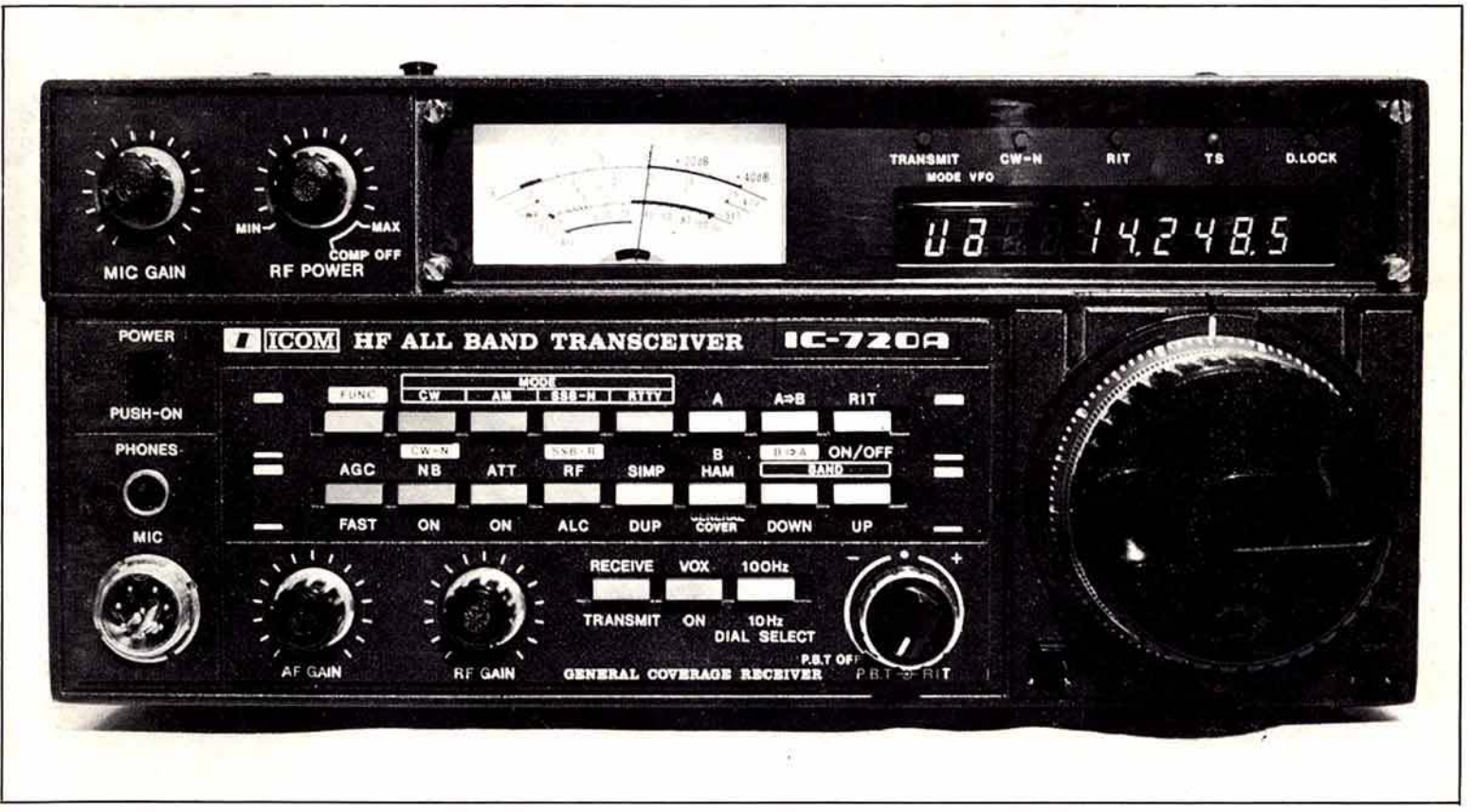
February 1982

RADio COMmunication

REVIEWED IN THIS ISSUE

THE ICOM IC720A



Journal of the Radio Society of Great Britain

CATRONICS FOR TRIO

ALL TRIO EQUIPMENT PURCHASED FROM CATRONICS NOW CARRIES 2 YEAR GUARANTEE

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:
H1 = 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:	H1 = 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:	**£374**

TR7800
2M FM SYNTHESISED

TR7800 Brief Specification

Frequency Range:	144–145·995MHz
RF Output power:	H1 25W, LO 5W (adjustable)
RX sensitivity:	0·2μV for 12dB SINAD
Autoscan:	5kHz or 25kHz
Memories:	15 inc 1 × priority
Repeater shift:	+/− 600kHz & Reverse
Frequency display:	4 digit LED & Mem. No.
Catronics' Price:	**£284**

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:	**£334**

R1000
COMMUNICATIONS RECEIVER

R1000 Brief Specification

Frequency Range:	200kHz–30MHz
Modes:	AM, USB, LSB, CW
Sensitivity:	<2MHz: 5μV >2MHz: 0·5μV for 10dB S + N/N on SSB
Digital Readout:	to 1kHz
Clock:	Quartz controlled
Catronics' price:	**£297**

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

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

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FEBRUARY 1982

VOLUME 58 No 2

RADio COMmunication

CONTENTS

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

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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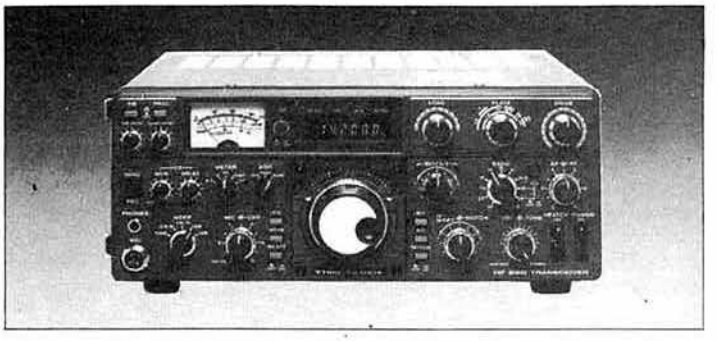
Closing date for contributions unless otherwise notified: five weeks before publication date

HF TRIO *pacesetter in amateur radio*

We've handled a lot of equipment in our time as radio amateurs but the TS830S really took us by storm. As you will hear if you listen on the air, it's reputation is high all round the world. We think the TS830S is exactly right for the operator who has carefully considered all the features necessary for top performance, put aside all the gimmickry and found the TS830S. This rig offers you all band coverage; true frequency readout on all modes; variable bandwidth *and* passband tuning; rugged, reliable 6146B valves in the PA; top quality both in construction and design; and, above all, the Trio reputation for giving you the best equipment at a reasonable price. Thousands of happy users worldwide all confirm that if you want total satisfaction, try the TS830S. Send for details today.



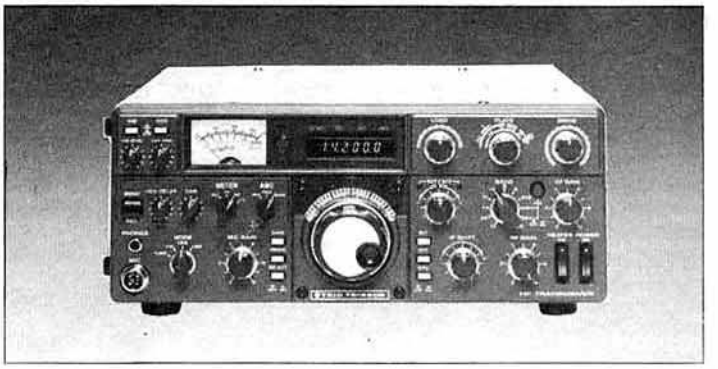
TS 830S

£694.83 inc VAT. Securicor £4.50

A recent addition to the Trio HF range, and proving amazingly popular is the new TS530S. Designed as a "little brother" to the TS830S, the TS530 uses the same PLL system, same RF boards, same readout system and many other features of the 830 but without the variable bandwidth facility. You do, of course, have the famous Trio IF shift system for dodging the QRM.

We really believe that the TS530 is the finest mid-price HF base station transceiver on the market and we would like the opportunity to prove it to you. Why not call us, or call in person to see and try out this super rig.

If you like to read lists of features, how about 160-10 metres including new bands: passband tuning on all modes: 6146B PA tubes for low intermod: low power tune up: digital readout shows *true* frequency at all times: VOX built in: CW sidetone: speech processor: noise blanker: etc.

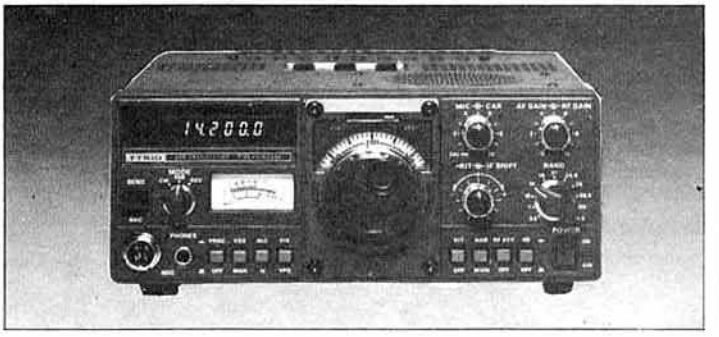


TS 530S

£534.98 inc VAT. Securicor £4.80

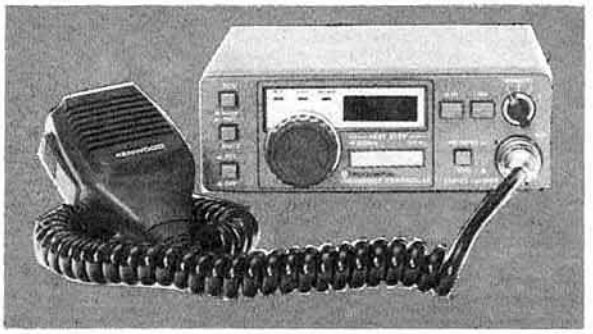
For the keen mobile/portable enthusiast, the "no-tune" solid state transceiver has proved irresistible, and the Trio TS130S is probably the best of the bunch. When the original TS120 was introduced, there were gasps of amazement at Trio's achievement in making a first class HF rig in such a small size. With the advent of the TS130S, the mobile rig really comes to maturity. Imagine an 8 band transceiver with digital readout, I.F. shift, vox, speech processor, single conversion PLL derived transmitter and receiver, 100W output, red hot receiver – and all in a package you can carry on the palm of one hand. It's a staggering thought.

The unquestioned excellence of Trio design and manufacture shows in every aspect of the TS130S – why not see it and try it for yourself.



TS 130S.V

£525.09 inc VAT. TS130V £445 inc VAT



The compact DFC230 Digital Frequency Controller provides maximum efficiency and flexibility for mobile and fixed operation by combining a 20Hz step digital VFO with 4 memories. ● 20Hz step digital VFO. ● Four memories. Frequency can be transferred from VFO to memory or from memory to VFO. ● Built-in digital display. Shows digital VFO or memory frequency. ● Perfect for mobile installation. ● UP/DOWN manual scan. Frequency can be shifted with UP/DOWN microphone (supplied with DFC-230) or with FAST STEP switch on front panel. ● Cross-operation switch. Allows split-frequency operation, with transceiver VFO on transmit and DFC-230 (VFO or memory) on receive, or vice versa. ● RIT (receiver incremental tuning). ● RIT, VFO, and MEMO indicators: LEDs show functions in operation. ● Compatibility with TS-830S, TS-120S/V and TS-130S/V.

DFC 230

£179.86 inc VAT. Securicor carriage £4.80

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NEW *from Trio for 1982*

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

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

R600

R600 RECEIVER. £235.06 inc VAT carriage £4.50

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

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

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

TR2500

TR2500 HANDHELD TRANSCEIVER £207.00 inc VAT carriage £4.50

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Belfast 647570

TRIO

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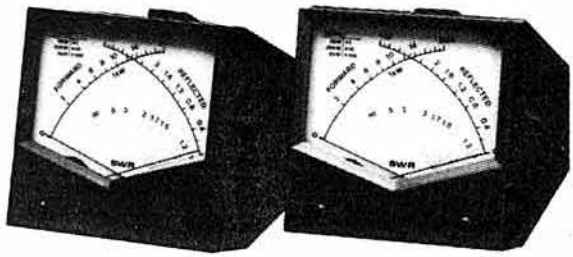


CN540

50MHz-150MHz
£35.00 inc VAT carr £1.50

CN520

1·8MHz-60MHz
£32.50 inc VAT carr £1.50

The UL1000 is a new concept in receiving station accessories and will help any keen listener to improve the performance of his station, particularly in the difficult conditions existing in the medium wave band (500kHz-1.6MHz).
The UL1000 is a self-contained variable gain, tuned preamplifier suitable for use with various aerial systems. A particular feature of the UL1000 is the use of a high Q loop aerial for the 500kHz-1·6MHz band.

UL1000

£39.50 including VAT
carriage £2.00

HONOR

carriage on meters £1.00
KRT100 £5.75 KRT200 £10.50 KRT500 £19.50

For those of you who enthuse over portable SSB operation on the hills and mountains of the UK, or wish to chat to the local lads whilst seated by your fireside, then the Mizuho SB2X 2 metre SSB portable is the rig for you. One watt output on the SSB frequencies 144.000 to 144.600 and the ability to listen to the beacon frequencies from 144.800 to 145.000 (also transmit).

£165.00 inc VAT carr £4.50

MIZUHO SB2X

UHF | VHF

TR9000 The exciting TR9000 2-metre all-mode transceiver combining the convenience of FM with long distance SSB and CW in a very compact, very affordable package. Because of its compactness the TR9000 is ideal for mobile installation, add on its fixed station accessories and it becomes the obvious choice for your shack.

TR9000

£394.00 inc VAT Securicor carr £4·50

The TR9500, a 70cm multimode mobile giving SSB, FM and CW operation in a compact rig based on the phenomenally successful 2 metre 9000. Combining the convenience of FM with the 'DX ability' of SSB on the 70cm band this is the rig all discerning VHF and UHF amateurs have been waiting for.

TR9500

£449.88 inc VAT Securicor carr £4.50

TR7800 Trio's remarkable TR7800 2-metre FM mobile transceiver provides all the features you could desire for maximum operating enjoyment. Frequency selection is easier than ever, and the rig incorporates new memory development for repeater shift, priority, and scan. The TR7800 by Trio, the only FM mobile.

TR7800

£284.97 inc VAT Securicor carr £4.50

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

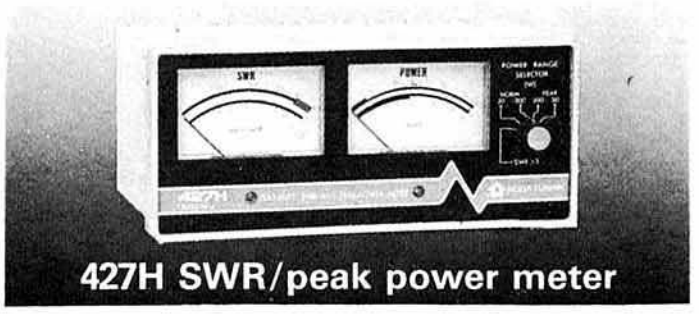
EMPORIUM NEWS

Well, another month has gone by and the log book is a little fuller. Can you imagine that after **a hard day's work** writing amateur radio, talking amateur radio and generally being totally involved in amateur radio, I return home to my loving wife, eat my tea, have a word with the family budgerigar and retire to the shack to listen **and work a bit of DX on 70cm** sideband – yes, of course, you can work DX on 70cm sideband, that is if you are using **a Trio TS780**. I told you all about it last month – well it's still in my shack and going strong. Of course I now have it programmed to my requirements and three small cells installed to defeat those failures of electrical supply to the shack. **Again a winner from Trio.** Just imagine what other manufacturer would have thought of putting a free-running synthesized VFO in a mechanism which at the flick of a switch would give 12·5kHz steps plus click stop feel. Not manufacturing genius but a design team which obviously has dedicated amateurs within it. You can tell the amateur repeater scene is flourishing in Japan; The TS780 has both 2 metre and 70cm shift within it and – wait for it – fitted reverse repeater.

John Wilson, our Technical Director, has just recently been burning midnight oil over **the Trio R820 Receiver.** Why, you may ask: because Roy, our man with the Trio R820, yearned to listen to those oceanic air traffic control frequencies. He, Roy that is, was a bit peeved because the NRD515 I was using had full coverage. Anyway, to get back to the plot, John, for Roy and, if you drop us a line with a stamped addressed envelope, for you, has produced a mod that greatly increases the general coverage facility of the Trio R820 receiver. Don't hear much of Roy on the band now he's oceanic.

Also from John, and I quote: "At the same time there is **a change of attitude** at consumer level. Price is still very important, but with money so tight no one can afford a bad purchase even if it's cheap. There is more awareness of 'price value' with more emphasis on brand quality, guarantees, durability, availability and good old fashioned service".

From "E.R.T. Magazine", October, 1981 and said by the Commercial Director of a 95 branch wholesaler in electrical and electronic products.



We have *always* had this approach and it's good to see others confirming it. There really is more to buying radio equipment than scanning the price lists for "ten quid off".

What a blessing to have a short wave receiver in the shack on these long dark nights. I spent an interesting evening last night, courtesy of the short wave broadcast stations, on a trip round the world. Absolutely colossal signals from some of the Far East stations and for a dull Sunday afternoon the music program from Radio Free Europe on 9595 is very good.

Our range of receivers starts with the **SRX30D (£215)** which is a first class rig to start with, digital readout and continous coverage from 500kHz to 30MHz. Moving up market gently, we come to **the R600, the new general coverage receiver from Trio** which has all the receive capabilities of the R1000 without the clock and certain sophistications. **The R1000** is still a current model and, as such, is still in great demand **at the price of £297.85.** Available for both rigs is the matching speaker **SP100 (£26.91).** Of course, we still have the ultimate in receivers – **the NRD515 (£1,090.20),** the matching memory unit (£198) and the speaker at £34.50. The transmitter for this NRD line-up is now available at (£1,223.60) with the matching power supply at £148.35. Perhaps a little expensive I hear you say but what a station line up. And what superb equipment. **What a pleasure to find a manufacturer who still puts quality and performance ahead of any cost considerations.** So if you want the best you have to pay for it.

Whilst we seem to have drifted to the subject of HF transmitters, (drifted, whoever admitted to drifting!) take a look at the Trio range of HF transceivers. **The TS830S** (£694.83), **the TS530S** (£534.98), **the TS130S** (£525.09) and, last but not least, **the TS130V** (£445.05). **Compare the prices** with other equipment offering the same operating facilities and I am sure you will be amazed. Have a look at the page on HF equipment and you will see what I mean. People now seem to be talking more about **the DFC230 digital frequency controller** and I am not surprised at that. The DFC230 (£179.86) not only mobilizes any of the current equipment, HF equipment but, for base station operation the DFC230 provides 4 memories and effectively another VFO unit enabling split frequency operation.

Here at Matlock we have a full TS530S line up operating into a 3-element beam antennae on 28 and 21MHz – come along, and have a listen on a first class Trio station. You will even be able to tell the time world wide using **our HC10 digital station world time clock** (£58.88). Linked up to our station here at Matlock are **the Daiwa DR7500X preset rotator** (£98.04) and the cross needle meter, **the Daiwa CN620A** (£52.81). Of course, had it not been for the perfect matching of the aerial to the transmitter here at Matlock, we would have used either **the new CNW518 manual tuning unit** (£175) or one of the automatic tuning units. Either **the CNA1001A** (£156) or **CNA2002** (£228) high power version.

We also have in the Lowe Station a Trio **multi mode TR9000** (£374.90) and matching power supply PS20 (£49.45) speaker SP120 (£23) and, of course, base plinth BO9 (£34.96).

All those who avail themselves of the station seem pleased with the operability of the line up. In these days of increased 2 metre FM activity, to work DX on the sidebands is a real pleasure. Remember, we have in stock most of the Jaybeam range of aerials. If you are coming to Matlock for a specific Jaybeam antenna, then give us a ring first and check with David, yes he's still with us, whether we have the particular one you want.

The SB2X seems to have caught on, **a portable 2 metre SSB rig** priced at a realistic £165 must be just the thing for those of you who frequent the mountain tops. Giving coverage both on receive and transmit of both the sideband end of the band, plus the beacons section, then what more do you want. Don't tell me a multi mode, 1·6 through to 433MHz transceiver complete with general coverage receiver facilities in a package no bigger than the TR2300 – running at least 200W and priced at no more than £200.

Well keep reading Emporium News and you may be surprised. **A Happy Customer** popped into the shop last week pleased as punch with his TR7800 he was. The TR7800 you remember – the **only** 2 metre FM mobile transceiver (£284.97) the rare version, the TS7850 40 watt version at £284.97 – well back to the story. The gentlemen had purchased the TR7800 several weeks before and was very pleased with it. However, he had noticed that when driving his Volvo Estate car whilst using the TR7800 he achieved an increased four miles per gallon so there we are – **buy a Trio TR7800 and improve your car mileage per gallon!** The fact that you can keep in touch with the amateur 2 metre FM world is an added bonus.

For those of you who spend long hours in a car, then why not monitor the 2 metre FM band. **The SR9** (£46) and **the SR11,** the scanning version (£55) are just the thing for keeping in touch and relieving the tedium of the traffic jam. If you cannot stretch as far as a new piece of equipment, why not drop us a line and **ask for the current second-hand list.** I am sure you will appreciate that by the time you have received the list it will be out of date but you can, of course, telephone us and find out the up to the minute second-hand stock situation. And if something takes your fancy then reserve it.

Anyway, that's it for now as rumour has it that David has given a customer a token for the drinks machine and the showroom is in an uproar so – until next month Gud DX ès 73es FB OM, etc.

COMING SOON! IC-490E.

At last an ICOM 70cm. multimode mobile. SSB, CW, and FM. 10W output, 430-439·99 Mhz. Similar features to the 2m. brother IC-290E. Price around £445!

Call us for advance details

ICOM

IC–730 The Best for Mobile.

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, 100Hz and 1kHz steps allows effortless tuning and what's more a memory is provided for one channel per band. Further convenience circuits are 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 switchtable RF Pre-Amp is a boon on todays crowded bands. Full metering, WWV reception and connections for transverter and linear control almost completes the IC-730's impressive facilities.

IC–2KL Super Linear

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 30 MHz 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 overridden 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, has a high conductance, several hundred times that of copper and 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–720A The Best for H.F.

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! 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.

Here are some of the features:-

- Two VFO's with automatic band changing
- General coverage receiver 100 kHz to 30 MHz (with provision to transmit if you have a licence!)
- No PA tuning
- Protection against rotten antennas
- Self cancelling RIT
- Full power capability (even on RTTY) for prolonged periods.
- Automatic control of linear and antenna tuner

IC–24G Low Priced Mobile £169 inc.

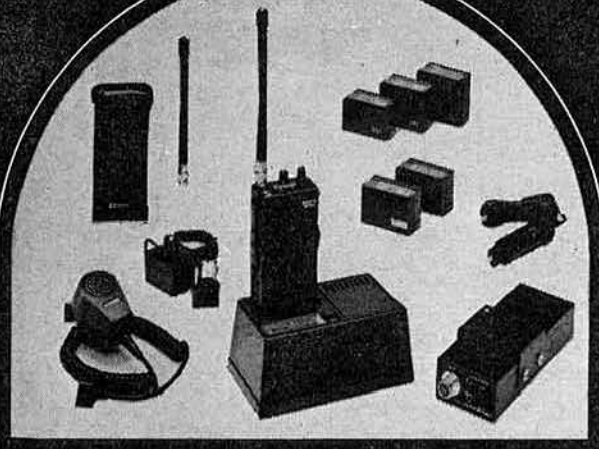
The famous IC-24O has been improved given a face lift and renamed the IC-24G. Many thousands of 240s are in use, and its popularity is due in part to simplicity of operation, high receiver sensitivity and superb audio on TX and RX. The new IC-24G has these and other features. Full 80 channels (at 25kHz 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 crystal controlled tone call Hi–10W and Lo–1W RF outputs is available along with a 12½ kHz upshift, should the new channel spacing be necessary. The old IC240 proved to be the most reliable rig we have ever sold – the IC24G 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.

IC–251E Great Base Stations IC–451

ICOM produce a perfect trio in the VHF base station range, ranging from 6 Meters thru 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, turning 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.

Buy Direct and Enjoy the Benefits

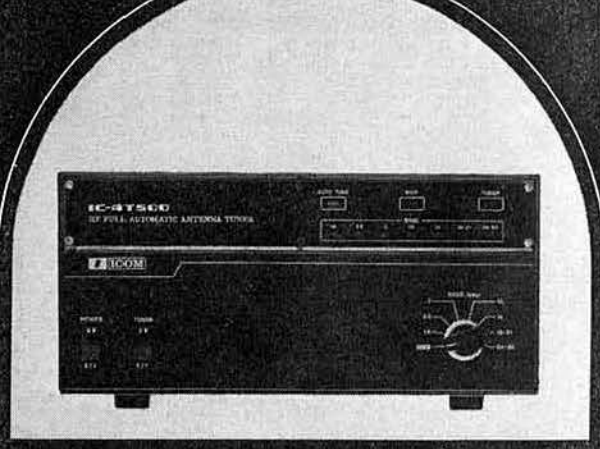


IC–2E (2m)
IC–4E (70 cm) **The Perfect Portable Pair.**

FULLY SYNTHESIZED – covering 144–145.996 in 400 5kHz steps (2E) 430–440 (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
BNC ANTENNA OUTPUT SOCKET – 50 ohms for connecting to another antenna or use the Rubber Duck supplied
SEND BATTERY INDICATOR – Lights during transmit but when battery power falls below 6V it doesn't 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 (2E) + 116MHz (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

IC ML1	
10 Watt Mobile Booster For IC2E	£49.00
BP5 11 Volt Battery Pack	£30.50
BP4 Empty Battery Case for 6x AA Cells	£ 5.80
BP3 Standard Battery Pack	£17.70
BP2 6 Volt Pack	£22.00
BC30 Base Charger for Above	£39.00
BC25 Mains Charger As Supplied	£ 4.25
DC1 12 Volt Adaptor Pack	£ 8.40
HM9 Speaker/Microphone	£12.00
CP1 Mobile Charging Lead	£ 3.20
LC1/2/3 Cases	£ 3.60 each

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



Announcement of the New IC–AT500 Automatic Antenna Tuner

Icom's Research and Design Team is proud to announce the debut of the new IC-AT500 Automatic Antenna Tuner. This innovative piece of equipment is a marvel of electronic circuit wizardry and is the first of its kind on the market anywhere in the world today.

This compact 6.4 kg antenna tuner provides the following features:

Quick tune up
The newly developed detector circuit detects resistance and reactance of the load, and controls powerful motors to tune the two variable capacitors, thus making the tune up time very short.

Auto band switching
When the IC-720A, IC-701 (or IC-730 with the optional LDA Unit installed) is used, band switching of the tuner can be controlled by the band switch of the IC-720, 720A or 730. This tuner has dual accessory sockets, so the auto band switching function can be used with the IC-2KL linear amplifier at the same time.

Pre-set capability
The matching circuit can be used for each band, so you are able to make quick QSY's and have trouble-free operation.

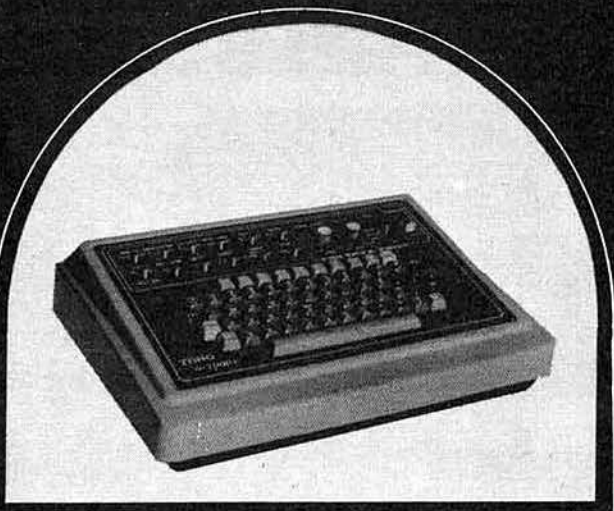
Four antenna connectors
This tuner has four coaxial sockets for antennas, and selects the suitable antenna for each band automatically. When the power of this tuner is turned off, this tuner can be used as an automatic antenna selector.

Two way power source
This tuner can be used with DC 13.8 volts or AC240 volts.

Thanet Electronics

ICOM

143 RECULVER RD.,
BELTINGE,
HERNE BAY, KENT.
Tel: 02273 63859



£699 NEW! 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 modem 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 2 V.
DISPLAY OUTPUTS:- RF output and composite video output 1V P-P 75 ohms.
6 memories – 32 chrs each.
Printer interface – Centronic compatable parallel interface buit-in.
OUTPUT FOR OSCILLOSCOPE:- RTTY and ASCII impedance 200K ohm IV 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 V.A.T.

Green Display Monitor CRT 120G	£125.00
Dot Matrix Printer HC 900	£449.00
Printer Socket SK7	£ 8.50
Linear Amplifiers :-	
UC 70	
(430 mHz 55W) + RX. Pre-amp	£149.00
2M–50W (2m)	£ 65.00
2M–100W (2m) + RX. Pre-amp	£115.00
MR–150W (2m) + RX. Pre-amp	£159.00
MR–250W (2m) + RX. Pre-amp	£259.00
MR–28LB	
(26-30 MHz) + RX. Pre-amp	£ 65.00
Mast-Head Pre-amps:-	
RX 144 (including control)	£ 65.00
RX 430 (and psu box)	£ 70.00

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

Thanet Electronics

ICOM

Tono Theta 7000E **£599**

A great computer on offer from Thanet.

The new THETA Means that every Amateur can enjoy the visual display of CW, RTTY and ASCII in both transmit and receive modes. Just connect the TONO to any TV set via the antenna terminals or to a page printer from the parallel port provided. Bring up your CW speed in receiving or sending by either watching received signals or from recorded cassettes. Connection to the transceiver is via the key, phone and mic sockets.

Some of the Outstanding Features:

COMMUNICATIONS COMPUTER THETA 7000E
UHF and Composite Video Output Printer Interface. Wide range of transmitting and receiving speeds 10CW speeds + 8RTTY.
Built-in demodulator for high performance for 170 Hz, and 820 Hz shift.
Crystal controlled modulator for ASFK Hi or Lo tone.
Convenient ASCII key arrangement. Large capacity display memory – 2 pages 32 chr x 16 lines split screen to RX and TX if required.
Automatic transmit/receive switch. Anti-noise circuit. Battery backed up memory 7 channels of 64 chrs. Send function. Buffer memory, 53 character type ahead, rub out function. Simultaneous access of the memory – 53 character type ah. LF (line feed cancel function. Cursor control CR/LF 172, 60 or 80 chrs per line) Echo function.
Word wrap around function. Transmit/receive in ASCII or RTTY, CW identification function. Mark and break (space and break) system. Monitor circuit & CW practice functions. Variable CW weights. Cross pattern checking output terminal, log computer output provided. Test message function (Ry and OBF) Receive only version £259

Phone or write for the price list of accessories for this unit

You will get a good deal from Thanet–CALL US!

What are the benefits of buying direct?

1) Full 2 years warranty on all equipment.
2) Excellent back up and after sales service using fully equipped workshop.
3) ICOM trained technical staff.
4) No charge for speedy delivery service.
5) Avoid disappointments – buy direct from the experts with years of experience.

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How to place your order for all advertised products:

- Fill in the attached coupon.
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- Out of hours leave a message on our ansafone stating clearly your name, address, daytime Tel. No. Access/Barclaycard No.
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Please note Access/Barclaycard customers – goods must be sent to address registered with the credit card company.

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Access

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TRIO R-1000

TR-9000

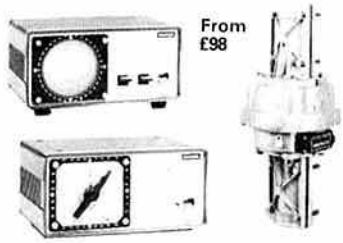
TRIO TS-830S

TRIO TS-130S

NEW TRIO R-600 RECEIVER AT £235.00

TRIO PRICES										
Full Range of Accessories Available	TS830S	£694.83	TS530S	£534.98	TS130S	£525.00	AT130	£79.12	TR78500	£314.87
	AT230	£119.83	VFO240	£92.92	TS130V	£445.05	TR2300	£165.00	TR8400	£334.88
	SP230	£34.96	R820	£589.95	TL120	£144.90	TR2400	£198.95	TR9000	£394.91
	VFO230	£215.97	TS180S	£679.00	SP120	£23.00	TR7730	£247.94	TR9500	£449.88
	DFC30	£179.86	PS30	£88.55	PS20	£49.45	TR7800	£284.97	PS10	£64.86

DAIWA Full range of reliable antenna rotators



From £98

DAIWA AUTOMATIC ANTENNA TUNER/

CN1001A 200 watt £156.00
CN2002 2kW £228.00

FULL RANGE OF PUBLICATIONS IN STOCK

NRD-515 RECEIVER

For the discerning DXER comes the modern NRD-515 general coverage receiver ● Full of all performance advantages offered by any receiver ● All modes of operation PLL Digital VFO ● Solid state ● Up conversion type double conversion ● Frequency coverage 100kHz to 30MHz ● LF/MF bands below 1·6MHz are clearly receivable through the use of a filter/tuned circuit ● Band Pass tuning ● Noise Blanker ● RIR ● Attentuator ● AGC ● Recording terminal ● Mute terminal, etc which permits operation with the NSD-505 transmitter or ant transmitter ● Optional: speaker, memory unit, cw filter available. PRICE **£1038.00** inc VAT

JRC NSD515 Transmitter. Matching unit to the NRD515 Receiver available shortly. 65 years of experience produces the finest "separates" available in the world to the Radio amateur who wants the best in Amateur Radio.

YAESU

FRG7 Receiver	£199.00

DRAKE

TR7 Transceiver and AC PSU	£1,242.00
MN7 Antenna Matching Unit	£124.20
R7 General coverage receiver	£989.00

Other Drake equipment available to order.

STABILISED POWER SUPPLIES

Model 125 10-15V 5A	£28.00
Model 156S 4-15V 6A Twin Meter	£40.00
Model 1210S 4-20V 10A Twin Meter	£75.00

Maximum ratings quoted.

STATION ACCESSORIES (inc post)

SWR 25 Twin meter	£12.80
2-way Antenna switch (V2)	£6.50
3-way Antenna switch (V3)	£10.80
4-way Antenna switch (V4)	£11.00
2-way Antenna switch (VHF)	£11.00
DL50 50 watt dummy load 50ohm	£7.00
Oscerblock SWR200B SWR/Power	£41.00
FX1 Station Wavemeter	£29.00
Wellz SP200 swr/power	£49.95
HP4A High Pass Filter	£6.00
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Full range of aluminium tubing, wall clamps, brackets "V" bolts for the caller.

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FRG7700 Receiver	£329.00
SR9 2m FM Receiver	£46.00

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AR22 2m Handheld Receiver	£85.00

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12AVQ 10-15-20m Vertical Antenna	£43.13
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WIDE RANGE OF HY-GAIN BEAMS FROM STOCK

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HF5 vertical 10-through 80m	£41.40
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Extendarod	£10.99
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Coils for above	£6.56

FDK

Multi 700EX Transceiver	£199.00
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Shop Hours: Mon to Fri 9.30am to 5.30pm
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PCS 3000
2M FM 25 WATTS
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THE RIG WITH THE DETACHABLE CONTROL HEAD

The PCS 3000 by Azden is an advanced design combining state of the art with reliability. For the amateur who demands the utmost in versatility at a realistic price, the PCS surely combines all these qualities into one neat package. Full coverage from 144 to 146MHz is possible plus extended coverage into the American band up to 148MHz with modification. A compact microcomputer control unit is at the heart of the PCS 3000 providing control data for its many functions. In order that the memory information is not lost when the unit is disconnected from the 12V dc supply, a built-in ni-cad battery charged from the dc supply line is incorporated. Frequency selection is by remote microphone control or "touch pad" front panel controls in steps of 25kHz or 12½kHz. The "on-board" microcomputer has 8 memories including offset and priority information.

Three scan modes are possible: memory, band and programmable "limited band" with pause and auto-resume. 1,750Hz tone oscillator and 600kHz shift is incorporated with repeater input listening possible at the flick of the microphone side switch and, of course, it has a conservative 25 watts output rating that will put your signal head and shoulders above the 10 watt brigade. We could go on about its high/low power features, its advanced construction and its technical parameters, but maybe we should suggest you send us an S.A.E. for the full colour brochure on the advanced PCS 3000.

SEE PAGE 105 FOR EASY MAIL ORDER SLIP

NEW

AZDEN PCS 300

BREAKS THE PRICE BARRIER

£184

(incl. AC charger)

3 WATTS
144-146MHz
12½kHz STEPS
"PIEZO BLEEP"

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 3 watts output in the high power mode with ½ 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 March and at this price it's a real breakthrough.

WELZ RF PRODUCTS

NEW

FOR THE PROFESSIONAL AMATEUR

SP-45M SWR/PWR METER
140-470MHz
3W; 20W; 100W RANGE
FLAT RESPONSE **£45.00**

AC-38M 8 BAND ATU
400W PEP
20-300 OHMS UNBALANCED
SO 239 SOCKETS **£59.00**

CH-20A COAX SWITCH
2kW PEP
0-900MHz
0·1 dB LOSS
60dB ISOLATION
DOUBLE CAVITY
£15.95

PROFESSIONAL LINE

MODELS

SP200 1·8 160MHz 20W-200W-1kW	**£59.95** (n.c.)
SP300 1·8 500MHz 20W-200W-1kW	**£79.95** (n.c.)
*SP400 130-500MHz 5W-20W-150W	**£59.95** (n.c.)

*Note: VHF model has 'N' sockets

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LARGEST STOCKS IN THE SOUTH!

All prices include VAT

PRICE LIST – FEBRUARY 1982

Carriage charge in brackets

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TRIO

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)
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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)
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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)
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SP70	External speaker unit	18.60 (1.00)
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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)
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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)

YAESU

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	Fan 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)
Y0901	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/4 amp 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/dwn 8pin.p.	13.80 (1.00)
YM36	600 ohm as above (no up/dwn)	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)

FDK VHF/UHF EQUIPMENT

M700EX	2m FM 25 watt trcvr. 12v DC	199.00 (n.c.)
M750E	2m FM/10W trcvr 12v DC	289.00 (n.c.)
Expander	70cm transverter	219.00 (n.c.)
PS750	230v A.C. power supply	66.00 (2.50)
Palm II	2m FM 6 channel portable	109.00 (n.c.)
Palm IV	70cm FM 6 channel portable	149.00 (n.c.)
TB1	1750Hz tone burst	10.00 (n.c.)
T1200	2m FM synthesised portable	179.00 (n.c.)
TM56B	2m FM monitor 230v/12v DC	89.90 (n.c.)
CC2	Leather case for Palm II/IV	5.75 (.50)
BC2	230v AC battery charger	4.50 (.50)
BB2	"AA" size external battery case	5.00 (.50)
BT2	Ni-cad battery pack	12.00 (.50)
Xtals for Palm II and Palm IV		3.00 (.15)
Xtals for TM56B		2.50 (.15)

MICROWAVE MODULES

STOP PRESS

Ex demo SM220 + B58 Trio monitor 'scope 215.00 (5.00)

MMT28/144	10m linear transverter	99.00 (1.75)
MMT144/28	2m linear transverter	99.00 (1.75)
MMT432/28-S	70cm linear transverter	149.00 (1.75)
MMT432/144-R	70cm linear transverter	184.00 (1.75)
MMT70/28	4m linear transverter	115.00 (1.75)
MMT70/144	4m linear transverter	184.00 (1.75)
MMT1296/144	23cm linear transverter	184.00 (2.25)
MML144/25	2m 25W linear amplifier	59.00 (1.75)
MML144/40	2m 40W linear amplifier	77.00 (1.75)
MML 144/100	2m 100W linear amplifier	129.00 (2.75)
MML432/20	70cm 20W linear amplifier	77.00 (1.75)
MML432/50	70cm 50W linear amplifier	119.00 (2.75)
MML432/100	70cm 100W linear amp	228.65 (2.75)
MM2000	RTTY to TV converter	169.00 (1.75)
MM4000	RTTY Tcvr with keyboard	289.00
MMC28/144	10m converter	27.90 (.65)
MMC50/28	6m converter	27.90 (.65)
MMC70/28	4m converter	27.90 (.65)
MMC70/28LO	4m converter	29.90 (.65)
MMC144/28	2m converter	27.90 (.65)
MMC144/28LO	2m converter	29.90 (.65)
MMC432/28-S	70cm converter	34.90 (.65)
MMC432/144-S	70cm converter	34.90 (.65)
MMC435/51	70cm ATV converter	34.90 (.65)
MMC435/600	70cm ATV converter	27.90 (.65)
MMC1296/28	23cm converter, 10m output	32.20 (.65)
MMK1296/144	23cm converter, 2m output	59.80 (1.75)
MMDPT	Frequency counter probe	11.50 (.65)
MMA28	10m preamplifier	14.95 (.65)
MMA144V	2m RF switched preamp	34.90 (.65)
MMA1296	23cm preamplifier	29.90 (.65)
MMF144	2m filter	9.90 (.65)
MMF432	70cm filter	9.90 (.65)
MMV1296	70cm-23cm varactor tripler	34.50 (.65)
MMR15/10	15db attenuator, BNC terms	9.90 (.65)

JAYBEAM ANTENNAS

TB3	HF 3 element Tribander Beam	181.00 (4.50)
VR3	HF Vertical Triband	46.00 (3.00)
4 metre Antennas		
4Y/4M	4 element yagi	22.42 (3.00)
PMH2/4M	2 way phasing harness	13.22 (1.00)
2 metre Antennas		
DC1/WB	Wide band discone (100-470MHz)	41.40 (2.50)
LR1/2M	Omnidirectional vertical	25.87 (2.50)
C5/2M	5dB glass fibre colinear	47.70 (3.50)
5Y/2M	5 element yagi	12.07 (2.00)
8Y/2M	8 element yagi	15.50 (2.50)
10Y/2M	10 element 'long yagi'	33.35 (3.50)
PBM10/2M	10 element Parabeam	39.67 (3.50)
PBM14/2M	14 element Parabeam	48.30 (4.50)
5XY/2M	Crossed 5 element yagi	24.72 (3.00)
8XY/2M	Crossed 8 element yagi	31.00 (3.50)
10XY/2M	Crossed 10 element yagi	40.80 (4.00)
X6/2M/X12/70cm	Dual band crossed yagi	41.40 (4.50)
PMH/2C	2 way phasing harness	8.00 (.75)
Q4/2M	4 element quad yagi	25.87 (2.50)
Q6/2M	6 element quad yagi	33.90 (4.50)
D5/2M	Double 5 slot-fed yagi	21.85 (2.50)
D8/2M	Double 8 slot-fed yagi	29.32 (4.00)
SVMK/2M	Kit for vertical polarisation	8.00 (1.50)
UGP/2M	ground plane	10.90 (1.50)
HO/2M	Mobile 'halo' head only	5.15 (1.50)
HM/2M	Mobile 'halo' with 24" mast	5.75 (1.75)
PMH2/2M	2 way phasing harness	10.90 (1.00)
PMH4/2M	4 way phasing harness	25.30 (1.75)
70cm Antennas		
C8/70cm	8dB glass fibre colinear	54.00 (3.50)
D8/70cm	Double 8 slot-fed yagi	22.40 (2.50)
PBM18/70cm	18 element Parabeam	27.60 (2.50)
MBM48/70cm	48 element Multibeam	31.00 (3.00)
MBM88/70cm	88 element Multibeam	42.55 (4.50)
8XY/70cm	Crossed 8 element yagi	36.80 (3.50)
12XY/70cm	Crossed 12 element yagi	46.00 (4.50)
PMH2/70cm	2 way phasing harness	9.20 (1.00)
PMH4/70cm	4 way phasing harness	19.55 (1.50)
23cm Antennas		
D15/1296	Double 15 slot-fed yagi	36.80 (1.50)
PMH2/23cm	2 way phasing harness	27.60 (1.00)

G-WHIP MOBILE ANTENNA RANGE

Tribander Helical for 10/15/20 metres	25.80 (2.00)
LF40m Coil for above	6.55 (1.00)
LF80m Coil for above	6.55 (1.00)
LF160m Coil for above	6.55 (1.00)
LF telescopic resonator whip	4.25 (1.00)
Base mount single hole fixing + 3m cable	5.75

AERIAL ROTATORS

CDE AR40 (5 core cable)	62.00 (1.50)
Channelmaster 9502 (3 core)	54.00 (2.00)
Sky King SU4000 (6 core)	75.00 (2.50)
KR 400RC (5 core) complete	99.00 (2.00)
CDE alignment bearing	7.75 (1.00)
Channelmaster alignment	11.75 (1.00)

HF ANTENNAS

Mini-Products HQ-1 20/15/10m 2 el	115.00 (2.50)
Mini-Products C4 20/15/10m vert dipole	55.00 (2.00)
Mosley TD3JR 20/15/10m wire dipole	34.50 (1.50)
Mosley "Mini-Beam" 20/15/10m 2 el. 600W	99.00 (2.00)
Mosley "Mini-Beam" 20/15/10m 2 el. 2kW	129.00 (2.00)
Mosley TA32 20/15/10m 2 el.	89.70 (2.00)
Mosley TA33 20/15/10m 3 element	133.40 (2.50)
Mosley Mustang 20/15/10m 3 element 2kW	166.75 (4.00)
Hy-Gain 12AVQ 20/15/10m vertical	43.00 (2.00)
Hy-Gain 14AVQ 40-10m vertical	58.00 (2.00)
Hy-Gain 18AVT/WB 80-10m vertical	89.95 (2.50)

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Radial Kit for HF5	28.00 (2.00)
Sagant EL40X 80-40 Balun fed dipole (79')	36.50 (1.50)
Jaybeam TB3 HF 3 element Tribander	181.70 (4.50)
Jaybeam VR3 HF Vertical Trihand	46.00 (3.00)
Western DX5V 5-band	89.00 (3.00)

DATONG

FL1 Automatic audio filter. Int batt.	67.85 (n.c.)
FL2 Multi-mode audio filter	89.70 (n.c.)
PC1 Receiver adapt. 50kHz-30MHz 144MHz o/p	120.75 (n.c.)
ASP Auto RF speech processor	79.35 (n.c.)
VLF Recv. converter. 0-500kHz 28MHz o/p	25.30 (n.c.)
D70 Morse tutor. Self contained	49.00 (n.c.)
D75 RF speech processor (manual control)	56.00 (n.c.)
AD270 Active recv. aerial (indoor model)	37.95 (n.c.)
AD370 Outdoor version of above	51.75 (n.c.)
A/C pwrd. versions AD270+p.s.u. £42.55 AD370 £56.35	
A/C power supply only	6.90 (n.c.)
DC144/28 2 metre recv. converter	35.65 (n.c.)

ADONIS MICROPHONES

AM202G Mobile safety mic	20.95 (n.c.)
AM202S Mobile safety mic	20.95 (n.c.)
AM202H Mobile safety mic	29.00 (n.c.)
AM502G Base station compressor mic	39.00 (n.c.)
AM601 Compressor mic.	44.00 (n.c.)
AM802G Base station compressor mic	59.00 (n.c.)

SEM

2m power amplifier/pre-amplifier 5/30W	57.00 (1.00)
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2m power amplifier/pre-amplifier 16/100W	126.50 (1.50)
2m converter	24.70 (.35)
2m Auto switching pre-amplifier	25.00 (.35)
70cm Auto switching pre-amplifier	30.70 (.35)
2m pre-amplifier	14.95 (.35)
70cm pre-amplifier	19.00 (.35)
2-40MHz pre-amplifier auto switching	18.85 (.35)
2-40MHz pre-amplifier	11.90 (.35)
PA3 miniature 2m pre-amplifier	8.00 (.35)
PA70 miniature 70cm pre-amplifier	11.95 (.35)
Z Match Aerial tun unit 1-8-30MHz 500W	65.00 (1.50)
EZITUNE Aerial tuning aid	30.48 (.75)
IAMBIC Keyer	34.50 (.75)

VHF/UHF MONITORS

TM56B FM Scanner 4+12 channels	89.00 (n.c.)
Sound Air 008 8 channel FM monitor	69.00 (n.c.)
Sound Air M161 16 channel FM monitor	59.00 (n.c.)
MF083 Marine or Amateur + 3 FM broad.	85.00 (n.c.)
BEARCAT 220FB VHF/UHF	258.00 (n.c.)
SX200 VHF/UHF. New stock just arrived!	260.00 (n.c.)
SR9 Tuneable 144-148 or 156-162MHz	46.00 (n.c.)
AR22 2m FM pocket synthesized handheld	89.00 (n.c.)
AR22 flexible antenna	3.00 (n.c.)

MOBILE AERIALS

ASP201 2m ¼ wave with base	3.50 (1.25)
ASP2009 2 5/8th wave with base	9.25 (2.00)
ASP3009 2m 5/8th wave with base	9.75 (2.00)
ASP462 70cm co-linear with base	8.25 (1.25)
Magnetic base adaptor	8.50 (.75)
ASP677 2m 5/8th wave	14.95 (2.00)
ASP667 70cm co-linear	17.95 (1.25)
ASPM125 28MHz ¼ wave	18.50 (2.00)
Magnetic base adaptor	8.50 (.75)
ASP 'no hole' boot mount adaptor	3.75 (.50)
2NE 2m 7/8th mobile whip	13.00 (2.00)
RG4M Base for above aerial	3.50 (.75)
GSS Heavy duty gutter/boot mount	3.15 (.50)
MB5 Magnetic mount with 5m coax	7.95 (1.00)
10SE 28MHz whip 1·72m long	11.50 (1.25)
15SE 21MHz whip 1·72m long	11.50 (1.25)
20SE 14MHz whip 1·72m long	13.80 (1.25)

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SP200 1-8-160MHz 20/200/1kW SWR/PWR	59.00 (n.c.)
SP300 1-8-500MHz 20/200/1kW SWR/PWR	79.00 (n.c.)
SP400 130-500MHz 5/20/150W SWR/PWR	59.00 (n.c.)
SP-15M 1-8-150MHz 2½/20/200W SWR/PWR	29.00 (n.c.)
AC-35M 3-5-30MHz 400W a.t.u. (unbalanced)	49.00 (n.c.)
AC-38M As above with new bands.	(n.c.)
CH-20A 2 way coax switch. 1kW SO239	15.95 (n.c.)
CH-20N 2 way coax switch. 1kW 'N'	23.95 (n.c.)
CT-03N Dummy load. 3W 1-3GHz 'N'	29.00 (n.c.)

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3-30MHz Inverted "L"	9.95 (1.00)
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Mosley RD5 all-band dipole	40.00 (1.00)
CT-20G ditto 20W 2·5GHz 'N' type	t.b.a. (n.c.)
CT15A ditto 15-50W 450MHz	6.95 (n.c.)
CT15N ditto 15-50W 450MHz	11.75 (n.c.)
CT 150 ditto 150-400W 250MHz	31.00 (n.c.)
CT 300 ditto 300-1kW 250MHz	43.00 (n.c.)

