, £6. One 5μF 2,500V dc, £2. G3MBL, QTHR. Tel 01-445 4321.

FT107M, FP107E psu/spkr, memory unit, cw filter, £575. FL2100Z, linear, £300. YM34 desk mic, £13. Pair new 572B valves, £35. Magnum 2 transverter, £40. MMA1296 23cm preamp, £18. SEM 70cm preamp, £10. 1in Thomson vidicon, £5. G3WHK, QTHR. Tel 01-330 5795, after 6pm.

MMT432/144R 70cm transverter, Jaybeam 48-el multibeam, both in vgc, £150 or will split. Wasp music synthesizer, cost new £199, bargain at £75. G6AMZ, QTHR. Tel Telford (0952) 595959.

BC456B command modulator tx, 3-4MHz, rx, 3-6MHz, some controls, HRO unmod, six coils, S27, rfu 25, RFU27, TU10B, offers. Further details G3HFZ, QTHR.

Trio TR2400 2m handheld spkr mic, mains and 12V chargers, spare battery pack, strong leather case, £170. G8LVX, QTHR. Tel Dave, 01-904 0878.

FT101B, cw filter, £325. FV101, £50. SP101, £10. FT7, £240. IC202E, £130. Liner 2, £80. Two Marconi Mk5 pwm, need attention, £10 each. 5FP7 sstv monitor parts, case, tube, coils, magnets, eht, etc, £15. Shure 444, £15. Tel Chelmsford 66776.

KW202, KW204, KW107, £300 for quick sale. Gone QRT. Neil O'Dwyer, G4ICY, west London. Tel 01-568 5019, Ansafone during day gives business number.

SL1600 one 16ch scanner, fitted R4, R6-7, S20-23, reverse R4, £48, or may retain xtals. Spare R7 xtal, £2. Ex-GM6CFT. Tel David, 062-086 573.

FT101Z, cw xtal, MFJ audio filter, used little, orig pkg. G4FM, QTHR. Tel 0524 65272 ext 232, days.

FRG7 with handbook, no mods, £70. TT21 valve, unused, £4. "Belco" SG2030 sig gen, 250kHz-300MHz, £20. G4MH 12V 2A tx/rx, mains psu, £7. 2m 5/8 mobile whip, magnetic mount, £10. G3TJC, QTHR. Tel 0274 582781.

Microwave Modules 10-2m transverter MMT28/144, as new, unused, £70 ono. Icom IC201 2m tx/rx, 240/12V, £200. G4HHI, QTHR. Tel Darlington (0325) 52739.

2200GX, comp, case, nicads, charger, mic, xtals etc, £80. Microwave Modules 144/25 preamp/power amp, £30. Comdel speech processor with in-built psu, £25. G4GHG, QTHR. Tel Torquay (0803) 37050.

FT227RA, hi-low, mic, scanning, memories, mobile mount, mint, £175. TR7010 2m tx/rx, cw, ssb, mobile mount, cw xtal fitted, £95. HW8 QRP rig, mod to ls and phone, used little, £100. G4HZF, QTHR. Tel Grimsby 71215.

Yaesu FT7 tx/rx, hf 80-10m, two years old, vgc, £220. Trio TR7500 2m fm, two years old, £140. Icom IC2E, all accessories, £120. G4CLN. Tel 0803 558581.

Yaesu FTV250 transverter, £90. Hartley type 13A oscilloscope, £20. Transformers, mains ip: sec 25-0-25V at 6·0A, £15 ono; sec 55-0-55V at 20A, £15 ono, both in flameproof oil bath; sec 25V at 20A, £10 ono; sec 110V, £5 ono. P. Carey, G3UXH, 99 Bells Lane, Hoo, Rochester, Kent. Tel Medway 250562.

Trio TS120S, not used mobile, plus PS30 matching psu, handbooks etc, orig packing, will separate, £350. G4LJY, QTHR. Tel Wickford (03744) 67947.

Airmec 210 deviation meter, good cond, manual, measures a.m., fm, 3kHz, 10kHz, 75kHz, £75. 13·8V psu, 7A max, not cb type, good cond, carrying handle, £25. GM4FDM, QTHR. Tel 0505 22749.

Shack clearance: large National Vernier dial, £4. About 100 valves, many boxed, all OK, £10. KT66, new, boxed, £3 each. Large 240V blower, exc, £7. Five 6146 valves, used but OK, £5. National wide-spaced split stator, 100pF per section, £8. Two wide-spaced variables, 140pF, £5. Trio GDO DM800, seven coils to 250MHz, as new, £25. Coil of 18swg enamelled copper wire, 150ft, £4. Collect or carriage please. G3AO, QTHR. Tel Chinley 50639.

Jaybeam C5 colinear, exc performance, recently overhauled by manufacturers, bargain at £27. G4JLU, QTHR. Tel David, 01-954 6728, evenings.

KW600 linear amp, 500W, 10-80m, mint cond, £140. G3THZ, QTHR. Tel 021-588 2767.

SSTV tubes 5PF7, £10. 3BP7, £3. 7BP7 (7in 5FP7), £10. TV scan coils to suit, £2. 27M2 photomultiplier with base, £2. Three board sstv monitor, data, less power supply, tube, £25. Carriage at cost. G3WDI, QTHR. Tel Lowestoft 63216.

A.M. Pye Bantam, 2m or glider channels, mic, nicad, case, handbook, £48. KP202 2m hh, 2W, S20, S22, R0, R5-7, at/b, nicads, charger, case, £65. 1932/35 *Practical Wireless* mags, 75p each. Geloso vfo, £8. G3WIF, QTHR. Tel Bristol 293738.

Trio Kenwood TS530S hf tx/rx, brand new, matching hand mic, only two months old, £500, no offers. G3KLF, tel Fareham 236906, weekends or evenings only please.

SB200 1·2kW linear amp, exc cond, £250 ono. Buyer collect. *Wanted:* FDK2700 Mk2, must be exc cond. G3LUI, QTHR. Tel Dick, Southend-on-Sea 232117.

FRG7 rx, fine tune, Toko ssb filter prof fitted, two years careful use, manual etc, £135. Buyer collects. RS40425. Tel Marlow 2726, evenings or weekends.

WANTED

Rotor KR400 or similar, also alignment bearing. Datong asp clipper. Electronic key, not wkg acceptable. Will arrange collection or delivery to English address. Hugues de Laistre, F6GPA, Place de la Mairie, 41600 Chaon, France.