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SEIF 13·8V 4 amp AC power supply	24.95 (2.00)
PS125 6 amp AC power supply	29.00 (2.00)
EK121 Katsumi Electronic Keyer	29.00 (1.00)
EKM12 Matching side tone monitor	10.95 (1.00)
CW2A general purpose morse oscillator	6.95 (.65)
Telegraph CW key (manual)	10.50 (.75)
YW3 Twin SWR/Pwr/Field strength meter	11.95 (.50)
MF210 Self powered 2M FM monitor	12.95 (.50)
FX1 d/l station w/meter 700kHz-250MHz	28.00 (1.00)
DM81 700kHz-250MHz dip meter	51.75 (1.00)
Station log books	1.95 (.50)
12BY7A driver valves	2.75 (.50)
6146B/S2001A P.A. valves	8.70 (.50)
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PL259 plugs	.63 (n.c.)
PL259 reducers	.17 (n.c.)
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PL259 joiners	.85 (.10)
N. Plugs. Silver plated UR67	2.00 (n.c.)
N. Plugs. Silver plated UR43	2.00
4 pin mic plugs	.85 (.10)
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6 pin mic plugs (FDK 750)	1.00 (.10)
3 pin chassic socket	.85 (.10)
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BNC plugs (bayonet)	.90 (.05)
Pen Cell Ni-cads (HP7 size)	1.20 (.05)
Cigar lighter plugs	.55 (.10)
UR67 cable 50Ω per metre	.69 (.10)
UR43 cable 50Ω per metre	.23 (.05)
5 core rotator cable per metre	.30 (.05)
BL40X baluh 50Ω	11.25 (.35)
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Mosley aerial insulators	.30 (.05)
KX2 SWL aerial tuner 0·5-30MHz	29.90 (1.50)
APM1 Audio Peak and notch filter	33.00 (1.00)
HP3A TVI high pass filter (UHF T.V.)	3.50 (.50)
Drake TV3300 LP Low Pass Filter	18.40 (1.20)
Shure 444D high impedance desk mic	27.50 (1.50)
Shure 201 high impedance hand mic	12.50 (1.00)
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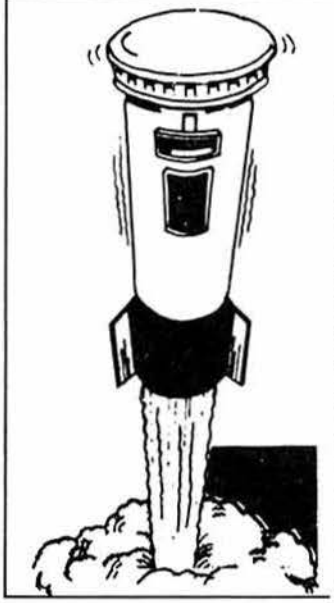

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Finally, if you call in to see us we hope you will feel that we are justified in our claim of "such nice people". It's no coincidence that our shop sales manager, David Rouse, has just come top in the regional Access Salesman of the Year contest. Good luck in the national finals David and thanks for keeping the customers happy!

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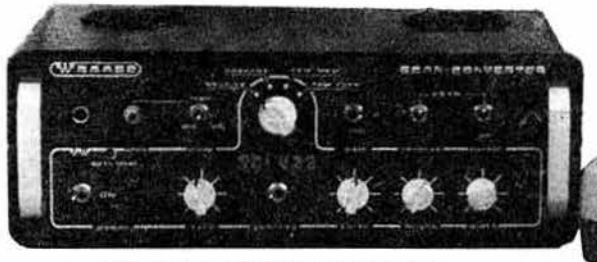

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The tried and tested Yaesu HF base station, now with audio peak filter and reject notch filter as standard, and choice of AM or FM.

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ATV-2 TV TRANSCEIVER

Available only from us, this has been developed from the very popular ATV-1 TV Transmitter and it represents a real triumph of miniaturised solid-state technology.

So simple to go on the air, transmitting or receiving high-definition fast-scan video ... Camera or VCR in at one end, 70cm antenna and normal domestic TV out of the other, connect to 12v, and there you are... who needs the BBC?

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- 2-channel input from video camera or recorder in B/W or colour (switchable on front panel)
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- Video transmitter gives full 3w PSP output • Spurious better than 50dB down
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MICROWAVE MODULES LTD

AND FIRST CLASS!!

MMS 2

THE MOST ADVANCED
MORSE TRAINER
AVAILABLE

This advanced morse trainer is a natural development of the highly successful speech synthesised morse tutor, MMS1. (See September Rad Com for full details).

The MMS2 contains all the features of the MMS1, with the additional feature of speaking back the morse keyed into the unit by the pupil. This invaluable facility allows the pupil to gain efficiency in both sending and receiving morse.

The unit represents a truly cost-effective means of reaching the standards required in Post Office, maritime and amateur morse code examinations, without having to rely on a third party for instruction.

A DC power supply 9 to 13·8 Volts and a suitable morse key are the only requirements to enable full operation.

FEATURES:
- Complete self-contained speaking morse trainer for reception and transmission
- Wide speed range: 6-32wpm
- Variable group length and single character facility
- Latest state of the art microprocessor speech synthesis system
- Suitable for novices and experienced operators alike

£155 inc VAT (p&p £2)

MM1000KB

ASCII TO MORSE CONVERTER

This microprocessor-controlled converter enables any parallel ASCII keyboard to send variable speed morse in the range 12-30wpm.

The converter has four 256 character memory stores which may be used for CQ calls, station and location details etc. An 80 character keyboard buffer is incorporated which ensures perfect sending.

A comprehensive character set is included which contains full alphabet and numbers, punctuation and four merged characters.

A useful high speed facility has been included which allows stored messages to be transmitted at 600 characters per minute. This facility is particularly useful for meteor scatter use.

The price shown below includes a suitable ASCII keyboard, and is not a misprint!

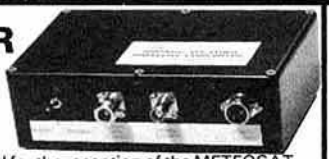
The MM1000KB represents outstanding value for money, and is substantially cheaper than any comparable morse keyboard, due to the use of the latest microprocessor technology.

(The converter is available separately at a cost of £59 inc VAT, P&P £0.80).

£89 inc VAT (p&p £2.75)

MMK1691/137·5

1690MHz WEATHER SATELLITE CONVERTER



The MMK 1691/137·5 Converter is intended for the reception of the METEOSAT Weather Satellite, and other weather satellites operating in the 1690-1710MHz frequency band. The METEOSAT satellite forms part of a global network of five geostationary satellites distributed around the earth's equator, all of which use similar frequencies in the 1690MHz band.

The converter is fed by an antenna such as a parabolic dish or other high gain antenna designed for 1690MHz, and the output of the converter at 137·5MHz is available for driving an existing receiver on the VHF weather satellite band of 136-138MHz.

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

£115 inc VAT p&p £2

STOP PRESS!!

WE ARE PLEASED TO ANNOUNCE AT SHORT NOTICE THE ADDITION OF SO239 SOCKETS AS AN OPTION TO OUR RANGE OF PRODUCTS. (EXCEPT 70CM AND 23CM UNITS). THIS OPTION WILL BE AVAILABLE BY THE TIME THIS ADVERT APPEARS IN PRINT. AND IS AVAILABLE AT NO EXTRA CHARGE.

Customers with existing products wishing to replace BNC connectors for SO239 connectors can purchase special SO239 sockets directly from us, at a cost of **£2.00** per pair, inc. VAT.

OUR HIGHLY POPULAR AMPLIFIER, MML144/25, HAS NOW BEEN UPDATED TO INCLUDE SWITCHABLE PREAMP AND STRAIGHT THROUGH OPERATION—MML144/30-LS PLEASE PHONE OR WRITE FOR FURTHER DETAILS . . .

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

Access BARCLAYCARD VISA
WELCOME

MICROWAVE MODULES
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

MICROWAVE MODULES LTD

THEY'RE ALL NEW!!

100 WATTS OUT FOR 1 OR 3 WATTS INPUT WITH THE ALL-NEW MML144/100-LS

MML144/100-S PICTURED ABOVE

This new two stage 144MHz solid-state linear amplifier has been introduced as a result of the large number of low power transceivers currently available. When used in conjuncion with such a drive source, this linear amplifier will provide an output power of 100 Watts. Several front panel mounted switches controlling the switching circuitry allow the unit to be left in circuit at all times. The linear amplifier and the ultra low-noise receive preamplifier, which are incorporated in the MML 144/100-LS, can be both independently switched in and out of circuit. In this way maximum versatility and flexibility is available to the user at the flick of a switch. The receive preamplifier uses one of the latest dual-gate MOSFETS (3SK88) in a noise matched configuration. This technique together with careful optimisation of overall gain makes the preamplifier ideal for use ahead of any popular 2 metre transceiver

USE THIS NEW AMPLIFIER WITH YOUR FT290R, CS8, TR2300 ETC, AND HAVE SUPERB BASE STATION PERFORMANCE AT A REALISTIC COST

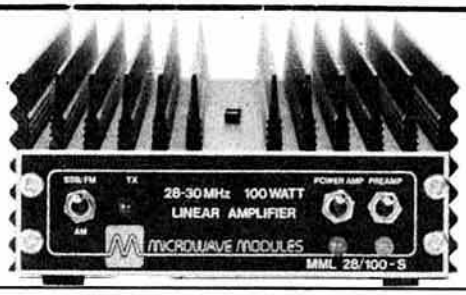
FEATURES:

- 100 Watts RF output power
- Suitable for 1 Watt or 3 Watt transceivers
- Straight through mode when turned off
- Ultra low noise receive preamp
- Equipped with RF vox
- Supplied with all connectors

SPECIFICATION:

Power output:	100 Watts (within 0·5dB)
Power input:	1 or 3 Watts
Power requirements:	13·8 Volts at 14 Amps
Overall preamp gain:	12dB
Overall preamp noise figure:	Better than 1·5dB
RF connectors:	SO239
Weight:	1·75kg
Overall size:	265 × 117 × 54mm

ALL THIS FOR £145 inc VAT (P&P £2.75)



MML 28/100-S

10 METRE 100 WATT LINEAR AMPLIFIER

This all-new 10 metre solid state linear amplifier is intended for use with any existing 28MHz equipment having an output power of up to 10 Watts. When used with such a drive source this linear amplifier will provide an output power of 100 Watts on SSB and FM and 40 Watts on AM. **WITH ALL THE GREAT FACILITIES OF THE HIGHLY SUCCESSFUL MML144/100-S.**

£129.95 inc VAT (P&P 2.75)

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

Access BARCLAYCARD VISA

WELCOME

MICROWAVE MODULES
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

AMATEUR ELECTRONICS UK

Your number one source for YAESU MUSEN

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-480R High technology all-mode 2 metre 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-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-7 General coverage receiver

The set with the world-wide reputation. YAESU's famous FRG-7 out-performs many a more expensive set. Rugged and reliable, it features high sensitivity and Wadley loop stability – a delight to use for the established amateur and new SWL alike.

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.

Access | Barclaycard VISA

or attractive H.P. terms readily available for on-the-spot transactions. Full demonstration facilities. Free Securicor delivery.

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

For full details of these new and exciting models, send today for the latest YAESU PRICE LIST and LEAFLETS. All you need to do to obtain the latest information about these exciting developments from the world's No. 1 manufacturer of amateur radio equipment is to send 36p in stamps and as an added bonus you will get our credit voucher value £3.60p – a 10 to 1 winning offer.

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 95dB!

and **NO** band switch!!!

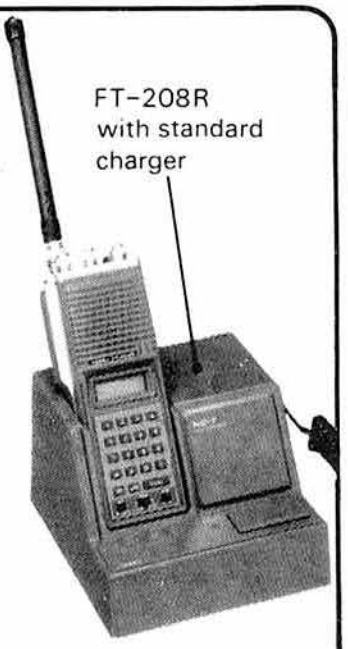
FT-708R

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 70cm and 2m operator. LCD display, 10 memories, memory and bandscan, priority function, internal lithium battery back-up. RF output FT-708R, 200mW low, 1 watt high, FT-208R, 300mW low, 2·5 watts high.

FT-708R with NC8 standard/quick charger/DC PSU

FT-208R

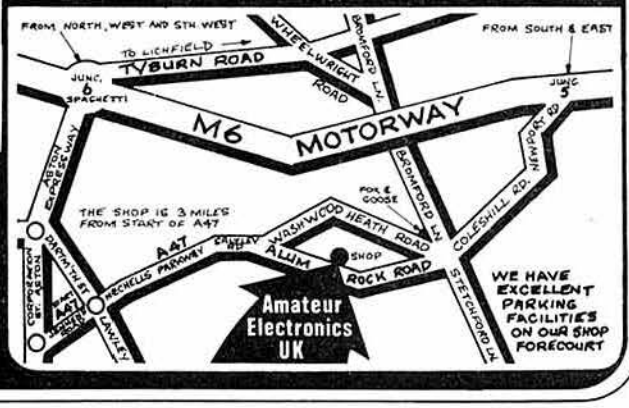


FT-208R with standard charger

AGENTS

NORTH WEST – THANET ELECTRONICS LTD, GORDON, G3LEQ. KNUTSFORD (0565) 4040.
WALES & WEST – ROSS CLARE, GW3NWS, GWENT (0633) 880 146
EAST ANGLIA – AMATEUR ELECTRONICS UK – EAST ANGLIA. DR T THIRST (TIM) G4CTT, NORWICH 0692 650865
NORTH EAST – NORTH EAST AMATEUR RADIO. DARLINGTON 0325 55969
SOUTH EAST – AMATEUR ELECTRONICS, UK – KENT KEN McINNES, G3FTE. THANET (0843) 291297

WHERE TO FIND US



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.

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 £3.50!! Biggest stocks of amateur equipment in UK. Twenty-two 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.

YAESU MUSEN

As UK agents we show some major Yaesu items; VHF multimode hand-portable, general coverage Rxs, multimodes for VHF and UHF FM Tx/Rxs for VHF, UHF and VHF/UHF, HF transceivers (SSB, CW, FSK, AM, FM) and a fistful of VHF and UHF handhelds. NB: 150 Yaesu accessories complement the above—check the last two pages for a sample of our range.

The FT-ONE is the culmination of an all-out design project, without the usual cost constraints, a revolutionary blend of computer and RF technology.

GENERAL COVERAGE, ALL SOLID STATE
The FT-ONE is a full-coverage all mode transceiver, equipped for reception between 150kHz and 29.99MHz, and transmission on all nine amateur bands. For commercial use the FT-ONE may be programmed to transmit throughout 1·8-29·99MHz range.

KEYBOARD FREQUENCY ENTRY
Fully digitally synthesized, the FT-ONE uses a front panel keyboard for initial frequency entry. Frequency change is then accomplished via the main tuning dial or the pushbutton scanner, with tuning in either 10Hz or 100Hz steps. The FT-ONE permits extremely fine tuning and instantaneous band changes.

DUAL VFO SYSTEM
Ten digital VFO's with memory are provided, in conjunction with an A-B selection scheme that allows instant recall of any transmit, receive, or transceiver frequency. For split-frequency operation, the operator may select TX on VFO-A and RX on VFO-B, automatically storing the calling and listening frequencies. For net operations, a non-volatile memory board is available as an option, (eliminates the possibility of dumping).

FULL CW BREAK-IN
Recent advances in solid-state technology have made full CW break-in reliable enough to be incorporated into the FT-ONE. You can select traditional semi-break-in (for use with amplifiers not equipped for full break-in) or full high-speed break-in.

SWITCHING REGULATED SUPPLY
Extremely compact and light in weight, the switched mode power supply reduces substantially the space required to produce the operating voltages used in the FT-ONE. It is highly efficient, uniquely stable and provides superb reliability.

'ELITE' CLASS PERFORMANCE
In addition to the full break-in and superb receiver filters, the FT-ONE is packed with subtle virtues that others might have overlooked. Rear panel jacks allow the use of both an external receiver and an independent receive antenna, when scanning, automatic halting on a received signal may be programmed, an optional Curtis 8044 keyer board is available, and there is even a microphone squelch (AMGC) to reduce background noise pickup between words and sentences!

GAIN/INTERCEPT OPTIMIZED RECEIVER
Utilizing up-conversion with a first IF of 73MHz, the FT-ONE RF amplifier stage uses push-pull power transistors configured to produce a typical output intercept of +40dBm. The first mixer utilizes a diode ring module followed by a low noise post amp, for optimum noise figure consistent with modern day intercept requirements. The result is a receiver with a typical two-tone dynamic range well in excess of 95dB (14MHz, CW bandwidth). Additional gain tailoring is provided via a PIN diode attenuator controlled from the front panel.

FILTER READY FOR COMPETITION
Three filter bandwidths are available for CW operation (two for FSK!), using optional 600Hz or 300Hz crystal filters. Filter insertion losses are equalised and an audio peak and notch filter is standard. Both IF Shift and Variable Bandwidth are provided, and two CW filters may be cascaded, for competition-grade selectivity. For SSB work, the Variable Bandwidth feature eliminates the need for costly 1·5kHz or 1·8kHz filters.

EXPANDED OPERATING DISPLAYS
Digital displays for the VFO frequency, memory channel, and RIT offset are provided. The large front panel meter provides easy viewing of transceiver operating parameters, including finals collector current, input voltage, FM discriminator, processor compression, and forward/reflected relative power.

NON OPTIONS
Remember with your FT-ONE the noise blanker, speech processor and power supply are all built-in, not options.

SOUTH MIDLANDS COMMUNICATIONS LTD

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

HUMBERSIDE
S.M.C. (Grimsby)
247A Freeman Street,
Grimsby, Lincolnshire,
Grimsby (0472) 59388
10-6 Tuesday-Saturday

STOKE-ON-TRENT
S.M.C. (Stoke)
76 High Street,
Talke Pits, Stoke
Kidsgrove (07816) 72644
9-5.30 Tuesday-Saturday

LEEDS
S.M.C. (Leeds)
257 Otley Road,
Leeds 16, Yorkshire.
Leeds (0532) 782326
9-5.30 Monday-Saturday

CHESTERFIELD
S.M.C. (Jack Tweedy) LTD
102 High Street,
New Whittington, Chesterfield.
Chesterfield (0246) 453340
9-5 Tuesday-Saturday

WOODHALL SPA
S.M.C. (Jack Tweedy) LTD
150 Horncastle Road,
Woodhall Spa, Lincolnshire.
Woodhall Spa (0526) 52793
9-5 Tuesday-Saturday

— SMC AGENTS —

Bangor	John	GI3KDR	(0247) 55162	Stourbridge	Brian	G3ZUL	(03843) 5917	Buckley	Howarth	GW3TMP	(0244) 549563
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Edinburgh	Jack	GM8GEC	(031665) 2420					Buckley	Howarth	GW3TMP	(0244) 549563

FREE FINANCE AVAILABLE PLUS 2-YEAR SMC GUARANTEE

FT101ZD £635 inc VAT @ 15% & SECURICOR

- ★ 160–10 metres including new allocations
- ★ Variable IF bandwidth 2·4kHz down to 300Hz
- ★ 8 pole filters for razor edge selectivity
- ★ Selectable CW fixed bandwidth CW-W and CW-N
- ★ Semi-break in with sidetone for excellent 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 and is adjustable from the front panel
- ★ Wide dynamic range for big signal handling
- ★ High usable sensitivity, for those weak ones
- ★ Superb noise blanker, adjustable threshold
- ★ Attenuator: 0-10-20dB, 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 power supply 110–234V ac and 12V dc
- ★ Incredible range of matching accessories
- ★ 6 models, Digital/Analogue — AM/FM options

*Option

FT902DM £885 inc VAT @ 15% & SECURICOR

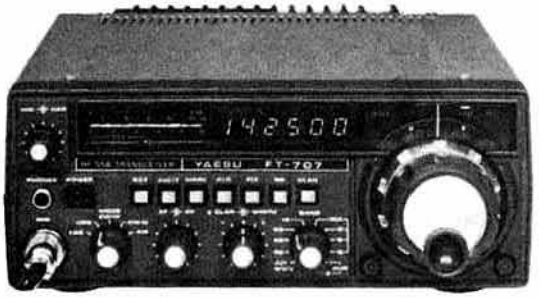
- ★ 160–10 metres including new allocations
- ★ Variable IF bandwidth 2·4kHz down to 300Hz
- ★ Audio Peak and independent notch controls
- ★ AM, FSK, USB, LSB, CW, FM (Tx and Rx)
- ★ Semi break in. Inbuilt Curtis IC keyer
- ★ Digital plus analogue frequency displays
- ★ 6146B's with negative feedback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

*Option

FT107M £725 inc VAT @ 15% & SECURICOR

- ★ 160–10 metres (including 10, 18 and 24MHz)
- ★ USB-LSB-CWW-FSK-AM multi-mode
- ★ Full broad band "no tune" power amplifier
- ★ 240W PIP. 75 per cent power output at 3·1 VSWR
- ★ 12 memory channels with clarifier on memory
- ★ Digital Memory Shift gives offset from memory
- ★ Up/down scanning control from the microphone
- ★ Variable IF bandwidth—16 poles of selectivity
- ★ Bandwidths: 6kHz*, 2·4kHz→300Hz, 600Hz, 300Hz*
- ★ Selectable CW "fixed" widths CW-W and CW-N*
- ★ Tunable Audio Peak (AFP) and Notch filter
- ★ Diode ring mixer for very high Rx dynamic range
- ★ Noise blanker—front panel adjustable threshold
- ★ AGC: slow-fast-off switchable from the front panel
- ★ Attenuator 0·20dB, plus RF gain on front panel
- ★ RF speech processor fitted—front panel adjustable
- ★ Digital (100Hz) plus analogue frequency displays
- ★ Meter Reads: Vcc, Ic, AFC, Compression and SWR
- ★ Semi break-in with side tone, VOX built-in
- ★ Choice of built-in or separate power supply units

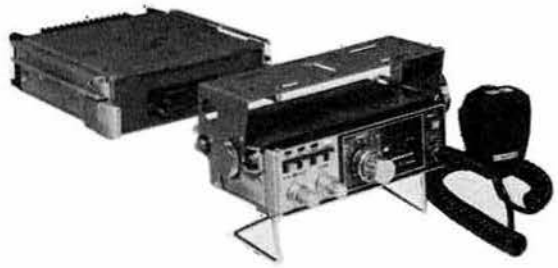
*Option



FT707 £569 inc VAT @ 15% & SECURICOR

- ★ 80–10 metres (including 10, 18 and 24MHz bands)
- ★ USB, LSB-CWW, CWN, AM (Tx and Rx operation)
- ★ 100W PEP, 50% power output at 3:1 VSWR
- ★ Full "broad band" no tune output stage
- ★ Excellent Rx dynamic range, power transistor buffers
- ★ Rx Schottky diode ring mixer module
- ★ Local oscillator with low noise floor
- ★ Variable IF bandwidth—16 crystal poles
- ★ Bandwidths 3kHz*, 2·4kHz, → 300Hz, 600Hz, 350Hz*
- ★ AGC: slow-fast switchable from the front panel
- ★ VOX built-in and adjustable from the front panel
- ★ Semi break in with side tone for excellent CW
- ★ Digital (100Hz) 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) control
- ★ Advanced noise blanker with local loop AGC
- ★ 25kHz crystal calibrator feature
- ★ Internal, xtal or external VFO control

*Option



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

FREE FINANCE AVAILABLE PLUS 2-YEAR SMC GUARANTEE

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

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

1·6MHz shift now available

FT780R

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

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
- ★ Constantly variable tone control
- ★ 110 and 240V ac and 12V dc option
- ★ Switchable speed A.G.C. system
- ★ Signal meter calibrated in "S" and SIMPO
- ★ Acc; Tuners, Converters, LPF, Memory Memory
- ★ 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
- ★ FF5; 500kHz (for improved VLF reception)
- ★ MEMGR7700; 12 Channels (internal fitting)

FREE FINANCE AVAILABLE PLUS 2-YEAR SMC GUARANTEE

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.

FT208R £209 inc. VAT @ 15% & SECURICOR

- ★ 144–148MHz (144–148 possible)
- ★ 12·5/25kHz synthesizer steps
- ★ Any split + or − programmable
- ★ ±600kHz repeater split
- ★ 2·5 or 0·3W RF output
- ★ Rx: 20mA squelch 150mA max AF
- ★ Tx: 800mA at 2·5W RF
- ★ 0·25μV for 12dB SINAD
- ★ Dual conversion 16·9MHz and 455kHz

FT708R £219 inc. VAT @ 15% & SECURICOR

- ★ 430–440MHz (440–450 option)
- ★ 25kHz synthesizer steps
- ★ Any split + or − programmable
- ★ ±7·6MHz EU split standard
- ★ 1W or 100mW RF output
- ★ Rx: 20mA squelch, 150mA (max AF)
- ★ Tx: 500mA at 1W RF
- ★ 0·4μV for 12dB SINAD
- ★ Dual conversion 46·255MHz and 455kHz

SOUTH MIDLANDS COMMUNICATIONS LTD

S. M. HOUSE, OSBORNE ROAD, TOTTON, SOUTHAMPTON, SO4 4DN, ENGLAND

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Edinburgh	Jack	GM8GEC	(031665) 2420	**Redcar**	Simon	G4EQS	(0642) 480808	**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

As well as 2m antennas featured here, the range covers 4m through 23cms. All models offer good 50ohm matches and bandwidths by incorporating such innovations as the inverse balun. Technical details are quoted in accordance with ICE (ICE138 + 138A) and I.E.E.E. (RV481 RE252 Jan 65) recommendations. (Sae for catalogue.)

The 8XY/2m is basically two 8 element yagis mounted at right angles on a common 9ft boom. It is suitable for horizontal, vertical or circular (with PMH/2c) polarisation. 9·5dB gain in each plane. 47° horizontal beamwidth, 10lb weight, 64lb wind load at 100mph an elegant answer to a single antenna installation.

JAYBEAM 2 METRE

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 omni vert	4·8dB	£47.72	£1.73
LR1/2M	Colinear	4·5dB	£25.87	£1.73
5Y/2M	Yagi 5 ele	7·8dB	£12.07	£1.73
8Y/2M	Yagi, 8 ele	9·5dB	£15.52	£1.73
10Y/2M	Long Yagi, 10 ele	11·4dB	£33.35	£1.73
14Y/2M	Long Yagi, 14 ele	13·0dB	£42.00	£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 ele parabeam	12·4dB	£39.67	£1.73
PBM14/2M	14 ele parabeam	13·7dB	£48.00	£1.73
Q4/2M	Quad, 4 ele	10·0dB	£25.87	£1.73
Q6/2M	Quad, 6 ele	12·0dB	£33.92	£1.73
5XY/2M	Yagi, 5 ele cross	7·8dB	£24.72	£1.73
8XY/2M	Yagi, 8 ele cross	9·5dB	£31.05	£1.73
10XY/2M	Yagi, 10 ele 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	Hrns, 2 way long		£11.92	£1.15
PMH4/2M	Harness, 4 way		£25.00	£1.73

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

Kenpro

KR600RC
£132.25

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

KR400RC
£90.85

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

KR500
£86.25

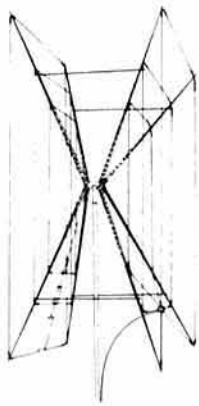
Elevation Rotator (180°).
Up to 50kg of Load.
1¼in-2¼in mast.
1¼in-1¾in boom.

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' × 9¼'; TR 9¼'; 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 8¼sq 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 · WOODHALL SPA

VERSATOWER

TELESCOPIC & TILTOVER RADIO TOWERS

BEST BUYS LOW COST TOWERS

NEW

18FT ONLY £112.70

28FT ONLY £169.90

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' £396.75
13M20P60 60' £485.30

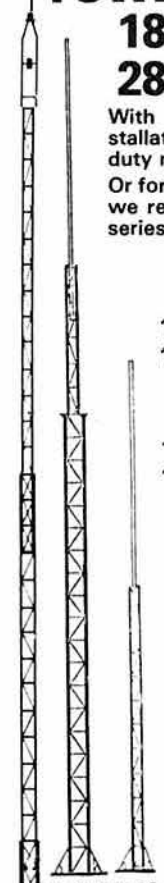
HEAVY DUTY
Post mounting

16M20P60 60' £671.60
16M20P80 80' £1012.00

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	£353.05
10M10W30 Wall mount (LG1013W extra)	£339.25
10M10BP30 Base Plate (HD Bolts extra)	£373.75
10M10FB30 Fixed base (HD Bolts extra)	£327.75

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 × 5½"
Size Meter: 2 × 3½"
Time Const: PEP follow 4 second

FS500 £60.95

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

FS600 £44.85

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

FS300 £40.25

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

FS7 £35.65

VHF/UHF WATTMETER & BRIDGE
FS7 145MHz & 432MHz 5, 20, 200W
Power 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 × 2¼ × 1¼"
coupler 3¼ × 2½ × 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 × 3½". 'On the Air' LED

FS300M £31.05

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

SWR3S £23.00

WIDE RANGE POWER & SWR
SWR3S 3·5 150MHz 20 & 200W
Power 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

OMNIDIRECTIONAL VERTICAL HF, VHF, UHF ANTENNAS

HF TRAPPED VERTICAL

The SMCHF5V covers five bands, 10 to 80 metres. Only 15ft 9in high, about 1⅜in diameter and weighing 6½lb but with PEP handling (within the 1·5:1 VSWR bandwidth) of 500W on 10–20m and 200W on 40 and 80m. It is suitable for ground mounting on a good earth stake (with or without radials) or in an elevated position with resonant wire radials or the SMCHF5R trapped radial kit.

The SMCHF5R consists of five solid rods (between 6½ft and 7½ft) sloping downwards at 45° to the antenna. It is the perfect answer to restricted locations. Power; 150W PEP, weight 4lbs.

SMCHF5V £40.25 **SMCHF5R £29.90**
(Carriage on either or both together £1.73)

2 METRE COLINEAR

144MHz, 6·5dB gain and low angle of radiation from two ⅝λ phased sections. Height 3·1 metres. Three 48cm radials project from the bottom chrome-plated brass boss. A good 50ohm match offers better than 1·5:1 VSWR at resonance for 100W PEP plus performance over 4MHz of operational bandwidth. Weatherproof design with a SO239M connector recessed 30cm up the detachable 3·2cm OD support tube. Supplied complete with mounting plate and U bolts for 1¼in mast. Weight 1·5kg.

SMCGP144W (P&P £1.73) **£24.95**

70CMS COLINEAR

432MHz, 6·8dB gain and ultra low angle of radiation from three ⅝λ phased sections to a maximum height of 1·7 metres. Three 17cm radials project from the bottom chrome-plated brass boss. A good 50 ohm match offers better than 1·5:1 VSWR at resonance for 100W PEP plus performance over 10MHz of operational bandwidth. Excellent weatherproof design with a SO239M connector recessed 23cm up the detachable 3·2cm OD support tube. Supplied complete with two extruded mast clamps and U bolts capable of taking masts up to 2⅜in. Weight 1·1kg, Projected area 0·034 square metres.

SMCGP432X (P&P £1.15) **£28.00**

2 METER AND 70CMS COLINEAR

144MHz 2·8dB gain and 432MHz 5·7dB of gain single 50ohm feed. 1·1m high. 100W PEP.

SMC 70N2V (P&P £1.15) **£27.60**

VHF/UHF DISCONES

The SMCGDX1 is a vertically polarized, 3dB gain, 500W PEP, 50ohm, broad-band antenna. It is constructed of eight horizontal rods (each 40cm) radiating from a central boss, thus forming the disc, and eight rods (each 90cm) radiating from the boss but sloping downward at 45° to form the cone. This configuration produces a 1·5:1 VSWR over the range 80 to 480MHz.

The SMCGDX2 is a development of the GDX1 with every other disc rod extended by 72cm and every other cone rod extended by 1·3m. This reduces the lower frequency limit to 50MHz.

The SMCVHFL is a skeleton discone with three off 53in cone and three off 24in disc elements suitable for listening anywhere between 65 and 520MHz.

All models use a SO239M coax connector, (in the GDX versions it is recessed into an extension of the support mast—which doubles as the coaxial feed) and are supplied with mounting hardware to 1¼in mast.

SMCGDX1 (P&P £1.73) **£41.40**
SMCGDX2 (P&P £1.73) **£47.96**
SMCVHFL (P&P £1.73) **£16.85**

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

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

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G. R. Jessop, CEng, MIERE, G6JP
T. I. Lundegard, G3GJW
D. M. Pratt, BTech, CEng, MIEE, MIERE, G3KEP

Zonal members
Zone A. J. Heathershaw, G4CHH (Mrs)
Zone B. H. S. Pinchin, BSc, MBIM, G3VPE
Zone C. W. J. McClintock, G3VPK
Zone D. L. Hawkyard, G5HD
Zone E. R. G. Barrett, GW8HEZ
Zone F. I. J. Kyle, GI8AYZ
Zone G. F. Hall, GM8BZX

REGIONAL REPRESENTATIVES

Region 1—W. R. Parkinson, G3FNM. Tel 061-973 1472
Region 2—D. S. Smith, G4DAX. Tel 0947 86333
Region 3—*(Post vacant)*
Region 4—M. Shardlow, G3SZJ. Tel 0332 556875
Region 5—J. S. Allen, G3DOT
Region 6—F. S. G. Rose, G2DRT. Tel 0494 814240
Region 7—P. J. Walker, G8HMG. Tel 0737 64035
Region 8—K. A. Crouch, G8KEN. Tel 0303 55241
Region 9—W. J. Colclough, G3XC. Tel 0726 860485
Region 10—P. A. Jones, GW4HAT
Region 11—B. H. Green, GW2FLZ. Tel 0492 49288
Region 12—*(Post vacant)*
Region 13—A. B. Givens, GM3YOR
Region 14—V. Kusin, GM4HCO
Region 15—J. T. Barnes, GI3USS. Tel 0247 3948
Region 16—T. D. Howe, G3PLF. Tel 0268 24453
Region 17—H. G. Cunningham, G8FG. Tel 0202 876018
Region 18—W. Ricalton, G4ADD Tel 067 088 249
Region 19—R. J. Broadbent, G3AAJ
Region 20—B. L. Goddard, G4FRG.

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Correspondence to RRs and honorary officers should be addressed directly to them (QTHR), not to RSGB HQ.

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

RADIO SOCIETY OF GREAT BRITAIN

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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.

GENERAL MANAGER AND SECRETARY
D. A. Evans, G3OUF

EDITOR
A. W. Hutchinson

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RSGB SUNDAY NEWS BROADCASTS

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

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

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

H = horizontal polarization

RSGB PRESIDENCY

The RSGB is sorry to announce that for health reasons Mr J. Anthony, G3KQF, has been unable to take up the appointment of 1982 President of the Society. A scheduled meeting of Council on 9 January, at which a successor would have been elected, was postponed until 23 January because of weather conditions. The name of the next President will be announced over GB2RS and in the next issue of *Rad Com*.

QTC
Amateur radio news

Membership cards
For convenience, membership cards are printed in large batches once every six weeks. For this reason members might not appear to receive an immediate acknowledgement of their subscription payment sent either direct to RSGB HQ or via the bankers standing order system. To allow for this, membership cards are valid for three months following the expiry date printed on the card. Annual membership cards are sent to members in the British Isles, while overseas members receive a card on joining the Society.

Co-ordination of rallies and exhibitions
Each year there seems to be a greater number of amateur radio events in the UK. To help avoid those unfortunate clashes of dates, event organizers are invited to contact one of the Society's membership services officers at RSGB HQ, where a computerized diary of events can be on-line within seconds and can be used to check for free dates on a first-come basis.

RSGB HF Convention 1982
Plans for this new Society event are well advanced, and include lectures by Pat Hawker, G3VA, and Louis Varney, G5RV, together with dx film shows and a committee forum. There will also be a trade exhibition.

The venue is the Belfry Hotel, a few miles southeast of Oxford and close to the M40. Adequate car-parking facilities are available at the hotel, and there is a bus service to Oxford if required. Full details will appear in a later issue of *Rad Com* but make a note of the date now:

Saturday 19 June 1982 at the Belfry Hotel, Oxford

QSL Bureau
G4OAA-OZZ series. Mrs J. Rhodes, G8LRT, Wesley Mount, Spring Bank, New Mills, Stockport SK12 4BH, has been appointed sub-manager for this series.

G6 + three letters series. Mr and Mrs D. R. Brooks, G4IAQ/G4IAR, 28 Avon Vale Road, Loughborough, Leics LE11 2AA, who are sub-managers for the G6AAA-LZZ series, will in future handle the whole G6AAA-ZZZ series.

New IARU Region 1 secretary
Following the death of Roy Stevens, G2BVN, who was secretary of the Region 1 Division of the International Amateur Radio Union for many years, the IARU Region 1 Executive Committee has appointed Eric Godsmark, G5CO, to succeed him.

Eric Godsmark spent 25 years in the radio branch of the Post Office and Home Office prior to retiring from the Civil Service in 1979. Later in the same year he was a member of the IARU team at WARC. He is currently a member of the RSGB IARU and Telecommunications Liaison committees.

The late Roy F. Stevens, MBE, G2BVN
Mrs J. Stevens, widow of G2BVN, having been unable to tender her thanks personally, has asked that the following letter be published:

My daughters and I wish to thank members of the radio fraternity, together with personal friends, for their generous donations for research into Motorneurone Disease, and hope that it may help to find the cause of this dreadful disease.

Joan Stevens

Courses for amateurs
Paddington College, London. The following courses are held at this college:

(a) **Twelve-week short morse course.** Commencing in January, April and September; 6 to 8pm, Fridays. In addition to conventional teaching methods, a microcomputer system is also used.

(b) **RAE course.** Commences in September; Tuesdays for theory and Thursdays for practical work.

(c) **Part-time post-licence course.** A proposed new course designed for licence holders in which expert guidance and laboratory facilities for the construction and testing of equipment will be available. A number of ex-students have applied to join, and others will be welcome.

Further information from Mr David Pearce, course tutor, Dept of Engineering Technology, Paddington College, 25 Paddington Green, London W2 1NB. Tel 01-402 6221, ext 54.

Chippenham Technical College. In addition to two classes for the RAE already being held, a 12-week short course is also held on Mondays, 6.30 to 8.30pm. For further details contact Mr K. J. Hill, tel Chippenham (0249) 50501, ext 43, or write to Dept of Engineering, Chippenham Technical College, Cocklebery Road, Chippenham SN15 3QD.

Dxpedition to the UK
Members of the Surrey ARC, from the town of Surrey, British Columbia, will be coming to the UK to operate a special event station, GB2BC, from British Columbia House, Regent Street, London, for the period 26 March to 1 April 1982. Led by the club's vice-president, Ralph Webb, VE7BVG, it is their intention to put BC House "on the map" to celebrate its 110th Anniversary. Two stations covering the hf bands are planned, with a special QSL card designed for the event.

The event is being supported by members of the Sutton & Cheam RS, of Surrey, England, with Ron McDonald, G3DCZ, the hon vice-president, acting as UK co-ordinator. Bernard Godfrey, G4AOG, of Amateur Radio Exchange, has kindly offered assistance with the loan of equipment.

It would be of great assistance if any amateur could provide accommodation, preferably on an "at cost" basis, to help our Canadian friends keep the exercise down to as minimum a cost as possible. Offers of assistance, or other enquiries, please write to Ron McDonald, 60 Dudley Drive, Morden, Surrey SM4 4RJ.

G3IGS. Ilminster Grammar School ARS
Licensed in 1952, the above station will again be active during 1982 in celebration of the 50th anniversary of the Ilminster Grammar School Old Boys Association. The station will be particularly active during the weekend of 16-18 July. A special QSL card is being produced which will be sent in acknowledgement of all contacts. Will any member of IGSARS who has lost contact please write to G3DTB, QTHR.

The school has unfortunately lost its identity owing to local reorganization, but in the past G3IGS produced many operators to swell the amateur ranks—during 1961 no less than five fully licensed operators were still studying at the school.

Blind Radio Amateurs Auditory Gimmicks Information Service
BRAAGIS is a new service to assist the blind radio amateur and electronics enthusiast by providing information on the various auditory aids which are available and which will help them in the pursuance of their hobby activities. "Auditory Gimmick" is a convenient description of any device which will convert a visual reading into an auditory signal which a visually

handicapped person can use. This auditory read-out can take various forms —for instance, a synthesized voice on a talking frequency counter, a rising or falling tone indicating a voltage change, or a coded tone read-out.

BRAAGIS will not in any way pre-empt the magnificent work being done by the many voluntary organizations concerned with helping the visually handicapped and disabled—it will in fact, publicise still further the assistance they can offer. With the co-operation of organizations, manufacturers and individual researchers throughout the world it should be possible to bring together information which could be invaluable to a visually handicapped person who has a special need.

Many experimenters design and construct equipment for their own use, and BRAAGIS is appealing to them to pose the question: "Could this device in any way help a visually handicapped person in the field of electronics and amateur radio?" and if the answer is "YES" to send details to BRAAGIS for inclusion on a central file. A cassette library of circuit data of selected auditory gimmicks, the circuits being described in the narrative point to point system, will be established for the use of the amateur constructor. Further details on request.

Visually handicapped persons wishing to make use of BRAAGIS should do so by sending a cassette outlining their particular needs. The service will then provide the necessary information if it is on file or advise the enquirer of an appropriate source willing to help. No charge will be made for this service which has been established on a voluntary basis as a personal contribution to The International Year of Disabled People.

Organizer and researcher: Peter D. H. Jones, BEM, G3DRE, 69 Prospect Road, Bradway, Sheffield, South Yorkshire S17 4JB. Tel 0742 369199.

Town & Country Planning Acts

Considerable concern has been expressed recently by members who have learned of an appeal decision in which it was held that tvi can be taken into account by planning authorities when considering applications for planning permission for masts and antennas.

This decision is contrary to what has always been presumed to be the law on the subject as indicated by several planning appeal decisions relating to amateur installations. This latest decision was in respect of a commercial installation in a residental area, but it is anticipated that planning authorities may endeavour to apply it when dealing with planning applications for amateur installations. If this occurs the RSGB general manager would like to be informed straight away in order that appropriate steps can be taken to deal with the matter.

Stolen equipment

From a car near Ellesmere Port, Merseyside, on 21 December 1981: Yaesu FT290R, serial number 1H031413. Information to police on 051 355 4066, any police station, or G8NEO, QTHR.

From a car on 18 December: 144MHz transceiver type IC245E. Information to G3ZER, QTHR.

From a car at Slough station on 23 November: FDK Multi-7, serial number 32372, with microphone. Information to G3PWY, tel 06285 25019 or Slough police, 0753 31282.

OBITUARY

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

Mr D. Butler, GI3JEX
David Butler died on 30 November 1981, aged 72. He was a member of the Society and active on all bands. His most popular frequency was top-band, where he spent much time working cw. During his years of operation he obtained many awards, including the Milne Trophy, which he held for three years in succession, the Vereniging Voor Experimenteel Radio Onderzoek in Nederland, at 25wpm, and the Royal Naval Amateur Radio Society Proficiency Award for International Morse Code, at 30wpm. He was a member of the Tops and High Speed Clubs, A1 Operators, and First-class Operators Club. David participated in the Royal Signals Net, and many GI amateurs will remember him for his group control of the Salt Miners Net starting at 0715 on 144MHz.

Mr H. Taylor, GJ2KN
Harold Taylor died on 10 November, aged 86. He was licensed in 1920 as 2KQ. He designed the two-valved broadcast receivers made by the AJS Motor Cycle Company. He was active on the 7 and 3·5MHz bands.

Mr E. Theobald, G2DWI
Ernie Theobald died on 10 December 1981. He was licensed in 1938 with an AA call, and received his radiating licence after the war. Ernie was an enthusiastic supporter of the RSGB and a founder member of the North Bristol Amateur Radio Club, of which he was chairman at the time of his death. Ernie was recently made the first president of the club. Well-known as a producer of pcbs, he was active on all bands.

Also:
Mr L. D. Grearson, RS27858, in November 1981;

Mr J. Nisbet, GM3XQK, on 10 April 1981;

Mr L. A. S. Poole, G4FKN;

Mr A. Trewin, ZS5AX; and

Mr P. Williams, RS46260, on 4 September 1981, aged 16.

Mr W. E. F. Corsham, G2UV
"Uncle Vic"

Bill Corsham died on 12 December 1981, just a week after making his annual attendance and contribution at an RSGB AGM.

His interest in wireless began in 1914, when he joined the Signals Regiment, and continued after the first world war when he returned to the GPO. In 1920 he obtained a licence, and like many early experimenters he did some broadcasting before the arrival of the BBC. He was an early member of the Harlesdon Wireless Society, and the first president of the Mount Pleasant (GPO) Wireless Society.

Prior to the arrival of valves, he operated on spark or tonic train, and his first cw transmitter used less than 10W. In 1921 he took part in the original transatlantic tests, using a three-valve receiver, and shared third prize with Spence of Aberdeen—this led to these stations making the first contact between England and Scotland in 1922.

As a member of the British Wireless Relay League, in 1922 Bill organized round-Britain relays, and in September of the same year he became a member of the RSGB. He took a major part in the formation of the Transmitting & Relay Section of the Society, formed when the BWRL was absorbed by the RSGB, of which he and Ken Alford, 2DX, became joint traffic managers. He also generated the first known QSL card in Europe, if not the world.

During a talk broadcast from 2LO in 1924, when contacts with stations abroad were "not allowed", he virtually challenged the Post Office to withdraw licences on this account—they did not! All his working life was spent with the Post Office, and during the second world war he was engaged on Radio Security Service work, specializing in Japanese transmissions.

Always an ardent supporter of the RSGB, his knowledge of the early days was invaluable in the writing of *World at their fingertips*, by John Clarricoats, G6CL. In 1973 he was elected a Vice-President of the RSGB. Bill was a regular member of the Radio Society of Harrow, and as a member of the Radio Amateur Old Timers' Association he had recently been active in setting it on a firm basis for the future and obtaining G2OT as the RAOTA Net callsign.

YOUR OPINION

TRY A DIPOLE
The Editor
Radio Communication
Sir—"Simple aerials can often prove surprisingly useful . . . when too many amateurs associate dx operation only with rotary beam aerials." So says G3VA in *Amateur Radio Techniques*; and in the cash-saving spirit of the recent *Rad Com* correspondence I thought that some of the many newcomers to the bands might like evidence that G3VA's comment is true.

Not that I am in favour of "wet-string" antennas, or careless about matching; but I do not want a tower or a beam in my garden. Since returning to the bands in 1977 I have mostly been on 7MHz, but while / A in North Devon recently I thought I would give 21MHz a try, with a 7MHz dipole 7ft high in a steeply-sided wooded valley. The results were astonishing: 100W produced W and PY on the two evenings I operated, with entirely respectable S4-7 reports. Since returning home I have worked W (including W6), PY, JA, VK, VE and LU using a 7MHz dipole (inverted-V) with the apex at 25ft, and which most people do not notice until it is pointed out to them. Some of the Ws gave solid contacts with 20W; and every station except the VK came back first call. Some tvi was instantly cured with a Faraday loop in the coaxial cable.

There is one constraint: I got nowhere on ssb. All contacts were cw (sorry—morse code telegraphy!). None of the dx is rare, but it is dx; so before you spend huge sums on a beam and upset the neighbours and your family, try a dipole, properly matched, and blow the dust off the key. Then you can spend the cash on building a QRP rig for hf and really making dx a challenge!

J. R. G. Beavon, G3PPR

144MHz CW
The Editor
Radio Communication
Sir—I am very surprised to find the arguments from G4EZZ/F0CVO in the October issue. During the period from 1 January to 30 June 1981 I worked 416 cw QSOs on 144MHz, about 34 of which were with British stations.

Jan Martin Noeding, LA8AK

FIFTY-FIFTH RSGB ANNUAL GENERAL MEETING

The fifty-fifth annual general meeting of the Radio Society of Great Britain was held at the Institution of Electrical Engineers, Savoy Place, London, on 5 December 1981.

The following is a brief report on the formal proceedings and presentation of awards. Official minutes of the meeting and a report on the informal session which followed it will be published at a later date.

The chair was taken by the 1981 RSGB President, Basil O'Brien, G2AMV, who was accompanied on the platform by Jack Anthony, G3KQF, executive vice-President; David Cornish, G3COR, honorary treasurer; and David Evans, G3OUF, general manager/secretary. The President announced that 139 members were present, and the notice calling the meeting was read by the secretary.

Formal agenda items

The minutes of the fifty-fourth annual general meeting were approved. The accounts for the year ended 30 June 1981 and the reports of the Council and auditors were received and considered.

The President announced the results of the election to fill vacancies on the 1982 Council, and the names of the duly elected members of the Council.

It was resolved to reappoint Messrs Edward Moore & Sons as auditors of the Society for the coming year, and Council was authorized to fix their remuneration.

The President called for volunteers to act as scrutineers at the election for the 1983 Council, and a list was compiled.

Marconi Medal

The Council had recommended to the Marconi Company that the award be made to Mr Peter Tunbridge, G8DEK, for work on microwave and tropospheric transmission. The medal and cheque for £100 was presented to him by Mr W. J. Morcom, BSc, MIEE, of the Marconi Company.

Founders' Trophy

This had been awarded to Mrs Frances Woolley for the wonderful work she had done for the Radio Amateur Invalid & Blind Club over very many years. Unfortunately she was unable to be present to receive it, but it was accepted on her behalf by Mr G. R. Jessop, G6JP.

Other Society awards

At the conclusion of the formal part of the meeting, and before the informal question and answer session began, the presentation of other awards to recipients who were present was made.

The NFD Shield, awarded to the Guernsey ARS, being accepted by a representative

The Louis Varney, G5RV, Trophy being received by a representative of the UOSAT Project team

G3XTJ receives the Edgware Trophy on behalf of the East Barnet ARC

Mr D. T. Hayter, G3JHM, receiving the Fraser Shepherd Prize

The G2QT Cup Winners Cup being presented to Mr D. F. Beattie, G3OZF

The Frank Hoosen Trophy being received by two representatives of the Southgate RC

The Wortley Talbot Trophy, awarded jointly to Dr C. W. Suckling, G3DWG (I), and Dr J. N. Gannaway, G3YGF

The Gravesend Trophy, awarded to the Gravesend RS, being received by three members of that society

The KM4000 keyer-memory

by K. L. KIMBER, BSc (Hons), and
A. FLOYD, GradInstBE, G4GVB*

Introduction

The KM4000 was originally conceived as an add-on memory unit for existing keyers to fill an obvious need for a mid-range-cost keyer with memory. As the project progressed, however, it became evident that the logic involved in achieving a high degree of reproduction accuracy precluded the concept of an add-on unit. Thus the KM4000 became the first truly low-cost keyer-memory to conform to individual requirements.

The KM4000 was designed with the user in mind and around a well-defined requirement—that it should be a quality product with a realistic price tag. It also had to be a useful addition to amateur radio station equipment without unnecessary frills. From these and many other ideas the essential requirements for the KM4000 became:

1. Single pcb construction.
2. Ease of use.
3. Sufficient storage capability.
4. Iambic or straight paddle keyer operation with dot and dash store.
5. Low cost.
6. High degree of custom flexibility.

* GVB Electronics, 95 Old Worthing Road, East Preston, West Sussex.

System design

There are two fundamental problems in the operation of the keyer which influence the overall system design. Their solution determines the nature of the circuit elements shown in Fig 1, and ultimately the quality and feel of the final product. First, the keyer must generate morse as an instantaneous response to paddle operation; this implies that it must either be instantaneous by nature, or be seen to be instantaneous by a speedy reaction to morse initiation. Second, the inter-character and inter-word spacings must retain the information imparted as part of the original cw transmission. So the reproduction must be structured in such a way that the spacings are discernible from one another. There are two possible approaches to this problem, each with its own cost penalty, and each influencing the nature of the keyer logic.

The system must either copy the cw exactly as defined by the operator, or automatically generate correct spacings irrespective of any minor variations in the incoming morse. In the second case some form of network to discriminate between the two types of spacing would be needed, along with the ability to represent each as a fixed code. This solution has two advantages over the first: it is likely to make more efficient use of the memory space available, and the reproduced morse will be perfect—provided the original cw is not too distorted. However, the logic involved in performing the space recognition and encoding incurs additional hardware costs which can only be offset by the optimized use of the memory. As the KM4000 is to be a low-cost system with a relatively small information storage capability, this becomes an unattractive solution; a cw copier with a resolution which makes digitizing errors unnoticeable would be best.

This decision influences the choice of the method of governing the keyer response, as it is logical to adopt the same approach as for the memory, and base it on a free-running master clock. So the overall structure of the KM4000 takes the form shown in Fig 1. The next step involves designing logic around this system.