Circuit diagram for Panda Cub, purchase, borrow or photostat. C. Tunna, 15 Kingsbury Close, Sunderland SR5 4DE. Tel Sunderland 76191, ext 111, 9am-5pm.

AR88D for spares. GW8XWN, Ola Luest, Llanfyllin, Powys.

Marconi Kestrel rx. G6PO. Tel 0253 885893.

B2 and A Mk3 suitcase radio or any other wartime suitcase/spy type radio. Any cond or incomplete welcomed. G8VDZ, QTHR. Tel 01-949 2317.

Junkers morse key. EC10 rx handbook. GM3WIJ, QTHR. Tel 0224 37019.

Collins 51S1 rx, 312B console. Racal RA17L, RA98. SSB adaptor will be available if 51S1 obtained. Tel Ipswich (0473) 79186.

I need to contact owner of Kamoden GT101 multimeter. Youngster in our club has burned out several multiplier resistors and colours cannot be seen. Help please. Contact G3HGM, QTHR. Tel Luton 33436, evenings.

Datong morse tutor. Medium-sized rotator. Tel Malcolm, Locks Heath (04895) 84905.

For the Wireless Museum: pre-war radio books, magazines, catalogues, QSL cards, Gamages catalogue, 1916 White valve, Mk3 aircraft tuner, morse keys, old knobs! Collection arranged. Details to hon sec G3KPO, QTHR. Tel Ryde 62513.

Hygain vfo model 3855. RF power tubes 2002. High voltage antenna. Single pole changeover relays. G3ACB NOT QTHR. Tel 01-670 4337.

KW107/109 atu. G4DAU, QTHR. Tel Nailsea 2304.

Urgently for club's contest rig: 600Hz cw filter for FT101E. Full price paid. Can you help? G4GXI, QTHR. Tel 0783 865762.

USA SB34 tx/rx. Any info on Telefunken valves type EBC11, ECH11, EF12, EF13, EDD11, FF11, E211. G3PBQ, 71 Deakin Road, Erdington, Birmingham B24 9AL. Tel 021-373 2282, evenings.

Yaesu FT225RD or Trio TS700S 2m tx/rx, good cond essential. G3WEX. Tel 021-354 4265.

Kim 1 6502 micro, to buy or copy user manual. Circuit or any information on facilities or extensions, motherboard, memory etc. Expenses repaid in full. Details to Mike Barry, G4MAB, QTHR. Tel Huddersfield 661632.

TH6DXX, or similarly sized multiband Yagi, for 10/15/20. G3NLY, 46 Church Road, Burntwood, Walsall. Tel 054-36 71447.

Sinclair MK14 pcbs, ic processor, character gen, cassette interface. G3SKK, QTHR. Tel Formby 70806.
FT200/FP200 or similar hf tx/rx, reasonable price. Would be interested px 2300 plus cash. G8YST. Tel Morecambe (0524) 824579.
4-250s and bases. G4HUE, QTHR. Tel Andy, 01-554 0399.
Datong FL2 audio filter. Codar AT5 tx and matching ac psu. Memory unit for Yaesu FRG7700 rx. Prices and details to Ken Ballance, G3KNB, QTHR.
KW2000B, with matching power supply urgently wanted. Must be in good cond. Sensible price no problem. Douglas, 29 Blackheath Grove, Wonersh, Guildford, Surrey. Tel 0483 893411, anytime.
500pF wide-spaced capacitor for B&DARC atu project. Can collect locally. Funds available. GW8WCI, QTHR. Tel Bridgend 861115.
Tx/rx under £200. FT200, Swan 350, or similar. One in need of repair considered. G3JQL, QTHR. Tel Durham 61116.
Split stator capacitor, high suitable for transmitter atu. To match 600Ω bal to 50Ω unbal. Reasonable price paid. G4LMW. Tel Bob, Sittingbourne (0795) 76956, after 6pm.
Handbooks or circuit diagrams for Labgear LG50 tx, Eddystone 888A rx, Geloso a.m./cw rack mounting hf band tx. G3JSP, QTHR.
Required for use, clean wartime USA metal valves type 6A8, 6F5, 6F6, and 6X5. Required for tx, 10XJ or FT243 80 and 40m xtals. G4IMT, QTHR. Tel Marshfield 254.
Marconi TF1065 tx/rx output test set. G4EZM NOT QTHR. Tel Blackpool 64836, after 6pm.
Pye W15U uhf mobile, prefer unmodified, with or without control box. Pye F460 base required. Will arrange collect any area. G4HDQ, QTHR. Tel 0902 790819, reverse call charges.
KW515 or similar QRP cw/ssb tx/rx. Must be vgc. GW6DXC, 71 Fairleigh Road, Cardiff CF1 9JW.
HT trans for KW Vanguard tx, 425-0-425 at 175mA, 240 ac primary, size 4 by 4in upright mounting, would accept 400-0-400 150mA, GZ32 valve or equivalent. C. Collins, 60 Alexandra Road, Skegness, Lincs PE25 3RE.
MML70/100 4m 100W linear. G3WBN, QTHR. Tel 01-654 2761.
Workshop manual for Yaesu FT101 series of tx/rxs. GM2TW, QTHR.
KW107 antenna tuning unit. G8WTY, QTHR. Tel Malvern 4968.
KW2000E, with power supply, must be in good cond, or KW202 and KW204, also in good cond. GW4JPC, QTHR. Tel Gareth, Gorseinon (0792) 896815, after 4.30pm.
Special communications Mk7 tx/rx (Spy TRX), offers. Otto A. Wiesner, DJ5QK, Feuden Heimer St12, D-69, Heidelberg, Germany.
Suitcase or similar miniature tx/rxs (British, American or Polish wartime manufacture). Post-war sets welcome; any spares, damaged sets, orig manuals etc. WS62 (with transistorized psu), army transmitter No 53 Mk2. Taylor, G3UCT, QTHR. Tel Fleet (02514) 6998.
Versatower P40 or P60. *For sale:* Datong morse tutor D70, £35. Tel Taunton 84225.
TS520 remote vfo. G3KVT, QTHR. Tel 0603 860452.
For spares or rebuild: Telefunken KWEA and Lorenz LO6K39 rxs. Details to G8LIU, QTHR. Tel Uxbridge (0895) 30006.
Returning to bands after long absence, G3FGH wants KW2000 with pair 6146Bs, ac psu, manual, must be in good wkg order. "E" model preferred. Tel Bath (0225) 62744.
Yaesu SP101 spkr console. 1A thermo-couple ampere meter. G3XSI, QTHR. Tel 0742 51417.
4-125 and 4-250 valves and bases. G3AMF, QTHR. Tel 01-989 9224.
Morse key, good quality type like Marconi 365 or similar. Must be good cond. W.H.Y.? State price. G3SIH, QTHR. Tel Melksham (0225) 703443.
FT7, in mint cond, unmodified, would consider TS120V. GM3NJF, "Craigendoran", Lamlash, Isle of Arran. Tel 0770 6502, business, 0770 2358.
Portable 0·5in vtr, must be compatible with Sony audio-visual reel type, 12 or 24V. Details of any a.m./cw tx/rxs for 5MHz air cadet work. G8UNZ, QTHR. Tel Colchester 74427, ext 10.
QY4400 or 3500 valves to keep link with father ZL1BBW operational, used but tested valves considered. R/control equipment. Skyleader SLX a.m./fm, comp unit or part. G3YCP, QTHR Somerset. Tel 0278 785015.
Prop pitch motor, Desyn txs and indicators, selsyns or magslips, Sherwood 125CS filter for Drake R4C. G3FPQ, QTHR. Tel 0420 23168.
FT101E or FT7B, Icom IC210, all any condition. Photocopier or duplicator (small), test gear, W.H.Y? Exchange Sony ICF2001, psu, as new, 2m solidstate linear 200W, psu or will pay cash for above. G4KZH, G8KZH, QTHR. Tel 021-550 9324.
B29 lf rx handbook or copy. Wooden mast or pole, 2-6in diameter, 20-30ft long. GM4HXW, QTHR. Tel 05055 2715.
3GHz preamp and/or front end (for South African tv satellite). Solar cells. G8APX, QTHR.
Solartron CT436 scope, mains transformer. Tel 03947 298, evenings.

CLUB NEWS

(Continued from page 343)

Horndean (H&DARC)—8 April ("Radio ramblings", by G3WLY), 13 May ("Disc video", by G8HVO), 7.30pm. Merchiston Hall, Horndean. The club net will now operate on Wednesday instead of Thursday. Sec G6GBM, tel Horndean (0705) 593429.
Poole (PRAS)—Normally the last Friday in each month, 7.30pm. Poole Technical College. The AGM will be held in April on a date to be announced. Sec G8ZCG, tel Broadstone (0202) 693986.
Portsmouth (Marconi E&RS)—27 April (Talk by IBA Engineering), 8pm. Broad Oaks Works Canteen, Portsmouth Airport. Details from G8NEH, tel 0705 664966, ext 153, during office hours.
Swindon (S&DARC)—Thursdays, 7.30pm. Park School, Marlowe Avenue, Swindon. Sec G8SFM.
Weymouth (South Dorset RS)—13 April (AGM), 7.30pm. Civilian Canteen, Army Bridging Camp, Wyke Regis. Sec G3ZGP, tel Weymouth (0305) 812893.

REGION 18—RR W. A. Ricalton, G4ADD, 4 South Road, Longhorsley, Morpeth, Northumberland NE65 8UW. Tel 067-088 259.

Durham (DURES)—27, 28, 29, April, 1 May (The club will be operating a special event station to celebrate the university's 150th anniversary), 25 June (Trip to RAF Fylingdales). Physics Dept, Science Site, Durham University. Details from sec Mark Puddephat, Oswald 299, Gray College.
Morpeth (Northumbria ARC)—Change of name here after AGM. The word "amateur" has been inserted to avoid confusion with other organizations. A full programme is at present being arranged. Old Telephone Exchange, Ellington. Sec Ian Gibbs, G4GWB, tel Morpeth 790417.
Prudhoe (TARC)—A new club. First Tuesday in each month, 7.30pm. The Falcon Hotel, Prudhoe—the room at the end of the bar. Sec Ken Hatton, G4IZW, tel Newcastle 678828.

REGION 19—RR R. J. C. Broadbent, G3AAJ 94 Herongate Road, Wanstead Park, London E12 5EQ. Tel 01-989 6741.

Cheshunt (C&DRC)—7 April (Junk sale), 14 April (Visit to ATC Stansted Airport, plus natter night), 21 April (Natter night), 28 April ("Broadcasting techniques", by G8XYJ), 8pm. Church Room, Church Lane, Wormley, Nr Cheshunt, Herts. Sec R. Gray, G6CNV, 2 Sacombe Green Road, Ware, Herts, tel Dane End 203, or Jim Sleight, Ware 4316.
Chiswick (ABCARC)—20 April ("A chip for speech processing", by G3CCD), 7.30pm. The Committee Room, Chiswick Town Hall, Chiswick, London W4. Enquiries to W. G. Dyer, G3GEH, tel 01-992 3778.
Edgware (E&DRS)—8 April (To be announced), 22 April (Informal), 29 April ("Skeye", 3·5MHz straight key evening), 8pm. Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. Club net, 8pm Mondays, 1·875MHz. All details from sec Howard Drury, G4HMD, tel 01-952 6462.
Grafton (GRS)—9 April (No meeting), 23 April (Junk sale—RSGB exhibition, club will provide talk-in), 8pm. Five Bells, East End Road, East Finchley. No info on new sec.
St Albans (Verulam ARC)—27 April ("Maritime communication", by G. Price), 7.30 for 8pm. Charles Morris Memorial Hall, Tyttenhanger Green, Nr St Albans. Details of other club activities from Peter, G3VJO, tel Redbourn 2761.
Southgate (SRC)—8 April (Junk sale—bring some—flog some), 7.30 for 8pm. St Thomas's Hall, Prince George Avenue, Oakwood, London N14. Publicity from John, G8EWG.
Wanstead (ELGRSGB)—18 April (To be announced—listen to 145·475MHz net on Fridays at 8pm), 3pm. Wanstead House, The Green, Wanstead, London E11. Details of programmes from sec G8VDD, tel 550 2579.

Would all club officials *read* the introduction to "Club News" in this issue. The RR cannot invent your programme for the June issue (or any other) and, if you have not a *programme* on the night there is not much attraction to bring in visitors to your gathering, is there? Massive support for an ORM in Region 19—*three letters* from approximately 4,000 members in the region. See "QTC" for details.