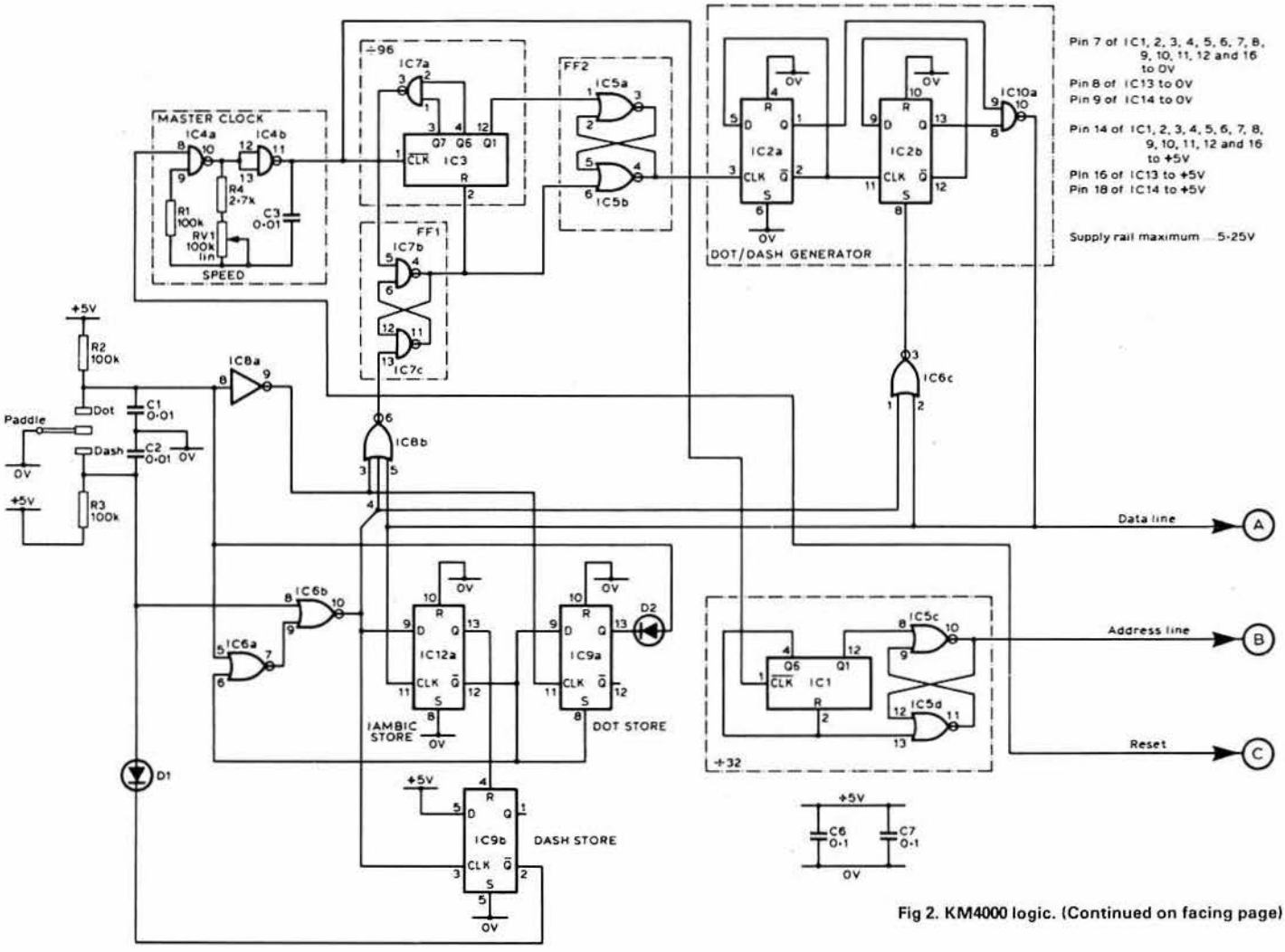


Fig 2. KM4000 logic. (Continued on facing page)

Circuit description

The circuit diagram, Fig 2, shows the KM4000 logic. In order to make description and understanding of the circuit easier it has been drawn in block fashion with well-defined circuit elements referenced *en bloc*, eg IC7B,C is an R–S flip-flop referenced FF1. Broadly speaking the circuit conveniently divides into two main areas: the keyer logic and the memory logic.

The keyer comprises the paddle, dot store, dash store, iambic store, the dot/dash generator and the ÷96 counter. The master clock may be considered as common to the whole system. A dot is sent by keying the paddle to the right, latching FF1 and thereby allowing the ÷96 counter to free-run. Note that by clocking FF2 from the Q1 output, the counter output responds to paddle operation within one clock pulse and the response is seen to be instantaneous. The dot/dash generator is clocked by the positive-going edge from FF2, thus driving data line A high. Since IC2B of the dot/dash generator is held SET by IC6C, the output NAND gate decodes a dot which holds the data line A high for 96 master-clock periods (one dot). A dash is formed in the same way, except

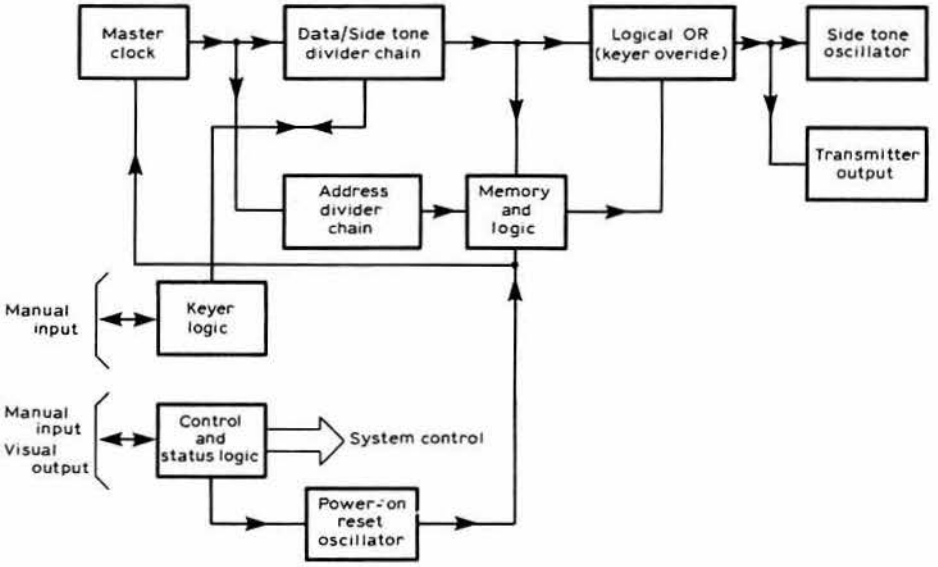
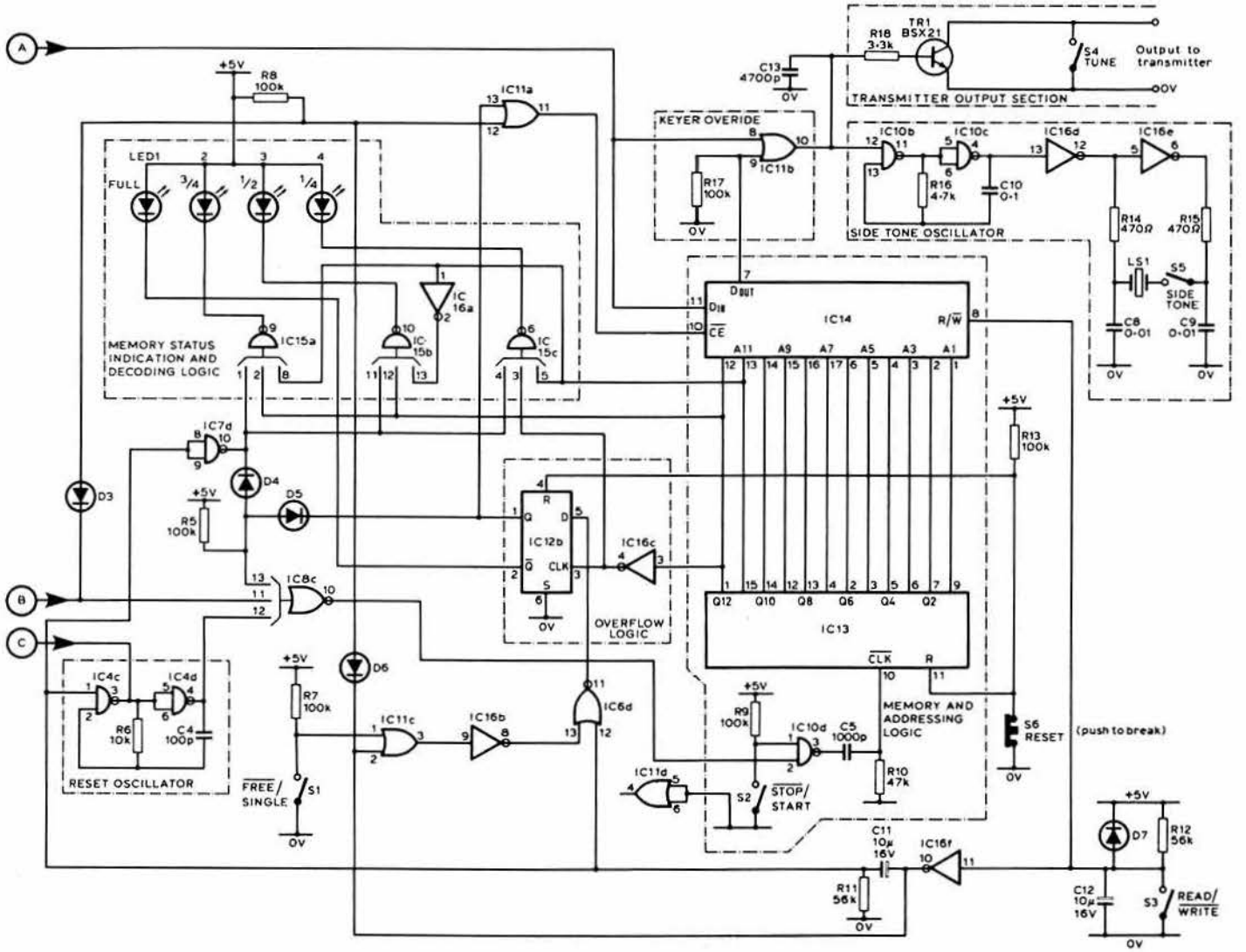


Fig 1. Block diagram, system overview



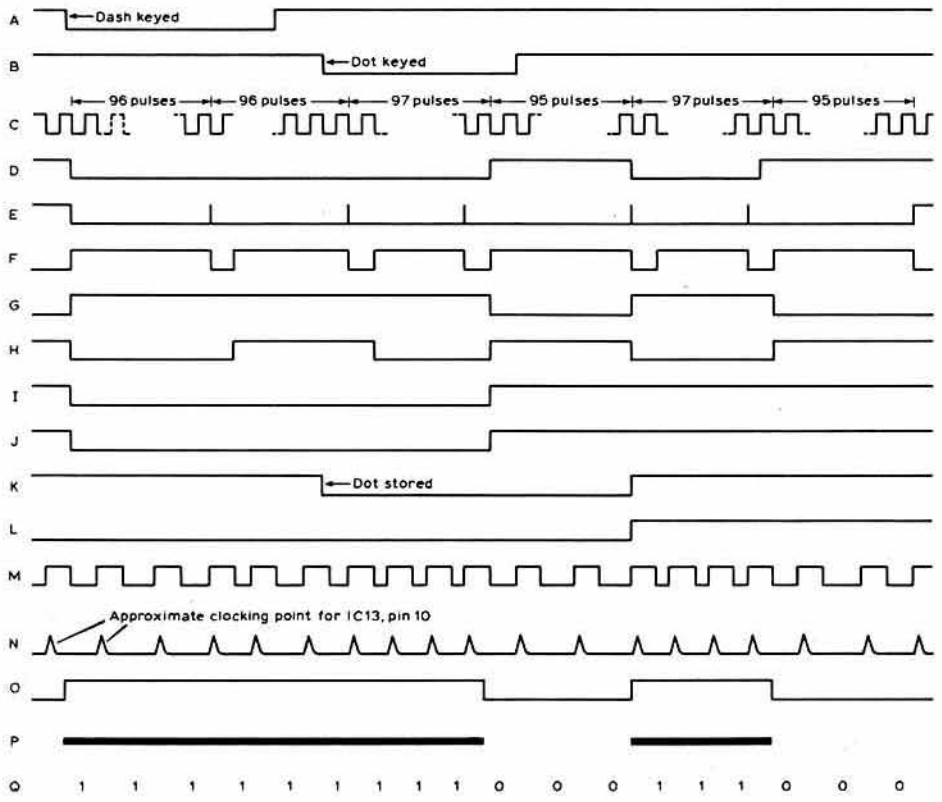


Fig 3. Timing diagram. Writing the letter "N" to the memory showing autospacing dot-store iambic response memory clocking four significant timing waveforms
A = Dash input IC6B pin 8
B = Dot input IC8A pin 8
C = Master clock output IC4B pin 11
D = IC6C pin 3
E = IC7B pin 4 (FF1 output)
F = IC5B pin 4 (FF2 output)
G = Data line "A"
H = IC10A pin 9
I = IC10A pin 8
J = IC9B pin 2
K = IC9A pin 13
L = IC12A pin 12
M = Address line "B" IC5 pin 10
N = Address counter IC13 pin 10
O = IC11B pin 10
P = Morse
Q = Stored data

that in this case both flip-flops are able to toggle; thus the space between two successive dots is filled-in and the output NAND gate decodes a dash. Consequently the dataline is driven high for 3×96 master clock periods (one dash).

In both cases interdigit spacing, ie the space between successive dots or dashes in any one character, is automatically generated as 95 periods long. This is guaranteed by data line A going low—to signify the end of a dot or a dash—one clock period *after* the reset pulse to the $\div 96$. Thus the counter free-runs for another 95 pulses before the next reset pulse from IC7A latches FF1 and holds the counter reset. If at any time during the transmission of a dash the paddle keys a dot, then a "0" is clocked into the dot store which thus ensures that the input of IC8A is kept low after the completion of the current dash and interdigit space. The same technique is used for the dash store but, in this case the $\overline{Q}$ output is used from IC9B to compensate for the "1" clocked into the data input (IC9B pin 5). Note that the diodes on the output of the respective stores perform the logical AND function with the paddle inputs.

The iambic store operates by clocking a "0" (representing a dot) or a "1" (representing a dash) to its Q output in response to the digit which initiates the sequence of dots and dashes. As a result of both paddle contacts being closed the iambic store toggles indefinitely via IC6A, thereby complementing IC6C pin 1 as each digit is transmitted. Thus the first rising edge after completion of a dot disables the SET pin of the dot/dash generator, which results in a dash being decoded by the NAND output gate. As such, a string of alternating dots and dashes is sent, the form of which is defined by the logical sequence in which the paddles are closed and opened.

Finally, the speed at which the morse is sent or read from the memory may be varied from as slow as 2wpm to as fast as 200wpm by varying the speed of the master clock. RV1 is used for this purpose since, together with C3 and R4, it sets the frequency of oscillation, f_o, of the master clock as defined by the equation $f_o = 1{\cdot}4RC$. Incidentally, due to the divider chains used in this design the mark/space ratio of the master clock is not critical.

The second major section of the KM4000 is the memory and associated logic. It comprises the bipolar memory ic and addressing logic, the overflow logic, the memory status indication and decoding logic, and the power-on reset oscillator. These sections are indicated in block form in Fig 2. There is also additional logic performing various ancillary functions; this includes the front-panel switches and interconnecting logic, the side tone oscillator etc. These will be dealt with at the end of this section.

The address counter is a straightforward 12-bit binary counter, the outputs of which drive the 12 address lines on the MM5257 memory chip. Timing considerations associated with the MM5257 require that the $\overline{CE}$ pin be high during positive-going transitions on the address lines, and to this end the clocking waveform to the address counter is modified by the CR network on the output of IC10D (See the timing diagrams, Figs 3 and 4). The bandwidth of this arrangement stretches from the slowest clock speed, approximately 2wpm, to well over 200wpm, and is great enough to cover all eventualities. The data from the keyer is synchronously clocked off data line A into the memory, which is organized as 4,096 words $\times$ 1 bit. Each bit resolves the time-equivalent of one-third dot as defined by the address and data divider ratios. These ratios were arrived at empirically and have been chosen to optimize the memory available while at the same time maintaining resolution and response.

At all times during reading and writing, the memory status is indicated by the 0·25, 0·5, 0·75 and full l.e.ds which are driven from the address decoders IC15 A,B,C. The overflow latch which drives the full l.e.d. is

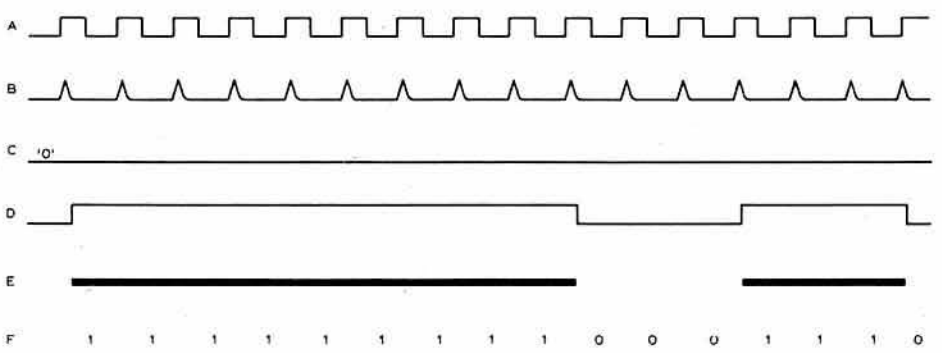


Fig 4. Timing diagram. Reading the letter "N" from the memory
A = Address line "B" IC5 pin 10
B = Address counter IC13 pin 10
C = IC14 Pin 10 $\overline{CE}$
D = IC11 Pin 10
E = Morse
F = Stored data

toggled on the falling edge of Q12 by virtue of inverter IC16C. Therefore it indicates when the memory has just gone into the full state, and prevents data corruption or repetition—when in the write or single read mode respectively—by disabling the memory chip (Q connection to IC11A pin 13) and gating out the address clock (Q connection via D5 to IC8C pin 13).

D4, D5 and R5 perform the logical AND function between the Q output from the overflow latch and the enable line to the power-on reset oscillator via IC7D. When either the overflow latch or IC7D is a "0" IC8C is enabled, thereby allowing either address line B or the reset oscillator to clock the memory. The power-on reset enable line is derived from the differentiator on the output of IC16F. This ensures that:

(a) The memory is cleared for a fixed length of time after power-on irrespective of the read/write switch position.

(b) When S3 is switched to write, the memory is automatically cleared out. This ensures that a short message may be over-recorded on a long message without the remains of the previous message coming through.

(c) The overflow logic (See Fig 2) is disabled during reset (connection via IC6D pin 12 to IC12B pin 5) which allows several memory reset cycles to be made.

(d) The l.e.ds are also held off by means of IC7D.

During power-on reset the memory is held in the write condition for approximately 560ms as defined by the RC time constant of R12, C12. D7 acts as a discharge path for C12 when the +5V rail is powered down.

In the free-run mode IC6D disables the overflow logic and allows the data to be cyclically read out. However, the free-run action is prevented in the write mode (IC16F connection to IC11C pin 2) irrespective of the free/single switch position, guaranteeing that data corruption through over-recording is not possible.

Data output from the memory is ORed with the data line A, allowing the keyer to be used irrespective of the state of the rest of the system. Coupled with the stop/start switch which halts memory operation, this enables the operator to make an immediate response to any incoming cw when full break-in mode is used, providing a very powerful override facility. The resulting output from IC11B drives the sidetone oscillator and the transmitter output. In the standard KM4000 a BSX21 is used in the TR1 position. This has a worst-case h_{FE} of 40 and a breakdown V_{CEO} of 120V. The cmos OR gate IC11B is capable of supplying approximately 1mA base drive, so enabling TR1 to sink a maximum of 40mA. This should suffice for most transmitters. Any equipment which exceeds these parameters will require that TR1 be changed or relay switches be used. S4 across the transmitter output has been included to facilitate tuning the transmitter.

The choice of psu for the KM4000 is largely up to the individual but should be capable of supplying 80mA at +5V dc. The bulk of this current is consumed by the memory ic which, being bipolar, dictates that the supply should also be regulated to ±0·25V. Although a battery back-up is somewhat impracticable with this level of current consumption, it could be included to prevent volatility over short periods of time. The memory ic will retain preprogrammed data down to a V_{CC} of +2V. For those who do not wish to supply their own psu, a suitable design is shown in Fig 5. The voltage regulator used here has internal foldback, overload, thermal and short-circuit protection and regulates 100mA at +5V. The psu pcb is given in Figs 6, 7 and 8. Finally, the push-to-break reset switch sets all address lines to zero for a memory read or write.

Construction

Because this design is user-definable, planning the construction and deciding upon the mechanical layout lies in the hands of the constructor. However, in common with most electronic projects there are guidelines which, if followed, simplify construction of a neat and professional-looking piece of equipment. The following guidelines also include comments specific to the KM4000.

Before assembling any components on the pcb it is advisable to lay the board on a piece of paper and mark out a template so that its mounting holes

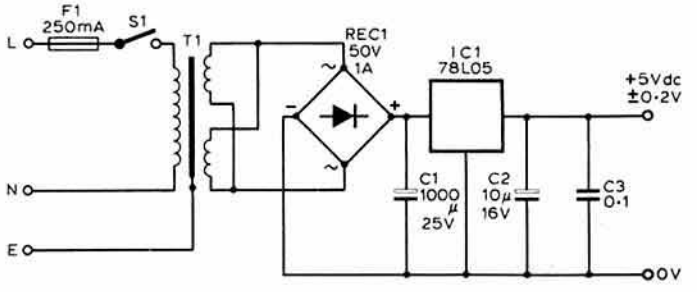


Fig 5. PSU circuit diagram

Components list

KM4000

R1, 2, 3, 5, 7, 8, 9, 13, 17	100kΩ ±5%	C1, 2, 3, 8, 9	0·01μF Mullard 352 series
R4	2·7kΩ ±5%	C4	100pF disc cer (min)
R6	10kΩ ±5%	C5	1,000pF disc cer (min)
R10	47kΩ ±5%	C6, 7, 10	0·1μF Mullard 352 series
R11, 12	56kΩ ±5%	C11, 12	10pF 16V rad
R14, 15	470kΩ ±5%	C13	4,700pF min plate cer
R16	4·7kΩ ±2%	D1-7	General purpose silicon
R18	3·3kΩ ±5%	TR1	BSX21 (see text)
(All resistors 0·25W)			
RV1	100kΩ linear	LED 1-4	3mm red
		LS1	Piezo cer transducer

(For speed 8-32wpm 50kΩ linear plus 15kΩ ±5% in series)

IC1, 3	4024B cmos	IC11	4017B cmos
IC2, 9, 12	4013B cmos	IC13	4040B cmos
IC4, 7, 10	4011B cmos	IC14	MM5257 memory
IC5, 6	4001B cmos	IC15	4023B cmos
IC8	4000B or 4025B cmos	IC16	4069B cmos

(IC socket: Soldercon ic socket pins (if required))

S1-5	Miniature toggle spst
S6	Miniature push-button, momentary action, one normally closed contact
Veropins	Half-pin (18)
Track pins	T1558-01 (42)

PSU FOR KM4000

C1	1,000μF 25V 7·5mm lead space	T1	0-6V L3VA 196-296
		REC1	Bridge 50V 1A 262-141
C2	10μF 16V rad	S1	SPST 250V ac
C3	0·1μF Mullard 352 series	F1	250mA
IC1	78L05 100mA regulator	Veropins	Half-pin (4)

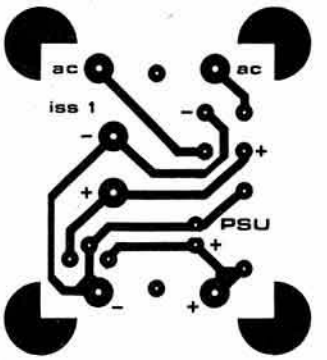


Fig 6. PSU pcb

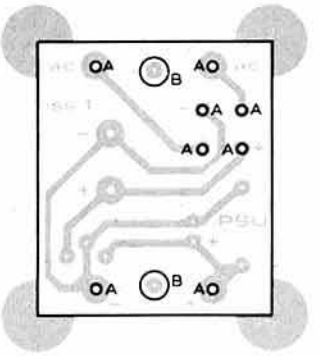


Fig 7. PSU pcb drilling plan

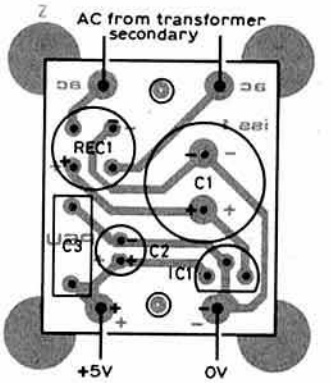


Fig 8. PSU component layout

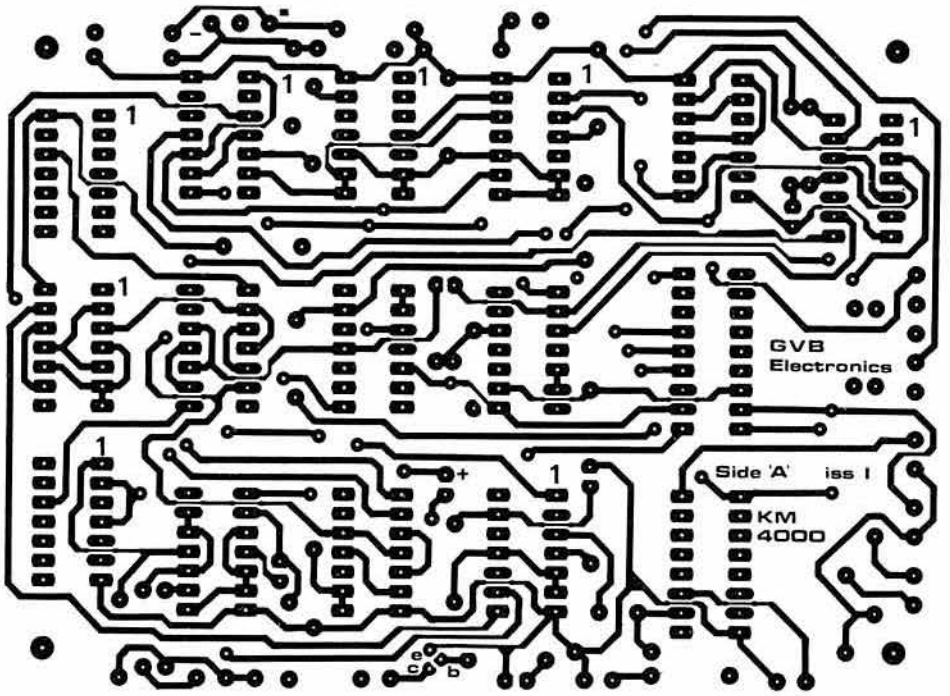


Fig 9. KM4000 pcb side "A"

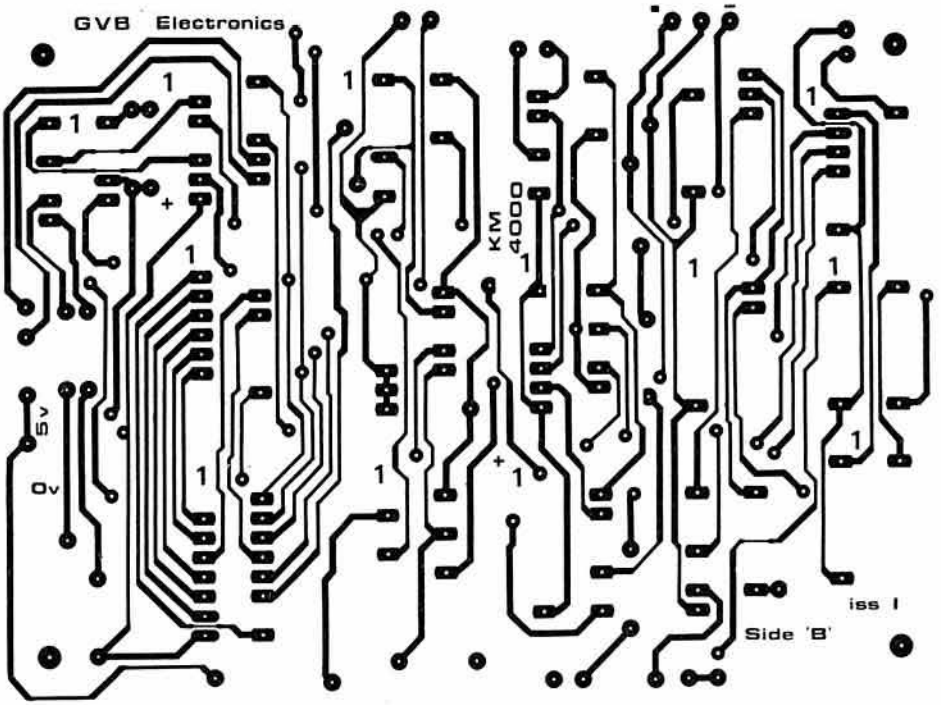


Fig 10. KM4000 pcb side "B"

may be accurately located when the unit is finally mounted in a box. Alternatively, if an enclosure has already been purchased the positions may be marked off directly. The pcb has been predrilled for 3mm (6BA) mounting studs. Next, carry out a visual check of the pcb prior to construction to ensure that the board has not been damaged in transit—this check may prove invaluable later on. The pcb artwork is shown in Figs 9, 10, 11 and 12.

The pcb has been laid out to minimize top soldering and pinning, and should present no problems to most constructors. The smallest soldering iron bit available should be used and after each component has been inserted check for any missed connections. As a rule of thumb the board should be assembled by starting with the lowest profile components and working up to the highest. The general assembly is shown in Fig 12.

Begin by inserting all the pcb pins in the positions marked in Fig 12. Some of these are located under ics, so ensure that none is missed and that they do not stick up too high after soldering. The through-hole pin used on the prototype is the Harwin T1558-01, which is supplied in the very convenient form of each pin connected top to tip—making it an easy matter to insert the end pin and break it free. However, 22swg tinned wire may be used instead. There are 42 pins in all.

Then insert the diodes, observing the correct polarity, and the resistors. These are all set on a 0·4in pitch and may thus be correctly preformed prior to insertion.

Next, insert the 25 board pins which connect to the psu, switches, l.e.ds etc, from the perimeter of the pcb. Standard Veropins can be used here as the board has been drilled out to 1mm in these positions. At this point the ics should be soldered into their respective locations, taking care to follow cmos handling precautions. Ensure that correct polarity is observed—the pcb has been laid out so that pin 1 uniformly lies in the same direction for all ics. Note that ic sockets cannot be used on this pcb as it is necessary to top solder the ics.

Follow up with the small capacitors, the transmitter output transistor and

Table 1
Speed related memory times

WPM	Seconds	WPM	Seconds
6	290	40	43
9	193	60	29
12	145	100	17·4
15	116	150	11·6
20	87	200	8·7
30	58		

The word storage capacity based upon the "standard" word *PARIS* is 29 words. The wpm speeds have been based on this standard.

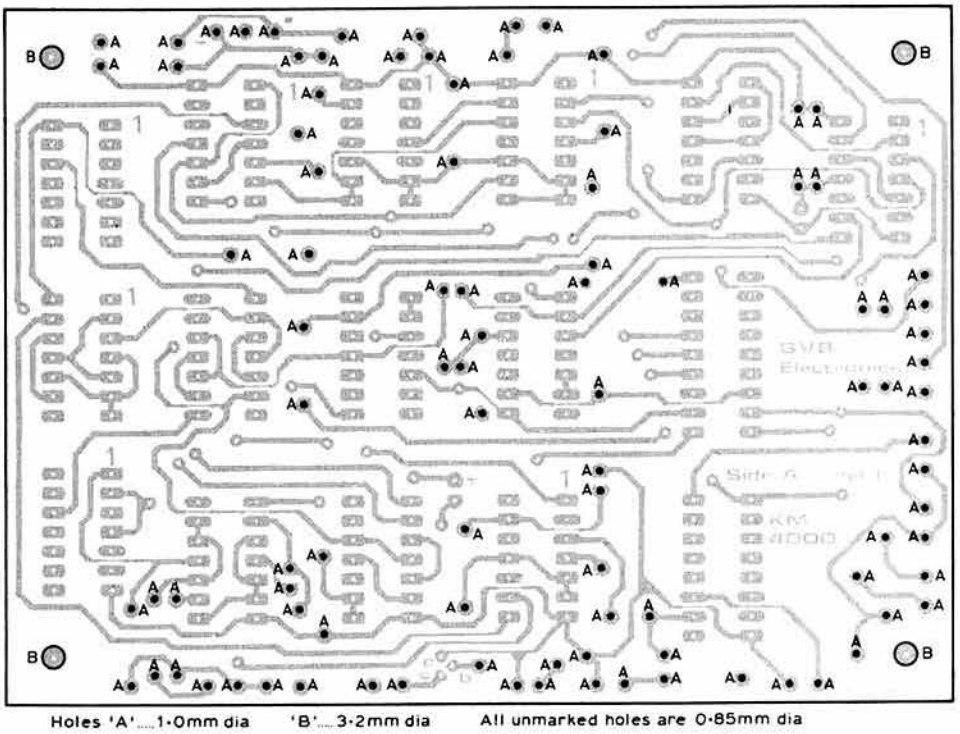


Fig 11. KM4000 pcb drilling plan

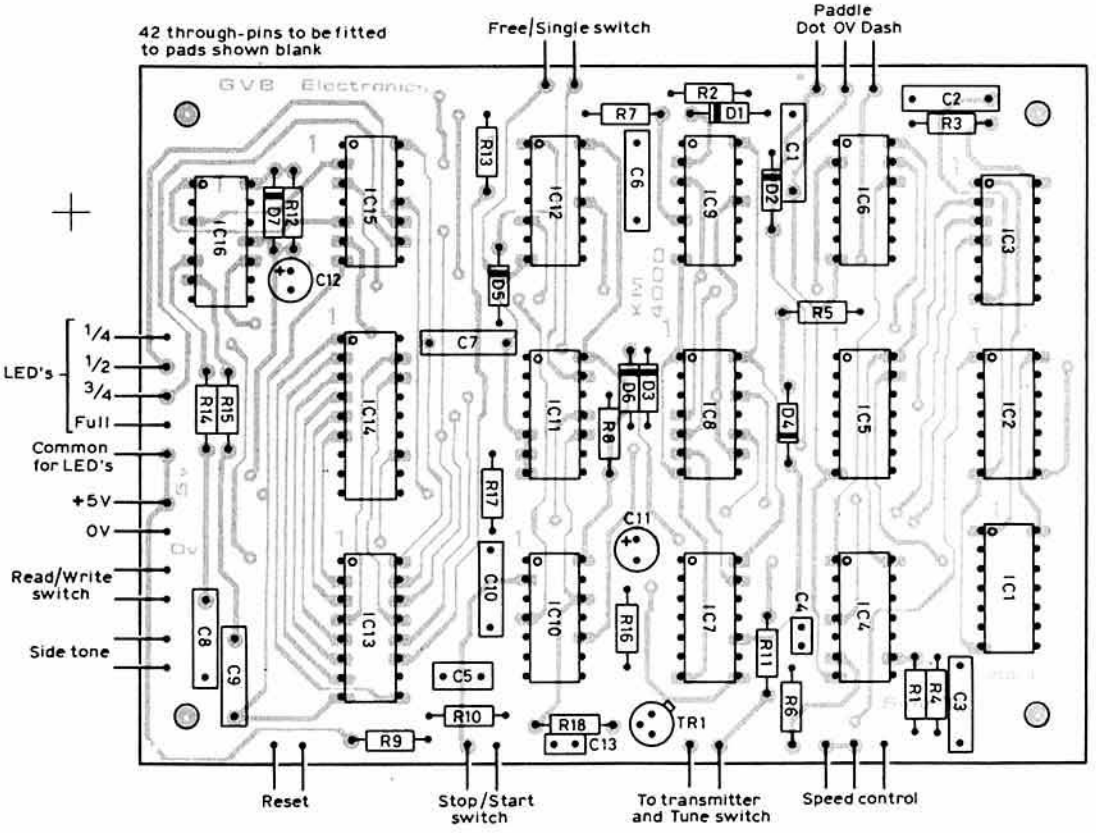


Fig 12. KM4000 component layout

the large capacitors. The positive leads of both electrolytics are marked with a + sign on the pcb, and the transistor legs have the collector and base positions marked c and b respectively.

Having inserted the components, the remaining top-side pads should now be soldered.

All that remains is to fit the completed board, psu and one's favourite paddle into the chosen box. The l.e.ds, switches and RV1 may be arranged on the front panel as desired. Incidentally, convention dictates that the paddle should be wired dots to the right, dashes to the left, so it is a good idea to follow this standard when wiring in the paddle. If it is decided not to fit any of the front-panel switches that have been allowed for, it is not necessary to wire out these positions on the pcb. The default case where any switch is omitted is catered for by the logic.

Using the KM4000

Begin by applying power to the KM4000 while monitoring the supply current. Typically this should be 35–40mA, but a tolerance weighting could take this as high as 80mA. Any l.e.d. indication at this point should be ignored.

Check that the keyer section and sidetone oscillator are functional by

Table 2. Logical interdependence of the front panel switches

Stop/Start	Read/Write	Reset	Free/Single	Comments
Stop	Don't care	Don't care	Don't care	Keyer functions memory halted
Start	Write	Reset	Don't care	Memory loads data from keyer
Start	Write	Reset	Don't care	Resets memory
Start	Read	Reset	Free	Reads out data cyclically
Start	Read	Reset	Single	Reads out data once
Start	Read	Reset	Don't care	No output from memory Allows keyer to over-ride

keying morse at different speeds and making sure that the dot and dash stores operate correctly—these are best checked at the slowest speed at which the keyer will run. To write to the memory, switch into the write mode and press RESET. When the reset button is released the memory immediately starts to clock in data from the keyer and will continue to do so until the full l.e.d. is lit. The 0·25, 0·5 and 0·75 l.e.ds provide a visual indication of memory breakpoints and will light up in sequence as the memory gradually fills up. To read the message, switch to READ and press the reset button. The KM4000 will respond by retransmitting the stored message at the same speed. Note that the information capacity does not vary with the speed of the master clock and remains constant under all conditions.

Based on the accepted "standard word" *PARIS* the KM4000 has a word-storage capacity of 29 words. The speed may be varied by altering the setting of RV1 which, as a result, will vary the length of time over which the message is transmitted, see Table 1. Thus in the free-run mode with a fast replay speed the KM4000 may be used for meteor scatter work. Other uses include CQ calls, morse practice, and callsign generation—write in the callsign, say, every 20s or so until the memory is full, select free-run (S1) and take the output to the microphone socket of the transmitter via a "T" pad attenuator (see Fig 13), or indeed to a tape recorder to facilitate the making of morse practice tapes. The logical interdependence of the front-panel switches is shown in Table 2.

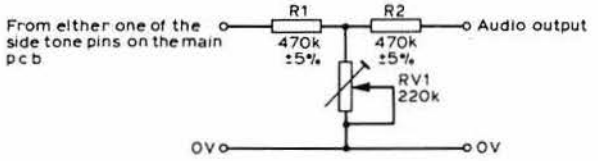


Fig 13. "T" pad attenuator

The quality of the sidetone oscillator is important in any keyer, and the piezo-ceramic device used in this design is associated with the shaping network IC16D, E, R14, R15, C8 and C9. This removes some of the harmonics that tend to give it a harsh quality when driven by a square wave and results in a more mellow tone. However, there is much room for experimentation in this area, and a great deal can be achieved by modifying the resonant cavity in which the transducer is housed. Broadly speaking, increasing the depth of the port and the cavity volume tends to decrease the resonant frequency, whereas decreasing the area of the port tends to increase it. Ideally the piezo transducer should be driven by a sine wave as this results in a soft, mellow tone. However, in order to get a reasonable volume with a sine wave the peak-to-peak voltage needs to be much higher than is possible with a +5V rail. Incidentally, other devices such as crystal earpieces have also been used on the prototype with good results. The sidetone frequency is set by R16, C10, and for the values shown in Fig 2 it is approximately 1kHz.

Conclusion

In practice the KM4000 has proved easy to use; it has succeeded in satisfying the performance required of it and has met an enthusiastic reception among local radio amateurs. A number have already been built and all have worked first time. PCBs are available exclusively for £9.62, incl p&p, from GVB Electronics, 95 Old Worthing Road, East Preston, West Sussex BN16 1DU; tel 09062 70260. Alternatively, a ready-built and tested board will be supplied for £44.95, incl p&p.

Bibliography

[1] "The 'ultimate' keyer", C. I. B. Trusson, MSc, CEng, MIEE, G3RVM. *Rad Com* May 1977.

[2] "A fourth generation cw keyer using cmos ics", E. B. Grist, G3GJX. *Rad Com* September 1976.

[3] *Memory Databook*, National Semiconductors 1978.

[4] *COS/MOS Databook*, 1st Edn July 1978 SGS ATES.

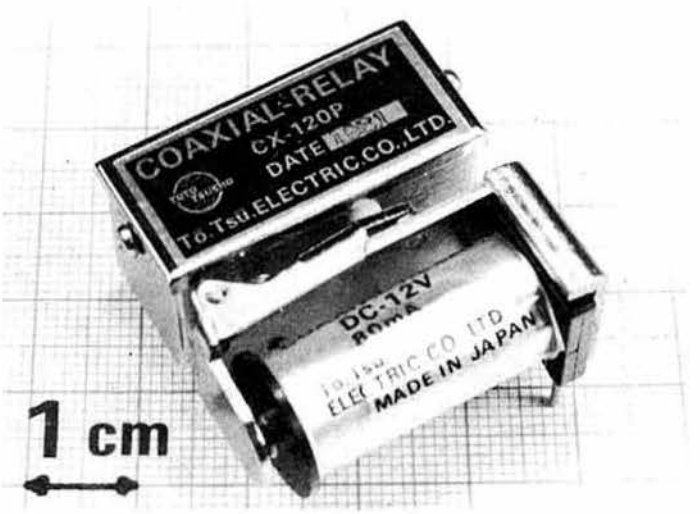
Acknowledgments

Typing, Mrs P. Young; script assistance, Miss T. C. Brown, BA; photography, K. Hayler, G4KYC.

NEW PRODUCTS

Toyo-Tsusho CX120P coaxial relay

The versatile CX120P coaxial relay is one of a comprehensive range of pcb-mounting devices made by this manufacturer. It has an exceptionally low vswr to over 1GHz, and crosstalk is better than 80dB across the hf range —and it is still better than 50dB at uhf frequencies.



The CX120P coaxial relay

An insertion loss of only 0·2dB at 2·5GHz, and the pcb terminations, make it a most versatile antenna relay. Applications include remote antenna switching, power attenuator switching, transceiver antenna changeover, and antenna grounding systems.

For further information contact Ambit International, 200 North Service Road, Brentwood, Essex CM14 4SG; tel 0277 230909.

Barrie's toroids

Barrie Electronics Ltd can now supply toroidal transformers, rated at 30, 60, 100, 160, 230, 330 and 530VA. The primary 110, 220 or 240V windings and the dual secondaries, in a range from 6+6 to 50+50V, have been selected to meet the needs of both professional electrical and electronic engineers and DIY enthusiasts. From a list of 58 toroidal transformers; it is possible to cover most requirements because the secondaries can be connected in series, parallel or independently. Each transformer is tested between primary to secondary insulation at 4kV.

The toroidal transformers, from the Cotswold Electronics "budget range", will complement the 150 laminated types held by Barrie Electronics, on an off-the-shelf basis, and will provide a range of transformers which are 50 per cent lighter and 50 per cent lower volume, and with a very low height to diameter ratio, compared with stacked laminated types, which makes toroids ideal for use in "slim-line" electronics. The toroidal transformer also has an approximately 10:1 better radiated noise (hum) characteristic and is acoustically quieter, which gives greater latitude when siting the transformer.

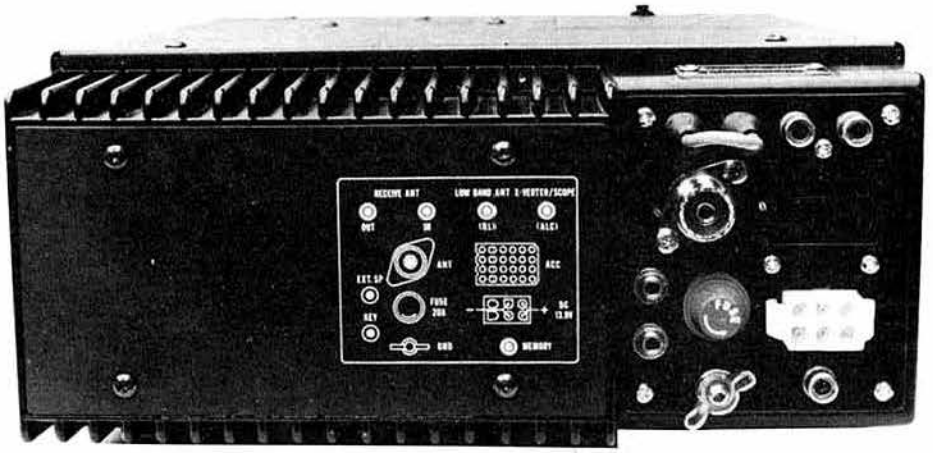
Each transformer is supplied with a data sheet giving technical details on the operation and installation of the Cotswold toroids. The grain oriented silicon steel clockspring cores permit operation at high flux density, with very low iron losses, resulting in high efficiency. Although the toroids in the "budget range" are designed to be operated within specific load, regulation and temperature rise parameters, they can also be used in a "derated" condition at a lower temperature rise and with improved regulation without incurring too much of a size penalty.

For further information contact Barrie Electronics Ltd, 3 The Minories, London EC3N 1BJ; tel 01-488 3316-7-8.

EQUIPMENT REVIEW

The Icom IC720A hf transceiver

by P. J. HART, BSc, G3SJX*



Rear view of the IC720A

Introduction

The IC720A is currently the top of the range hf transceiver available from Icom Incorporated. Advanced techniques are employed to provide an impressive list of facilities. Broadband circuitry together with a high first i.f. are used to give full general coverage receiver operation in addition to normal transceiver operation on the nine amateur allocations. A full frequency synthesizer is used with a microcomputer control system. Extensive remote control facilities allow the transceiver to control or be controlled by ancillary units. A matching linear (IC2KL) and atu (ICAT500) are available with bandswitching controlled automatically from the IC720A. The transceiver is intended for 12V operation. A matching mains power unit (ICPS15) is available at extra cost.

Built-in facilities

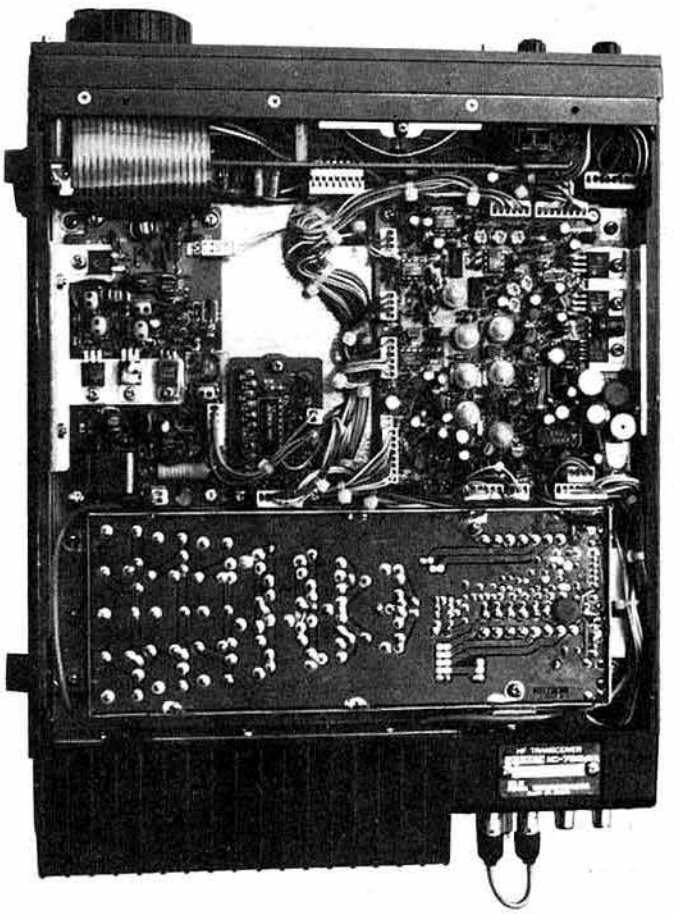
Modern hf transceivers seem to provide an ever-growing number of facilities, and the IC720A is certainly no exception. Transceiver operation on the nine amateur allocations is provided with general coverage receiver operation in 30 1MHz segments from 100kHz to 30MHz. A digital frequency synthesizer under control from a microcomputer provides two independent vfos which may be used in any combination for simplex/duplex or for receive and transmit frequencies on any combination of bands. The synthesizer step size can be selected in either 10Hz, 100Hz or 1kHz steps. Receiver features include passband tuning, noise blanker, rit, optimized bandwidths and demodulators for ssb, cw, a.m. and rtty modes, with optional extra i.f. filters for a.m. and narrow bandwidth cw. Transmitter features include broadband operation with no tuning controls, speech processing, full metering, fully adjustable ssb and cw vox operation, multifunction fan and direct 170Hz fsk operation on rtty. The transmitter is rated at 100W p.e.p. output power.

A number of input/output facilities are provided on the rear panel. These include external receiver and receiver external antenna sockets, transverter control and low level rf output sockets, linear control, connectors for external alc, panadaptor, remote operation, audio input/output and the usual accessory functions. Unfortunately, not all the above input/output facilities are available simultaneously. Two of the sockets provide facilities which must be selected by internally changing plugs and sockets. Either transverter input/output or panadaptor output or alc control is provided by one socket. Either lf antenna input for receive or linear switching is provided by the other socket.

Description

Considering the facilities provided, this transceiver is remarkably small, measuring 24 (w) by 11 (h) by 31cm (d) and weighing 7·5kg. The mains power supply is even smaller at 18 (w) by 11 (h) by 30cm (d). The circuitry is constructed on a number of boards mounted on both sides of a central screening support. Plug and socket flying lead interconnections are used throughout. Access to the main transceiver signal boards appears to be reasonably straightforward, but access to the digital control boards requires removal of the front panel. Miniature controls are used on the front panel, and all other functions that do not require variable controls are push-button selectable. Several of the push-buttons are multifunction. Once the operation of the controls is mastered, and this takes a little longer than with more conventional transceivers, the equipment is easy to use. The cw monitor, vox controls and meter switches are situated under an access cover in the top of the transceiver case. This makes them awkward to use but is an inevitable consequence of providing a large number of user-selectable facilities in such a small unit. The speaker is also mounted in the top of the case. A sturdy metal case is provided and a smart appearance is achieved.

The frequency band is selected by up/down push-button switches. The frequency is tunable in either 10Hz, 100Hz or 1kHz steps set by the main tuning knob controlling a photochopper. One revolution of the 50mm diameter tuning knob corresponds to 100 increments of frequency. This corresponds to tuning rates of 1, 10 or 100kHz/revolution of the tuning control. When tuning with 10Hz increments, no discrete step in frequency is noticeable, and the synthesizer handles like an analogue vfo. However, the tuning rate is excessively slow in this position for general use and, except



Top view of the IC720A with cover removed

*42 Gravel Hill, Addington, Croydon, Surrey.

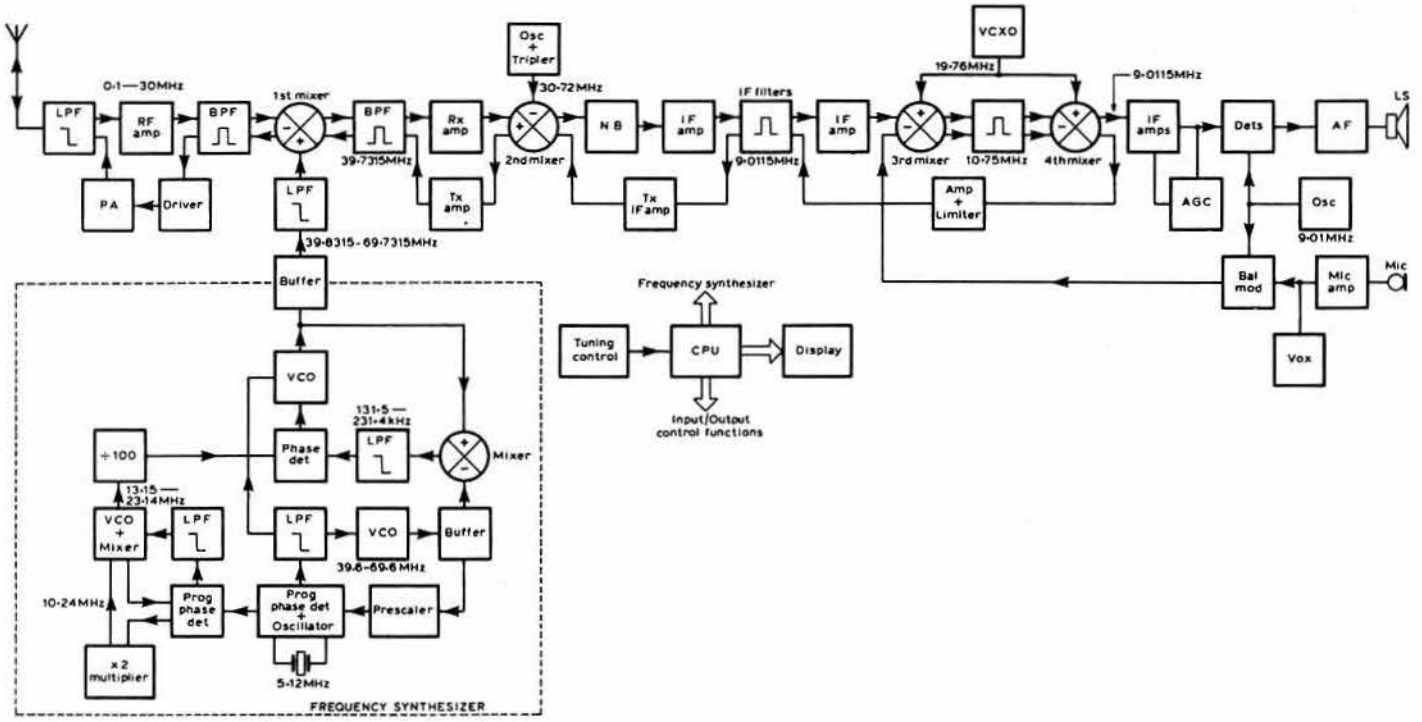


Fig 1. Block diagram of the IC720A

for cw operation, 100Hz steps are normally preferred. Although discrete steps in frequency are noticeable in the 100Hz step position, tuning into ssb signals poses no problem. The 1kHz step position is only suitable for rapid changes in frequency. It is possible to beat the synthesizer by turning the tuning knob too fast. The digital readout to 100Hz is provided by a blue-green fluorescent display which is clear to read under most conditions, although unlit segments become particularly noticeable with high ambient light levels.

On switch-off, or a momentary loss of supply, the computer-controlled functions such as frequency, mode etc are lost. On switch-on, the transceiver will reset to 7·1MHz lsb in amateur band mode, or 15MHz usb in the general coverage mode. The use of a 9–12V memory back-up supply connected to a socket on the rear panel will enable these computer-controlled functions to be stored. However, the current drawn from this supply is around 20mA when the equipment is switched off.

The transceiver is provided with a dynamic microphone which incorporates a built-in preamplifier.

A simplified block diagram of the IC720A is shown in Fig 1. Much of the circuitry is common to both transmit and receive. On receive, incoming signals are filtered, using lowpass and bandpass filters, and are amplified using a wide dynamic range push-pull fet amplifier. The signal is then converted up to an i.f. of 39·7315MHz, filtered and amplified, and then converted down to the second i.f. of 9·0115MHz. The main selectivity is achieved at this frequency. The first and second mixers are wide dynamic range double-balanced mixers. The passband tuning facility is provided by mixing the second i.f. at 9·0115MHz up to a third i.f. of 10·75MHz, where the i.f. signal passes through an additional crystal filter, and then mixing back down to 9·0115MHz again in a fourth mixer. A common local oscillator signal is used for both the third and the fourth mixers, and hence no net change in frequency results. By altering the frequency of this local oscillator, the i.f. signal can be moved relative to the 10·75MHz filter passband, and hence the overall i.f. passband shape can be modified (see Fig 2). This oscillator is a vcxo operating at 19·76MHz with a tuning range of ±1·5kHz. The detectors and audio adopt conventional practice.

On transmit, dsb is generated at 9·0115MHz. With the speech processor switched off, this dsb signal passes through the 9·0115MHz ssb filter and is converted up to 39·7315MHz. With the speech processor in operation, the 9·0115MHz dsb signal is converted first to 10·75MHz, where it is filtered to give ssb, and then converted back down to 9·0115MHz, where it is limited and filtered before being converted up to 39·7315MHz. The signal is then converted to final frequency, amplified and filtered. A fully solid-state wideband power amplifier is used. The mixers, filters and several of the amplifier stages are common to both the receiver and the transmitter circuitry. A rotary relay controlled by the microcomputer selects the appropriate signal filter. This relay is disturbingly noisy in operation.

The local oscillator drive for the first mixer is derived from the frequency synthesizer unit. Three phase-locked loops are used to generate the local oscillator drive of 37·7315–69·7315MHz in 100Hz steps. The local oscillator drive for the second mixer is crystal controlled. Where 10Hz increments in frequency are required, this second oscillator is shifted in 10Hz steps. A four-bit microprocessor is used to control all these frequency generating functions from input data provided by the front panel controls and the photochopper tuning control. In addition, the microprocessor controls other housekeeping functions such as selection of relevant sideband, mode, filter, detector etc, and additional features like cancelling the rit when the main frequency is altered.

There really is a lot going on inside this small box.

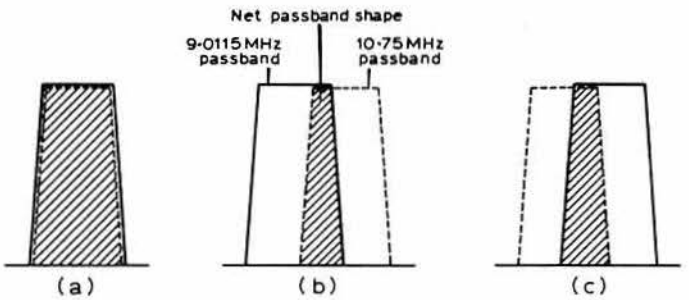


Fig 2. Operation of the passband tuning control. (a) Passbands coincide. (b) PBT set to attenuate lf signals. (c) PBT set to attenuate hf signals

Measurement technique

Unless otherwise stated, all measurements were made using the IC720A powered from the ICPS15 psu with ssb selected and with the audio gain set to give 100mW af output. In all cases, signal input voltages are quoted in pd across the antenna terminal. Signal generators are often calibrated in terms of source emf. Where a generator of 50Ω source impedance is connected to a receiver of 50Ω input impedance, the pd across the antenna terminal is half the source emf.

Three measurement arrangements were used to evaluate this transceiver. These are shown in Fig 3. A single generator was used to evaluate sensitivity-based measurements and spurious responses as shown in Fig 3(a). The two generator arrangement, Fig 3(b), was used to evaluate signal handling, ie blocking, crossmodulation, intermodulation and reciprocal mixing. For intermodulation measurements it is important to ensure that no intermodulation products are generated within the generators when the two are

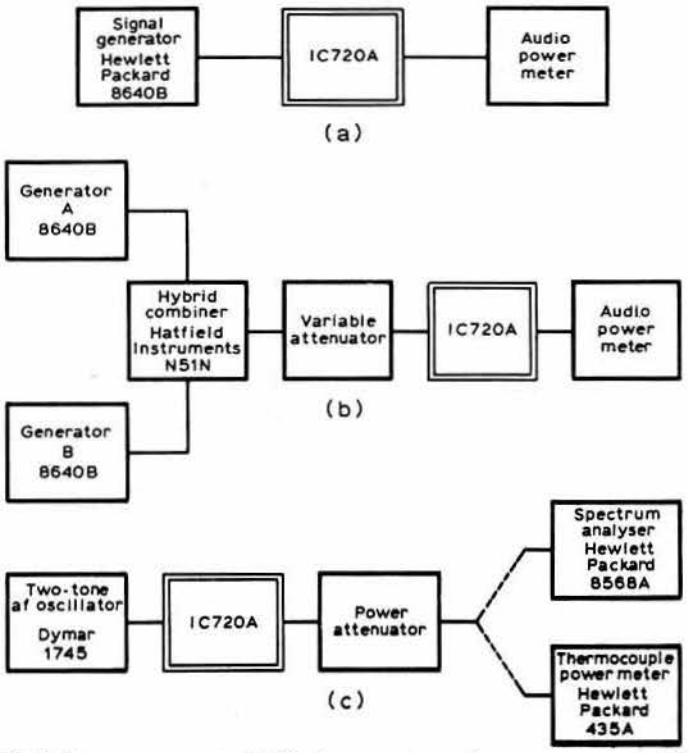


Fig 3. Test arrangements. (a) Single generator receiver measurements. (b) Two generator receiver measurements. (c) Transmitter measurements

coupled together. For this reason it is essential to use a hybrid combiner which provides isolation between the two input ports rather than a resistive combiner. The loss of the hybrid combiner and attenuator combination must be known in order to determine the signal input to the IC720A.

Receiver measurements

Sensitivity

The results of sensitivity measurements are shown in Table 1. These measurements were made at a signal plus noise-to-noise ratio of 10dB. For a.m. measurements the generator was modulated to a depth of 30 per cent with a 1kHz audio tone. A sensitivity of 0·1μV for 10dB s+n:n on ssb represents a noise floor in ssb bandwidths of approximately −136dBm or a noise figure of approximately 5dB. This is very sensitive for an hf receiver and well within the published specification.

S-meter calibration

The input signal level required to give a reading of S9 is shown in Table 1. At 21MHz the S-meter calibration was:

S reading	Input signal	Relative increase
S5	6·6μV	
		3dB
S7	9·5μV	
		3dB
S9	13μV	
		11dB
S9+20	45μV	
		12dB
S9+30	180μV	
		12dB
S9+40	730μV	

Spurious responses

With a first i.f. of 39·7315MHz, the image frequency occurs 79·463MHz above the frequency to which the receiver is tuned. The image rejection, 39·7315MHz i.f. rejection, and 9·0115MHz i.f. rejection, together with the half first i.f. rejection of 19·8658MHz are shown in Table 2. These levels were all measured by setting the signal generator to give the required spurious response at a level giving 10dB s+n:n ratio and relating this level to an on-tune signal of 10dB s+n:n ratio. A response at one half the first i.f. at a level much worse than the response at the first i.f. may seem surprising. However, on the bands where a significant half i.f. response is obtained, little rejection of this response is provided by the input filter networks. Responses at one third and one quarter of the first i.f. could be obtained between 10 and 21MHz. These responses are all due to harmonic generation in the first mixer. There was no detectable response on any band at the 10·75MHz i.f..

Table 1. Receiver measurements

Frequency	Sensitivity ssb	Sensitivity a.m.	Input for S9
1·8MHz	0·16μV	0·86μV	13μV
3·5MHz	0·16μV	0·86μV	14μV
7MHz	0·12μV	0·60μV	8·6μV
10MHz	0·1 μV	0·58μV	8·3μV
14MHz	0·11μV	0·68μV	10μV
18MHz	0·1 μV	0·56μV	8·7μV
21MHz	0·13μV	0·76μV	13μV
24MHz	0·12μV	0·71μV	12μV
28MHz	0·16μV	1·0 μV	17μV

Table 2. Receiver measurements

Frequency	Image rejection	39·7315MHz i.f. rejection	19·8658MHz half i.f. rejection	9·0115MHz i.f. rejection
1·8MHz	109dB	107dB	–	–
3·5MHz	110dB	108dB	–	–
7MHz	112dB	112dB	–	97dB
10MHz	111dB	115dB	–	69dB
14MHz	112dB	114dB	107dB	73dB
18MHz	110dB	115dB	87dB	114dB
21MHz	117dB	112dB	84dB	107dB
24MHz	92dB	96dB	77dB	102dB
28MHz	90dB	93dB	75dB	100dB

Note: dashes signify an unmeasurable response.

To check for internally generated spurious signals, the antenna socket was terminated in 50Ω and the receiver carefully tuned over the complete range 1·6 to 30MHz. There was no spurious response which was strong enough to move the S-meter. The strongest signals occurred at 9·0115, 10·24 and 20·48MHz, frequencies of internal crystal oscillators, and were equivalent to input signals of 0·5μV. Compared with some other receivers of similar design and complexity, this is a very good result.

Other spurious responses were checked by setting the signal generator on either side of the on-tune frequency and noting the amplitude for any responses corresponding to an S1 meter reading when the generator was tuned from 100kHz off frequency to 30 per cent off frequency.

Frequency	Worst response	Other responses
1·8MHz	70mV	1 at 100mV
3·5MHz	70mV	3 up to 70mV
7MHz	50mV	5 up to 100mV
10MHz	23mV	7 up to 50mV
14MHz	15mV	6 up to 100mV
18MHz	14mV	Several around 25mV
21MHz	18mV	5 up to 35mV
24MHz	20mV	Several around 20mV
28MHz	40mV	Several around 40mV

AGC performance

The agc threshold was found by slowly increasing the input signal until the af output ceased to rise linearly with the input. This occurred at around 3μV at 7MHz and 3·5μV at 28MHz. Above this level the audio output remained within 1dB up to at least 100dB above the threshold level.

Signal handling

Measurements on signal handling properties were made at a frequency of 7MHz using the test arrangement shown in Fig 3(b).

The noise spectrum of the first local oscillator gives rise to reciprocal mixing and can result in a degradation of the selectivity and strong signal performance of a receiver. Reciprocal mixing was measured by setting generator A on-tune at a level of 25μV, and the audio output set to 100mW. Generator A was then turned off and generator B set off-tune with the level adjusted to give an audio noise output of 1mW. This level was:

Frequency offset	Level
10kHz	11mV
20kHz	25mV
50kHz	70mV

An alternative measurement of reciprocal mixing was made by noting the noise level of the audio output of the receiver with no signal present, and then increasing the level of an off-tune generator until the audio noise output of the receiver increased by 10dB. This level was 5dB lower than that given in the table above at the same offset frequencies. Noise generated by the synthesizer occurs at a much higher level while the synthesizer is changing frequency. This was detectable as clicks when tuning the receiver close to the generator frequency with the output set in excess of 10μV. With a 1mV signal, these clicks on tuning were audible 100kHz away from the generator frequency.

Crossmodulation was evaluated with the IC720A switched to a.m.. Generator A was set on-tune at a level of 500μV rf output, and amplitude modulated to a depth of 30 per cent with a 1kHz audio tone. The audio output was observed on a spectrum analyser, and the modulation on

generator A was then turned off. Generator B was set 50kHz off frequency, amplitude modulated to a depth of 30 per cent with a 1kHz audio tone, and the level increased until the audio output was observed to be 20dB below the previous level. This occurred at a level of 160mV.

Blocking was evaluated by setting generator A on-tune at a level of 500μV. Generator B was set 50kHz off frequency, and the level increased until the S-meter just started to decrease. This occurred at a level of 250mV. This test was repeated with 100kHz and 300kHz frequency offset with identical results.

Third-order intermodulation distortion was measured by setting the two generators 50kHz and 100kHz away respectively from the frequency to which the receiver was tuned, and increasing the levels equally until a third-order intermodulation product was generated in the receiver passband at a level giving an s + n:n ratio of 10dB. This occurred when each generator was set to −36·5dBm (3·35mV), ie 89dB above the level of an on-tune signal giving a 10dB s + n:n ratio. In this case the intermodulation product was at a level of −125·5dBm (0·12μV). The third-order intercept can be calculated from the expression:

$$\text{Third-order intercept} = \frac{3S - I}{2}\ \text{dBm}$$

where S is the amplitude in dBm of each input signal and I is the amplitude in dBm of the third-order intermodulation product generated. This gives a third-order intercept of +8dBm for this receiver.

Audio power output and distortion

The maximum undistorted output power into an 8Ω speaker was 1·2W. At this power level the audio distortion was less than one per cent. At 2W audio output power the distortion was 20 per cent. Maximum audio output could be achieved with a 1·5μV input signal.

Selectivity

The i.f. selectivity curve was plotted by tuning a signal generator across the receiver passband and noting the level required to give an S-meter reading of S1. Such a method, measured directly from the antenna terminal, must be treated with caution, as attempts to measure too far down the skirts of the filter will result in inaccuracies due to reciprocal mixing and signal overloading problems. Using this method it was possible to measure down to −65dB before such effects became apparent. The results for the ssb filter were:

3dB bandwidth 2·2kHz
6dB bandwidth 2·4kHz
60dB bandwidth 4·6kHz

The total ripple within the passband was approximately 1dB, and the skirt response was symmetrical.

Transmitter measurements

CW power output

The power output of the transmitter is limited by the alc circuitry. Full power output on cw was measured as 100W between 10 and 28MHz, reducing to 94W on 7MHz and 92W on 1·8 and 3·5MHz. Minimum power output as set by the front panel control was approximately 6W on all bands.

Harmonics and spurious outputs

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

Band		Spurii
1·8MHz	Harmonics −56dB	Spurii less than −70dB
3·5MHz	Harmonics −56dB	Spurii less than −80dB
7MHz	Harmonics −56dB	Spurii less than −72dB
10MHz	Harmonics −58dB	Spurii less than −70dB
14MHz	Harmonics −58dB	Spurii less than −70dB
18MHz	Harmonics −54dB	Spurii less than −68dB
21MHz	Harmonics −56dB	Spurii less than −62dB
24MHz	Harmonics −52dB	Spurii less than −74dB
28MHz	Harmonics −56dB	Spurii less than −70dB

SSB power output and distortion

The test arrangement for making ssb measurements is shown in Fig 3(c). Again, the power output is limited to approximately 100W p.e.p. by the alc circuitry. Some high levels of inband distortion products were observed when making initial measurements. On further investigation these were found to be due to one of two causes.

(*i*) Intermodulation products occurring on adjacent channels and generated in the rf power amplification stages. The levels involved are fairly typical of a wideband semiconductor power amplifier.

(*ii*) Harmonic and intermodulation distortion generated in the audio or modulator stages of the transceiver and confined to within the filtered passband of the transceiver. However, these products also intermodulate in the power amplifier stages to produce products on adjacent channels at a lower power level. In order to reduce the audio distortion as far as possible, it is important not to advance the microphone gain control too far. If advanced too far, harmonic distortion of over 20 per cent can be generated within the audio or modulator stages. The distortion generated is unaffected by the operation of the speech processor.

Distortion due to cause (*i*) was measured by applying two equal amplitude audio tones at 600Hz and 2kHz to the microphone socket. By using widely-spaced audio tones, distortion due to cause (*ii*) largely fell outside the filter passband. The results at 100W p.e.p. output were:

Frequency	Third-order IPs	IPs at ±10kHz	IPs at ±20kHz
1·8MHz	−33dB	−55dB	−65dB
3·5MHz	−36dB	−55dB	−70dB
7MHz	−33dB	−52dB	−65dB
10MHz	−26dB	−52dB	−65dB
14MHz	−28dB	−53dB	−65dB
18MHz	−28dB	−55dB	−65dB
21MHz	−26dB	−52dB	−65dB
24MHz	−23dB	−55dB	−65dB
28MHz	−23dB	−54dB	−68dB

In all cases the intermodulation product level is quoted with respect to the amplitude of either tone of the two tone test signal.

Inband intermodulation products due to cause (*ii*) could be as high as −12dB. Fig 4 shows the output spectrum of the transmitter when driven from a two-tone source and exhibiting distortion due to both causes. The frequency span is 10kHz, and the vertical scale is 10dB per division.

The carrier suppression was better than −60dB and the sideband suppression at 1kHz was −70dB.

Audio response

The transmitter audio response was measured with the processor off by first applying a 1kHz audio tone, setting the power output to 30W, and measuring relative to this level. The −6dB points were 450 and 2,550Hz.

The transmitter is intended to be used with a microphone with a built-in preamplifier. The audio input required is about 200mV for full power output with the processor off, or 30mV with the processor on. The input impedance is 1·3kΩ.

Additional measurements

Frequency stability

The frequency drift from switch-on was very low. This is to be expected with a synthesizer tuning system using a crystal oscillator reference. Drift was measured at 24MHz. During the first 15min after switch-on the transceiver had drifted 100Hz and after 1h 200Hz. After this period the drift was within 20Hz.

Transverter operation

A useful facility provided by the IC720A is a low-level rf output and receiver input together with control signals for use with transverters. Frequencies in the range 20–30MHz are available for transverter operation, and measurements were made in the frequency range 28–30MHz. The receiver sensitivity via the transverter socket was 0·25μV for a 10dB s + n:n ratio, and the rf output power on transmit was measured as −10dBm. Fig 5 shows the output spectrum between 28 and 30MHz. The vertical scale is 10dB/division and shows inband spurii at a level of −78dB. This is very low compared with many other transceivers.

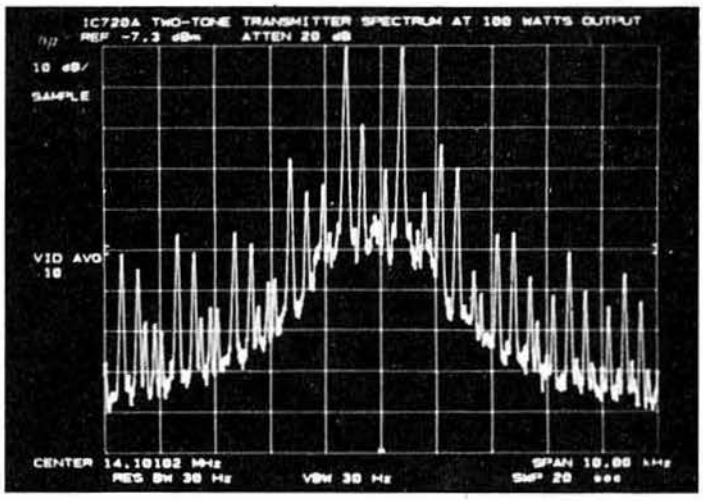


Fig 4. Transmitter two-tone output spectrum

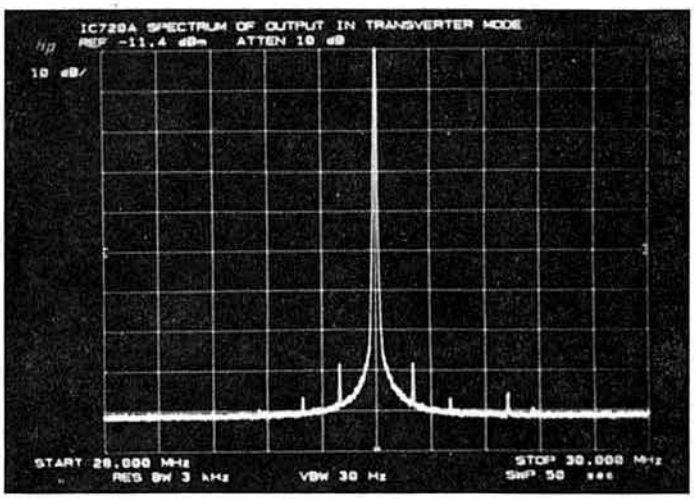


Fig 5. Output spectrum in transverter mode

DC power supply

The IC-PS15 mains psu provided a voltage of 14·25V on receive. This reduced to 14·15V on transmit at full power. The current drawn by the IC720A was 960mA on receive, 2·3A on ssb transmit with no audio applied and was not measured at full power output.

Low voltage performance

When a high power transmitter is powered from a 12V battery for portable or static mobile operation, there comes a time when the battery voltage starts to fail. With an 11V supply, the IC720A transmitter delivered 80W output power with reasonable distortion. Below 10·8V the synthesizer started to "chirp".

On the air results

In common with other broadband equipment, this transceiver is easy to use and rapid to change bands. It is important to make sure that the antenna is closely matched to 50Ω otherwise the vswr protection circuitry will reduce the transmitter power to protect the power amplifier.

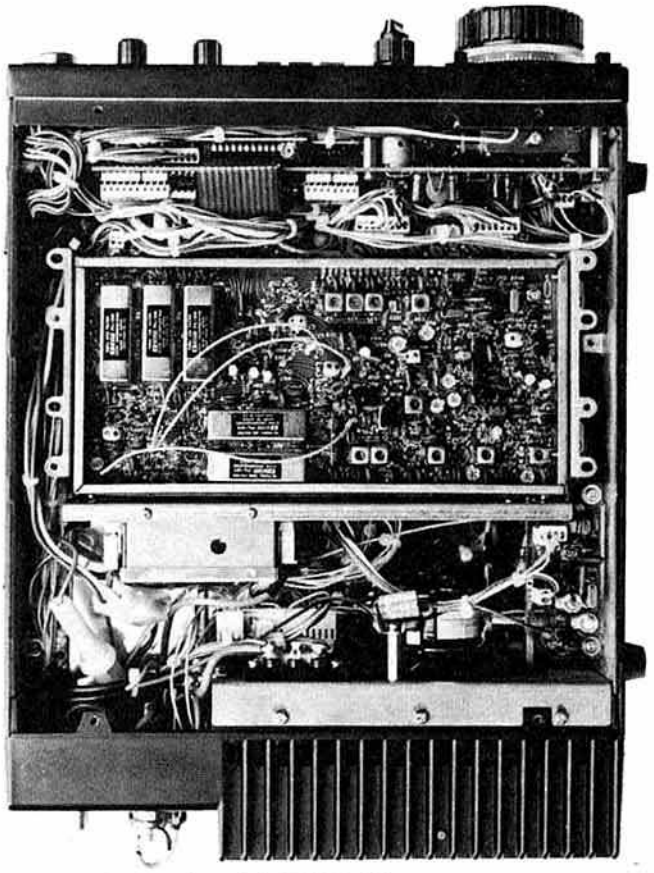
The receiver generally performed very well indeed, particularly in the presence of strong signals, as the creditable signal handling measurements would indicate. However, it was still necessary to use the 20dB attenuator for evening operation on the lower frequency bands. The "clicks" described in the receiver measurement section under signal handling were generally inaudible. However, the occasional "click" was heard at certain frequencies, particularly when the 100Hz digit changed from 4 to 5 or 0 to 1. The synthesizer also appeared to miss out certain frequencies. Operating very close to the 1MHz boundary frequencies in the 28MHz band can cause the actual frequency and displayed frequency to differ. This is described in the manual and does not really present a problem. Most of the time 100Hz tuning steps were used, but for tuning cw 10Hz steps were preferred. A more convenient system, in the reviewer's opinion, would be a tuning step size proportional to the rate at which the tuning control was turned. In certain parts of the world breakthrough on 19·8658MHz (half first i.f.) may be experienced. A filter is available from Icom distributors to cure this problem. The noise blanker was found to be completely ineffective, so much so that a fault on the particular equipment under review was suspected.

On transmit, good reports were received provided the microphone gain control was not set too high. With excessive microphone gain, reports of harsh audio were received.

Conclusions

The IC720A comes complete with a microphone, dc power cable, essential plugs (but no 24-way accessory plug) and a 40-page instruction manual. Operation and use of the equipment is described fully, with additional sections on circuit operation and alignment. Multicoloured board layout diagrams are provided and an overall circuit diagram. This overall circuit diagram is so complex that it is virtually unreadable.

The current price of the IC720A is £883 incl VAT, and the matching psu IC-PS15 costs £99 incl VAT. The transceiver used in this review was kindly loaned by Thanet Electronics of Herne Bay, Kent. □



Bottom view of the IC720A with cover removed

An improved tune-up device for the FT7

by LES MAY, G4HHS*

FOLLOWING PUBLICATION OF his article "Safe tune-up with the FT7" (*Rad Com* August 1981),, the author received several letters asking about his mention of the half-size G5RV [1], and others asking about the device described. In replying to these, the author began to look with a critical eye at the circuit he was using. In particular he was concerned that the sensitivity to small mismatches should be improved. In this context the term sensitivity should be taken to mean "What is the smallest mismatch that will show a significant deflection on the null meter?". The goal set was that when the bridge saw an swr of 1·5 the meter would indicate at least one third fsd. Several approaches were considered.

The original article mentioned that the resistor connected to the hot end of the dummy load (R2) might need to be reduced from 1kΩ to 500Ω. The disadvantage of this is that the transceiver would now see only about 45Ω. While this would not present a dangerously-high swr, increasing sensitivity would have to be bought by further decreases in this resistor. Another approach was to reduce the resistor in series with the meter (R6). This was tried, finally going down as low as 100Ω. Replacing the meter with a more sensitive one was rejected on the score of cost.

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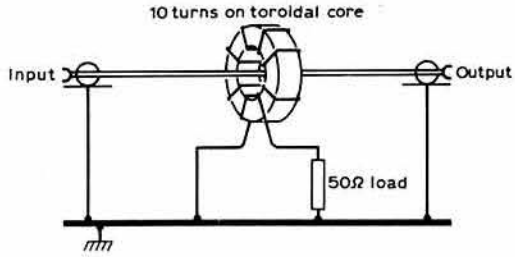

Fig 1. The "20dB coupler" arrangement

Circuit description

The approach finally adopted was to alter the method of taking a sample of the rf from the dummy load to feed the bridge. A further study of [2] produced the idea of the "20dB coupler". The principle may be understood from Fig 1. Power is fed through the single wire passing through the centre of a high-permeability ferrite toroidal core, and forms the primary of a current transformer. The secondary is formed from 10 turns of thin wire around the toroid. Each time the wire passes through the centre of the toroid is one turn. If the secondary is now terminated in a 50Ω load, such as the original bridge circuit represents when balanced, this termination is reflected back through the current transformer according to the square of the turns ratio. As a result the source sees the toroid as a 0·5Ω resistance in series with the load. If the main line is terminated by a 50Ω dummy load, the source will see 50Ω plus 0·5Ω from the current transformer, making an almost unchanged 50·5Ω. Any mismatch in the bridge will in effect be divided by 100 in the process of being reflected back to the source, making the load effectively constant. Because the ratio of the two resistances is 100, or 20dB, the power applied to the bridge is 20dB less than that applied to the dummy load. Having focused attention on power, it was decided to incorporate a simple means of measuring output power.

The final circuit is shown in Fig 2. Power is fed via SK2 to the dummy load connected to SK1. It passes through the primary of T1 made up of a short piece of insulated wire. The secondary is made up of 10 turns of thin insulated hook-up wire and feeds power to the rf bridge formed by R1,2,3. The fourth arm of the bridge is the output to the atu connected to SK3. As in the original, the balance point is detected by D1, C1 and the meter. Diode D2 and capacitor C4 form a peak rf detector, allowing a voltmeter to be connected via SK4,5. The original pcb layout is suitable, though it is suggested that the components be mounted on the copper side and the board left undrilled. This greatly facilitates experimenting with the most suitable value for R4 should this be desired. It is preferable to keep the internal connection between the input and the dummy load as short as possible, and this may necessitate taking the corner off the pcb to make room for the toroid. The toroid used in the prototype was from the spares box but [3] suggests that FX1596 might be suitable even as high as 70MHz. The prototype was good up to at least 30MHz. It was not usable on 144MHz. If it is felt to be worthwhile, an electrostatic shield may be incorporated between the primary and secondary by replacing the single wire primary

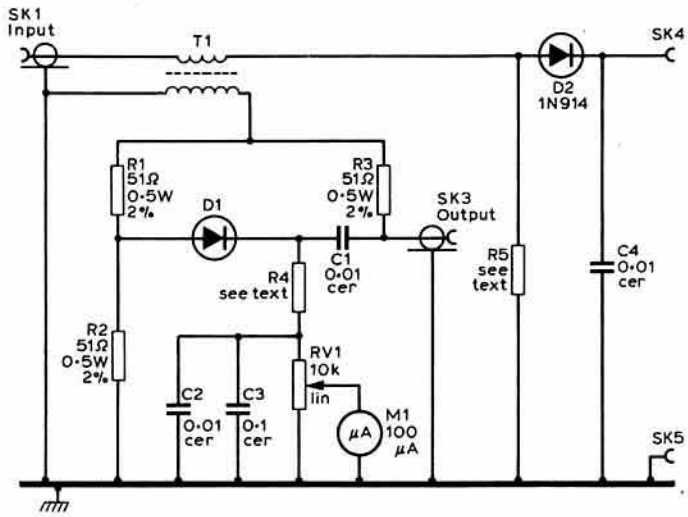

Fig 2. Circuit diagram

Components list

R1, 2, 3	51Ω 0·5W 2 per cent	D2	1N914 or similar silicon diode
R4	3·3kΩ (see text)		(see text)
R5	Dummy load (see text)	M1	100μA
RV1	10kΩ linear	SK1, 2, 3	SO239
C1, 2, 4	0·01μF ceramic	SK4, 5	1mm or similar socket
C3	0·1μF ceramic	T1	Toroid (see text)
D1	Hot carrier diode		

with a short length of coaxial cable and connecting one end only of the braid to chassis. In this case the secondary will have to be enamelled wire.

This version is used in much the same way as the original. The meter is set for minimum sensitivity with the antenna disconnected. Power is applied briefly and the sensitivity adjusted for fsd. The antenna is reconnected and the power applied while the atu is adjusted for a good match. At this point the null meter should fall to a very low level, even with the sensitivity control in its most sensitive position. To measure power the antenna is disconnected and a voltmeter on a suitable range attached to SK5,6. Power is applied and the reading on the voltmeter is noted. The output power may now be calculated from the method given in the appendix. Purists may replace the connection to the atu with a 50Ω resistor. No change in the reading on the voltmeter could be found when the atu was disconnected. Any errors are comparable with those found in the voltmeter or the dummy load etc.

Conclusion

The goal of making the tune-up indicator more sensitive has been achieved though at the cost of some frequency sensitivity, which is of no consequence in this case. The value of R4 has been chosen to provide a deflection of one-third fsd on 7MHz when the atu presents a mismatch of 1·5 swr. The load seen by the transmitter is very close to 50Ω during the antenna tuning process. In addition, facilities have been incorporated which allow the output power of the transmitter to be measured with a reasonable degree of accuracy. The method can be applied to higher output powers, but in this case diode D2 should be replaced with a device able to withstand a reverse voltage of at least twice the peak voltage being measured. Two or more diodes in series may be used.

Appendix

Diode D2 and capacitor C4 form an rf peak detector. Positive pulses pass through D2 on every alternate cycle of rf and charge C4 to the peak voltage of the rf. The peak voltage Vp is related to the rms voltage Vr as follows:

$$Vr = \sqrt{\frac{2}{2}} \times Vp$$

The power dissipated by a resistor R when a steady dc voltage V is applied to it may be found from

$$P = \frac{V^2}{R}$$

A steady dc voltage is equivalent to the rms voltage of an ac signal. Hence

$$P = \frac{Vr^2}{R}$$

substituting for Vr

$$P = \frac{\sqrt{\frac{2}{2}} \times Vp \times \sqrt{\frac{2}{2}} \times Vp}{R}$$

or

$$P = \frac{Vp^2}{2R}$$

If Vp is determined using a voltmeter, and R is known, the power supplied by the transmitter may be calculated.

The derivation of this formula has been given because it has been noted that many books fail to distinguish clearly between Vp and Vr when discussing the measurement of power by this method.

References

[1] "The G5RV aerial—some notes on theory and operation", Louis Varney, G5RV. *RSGB Bulletin* November 1966, pp705–7.

[2] *Solid-state design for the radio amateur*, W. Hayward and D. Demaw. Published by ARRL. Obtainable from RSGB Publications (Sales).

[3] "Frequency independent directional wattmeters and an swr meter", P. G. Martin, G3PDM. *Rad Com* June 1969, pp399–403.

A 12V 25A power supply unit

by W. BLANCHARD, G3JKV*

THE PREVIOUS ARTICLE, describing a 10A unit (*Rad Com* November, 1979), was well received, if the subsequent correspondence was any guide. Many correspondents made two points: the difficulty of finding the LM305 regulator that was specified; and the need for even higher power output, up to 25A. This article describes a modified unit that overcomes both problems.

It is worth pointing out immediately that with currents of 25A the remarks made in the previous article about using thick wire and ensuring really low-resistance joints apply with even more force. The circuit diagram (Fig 1) indicates those paths where the use of 10 gauge wire or better is necessary, but other connections will not be carrying much current and thinner wire is acceptable. When making the heavy-current joints, it is essential to use a high-power soldering iron (60W or more) or, alternatively, good-quality large screw connectors.

The basic layout of this unit is much the same as the earlier one, but heat dissipation is much more important, particularly in the final pass transistors. Because of this it is worth spending a few moments considering where this heat originates and how to minimize it at source. What happens is that the final transistors in the regulator chain pass the entire current while reducing the raw supply dc voltage to the regulated value of about 13·5V. If the unregulated supply is at 20V, then they are dissipating 6·5V at 25A, or no less than 162·5W. An obvious method of reducing this is to bring down the unregulated voltage, but there are limitations on how far it is possible to go. The basic limitation is what the regulator will allow as the differential between input and output voltage before it stops regulating. Most regulators need about 3V, and to this must be added the voltage drop across the boost transistors, giving, in this case, a total of about 4V.

So, if it is decided to provide 13·5V output, an absolute minimum of 17·5V unregulated is needed. Also, this is not the average value, but the value of the bottom of the ripple trough under load. The amount of full-load ripple thus becomes important; the smaller it is, the lower the input dc can be, and the less the wasted heat to be removed. However, although a ripple-free input might seem the ideal, it is virtually impossible to achieve at the current needed. Even assuming a perfect transformer with no voltage change under load, and using a very large capacitor (250,000μF), there would be about a 1V ripple at 25A (and, incidentally, the peak charging current would be such that 100A diodes would have to be used). There is, actually, no other real reason than heat dissipation for getting the ripple down to very low values. Provided the ripple trough can be held to the minimum specified, the regulator will get rid of the remaining ripple, so its effect on the output can be ignored. Using slightly more realistic (and easily obtained) values of capacitance of about 25,000μF, a ripple of about 4V will be produced at 25A if the transformer does not itself contribute anything due to under-rating. Allowing for mains voltage fluctuations and transformer variations, an off-load dc output of about 27V from the capacitor before regulation should be the aim. Hence, the transformer will have to supply 19–20V ac at 25A, as a minimum, but should not be much higher otherwise there will be heat dissipation problems.

Professionals would simply give this specification to their transformer supplier and get on with designing the rest of the unit, but amateurs are not so lucky. There are, of course, manufacturers who supply such transformers, but there are other ways open to the ingenious constructor. For instance, a transformer suitable in all ways except current rating may be used at the expense of incorporating a 50,000 or 100,000μF capacitor to hold up the voltage lost due to the winding resistance. The extra transformer heating will probably not matter considering the rather intermittent use typical of amateur operation. A transformer rated at 10A has been used quite satisfactorily in this way. Then, if current is all right, but voltage is wrong, two or three transformers can be connected with their secondaries in series. Old 6·3V valve heater transformers can be used this way, but be careful of the phasing. To get the voltage exactly right, try playing with the primary taps. Slight over-running by putting 240V on the 220V tap will not matter, but putting 240V on a 110V tap is not considered sound practice.

The same diodes as recommended earlier (1N1184) will still suffice, and having assembled the unregulated dc supply system of transformer, diodes and capacitor, it is worth testing both off and on load for correct voltages—about 27V off-load, and about 21V mean on-load with 3–4V ripple is permissible. Check on-load with a 'scope; the peaky waveform will make a multimeter read wrongly. A suitable load to take 25A is not easily come by, but try using five 60W car headlamp bulbs in parallel.

The regulator has only two jobs to do—reduce ripple to a reasonable level, and stop any excessive variation in voltage at the output.There is little point in trying too hard to get both perfect, since all the supply has to do is look approximately like a car battery under charge, and a quick look at the waveform of a typical car 12V line will show it is neither very smooth nor very stable. This being so, the finer points of electronic stabilization may be conveniently forgotten and the circuit kept fairly simple. The easiest regulators to use are the 'three-terminal' devices of the 78 series, which at the expense of a fixed voltage output and some limitations on overload protection and ultimate stabilization are very easy to install. They need only three connections—unregulated input, ground, and regulated output, and can give up to 1A of current without further assistance. They are also quite cheap (65p typically). For this application they are quite acceptable although unable to regulate against voltage drop in the pass transistors or wiring, and unable to provide any overload protection except for themselves. The 7815 is used, providing a regulated 15V at its output terminal. This will drop to 14V at the pass transistor emitters, and even lower at the output terminal of the complete unit, depending on wiring resistance. The regulation will not be much better than 0·5–1V but the average car is much worse. These devices can be obtained in various current output capabilities, 0·5A being ample, although if higher current devices are more easily available there is nothing against using them.

The last step is to multiply up the current output to 25A in two steps using a 2N3055 driving two 2N5301s in parallel. Neither the regulator itself nor the 3055 needs heatsinking, but the 5301s certainly do. As already mentioned, they are dissipating over 150W at full output, split between the two of them. Individual dissipation could be cut down by using more than two, but there are problems with making sure all transistors are carrying equal currents, and anyway the total power to be dissipated is still the same. Theoretical calculations about the required size of heatsink are liable to be wrong, particularly when different constructors may use very different constructional methods impossible to foresee. So the best advice is to arrange cooling sufficient to keep the transistor case cool enough not to burn a finger while running at maximum output for about 10min (or longer if you are given to lengthy overs). As a guide, the prototype unit needed a finned heatsink 8in by 8in in area with fins 2in deep, with the transistors mounted as far apart as possible. Take care to mount the heatsink where air circulation is as free as possible. If you have a small fan, use it to blow air over the heatsink just to be safe. Some of the low-power 12V models are very quiet and can be left on all the time.

Even using only two transistors, some balancing is necessary, and is done by the two emitter resistors (R1 and R2). These are 0·05Ω 10W units specially designed for the purpose, with the resistive element contained in a

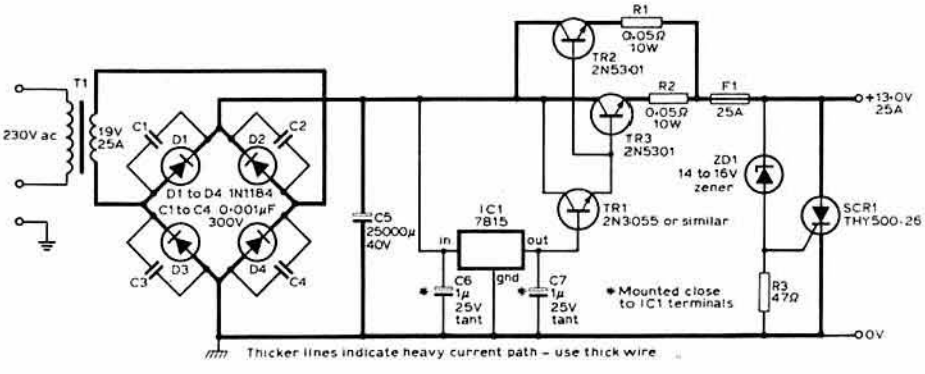

Fig 1. 12V 25A psu circuit diagram

*The Trundle, Tower Hill, Dorking, Surrey RH4 2AN.

small ribbed aluminium tube with lugs for bolting to a metal surface, which can be the heatsink itself, or simply the chassis. Suitable 0·05Ω resistors can be made up quite easily by wrapping about 10ft of 18 gauge wire around a 0·5in former. If the turns are spaced a little, the wire will not get much more than slightly warm at full current output. These resistors will be a lot bigger than commercial items, of course, but they will also be a lot cheaper. These resistors themselves are responsible for much of the voltage drop at high output (0·75V at 12·5A), but regrettably cannot be left out. If for any reason a higher degree of voltage stability is necessary, the only thing to do is to use one of the regulators that has a separate reference voltage input which can be connected after these resistors and thus compensate for this loss.

There is a danger with these power units of the collector-emitter junctions of the pass transistors short-circuiting and thus putting the whole of the unregulated voltage across the load. Your 12V transceiver may not like 22V! Some protection against this is advisable. There are several circuits available, but in this case the simplest is probably the best. ZD1 is a 14–16V zener which, if the output voltage rises above its conduction voltage, allows current to pass through resistor R3, developing a small voltage which is enough to trigger SCR1 which is connected straight across the output after the fuse, thus short-circuiting it and blowing the fuse. Since the fuse itself has to be of 25A rating, this SCR has to be able to conduct at least that current, so that if the load is very light and only drawing a few milliamps it will still work. SCRs of this rating are not cheap, but worth it for the peace of mind. The rating of the zener is not critical, and if necessary two could be used in series to get the right trip voltage, which should not be more than about 16V. Provided the heatsinking is right, nothing will be damaged by the temporary and very short-lived overload if you should happen to have a 25A load connected when the voltage gets out of control. The fuse, of course, also protects against external short-circuits.

Physical layout and construction are not critical, given adequate cooling, and a number of extras could be built in such as current and voltage meters, more extensive fusing, etc. One point is that an adequate transformer for this job will be quite heavy, and a lightweight aluminium chassis should not be expected to carry it. □

RF hazards and the radio amateur

by ROGER P. BLACKWELL, BSc, G8IZV,* and
IAN F. WHITE, MA, PhD, G3SEK*

THE BIOLOGICAL EFFECTS of rf radiation and their practical implications have received a great deal of attention in recent years. Papers on these subjects in professional and scientific journals abound. Unfortunately the echoes of these papers in the amateur radio press have often been ill-informed and in some cases sensationalized. The average radio amateur is left wondering whether rf hazards are truly a cause for concern and, if so, what to do about them.

The authors are radio amateurs who are professionally involved in radiological protection, one being a biologist and the other an environmental scientist. In this article they examine the potential hazards of amateur radio from the viewpoints of radiation biology, rf engineering and commonsense.

Normal good rf engineering practice automatically tends to control potential hazards to the station operator. At fixed stations the normal use of high antennas leads to very low environmental rf power densities in accessible places. Even in the less common cases where areas of relatively high rf power density are potentially accessible, the operator can still control the hazard by preventing access. The authors see no reason for treating rf hazards any differently from other hazards of amateur radio that are better-known, accepted and controlled.

Effects of rf radiation

The quantum energy of rf radiation, which determines what manner of interaction with matter takes place, is very low; orders of magnitude smaller than that required to cause ionization of atoms or molecules. RF radiation is thus totally different in properties from the ionizing radiations such as gamma and X-rays. The most important effect of rf radiation on biological materials is the induction of rotation of electrically-polarized molecules, such as water. This rotational energy manifests itself as heat. This principle is employed in medical diathermy and the microwave oven.

A great deal of research effort is currently directed towards understanding the biological effects of rf. While the authors would not wish to discourage anyone from taking an interest in this work, they must emphasize that the interpretation of the experimental results is difficult for the layman, and that it is all too easy to jump to the wrong conclusions. The view of the overwhelming majority of Western scientists working on this topic is that heating is the *only* biologically significant effect of rf. There are often reports, mostly emanating from Eastern Europe, of "non-thermal" effects occurring at extremely low power densities. Such reports must be regarded with suspicion, for they fail the basic test of scientific credibility: when independent workers have repeated the experiments the claimed results have not been observed. More credible effects have indeed been observed at rf power densities which, while not extremely low, seem low enough to suggest "non-thermal" origins; but closer examination has shown that they too can be explained by heating, and that what has been detected is the body's reaction to compensate for a very small thermal change induced by the rf field. Although such effects are of scientific interest, they have not been shown to be hazardous, bearing in mind that a "hazard" is a risk of *harm*.

Heating of a part of the body can be considered a hazard if the heat cannot be removed by the body's normal temperature-regulating mechanisms quickly enough to prevent a temperature rise sufficient to damage tissue. Perhaps the most critical organ in this respect is the lens of the eye, because it is near the surface of the body, has no blood supply to remove heat, and has no capacity for repairing damage. Hence the oft-repeated warning about looking down waveguide. There is no evidence whatsoever that rf radiation produces long-term damage of the kind associated with ionizing radiations, ie cancer or genetic damage.

RF exposure limits

The Home Office and the Medical Research Council recommend that the maximum for continuous exposure is a power density of 10mW/cm²; this limit may also soon appear in the form of a European Community (CEC) Directive. The figure of 10mW/cm² was arrived at over 20 years ago [1] and remains essentially valid today, despite close examination in recent years. Very similar limits are used in the USA and some other countries. Eastern Europe and Russia have somewhat tighter standards—for example, 10μW/cm²—but there is no valid reason for these from the Western viewpoint [2].

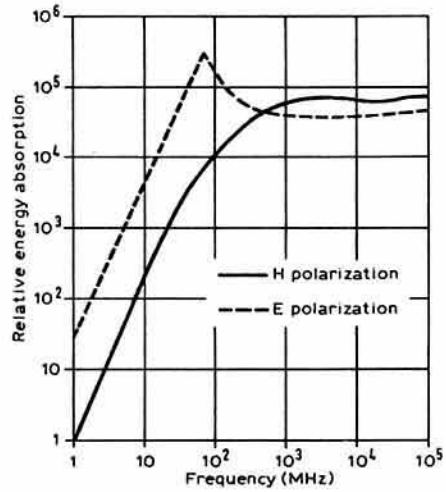

Fig 1. Relative energy absorption versus frequency for E and H field orientations of an "average man"

*National Radiological Protection Board, Chilton, Didcot, Oxon OX11 0RQ.

Recent work has substantially confirmed the validity of the UK limit over the majority of the rf spectrum [2]. The absorption of energy by a given object depends on several variables, such as the frequency of the radiation, size of the object and the materials of which it is made. For frequencies above 500MHz the amount of energy absorbed by, for example, an "average man" is relatively independent of frequency. At about 65–70MHz man is more or less resonant, because his height is approximately half a wavelength; absorption of rf energy, if the subject is oriented parallel with the E-field, is therefore at a maximum and may be possibly 10 times that at 500MHz. Absorption then falls off rapidly with decreasing frequency, at 10MHz being less than 10 per cent of that at 500MHz (Fig 1). There would therefore appear to be much less of a problem with hf exposures. The 10mW/cm² limit remains equally valid at all frequencies, although the "built-in" safety margins are less around the frequencies at which man is resonant.

Determining rf power density

It is very difficult to predict rf power densities in real-life situations, and none too easy to measure them. The reason for these difficulties is that power densities are likely to be highest close to the source, which is where the electric (E) and magnetic (H) components of the field are not at right-angles as they would be in the "far-field". The difficulty in measuring rf power density when the E-field and the H-field are not at right-angles is rather like that in measuring power in a reactive ac circuit, where the E and I vectors are not in phase. Just as one cannot determine power in the ac circuit by measuring E and/or I separately, one cannot determine rf power density in the near-field region by measuring the E-field and/or H-field separately.

Very sensitive measurements can be made of the E-field (or less commonly of the H-field) but their interpretation is ambiguous. If one assumes that the two components are at right-angles the power density is simply calculated from the equation

$$W = E^2/Z \qquad W/m^2,$$

where E is the E-field in V/m and Z is the "impedance of free space" (377Ω). Although this represents the maximum possible value of W, and may be a considerable overestimate in the near-field region, "derived standards" of the maximum permissible E-field for particular circumstances can be calculated on this conservative basis.

A less ambiguous measurement of rf power density is based on direct detection of the heating effect, but instruments employing this principle are not very sensitive owing to the difficulty of measuring the very small temperature rises involved.

Even under laboratory conditions, accurate measurements of rf power density call for specialized instruments and great care. It is not possible for amateurs (or indeed professionals) to measure near-field rf power density with normal communications test equipment.

However, commonsense suggests that situations in which rf power density *may* be high are best avoided as a matter of principle, even if they may not prove unduly hazardous in practice. Generally speaking, the larger the quantity of rf energy and the smaller the area in which it is confined, the higher the rf power density. Fortunately most of the undesirable situations also represent bad engineering practice for other reasons, and some of the authors' strictures are as much against the bad practice as against the rf hazards that might result.

Situations to avoid

1. RF exposures leading to an actual sensation of heating are far in excess of 10mW/cm², and are definitely to be avoided!

2. Looking down a waveguide

The classic example in which rf energy is confined into a small area (about 3cm² for WG16), and applied to sensitive tissue (the lens of the eye). NEVER look down a waveguide unless you are quite sure there is no rf source at the other end!

There is a tendency to single-out microwave radiation as being especially hazardous. This is not correct, as Fig 1 shows, though the practical situations in which high rf power densities could occur may not be readily anticipated by beginners who are unfamiliar with microwave technology. However, the level of skill required to generate large amounts of microwave power should be more than sufficient to anticipate and avoid the potential hazards.

3. Working on high-power vhf/uhf amplifiers with the covers off

Quite apart from the potential rf and high voltage hazards, testing an amplifier with a cover off the anode circuit is unlikely to be useful, for the patterns of circulating rf currents may be entirely changed.

Sadly there is no substitute for the use of a large number of securing screws, or for the tedium of removing and retightening them all, each time a change is made. Note that even a narrow gap between two covers can make an effective slot radiator if it is an appreciable fraction of a wavelength long: never peer through such a gap. If access or viewing ports are essential, round holes are best; for example, a hole of about 2cm diameter results in very little rf leakage at 144MHz.

4. Using a small antenna in the shack as a dummy load

This is very bad practice; the use of a proper screened dummy load is essential. Quite high rf power densities can be achieved close to small antennas such as vhf/uhf dipoles if the rf power level is a few tens of watts or more.

5. Adjusting energized antennas

This is also bad practice. "Live" adjustment is very convenient, but it can and should be done at very low power levels.