REGION 20—RR B. L. Goddard, G4FRG, 2 Greenfield Park, Portishead, Bristol BS20 8NQ.

Bristol (BARC)—6 April ("The truth about swr", by G8BLQ), 13 April ("A night on the air—top band and 10GHz". Club station G3TAD will be operating), 20 April (Quarterly meeting and "Contests, is it worth it?", by G8GFZ), 27 April (Computer group meeting), 7.30pm. c/o YMCA, Park Road, Kingswood, Bristol. Sec Trevor Cockram, G8GFZ.
Bristol (BRSGBG)—26 April (Rob Micklewright, G3MYM, will be talking about "Direct conversion receivers"), 7.30pm. Queens Building, Bristol University. Sec Chris Short, G8GLQ, tel 0272 621153.
Bristol (North Bristol ARC)—Fridays, 7.30pm. c/o Self Help Enterprise, Braemar Crescent, Northville, Bristol. At the recent AGM, Eric Harris, G2FXO, was elected chairman, and the new committee are looking forward to planning for the year. Recent visitor to the club was F6FYN from Brittany. Information from sec Ted Bidmead, G4EUV, tel 0272 691685.
Bristol (Shirehampton ARC)—Fridays, 7.30pm. Twyford House, Shirehampton, Bristol. Topics for this month include plans for HF NFD, df hunts, walking and driving (local), and the progression of the 144MHz receiver project. Information from Ron Ford, G4GTD.
Bristol (UBARCS)—Tuesdays, 7.30pm. Meetings are arranged for RAE and cw for university students by sec. Club stations G3KAC and G8CHY are active on most Wednesday afternoons. Information from Mark Posen, G6EYY, Flat 53, University Close, Bristol University.
Cheltenham (CARA)—1 April ("QRP operation", by Rev G. Dobbs, G3RJV), 16 April (Natter night), 7.30pm. The Old Bakery, Clarence Street, Cheltenham. 6 May (Joint meeting with GCHQ and Smiths clubs). Sec Grant Cratchley, G4ILI, tel 0242 43891.
Cheltenham (Smiths Industries ARC)—8 April (7.45-8.15pm, morse practice, 8.15pm, rag chewing). Club House, Newlands, Bishops Cleeve, Cheltenham. The club's new callsign, G4MEN, will be on the air (I am told yls and xyls are very welcome—*RR20*) during club nights on 14, 144, and 432MHz. Plans are also afoot for operation on 3·5MHz. Details from Roger Hawkins, G8UJG, tel 0242 67 2175.
Gloucester (GARS)—Thursdays, 22 April ("Another beginners evening", with some different demonstrations), 6 May (Quiz is being planned), 7.30pm. Chequers Bridge Centre, Painswick Road, Gloucester. Sec Tony Martin, G4HBV.
Portishead (Gordano ARG)—28 April (AGM), 7.30pm. Ship Hotel, Down Road, Portishead. Details from John Davies, G3LJD.
Thornbury (T&DARC)—Welcome to another new club in the Bristol area. The club is operating from the Thornbury Adult Education Centre, Thornbury. The next meeting will be on 7 April (7.30pm?) when there will be a talk on "Making printed circuit boards". Information from Alan Jones, G8AZT.
Yeovil (Y&DARC)—1 April ("The effect of non-linearity on sine-waves", by G3MYM), 8 April ("J-fet af amplifiers", by G3MYM), 15 April ("J-fet mixers", by G3MYM), 22 April ("Amateur radio experimental work", by G3MYM), 29 April ("A post-RAE look at ionospheric propagation", by G3MYM), 6 May (AGM), 7.30pm. Building 101, Houndstone Camp, Yeovil. Details from Don McLean, G3NOF, tel 0935 24956.

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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

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New

MODEL RFA

WIDE BAND PREAMPLIFIER - MODEL RFA

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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.

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- 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.

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New

MODEL S
"CODECALL"

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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.

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★ See text for details.

Data sheets on any products available free on request – write to Dept R.C.

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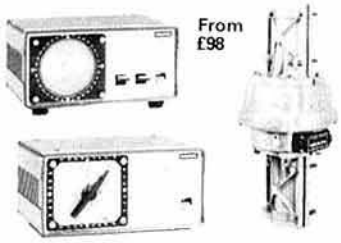

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FM Transmitter (0·5W)	70FM05T4	38.10	23.10
FM Receiver	70FM05R5	68.25	48.25
6 channel Transmit Adapter	70MC06T	19.85	11.95
6 channel Receive Adapter	70MC06R	27.15	19.95
Synthesiser (2 pcbs)	70SY25B	84.95	60.25
Synthesiser Transmit Amplifier	A-X3U-06F	27.60	17.40
Synthesiser Modulator	MOD 1	8.10	4.75
Bandpass Filter	BPF 433	6.10	3.25
PIN RF Switch	PSI 433	9.10	7.75
Converter (2M or 10M i.f.)	70RX2/2	27.10	20.10
FM Package 1 (Crystal Controlled)	70PAC1	135.00	100.00
FM Package 2 (Synthesised)	70PAC2	163.00	128.00
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Power Amplifiers (FM/CW use)			
50mW to 500mW	70FM1	12.05	6.85
500mW to 3W	70FM3	19.65	13.25
500mW to 10W	70FM10	30.70	22.10
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Pre-Amplifiers			
Bipolar Miniature (13dB gain)	70PA2	7.90	5.95
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RF Switched (25W max)	70PA2/S	21.10	14.75
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FM Receiver	144FM2R	64.35	45.76
Synthesiser (2pcbs)	144SY25B	78.25	59.95
Synthesiser Transmit Amplifier	SY2T	26.85	19.40
Bandpass Filter	BPF 144	6.10	3.25
PIN RF Switch	PS1 144	9.10	7.75
Synthesised FM Package (1·5W)	144PAC	138.00	105.00
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Kits are available from the following agents:-

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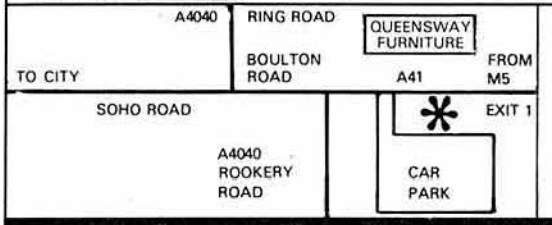

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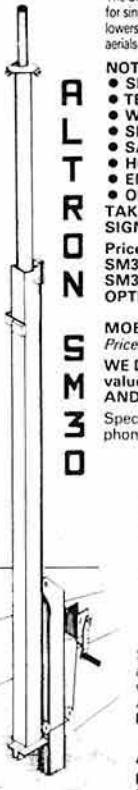

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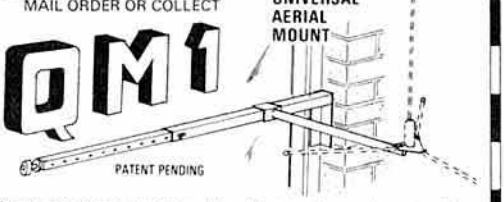

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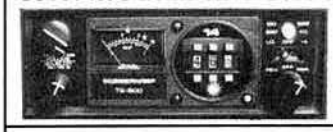

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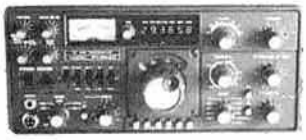

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Chris G4DGU

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PT4236A	10	1W min	12	175	£0.75
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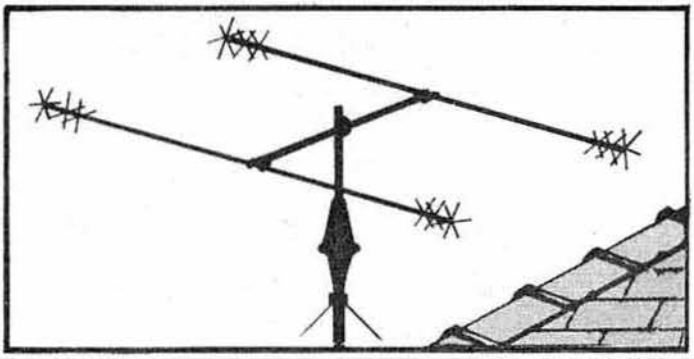

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Boom length	60 inches	Power rating	1400 watts PEP
Turning radius	7 feet	Input impedance	50 ohms
Operating frequencies	10m, 15m, 20m	Wind resistance	80 mph
Forward gain (ref D pole = 1:00)	3·6 dB	Weight	14 lbs
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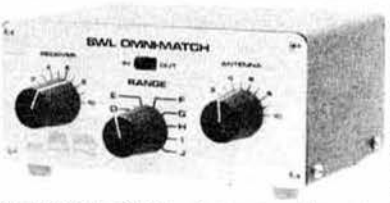

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Radio Society of Great Britain,
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Tel: 01-837 8688 or Oxshott (037 284) 3321

Members Ads should continue to be sent to the Editor at Chelmsford.

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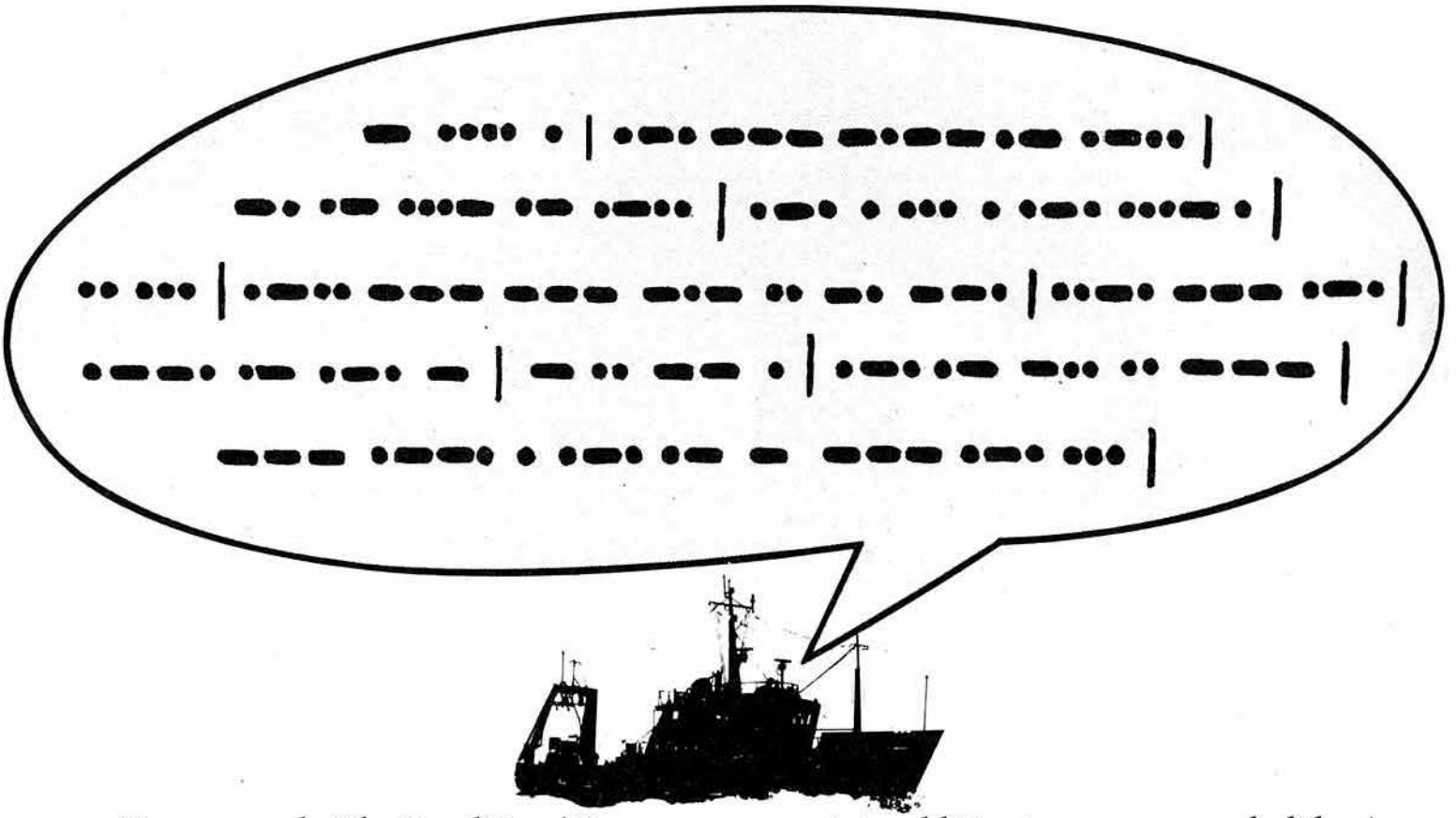