6. Using handy-talkies with "rubber duck" antennas

This is not necessarily to be avoided as being unduly hazardous, but it does lead to higher rf power densities in sensitive tissue (the eye) than almost any other activity in amateur radio [3,4] and it is of course a very common practice.

The E-field at the end of a foreshortened antenna such as the "rubber duck" (or normal-mode helix, to give it its proper name) is greater than that at the end of a full quarter-wave, and on a handy-talky the end-cap of the "rubber duck" can come quite close to the eyes and face. Extremely close contact with the end of the antenna is usually prevented by a very thick insulating end-cap on commercial antennas of this type. The authors strongly recommend amateur constructors to take similar precautions, for direct contact with the uninsulated end of a "rubber duck" could cause a corneal burn at power levels of only 1–2W.

Environmental rf fields

So far in this article the authors have concentrated mainly on potential rf hazards to the station operator. In order to obtain some indication of typical rf power densities generated in the environment of amateur radio stations, they also made a limited survey of fixed stations.

Station A. 300W p.e.p. rf output on 144MHz, to a 16-element Yagi on an 11m mast beside the house. Maximum power density near ground level occurred at 35m from the base of the mast in the direction of the main beam, and was 0·03mW/cm²; at a distance of 60m the power density had fallen to 0·0003mW/cm², the detection limit of the instrument in use. No fields could be detected at the base of the mast or in the shack or the rest of the house.

Station B. 400W p.e.p. rf output on 144MHz, to a 16-element Yagi 3m above the centre of the roof. Inside the loft, at the peak of the ridge directly below the antenna, the indicated rf power density was 0·2mW/cm². Otherwise the results were very similar to those for station A.

Station C. 400W p.e.p. rf output on 432MHz to a 20-element loop Yagi on an 11m mast beside the house. No rf field was indicated (ie less than 0·0003mW/cm²) in the shack, anywhere outside near ground level, or even when leaning out of the bedroom window.

Station D. 400W p.e.p. rf output on 28MHz to a TH6DXX multiband beam, which behaves as a four-element Yagi on 28MHz. The beam is mounted on a crankup tower, 20m from the house. With the beam at a height of 11m, pointed at the house, the power density at the nearest upstairs bedroom window, 7m below the plane of the beam, was 0·01mW/cm². The greatest power density observed outside, close to ground level, was 0·06mW/cm² at the foot of the tower.

Although the above information is circumstantial, and could not be used to accurately predict rf power densities at other locations, the general conclusions are clear enough. In all cases the measured power densities were very much less than 10mW/cm², even though the stations concerned were using powers up to the UK legal limit. Two of the stations had kilowatt permits for experimental work, and it is clear that the increase in power beyond the normal limit would introduce no appreciable hazard. In this survey the highest rf power densities encountered were where the height differences were small: in the loft at station B, and upstairs at station D when the tower was retracted.

In order to obtain any appreciable environmental rf power density, therefore, one needs the rather unusual combination of high rf power but a low antenna. Virtually all fixed stations have antennas high enough to preclude the possibility of anyone approaching them closely; this is another example of the way that normal good practice tends to control potential rf hazards without any special precautions to that end.

One possible exception to this general rule is the ground-mounted λ/4 vertical antenna, especially on 28MHz. A recent calculation [5] has shown that standing very close (20cm) to a 27MHz ground-mounted λ/4 vertical fed with 140W of rf can lead to the same energy absorption as would standing in a 10mW/cm² plane-wave field. However, the energy absorption is considerably reduced if the subject is not perfectly grounded.

(Continued on page 143)

TECHNICAL TOPICS

Pat Hawker, G3VA

OVER THE PAST FEW MONTHS I have attempted to highlight some of the problems facing those who do not wish to see amateur radio become predominantly a "consumer-appliance" hobby. There is, I have found, a wide measure of agreement that the "non-professional" home-constructor and experimenter can no longer hope to compete on anything like equal terms with the major firms in the construction of full-facility hf or vhf transceivers, while the strongest signals tend to come from large beam antennas that do not fit easily into many urban or residential areas. Furthermore some of these stations are tending to become well beyond the financial reach of many who in the past have formed the solid core of the hobby.

To maintain the "experimental" tag some believe that the hobby should concentrate more on the latest technology, in advance of the factory-built rigs: various forms of spread-spectrum modulation; data "packets" to provide "electronic mail" by means of advanced store-and-forward repeaters; fast and slow-scan colour television; more computer-to-computer links in which the rf path is basically a substitute for a cable or optical fibre. These are indeed mostly laudable projects but not altogether in keeping with what most of us tend to think of as "amateur radio" for the majority.

So some consider the answer would be to encourage a return to more basic communications, using equipment that is simple enough for even newcomers to build; cw rather than phone; dsbsc rather than ssb; and with less emphasis on competition between stations in the form of contests and awards. Yet others say "Go higher, young man" and make more use of orbital repeaters and self-excited microwave rigs, or alternatively become more scientific in the study of propagation anomalies.

In practice, I suspect there is no all-embracing answer: it is a measure of the quality and depth of the hobby that it can encompass so many diverse threads; including, let it be said, the appliance-user who intends to become efficient in "inter-communication"—accepting that this is an inherent part of the ITU definition of the amateur service as a form of self-training. Good *operating* is still a highly skilled craft that is rightly part and parcel of experimental amateur radio.

The sacred cow of ssb

TT (November 1981, p1036) noted the Home Office/British Telecom trials (at about 160MHz) designed to evaluate user experience of mobile ssb (with pilot carrier) compared with 12·5kHz and 25kHz channelling fm. These early results indicated that 25kHz fm was a fairly clear winner, particularly at longer distances, although ssb could (theoretically) provide five times the number of channels. In *Electronics Letters* (29 October 1981, Vol 17 No 22, pp852-4) A. J. Motley, of British Telecom Research Laboratories, provides further detailed results of these trials, including experience under conditions of co-channel interference. Using the scale 0-4 (4 indicating complete relaxation possible and no effort required, and 0 no meaning understood with any feasible effort), the following results were achieved. Without co-channel interference: 2·4 with 25kHz fm; 2·2 with 12·5kHz fm; and 1·9 with ssb. With co-channel interference: 2·4 with 25kHz fm; 2·1 with 12·5kHz fm; and 1·8 with ssb. The author comes to the following conclusions: "These results indicate that using ssb for mobile radio telephony would degrade subjective performance compared with 12·5kHz channelling and fm by as much as is experienced in changing from 25 to 12·5kHz fm. Also, ssb would require a higher co-channel interference protection ratio than fm; somewhere above 20dB seems necessary. However, companding was not employed and may, in practice, improve ssb performance, particularly in the presence of co-channel interference. Also further work (not reported) on impulsive noise blanking shows that the effects of ignition noise can be much reduced."

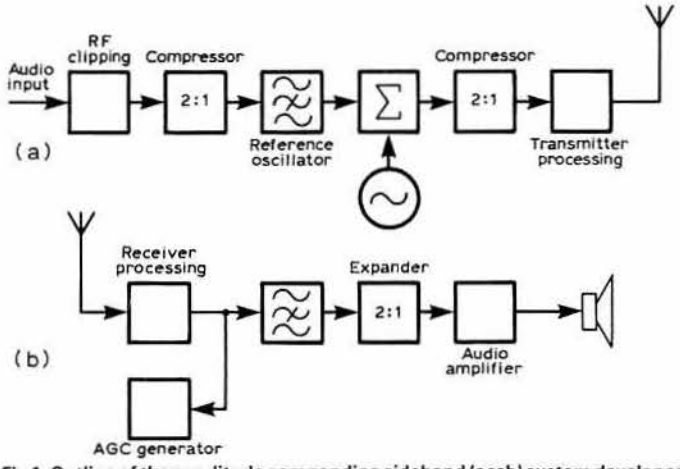

Fig 1. Outline of the amplitude companding sideband (acsb) system developed at Bath University for vhf mobile operation. (a) Transmitter; (b) receiver. The system, however, makes use of an in-band audio tone that is one of the techniques being used with ssb systems for the land-mobile radio service. The use of acsb could help overcome the lower performance of ssb compared with 25kHz channelling fm

"Companding" is a reference to a sophisticated form of "acsb" (amplitude companded ssb) that has been developed at Stanford University, USA, and in the UK at Bath University. The transmitted signal is compressed before transmission and then expanded in the receiver by means of very fast agc circuitry. Work at Bath University (reported in the same issue of *Electronics Letters*) using an 86MHz tone-in-band Wolfson system suggests that an improvement of some 7dB at low signal levels and 11dB at high signal levels can be achieved, with the disturbing effect of ignition noise between words greatly reduced. The system is described in some detail in two papers in *IERE Conference Proceedings No 50* (Radio Receivers and Associated Systems) but the basic arrangement is shown in Fig 1. From an amateur radio viewpoint, in would clearly be rather more difficult to apply the system without a pilot carrier or in-band audio tones, although rf speech-clipping and compression techniques already provide some (but not all) of the benefits of acsb.

One cannot help feeling that the additional complexity of acsb is yet another indication that perhaps professional communications engineers should have paid more heed to the many warnings, 20–25 years ago, given by J. P. Costas, W2CRR, that unprocessed ssb was an *inferior* system in a number of respects to dsbsc, and in non-channellized bands does not even result in saving spectrum! Recently Dick Rollema, PA0SE, brought to my attention the forceful four-page letter Costas wrote to *Proc IRE* (April 1957, pp534–7). While his valiant battle for double-sideband was, it would seem, irretrievably lost many years ago, I cannot refrain from a few extracts:

"A significant increase in usable channels cannot be obtained by use of ssb except in those very special communications applications where the dynamic range of received signals can be controlled. . . Again let me repeat that the dsb(sc) system represents an improvement over the present a.m. system. I would like to remind the reader that we may be far better off to improve what we now have rather than to seek a cure for our present problems by discarding completely the old, and accepting something entirely different. This statement may draw the accusation that the writer is not of a progressive frame of mind. I would deny this by stating that progress and increased complexity are not necessarily synonymous. True progress in my mind is achieved when improvements are obtained without a significant increase in complexity. . . The vast majority of those people who promote and defend ssb are forward-looking people who have seen the advantages of a new system and are anxious to put it into general use for the common good. As commendable as this attitude might be, there has been the tendency on the part of many of these people to make a "sacred cow" out of ssb . . . true progress will be hindered rather than helped by such an attitude".

That was 1957, since then ssb has served amateurs well and few now regret that the double-sidebanders lost the argument . . . but the evidence accumulates that they were right!

Double-sideband (dsbsc) transmission

Although some amateurs from time to time have used dsbsc on the air, they generally receive little encouragement from those who feel that no transmission in crowded amateur bands should "occupy" more bandwidth than is absolutely essential. At first sight this seems a logical enough viewpoint until one delves fairly deeply into the cogent and detailed arguments that were advanced by Costas to show that, in non-channellized bands, narrowband ssb is excessively vulnerable to interference and does not actually result in spectrum saving.

In the 'fifties some amateurs recognized from experience of using a.m. on hf that it was the heterodynes produced by the carriers (which also represented wasted power) that were the most serious cause of interference. It was also discovered that one could receive dsbsc very effectively by

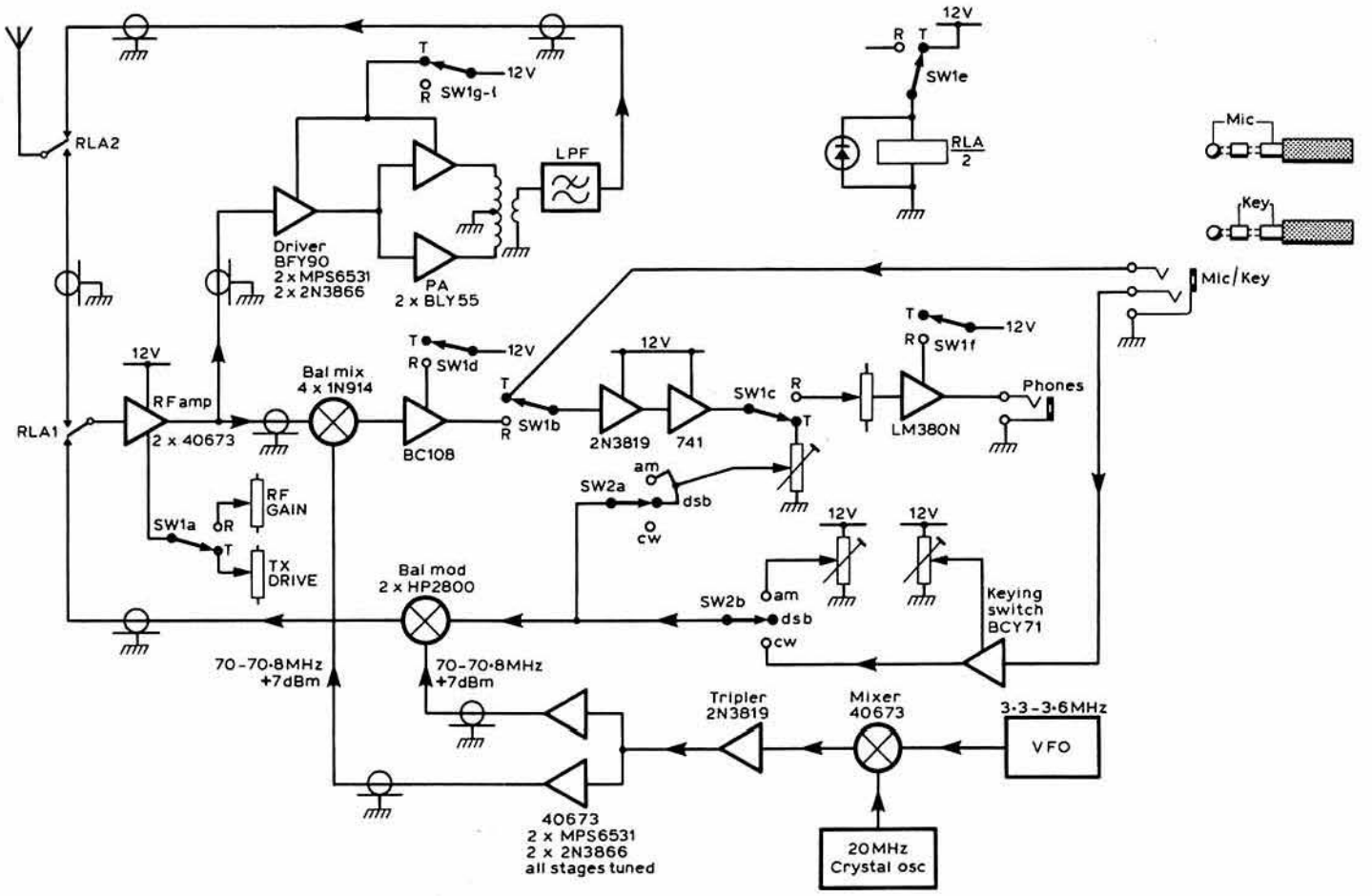

Fig 2. G4JQY's solidstate 70MHz homebuilt phone/cw transceiver using a single-phase direct-conversion receiver and dsbsc transmitter with common heterodyne-type vfo of good stability. Fundamental oscillator tunes 3·3 to 3·6MHz. Power amplifier, two BLY55 devices, provides about 4W output. For greater outputs relays RLA1 and RLA2 would need to be separate components to provide greater rf isolation. Switch 1 is 12-pole, two-way rotary

treating it as though it were ssb but with the advantage of being able to select either sideband in order to minimize or avoid interference. For optimum communication effectiveness, dsbsc needs a fully synchronous detector (phase coherent) but even when regarded as "ssb with two sidebands" it is an extremely potent system.

At that time the attraction of dsbsc was primarily that it appeared to provide a convenient means of converting existing a.m. transmitters to sideband operation at virtually no cost. The carrier suppression could be achieved simply by modifying the power amplifier to operate as a high-level balanced modulator, so removing at one stroke the requirement for low-efficiency linear stages and the heterodyne frequency conversion necessary for ssb. This approach proved not altogether satisfactory, but solely because of the relatively poor frequency stability of the then-current a.m. receivers and transmitters. Amateurs were soon convinced that most of the equipment that had been designed for a.m. was inherently unsuitable for sideband operation, and were soon investing in new ssb equipment, leaving dsbsc to a tiny few, and complaining to them that their signals were too broad.

In the mid 'seventies there was a revival of commercial interest in dsb, this time with "diminished" rather than suppressed carrier, and with the aim of using the system in the private land-mobile service. However, although trials carried out by a team at Swansea University were promising, the whole project was eventually abandoned in favour of the Wolfson ssb project (which at present is similarly encountering considerable opposition from manufacturers and users). Today, relatively few of the amateur handbooks pay much attention to dsbsc.

There are, however, some signs of a revival of interest. A letter in *Wireless World* December 1981, p52, from A. R. Moubayed, on phase locked detectors, claimed: "Even here, in Syria, dsb detection is performed by a simple low-cost circuit which has a large capture (and lock) bandwidth and no transient delays (ie no missed syllables at the start of transmission). Also we are experimenting with an improved design to detect, with equal ease, two dsbsc signals in quadrature. Therefore dsbsc transmissions will have the same power and channel density as ssb, with the advantage of using simpler systems."

The following item reflects recent amateur experience with dsbsc on 70MHz, an underused band which nobody could claim has no space for double sideband signals!

DSB/D-C 70MHz transceiver

Over the past five years Bob Connell, G4JQY, has built many direct-conversion receivers and two transceivers based on d-c reception and dsbsc transmission. His experiences are thus of value both to those interested in vhf d-c receivers and those concerned with relatively simple home-built transceivers. He writes:

"My most recent project was a 70MHz dsb/d-c transceiver (Fig 2) in which a home-built doubly-balanced product detector performs splendidly, using 1N914 diodes and two trifilar-wound transformers using 6mm ferrite ring cores. The secret with all dc receivers is getting enough selectivity before the detector; otherwise breakthrough of out-of-band broadcast stations tends to be intolerable. My 70MHz receiver uses a two-stage bandpass-coupled rf amplifier with two 40673 dual-gate mosfet devices (Fig 3) which also serves on transmit as the driver preamplifier. The output is permanently connected to both product detector and transmit driver amplifier, and switched between two front panel potentiometer controls giving independent gain control on transmit and receive. Similarly the microphone amplifier doubles as the audio drive amplifier on receive (when it drives an LM380N ic).

"The most difficult part of the whole project was developing the carrier insertion oscillator. I mix a 20MHz crystal with a vfo working at 3·3MHz and triple the frequency to tune from 70 to 70·8MHz. A lot of gain is needed after the tripler, and the 70MHz harmonic proved very hard to find! However, it was worth the effort and provides an extremely stable carrier, while on receive the detector resolves a.m., fm, dsb and ssb without difficulty.

"The project was technically rewarding, but disappointing from a utility point of view. The band is so little used that one can listen all evening and not hear a signal apart from the beacon . . .

"For the future I am hoping to rejig the two-diode balanced modulator to improve carrier suppression and to raise the power from 4 to 10W. In such

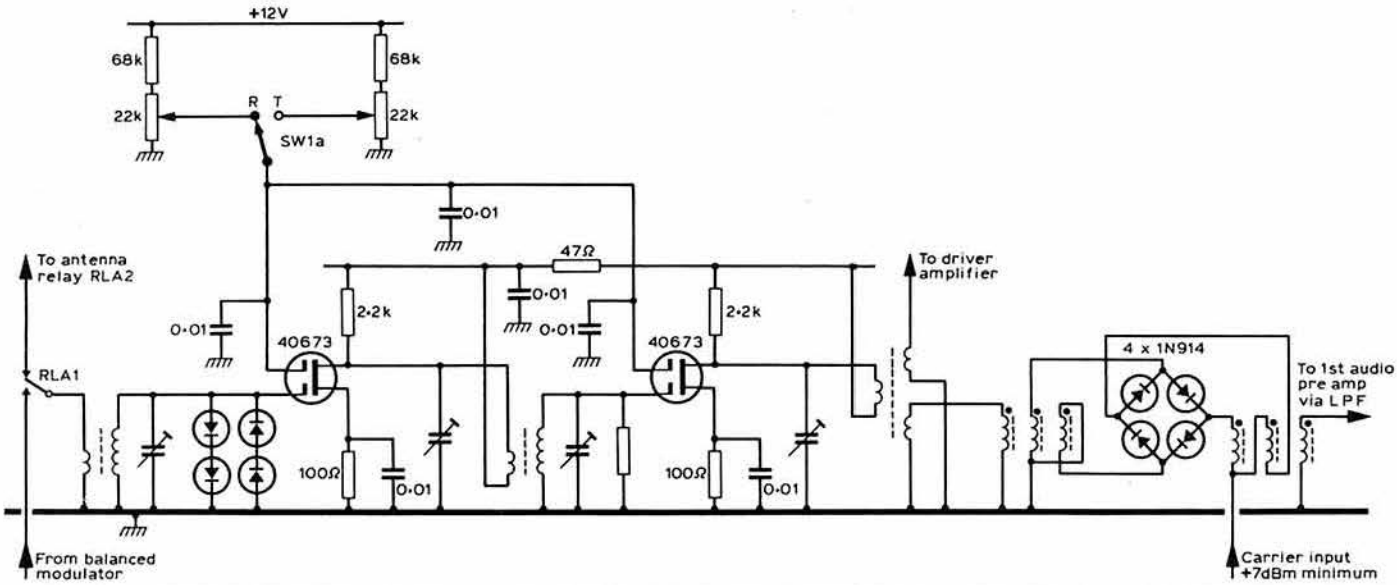

Fig 3. Front-end of G3JQY's 70MHz transceiver, including two-stage tuned rf amplifier which doubles as a transmitter driver preamplifier. All tuned circuits wound on Amidon T50/6 cores (for 70MHz use about 4·5 turns plus 10pF shunt capacitor). Select drain resistors for stable operation at maximum gain. For the diode-quad doubly-balanced product detector both transformers have nine turns 34swg trifilar wound enamelled wire on Siemens 6mm K1 cores

projects my bible is the ARRL publication *Solid State Design for the Radio Amateur*. With that book, a reasonable electronic voltmeter and a signal generator anyone with half an interest in homebrewing need not question the wisdom of having a go."

C. P. Norfolk, G6FRZ, also comments along similar lines. He writes: "it is possible to use the same vfo and balanced mixer of a good direct-conversion receiver as the heart of a simple, low power, dsbsc transmitter. Although d-c receivers have problems demodulating dsb signals, the complex and expensive ssb transceivers owned by so many amateurs suffer no such difficulty, so that effective communication can take place between amateurs with ssb transceivers and those with simple homebrew dsb/d-c transceivers. Even if such equipment might not qualify as 'state-of-the-art' it would allow keen but impoverished licence holders to participate more fully in this unique but increasingly money-conscious hobby of amateur radio."

10W solidstate amplifier

One of the most effective ways of putting together a general-purpose low-cost hf cw station is to use one of the low-power direct-conversion transceivers, such as the HW7 or HW8, with an add-on amplifier to raise the transmitter output power to 10, 25 or 50W. For the higher powers this is done most conveniently with one or two suitable valves. However, up to the

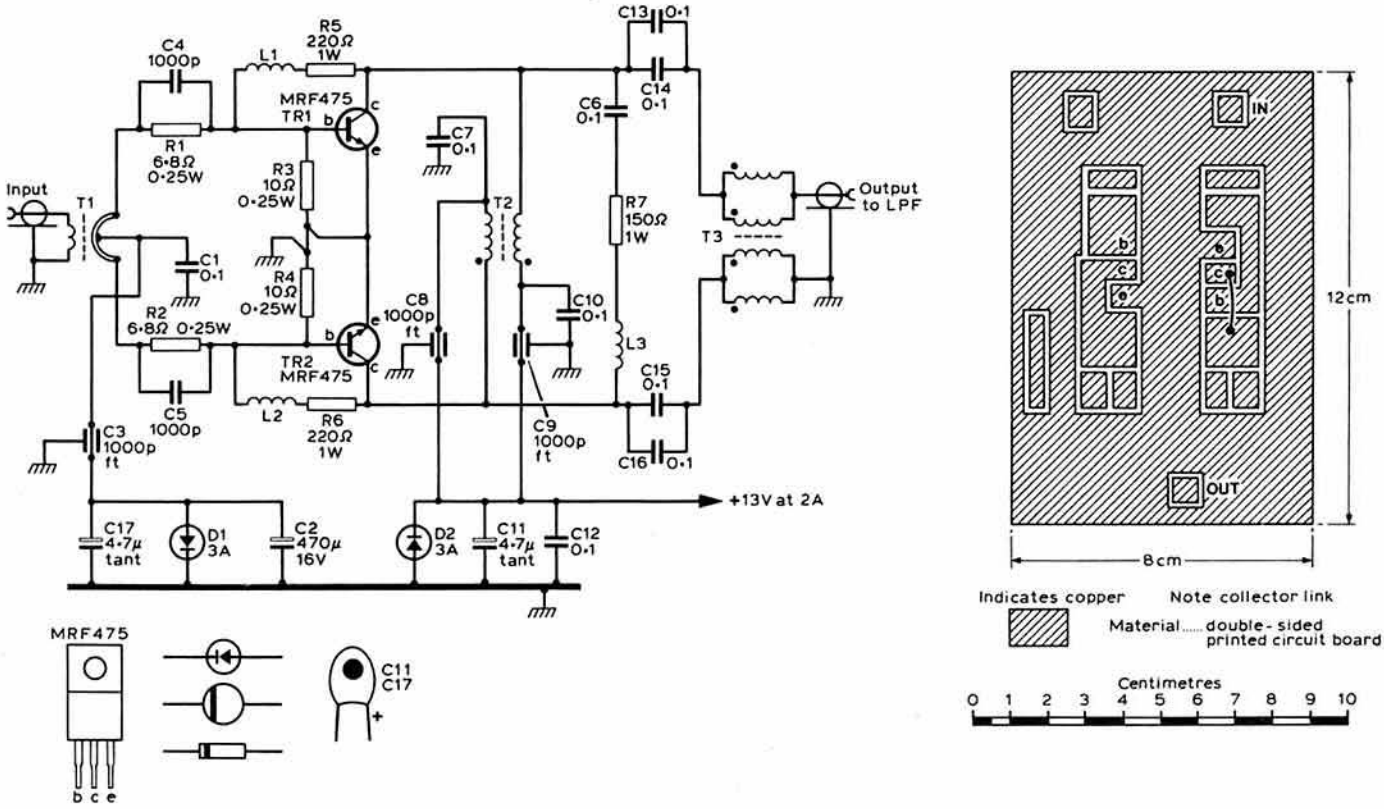

Fig 4. VK3XU's 10W broadband solidstate hf linear amplifier (output should be connected through lowpass filters designed for each band in use). All non-polarized capacitors are disc ceramic types (>63V). TR1, TR2 have TO220 heat sinks. C11, C17 4·7μF, 35V tantalum electrolytic capacitors. D1, D2 are 100V, 3A diodes, "ft" denotes feedthrough capacitors. Amplifier is constructed on double-sided pcb, one side of which forms groundplane and the other has suitable "pads" as shown

10W level the broadband solidstate amplifier now seems a more logical choice, since the whole rig can operate from 12V, there is a reduced requirement for band switching, and it will cope with cw, ssb, dsbsc or fm modes.

In *Amateur Radio* October 1981, pp7–9, Drew Diamond, VK3XU, describes a low-power solidstate linear for all bands from 3·5 to 28MHz using a pair of the reasonably-priced Motorola MRF475 transistors: Fig 4. It provides at least 8W (typically 10W) cw output power or 10W p.e.p. ssb for input powers of: 1·5W cw, 2W p.e.p. ssb on 3·5MHz; 2W cw, 2·5W p.e.p. ssb on 28MHz; with an input swr less than 1·5 on 3·5, 7, 14, 21 and 28MHz. Intermodulation distortion is claimed as of the order of −30dB. The amplifier requires 13V at 2A.

VK3XU notes that raising the power output of a transmitter from, say, 1·5 to about 10W can result in a significant improvement in communication efficiency; but that although suitable circuits for broadband amplifiers have been around for some time, Australian experimenters have been frustrated by the absence of the more specialized components, including low-cost rf power transistors and the magnetic materials usually specified for broadband transformers. Now, however, "cb" transistors such as the MRF475 are readily available, while he has obtained satisfactory results using locally-available toroids and balun cores with permeabilities of 50 and 220, respectively, rather than the 800 or so usually specified. His amplifier is constructed on a double-sided pcb with the reverse side forming a continuous ground plane and with components soldered directly to a few "pads" (except junctions L1/Rr and L2/R6) that form an extremely simple pcb. In the absence of ceramic chip capacitors for rf coupling and bypassing, he finds that ordinary disc ceramic capacitors perform satisfactorily provided that the leads are made as short as practicable.

Stability is achieved by using negative feedback, which also serves to maintain reasonably constant gain (about 7dB) over the frequency range. This type of amplifier has a tendency to oscillate at low frequencies when the output is terminated with load having high swr; stability in this amplifier is achieved by introducing artificial losses (C6, R7, L3). TR1 and TR2 have T0220 heat sinks, and the collectors must be insulated from ground.

More detailed construction information is provided in the original article: not shown here, for instance, are the separate low-pass filters for each band that need to be used in the output. VK3XU mounts these in the transmitter assembly and selects the required filter with a two-pole, five-position switch.

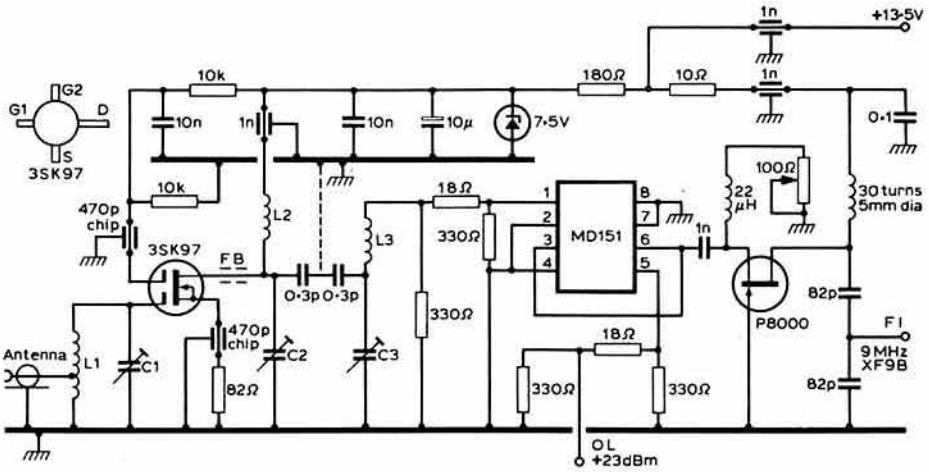

Fig 5. High-performance 144MHz receiver front-end using 3SK97 device described by F6CER as a dual-gate gasfet

Details of his broadband transformers are: "The secondary of the input transformer T1 has a single turn made from a 7cm length of RG58 coaxial cable braid passed through the holes of a 1050/1/F14 balun core. A scriber is then carefully used to enlarge a suitable opening in the braid at each entrance. Two turns of 22 B&S enamelled wire or thin hook-up wire are then passed through the holes to form the primary winding.

"The collector supply feed transformer T2 is a broadband 1:1 transmission line consisting of 14 loops wound upon a 432R/3/F25 toroidal core. To make the windings, first place the ends of two lengths of 24 B&S enamelled wire in a vice, and twist the other ends together and fix them in the chuck of a hand drill. Then, keeping the wires taut, turn the drill until there are about two twists per centimetre and give the drill a tug to 'set' the twists and remove the twisted pair. The quadrifilar winding for T3 is made in a similar manner, four wires being used to form a 25Ω transmission line (use a multimeter to trace ends of windings). The start of the winding is shown in Fig 4 with a dot, as it is important to observe the correct connections."

For a regulated power supply, the 78H12 ic is a suitable device.

144MHz gasfet front-end

The remarkable performance and good dynamic range of low-noise gallium arsenide devices for uhf and shf reception are now well established, but I was

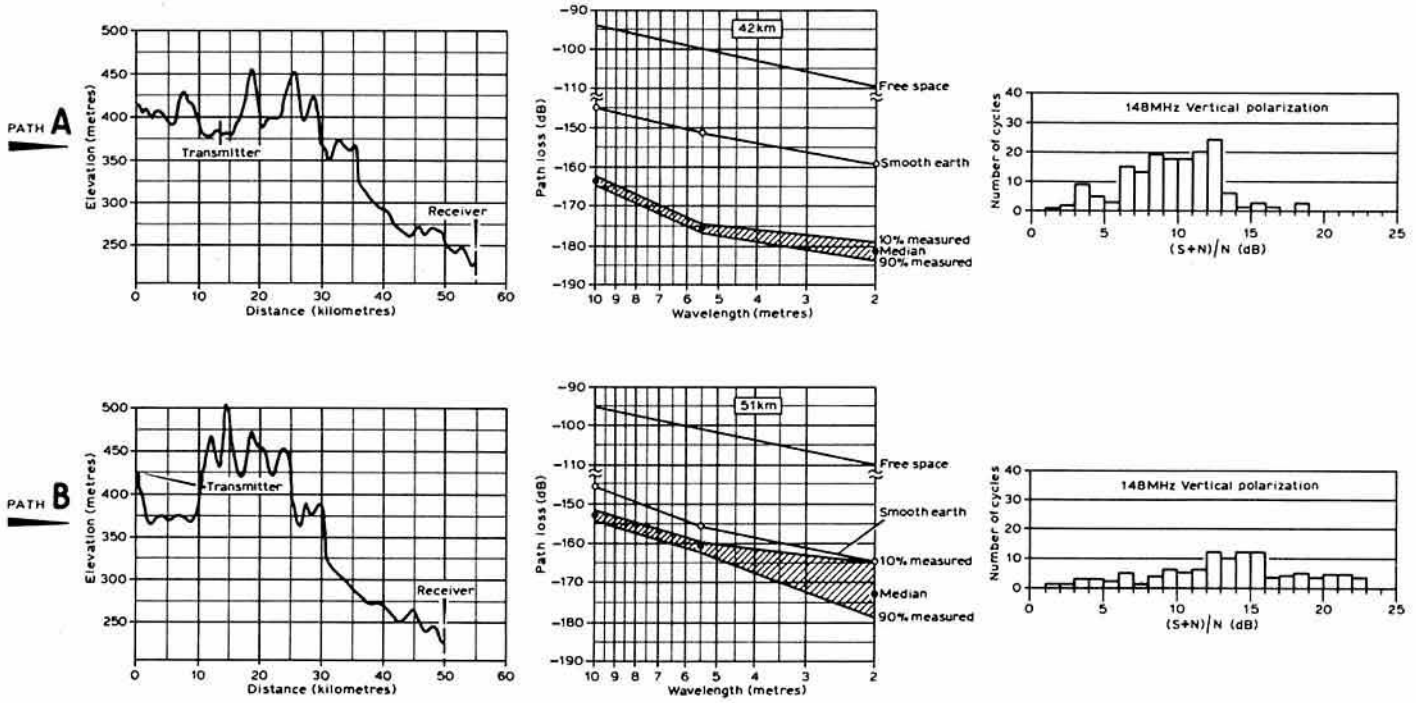

Fig 6. The vhf propagation study carried out by Walter Elliott of South-west Research Institute, Texas, on 30, 54 and 148MHz over two difficult propagation paths, with intervening peaks rising 150 to 200m above the transmitter sites. The middle diagrams show median, 10 per cent and 90 per cent signals when using 1W transmitter output on the three frequencies. The right-hand diagrams show detailed results of a large number of transmission cycles on 148MHz

surprised to come across a brief note by F6CER in the vhf column of *Radio-REF* No 10, October 1981, p663, describing, with circuit diagram, the front-end of a 144MHz receiver making use of a 3SK97 device as the rf amplifier. According to F6CER, this device (and also the 3SK98) is a dual-gate gasfet now available in West Germany (imported from the USA) and priced about DM20 (roughly £5).

As shown in Fig 5 the rf amplifier is followed by an MD151 doubly-balanced diode mixer and P8000 fet impedance-converting grounded-gate amplifier leading to a 9MHz XF9B crystal filter. Only limited constructional information is provided. The current through the 3SK97 is regulated to 15 to 20mA by the 82Ω source resistor; that of the P8000 is adjusted by the 100Ω preset resistor to between 25 to 30mA. L1, L2 and L3 are described as six turns of 10/10^{c} silvered wire 7mm diameter and 20mm long with L1 tapped at one turn. C1, C2 and C3 are high-quality (Tronsor) capacitors, and the whole front-end is carefully screened, bypassed etc, as befits what is clearly quite a high-cost, high-performance receiver.

VHF propagation

VHF operators depend on anomalous propagation conditions when making extended range contacts: sporadic-E, tropospheric ducting, auroral reflection etc. But many amateurs are also concerned with the coverage that can be achieved even when conditions are "flat", recognising that it is a misnomer to think that vhf range is a matter of "line-of-sight", even when this is based on the so-called 4/3 Earth radius. Surprisingly, there have been few detailed studies made of ground-propagated vhf signals beyond line-of-sight, where the received signals may depend on "knife-edge diffraction" or even "double knife-edge diffraction" from high intervening peaks etc.

In *IEEE Ant & Prop* Vol AP-29, No 5, September 1981, pp808-11, Walter Elliott of the South-west Research Institute, San Antonio, Texas, describes a detailed study made over the course of six weeks using vehicle-mounted λ/4 vertical whip transmitting antennas and low-noise receiver (about 3dB noise figure) with fixed Yagi receiving arrays (about 9dB gain) at 30ft above ground level. Although this was a professional study it seems to have been based on amateur radio equipment, as all measurements were made within the American 28, 50 and 144MHz bands. Two paths (42 and 51km) were studied (Fig 6) both having the transmitter screened from the receiver by high peaks rising several hundred feet above the transmitting antennas.

A transmitting cycle comprising four power levels (100, 10, 1 and 0W) was used, and incoming signals were recorded on a multichannel strip-chart. It is very interesting to note that even the 1W transmissions were received consistently some 5 to 13dB above noise (measurements were made at the 1W level, although the higher power levels were useful as markers). In both cases the path losses are some 60 to 70dB greater than the calculated "free space" losses, but vary markedly when compared with calculated "smooth earth" figures.

The experiment indicates that low-power vhf transmissions can and do get out from apparently hopeless sites, although whether our more rounded hills would diffract the signals as well as the craggy peaks of Texas is uncertain.

Half-square and G5RV-type antennas

The half-square antenna (Fig 7) has figured previously in *TT*, as indeed has the bobtail curtain which is in effect a "double half-square" (though this is not as one might suppose a "square" antenna!) and both designs in several versions can be found in *ART*. Nevertheless, it is worth noting that in *Ham Radio* December 1981, Robert "Hasan" Schiers, N0AN, writes with great enthusiasm of the results he achieves on a number of hf bands with a simple, low-cost 7MHz half-square antenna, voltage-fed in the manner more usually advocated for the bobtail. He finds this configuration functions well as a λ/4 Marconi on 1·8MHz (current fed), a λ/2 end-fed on 3·5MHz, a

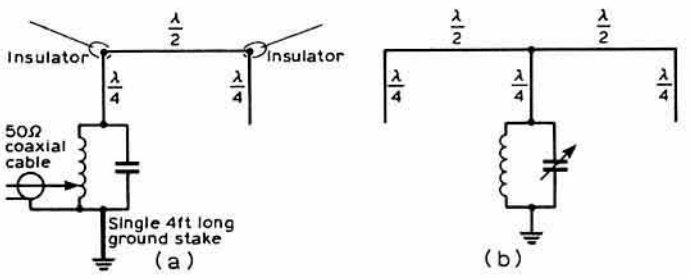

Fig 7. (a) The half-square antenna (mixed polarization) with the voltage-fed arrangement used by N0AN. This also provides an effective antenna on other hf bands. (b) The classic "bobtail" array in which the horizontally-polarized component is partially cancelled out to provide a three-element vertically-polarized array

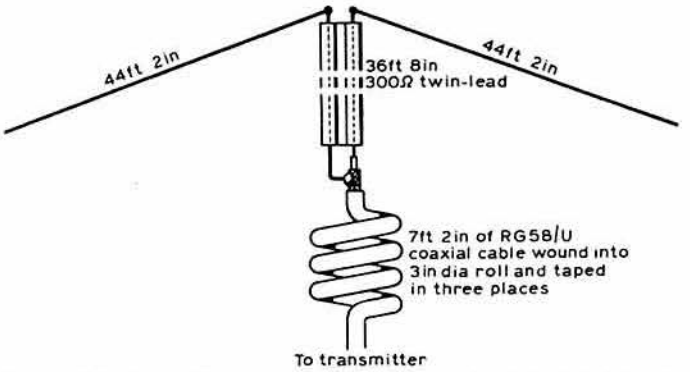

Fig 8. W5ANB's multiband antenna or "first cousin of the G5RV". With dimensions shown it is stated that it can be used without an atu on 7, 14 and 28MHz (and more critically on 21MHz, provided the transmitter will work satisfactorily with swr of about 3:1 or so

half-square array on 7MHz, a pair of λ/2 verticals, space 1λ, on 14MHz, and a pair of 1λ verticals spaced 2λ on 28MHz. However, he does not mention that polarization (unlike the bobtail) is mixed, as there will be a horizontal component which is not cancelled out. We suspect this is no disadvantage when used for a general purpose or dx antenna.

This is another article in which it is suggested that a length of RG-8/U coaxial cable forms an effective high-voltage, low-cost capacitor of required value. This particular cable has a capacitance of 30pF/ft, and N0AN obtains a value of about 38pF using a 15·2in length.

The practical snag with voltage-fed bobtail or half-square antennas is the need to change the resonant matching circuit which will normally be located outside the house. This is why antennas such as trapped dipoles and the G5RV multiband antennas are still so popular. In the past few years the convenience of the G5RV technique has crossed the Atlantic, and several articles have appeared in *QST* etc. The latest version, described as a first cousin of the G5RV antenna, is by Taft Nicholson, W5ANB ("Compact multiband antenna without traps" *QST* November 1981, pp26-27): Fig 8. This is claimed to need no atu when used with a transmitter having a valve output stage, and to work with some transmitters in this way on 21MHz "but tuning is quite critical". It all adds up to an antenna claimed to be easy to pack, carry, erect and use.

Coaxial cable lore

Roger Parsons, G3RBP, who is professionally concerned with underground communication systems—including "leaky" coaxial-cable systems—for the National Coal Board, has commented on the notes in the November *TT* which were based on the article in *QST* April 1981. He believes we should keep in proportion the additional losses brought about by the reduction in the amount of copper in the outer braid. He writes:

"For coaxial cable, longitudinal attenuation is related to: (1) the dielectric attenuation which is directly proportional to frequency; and (2) attenuation due to the inner and outer conductors which is proportional to the square root of frequency. At frequencies below about 100MHz the dielectric attenuation is generally small compared with conductor attenuation but, as it is proportional to the square root of the dielectric relative permittivity, the losses for *air-spaced* cables will be lower than solid cables, particularly at vhf. Conductor attenuation, however, is much more complex, being related to cable diameter, characteristic impedance, number and diameter of the braid wires, the number of braid carriers and the angle of the braid lay. While preparing an article on the subject (which was never finished) I compiled some formulae and nomograms that enable the characteristics of an unknown cable to be calculated from physical measurements. I would be prepared to supply copies to readers for the cost of photocopying (six sheets) and postage (QTH, School House, Newborough, Burton-on-Trent, Staffs).

"However, my main aim in writing is to say that with good cable design the increase in attenuation and radiation resulting from reducing braid

Table 1. Coaxial cable traps

Frequency (MHz)	Form length (in)	Cable length (in)	Turns	Effective length (in)
3·750	6·0	123·06	19·79	120
7·150	4·2	70·70	10·94	65
10·075	3·6	53·70	8·06	48
14·175	3·2	41·47	6·00	36
18·118	3·0	34·80	4·87	29
21·225	2·8	31·24	4·27	26
24·940	2·8	28·09	3·74	22
28·850	2·6	25·61	3·32	20

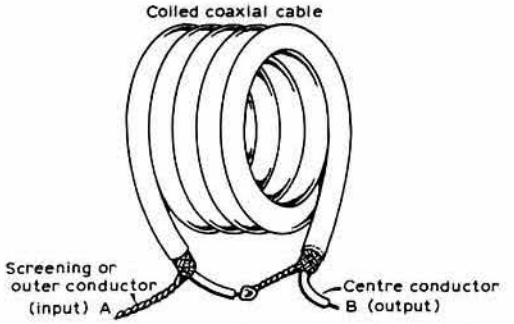

Fig 9. Antenna "trap" made from length of coaxial cable which forms both the inductor and the high-voltage capacitor

coverage from, say, 95 to 60 per cent will be very small, and of little practical significance to most amateurs, certainly those using hf.

"Further, I feel that the American authors have exaggerated the effect of the mounting environment. It would be difficult to measure the difference in attenuation at hf on a cable such as the URM67 when in air, when attached to the leg of a tower, or when immersed in salty water. The reason for this is that the proportion of power radiated—even from cables designed to be 'leaky'—is very small compared with the losses due to the conductors and the dielectric. This is *not* true of twin feeders where radiation losses can be increased greatly by any imbalance induced by nearby objects. When 300Ω twin feeder was used in some early NCB radio systems, disastrous effects occurred when the feeder was whitewashed!

"On the other hand the notes in *TT* about corrosion are entirely valid, and even a small amount of water can destroy the performance of air-spaced cables.

"One final comment. Radiation from solid-dielectric cable can be as much as 20dB lower than from a similar air-spaced cable; this is because of the lower velocity of propagation. It may thus be better to use solid dielectric cables in those circumstances where maximum screening is required. But, in either case, radiation will normally be much less than that caused as an indirect consequence of feeding a balanced load from an unbalanced line."

The use of coaxial cable to form the high-voltage capacitor for antenna traps was suggested by Gary Myers, K9CZB, in *QST* June 1980, and this idea turns up again in an article by Gary O'Neill, N3GO "Trapping the mysteries of trapped antennas" *Ham Radio* October 1981, pp10–16. In this case the trap uses the cable to form both the inductor and the capacitor of an antenna trap by means of the arrangement shown in Fig 9. Table 1 shows the recommended dimensions for traps resonant at amateur frequencies in the range 3·5 to 30MHz when using RG-58/U cable and 1·25in pvc stock (form lengths permit 1in to extend beyond each side of the coiled cable). Traps are closewound and should be as tight as possible to ensure good mechanical stability. Lengths of cable recommended permit 3in of cable to extend beyond each side of the coil, permitting antenna-section splicing and the wiring of the trap itself. The *Ham Radio* article also includes detailed constructional information and the use of such traps as a 1:1 transformer or coupler.

Safety and polyurethane wire

Some time ago Brian Castle, G4DYF, brought to my attention the fact that there is a potential hazard when soldering copper wire covered with a synthetic enamel based on a polyurethane resin. This type of wire covering was developed to permit soldering without the need to strip off the enamel. When a hot soldering iron is applied to the polyurethane film the film decomposes and melts back, revealing the copper wire. However, when the resin melts a small amount of toluene di-isocyanate (tdi) is given off. This vapour is irritating and harmful to the eyes and respiratory system, and asthmatic attacks may result from exposure (attention has previously been drawn to this type of hazard arising from soldering fluxes). The answer would seem to be always to ensure good ventilation if you are doing much soldering.

British Telecoms Research have recommended that polyurethane-enamelled wire should not be used except under special circumstances. It is also possible, Brian Castle suggests, that the solderable varnish applied to many printed circuit boards and matrix boards may be polyurethane, and this could result in tdi when soldering such boards in confined places.

Tips and topics

Jan Martin Noedling, LA8AK, agrees that the form of multilayer capacitor construction advocated by G6JP (*TT* October 1981) would be a useful alternative to his own suggestions (*TT* August) for improving the efficiency of strip-line amplifiers. However, he points out that the vertical form of construction would not be suitable for a number of designs, including the W2GN amplifier which uses a 6cm high upper box and could not accommodate a capacitor in the erect position. But the multilayer arrangement can of course be used horizontally, and this form of construction is also advocated by DK1OF in the 400W, 145MHz amplifier he described in *VHF Communications.* □

RF HAZARDS AND THE RADIO AMATEUR *(Continued from page 137)*

Mobile operation

In mobile operation the antenna is low, but in most cases the rf power is also low. There is an effective limit of about 100W rf output because of the drain on the battery while stationary, and in the UK the legal power limits are only a little above this level. Even when using such power levels, the operator can still control any rf hazards simply by making sure that nobody remains close to the antenna while the transmitter is in use, or by refraining from transmitting high power if anyone is close by; and of course the problem disappears when the car is in motion.

Conclusions

Heating appears to be the *only* biologically-significant property of rf energy, and is only a hazard if the heat cannot be removed quickly enough by the body's thermostatic mechanisms.

Absorption of rf energy by the human body diminishes rapidly with frequency in the hf region, and is relatively constant in the microwave region. The slightly enhanced absorption occurring near the resonant frequency of the human body is not a major cause for concern.

Normal good rf engineering practice automatically tends to control any potential hazards to the station operator. However, commonsense suggests that situations in which rf power densities *may* be high are best avoided as a matter of principle, even if they may not prove unduly hazardous in practice.

At fixed stations the normal use of high antennas tends to reduce the environmental rf power density in accessible places to very much less than the maximum levels considered acceptable.

Even if areas of relatively high rf power density are potentially accessible, the operator can still control any hazard by preventing access or by not transmitting when anybody is in such an area.

The authors see no reason whatever for treating rf hazards any differently from other hazards of amateur radio that are better known, accepted and controlled, eg high voltages or falling antennas. There is no case for introducing any special regulations, on any amateur band, aimed at controlling rf hazards due to amateur radio.

References

[1] *Safety Precautions Relating to Intense Radio-Frequency Radiation,* HMSO, 1960.
[2] "A Review of Selected Biological Effects and Dosimetric Data Useful for Development of Radiofrequency Safety Standards for Human Exposure", R. A. Tell and F. Harlen. *J. Microwave Power* 14 (4) 1979.
[3] Technical correspondence, *QST* September 1978.
[4] "Energy Deposition in Biological Tissue Near Portable Radio Transmitters at VHF and UHF", Q. Balzano *et al. IEEE 1977 Conference Record of Vehicular Technology Group,* March 1977.
[5] "Electromagnetic Coupling Between a Thin-Wire Antenna and a Neighboring Biological Body: Theory and Experiment", K. Karimullah, K-M Chen and D. P. Nyquist. *IEEE Transactions on Microwave Theory and Techniques,* Vol MTT-28 (11) 1218, November 1980. □

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SWL NEWS

Bob Treacher, BRS32525*

Verifications at vhf

The vhf awards manager tells your scribe that because so few certificate claims are received from listeners it was quite an event for him when a double one for 144MHz came in from the redoubtable BRS41733 of Chiswick in West London. George, who is now G6GGE, possesses only the second-ever "4-2-70" certificate to be sent to a receiving member (G5UM adds that the first went to BRS32525!) and only the fourth "Four Metres and Down" Senior: the other three went to Ron Ham in 1966; to Colin Baker in 1970; and to Mike Allmark in 1975.

When G5UM checked over the cards received by "Chiswick George" he was impressed by the gratitude which many of the senders voiced to a receiving member who frequently heard much more than they did, and could tell them that others were calling them when they did not know themselves. The value of well-documented listener reports needs no further underlining.

It might be added that it took more than two years for the needed cards to be returned to G6GGE from the 15 countries and 60 counties heard on 144MHz, and this must be taken as the norm (transmitting members experience the same delay). Although his FMD Senior was achieved on 144MHz he is no stranger to the more difficult bands of 70MHz and 432MHz. For listening on both of these he has won FMD parchments. On account of the lower levels of occupancy, transmitting members are especially appreciative of reports received on these bands. The vhf awards manager's figures show that only six certificates have been issued to receiving members on 70MHz, and seven on 432MHz. Just one 432MHz Senior has been claimed: it went to Harold Meerza, BRS34348, of Chatham, as long ago as 1975. He also holds the distinction of being the only receiving member to hold a 1·3GHz award, issued in January 1978.

Listeners who require claim forms for the "Four Metres and Down" or for the "4-2-70" award should send an sae to the vhf awards manager, G5UM, 27 Ingarsby Lane, Houghton-on-the-Hill, Leicester LE7 9JJ.

144MHz

Staying with vhf, Dave Whitaker, BRS25429, mentioned the "lift" on 3 November. He heard his first LX stations—LX1DB and LX1GG—but remarked that the conditions did not prevail long enough in his part of the world to be really interesting. The lift did stay long enough for him to knock off some squares (perhaps he will be Jack's next customer?). He lists stations in BH, BI, BJ, CJ, DI, DJ, EI, EJ and FJ squares. LX eventually provided his thirteenth country verification on the band, while EI2CA meant square No 19 was confirmed. Your scribe caught some of the 3 November conditions but they did not seem too spectacular, even though several stations in the South worked into northern Spain.