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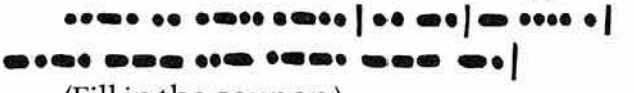

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Radio Society of Great Britain

THE NEW LICENCE

SCHEDULE

22 March 1982

Radio Communication

SPECIAL PULL-OUT SUPPLEMENT

THE NEW LICENCE SCHEDULE—continued

As members will already know from the special insert included with the March 1982 issue of *Radio Communication*, the Home Office published a new schedule to the amateur licences on 12 February 1982. Of all the errors and ambiguities contained in this document, the most pressing was the fact that the distinctions between the privileges accorded to Class A and Class B licensees were not published in the London version of the Gazette notice. Since the RSGB had not been informed of the majority of the changes brought about by the Home Office in the new schedule prior to its publication, we immediately contacted the Home Office in order to discuss it in detail. On Friday 26 February, another notice was published in the London Gazette which corrected the position with regard to Class B licensees.

The insert in the March issue of *Radio Communication* outlined the main problems with the new licence schedule, and reported on the position up to 28 February 1982. Since then the Society has had further meetings with the Home Office, and all the significant problems have now been resolved.

By the time members receive this special pull-out supplement, a revised schedule replacing that published on 12 February 1982 should have appeared in the London, Belfast and Edinburgh Gazettes*. By courtesy of the Home Office we are able to reproduce the new Class A and B schedules, together with the footnotes to the Class A schedule and an explanation of those sections which do not apply to the Class B licence.

The fundamental reason why both the Society and the Home Office wished to produce a practical and viable schedule as a matter of urgency was that until this job had been completed, the Home Office was not able either to issue any new licences or to deal with a backlog of applications which had been accumulating at Waterloo Bridge House since late December 1981. Further details of the present position as far as the issue of licences is concerned are given later.

One of the fundamental difficulties with the new schedule was the interpretation of the new designations of emissions agreed at WARC 1979 and implemented on 1 January 1982, since a straight translation from the old designators to the new ones precludes the use of a wide variety of transmission modes in current use by radio amateurs. Another problem raised by the 12 February schedule was the fact that power levels were specified on frequencies above 1GHz in terms of equivalent isotropic radiated power, and this concept caused the Society great concern. The eirp figures specified in the 12 February schedule were also most restrictive, apparently on the grounds of safety. As readers will already know, the Society took advice from staff of the National Radiological Protection Board, who considered that the concept of eirp limitations was ". . . unsound". While the Home Office wishes to examine this matter further, it will be noted from the new schedule opposite that on frequencies above 1GHz, power is specified in terms of dc input. For ssb modes, peak output power is specified as in the past.

Despite having produced a practical and viable schedule at short notice, both the Society and the Home Office agree that there is a great deal of additional work remaining to be done, specifically in relation to the new ITU designations of emissions. The Society has agreed to have meetings with the Home Office in the course of the next few months: the object of these meetings is to clarify the way in which the new designations of emissions relate to amateur practice, and to resolve a number of related ambiguities concerning modes of emission. In addition the Society also wishes to discuss a simplification of the licence format in order to rationalize the multiplicity of footnotes. We hope that the final result will be a more flexible schedule which will be presented in a much clearer way.

In the matter of the issue of licences, the current position is that for applicants who sent their papers to the Home Office late last year or earlier this year, their licences have been drawn up and signed: they will be posted as soon as the new schedule has been inserted. This also applies to successful candidates of the December 1981 RAE whose applications were sent promptly to the Home Office. For Class B licensees who are converting to a Class A licence, the position is similar insofar as a substantial number of licences have been signed and are only waiting for the new schedule to be attached. This should be in hand by the time that this special pull-out reaches you. As the flow of applications from the December 1981 examination reaches its peak (there were 3,500 passes) the licensing process will be subjected to increasing delays—for instance, if an application was submitted to the Home Office tomorrow, it would probably take about seven weeks for it to be processed and for a callsign to be issued.

Below, you will see a summary of the power levels permitted by the new, revised schedule, together with a brief explanation of the differences between the footnotes for the Class A and Class B licence.

Power levels in the new schedule

Band (MHz)	Carrier power supplied to the antenna	Peak envelope power supplied to the antenna (SSB modes)
1·81–2·00	9dBW (8W)	15dBW (32W)
All bands 3·5–29·7	20dBW (100W)	26dBW (400W)
70·025–70·5	16dBW (40W)	22dBW (160W)
144–146	20dBW (100W)	26dBW (400W)
430–432	10dBW erp	
432–440	20dBW (100W)	26dBW (400W)
All bands above 1GHz	150W maximum dc input power	26dBW (400W)

Note—Powers in watts given above are approximate.

Understanding the dBW

The concept of "dBW" is simply a way of expressing power levels relative to a fixed amount of power, which in this case is 1W. Using this system 1W is written as "0dBW", and each time you double a figure in watts you add 3 to the "dBW" figure. So for example, 2W equals 3dBW and 4W equals 6dBW. If you look in the table above, you will find all of the new "dBW" figures used in the new schedule together with the power given in watts.

Differences between Class A and Class B licences

In order to save space in this special pull-out, we have only printed the footnotes to the Class A schedule. Class B licensees should note that footnotes 2, 3 and 4 do not apply. In addition, as may be seen from the schedules themselves, Class B operators may not communicate using certain modes related to morse telegraphy.

As you will no doubt realize, the amount of work which both staff and volunteers have had to carry out in order for us to arrive at a satisfactory outcome has been considerable; however, the results have been positive and, during the remainder of this year, work will continue so that the UK radio amateur will continue to enjoy the benefits of a well thought-out and well-engineered schedule.