QSL

G2CIL (ex-BRS1914) wrote telling of his experiences of swling in the pre-war years. The most interesting point made concerned his purchase of a number of colour postcards of his local town, Horsham, which he used as QSL cards. Some featured a view of an old church, and the remainder the local inn, "The Dog & Bacon". He received only a 40 per cent return from the "church" cards, but over 90 per cent from those depicting the inn! Is there a moral here?.

G4EFE is QSL manager for VS5DD, who should be active from Brunei until mid-1982. He will QSL all correct listener reports received either via the bureau or direct.

Newcomers

Tim Lake ARS45184, uses a KW201 and 84ft of wire, and a multiband dipole for 14–28MHz. VK3BM had been copied on 3·5MHz, and ZL2ACY on 28MHz for his best dx so far.

Tony Lee, BRS48530, has been swling since August, and joined the Society in September. He uses a DX302 receiver and an AD370 active dipole.

*79 Granby Road, Eltham, London SE9 1EH

1981 HF COUNTRIES LIST

Station	28	21	14	7	3·5	1·8	Total	Mode
BRS14585	218	233	237	162	138	29	1017	ssb/cw
RS42604	209	221	211	163	121	37	962	ssb
BRS25429	205	221	225	147	121	42	961	ssb
BRS8841	201	215	240	139	109	16	920	ssb/cw
BRS48909	191	221	226	124	81	25	868	ssb
BRS44703	156	162	180	117	100	26	741	ssb
A8808	172	166	164	106	96	34	738	ssb/cw
BRS1066	149	172	171	87	66	46	691	ssb/cw
RS46228	103	133	175	155	71	23	660	ssb/cw
BRS44266	141	116	154	60	43	14	528	ssb
BRS35509	97	136	151	67	63	3	517	ssb
BRS18529	82	107	130	86	77	27	509	ssb
ORS45992/7Q7	134	173	143	4	12	0	466	ssb
BRS31440	120	122	100	65	42	3	452	ssb
ARS42503	92	125	146	28	32	0	422	ssb
A9191	88	100	117	49	40	8	402	ssb/cw
BRS41992	56	74	131	65	50	16	392	ssb
RS44218	81	85	111	26	21	5	329	ssb/cw
ARS41349	76	89	79	36	40	3	323	ssb
BRS40705	95	85	92	31	24	1	327	ssb
BRS46708	71	40	85	40	57	0	293	ssb
BRS32601	135	55	46	16	14	0	266	ssb
BRS48675	37	78	72	18	9	1	215	ssb

A lengthy list of dx heard which Tony provided showed that he spread his listening evenly between the three higher frequency bands. A card index system is used, and the name, QTH, equipment used etc of the stations he has heard are noted.

Peter Webb, BRS25172, has an FRDX500 (a fine receiver, Peter), an FR101 and a Trio QR666. A triband beam has helped him amass 11,757 QSL cards, He can also handle cw at 25wpm. An experienced swl, no doubt, but Peter also felt a little hard done by at his current QSL rate. He offers an interesting theory of why the swl often never receives cards—that the QSL scene has reached saturation point. With so many amateurs and swls around the world now, Peter thinks that the guy at the other end can be too choosy and simply QSLs those cards which are of use to him for DXCC etc. Peter remarks that his return a few years ago was far healthier than his 3 per cent return for 1981.

David Lytton, BRS44798, feels that all the recent publicity in this piece about the poor response listeners have received to QSLs sent will harden the recipients attitude to the swl, not improve it. Everyone is entitled to an opinion, but there seems no harm in trying to gently remind the licensed fraternity that today's listeners are tomorrow's licensed amateurs, and the more encouragement they receive, in whatever form, including receiving QSL cards, certainly does no harm. On the other hand, some listener reports which your scribe has seen in the course of his QSL manager duties show why some listeners do receive such poor returns. Here, for example, are just two things which will result in you *not* getting a card. One is getting the callsign of the station being worked wrong. This highlights the problem of only giving the station you are reporting on details of one QSO that he made. Why not give details of two or more QSOs? Another is to send a report to a station saying he was 59 in London when he was working a G-station. In such circumstances, the station knows his signals were 59 in G-land, so a QSL may not always be worthwhile in the first instance. There are exceptions, of course, such as reporting on lower frequency QSOs, because some parts of G-land *do* experience different conditions around sunset and sunrise times. As your scribe remarked last month, any report *must* be accurate and informative. If your report meets both requirements the desired return card, in most cases, is at least 50 per cent guaranteed. This topic could be developed further, but there are other subjects to squeeze into the column now.

1·8MHz

A useful beacon for those interested in 1·8MHz USA dx is the W1AW code practice on 1·835kHz at 0200 each weekday.

Two reports were received indicating that December conditions were an improvement over recent months. Phil Catterall, BRS48181, lists 20 European stations, while Brad Bradbury, BRS1066 heard UK9SBD, UM8MAZ, VE, W1-3, 8 and 9, 4X4NJ and 8P6GG to help his all-time score for the band past the half-century mark.

DX reports

Conditions on all five bands were reasonable towards the end of 1981, but 7MHz perhaps stole the "best band" tag. The band was open to the Americas until 1000 and open to JA at around 1550. Some West Coast stations were audible on cw via the long path around 1515. ZL4BO was a consistently good signal, also over the long path, around 1730. An opening to Africa was evident on several days, again around 1730, with 9U5JM the pick of the stations heard. Later in the day, at around 2230 to 2300, several JAs were extremely strong during their sunrise. Tuning the band at midnight

(Continued on page 147)

4-2-70

John Morris, G4ANB*

50MHz

50MHz continued to confound the propagation prophets during November and early December, obstinately producing good openings after the expected end of the season.

G5KW on the Isles of Scilly made his first 28-50MHz crossband contact with Hong Kong on 20 November, surprisingly by long path. The contact came quite by chance; G5KW had been listening for VS6 stations on 50MHz by short path during the morning of 20 November. Hearing nothing, he turned the beam towards the Caribbean to listen for the FY7THF beacon, and promptly heard VS6BE calling "CQ" on 50·110MHz, on a beam heading of 240°. G5KW and VS6BE went on to complete two crossband contacts, first at 1107gmt and again at 1142gmt.

VS6BE was also heard on long path by G4BPY on 20 November. During the latter half of November G4BPY heard several Caribbean beacons, including 6Y5RC (50·025MHz) on 25 November. During the month G4BPY worked five new countries on crossband, in the shape of C5AEH, 9Y4LL (a G-9Y4 crossband "first"), PJ9EE, HC8VHF and HK0BKX; although the contact with PJ9EE was only partially completed.

C5AEH gave several crossbanders a new country during November. He is now reported to have left Gambia (QSL via W6JKV), but has left behind an 11-element 50MHz beam which will be used by C5ACG.

50MHz was open to the Caribbean again on 11 December, when DL3ZM/YV5 was worked on crossband by several people. One of the stations to work DL3ZM/YV5 was G3COJ, who was particularly pleased with his contact as it was the last one needed to complete his crossband WAC.

70MHz beacons

Following the reduction in the upper limit of the 70MHz band from 70·7 to 70·5MHz and consequent changing of the beacon sub-band to 70·025-70·075MHz (December *4-2-70*), new frequencies have been designated for the four operational or proposed UK beacons. The plan is to space them at 10kHz intervals, running up the band from the south to the north of the country, as follows:

Callsign	Proposed frequency	QTH locator
GB3CTC	70·03MHz	XK64a
GB3SX	70·04MHz	AL71d
GB3SU	70·05MHz	ZN61a
GB3ANG	70·06MHz	YQ35c

These frequencies must be confirmed by the Home Office before the beacons come on the air.

GB3SX was taken off the air in early December in preparation for the move. While the transmitter was being set up for its new frequency the opportunity was taken to change the antenna to a two-element beam pointing northwest. Exactly when the four 70MHz beacons will be on the air is not known at the time of writing, but it may be expected that GB3SU and GB3SX will be operational very soon after receiving Home Office approval of the new frequencies; hopefully by the time this is published.

In keeping with the policy of UK beacons using GB3 + three letter callsigns, with the GB3 + two letter series kept for repeaters, plans are afoot to change the callsigns of the few remaining beacons which still use GB3 + two letters. GB3SX, for example, is expected to become GB3WHA in due course. The timing for the callsign changes is again unknown at the time of writing, but they are regarded as being rather less urgent than actually getting the transmitters on the air.

Repeater news

Site changes are pending for GB3LL (RB4, Llandulas, Colwyn Bay), and GB3CR (RB6, Mold, Clwyd). Home Office approval has been received for site changes for GB3FC (RB2, Fylde Coast) and GB3TR (R2, Torquay). GB3YL (RB14, Lowestoft) is now operational from a new and better site.

GB3PB (RB10, Peterborough, Cambs) was put off the air by storm damage to the antennas in late November. It was planned to use a temporary antenna at reduced height, giving a reduced service area, until full repairs could be made.

The hardware for GB3NL (R7, north London) has been replaced. GB3NL was originally brought on the air using the standby equipment for the old GB3LO. The new machine uses a Storno 600 base station coupled with the GB3US logic and runs 4W to a 6dB gain antenna. Operation through GB3NL remains virtually unchanged.

GB3NK (RB4, Wrotham, Kent) is due to move about 100m to a new tower during early 1982. The exact timing for this move is not known as the group is dependent on other people for antenna rigging. GB3NK has been running without a break for five years, so when it is closed down for the move the opportunity will be taken to completely overhaul the hardware. Its new home will also need some preparation and GB3NK is expected to be off the air for a few weeks.

The new GB3WH (R2, 6km southeast of Swindon) came on the air on schedule on 5 December. The equipment has been almost completely redesigned and built from scratch, with only the cavity filters from the old hardware being used. GB3WH is now tone access, carrier re-access, with no time-out. At the end of each over three short pips, spaced a few seconds apart, are sent. Stations already in contact should re-access between the second and third pips to allow mobiles and emergency calls to break in between the first and second.

GB3WH complements GB3VA (R4, 16km west of Aylesbury) in the master plan for providing vhf repeater coverage in central-southern England. In its early days the scheme seems to be working well, with both units performing just about as predicted, bringing satisfactory mobile service for the first time to large areas of the country. GB3WH has initially been suffering from strong signal interference from other transmitters with which it is co-sited, but by the time this is printed these teething troubles should have been sorted out.

UHF repeater GB3LH in Shrewsbury has changed channel from RB4 to RB15 to avoid co-channel interference with GB3MA (RB4, central Manchester). GB3LH is the first unit to operate on Ch RB15, the most recently introduced uhf repeater channel. When a new channel is brought into use there can be problems obtaining suitable crystals. The crystal suppliers are understandably reluctant to build up their stocks of a particular frequency until they can be sure of the demand, while users of a repeater are equally reluctant to buy crystals before quantity production has brought the price down. To try to shorten this *Catch-22* period the Repeater Working Group has a policy of allocating as many repeaters as possible to the new channel, so establishing a demand. In accordance with this policy four of the 10 proposals in uhf Phase 6, which is still with the Home Office at the time of writing, have been allocated to Ch RB15. This problem is unlikely to arise again, at least on uhf, as the RWG has concluded that no new channels will be needed in the foreseeable future. If eventually more channels are needed, and space for them can be found, it is anticipated that synthesized rigs will be much more common in the 432MHz band than they are now.

As this is being written I can see out of my window a thick carpet of snow covering everything, and the local repeaters are being kept busy by mobiles exchanging information on the state of the roads. I would be most interested to receive any reports of occasions when the repeater networks, or indeed the simplex frequencies, have been of particular use to travellers in the adverse weather conditions.

UOSAT orbital predictions

The launching of UOSAT—now known as "UO-9"—has generated an enormous amount of interest, and not just within amateur radio circles. Unfortunately, predicting the position of a low-orbit satellite such as UOSAT is not easy, as explained in the following extract from the AMSAT Satellite Report:

"Predicting the position of UO-9 more than a week or two in advance has proved a frustrating, often embarrassing, challenge to experienced and novice Oscarites alike. The low altitude of UO-9 makes the drag factor inconsistent and determining the orbital period is akin to predicting the weather. In fact, that metaphor is not too far from literal truth. The weather is a function of the atmosphere. The weather machine is driven by the sun's input. Similarly, the orbit of UO-9 is closely coupled with the sun's effect on the atmosphere. When the radiation output of the sun is high the upper atmosphere heats and expands significantly. The increased atmospheric drag caused by the higher particle density at UO-9's orbital altitude slows the satellite and lowers the orbit. Lowering the orbit shortens the period. Changing the period in unpredictable ways makes medium-term predictions very difficult and long-term predictions nearly impossible. Nevertheless, it should be possible to make predictions that will hold reasonably well for a two to three week period for errors in EQX (equator crossing) time of a few tens of seconds, and in EQX longitude of a degree or two."

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

AMSAT-UK runs a net on 3·780MHz at 1900gmt, Monday to Saturday, and at 1015gmt on Sundays, where up-to-date information may be found. UOSAT orbital predictions are also given on the GB2RS news broadcasts each Sunday.

Repeater standards

It is interesting to note that all but six out of the 130 or so currently operational fm repeaters in the UK now use the IARU recommended standard of "tone access, carrier re-access". This means that a 1,750Hz toneburst is needed to bring up a repeater from cold, but once awakened it can be used simply by transmitting on its input frequency, with no further tone required. If the input remains clear, typically for a few tens of seconds, the repeater will close down and remain dormant until another valid access tone is detected.

With a limited number of repeater channels available, particularly on vhf, it seems inevitable that there will be occasions when it is possible to access two repeaters simultaneously, especially during lift conditions. To help minimize the effects of this co-channel interference the Repeater Working Group recommends users of tone access, carrier re-access repeaters *not* to send a tone at the start of each transmission, except of course when initially bringing the repeater up. If the rig is fitted with an automatic toneburst which sends a tone each time the ptt is pressed this should if possible be disabled. This will ensure that if two repeaters on the same channel *can* be accessed at the same time, but only one of them is actually in use, the other will not be activated accidently by an unnecessary toneburst.

Just about half of the operational vhf/uhf repeaters will "time-out", and stop relaying messages if an incoming transmission lasts too long. This is intended to discourage long, repeater-hogging overs. Where time-out is used many groups are now adopting the RWG recommended periods of 2min on vhf and 5min on uhf. Of course, if we all followed the second rule of repeater operating, "keep it brief", time-out would be unnecessary.

These moves towards standardization are welcome. Every repeater has its own individual characteristics and it would be sad indeed if they all sounded exactly the same. However, repeaters are designed for mobile operators, who may use several different and perhaps unfamiliar units during the course of a journey. For these stations it is preferable for the important features of repeater logic—access method and time-out period—to be consistent from one repeater to the next. Within these constraints there is still room for individuality, and let us hope the day will never come when the only way of telling one repeater from another is to listen to the callsign!

In case you are wondering about the *first* rule of repeater operating, it is the same as for all other forms of amateur operation—"listen before you transmit".

Propagation warning systems

The possibility of using repeaters or beacons to send out propagation information and warnings of openings (*4-2-70*, October 1981) continues to attract interest. Although there is general agreement that some sort of propagation warning system would be useful, there is no such consensus as to how it should operate. The main point of discussion is whether beacons or repeaters should be used. Whichever option is chosen it will be most important not to disrupt the functions for which the transmitters are designed; propagation monitoring in the case of beacons, and mobile communications in the case of repeaters.

Each choice has its peculiar advantages and disadvantages. Repeaters are designed for local use, so one fitted with a warning system may be inaudible from any distance because of other, nearer repeaters on the same channel. To fit suitable hardware to enough repeaters to give widespread coverage would be a massive undertaking. Beacons, on the other hand, are relatively few and far between, and rarely share the same frequency. Unfortunately they are often weak, just carriers in the noise, making any propagation information difficult to detect automatically.

G4IFX supports the use of repeaters with information encoded in an unobtrusive manner: "Reception of a propagation indicator must be more reliable than that of a beacon which is at some distance. In the northwest of England anyone with an "ordinary" antenna system can probably receive GB3VHF all the time, but rarely strongly, while there are many easily audible repeaters. As to the objection about intermittent transmission, why not just switch to continuous carrier when an alert is being given? I notice that the 1,296MHz repeaters will in fact transmit carrier when not in use."

SU1CR would prefer the use of beacons, not just those on vhf/uhf, but also those in the 28MHz band. He suggests a few characters following the callsign would not seriously hamper the continuous carrier being used for propagation monitoring.

In between all of this discussion Jan Martin Noeding, LA8AK, one of the most enthusiastic promoters of propagation warning systems, has pointed out that before making any decisions it would be a good idea to actually try a few of the many ideas. He and LA4WN have been carrying out trials through the LA5SR repeater. To initiate an alarm test a short morse transmission is sent through the repeater using afsk. Because of the use of morse there are no anonymous transmissions, but a simple decoding and counting circuit can be used to detect a warning. The detection hardware does not discriminate between dots and dashes, but simply counts both and sounds an alarm when a sufficient number has been detected.

This attractively simple idea proved very effective during the trials. Although LA8AK is 180km from the repeater the system was found to be highly immune to interference and no false alarms occurred. Further tests are being planned between LA8AK (DS80b) and LA8SJ (FT04g).

Propagation warning system fitted to OZ7IGY

While LA8AK and others experiment with propagation warnings on repeaters, OZ7IS has provided details of a new beacon-based system in Denmark.

In its 24th year of operation the OZ7IGY beacon station, which has transmitters in the 144, 432 and 1,296MHz bands, has undergone some major changes. It has recently been moved from Copenhagen to a new site 50km west at Töllöse, in locator FP39b. All three beacon transmitters now use A1 keying and operate into omni-directional "big-wheel" antennas at between 94 and 96m asl. The frequencies are 144·930, 432·930 and 1,296·930MHz. The 144 and 432MHz transmitters each run 50W, and the 1,296MHz 5W.

For propagation warning an extra letter can be added after the callsign by remote control. "E" will be used for sporadic-E, "T" for tropo, and "A" for aurora. Whenever one of these letters is coded a 975Hz fm toneburst will be sent on the 144MHz carrier. This feature is intended for local use, where a tone receiver with an alarm circuit can be left monitoring the frequency at all times to give a warning whenever unusual conditions occur.

432MHz WAC for G3YGF

Julian Gannaway, G3YGF, of Oxford, has joined the elite club of those having achieved "Worked All Continents" on 432MHz. He recently turned in the necessary six cards to the vhf awards manager as proof of having made eme contacts with six continents on 432MHz.

The list of antennas used by the stations worked by G3YGF for his WAC makes interesting reading: A 9m diameter dish at JA6CZD; 6m dish at VK5ML; 7·6m dish at W7GBI; 9·75m dish at ZE5JJ; 16 10-element Yagis at DL9KR; and 16 21-element Yagis at the YV5ZZ. G3YGF himself used a 9m dish.

It is worth emphasizing that moonbounce exchanges come into the category of "direct contact". By contrast, contacts made through satellites come under the heading of "assisted contact" as the transponder within the satellite does at least part of the work. Specially endorsed WAC certificates are, however, available for both categories.

Awards

At a time when the trend seems to be to add linear amplifiers to existing 144MHz rigs (sometimes regardless of the fact that a better antenna could do the same job more cheaply, and would also work on receive), it is refreshing to note from a recent award claim by G8TRW in south Essex that his power never exceeded 3W from an IC202 at no more than 100ft asl. Helped by an effectively sited 14-element Parabeam this modest equipment has brought G8TRW 144MHz FMD Standard No 597.

Martyn Hunt, G6AJA, near Ulverston has the distinction of becoming the first holder of a G6+3 callsign to take an FMD award, and his certificate, for 144MHz Standard No 596, has been endorsed accordingly. One of the callsigns appearing in G6AJA's claim was that of his father, G2MJ, in respect of Lancashire.

In 1973 G8FMK of Thame claimed FMD Standards on 144 and 432MHz. Unusually, he then took the 432MHz Senior (No 28 in 1976) long before the 144MHz. He has now taken 144MHz Senior No 174, and holding two Seniors plus a 1,296MHz certificate has automatically qualified for the gold leaf FMD Supreme, No 37.

30 and 20 years ago

"GW2ADZ and G3EHY continue to run their skeds on this band (432MHz) nearly every evening between 1900 and 1930 G.M.T. Under the best conditions signals have been RST 599 both ways, but during the past month most contacts have been spoilt by fading. The number of occasions when some kind of signal gets through is, however, surprising, and there seems little doubt that when r.f. stages, comparable in efficiency with those in general use on 144 Mc/s., become normal practice, and the powers-that-be permit more than the present inadequate input of 25 watts, quite reliable results will be possible on the higher frequency, even over such a difficult path as this."—G2UJ in *Around the V.H.F.'s*, February 1952.

RSGB FOUR METRES AND DOWN AWARDS

The following awards, intended to mark successful vhf/uhf achievements, are available:

Title of award	Requirements
70MHz Standard Transmitting	3 countries, 30 counties
70MHz Senior Transmitting	6 countries, 60 counties
70MHz Standard/Senior Receiving	As transmitting
144MHz Standard Transmitting	6 countries, 40 counties
144MHz Senior Transmitting	15 countries, 60 counties
144MHz Standard/Senior Receiving	As transmitting
432MHz Standard Transmitting	3 countries, 20 counties
432MHz Senior Transmitting	9 countries, 40 counties
432MHz Standard/Senior Receiving	As transmitting
1,296MHz Standard Transmitting	3 countries, 20 counties
1,296MHz Senior Transmitting	6 countries, 40 counties
1,296MHz Standard/Senior Receiving	As transmitting
Supreme Award (fixed stations only)	Three Senior awards or two Senior awards plus one 1,296MHz award

(1) All claims must be fully supported by QSL cards.
(2) All contacts must have been made after 1 January 1961 in respect of old UK counties, or after 1 January 1975 in respect of new counties. Scotland revisions with effect from 1 January 1976.
(3) Eligible countries are shown on the list attached to the claim form.
(4) Stations are eligible for the awards in the following groups:
(a) Fixed stations;
(b) Alternative address (/A) stations, any address;
(c) Portable (/P) stations, any location;
(d) Mobile (/M) stations, any location.
(5) All claims must be submitted to the vhf awards manager, whose name appears on the title page of *Rad Com.*
(6) An address label from a recent issue of *Rad Com* should be sent as proof of RSGB membership. For the return of cards adequate postage in stamps should be sent.

RSGB 4-2-70 SQUARES AWARDS

The following awards, intended to mark successful vhf/uhf achievement, are available. A certificate and one sticker will be issued, and further stickers will be issued as additional QTH squares are worked. For brevity, the requirements for the various categories of award are given in the format "squares/countries". For example, the requirement for the 70MHz 20/4 award is 20 QTH locator squares including at least four countries confirmed on 70MHz.

Band	Categories available
70MHz	20/4, 25/6, 30/8, 35/10, 40/10, 50/10.
144MHz	40/10, 60/15, 80/18, 100/20, 125/20, 150/20.
432MHz	30/6, 40/10, 50/13, 60/15, 70/15, 80/15, 100/15.

(1) All claims must be fully supported by QSL cards bearing QTH locator details.
(2) All contacts must have been made after 31 December 1978.
(3) Eligible countries are shown on the list attached to the claim form.
(4 Stations are eligible for the awards in the following categories:
(a) Fixed stations;
(b) Alternative address (/A) stations, any address;
(c) Portable (/P) stations, any location;
(d) Mobile (/M) stations, any location.
(5) All claims must be submitted to the vhf awards manager, whose name appears on the title page of *Rad Com.*
(6) All applicants must be members of the RSGB and must enclose an address label from a recent issue of *Rad Com* as proof of their membership.
(7) QSL cards submitted must be in alphabetical order, and a checklist enclosed of the QTH locator squares claimed.
(8) For the return of QSL cards, adequate postage in stamps should be sent with the application.

Extensions to the 4-2-70 Squares award scheme are under discussion. Claim forms and copies of the rules for the 4-2-70 Squares and Four Metres and Down awards may be obtained by sending an sae to the vhf awards manager, Jack Hum, G5UM, 27 Ingarsby Lane, Houghton-on-the-Hill, Leicester.

"Further information on his (144MHz) moon reflection experiments has been received from G2HCG, who reports that the EME path has been proved practicable given the required aerial gain, transmitter power, receiver sensitivity and bandwidth. These calculations amount to a receiver noise factor of 4db, transmitter power input of 1 kW, receiver bandwidth of 400 c/s and aerial gain of 26db.

"The aerial is the main problem, and no matter what configuration is used it finishes up 40 ft. square."—G2AIW in *Four Metres and Down*, February 1962.

1982 *RSGB Amateur Radio Call Book*

The 1982 edition of one of the most useful "paper accessories" for the vhf/uhf enthusiast, the *RSGB Amateur Radio Call Book*, is now available. The new edition contains over 10,000 additions and amendments to the 1981 edition, and I estimate it contains some 40,000 callsigns, names and addresses.

When a station in another country is heard on vhf/uhf the callsign of the station gives a good indication of which way the beam should be turned. When a station in one's own country is heard, the callsign gives no such indication, and this is where the *Call Book* comes in. By looking up the station's callsign, the beam heading can be determined without having to do a time-consuming 360° scan, and for this reason the *Call Book* is recognized as an invaluable aid for the active vhf/uhf operator.

Mind you, the new edition confused me. It is my habit, when each new edition arrives, to write the most recently issued callsigns it contains in large letters on the front cover. The G4s were no problem, but the 1982 edition is the first to contain the new G6+3 series. This series was started after the G8+3 series was exhausted, so where in the *Call Book* did I expect to find them? After the G8s, but I was wrong! Six comes before eight, so the G6s are listed *before* the G8s. Does anyone know how to remove "G8ZZZ" from the front cover of a *Call Book?*

Scatter

During the course of a single year SM5CHK spent something like 900h on 144MHz ms to bring his unconfirmed squares total up to 308. That is nearly 2·5h a day, every day, for a year! Meanwhile G3POI is rumoured to be up to about 350 squares worked. The *Dubus Info* "top-list" puts SM7AED in the lead with 394 squares claimed.

G8VBC and G3XKX appeared on the Midlands ITV programme *ATV Today* in early December. G3XKX's shack and atv equipment were shown, and G8VBC appeared in vision via a noise-free link on 432MHz.

The Home Counties ATV Group holds a net each Wednesday evening at 9pm on the atv talkback frequency, 144·750MHz. A group of atv enthusiasts in and around Chester meet on Monday and Thursday evenings on 145·275MHz.

GI4LKA has noted that a minor propaganda campaign instigated in part by himself on the subject of solid-state "linear" amplifiers supplied by float-charged batteries has had the desired effect. In GI4LKA's part of the world, at least, the bottom end of 144MHz is a much tidier place than it used to be.

Conditions during the 144MHz Fixed Contest on 6 December were generally described as "abysmal".

So we come to the end of an unusually quiet month on vhf/uhf. As this is being written my change of QTH is imminent, so please make sure you use the right address when writing to *4-2-70.* All items for April to arrive by **19 February** (late news by **1 March**) and for May by **19 March** (late news by **29 March**) please. □

SWL NEWS

(Continued from page 144)

provided CO2JL, CX3TU, FM7WS, HP3FL, VP5WJR, YS9RVE, YV3BQS, 4Z4AB and 5B4CV.

Robert Small, BRS8841, logged A71AA and HC8MD for two new countries. Graham Powell caught up with ZL4PO/C and ZL4OY/A on Chatham and Campbell Is respectively, and W5NUT/PJ7.

3·5MHz too had provided some interesting dx, with W7FU audible in G-land over the long path at 1550 on 28 December. VS6II was also audible at 1545. JA stations had also been audible from 1715 at good strength and continued to be heard until 2100. TL8RC appeared to provide a new country for many, but at the time of writing nothing exciting had been heard from the Pacific over the long path.

The higher bands had also been in good shape. The daily DK2OC net on 28·750MHz continued to provide a good selection of dx stations. HC8MD figured in many reports received, as did VK9NYG. W6QL/8R1 had been attracting much attention, as Guyana must be one of the rarer countries in the South American continent. Other stations noted on 28MHz included A51PN, CE0AE, WH0AAB, W6YB/3D6, 3V8AA, 4U1UN and 5Z4CM. On 21MHz, the DK9KE net, which operates daily on 21·157MHz, provides some interesting dx, but it does not seem to attract the volume of dx stations which the DK2OC net can. However, WA2UUK/DU2 and JH7EAY/JD1 (Ogasawara Is) attracted ample Europeans on one day when your scribe found the net. JD1BAT (Minami Torishima) had been reported, along with A71AD, FB8WG, FH8OM and VS6JW (ex-VS6-0001 who had reported to this page). Everyone except Paul Crankshaw, BRS48909, Robert Small, BRS8841, and Mark Mullins, RS42604, seemed to have neglected 14MHz. As usual though, the band had produced the goods. The best stations reported were BV2B, KC6CG, KC6IN, KX6EM, TJ1GH, VP8ANT, 3B8AS, 4K1A (Molodezhnaya Base, Antarctica), 5H3TC and 5T5ZZ.

Finale

Copy date for **April** is **23 February**. The 1982 hf table will appear as soon as sufficient entries are received. Remember, all scores for 1981 which were above the 750 entry mark for the all-time table will be included in that table, but scores must be updated at least every six months to remain there. □

RSGB NATIONAL VHF CONVENTION

Sandown Park Racecourse, Esher, Surrey

Saturday 20 March 1982

- **One day exhibition and lecture programme**
- **Saturday social evening and buffet supper**
- **Comprehensive trade exhibition**
- **Exhibition by specialist groups**
- **Home-constructed equipment exhibition**
- **Full lecture programme on vhf, uhf and microwave subjects**

PROGRAMME

1030 **Convention opens.** Entrance through racecourse turnstiles. (Open to exhibitors from 0800 through special exhibitors' entrance) **Refreshments.** Snack bar in the hall will be open from 1100 to 1600, and the licensed bar will be open throughout the convention.

1400 **Convention address** by RSGB President

LECTURE PROGRAMME

	Stream A	Stream B	Stream C
1415	"Antenna gain measurement", Oscar Bäckman, SM5CHK	"Amateur satellites—research and development", Ron Broadbent, G3AAJ, and members of AMSAT-UK	"Solidstate power generation at microwave", Peter Tunbridge, G8DEK
1515	"More information on 4CX250B power amplifiers and their power supplies", John Nelson, G4FRX	"Pilot ssb—the replacement for fm?", David Holmes, G4FZZ	(a) "Implications of new microwave allocations", Heath Rees, G3HWR (b) "Gasfet preamplifiers for microwave bands", Charles Suckling, G3WDG
1615	VHF Contests Committee forum	"Meteor scatter", David Butler, G4ASR	"1·3GHz mobile systems", Graham Murchie, G4FSG, and Mike Walters, G3JVL
1715	Lecture session ends		
1800	Trade exhibition closes		

The lectures will be held in the Wolsey Bar, and the Wolsey and Claremont restaurants. Detailed arrangements will be notified on arrival

SOCIAL EVENING

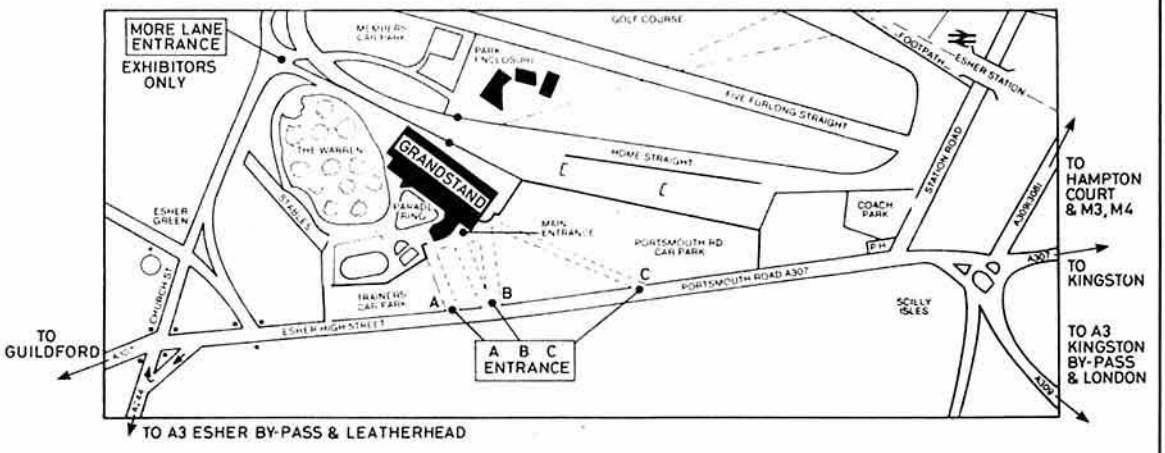
1900 Social evening begins in the Cavalry Room.

2000 A substantial "knife and fork" buffet supper consisting of three courses plus coffee will be served

2100 Presentation of awards

2300 Convention ends

ACCESS MAP TO SANDOWN PARK



Map by courtesy of United Racecourses

APPLICATION FOR TICKETS

RSGB NATIONAL VHF CONVENTION
20 March 1982

Please supply tickets as under:	Cost	Number	Total cost
Convention and exhibition only	£1.00	.....	.....
Convention and exhibition (under 18)	£0.75	.....	.....
Convention, exhibition and evening	£7.50	.....	.....
Evening only – if purchased in advance	£7.00	.....	.....

I enclose cheque/postal order for £.....

(Evening only – if purchased on day ..... £7.50)

Name.....

Address.....

This application for tickets must be sent to: Miss D. P. Beisiegel, RSGB,
35 Doughty Street, London WC1N 2AE. Cheques to be made payable to RSGB

Early application will be greatly appreciated

RAYNET

G. Cluer, G4AVV*

What is a Raynet group?

The amateur licence allows any licensed amateur to pass third party messages on behalf of one of the user services: Red Cross, St John Ambulance, police or emergency planning officers, and the amateur does not have to be a member of Raynet or the RSGB to do this. However, there are a number of reasons why interested amateurs have joined together to form Raynet groups. First, there is the training aspect; most of the groups who use Raynet use formal written messages, and these need some knowledge to be used correctly. Also it is surprisingly difficult to pass messages quickly under strain without making any mistakes, and groups find that regular exercises are essential. Second, there is the problem that only by being in a recognized group will the user service know where to find you when you are needed. Groups have made contact with local Red Cross groups, police and emergency planning officers etc, and these people have a list of contacts for the group and a procedure for contacting them in emergencies. Third, the structure of Raynet, supported by the RSGB, allows for a joint approach to the Home Office over licensing conditions, and for supplies of badges, certain insurances etc to be organized nationally.

Each Raynet group is a virtually autonomous group whose actions are co-ordinated by a committee of the Council of RSGB known as the Raynet Committee. In trying to keep information on each group this committee issues a survey form every year; if you are a group controller and did not receive a form around Christmas time it could be that the RSGB has lost touch with your group. Please write to me at the address below and I will pass on your letter to the person responsible for issuing these forms. There may be some groups of amateurs providing an emergency radio service who, in the past, decided that they would not work as a Raynet group. Now that there has been a reorganization in the way that Raynet is run, if you belong to such a group and want to consider bringing the group back into Raynet the committee would be delighted to hear from you.

Finally if you would like to join or start a Raynet group please write to me or the elected committee member for your area marking the envelope "Raynet Information" and we will ensure that you are sent the relevant information.

Elections

Part of the reorganization in the way that Raynet is run has involved electing representatives from each defence zone to serve with the Raynet Committee. These representatives are a link between the members and the committee and hold local information on groups and activities around the country. They are

Zone	Member
1. Northeast England	Mrs S. B. Jebb, G6AJF
2. Yorkshire/Humberside	R. A. Webb, G3EKL
3. East Midlands	G. Griffiths, G3STG
4. East Anglia	J. A. Birley, G3PYN
5. Greater London	W. R. Andrews, G3LRE
6. Home Counties/Southeast England	R. P. Jeffries, G4KAR
7. Southwest England	W. J. Colclough, G3XC
8. Wales	S. J. Brennan, GW3ZXI
9. West Midlands	D. J. Lankshear, G3TJP
10. Northwest England	*vacant*
11. Northern Ireland	*vacant*
12. Scotland	D. E. Garrington, GM3FRA

Group reports

Finally, the lack of group reports this month does not mean that there has been little activity. The reverse is true; there has been so much that it would be impossible to record it all. However, the writer is grateful to the following groups for their recent reports, and those amateurs who live locally who are interested in Raynet might like to contact the group controller for full details of the groups' activities.

Group	Controller	Group	Controller
Norfolk & NE Suffolk	G3HRK	Lothians (which needs members, particularly in E Lothian)	GM3OWU (Tel 441-3368)
West Midlands	G3NXC		
Kent (a superb report)	G3VFC		
London	G3IIR		
Gloucestershire	G8JXS	North Wilts	G3IDW
Sussex	G4BLJ	Devon and Cornwall	G3XC
St Austell	G4JYF	Southeast Dorset	G4GTH
		Oxfordshire	G4GKL

Most of the groups report major exercises, often by a number of groups, working with one or more user service, and often press cuttings are included showing the interest shown by the local press. They nearly all include letters of appreciation from the Chief Constable, the emergency planning officer or the local MP.

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

"Try fm but remain horizontal", he said

by JACK HUM, G5UM*

HE WAS AN S9-PLUS SIGNAL from 50 miles away down at the ssb end of the 144MHz band. Would he care to change to fm, asked his QSO-partner? "It always sounds pleasanter to human ears than even the best of ssb, especially when the signal is as strong as yours is", he added. The man at the other end replied that he would indeed—but, he said, he didn't have a vertical antenna for use on fm, and wasn't this rather a drawback?

Smothering a reply that antennas are not mode conscious, the QSO-partner ventured to comment that ". . . using fm doesn't mean you must slavishly stick to an omni-directional vertical antenna . . . try fm but remain horizontal" and he went on to add that the omni-vertical was one of the least efficient forms of radiator that could be devised for use at vhf. The man 50 miles away laughingly took the point: both of them moved up-band out of the ssb segment and continued their contact on fm with horizontal and directional radiators in use at each end.

Lest the above remark about the inefficiency of omni-verticals may seem somewhat provocative to the many thousands of vhf operators who use them, it is worth delving further into the subject of antenna polarization at vhf.

Verticality—a recent phenomenon

It may surprise the newer licensees and the newer readers of this journal to be told that the use of vertical antennas at vhf and uhf is a comparatively recent phenomenon. Older licensees, too, disenchanted by what they hear on the hf bands and taking to vhf, may be surprised (recently the author met one of them, a superb telegraphist with a G3 callsign, and newly on 144MHz, who had no idea whether his polarization should be vertical or horizontal: so many people had told him "vertical" that he had come to believe it. His dilemma was resolved after a few other cw QSO-partners had advised him to: "go horizontal and go directional", which he did—and his coverage changed from local to national).

Verticality at vhf came to be adopted, gradually at first and then with increasing speed, in the early 'seventies, prompted by the "mobile revolution" that postulated vertical antennas for reasons of mechanical convenience—though it should be added that the horizontally-polarized halo was a long time a-dying, and is indeed in some evidence even today.

Very soon the limitations of mobile operation became all too obvious when antennas of minimal gain and operating virtually at ground level produced disappointingly poor coverage. To enhance mobile coverage repeaters were invented—"invented" in an amateur context, that is, for they had been around on the professional communications scene for a considerable number of years. Their application to amateur vhf operation became an important operational requirement as the mobile trend spread. Verticality, already the norm with mobiles, suggested that verticality for the new repeaters should be part of their specification, and that is the way it has been since the famous GB3PI prototype first took to the air 11 years ago.

Although repeaters were (and are) intended for the disadvantageously sited—meaning mainly mobiles—it has become a fact of life on vhf that they are widely used by fixed stations as well, and nothing wrong in that provided that those same fixed stations have assured themselves that they really *do* need to use a repeater and that they really *don't* hear one another "on the input" to allow a simplex contact to be set up (there is some evidence that many fail even to try).

Split bands

Along with this trend towards verticality for vhf antennas came the division of the 144 and 432MHz bands into virtually *two* bands each, long-haul communication in their lower halves and local working in their upper halves. Operators in the lower "dx" segments, using cw or ssb, have always been single-minded about "putting the signal where it is wanted", that is, with beam antennas. By contrast, the upper, "local" segments centred around 145·5 and 433·2MHz have developed as areas of fm operation where quite basic, almost diminutive, antennas would give results of a sort, if all that the operator wished to do was to talk to other friends in the same town.

To longer-term users of the vhf spectrum, this was a retrograde trend: to them it had been axiomatic that hard-won rf energy should be directed ". . . to where you want it to be heard, and not all around you". To achieve this objective, a beam antenna was mandatory. In the earliest days you made one yourself, but before long it became evident that the market for beam radiators for the amateur service was going to be large enough to persuade commercial manufacturers to enter it, and this they did to the benefit of subsequent purchasers and users.

However, not all of these purchasers were persuaded of the need for directivity when, as has been said, results of a sort could be had without it. Signs that they *are* now being so persuaded increase as each month passes —signs in the sky, indeed, as beams appear above rooftops to replace (or to complement) the former omni-verticals.

Imminent overcrowding

Another cogent reason why one's signal should be placed where one wants it to go is suggested by the imminent overcrowding of the vhf bands, occasioned by the great increase in licensed amateurs over the past two years. When several thousand new stations start up on 144MHz each year, the likely level of interference, especially in conurbations of any size, may well be appreciated.

Much of this intolerable overcrowding will be mitigated if, as one suggests, signals are directed to wanted spots within a beamwidth of, say, 25° and not wastefully into the remaining 335° where communication is not required. To operators content to spend their time on the fm mode, vertical beams will bring about this desirable state of affairs (although, as has been pointed out above, there is no special merit in verticality for fm). To all others wishing to exploit vhf/uhf more fully, crossed Yagis that give either vertical or horizontal radiation at the touch of a switch are essential requirements.

Clearly, this situation is upon us now, and no time should be lost by those wishing to reverse the present wasteful practice of spreading the radiated signal all around. They can "get themselves directional" either by constructing beam antennas to the dimensions given in the current vhf/uhf textbook chapters, or by purchasing one of the many designs of Yagi (or similar) antenna advertised in this journal.

Suitable rotating mechanisms are also advertised in profusion; but, for the person who wishes to "do his own thing", the so-called "Armstrong" method of rotation will appeal. In practical terms this envisages a mast passing through clamps fixed to the wall of the house and stepped into a builder's scaffolding base at ground level. A bar bolted horizontally across the mast at eye level acts as the "steering wheel".

Having engineered these improvements the operator will at once notice that his send/receive range is greatly extended. He will find he is detecting stations never before heard, some of them so weak as to require rotation of the beam to bring them to maximum strength.

But which way to rotate? If the distant station announces his location all is well; but many inconsiderately do not. Recourse to the RSGB *Amateur Radio Call Book* helps the searching listener—but if the other man's callsign is a new one it will not be listed, a fact which reinforces the need always to announce location when putting out a CQ call.

Because the majority *are* in the *Call Book*, this publication asserts itself as the vhf man's best friend after his transceiver. A copy of it should be as accessible to him in his radio room as the logbook is, and not hidden beneath irrelevant impedimenta which makes it impossible to consult at that magic moment when the turning antenna slowly brings up the strength of a distant signal.

Conclusion

No claim to originality is made for anything written above; yet it is comforting to know (as has been reported in *4-2-70*) that groups have been formed in a number of areas to foster dx working on fm precisely along the lines suggested in this article. Their efforts deserve reward, and quickly, too, if the 144MHz band is not to become untenable through the sheer weight of the numbers spreading their rf on it in all directions. And if readers should imagine this statement to be alarmist they will have found evidence of its truth in the 1982 *Call Book* they purchased at one or other of the recent amateur radio exhibitions in the Midlands; the weight of numbers is listed there for all to see—excluding the several hundreds who have been licensed since it went to press.

As an appendix to the above—although not relevant to the present situation on the 144MHz band but very relevant to future developments—it may be worthwhile to point out that in the planning of 1·3GHz repeaters horizontal polarization is being specified to avoid horizontal/vertical polarization problems.

*27 Ingarsby Lane, Houghton on the Hill, Leicester.

MICROWAVES

Charles Suckling, G3WDG*

Modifications to the GDO33 24GHz gunn oscillator

The following is based on an item which appeared in the issue No 05-81 of the *Microwave Newsletter*.

Having discovered during a test on 24GHz that the output frequency of the Plessey GDO33 gunn oscillator is very sensitive to the load impedance presented to the oscillator, G3YGF developed the following modification to the GDO33, which improves its stability very considerably. The modification consists of using a higher "Q" cavity to define the oscillator frequency, and is based on the well-tried G8APP design for 10GHz, which uses a $\lambda_g/2$ cavity in front of the gunn diode. The use of a similar cavity on the GDO33 would have entailed machining the oscillator, and to avoid this the cavity was extended to $4\lambda_g$. This was the first multiple of $\lambda_g/2$ greater than the length of the GDO33 body where stable operation could be obtained.

The modification is shown in Fig 1, and consists of extending the length of waveguide in front of the diode by 9-9·5mm, and adding an iris. A piece of aluminium or brass plate of suitable thickness should be cut to the size of a WG20 flange, and using a standard flange as a template, the four corner holes are drilled in the plate. Several holes are also drilled in the centre of the plate, and filed out to form a rectangular hole of WG20 internal dimensions (approx 9 by 4mm). An alternative to filing out a block has been suggested by G4CNV. This is to solder two WG20 flanges of appropriate thickness back-to-back on a short length of WG20. A hole is drilled in the centre of the broad face of the plate and tapped 4BA to take a tuning screw. The iris plate is made from 0·1-0·15mm thick brass or copper sheet, with a 5mm diameter hole drilled in its centre. The iris is sandwiched between the front face of the spacer block and the flange of the following piece of waveguide, the whole assembly being held together firmly by the four flange fixing screws.

The results obtained with this modification were as follows:

1. With the hole diameter specified for the iris, the output power was reduced by 3dB when compared with the unmodified GDO33. Decreasing the hole size improves stability but at the expense of output power. Increasing the hole diameter has the opposite effect.

2. The tuning range is 200MHz with a 4BA nylon tuning screw; a 2BA screw could be used, giving a greater tuning range. The tuning range with ptfe is about half that with nylon.

3. The 8BA metal tuning screw on the body of the GDO33 can be used for coarse tuning. Varying the supply voltage can also be used to tune over 100-200MHz, but this is not recommended as the modulation sensitivity varies considerably. It is better to use supply voltage tuning only for fine tuning.

4. With a 1·2 load vswr, the maximum frequency pulling is only 2MHz, compared to 60MHz for the unmodified oscillator.

5. The stability of the modified oscillator is such that it has been possible to use a 25kHz bandwidth receiver, with retuning necessary only every 30 seconds. This result was obtained with the GDO33 in free air—a polystyrene box around it might improve stability further.

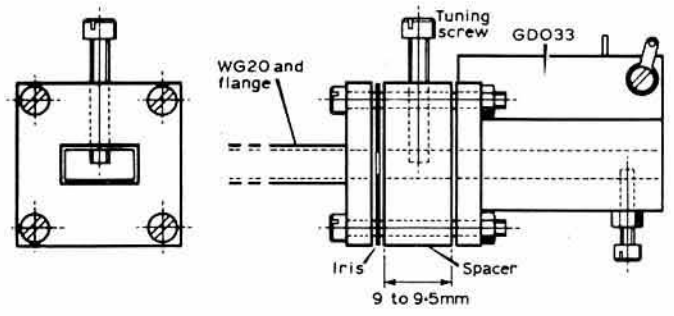


Fig 1. Details of G3YGF's modification to the GDO33 24GHz gunn oscillator to improve stability

*46 Windsor Close, Towcester, Northants

6. Any movement of the antenna or of objects near to it will still affect the frequency somewhat, although much less than with the unmodified oscillator. This can cause problems if a relatively narrow bandwidth receiver is used.

Modifications to the UPX-4 1·3GHz pa.

A number of UPX-4 type six-valve amplifiers (either homebuilt or ex-OZ9CR) are known to be operational in the UK. A number of users of this amplifier have reported difficulty in achieving the power output of which the amplifier is capable. The main reason for this seems to be that the output link as originally specified is not optimum. The use of a slug tuner (see *Microwaves* June 1981) can help considerably, but a better solution is to use a modified output loop. G3YGF and G4CNV have developed a new output loop so that the amplifier can deliver full power, into a well-matched load, without needing a slug tuner. Details of their modified loop are given in Fig 2(a). When optimizing the penetration and angle of the loop for optimum power output, it will be found that there are two possible penetrations for best performance, one with the loop barely into the cavity, the other with the loop well into the cavity. To prevent possible flash-over problems the position with the loop only just into the cavity is preferable.

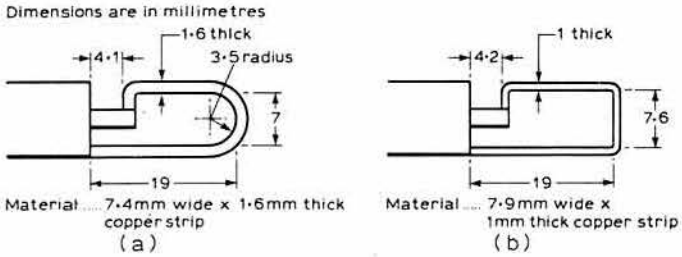


Fig 2. (a) modified output loop for UPX-4 amplifier. (b) modified input coupling

G3YGF and G4CNV also found that it was possible to increase the gain of the amplifier by changing the input coupling to a loop, details of which are given in Fig 2(b). The angle and penetration of the loop are adjusted for maximum drive, but care should be taken to avoid instability which can result if the loop is too far out (ie the coupling is too light).

After these modifications, and with an on-load anode voltage of 1·5kV, it was found possible to achieve 13dB gain (at 25W drive).

Microwave Newsletter

The Microwave Committee would like to remind readers that a *Microwave Newsletter* is being distributed by RSGB Headquarters. This newsletter is published at regular intervals (approximately monthly) throughout the year, and contains many items of interest to the microwave amateur, such as operating news, original technical items, and details of forthcoming events and contest activity. The continuing success of the newsletter depends on support from its readers, and the newsletter editors (G3YGF, G4CNV and G4KNZ) are always very grateful for contributions.

Subscriptions for the newsletter (£4 per annum) and any distribution enquiries should be sent to the General Manager at RSGB Headquarters.

Microwave bandplanning

Two microwave bandplanning topics have been discussed recently by the Microwave Committee. The first concerns 2·3GHz, where the move to 2,320MHz for narrow-band operation by DL amateurs begs the question —should UK stations also move up to this frequency? VERON is recommending that Dutch stations operate on 2,320MHz. Since a large proportion of contacts by UK stations on 2·3GHz are with PA/DL stations, it seems inevitable that a move to 2,320MHz will be necessary if these are to continue.

The second bandplanning question concerns the wideband operating frequency on 10GHz. A suggestion has been made that more wideband fm operation could take place around 10,400MHz instead of 10,100MHz. The main technical reasons for this are that wideband/narrowband compatibility would be improved, and that the problem of using a single antenna (eg a slotted waveguide) for a dual wide-band/narrow-band beacon would be greatly eased.

The Microwave Committee would welcome any comments or suggestions on these topics, either via its chairman (G4FSG, QTHR) or the writer.

THE MONTH ON THE AIR

John Allaway, G3FKM*

IN A LETTER to your scribe, G4EQI, who is one of the Society's volunteer army of helpers, draws attention to problems he encounters as a QSL bureau sub-manager. He finds that a significant proportion of cards carry the callsign of a QSL manager in which the latter's callsign is wrong—usually by one letter. Leo says that these prove to be mostly for cw contacts made during "pile-up" conditions, but that other cards—this time for individual operators—also often carry just one mistake, again almost always due to an error in copying the morse code. His advice to all is to make quite sure that their own callsign has been copied correctly—quite a few instances of "pirate" activity may be explained by misread calls.

Peter Linton, G4LPX, has written with a "Thought for the month" which appeared in *MOTA* February 1950. It reads: "Have you ever thought that maybe the station who is blotting out the station you want to work is only repeating to the station he wants to work the remarks which you blotted out?"

K9LKA is very anxious to trace the operator of VS9HRV in January 1967. He was at that time Sgt Ray Vasper, and the request arises from the fact that Larry has just discovered an error on his QSL card and is very anxious to have it replaced. Any information would be welcomed—via G3FKM please.