*The date on which this Gazette notice is actually published may be obtained by listening to GB2RS news broadcasts or telephoning *RSGB Headline News on 01-837 4118.*

THE SCHEDULE

Frequency Bands in MHz	Footnote No.	Power Limitations		Classes of Emission (see C & D Overleaf)
		Carrier Power supplied to the Antenna	Peak Envelope Power supplied to Antenna for SSB Operation	
1.81 - 1.85	2	9 dBW	15 dBW	A1A
1.85 - 2.0	2 & 4			
3.5 - 3.8	2, 9, 11 & 16	20 dBW	26 dBW	A1B
7.0 - 7.1	9,11,12&16			
10.1 - 10.15	1 & 16			A2A
14.0 - 14.25	9,11,12&16			
14.25 - 14.35	9, 11 & 16			A2B
21.0 - 21.45	9,11,12&16			
28.0 - 29.7	9, 11 & 12			A3E
70.025 - 70.5	1 & 3	16 dBW	22 dBW	
144.0 - 146.0	9,11,12,16&18	20 dBW	26 dBW	R3E
430.0 - 432.0	1,6,7 & 18	See f/note 7	See f/note 7	
432.0 - 435.0	1, 10 & 18	20 dBW	26 dBW	H3E
435.0 - 438.0	1,10, 14&18			
438.0 - 440.0	1, 10 & 18			J3E
Frequency Bands in MHz	Footnote No.	Maximum DC input Power (see A & B overleaf)	SSB Operation	F1A
1240.0 - 1260.0	1,10, 17 & 18	150 watts	26 dBW	F1B
1260.0 - 1270.0	1,14,15,17&18			
1270.0 - 1325.0	1,10, 17 & 18			F2A
2300.0 - 2400.0	1,10, 17 & 18			
2400.0 - 2450.0	1,10,13,14,17 & 18			F2B
3400.0 - 3475.0	1, 17 & 18			F3E
5650.0 - 5670.0	1,10,13,14,15 17 & 18			G1A
5670.0 - 5680.0	1,10, 17 & 18			
5755.0 - 5765.0	1,10, 17 & 18			G1B
5820.0 - 5830.0	1,10, 17 & 18			
5830.0 - 5850.0	1,10,13,14,15 17 & 18			G2A
10,000 - 10,450	1,10, 17 & 18			G2B
10,450 - 10,500	1,10,13,14, 17 & 18			G3E
24,000 - 24,050	8,10,12,17&18			
24,050 - 24,250	1,8,10,17 & 18			
2350.0 - 2400.0	1,5,13,17 & 18	25 watts mean power & 2.5 kilo-watts peak power		K1A L2A K2A L3E K3E M2A Q2A V2A
10,050 - 10,450	1,5, 17 & 18			
5755.0 - 5765.0 5820.0 - 5850.0	1,5,13,17 & 18			

FOOTNOTES TO CLASS A LICENCE SCHEDULE

1. This band is allocated to stations in the amateur service on a secondary basis on condition that they shall not cause interference to other services.

2. This band is shared with other services.

3. This band is available to amateurs until further notice provided that use by the Licensee of any frequency in the band shall cease immediately on the demand of a Government official.

4. The type of transmission known as Radio Teleprinter (RTTY) may not be used in this band.

5. Use by the Licensee of any frequency in this band shall be only with the prior written consent of the Secretary of State.

6. This band is not available for use within the area bounded by 53°NO2E, 55°NO2E, 53°NO3W and 55°NO3W.

7. In this band the power must not exceed 10 dBW erp (effective radiated power).

8. Use by the Licensee of any frequency in this band shall only be with written consent of the Secretary of State and such consent shall indicate the power which may be used, taking into consideration the characteristics of the Licensee's station.

9. Slow Scan Television may be used in this band.

10. High Definition Television (A3F, C3F, F3F, G3F) may be used in this band.

11. Facsimile Transmission(A3C,F3C,G3C)may be used in this band, with a bandwidth not greater than 6 kHz.

12. The amateur-satellite service also has an allocation in this band.

13. This band is allocated to stations in the amateur-satellite service on a secondary basis, on condition that they shall not cause interference to other services.

14. The amateur-satellite service may operate in this band in accordance with International Radio Regulation 2741, viz:

Space stations in the amateur-satellite service operating in bands shared with other services shall be fitted with appropriate devices for controlling emissions in the event that harmful interference is reported in accordance with the procedure laid down in Article 22 of the Radio Regulations. (Administrations authorising such space stations shall inform the IFRB and shall ensure that sufficient earth command stations are established before launch to guarantee that any harmful interference which might be reported can be terminated by the authorising administration (see RR 2612).)

15. The use of the amateur-satellite service in the following bands shall be limited to the direction stated below:-

1260 - 1270 MHz Earth to Space
5650 - 5670 MHz Earth to Space
5830 - 5850 MHz Space to Earth

FOOTNOTES TO CLASS A LICENCE SCHEDULE (continued)

16. The bands allocated to the amateur service at 3.5, 7.0, 10.1, 14.0, 21.0, and 144 MHz may, in the event of natural disasters, be used by non-amateur stations to meet the needs of international emergency communications in the disaster area in accordance with regulations of the Radio Regulatory Department.

17. Since high intensities of RF radiation may be harmful, the following safety precaution must be taken: in locations to which people have access, the power density on transmit must not exceed the limits recommended by the competent authorities. Currently this limit is 10 mW/cm^2.

18. Data transmission may be used within the frequency bands 144 MHz and above provided (a) the Station callsign is announced in morse or telephony at least once every 15 minutes and (b) emission is contained within the bandwidth normally used for telephony.

A. DC input power is the total direct current power input to (i) the anode circuit of the valve(s) or (ii) any other device energising the antenna.

B. As an alternative for R3E and J3E single sideband types of emission, the power shall be determined by the peak envelope power (PEP) under linear operation.

C. Double Side Band suppressed carrier emissions are permitted within the terms of this licence.

D. The symbols used to designate the classes of emission have the meaning assigned to them in the Telecommunication Convention. They are:-

Amplitude Modulation

A1A Telegraphy by on-off keying without the use of a modulating audio frequency.

A1B Automatic telegraphy by on-off keying, without the use of a modulating audio frequency.

A2A Telegraphy by on-off keying of an amplitude-modulating audio frequency or frequencies, or by on-off keying of the modulated emission.

A2B Automatic telegraphy by on-off keying of an amplitude-modulating audio frequency or frequencies, or by on-off keying of the modulated emission.

A3E Telephony, double sideband.

A3C Facsimile Transmission.

H3E Telephony using single sideband full carrier, amplitude modulation.

R3E Telephony, single sideband, reduced carrier.

J3E Telephony, single sideband, suppressed carrier.

A3F/C3F Slow Scan Television and High Definition Television

FOOTNOTES TO CLASS A LICENCE SCHEDULE (continued)

Frequency Modulation

F1A Telegraphy by frequency shift keying without the use of a modulating audio frequency: one of two frequencies being emitted at any instant.

F1B Automatic telegraphy by frequency shift keying without the use of a modulating audio frequency.

F2A Telegraphy by on-off keying of a frequency modulating audio frequency or frequencies, or by on-off keying of a frequency modulated emission.

F2B Automatic telegraphy by on-off keying of a frequency modulating audio frequency or frequencies, or by on-off keying of a frequency modulated emission.

F3E Telephony.

F3C Facsimile Transmission.

F3F Slow Scan Television and high definition television.

Phase Modulation

G1A Telegraphy by phase shift keying without the use of a modulating audio frequency.

G1B Automatic telegraphy by phase shift keying without the use of a modulating audio frequency.

G2A Telegraphy by on-off keying of a phase-modulating audio frequency or frequencies, or by on-off keying of the phase-modulated emission.

G2B Automatic telegraphy by on-off keying of a phase-modulating audio frequency or frequencies, or by on-off keying of the phase-modulated emission.

G3E Telephony

G3C Facsimile Transmission

G3F Slow Scan television and high definition television.

Pulse Modulation

K1A Telegraphy by on-off keying of a pulsed carrier without the use of a modulating audio frequency.

K2A Telegraphy by on-off keying of a modulating audio frequency or frequencies or by on-off keying of a modulated pulsed carrier - the audio frequency or frequencies modulating the amplitude of the pulses.

L2A Telegraphy by on-off keying of a modulating audio frequency or frequencies or by on-off keying of a modulated pulsed carrier - the audio frequency or frequencies modulating the width (or duration) of the pulses.

K3E Telephony, amplitude modulated pulses.

L3E Telephony, width (or duration) modulated pulses.

M2A Telegraphy by on-off keying of a modulating audio frequency or frequencies or by on-off keying of a modulated pulsed carrier - the audio frequency or frequencies modulating the position or phase of the pulses.

Q2A Telegraphy by on-off keying of a modulating audio frequency or frequencies or by on-off keying of a modulated pulsed carrier - the audio frequency or frequencies modulating the angle of the carrier during the pulses.

V2A Telegraphy by on-off keying of a modulating frequency or frequencies or by on-off keying of a modulated pulsed carrier - which is a combination of the foregoing, or is produced by other means.

CLASSIFICATION OF EMISSIONS

Basic Characteristics

The basic characteristics of a radio emission are described by three symbols as follows:-

(i) first symbol-type of modulation of the main carrier.

(ii) second symbol - nature of Signal (s) modulating the main carrier.

(iii) third symbol - type of information to be transmitted.

INTERPRETATION

(i) Carrier Power of a Radio Transmission. The average power supplied to the antenna from a transmitter during one radio frequency cycle under conditions of no modulation. This interpretation does not apply to pulse modulated emissions.

(ii) Peak Envelope Power of a Radio Transmitter. The average power supplied to the antenna by a transmitter during one radio frequency cycle at the highest crest of the modulation envelope, taken under conditions of normal operation.

(iii) Effective Radiated Power (e.r.p) (in a given direction): The product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction.

THE SCHEDULE

Frequency Bands in MHz	Footnote No.	Power Limitations		Classes of Emission (see C and D overleaf)
		Carrier Power supplied to the Antenna	Peak Envelope Power supplied to Antenna for SSB Operation	
144.0 - 146.0	9,11,12,16&18	20 dBW	26 dBW	A3E R3E H3E J3E F3E G3E
430.0 - 432.0	1, 6, 7, & 18	see f/note 7	see f/note 7	
432.0 - 435.0	1, 10 & 18	20 dBW	26 dBW	
435.0 - 438.0	1, 10, 14 & 18			
438.0 - 440.0	1, 10 & 18			
Frequency Bands in MHz	Footnote No.	Maximum DC input Power (see A & B overleaf)	SSB Operation	
1240.0 - 1260.0	1, 10, 17 & 18	150 watts	26 dBW	
1260.0 - 1270.0	1,14,15,17&18			
1270.0 - 1325.0	1, 10, 17&18			
2300.0 - 2400.0	1, 10, 17&18			
2400.0 - 2450.0	1,10,13,14,17&18			
3400.0 - 3475.0	1, 17 & 18			
5650.0 - 5670.0	1,10,13,14,15, 17&18			
5670.0 - 5680.0	1, 10, 17 & 18			
5755.0 - 5765.0	1, 10, 17 & 18			
5820.0 - 5830.0	1, 10, 17 & 18			
5830.0 - 5850.0	1,10,13,14,15, 17&18			
10,000 - 10,450	1, 10, 17 & 18			
10,450 - 10,500	1,10,13,14, 17 & 18			
24,000 - 24,050	8,10,12,17&18			
24,050 - 24,250	1,8,10.17&18			
2350.0 - 2400.0	1,5.13,17&18	25 watts mean power & 2.5 kilo-watts peak power		K3E L3E
10,050 - 10,450	1, 5, 17 & 18			
5755.0 - 5765.0 5820.0 - 5850.0	1,5,13,17&18			

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MULTIMODE OPERATION
Never before possible from such a compact package, true multimode – USB, LSB, CW & FM – operation is yours to enjoy. With CW and SSB activity at an all-time high, you will not be left out of the satellite or DX action and you can still ragchew on FM simplex or even via a repeater (inbuilt ±600kHz shift and 1750Hz tone burst).

ADVANCED MICRO CONTROL
Advances in microprocessor circuitry allows selectable synthesizer steps, up/down scanning from the microphone, priority channel operation, and ten memories (with memory scan), called up with fingertip ease.

LCD DISPLAY
A large, easy-to-read Liquid Crystal Display provides readout of the operating frequency, and an indication of a number of the control functions. The display, highly readable under conditions of bright sunlight, is backed up by an illuminating lamp for night-time operation while portable or mobile.

PROGRAMMABLE SYNTHESIZER
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 the NC11C 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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