Overseas news

Apologies to Ian Shepherd, G4IJF, whose callsign was incorrectly given as G3LJF/3B8 in December *MOTA*. His operation from Mauritius was undertaken while he was on holiday; he took a Fritzel three-band vertical to use with his TS830, and used an inverted-V for 7MHz. He made 1,111 contacts and worked 117 countries in spite of the fact that his operating position consisted of a table and chair on the beach, with a cardboard box cut to protect the transceiver from the sun! Many UK stations were worked on 7MHz, and a regular 21MHz schedule was kept with QSL manager G4DYO.

Trevor, G3YMM, recently holidayed in Cyprus and reported that a station is once again active from the Sovereign Base Area at Episcopi. Its callsign is ZC4EPI and it belongs to a recently formed club; Trevor also understands that clubs have been re-formed at RAF Akrotiri and at Dhekelia. He was issued with a reciprocal licence with little difficulty—he sent a copy of his UK licence to the Ministry of Communications & Works in Nicosia a few weeks prior to his visit, and received confirmation of authority to operate by telephone on arrival on the island. No operation is possible in the Turkish-occupied part of Cyprus at the present time.

More news of ZC4EPI has been received from Martin Hartley, G4FQL/ZB2DP/ZC4PH, who says that the club has five members, three of whom have licences. The equipment is borrowed and the club is active on all bands up to 28MHz, normally between 1200 and 1600 on 21 and 28MHz ssb and cw. QSL to the address in "QTH Corner".

More information from Terry Miles in Tanzania (see January *MOTA*) is that he has been given the callsign 5H3DM but that it may take up to six months for his licence to arrive. He has two-element Hy-Gain beams for 14, 21 and 28MHz, as well as a 3·5–28MHz inverted-V, but is searching for a support for them. It seems that there are only about five 5H3 amateurs active —but that in the absence of television they have no tvi problems!

Expeditions

DL1VU left Germany on 7 December for Kuala Lumpur to commence an extensive journey through the Pacific area. He was hoping to be on the air from 9M2, VK2AOU, all ZL call areas, VK9N, YJ0VU, 3D2VU, FW0VU, 5W1DC, ZM7VU, DL1VU/KH8, ZK1XG, ZK1XZ/N, Cook Is, ZK2VU and A35VU. This is the maximum itinerary and will be followed by return to Germany via ZL, VK and 9M2. Timings are not known, and at the time of writing FK0VU was expected to appear during January with the certainty of YJ, ZM7, KH8, and ZK/N Cook Is to follow.

According to the *DX Bulletin* EA8AK has said that the proposed visit to Albania is being held up by the non-arrival of one piece of paperwork which will give the dates of permitted operation. The group is hoping that this will be during this month.

Iris and Lloyd Colvin made 9,000 QSOs from 9Y4KG and worked 141 countries. They found Trinidad a very difficult country in which to import and export radio equipment—on arrival it took them eight days to obtain customs clearance of their gear. At the time of writing they were in Guyana using the callsign W6QL/8R1.

DX-NL reports that the announced Bouvet Is expedition, 3Y0A/3Y0B, has had to be postponed until next winter because of transportation difficulties.

DX news

VK9ZG was expected to leave Willis Is at the end of 1981, but it was likely that his place would be taken by another amateur, VK9ZH. The new operator, Tony, will use VK3OT as his QSL manager. VK9XW, on Christmas Is, is often to be found on 14MHz ssb after 0800 and sometimes also in the YL ISSB Net on 14,331kHz between 0930 and 1230.

The *Lynx DX Bulletin* says that ZK1BM is located in the N Cook Is group and looks for European contacts on 3,800kHz between 0500 and 0800. He also uses 21,157kHz around 1000. The same news source mentions that VR6TC keeps a schedule on Sundays at 0745 on 14,175kHz.

Graham Mott, G4KLP, recently visited Tim, BV2A/BV2B, and has kindly updated the information given in December *MOTA* which was not fully correct. Tim's operating frequencies (which are allocated) are 14,025, 14,040, 21,030 and 21,110kHz (as BV2A), and 14,218, 14,250, 21,270 and 21,350kHz (as BV2B). His normal operating times are 1200 to 1600 on Wednesdays, and from 2300 on Saturday until 0200 on Sunday.

Increased activity from Iraq in the shape of a second station, YI1AS, has been reported. The operator is said to be from Germany and likely to be there for two years. *DX News Sheet* says that he is often on 28,510kHz at 1400. The other station, YI1BGD, is reported active on 14,245kHz between 1600 and 1900 and on 14,175kHz from 2030. QSLs should be sent to the address in "QTH Corner" together with three ircs.

An Indian station using the prefix AU2 has been heard. AU is allocated to India according to the ITU block prefix list.

EP2TY, who continues to be the sole representative of Iran on the amateur bands, is a Japanese national. He has been noted on 3,503kHz around 0600, on 14,190–14,210kHz between 1700 and 1900, and on 28,750kHz around noon.

VK0AN, mentioned last month, should be on Macquarie Is for most of this year. He is trying to operate regularly from 0600 on 14,205kHz and from 1400 on 14,225kHz.

Jacky, 3B8CF, asks for QSLs to be sent to him direct and not via the bureaux. He is able to answer requests for cards for contacts with 3B9CF, VQ9SM, VQ8CFB, 3B6CF and 3B7CF, as well as for his home call in Mauritius.

FH8OM and FH8YL frequently appear at 2000 on 28,530kHz on Fridays for a schedule.

The operation from "TJ1BF" late in 1981 which asked for QSLs via K4MME was by a pirate. The real holder of the callsign was in Israel at the time and using his 4X6RH call.

An interesting news snippet appeared in the *DX Bulletin:* "FCC has granted a permit for another Woodpecker . . . located at the University of Alaska, 10kW, 0·25–20MHz. The authorized band shall be swept through in a period of 30s and not more often than 15 times/h." Readers of the *DX*

Dr Sid, ST2SA, a very well-known and popular dx operator, at his home in Khartoum. *Photo:* G4KLP

* 10 Knightlow Road, Birmingham B17 8QB

Bulletin are invited to send their swl cards to FCC 5th Regional Office, PO Box 440, Anchorage, Alaska, 99510 . . .

SP2BHZ/JW is a Polish expedition making scientific studies, and the operator is Andy, SP2BHZ. He was at HF0POL two years ago and will try to be on the air, mostly at weekends, 5kHz above lower band edges on cw, and on 3,795, 7,086, 14,240, 21,205 and 28,490kHz on ssb. QSLs should go via SP2ESH. UA1PAB is said to be on Novya Zemlya and not Franz Josef Land.

A letter from 9Q5EP, President of Union Zairoise des Radio-Amateurs, says that 9Q5HU, who has been worked on rtty, is a pirate.

Joeke, PA0VDV, who will be remembered by many for his activity as PJ2VD, will be back in the Caribbean area from 1 to 23 February as PA0VDV/PJ7 from the island of St Maarten. He may also visit Anguilla around 13 and 14 February and be heard as VP2EL. After leaving PJ7 he will be on from PA0VDV/PJ2 for a few days.

The 250th Anniversary of the birth of George Washington will be celebrated on 22 February by day-long amateur radio operations from Mount Vernon, the beautiful estate of George Washington located south of Washington. Members of the Mount Vernon ARC will operate on a number of bands continously from 1400 to 2100 using the callsign WB4IGW near 14,285kHz, and possibly also near 21,415 or 28,745kHz. A special QSL card will be available to those sending a self-addressed envelope and postage to the address in "QTH Corner".

UA4PAB has told G3XBY that UK1PGO is in Moscow at present and will return in March or April. UA4PAB offers to help those awaiting QSLs from UK1PGO if they will write to him at PO Box 1036, Kazan, USSR. UA1PAM operates cw only, and is often found on 14,025kHz around 2000.

Simon, CR9AN, says he is active most days on 28,500kHz at 1400. His QSLs should be sent via the address in "QTH Corner".

Merrill, V3ME, looks for UK stations every Sunday from about 1200 on 28,420kHz. There is no QSL bureau in Belize so he asks for cards direct to the address in "QTH Corner".

Top band

With WARC proposals now beginning to be put into practice some interesting changes will be seen on 1·8MHz. These will continue to happen over a long period but it is already clear that a number of CEPT countries are increasing the availability of the band to amateurs. Your scribe will try to list changes as they are made—the Federal Republic of Germany is being allowed to use 1,815–1,835kHz and 1,850–1,890kHz already, with low power A1A only.

G3SED has returned to the band with a Drake "C" line, λ/2 dipole at 85ft fed with open-line feeder, and 500ft Beverage receiving antenna. He has been off for seven years but promises that he will now be trying to increase his band-countries from its 72-worked level. He makes a plea on behalf of stations trying to work into Japan. During December this was possible for about 20min just before 2100 but at that time the JA allocation confined JAs to the sector 1,907·5–1,912·5kHz—an area much frequented by ragchewing phone stations. He believes that few of the latter realize that dx signals can be on the frequency, and he asks for them to appreciate that they most certainly can! Japanese stations listen for calls between 1,825 and 1,829kHz. (*NB*. The Japanese allocation may well have been changed by the time this is being read.)

Mike Devereux, G3SED, has recently returned to dx hunting on 1·8MHz. He finds his amateur radio globe invaluable for calculating best QSO times

Arthur Milne, G2MI (seated), recently entertained VP9HK (left) and G3AAE

28MHz

The second issue of the *10-UK Newsletter* has now been published and contains a number of items of interest to those trying to stimulate greater use of the band. The Ten-Ten International Net meets near 28,800kHz, and details of membership can be obtained by calling in. More information on 10-UK is available from Jeff Harris, G3LWM, The Oaks, Cricketfield Lane, Bishop's Stortford, Herts.

Contests

The PACC Contest

1400 13 February to 1700 14 February

1·8 to 28MHz. Phone and cw, but no cross-mode contacts. Single- and multi-operator and listener sections. Exchange RS/T plus serial QSO number (from 001). Netherlands stations will give RS/T plus province (GR, FR, DR, DV, GD, UT, YP, NH, ZH, ZL, NB or LB). Each QSO with the Netherlands counts one point, and a station may be worked once per band only (irrespective of mode). The multiplier is one for each province on each band (maximum $6 \times 12 = 72$), and final score is this total multiplied by the sum of QSO points from all bands. Listeners score one point for each PA station logged, otherwise scoring is the same; they should log the codes exchanged by both stations in the QSO. Summary sheets may be obtained from G3FKM (sae please), and logs should be posted before 31 March 1982 to PACC Contest, F. Th. Oosthoek, PA0INA, Fred. Maystraat 36, 4614 EH Bergen op Zoom, Netherlands. In the **1981 contest** UK scores were: **GM3KLA** (4,060 points), **G4IQM** (4,025), G3AEZ (3,332), G3ESF (2,607), G2HLU (2,170), G4JFN (1,320), **GW3MRI** (1,080) and G5CRP (1,024). Listener scores were: **RS42876** (3,201), RS44395 (2,128), RS45019 (1,794) and RS15822 (1,593).

The Bermuda Contest

0001 20 March to 2400 21 March

Open to all licensed amateurs in Canada, the USA, UK and Federal Republic of Germany. Operation may not exceed 36h, and each off period (of at least three consecutive hours) must be logged clearly. All stations shall be single-operator only and must be operated from their own private residence or property. Top winners in the 1978, 1979, 1980 and 1981 contests shall be eligible for the area awards only. Bands 3·5 to 28MHz, modes cw and phone, but no cross-mode contacts. Although the ITU recommendation concerning intercontinental contacts is no longer valid it is still forbidden to make phone contacts on 7MHz with the USA in this contest.

The object for UK stations is to contact W/VE/VP9 stations, and exchanges should consist of RS/T plus state/province/parish or county. Each contact counts five points and only one QSO may be made on each band with any one station (either on cw or phone but not both). The multiplier is the total number of Bermuda stations worked on each band added together. Logs should have separate sheets for each band, and duplicate sheets must be enclosed if more than 200 QSOs have been made. For every duplicate QSO for which points are claimed a penalty of three contacts will be subtracted and an excess may mean disqualification. Separate sheets must be used for each band and should be clearly marked with the contestant's call, year and band. All must sign a declaration that they have complied with the rules and terms of their licence. Logs must be received by the Contest Committee, Radio Society of Bermuda, Box 275,

QTH CORNER

CN8CY	via GW3IEQ, P. Hudson, "Silhill", Dinas Dinlle, Llandwrog, Caernarvon.
CR9AN	PO Box 468, Macao.
FC0FOO	T. Gallagher, N6RA, PO Box 31365, San Francisco, Cal, 94131, USA.
FK0VU	via DB9CI, C. Klinner, Kranzer 17, D8171 Gaissach, FR of Germany.
FR0GGL	Box 386, St Pierre, Reunion Is.
SP2BHZ/JW	B. Krzymin, al Powstancow Wielkopolskick 22 m 44, 85-090 Bydgozcz, Poland.
P47A	via WB1HJF, M. Olsen, PO Box 301, Somers, Ct, 06071, USA.
KV4AD/PJ6	KV4AD, Box 2126, St Thomas, Virgin Is.
PA0GMM	Guido M. van den Berg, Tweeboomlaan 117, 1624 EC Hoorn, Netherlands.
TN8AJ	via Y25LO.
TZ0PP	via F9KP, P. Levy, 30 Av des Champs Perdrix, 21000 Dijon, France.
V3ME	PO Box 367, Belize City, Belize, Central America.
VS5DD	via G4EFE, M. Peters, 42 Gorselands, Wash Common, Newbury, Berks RG14 6PX.
WB4IGW	Elmer Zborofsky, 5912 Brookview Drive, Alexandria, Va, 22310, USA.
YI1AS	via DK2OC, U. Adelung, Roseneck 6, D3380 Gosler, FR of Germany.
YI1BGD	Box 5864, Baghdad, Iraq.
YJ0VU	via DK5EX, G. Mannheim, Arzbacherstr 7, D8172 Lenggries, FR of Germany.
ZC4EPI	via JSB, BFPO 53.
ZK1CG	V. Rivers, PO Box 618, Rarotonga, Cook Is.
ZK1XG	via DL3GU, H. Breden, Lessingstr. 13, D2944 Wittmund 1, FR of Germany.
ZM7VU	via F6DYG, P. Rollet, Etoiles des Alpes, 74480 Plateau d'Assy, France.
5T5ZZ	via W4FRU, J. Parrot Jr, 4640 Ocean View Av, Virginia Beach, Va, 23455, USA.
W6QL/8R1	via YASME Foundation, PO Box 2025, Castro Valley, Cal, 94546, USA.

Hamilton 5, Bermuda, no later than 31 May 1982—overseas entrants are advised to forward them via airmail. Logs and summary sheets are available from G3FKM (sae please).

This year's winner will receive a trophy which will be awarded at the Society's annual dinner in Bermuda in October. Round-trip air transportation plus accommodation will be provided. The winners will stay at the Hamiltonian Hotel.

ARRL International DX Contests

0000 20 February to 2400 21 February (CW)
0000 6 March to 2400 7 March (Phone)

Single-operator single- or multi-band, multi-operator single- and multi-transmitter, and QRP (less than 5W output) categories. Exchange RS/T plus figures indicating power input, W/VE stations will give state or province. Each QSO counts three points, and the multiplier is the number of contiguous states and VE provinces worked on each band (added together in the case of multi-band entries). Note that it is now quite in order to work USA stations operating above 7,100kHz on phone. Certificates will be awarded to country leaders and to those making 500 or more contacts. Note that the latter must also include duplicate sheets with their entry. Entry forms are available from ARRL DX Contest, 225 Main Street, Newington, Ct, 06111, USA (please enclose large envelope and several ircs). They are *not available* from G3FKM. Entries must be postmarked before 6 April 1982.

The New Hampshire/Vermont QSO Party

2100 7 February to 0500 8 February and 1100 8 February to 0100 9 February. Activity will be centred around 3,530, 3,760, 7,030, 7,130, 7,230, 7,260, 14,080, 14,280, 21,060, 21,150, 21,360, 28,070 and 28,570kHz, and provides a good opportunity to work these rare states and their individual counties. Send QSO number, RS/T and country. Each QSO counts one point and is multiplied by the number of counties worked. Stations may be worked on each mode on each band. Send logs to Rex Lint, K1HI, 10 Hartwood Drive, Merrimack, NH, 03054, USA, by 15 March. The Worked NH Award is available to those working all NH counties, and the Worked Vermont to those working 13 of the 14 Vt counties.

Results of the **1981 CQ 160 CW Contest** have arrived from W1WY. British scores were as follows: **GD4BEG** (180,117 points), **G3SZA** (131,208), G3ZYY/A (106,440), G3XWZ/A (59,175), G3VRW (58,545), G3XTT (30,381), **GW3NYY** (21,843), G8VF (9,492), **GM3OXC** (3,270). In the multi-operator section **GM3IGW** scored 106,132 points and G3RPB 94,824. Congratulations to **GD4BEG** who was European winner.

Awards

PACC Award

For contact with 100 different Netherlands stations. Applicants will not need to submit QSLs for contacts made during the PACC Contest (see "Contests") if a contest log is submitted, and under these circumstances applications should be sent via the VERON Contest Manager (including QSLs if necessary to make up the 100). Stickers are available for each extra 100 stations worked. The award costs eight ircs, and normal applications should go to Traffic Bureau, VERON, A. Sanderse, PA0MOD, Obdammerdijk 2, 1713 RA Obdam, Netherlands. The Listeners Century Award is issued under the same conditions.

Mercury Award

Issued by RNARS for contacts with members. UK applicants need 20, other Europeans 10, and others 5. Endorsements are issued for each extra 10 members worked. One point is gained per contact with a member per band. QSOs with RNARS sponsored stations (eg GB2RN, GB3RN and GB3HMS) are worth two points. All contacts must have been made since 1 January 1980. Send certified list of QSLs, plus 50p, to Mercury Award Manager, G3HZL, 8 Meon Court, 609 London Road, Isleworth, Middlesex.

Scarborough Award

This is being issued by the Scarborough ARS to celebrate its 50th anniversary in 1982. To qualify it is necessary to work or hear G4BP and five SARS members during 1982. Full details and a list of members can be obtained by sending an sae to D. E. Mappin, G4EDR, 39 Clarence Drive, Filey, N Yorks YO14 0AZ.

The Diploma Unita d'Italia

This award was described on page 1175 of November 1980 *Rad Com*. It is no longer necessary to submit QSLs for inspection, and the fee is now stated as US$1 or five ircs.

CWBC

For all cw amateurs in the British Commonwealth for contacts after 31 December 1979. Class 1 requires 22 contacts including the following: one with ZL (North Island); one with ZL (South Island); three with VK1, 2, 3, 4, 5 or 7; one with VS5, VS6, 9M2, 9M6 or 9M8; two with VU; three with ZS; two with Belize or the former VP2 areas; three with VE1, VO1 or VO2; and six with G. Send certified log data to VE1ACK, 35 Clearview Avenue, Fredericton, NB, Canada, E3A 1J9. There is no fee but three ircs should be enclosed for return postage of the certificate.

St David's Day Award

The BSC Amateur Radio section at Port Talbot will be operating GB2SDD on 1 March using as many bands and modes as possible. An award will be available to those contacting GB2SDD and other Welsh stations during March and April 1982—applicants in the UK need 10, European and Americans need seven, and all others five. Send log extracts plus £0.80, five ircs, or US $2, to club station GW3EOP. On 1 March 1981 over 700 stations were contacted on bands 1·8 to 432MHz, excluding 70MHz, and it is hoped to use 10MHz this year.

A group of keen hf operators at the QTH of G3KMA, l to r: G3GIQ, G3OZF, G3DOG, G4FXT, G3PEC, G3VIE, G3RUR, G3MCS, xyl of ON5NT, G3YJI, ON5NT, G8YYB, xyl of G3KMA, and G3KMA

HF propagation study

Band predictions for February 1982

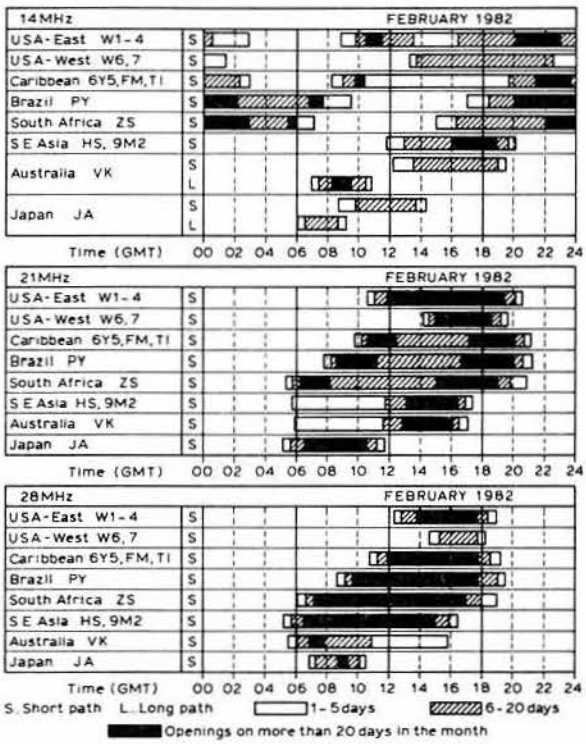
	28MHz	21MHz	14MHz	10MHz	7MHz	3·5MHz
UTC	000001111122 / 024680246802	000001111122 / 024680246802	000001111122 / 024680246802	000001111122 / 024680246802	000001111122 / 024680246802	000001111122 / 024680246802
EUROPE						
Moscow	....58885...	....999992...	....57777881.	42.654456874	874422224688	++4.....4+
Malta	....688761..	....999996...	487778971	661754457897	997631124799	+++3.....4++
Gibraltan	....177551..	....699997...	88778971	441275556897	897753223699	+++2....3+
Iceland	.....1454...	.....68984...	.....3888893.	12...76557883	783153335688	+++52...235+
ASIA						
Osaka	....54.....	....1881.....	1...2754334.2	1...42124765	....1...1573	.....24.
Hong Kong	...18982....	...378872...	1...35356731	2....2124785	1.....1576	243
Bangkok	...28++6...	...3588892..	1....4347833	4....1114788	2.....1578	255
Singapore	...278887...	...3588893..	2....4347843	3....1114787	1.....1576	253
New Delhi	...3++81....	...557885...	2....2357433	731...124788	72.....1578	4.....255
Teheran	...4+++7....	...7667894..	411411347854	8641...14788	862.....1577	+3.....255
Colombo	...4+++8....	...4467895..	31...1347964	72.....14788	61.....1578	3.....245
Bahrain	...4+++71...	...75578961.	6223..247986	974....14798	861.....1577	+3.....254
Cyprus	...1++981...	...6888997..	42.754567974	984521235898	9862...12688	++3.....3+5
Aden	...4+++94...	1..644689941	8422..146998	984....14788	872.....1576	+4.....244
OCEANIA						
Suva (S)	.....3662...	....178873...	....6545671.	...3421245...	...12...12...	.....
Suva (L)	1...532..163	22..87643774	..157423672.	...341...34...	...11...12...	.....
Wellington (S)	....16743...	....688881...	....27545761.	...24212441	.....2...12...	.....
Wellington (L)	....421...23	32..86421365	..2274335631	...241...341	.....1...11...	.....
Sydney (S)	...187675...	...4987892...	265357821	....3212474.	.....1...152.	.....2..
Sydney (L)	.....12....11	.....5641.154	65334763	....42...363	.....1...131.	.....
Perth	...488765...	...4687885..	2...14347964	1....1.14785	1573	.....24.
Honolulu	.....1..	.....61.	.21.3221461.	.44421133...	..252...11...	.....2.....
AFRICA						
Seychelles	...4568744..	1..534688941	842...146998	962....14789	84.....1577	+.....245
Mauritius	...37+89951.	1..534689962	851...146999	951....14799	73.....1578	5.....255
Nairobi	...28789872.	21.644479984	9733...36899	985....3798	872.....1577	+4.....254
Salisbury	...167888841	42.544469997	9833...16899	985....3799	872.....1578	54.....255
Capetown	1...77889963	53.354458998	9945....5899	9862....2689	873.....378	54.....4+
Lagos	1...++++973	64.185458998	99673...4899	89951....1689	6883.....378	355.....45
Ascension Is	1...88767753	641.96445898	997461...589	99973....279	77851.....58	5552.....2+
Dakar	....6+++962	541.97546998	998372...1699	88974....379	76861.....158	44+3.....2+
Las Palmas	....4++9982.	99889982	663186556899	998663223689	888731...1379	+5+4.....4+
S. AMERICA						
South Shetland	14788863	431.67776777	787374321236	466641....13	23441.....	.....
Falkland Is	....2688+862	431.78755677	8982743...136	788741....3	47762.....1	.443.....
Rio de Janeiro	7756762	321.48543587	998274....58	999741....26	88862.....4	+5+3.....
Buenos Aires	25878861	221.78754576	8982742...26	899641....4	68862.....1	35+3.....
Lima	.....+++85.	21754455	6771643....5	799642....2	48862.....	2553.....
Bogota	.....++85.	1754355	6661243...16	898542....3	68762.....1	3543.....
N AMERICA						
Barbados	.....4++86	8754575	7761253...38	998642....16	88662.....3	+543.....
Jamaica	.....8+85.	874464	666.3432...16	8985421....3	68762.....1	3543.....
Bermuda	.....19+85.	5865684	666.2531.158	9985421....26	78762.....3	5543.....
New York	.....7+84.	1886773	665.25341257	89854211...25	68862.....2	3553.....
Mexico	.....9+83.	186442	565.42341...2	48954211.....	27862.....	.453.....
Montreal	.....69983.	2887773	665.25442357	89844211...25	68762.....3	3553.....
Denver	.....2872.	68652	554.3.144224	488441111...2	26862.....	.353.....
Los Angeles	.....761.	18641	453.31.45212	368442.12....	.4862.....	.53.....
Vancouver	.....4..	.....584.	452.31.26543	367442.13211	14662.....1	..43.....
Fairbanks	.....	.....131.	341.43236753	355442114543	12452....1211	...2.....

Propagation predictions

The end of winter approaches in the ionosphere during February, days lengthen and, especially towards the end of the month, the **14** to **28MHz** bands will remain open longer than in previous months. Traffic with western North America will not be certain on **28MHz**, but all other continents will be heard with certainty, if only briefly. On **21 MHz**, traffic with all continents will be certain.

Improving springtime conditions will be most noticeable on **14MHz** when conditions will be markedly improved compared to the previous month. However, only in April will this band revert to being the main night-time dx band. If, during the coming ARRL-DX-Contest the f2 mufs are above average for the month, traffic with the USA may be possible for the first two to four hours in the second half of the night.

Conditions on **7** and **3·5MHz** will differ little from those of the previous month. USA traffic will probably be possible from a few hours before midnight on **7MHz**, and on **3·5MHz** will be at its best three to four hours before sunrise until dawn.



Around the bands

G8KG's "end of year" report reads: "December was a month of extremes as far as solar activity was concerned. The daily solar flux peaked at 305sfu on 9 December, making this only the third month of the cycle with a peak daily value above 300. The high activity was, however, confined to one side of the sun, and by 19 December the flux had fallen to 134sfu but it was rising towards the 200 by the end of the month.

"The high peak in the first half of the month meant that the 27-day average continued to be above 200sfu, and at the time of writing (28 December) this condition had lasted for 145 days. The monthly mean flux for December should be close to 210, adding one more month to the spell of high activity. The annual mean flux for 1981 looks like being close to 203sfu, compared with 198 in 1980 and 192 in 1979.

"During December the geomagnetic field was much quieter than in recent months, even during the high peak in solar activity. As a result conditions on the higher bands were excellent in the first half of the month and good on most other days."

The writer is sure that readers will wish to join him in expressing thanks to "Smithy" for his most informative monthly surveys—may they long continue!

The following managed to send in reports by the closing date in spite of the collapse of postal deliveries in Birmingham: G2DHV, G2HKU, G3YY, G5JL, G3s GIQ, GVV, IMW, KSH, LOL, NWG, SED, XBY, G4s DJX, LDS, LRS and RS1066.

Stations listed in italics were using A1A, the rest J3E.

1·8MHz. 0000 *8P6CG.* 0100 *UK9SBB, UM8MAZ.* 0200 *EA9EU, VE1BVL, W1,2,3,8,9, ZF2AG, 4X4NJ.* 0300 *EA8AK, OY7ML, UD6DHC, VP8ANT, YV1OB.* 0400 *UK9SBD.* 2000 *FC9VN.* 2100 *KP4KK/DU2, JA5DQH, UA9WHA, VK6HD.*

3·5MHz. 0600 *XT2AW.* 0700 CT3BZ, *EA8FJ,* HK0FBF, HT2CGB, OX3ZM, VE1JX, W4, W5, W6NLZ, W0GYH. 0800 HC8MD, *KV4CI, OY7ML,* TG9NX, VK9NS, ZL1AZV/C, ZLs 2BT, *3GQ, 3IS.* 1800 *VK3MR.* 2000 JA9YBA. 2100 *JA* JA1BRK, *PY1MAG.*

7MHz. 0100 *TG9NX, TN8AJ, VP2VJ.* 0600 *W5DNC/C6A.* 0700 *W6-W7, ZD8TC, ZL.* 0800 ZL1AHV/C, ZL4OY/A, 8P6OR, 0900 W6QL/8R1. 1000 *VK2, VK3.* 1600 *JA* (until 2100), *ZL3GQ.* 2100 *PY, PZ1AB, VK3VJ.*

14MHz. 0100 *JX5VAA.* 0800 *K0MFO/C6A,* KL7, VK, VK9NS, ZL, ZL4PO/C. 0900 VK2,3,6, ZL. 1000 *KH6RM.* 1100 *KL7RA.* 1200 YI1AS, *8J5SUN.* 1500 W7 (until 2100). 1600 A71AA, ZL. 1700 *AL7H,* FB8WG. 1800 *ZL1AX,* 5H3BH. 1900 *T30AT.* 2000 VP8ANT. 2200 W1-W0.

21MHz. 0800 *HZ1HZ, SU1AA.* 0900 JA (until 1100), KL7, VK, ZL (until 1400). 1000 CR9AN, *KL7RA, TL8RC,* ZL1AAS/C. 1100 *VP8ANT,* W (East coast until 2100), 1200 J5HTL, 9G1OC. 1300 *V3MS, 3B8AS.* 1500 W (West coast until 2000), *4S7MX,* 9U5WR. 1600 HB9BVL/5N0, *3B8ZZ.* 1700 *AL7H, FR0GGL, J5HTL, K3SA/PJ3, TZ0PP,* VE7, ZS, 3B7CF, 5T5ZZ. 1800 *HC8MD, NL7M, W4UY/PJ7,* VP8ANT, VQ9JB. 1900 *VP2MFZ.* 2000 *W7DNC/C6A.*

28MHz. 0800 *CR9AN,* JA (until 1100), *KP4KK/DU.* 0900 KB7IO/KH2, P29PS, VK and ZL (until 1200), VS5DD, 3D6AO. 1000 A4XGB, A71AA, VS6s CP,CT, 9X5SL, *9V1UQ.* 1100 *CN8CY,* DU1RD, *FY7BW, SU1AA,* W (East coast until 2100), VK9NYG, N6YK/V2A. 1200 C6ADV, HH2JR, *J6LZA, V2AAW, YB0ACP/9,* YI1AS, ZL1AZV/C. 1300 C5AEG, J5HTL, JX5VAA, KL7. 1400 W (West coast until 1900), W6QL/8RI. 1500 CP6CC, HC8MD, *J3AAC,* JY1, *K3OIH/PJ7,* 3B7CF, 3V8AA, 7Q7LW. 1600 4U1UN. 1800 *OA4JR, V3MS, XE1BC.* 2000 LU8DQ.

Many thanks to all who sent in information, and to the editors of the following for items extracted: *Lynx DX Bulletin* **(EA1QF/EA2JG)**, the *DX Bulletin* **(K1TN)**, the *Long Island DX Bulletin* **(W4UL/W2IYX)**, *DX News Sheet* **(Geoff Watts)**, the *Ex-G Radio Club Bulletin* **(W3HQO)**, *Long Skip* **(VE3EUP)**, *DX'press* **(PA0TO)**, *CQ Magazine* **(W1WY)**, and *DX NL* **(DL3RK)**.

Please send all items for the **May** issue to reach G3FKM by **19 March**, and for **June** by **27 April**. Note that the **May** closing date is **extremely early**—thank you.

CONTEST NEWS

A guide for vhf contestants

The VHF Contestants Committee has noted with pleasure the increasing number of new callsigns appearing on contest cover sheets. However, a significant increase in the number of points lost due to logging errors has prompted the following comments.

First, read the rules; very few entrants do! A photocopy of the general rules, published each year in the January issue of *Radio Communication*, kept in the logbook or on the shack wall, can be conveniently related to the particular contest rules which appear two months before the contest.

A *stamped* addressed envelope will bring a modest supply of contest log and cover sheets from the adjudicator whose name and address is included with the particular contest rules. Send your entry to this address, to be posted within 14 days of the contest date. Entries sent to RSGB HQ or to the committee are unlikely to be included in the results table.

Larger quantities of paperwork are available from RSGB HQ. The summary sheet, Form 4427, is only required for multiband contests.

The following table shows how points can be lost.

G5HD/P	549011	XK21C	8km S of Xtown
G5HD	539011	XK22C	8km N of Xtown
G5SD/P	549011	XK21C	8km S of Xtown

The first line is correct. The second has four errors, and loses eight points with a zero score for a contact worth less than nine points. The third line scores zero points because of incorrect callsign.

In IARU rules, where the points/km scoring system is used, a 25 per cent penalty is awarded for one error, 50 per cent for two, and no score for three or more mistakes.

Logs with numerous errors receive a 20-30 per cent block penalty, as do entries where information sent does not tally with that shown on the cover sheet.

Entries with the declaration on the cover sheet unsigned are disqualified.

Stations can also be disqualified for radiating poor signals, and for gross misuse of portable sites. All complaints are carefully considered by the VHF Contests Committee before any action is taken. In the case of poor signals several independent reports are required, including evidence that the offending station was warned over the air and took no action.

The cover sheet has one other, not obvious, function. Changes in contest rules and format all stem from comments, criticisms and suggestions received from contest enthusiasts using the reverse side of the 427 forms.

The dates chosen for the March, May, July (VHF/NFD) contests are IARU co-ordinated events, with European societies arranging their contests on the same weekends. The September 144MHz, October UHF/SHF, and the November cw contests are IARU contests, and the logs are adjudicated by national societies and then forwarded to the IARU Region 1 vhf manager for inclusion in the multi-national results table.

The committee has for years lobbied at IARU Region 1 conferences for the adoption of the "radial ring" scoring system in place of the incredibly laborious "points/km" system. At the 1979 conference in Hungary a carefully prepared paper was submitted. It was rejected because: "Everyone has a computer".

MORE ENTRIES, PLEASE!

SSB Field Day 1981 results

Fifty-five groups participated in the contest, eight more than in 1980, with the Open Section alone benefitting from the increased numbers. Conditions were pretty good and generally much larger scores were made than in other years. The leading stations, particularly in the Open Section, took full advantage of the 21MHz band openings to JA and W, making over 100 QSOs/hour at times.

Congratulations to the Guernsey ARS, GU3HFN/P, for winning the Open Section for the third time in as many years. The station consisted of a TS830S driving an FL2100 with a W3DZZ inverted-V dipole at 35ft, and a TH6DXX tri-bander at 25ft. Operators were, GU3s MBS, WHN, YIZ; GU4s ASO, CHY, EON, GNS; and GU8OVO. Runner-up in the Open Section was the Northumbria RC, G4AAX/P, operated by G4s ADD, KBX, AVO, GWB, BCP and FCC. They used a TS820 and an SB220 with dipoles for 3·5MHz and 7MHz at 50ft, a Mustang, also at 50ft, and a TH3 at 70ft.

In the Restricted Section, the winner was the Liverpool & DARS, G3AHD/P, with a massive lead over the rest, achieved principally by success on 21MHz. An FT101ZD was operated by G4CVZ, G4JJE, G3WOH, G4LKH, and G4IHS. The antenna was a 245ft centre-fed wire at 43ft, with 600Ω feeders tuned by a KW107. In second place was the Hornsea & DARS, G4EKT/P, who had an FT107 coupled to a 210ft centre-fed antenna at 42ft. The operators were G3LZQ, G3TEU, G4IGY, G3ZRS, and G3PWN.

Many groups said they thoroughly enjoyed the field day, although the clash with the 144MHz contest came in for some adverse criticism. The RSGB's contests committees are guided by IARU dates, and similar events held by European societies (notably DARC). The clash is unfortunate but cannot by avoided unless we are prepared to forfeit European participation in this event.

A number of groups had clearly not studied the rules for this field day. Logs were wrongly scored, multipliers wrongly calculated, countries check lists omitted, and cover sheets not submitted. Fortunately such groups were in a relatively small minority, otherwise the adjudicators' patience would have expired! Please read the rules, please include check lists, and please, please use the latest hf contest summary sheet (Form HFC2, Rev 80) for multi-band events (or your homebrew version). These summary sheets are particularly important as they enable the adjudicator to check that the total score has been properly calculated. A final word on multipliers – the value of the multiplier is arrived at by adding-up the multipliers worked on all bands. The total claimed score is then "total QSO points times the multiplier". Note that multiplying QSO points and multipliers for each band separately, and then adding the totals does not produce the same answer!

Thanks to all those groups who forwarded comments, these will be considered by the HF Contests Committee in due course.

The Northumbria Trophy will be presented to GU3HFN/P, and certificates of merit will be sent to G4AAX/P, G3FJE/P, G3AHD/P, G4EKT/P, and GM3NEQ/P.

G3NKS

How the leaders made their scores

Callsign	Number of QSOs/multipliers 3·5MHz	7MHz	14MHz	21MHz	28MHz	Total Multipliers
Open Section						
GU3HFN/P	34/9	21/8	506/47	1063/43	243/21	128
G4AAX/P	128/16	124/15	325/42	647/29	80/26	128
G3FJE/P	168/16	62/11	250/33	502/31	300/30	121
Restricted Section						
G3AHD/P	149/15	118/9	202/29	272/24	30/13	90
G4EKT/P	167/11	102/8	121/21	40/14	17/13	67
GM3NEQ/P	46/6	135/14	137/20	107/20	5/5	65

OPEN SECTION

Posn	Callsign	Group	Points
1	GU3HFN/P	Guernsey ARS	729,984
2	G4AAX/P	Northumbria RC	567,296
3	G3FJE/P	Shefford & DRS	505,175
4	G3WAS/P	Lichfield ARS	504,756
5	G3KLH/P	Wiltshire CG	491,416
6	G3RCV/P	Cray Valley RS	469,027
7	GW3EOP/P	BSC Port Talbot RC	462,220
8	G3TR/P	Crawley ARC	437,682
9	GM4AGG/P	W of Scotland ARS	380,324
10	G5BK/P	Cheltenham ARA	341,536
11	G3AFT/P	Grafton RS	328,624
12	G3WOR/P	Worthing & DARC	316,944
13	G3XEP/P	White Rose ARS	304,113
14	G3NJA/P	Torbay ARS	290,400
15	GI4GTY/P	Lagna Valley ARS	276,584
16	GW5ZL/P	Swansea ARS	252,791
17	G8JC/P	–	250,862
18	G4HRS/P	Horsham ARC	249,022
19	G3SFG/P	Southgate RC	180,159
20	G4LBS/P	Borden ARC	145,152
21	G4IRC/P	Ipswich RC	143,412
22	G3AMW/P	Hull & DARS	133,705
23	G3ASR/P	Edgware & DRS	113,715
24	G4ECT/P	Cheshunt RC	112,024
25	G6CW/P	ARC of Nottingham	110,507
26	G3BPK/P	Douglas Valley ARS	97,560
27	G3VGG/P	Bromsgrove & DARC	97,240
28	G3BRS/P	Bury RS	89,088
29	G3SDS/P	South Dorset RS	82,732
30	G3GHN/P	Clifton ARS	77,952
31	G3VER/P	Verulam	76,755
32	G3NWR/P	Wirral ARS	72,900
33	GI3XRQ/P	Bangor & DARS	68,850
34	G3ZPR/P	Poole RAS	64,676
35	G3OHM/P	–	57,256
36	G4LCK/P	St Helens & DARC	55,430
37	GM4MFL/P	East Ross ARC	41,268

RESTRICTED SECTION

Posn	Callsign	Group	Points
1	G3AHD/P	Liverpool & DARS	249,480
2	G4EKT/P	Hornsea & DARS	121,270
3	GM3NEQ/P	Windy Yet Gp	117,195
4	G4AYM/P	Gloucester ARS	116,256
5	G4MHC/P	Malvern Hills ARC	116,058
6	G3GRS/P	Gravesend RS	103,480
7	GM3UWO/P	Kilmarnock & Loudoun ARC	101,840
8	G3IPL/P	Northampton & Daventry RCs	88,074
9	G3YDD/P	Hereford ARS	82,570
10	G3GIZ/P	Chester & DRS	65,932
11	G3ULH/P	–	61,440
12	G3KUE/P	Preston ARS	53,345
13	GM3ZRC/P	Greenock & DARC	44,731
14	G3XRT/P	Ilford RSGB Gp	43,785
15	G3SKY/P	Isle of Wight ARS	41,106
16	G4CDD/P	Denby Dale RC	40,248
17	G3YRC/P	Yarmouth RC	34,275
18	GM4HEL/P	Helensburgh ARC	31,108

National Field Day 1982 rules

Please note the change in rule regarding applications to enter this contest. Special stationery will not be sent to entrants and logs should be submitted on standard sheets obtainable from RSGB HQ.

1. The general rules for RSGB hf contests, published in the January 1982 issue of *Radio Communication*, will apply.

2. Notification of site. Each group intending to compete must send details of the site to be used to: RSGB HF Contests Committee, PO Box 73, Lichfield, Staffs WS13 6UJ, to arrive not later than Friday 21 May 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. When. From 1700gmt Saturday 5 June 1982 to 1700gmt Sunday 6 June 1982.

4. Eligible entrants. Any group of RSGB members within the prefix zones G, GD, GI, GJ, GM, GU and GW. NFD is a multi-operator contest.

5. Operation must be from a portable station not located in a permanent building and not using a mains supply. No equipment or antennas may be installed on the site prior to 24h before the start of the contest. This does not apply to the storage of equipment.

6. Mode. CW(A1) only, in the 1·8, 3·5, 7, 14, 21 and 28MHz bands.

7. Sections.

a) Open section. The station shall consist of a transceiver (or transmitter and

receiver) with an additional receiver if desired, which may only be used for monitoring purposes. There is no restriction on the number or type of antennas, but the maximum height must not exceed 60ft (18·5m).

b) Restricted section. The station shall consist of a transceiver (or transmitter and receiver) with one antenna which must be a single-element such as a dipole, vertical, long wire, etc, having not more than two elevated support points and not exceeding 35ft (11·5m) above ground at its highest point.

Both sections. Standby equipment may be at hand but not powered or connected in any way simultaneously with the main equipment.

The presence on the site of additional amplifiers or modified commercial equipment capable of excess power, may result in the entry being disallowed.

8. Scoring. Points will be scored as follows:

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

The contacts on 1·8MHz and 28MHz should be scored as above and the totals multiplied by two to obtain the claimed score.

9. Group contacts. Points must not be claimed for contacts made by a competing station with members of its own group.

10. Entries. These are to be in accordance with general rule 6 with the following exceptions:

a) Separate logs must be used for each band using the standard RSGB hf log and cover sheets.

b) An additional standard cover sheet, summarizing the overall multiband entry, must be included.

c) Entries must be postmarked no later than Monday 21 June 1982 and sent to RSGB HF Contests Committee, c/o M. Harrington, 123 Clensham Lane, Sutton, Surrey SM1 2ND. Entries sent to RSGB headquarters or having insufficient postage will not be accepted.

d) Packages of suitable log and cover sheets are available from RSGB headquarters on request.

e) Duplicate contacts must be marked as such without any claim for points. Unmarked duplicates will be penalized at 10 times the claimed score and logs containing in excess of five will be disqualified.

11. Trophies.

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

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

c) The Gravesend Trophy to the group having the second highest checked score in the section with the largest number of entries.

d) The Scottish NFD Trophy to the Scottish group having the highest checked score.

e) The Frank Hoosen Trophy to the group having the highest checked score on the 14MHz band.

f) Certificates of merit to the groups in each section with the highest checked scores on the 1·8, 3·5, 7, 14, 21 and 28MHz bands.

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

13. Inspections. All stations are subject to inspection by nominated representatives of the HF Contests Committee. The inspector's brief will be to ensure that the rules and spirit of the contest are being observed. Should the inspector be unable to locate the site due to inadequate or incorrect information 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.

March 144/432MHz & SWL Contest rules

1500-1500gmt, 6-7 March 1982

The following general rules, published in the January 1982 issue of *Radio Communication,* will apply: 1, 2, 3, 4d, 5a, 6a, 7a, 8b, 9, 10a, 11a, 12a, 13-26.

Single-operator stations, as defined in rule 4 of the general rules, must break for six consecutive hours.

Multi-operator stations may use different callsigns on each band and operate concurrently.

All entries and checklogs to: VHF Contests Committee, c/o Mr M. Pharoah, G3LCH, 49 Streathbourne Road, London SW17.

BARTG Spring RTTY Contest 1982 rules

0200gmt 20 March—0200gmt 22 March

Rules for this contest are as those published on p286 of *Radio Communication*, March 1980, except for the following:

1. Short wave listeners are now only required to log the message from the station heard, and not the messages from both stations involved in the contact.

2. Holders of existing QCA awards are requested to list any new additions in the way of countries to be added to their records. In the past this has been done by the contest manager automatically, but the revised system will enable the up-dating process to be carried out more rapidly.

All logs must be received by 31 May in order to qualify and should be sent to Ted Double, G8CDW, 89 Linden gardens, Enfield, Middx EN1 4DX, from whom copies of the rules may also be received.

RSGB Region 1 Contest Awards 1981

HF NFD. Three Region 1 trophies are awarded annually. They are (a) the RR's Cup to the highest scoring station overall, (b) the Region 1 Field Day Trophy for the best score on 3·5MHz and (c) the Harold Hilton Rosebowl to the leading top band station. The winners for 1981 were once again the Stockport Radio Society with their "A" station.

VHF NFD. The G2AMV Quarter Century Trophy for the best score by a Region 1 group was won by the Westmorland VHF CG, overall winners of the Restricted section.

Region 1 VHF Contest. There are three sections to the contest. The multi-operator section was won by the PACT G4BVE Group, and the successful single station was G4HAO. They receive the G2CIP and G3SMM Shields respectively. In the third section, for stations outside Region 1, a certificate of merit was awarded to G8NQP.

Slade Radio Bert Simmonds Memorial Trophy 1981 results

The following are the final placings in the 1981 Bert Simmonds Memorial Trophy Competition, which is based on the results of the RSGB df qualifying events, and adjudicated by the Slade Radio Society.

Posn	Name	Club	Points
1	R. J. Parsons	Burton-on-Trent	45
2	M. P. Hawkins	Chelmsford	27
3	W. J. North	Mid-Thames	25
4	D. E. Newman	Slade	13
5	I. R. Butson	Colchester	11
	T. C. Gage	Mid-Thames	
7	C. M. Wells	Mid-Thames	9
	R. A. W. Brocks	Chelmsford	
9	B. M. Bristow	Mid-Thames	8
10	P. H. Lisle	Mid-Thames	6
	C. D. Plummer	Mid-Thames	
12	R. Shepherd	Mid-Thames	5
	B. J. Mahony	Aerial/Hereford	
14	G. A. Whenham	Coventry	4
	A. M. Simmons	Mid-Thames	
	C. D. Merry	Dartford Heath	
17	E. L. Mollart	Mid-Thames	3
18	T. Gleeson	South Manchester	2
	D. Yorke	South Manchester	
	D. Holland	South Manchester	

Contests calendar

6-7 February	7MHz Phone *(Rules in August issue)*
7 February	432MHz Fixed *(Rules in January issue)*
13-14 February	1·8MHz (First) *(Rules in January issue)*
20 February	160m Mixed Mode (WAB) *(Rules for all WAB contests from Del Roberts, G4FQO, 12 Chestnut Ave, Cranwell, nr Sleaford, Lincs NG34 8HT)*
26-28 February	CQ WW 160m Phone *(Rules in January MOTA)*
27-28 February	French DX Phone *(Rules in January MOTA)*
27-28 February	7MHz CW *(Rules in August issue)*
6-7 March	144, 432MHz & SWL *(Rules in February issue)*
13-14 March	Commonwealth *(Rules in November issue)*
20 March	AGCW—DL UHF/VHF CW (432MHz) *(Rules in June 4-2-70)*
20-22 March	BARTG Spring RTTY 1982
3 April	1,296MHz Trophy
4 April	432MHz Trophy & SWL
4 April	ROPOCO 1
18 April	144MHz CW
18 April	Low Power
25 April	10GHz Cumulative 1982
1-2 May	432/1,296/2,304MHz
2 May	144MHz Low Power
16 May	10GHz Cumulative 1982
16 May	Region Round-up
16 May	LF Phone (WAB) *(See note after 160m Mixed Mode Contest (20 February))*
22-23 May	144MHz
5-6 June	NFD *(Rules in February issue)*
13 June	70MHz & SWL
20 June	10GHz Cumulative 1982
26-27 June	1·8MHz (Summer)
27 June	VHF 2m/70cm Phone (WAB) *(See note after 160m Mixed Mode Contest (20 February))*
3-4 July	VHF NFD
11 July	10GHz Cumulative 1982
18 July	3·5MHz Field Day
8 August	10GHz Cumulative 1982
15 August	70MHz Trophy & SWL
29 August	ROPOCO 2
4-5 September	144MHz & SWL
4-5 September	IARU 144MHz
4-5 September	SSB FD
19 September	10GHz Cumulative 1982
2-3 October	432MHz-2·4GHz & SWL
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 160m Mixed Mode Contest (20 February))*
13-14 November	1·8MHz (2nd)
5 December	144MHz Fixed

Looking ahead

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

20 March—RSGB VHF Convention, Sandown Park.
4 April—Northern Amateur Radio Societies Association Exhibition, Lancaster Suite, Belle Vue Leisure Park, Manchester.
28 May—RSGB Region 1 lecture, Manchester.
19 June—RSGB HF Convention, Belfry Hotel, Oxford.

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 **April** issue should reach them by **20 February**, and for the **May** issue by **18 March.**

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)—18 February (EGM to consider a proposed new constitution, all members are urged to attend), 8pm. Globe Bowling Club, Willows Lane, Accrington. At the November AGM the officers elected were: chairman, G8MSA; treasurer, G3ZLB; secretary, G3RXH. Subscriptions are now due and can be paid to G3RXH or G3ZLB whose address is now 7 Hambledon View Road, Burnley, Lancs BB12 7PD. For further information contact sec H. A. Aspinall, G3RXH.

Ainsdale (AARC)—2, 16 February. Ainsdale Scout HQ. Details from sec Norman Horrocks, G2CUZ, tel 0704 77604.

Barnoldswick (Rolls-Royce ARC)—3 February (Programme for this meeting to be finalized), 8pm. Members are reminded that the construction competition is to be held in conjunction with the annual social in mid-March. RR Sports & Social Club, Barnoldswick. Sec Leslie Logan, G4ILG, tel Barnoldswick 812288.

Blackburn (East Lancs ARC)—2 February ("ATV", a lecture by Trevor Brown, G8CJS), 2 March (Surplus equipment sale), 7.30pm. Shadsworth Leisure Centre, Blackburn. Pro Norman Jenkin, G4CGT, tel 0254 75037.

Blackpool (B&Fylde ARS)—2 February, 2 March. Details from Jim Newland, G5ND, tel 0253 64508.

Fylde (FARS)—A new club has been formed to provide greater convenience and shorter travelling distances for members living in Lytham St Annes and the southern parts of the Fylde. Meetings are held at the County Hotel, Church Road, Lytham, 8pm, on the second and fourth Tuesdays in each month. The programme for the next six months was resolved at the meeting held on 12 January. Pending appointment of a permanent sec, information can be obtained from G8GG, tel 0253 725717, or John Parkinson, G6DNK, 60 North Promenade, St Annes, tel 0253 727676 or 22110 in office hours.

Leyland (LHARG)—8 February (Meeting at the Rose & Crown, Ulnes Walton at 7.30pm), 15 February (Talk and demonstration by Fred Starkey, G8TJG, in Leyland Library, Lancastergate, Leyland, 7.30pm). Sec Arthur Jolly, G4JCO.

Manchester (South Manchester RC)—5 February ("An introduction to Wood & Douglas kits", by Fred Starkey, G8TJG), 12 February ("Radio control models", talk and demonstration by Ken Murgatroyd), 19 February ("Railway signals", a lecture by Dave Yorke, G4JLG), 26 February (Surplus equipment sale—yet another!), 8pm. Sale Moor Community Centre, Norris Road, Sale. Informal meetings in the club shack, Mondays, same time and place. Sec Dave Holland, G3WFT, tel 061-973 1837.

Mid-Cheshire (MCARS)—Formal club activities have had to be temporarily suspended because of loss of permanent meeting venue. It is anticipated that by the time of this publication a new location will have been finalized. In the meantime members should refer to the club net on Tuesday evenings, usually on 145·200MHz. The club officers are now chairman, G4LPX (ex-G8SZH); treasurer, G8ZSK; secretary, N. H. R. Black, G6AKV.

Stockport (SRS)—10 February (DVMs, by Alan Buxton, G8CZW), 24 February (Subject to be announced), 8pm. Blossoms Hotel, Buxton Road, Stockport. 13 February (Annual dinner dance, Southlands Hotel, Beech Road, Stockport). The following officers were elected at the recent AGM: chairman, Geoff Royle, G4FAS; treasurer, Alan Buxton, G8CZW; secretary, Stan Aspinall, G3VSA, tel 061-437 1437.

Thornton Cleveleys (TCARS)—1 February (An evening with Harry Gregory, G3GIY), 8 February ("Construction"), 22 February ("Hospital radio"), 7.30pm. Thornton Cleveleys Sports Centre, Victoria Road, Cleveleys. Following the AGM the new sec is Mrs J. S. Ward, G8YOK. The RR also believes that the chairman is of the Ward clan—an om and yf partnership.

Warrington (UK FM Group Western)—4 February, 4 March, 8pm. Grappenhall Community Centre, Bellhouse Lane, Warrington. Sec Gordon Adams, G3LEQ, tel 0565 4040.

REGION 2—RR D. S. Smith, G4DAX, Red Roof, Goathland, Whitby, North Yorks YO22 5AN. Tel 094 786 333.

Halifax (H&DARS)—First and third Tuesday in each month, 7.30pm. Claremount Liberal Club, Belgrave Avenue, off Claremount Road, Halifax. The first Tuesday is usually for lectures, and the third, cw/natter night. Recently re-formed, this club is now forging ahead. A proposed visit to a fire brigade hq in March will have to take place in two parts due to the number wanting to go.

Harrogate Repeater Group (HRG)—By the time this note is read the licence should be but a month away. At the time of writing G8XHS had the antenna in hand—or on the tower, and the logic had been interfaced to the transceiver. Details from G4ATZ.

Leeds (L&DARS)—Mondays, 8pm. Old Hall Golf Club, Woodhall Lane, Calverley, Leeds. Sec G8NVP. Sunday 13 December saw L&DARS's first winter fair despite the most atrocious weather. It was very well attended by both visitors and trade. A chance to meet friends from further afield in mid-winter, it was also an opportunity to stock up with bits for those winter projects. A very pleasant rally and one that hopefully will become a regular on the region's calendar.

Leeds (White Rose RS)—8pm. Moortown Rugby Football Club, Moss Valley, Alwoodly, Leeds 17. Sec G4GDL, club net 8pm, Thursdays on 3·7750MHz, or 21·350MHz. Basil O'Brien, G2AMV (RSGB President), Joan Heathershaw, G4CHH, (Zone A manager), and RR2 were guests at the White Rose Christmas dinner. Despite the exceedingly cold weather a thoroughly enjoyable evening was had by all. The informality of the evening was underlined by G2AMV's short speech in which he publicised his "Society for the Correct Enunciation of Call Signs" (SCECS!). He also mentioned increasing pressures on our frequency allocations, and the importance of maintaining high operating standards on all bands—one is never sure who is listening.

Pontefract (P&DARS)—4 February (Construction evening), 18 February ("Fast scan atv", by G8CJS), 4 March (Tape/slide lecture). Reflooring of the shack is underway, and the formation of a Raynet group is in hand. Do not forget the components fair on 14 March. Time to stock up on bits after the winter.

Tom Beaumont, G4LAR, (left) presenting the LAR Constructors Trophy at the White Rose ARS to last year's winner, Mike Haswell, G4KAX, with his part-finished 3·5MHz ssb transceiver. On the right is Chris Mobbs, G8UHW, runner-up with his novel 144MHz linear.

In third position was Peter Thacker, G4HSZ (who took the photograph) who, with the help of Eric Lipkin, G3HHE, built an rtty terminal for the club

Scarborough (SARS)—Mondays, 7.30pm. Scarborough Cricket Club, North Marine Road, Scarborough. Sec G4JAQ, tel Scarborough 862638. A grand time was had by all at the Christmas dinner on 4 December, when among other things, the identity of the 1982 president was revealed by the committee as G4FLM, who has done a great deal for the society over the last few years.

Wakefield (W&DARS)—9 February ("70cm and 23cm", by G3HCW), 23 February (On the air/natter night), 8pm. Holmfield House, Denby Dale Road, Wakefield. Sec G4BLT, tel Wakefield 255515.

York (YARS)—Fridays, except the third in each month, 7.30pm. United Services Club, Micklegate, York. Sec Keith Cass, G3WVO. Another "family tree" investigation has taken place, this time from ZL. The club is working on the possibility of a York, UK/York, Pennsylvania net; apparently there is a flourishing amateur community in York, Pennsylvania.

A club chairman mentioned recently how difficult it is to get new blood on to committees. Clubs very often fade away because of staleness and lack of new ideas. Is it shyness or laziness—it is often easier to let someone else get on with it (perhaps because he always has). However, you only get out of a hobby as much as you are prepared to put in. Try it, you might enjoy it. New club secs, do not forget to let me know. *RR2*

REGION 3—Acting RR H. S. Pinchin, G3VPE, 61 Cole Bank Road, Hall Green, Birmingham B28 8EZ. Tel 021-777 1320.

Birmingham (Midland ARS)—16 February (The secret listeners—RSGB video tape), 8pm. 294a Broad Street, Birmingham B1 2DS. Sec G8BHE, tel 021-422 9787.

Birmingham (Slade RS)—5 February (CB or amateur radio—which is your wavelength?), 5 March (Talk and demonstration of dbx—hifi, by Peter Liggins, technical manager of Audio Dynamics Corporation (Europe) BSR Ltd), 7.45pm. The Kingsbury Road Community Centre, 75 Kingsbury Road, Erdington, Birmingham B24 8QH. Sec G4FGF, tel 021-770 3474.

Birmingham (South Birmingham RS)—Thursdays (HF night on the air), Fridays (Construction and morse classes), 7.30pm. 3 March, 8pm. Hampstead House, Fairfax Road, West Heath, Birmingham B31 3QY. Sec G8RGQ, tel 021-459 8312.

Bromsgrove (B&DARC)—12 February (to be announced), 26 February (QRP meeting), 8pm. Avoncroft Art Centre, Bromsgrove. Club net Wednesdays, 144·850MHz, 8pm. Morse classes Mondays. Sec G4HFP, tel Stourport (02993) 3818.

Cannock Chase (CCARS)—11 February, 18 February (Equipment sale), 25 February, 4 March, 8pm. Bridgtown War Memorial Club, Union Street, Bridgtown, Cannock. Sec G8HZP, tel Cheslyn Hay (0922) 416419.

Hereford (HARS)—5 February (AGM), 19 February (Informal), 8pm. Civil Defence HQ, Gaol Street, Hereford. Sec G4CNY, tel Hereford (0432) 3237.

Malvern Hills (MHRAC)—9 February (Morse class and talk to be arranged), 7.30pm. The Red Lion Inn, St Ann's Road, Great Malvern. Sec G4GFX, 9 Wyche Road, Malvern, tel Malvern (06845) 62900.

Redditch (RRC)—11 February (AGM), 25 February (Informal), 8pm. WRVS Centre, Ludlow Road, Redditch. Sec G3EVT, tel Alcester (0789) 762041.

Shrewsbury (Salop ARS)—4 February (Natter night), 11 February ("PCB prototype production", by John Oliver, G8ARS), 18 February (Natter night), 25 February ("Noise", by Richard Golding, G3VZG), 4 March (Natter night on contests), 8pm. Albert Hotel, Smithfield Road, Shrewsbury. Sec G6AKE, tel Shrewsbury (0743) 66969.

Solihull (SARS)—16 February ("Test equipment", by Paul Gaskin, G8AYY), 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.

Stourbridge (StARS)—15 February ("Twelve years of colour tv", by Tony Colton, G8PAW), 7.45pm. Library, Longlands School, Brook Street, Stourbridge. Sec G8JTL, tel Lye (038482) 4019.

Stratford-upon-Avon (S-upon-A&DARC)—8 February (Talk on Raynet), 22 February (Activity night), 7.30pm. Bearley radio station. Talk-in on S22. Acting sec G8OVC, tel Stratford (0789) 750584.

Telford (T&DARS)—10 February (Bring your computer night), 17 February (Club project finals), 24 February (Microwave evening), 3 March (Informal), 7.30pm. Phoenix Centre, Webb Crescent, Dawley. Sec G8UGL, tel Telford (0952) 584173.

Worcester (W&DARC)—1 March (Open forum), 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)—3 February (Junk sale), 10 February ("The war years until today", a talk by Fred Ward, G2CVV) 14 February (Visit to Willington Power Station, contact G3VGW for place on visit) 17 February (Visit by Lowe Electronics), 24 February (Night on the air), 3 March (Bring & buy), Club Room, Top Floor, 119 Green Lane, Derby. 6 March (Annual dinner at Derbyshire Yeoman). Sec Jenny Shardlow, G4EYM, tel Derby 556875.

Grimsby (GARS)—1 February ("Propagation", by G4KAL), 15 February ("Oscilloscopes and their uses", by G3RXP), 7.30pm. Cromwell Social Club, Grimsby. Sec Trevor Matthews, G3RGC, tel Grimsby 884060.

Mansfield (MARS)—4 February ("Mobile operation", tape lecture), 15 February (Club meeting), 5 March (AGM), 7.30pm. New Inn, Westgate, Mansfield. Sec John Coates, G4GYU, tel Mansfield 27257.

Melton Mowbray (MMARS)—19 February ("Modernization of telephone system", a talk by G3FXP), 7.30pm. St John Ambulance Hall, Asfordby Hill, Melton Mowbray. Sec Richard Winters, G3NVK, tel Melton Mowbray 63369.

Nottingham (ARCON)—4 February (Forum), 11 February ("Amateur satellites", by G4CHO), 18 February (Activity night), 25 February (Slow scan demonstration by G3XER and G4BLL) 17 February (Nottingham Raynet Group meet), 7.30pm. Sherwood Community Association, Mansfield Road, Nottingham. Sec Mike Shaw, G4EKW, 50 White Street, Nottingham.

Scunthorpe (SARC)—2 February ("CW contest", G3TMC), 9 February (Bring & buy, also junk sale), 16 February (Animal, veg or mineral?), 23 February (Natter night). 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, Beds. Tel 0582 508515.

Cambridge (C&DARC)—Fridays, 5 February ("Sporadic-E and long distance tv", by John Worsnop), 12 February (Informal and morse class), 19 February ("Television systems", by Chris Rowsell), 7.30pm. Coleridge Community Centre, Radegund Road, Cambridge. Sec G8JKV.

Corby (CARG)—Fridays, 7.30pm. 104 Mallows Drive, Raunds Wellingborough, Northants, Dunstable, Beds. Sec G4ENB.

Leighton Buzzard (LLRC)—8 February ("An easy introduction to basic programming", —"hands-on" demonstration by Bob Leggett), 22 February ("The electronic organ", by G8GIK with Mr Gabriel Butler of MKM), 7pm. Vandyke Community College, Room A64. Sec G8GIK.

Luton (Kent Process Controls Ltd)—First Wednesday in each month, 8pm. KPC Ltd Sports Club, Tenby Drive, Luton. 12 February (Annual dinner at The Spinning Wheel Restaurant, Luton). Sec G3DOT.

Thanks to all the club secretaries who have supplied this information, I still have not heard from any of the clubs in Northamptonshire. Was it something I said? As you can see, it is a bit sparse, so club secretaries please get in touch with me. *RR5*

REGION 6—RR F. S. G. Rose, G2DRT, 84 Cock Lane, High Wycombe, Bucks HP13 7EA. Tel Penn (049481) 4240.

Aylesbury Vale (AVRS)—23 February. Elmhurst Youth Centre, Fairfax Crescent. Possible new venue soon. Sec M. J. Marsden, G8BQH, tel 0296 64783.

Maidenhead (M&DARS)—4 February (Demonstration by CQ Electronics), 16 February (Talk "VHF contest operating", by G8AZU), 4 March (Quiz), 16 March (AGM), 7.30 for 8pm. The Red Cross Hall, The Crescent, Maidenhead. Sec John Patrick, G3TWG, tel Bourne End (06285) 25275.

Milton Keynes (MK&DRS)—Second Monday in each month, 8pm. Lovatt Hall, Silver Street, Newport Pagnell, Bucks. Sec D. O. White, G3ZPA, tel Milton Keynes 501310.

Newbury (N&DARS)—9 March (Slide show "HF Holiday in Iceland", by G4JAL/G8LTD), 13 April (AGM). Details from sec Merton Vaslet, tel Newbury (0635) 46078.

Vale of the White Horse (VWHARS)—2 February (Ian White, "Yagi antennas, facts and fancies"). Sec G4FLX, tel Wallingford 37482.

REGION 7—RR Pat Walker, G8HMG, 12 Brownlow Road, Redhill, Surrey RH1 6AW. Tel Redhill 64035 (evenings), 01-834 9070 (days).

Cray Valley (CVRS)—4 February ("Propagation at vhf and above", by G8CIU and G8GGP), 18 February (1982 construction contest for the Reigate Cup. Organizer

Ken Alford, G2DX, centre, showing some of his early valve trophies following a talk on "The early days of wireless" which he gave to the Salisbury RC. Bert Newman, G2FIX, secretary, and Sir Evan Nepean, G5YN, chairman of the club are on left and right respectively. ***Photo: G4AJD***

G3XMD), 4 March (Spring surplus sale), 8pm. Christchurch Centre Hall, Eltham High Street, Eltham SE9. Sec G4FUG.

Kingston (K&DARS)—17 February (Mike Bues will talk on amateur tv), 8pm. "Alfriston", 3 Berrylands Road, Surbiton. Details from G4LJI.

New Cross (Clifton ARS)—19 February (Film show), 19 March (Video evening). New Cross Inn, SE14. Details from G3JKY. The club net is on Mondays on 144·41MHz ssb.

Redhill (Reigate ATS)—16 February ("Special communications", by G4EUG), 16 March ("Technical topics", by G3VA), 8pm. Constitutional and Conservative Centre, Warwick Road, Redhill. Winner of the December constructional contest was Mike Funnel, G3YQW.

Thames Ditton (Thames Valley ARTS)—2 February (Surplus equipment sale), 2 March (AGM), 8pm. Giggs Hill Green Library, Giggs Hill Road, Thames Ditton. Sec G8RLB.

Please will club secretaries let me have details of their programmes by the dates shown at the beginning of "Club News". If it is easier a telephone call will be sufficient.

REGION 8—RR K. A. Crouch, G8KEN, 14 Victoria Road, Capel-le-Ferne, Folkestone, Kent CT18 7LR. Tel 0303 55241.

Burgess Hill (Mid-Sussex ARS)—11 February ("Television principles", by G3XUP), 25 February (Talk and demonstration of amateur tv, by G8KOE), 11 March (Date for your diary, "UOSAT", by G8FQT), 7.30pm. Marle Place, Leylands Road, Burgess Hill. Further details from Jack Brooker, G3JMB, tel Hassocks 4965.

Canterbury (EKRS)—4 February ("Shack exposé", Dominican Hall, Canterbury), 4 March (Provisional visit to a brewery, QTH to be announced). Please contact G8ELS, tel Herne Bay 5629.

At the Thames Valley ARTS annual party, Alan Watson, G4DZS, was presented with the Cullen Trophy for the year. The trophy is contested for annually by the Thames Valley and Sutton & Cheam societies during the RSGB Affiliated Societies Cuntest. L to r: Alan Mears, G8SM, president, TVARTS; Alan Watson, G4DZS; Bob Tillen, G3MES, president, Sutton & Cheam

Dover (SEKYMCAARC)—3 February (Natter night), 10 February ("Oscilloscopes", by G4IMP), 17 February ("Colour tv", by G6BNB), 24 February (Project update), 3 March (Natter night), 7.30 for 8pm. Morse practice at 7pm. All at YMCA in Dover. Listen S20 or GB3KS. Further information from G3VSU or G8KEN.

Hastings (HERC)—Wednesdays, 17 February ("Transmission lines", by Tony Holder), 7.30pm. First Wednesday in each month (Committee meetings), second, fourth and fifth Wednesday in each month (Micro nights). All these at 479 Bexhill Road. Third Wednesday is the main meeting, West Hill Community Centre. Details from Alan, G8VEA, tel Hastings 216516. RR8 and xyl would like to thank the club for the social evening on 16 December. Hope to see you again sometime.

Kent Repeater Group—All information from G3MDO. The group maintains GB3KS and GB3KN on 144MHz, and on 432MHz GB3CK, GB3EK, GB3NK and GB3SK, which came on 1 January from its new site at Folkestone. Reports of this recent site change and coverage would be welcome by either G8EGT, G4IMP, G8KEN or G3MDO.

Medway (MARTS)—This year is the club's diamond jubilee (1922-82). It is being celebrated by a series of "happenings". The first of these will be during February when the calls GB2MDJ and GB8MDJ will be on the air. The date from which these will be operative will hopefully be 21 February. Linked to this will be an award for hf and vhf. Further details will appear in *Rad Com* but information can be obtained from the awards manager, D. Axford, G4LHU. RR8 wishes the club all success during the year and as promised will visit during the events.

Tunbridge Wells (WKARS)—Alternate Fridays, 5 February (HF/VHF Field Day preparations), 8pm. Adult Education Centre, Monson Road, Tunbridge Wells. Informal meetings take place the following Tuesdays at The Drill Hall, Victoria Road, Tunbridge Wells.

Thanet (TRC)—12 February (Bring & buy sale), 26 February (Talk on antennas), Birchington Village Centre. Further details from Ian Cane, tel 0843 54154.

The above is all the information received from all the clubs in Region 8. If your club is not mentioned ask your club secretary why not. If information is obtained before the dates given, RR8 will extract the details and they will appear in "Club News". More details mean more publicity, this means more members and more money for club coffers.

Biggin Hill amateurs please note: R. Jones, G3YMK, hopes to start a new club in this area, and asks people who are interested to contact him as soon as they can, at 17 Polesteeple Hill, Biggin Hill, Westerham, Kent.

REGION 9—RR W. J. Colclough, G3XC, Highview, Indian Queens, St Columb, Cornwall TR9 6LL.

Camborne (Cornish RAC)—2 February (Please note this meeting takes place on **Tuesday**: "ETS video equipment and tapes demo), 15 February (Meeting of the computer group: "Converting tvs to provide vdus", by Bert Hammett, G3VWK). SWEB Pool, Camborne. At the November meeting the chairman announced that Ron, G2ABC, had resigned as pro. Contact sec Andy French, G8TUJ, tel Camborne 717343.

Exeter (EARS)—8 February ("Radio propagation" (part 2), by Mr D. Muggleton of Exeter University), 7.30pm. Community Centre, St Davids Hill, Exeter. First, third and fourth Monday in each month, The Scout Hall, Emmanual Road, Exeter. A number of high standard lectures have been arranged for 1982, together with practical demonstrations. Details from pro Geoff Draper, 1 Carlyon Close, Heavitree, Exeter EX1 3AZ.

Plymouth (PRC)—Alternate Mondays, 7.30pm. Tamar School, Paradise Road, Millbridge, Plymouth. In an attempt to publicise amateur radio at the expense of the opposition, an open day was recently held where non-amateurs could see modern equipment in operation. A number of qualified amateurs were in attendance to answer questions on the hobby. Good publicity was given before and after the event by local radio. During 1981 highlights of outdoor events were the hf and vhf field days and also the barbecue held in August. Club membership now tops the 100 mark. Contact pro Alan Huxham, 73 Winchester Gardens, Whitley, Plymouth, tel 0752 786508.

Torbay (TARS)—Fridays, 7.30pm. Last Saturday in each month, special meeting, 7.30pm. Bath Lane, rear of 94 Belgrave Road, Torquay, Torbay. The annual dinner is scheduled for 13 March at the Templestowe Hotel, Torquay. The club repeater GB3TR logic has now been rebuilt and should by now be in operation at the new site, reports would be appreciated. Details from sec Hugh Davies, G4DZH, tel Paignton 523063.

Very little club information received this month. This is your page—please help me fill it. 73. *Bill, G3XC.*

REGION 11—RR B. H. Green, GW2FLZ, 1 Clwyd Court, Tan-y-Bryn Road, Colwyn Bay, Clwyd LL28 4AH. Tel 0492 49288.

Dolgellau (Meirion ARS)—4 February (Film show), 7.30pm. Royal Ship Hotel, Dolgellau. Sec Mrs Jean Jones, GW4KYK, tel Tywyn 710402.

Colwyn Bay (Conwy Valley ARC) (GW6TM)—11 February (Talk by G. Pritchard, British Telecom—"Interference and the radio amateur"), 24 February (Discussion on a technical subject), 7.30pm. Green Lawns Hotel, Bay View Road, Colwyn Bay. Sec J. N. Wright, GW4KGI, tel 0745 823674.

Rhyl (R&DARC)—11 February (General meeting), 25 February (Film show), 7.30pm. Ambulance Station, Rhyl. Sec B. Jones, GW8OYT, 6 Rhodfa Maes Hir, Rhyl, Clwyd, tel 0745 37284.

REGION 12—New RR to be appointed

Aberdeen (ARS)—Fridays, 7pm. New club premises at 35 Thistle Lane, Aberdeen (near Holburn Junction and behind 35 Victoria Street). Programme details from sec GM4BKV.

Dundee (Kingsway Technical College ARS)—Tuesdays, 6.30pm. Electrical Laboratory, Kingsway Technical College, Old Glamis Road, Dundee. All radio amateurs welcome. Programme details from sec GM4JCM.

Perth (P&DARG)—Tuesdays, 2 March ("Amateur repeaters", by GM8KPH/GM8JZY), 6 April ("RSGB", by zonal manager), 4 May (GM4AWA magic lantern show), 7.30pm. Perth City Sports & Social Club, Leonard Street, Perth. The club is located within licensed premises and meetings are no longer "dry". Details from sec GM8JYZ.

REGION 14—RR V. J. Kusin, GM4HCO, 109 Weymouth Drive, Glasgow G12 0EL.

Ayr (AARG)—Fridays, 12, 26 February, 7.30pm. Community Leisure Centre, 24 Wellington Square, Ayr. Details from GM3THI.

Falkirk (Stirlingshire ARG)—First Tuesday in each month, 7.30pm. Details from Grant Stewart, GM6CRQ, 2 Mayfield Mews, Falkirk.

REGION 16—RR T. D. Howe, G3PLF, 18 Vange Hill Drive, Basildon, Essex SS16 4DD. Tel 0268 24453.

Braintree (B&DARS)—1 February (Informal), 8pm, 15 February (Formal), 7.45pm. Braintree Community Centre, Victoria Street. Details from Alan Williams, G6CIV, tel Silver End 83516.

Chelmsford (CARS)—2 February ("Black box evening"), 2 March (Demonstration of latest equipment), Marconi College, Arbour Lane. Details from Andrew Mead, G4KQE, tel Silver End 83094.

Vange (VARS)—4 February ("New programme discussion"), 8pm. Main Hall, Barstable Tennants' Community Association, Long Riding, Basildon. Details from Mrs D. Thompson, 10 Feering Row, Basildon, SS14 1TE.

REGION 17—RR H. G. Cunningham, G8FG, 235 Station Road, West Moors, Wimborne, Dorset BH22 0HZ. Tel Ferndown (0202) 876018.

Basingstoke (BARC)—17 February ("Satellites and sunspots", by Ray Turner), 7.30pm. Chineham House, Popley, Basingstoke. Sec G6CPA, tel Tadley (07356) 4964.

Guernsey (GARS)—Tuesdays and Fridays, 8pm. The Lodge, La Corbinerie, Oberlands, St Martins. At the recent AGM the following were elected vice-presidents in recognition of their enormous contributions to the GARS: GU2FZC; GU8HT; GU8ITE; and Mr Bert Crusaz. Sec GU6CLY, tel 0481 21197.

Horndean (H&DARC)—11 February (Film show, Southern Sound and Cine Group), 11 March ("RTTY", by G3PLX), 7.30pm. Merchiston Hall, Horndean. Sec G6GBM, tel Horndean (0705) 593429.

Poole (PRAS)—Last Friday in each month, 7.30pm. Poole Technical College. Congratulations to G8VBZ, who is now G4NGG. Also to George McAvoy, who is awaiting his G4 call. Sec G8ZCG, tel Broadstone (0202) 693986.

Portsmouth (Marconi Electronics & Radio Club)—Last Tuesday in each month, 7.30pm. Broad Oak Works Canteen, The Airport, Portsmouth. Details from G8NEH, tel 0705-738067.

Southampton (SARS)—Wednesdays, 10 February ("Intruder Watch", by G3OZT), 7.30pm. Toc-H House, Little Oak Road, Bassett. Sec. G8UVS, tel Southampton (0703) 782545.

Southampton (Waterside Shortwave Club)—7.30pm. Blackfield Community Centre, Blackfield, near Southampton, 23 February (Lecture and film show on undersea cables by G3KWU). Sec G6DLJ, tel Fawley (0703) 891975.

During an open day at Rolls-Royce, Bristol, for employees and families, special event station GB2RR was manned by operators employed on the site, and operated on all bands 3·5 to 144MHz. Seen here, around the 144MHz station, are: (standing) G8CLS, G6ENI, G3XPJ, G4DWY, G3MCY, G8GVP and G8BIY; (seated) G8CKK and G8WAX

South Dorset (SDRS)—2 February (Films and video tapes from AMSAT), 2 March (Annual constructors contest), 7.30pm. Civilian Canteen, Army Bridging Camp, Wyke Regis. Sec G3ZGP, tel Weymouth (0305) 812893.

Swindon (S&DARC)—Thursdays, 7.30pm. Park School, Harlowe Avenue, Swindon. First Thursday in each month (Practical evening and basic electronics course), second Thursday in each month (Talks, demonstrations, club contests etc). Sec Ian Browne, tel Swindon (0793) 485584.

REGION 19—RR R. J. C. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ. Tel 01-989 6741.

Barking (BRES)—11 February (Junk sale), Tuesdays (Morse code practice nights). Westbury Recreation Centre, Westbury School, Ripple Road, Barking, Essex. Contact Terry Parker, 2D Hubbards Chase, Hornchurch, Essex.

Cheshunt (CDRC)—3 February (Natter night), 10 February ("Aerials", by Dave Woollard), 17 February (Natter night), 24 February ("Sierra Leone", by Roger, G8DJU), 8pm. The Church Room, Church Lane, Wormsley, Herts. Enquiries to Jim Sleight, tel Ware 4316.

Chingford (Silverthorn RC)—Fridays, 7.30pm. Friday Hill House, Simmons Lane, Chingford, London E4 6JH. This club has successfully negotiated with the Home Office for the re-allocation of Eric Johnson's old call, G2HR. This is in memory of Eric, who was a founder member of Silverthorn and did a lot of sterling work for many years in the East London district for the AR. Sec C. Hoare, G4AJA, tel 01-529 2282.

Chiswick (ABCARC)—16 February ("Aerials for restricted places", discussion opened by G3IGM), 7.30pm. The Committee Room, Chiswick Town Hall, High Road, Chiswick W4. Sec W. G. Dyer, G3GEH, tel 01-992 3778.

Edgware (EDRS)—11 February ("Intro to amateur radio", by John Bluff, G3SJE), 25 February ("World of Amateur Radio", a new film by ARRL), 8pm. Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. Sec H. Drury, G4HMD, tel 01-952 6462.

London (UK FM Group)—Bi-monthly at Marquis Cornwallis, 31 Marchmont Street, London WC1. 9 February (AGM), 8pm. All members are urged to attend and bring a friend. Sec J. Parkins, G8KVP.

Southgate (SRC)—12 February ("Raynet", by Peter Stone, G8PRR), 7.30 for 8pm. St Thomas Church Hall, Prince George Avenue, Oakwood, London N14. Sec V. Austin, G4MCD, tel 01-360 5832.

Stevenage (S&DARC)—4 February ("Morse code", by G4HED). 18 February ("REACT" video tape, plus the S.E.A. co-ordinator), 8pm. The Staff Canteen, B. A. Dynamics Ltd, Site B, Gunnels Wood Road, Stevenage. Sec S. Clarke, G8LXY. Publicity officer G8MCV, tel 0438 64624.

RR19 apologizes for non-entry of some clubs, but no report from secs means no entry. Suspect most forgot the early deadline!

REGION 20—RR B. L. Goddard, G4FRG, 2 Greenfield Park, Portishead, Bristol BS20 8NQ.

Bristol (BARC)—2 February (Computer group meeting), 9 February (UOSAT discussion), 16 February (Bring and buy sale), 23 February ("Everything you *didn't* want to know about your rig", by G8UGT), 7.30pm. Please note the new address of the club HQ which is c/o YMCA, Park Road, Kingswood. Further information from Trevor Cockram, G8GFZ.

Bristol (BRSGBG)—22 February (Ross Clare, GW3NWS, will be talking about "HF linears"), 7.30pm. Queens Building, Bristol University. Further information from Chris Short, G8GLQ, tel 0272 621253.

Bristol (North Bristol ARC)—Fridays, 7.30pm. c/o Self Help Enterprise, 7 Braemar Crescent, Northville, Bristol 7. Sec reports that RAE and cw classes will commence in the new year, but at the time of writing it is not known how many candidates will be accepted. Sec Ted Bidmead, G4EUV, tel 0272 691685.

Bristol (Shirehampton ARC)—Fridays, 7.30pm. Twyford House, High Street, Shirehampton. Sec is pleased to report that membership fees are actually cheaper than last year and that there is a QRP group forming within the club. Further info from Ron Ford, G4GTD, tel 0272 770504.

Cheltenham (CARA)—4 February ("Receiver performance", by Roger Dixon, G4BVY), 19 February (Natter night), 7.30pm. The Old Bakery, Chester Walk, Clarence Street, Cheltenham. Further info from Grant Cratchley, G4ILI, tel 0242 43891.

Gloucester (GARS)—Thursdays, 4 February (Slide show on "Hospital radio links abroad"), 7.30pm. Chequers Bridge Centre, Painswick Road, Gloucester. It was interesting to note in GARS Newsletter that new members were recently introduced to club activities during an informal evening devoted especially for them. Further info from Tony Martin, G4HBV.

Portishead (Gordano ARG)—24 February (Second "Test equipment evening"). This time there will be more emphasis on the description of the equipment. 7.30pm. Ship Hotel, Down Road, Portishead. Further info from John Davies, G3LJD.

Yeovil (Y&DARC)—4 February ("An absorbtion wavemeter", by G3MYM), 11 February ("Using vmos power fets", by G3MYM), 18 February ("HF aerials in small gardens", by G3MYM), 25 February (Natter night and committee meeting), 7.30pm. Building 101, Houndstone Camp, Yeovil. Club reports that on the 35th anniversary of the Yeovil Amateur Radio Club on 4 October 1981, G3CMH and G8YEO worked 126 stations in 52 countries and six continents, including VK, ZL, and JA. Further info from sec Don McLean, G3NOF, tel 0935 24956.

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 **25 February** (April), **23 March** (May), **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

Immac Drake C-line, T4XC tx, R4C rx, both in mint cond, numerous extra accessories, tx has hb psu which will also power transverter for vhf/uhf, all this performance for £569 ovno. GM3WTA, QTHR.

Trio TS900 hf tx/rx, Trio pss for ac and dc, not used mobile, offers over £250. Trio TS700G, all repeater xtals, as new, offers over £200. Ham rotator, control box, 30m control cable, offers over £50. GM4AGS, QTHR. Tel 0385 543113.

Shibaden video recorder, built-in edit facility, comp with eight Hitachi tapes, tv mod unit, exc cond, wkg order, must sell or swap for line printer for mpu or disc drive. G8POO, QTHR. Tel 061-273 1658.

RTTY Nascom 1 32k ram vdu, cuts 2400 Sony radio cassette, Catronics CT101, Creed 7E, software, 8k Basic, comp in case, wkg, used daily, the lot £400. Europa C transverter, three weeks old, £70. TR2200G, all extras, £60. TH3JR, £80. Possibly split computer system. GW4LWD, QTHR. Tel 476040.

Atlas 210X hf tx/rx, 100W output, mains power supply, mobile bracket, G-whip, tribander, helical, 80 and 40 coils, Atlas mobile antenna, matching transformer, all in good cond, £295. G3KLF, Tel Fareham 236906, weekends or evenings only please.

KW2000B, manual, spare valves, good cond, £210 or consider swop with cash adjustment for 2m multimode fixed or mobile. GW3YTL NOT QTHR. Tel Knighton (Powys) (0547) 528030, 6-8pm only.

Datong asp, £60. Yaesu YP150 absorption wattmeter, £62. Yaesu YO301, FT301s, matching monitorscope, £100. Yaesu FT901, dc-dc converter, £30. SMC SP4, cw psu, £35. All plus carriage. Please write with all enquiries. Bierton, 3 Aubreys Road, Hemel Hempstead, Herts HP1 2JP.

Xitex MRS100 morse rtty tx/rx, feeds into G3PLX vdu or teleprinter, as *Radio Communication* article July 1980, 110V, manual, offers about £100, plus postage. RAF morse key type D, £15 plus postage. G4IOT, QTHR. Tel Folkestone 76063.

FT227RB 2m tx/rx, never used mobile, £120. FP12 12A power supply, £40, or both for £150. Will exchange for music centre or stack system. L. Norton, 6A Brinkburn Road, Scarborough, North Yorks.

BC221 type freq meter, £10. Hansen swr bridge, £4. 10A mains variac, £10. Pair of 4X150As, £5. CV2131, 4-250A, £10. Pair of QV04/7 valves, £6. KW dummy load, QRO, £10. Newman, G4GLT, QTHR. Tel Coalville 35835.

TR9000 2m multimode, λ/4 mag mount, Tonna 9XY, AR40 rotator, all very good, offers. G8UFV. Tel 0903 503254.

FT902DM, three months old, mint cond, used only few hours, taking delivery FT1 February, first offer £750 secures. Buyer tests and collects or free delivery 50 mile radius Kettering. Securicor at cost. G3LPA, QTHR. Tel Kettering 760336, after 6pm.

IC210 2m fm base, £150. *Wanted:* Electroniques i.f. module, IFA/1-6/ssb (Mk2). G3TIS, QTHR. Tel Wye (0233) 812888.

TR2200G, charger, case, handbook, fitted 12 channels, auto toneburst, low power switch, exc cond, £80. Heathkit VF2031 2W handheld, auto toneburst, fitted six channels, handbook, charger, £75. G4GBN, QTHR. Tel 0935 862505.

Liner 2 with 8-el Jaybeam, £70. *Wanted:* Pre-1930 gear, wireless books. G3SSJ, Badgers, 37 Nursery Road, Alresford SO24 9JW. Tel Alresford 3816.

Microwave Modules 432/50 linear, £95. 144/40 linear, £50. 144/100P linear, £90. 5W a.m. tx, six xtals, £18. Stowe automatic rotator and bearing, £25. Heathkit HD1234 coaxial switches, two, £8 each. Buyer to collect. G8HPD, QTHR. Tel Wheathampstead (058283) 3307, evenings.

KW500 linear amp, mint, £120. 28MHz solidstate linear amp, 10W drive, 300W p.e.p., £80. 101ZD, as new, £550. RS47000, 28 Covert Road, Northchurch, Berkhampsted, Hertfordshire. Tel Ray, 04427 4240.

TS520SE, immac cond, property of deceased amateur, never been used, £400. Buyer arranges collect. GW4KGR. Tel 0492 57276, after 7pm.

Stolle 2050 rotator, bottom bearing, 5-el 2m Yagi, £30. Pair Pye Pocketfones type PF1, nightcall, charger unit, wkg RB4, £20. G4ANW, QTHR. Tel Shanklin (098386) 6687.

Semi-detached house, 12yr old, ideal radio site, 250ft asl, by the sea, good outlook, three bedrooms, gas central heating, lounge, diner, garden front and rear, will leave existing antennas if required. £24,000 ono. G4CFZ, QTHR. Tel Portland 820343.

SEM 2m auto switching preamp, £12.50. Two xtals for TR7010 covering 144·025/144·075, £1.50 each. PF1 tx and rx, tx xtal for RB6, £15. Anglian 2m transverter, 14MHz i.f., £25. Pye LG50 tx, £25. Buyer collects both. G2ATM, QTHR. Tel 0602 202592.

Seen the price of commercial keyers? Here's an opportunity to buy the Rolls-Royce of all morse keys—the Marconi type 365, brass base and cover painted grey, beautiful cond, £30. G3UJX, QTHR Wirral. Tel 051-677 1518.

KW2000B, mains psu, vgc, £200 ono. G3GJX keyer with paddle, £10. Homebrew atu, £10. G4EAH, QTHR. Tel Crowthorne 2829.

12AVQ Hygain, 10, 15, 20m, vertical antenna, instruction leaflet, £23. Buyer collects. G4BGY, QTHR. Tel 01-777 9061.

TR7010 2m ssb tx/rx, good cond, £110. SF1 Starphone handheld on RB6, batts, charger, £40. 2m fm synth tx/rx, homebuilt, wkg, £30. 5-el 2m Jaybeam, unused, £5. G8KER. Tel Rugby 832887.

RSGB Bulletins and *Radio Communications* from October 1966 to November 1968 (remember those funny glass things with pins on?), £5 the lot. Gutter mounting clamp for mobile antenna, as new, £2.50. Tel Tony, Southend (0702) 351936.

Liner 2, comp with mic, psu, mobile mount, £85. Part-built G3ZVC tx/rx, all components incl xtals, XF9B filter, MD108 modulator, metal case, but less pa, £25 ono. G8BSO, QTHR. Tel Peterborough (0733) 262989.

Junker hand key, £25. Drake TV3300 lpf, £14. Drake 7700 desk mic, £20. All mint cond, used little, post paid. Tel 0463 41211.

2200GX, Liner 2, incl usual accessories, handbook, Creed 7BRP, cover, 6SR tape reader, both incl full maintenance data, class D wavemeter, all exc cond, best offers. G4ICZ, QTHR. Tel 0543 472054.

FT707, FC707, brand new, boxed, list price £718, unused, unpacked, save over £100, all three for £600. Keith Rodgerson, 10 Leigh Road, Clifton, Bristol. Tel 0272-733848.

SX200 scanning monitor, 26-512MHz, exc cond, boxed, incl mag mount, vhf antenna, £190. Will deliver 50 mile radius of Exeter. Tel Exeter 69227.

Portable QTHs: six-berth frame tent, 14 × 14ft, £45; four-berth Walkers villa frame tent, two years use, £90. Jaybeam UGP/2M, £5. G6ACI, QTHR. Tel 051-260 9085.

DX33 triband Yagi beam, one month old, like new, £100. Planners force sale. G4FMO, QTHR Leicestershire. Tel 0530 413973.

Yaesu FRG7, used little, headphones, various maps, books, £140. Tel Bagshot 75316.

TS820S, lovely cond and performance, £425. G3AOS, QTHR. Tel 061-980 2415.

Icom IC260E 2m multimode with accessories, 1980, good clean cond, £240. G8NRJ. Tel Andrew, 01-399 0147, after 6pm.

7800 2m rig, mains psu PS20, £15 worth of coaxial, 5-el beam, £230. Morris. Tel Bolton 52384.

TM50B 2m fm rx, scans main channels, £35 ono. Keith Beverstock, G3YZZ. Tel Slough 2392.

Shack clearance: SMC75 multiband rx, 2m converter and antenna; Codar 8T5 tx; swr/power meter; SST1 atu; rf field indicator; headphones; morse key; dipole kit, etc, £110, no offers. BRS48787. Tel Barry, Sutton Scotney 798.

TL120 linear amp (hf), £100. Daiwa SR9 2m vfo/xtal fm rx, £40. Icom IC24G 2m fm tx/rx, £135. MMC432/28S converter, £25. Trio AT120 antenna tuner, £50. TS120V hf tx/rx, £300. Trio DM600 gdo, £50. G4IYU. Tel 021-520 6628.

KW2000A, fitted 6146Bs, manufacturer overhauled, exc wkg cond, no tvi, mains and battery psus, £160. AR88, needing some attention or for cannibalization, £17. Both with spare valves and handbooks. TA33JR, spare insulators, £15. G6ZO, QTHR. Tel 01-954 4837.

Fully-equipped Sprite Alpine caravan with awning, sited in New Forest, £1,000. Cossor double beam scope with manual, £30. HRO with bandspread coils, £30. Collector's item G2VVs orig 150W cw tx, Wilcox-Gay oscillator, orig paperwork, £25. G3YAO, QTHR.

Belcom HC1400 144-148MHz, 5/25W, 5kHz steps, mobile bracket, spare power leads, mic, homebrew psu, Revco 0·625in mobile whip, GPV5 colinear, 18ft pole, wall brackets for above, £165 the lot. G8JCD, QTHR. Tel Swingford (85) 634.

TR2400, exc cond, as new, SC3 carrying case, orig boxes, £160. G3LEQ morse tape lessons, A1 C90, A2 C90, A8 C90, A12 C90, A14 C90, all with text, £10 incl p&p. G4KUC. Tel John, 061-427 5931 (Manchester area).

FT101ZD, matching spkr, mic, fan, orig packing, fb wkg, appearance, can't really exploit, due antenna restrictions, going vhf, £350, incl carriage. Tel East Kilbride 22663.

Sommerkamp TS788DX, 10m all mode tx/rx, £295. Trio 2400 2m synth handheld, soft case kit, orig packing, £165. Eddystone 770R, £100. KW103 swr/power meter, £24. Heath HD1250 fet dip meter, new, £35. *Wanted:* FT707, FT7B, SX42 rx. Consider part exchange. G4AFY, QTHR. Tel Kidderminster 753358.

AR240 synthesized handheld 2m tx/rx, exc cond, cw charger, external antenna cable, orig packing, £95 plus £3 postage. G8BIR. Tel Richard, Bristol (0272) 510699.

TS520SE with matching AT200 tuner/power meter, both mint, unmodified cond, handbooks, circuitry, one owner, £465. 14MHz λ/4 vertical antenna, base insulator, ground section, telescopic ali tubing, makes fb groundplane, £9.50. Tel 0373 64694 (Bath area).

TS120V with cw filter, £300. FL110 linear amp, £80. AT120 atu, £75. ETM4C keyer, £75. Trio CS1566 scope, immac, £325. Hi-mound key with marble base, £20. Buyer collect or arrange transport. G4HWD, QTHR.

Trio TS130S, like new, £400 ono. PS30, £70 ono.

Handbooks, HW101 tx/rx, mic, manual, bargain, £110. *Wanted:* FT101, FT101/B, SB101, SB102 or w.h.y? G2DCF, QTHR.

Yaesu FT707, FP707 power supply, FC707 atu, YM36 mic, mint cond, £650. Cushcraft 10-80m vertical, new, £60. *Wanted:* FT902 or Trio 830S, matching atu vfo scope, 1kW dummy load, Datong FL1. G6DHD., Tel Nigel, 021-707 3684.

FL50/FR50, 80-10m, ssb/cw, 160m on rx, works well, £130. Yaesu XF51A xtal filter, suit FR50/FT75, £15. *Wanted:* KW E-Zee Match etc. Liner 2. SB2M. IC202 etc. Tel Southampton 760178, evenings.

FRDX400, FLDX500, £240. AVO9 Mk2, £60. Heathkit VA7U, £20. BC221, mint, £18. Tektronix storage scope 564, extra plug-in, £350. Exchange for hf, 2m gear or FRG7700, w.h.y? GW3ZNN NOT QTHR. Tel Wrexham 262855, evenings.

TR9000, 2m multimode, few months old, never used mobile, £320. Dymar 2m fm 10ch tx/rx, 25W output, seven channels xtalled, £75. GM8BOV. Tel 031-331 2755.

C58 standard 144MHz portable multimode, soft carrying case, nicads, charger, £230. Eimac 4CX350A, new, with data, £20 or offers. G4FBK, QTHR. Tel Mike, 01-864 1412, after 6pm or weekends.

FT225RD, Mutek fe fitted, exc cond, £430 ono. G8WZL, QTHR. Tel 0302 22616.

TS520, SP520, VFO520, mint cond, orig packing, dc psu, £390. G-whip MM77 80-10m exc 40m, £20. G4ETK NOT QTHR. Tel Potters Bar (0707) 45968.

Heathkit linear amp, 2kW, mint cond, used little, £275 ono. Buyer collect. G3XTU, QTHR. Tel Oakley (Beds) 982 4579, evenings.

FRDX400, hf rx, all options, cw filter, 2m and 4m converters, good cond, £130. Simpson, G3XQZ, QTHR. Tel Bedford (0234) 781149.

FDK750E multimode, mint cond, £245 ono. G3ZIF, QTHR. Tel Huddersfield 863936.

Xtals: one pair each for Pye Pocketfone PF1, RB10, RB14, £3 per pair. Pair R7 xtals for Pye Europa MF25FM, £6. 2m transverter Europa B 10m input, £45. GW4HAT, QTHR. Tel Swansea (0792) 290770.

Yaesu Musen monitorscope YO100 for FT101E or FT101B, FT400/401B as new, instruction manual, all accessories, two tone generators, £85. G4HMW. Tel Chesterfield 36496.

FRG7, mint, battery holder, front cover, no mods, manual, £160 ono. FR5013 ham band, exc, xtal calibrator, 10MHz band, no mods, manual, £80 ono. GM4MTI. Tel 0631 62936 or 0631 62965, anytime.

Icom 720A, save £100 on list. Microwave Modules 4m transverter and morse talker, all still guaranteed. FDK Palm 2 2m handheld, £65. 30ft tower mast with rotator etc, £100. Buyer collects. Might take part exchanges. G4JKP. Tel Leicester (0533) 899958.

Pye Cambridge 6ch, 2m fm, manual, £60. Oskerblock power/swr meter, 3-200MHz, £30. HRO rx, seven coils, psu, £50. Marconi 12ch 2m fm portable, £100. Howland-West 6ch stereo mixer, ac mains, £50. Codar PR30 pre-selector, £12.50. Pye Olympic 12ch, a.m., unmodified, manual, £80. Three 10ft scaffold poles with connectors, make good mast, £20. Big, old, heavy 50MHz sig gen, free to good cause, club etc. G8XHL, QTHR. Tel Colchester 48102.

2m fm tx/rx, 10W, fitted 10ch, toneburst, mic, cables, mains psu, equivalent to KDK2015, £90 or exchange for FT202/207. Cossor dual beam oscilloscope, 5MHz plus, spare new tube, £40. QM70 28-144 transverter, 50W, wired for FT101/200, manual, £65. Dual dc-dc inverter, 12V in 400/265, 180V out at 250mA, relay switched, £20. Nicad charger 9-500mA output, £10. RS 3+3W stereo amp in case, £12. SWR bridge (2) T3170L twin meter, £8 each. Mains psu, 5-25V out at 5A + or − earth, fully metered, £35. Alinco Electronics 13·8V 25A power supply, £45. All the above are surplus to requirements, but in good wkg order. G4IDF, QTHR. Tel Worcester (0905) 20135.

HRO with psu, spkr, full set of normal coils, spare set of valves, £50 ono. G4AOJ, QTHR. Tel 0245 73158.

Trio T599S tx, vgc, JR310 rx, the pair £250 or separately, tx £200, rx £60. PW repeater timeout indicator, £10 ono. *Radio Communication* cw memory, £10. New 4/42m slot antenna, £7.50. Prefer buyer collects. G3ZOC, QTHR. Tel 0772-746733.

FT107M all solid-state tx/rx (ex-memory option), with FP107E external psu/spkr, genuinely as new, list £830, £550. G2KF, QTHR. Tel 072-681 2337.

TA32/33 with 25ft triangular galvanized lattice tower, £80. ITT Starphoné on RB6, nicad, case, charger, £45 ono. G-whip multi-mobile 80-10m with base, £30. Other bits and pieces: 2m pas, 70cm pa etc. G4GZS, QTHR. Tel Rugby 815506.

TS520, vgc, manual, external mfj ssb filter, £300. KW E-Zee Match, £15. Sentinel auto hf preamp, £15. Buyer inspects and collects. G4INV, QTHR. Tel 051-724 3998.

VibroPlex bug key, £20. Grid dip meter, all coils, 440kHz-280MHz, £25. Tektronix 524AD scope plus wideband preamp, £105. Cap/res bridge, £10. Joystick and tuner, £12. Computer ZX81 plus 16k ram, Sinclair built, three months old, books, machine code incl cw programs, £110. *Wanted:* G2DAF Mk2 tx and rx of good construction. Tel John, Orpington (Kent) 37955.

Yaesu FL400 tx, 80-10m, vgc, spare pa valves, £110. G4CYW, QTHR.

Lunar linear 2M1080P, £105. Some items from last time's advert still available. G8ESK, QTHR. Tel 0274 45611.

Bantam hb/a.m., £30. Glider channel xtals, £15. Bantam hb/fm, £30. Marine band xtals, £15. Cambridge a.m. dash, two glider channels, £65. All vgc. GU3HKV, QTHR. Tel 0481 47278, 6-7pm only.

Solartron scope CD1212 dual beam, 24MHz, valved, large, eht transf dud, £30. Sullivan inductance bridge, £15. Cambridge Vernier potm, £15. Cambridge deflection potm, £15. Standard cells, inductors, capacitors, £4 each. G4KDV. Tel 0943 463083.

Trio station: TS520SE, SP520 spkr, AT200 atu, built-in swr bridge, LF30A low-pass filter, MC50 desk mic, all mint cond, 2yr old but used little, no split, £425. Going QRT. G4FIG, QTHR. Tel Lancing (Sussex) 62134.

Daima 2m fm 3ch portable tx/rx, S20-21 fitted, comp with λ/4 spkr/mic, 18V nicad, spare 14V nicad and charger, £45. G8RDN. Tel Burntwood (05436) 5885.

Wolfsen 2m rx, £40. LEC 9·1cu ft freezer, £60. *Wanted:* Circuit diagram for Sommerkamp FL200B tx, cheap rtty converter with printer or vdu. Can deliver or collect within reasonable distance. Tel Paul, Bradford 41506.

Trio TS120V hf tx/rx, handbook, orig packing etc, never used mobile, hence as new cond, £290. Icom IC215E 2m fm portable tx/rx, R0-9, S20-23, comp with handbook, orig packing etc, as new cond, £85. G8PNX, QTHR. Tel Sheffield (0742) 745850.

Trio 2300 2m fm, mint cond, nicads, charger, case, carrying strap, orig packing, £130. G8MJH, QTHR. Tel 01-529 0351.

Heathkit HW12A, 80m band tx/rx, 200W p.e.p., comp with psu, HS24 spkr, mic, leads, handbook, all in good cond, £60 or exchange for 2m transverter. G4KKG, QTHR. Tel Yeovil (0935) 25327.

Trio JR599, TX599 Custom Special, 2m and 6m converters, £325. Yaesu FC901 atu, mint, £85. G3UUI, QTHR. Tel Southend-on-Sea 64485, evenings, 01-481 8103, daytime.

TS770, £500. Palmsizer 2 handheld, £60. Mizuho SB2M 1W ssb, £50 ono. Heathkit 10-12V scope, £40. Apple 2 graphics tablet, £300. Supertalker, £100 ono. G8FAT, QTHR.

Trio TR9000 12 months old, £295. BO9, £25. PS20, £35. SP120, £17. All comp with orig packing. SEM 50W linear/preamp, £55. Catronics 40W pa, £27. MMA144V 144MHz preamp, £25. G6ABT, QTHR. Tel 0235 23034, after 6pm.

FT401 tx/rx, six bands incl 160m, cw filter, Shure 401 mic, spare pa valves, vgc, £300. Manuals for B28, BC348, AR88, AR88LF, SX28, £1.50 each. G3NKS, QTHR. Tel Cheltenham (0242) 41099.

FT101E, immac cond, mic, fan, rf processor, no mods, ac/dc leads, handbook, orig packing, two extra sets pa and driver valves, free to purchaser, never needed, rig mainly used to drive transverter, £350. GM3WCS NOT QTHR. Tel Fife (0383) 26456.

Standard C8800 2m fm tx/rx, five memories, scan vacant/busy, 10W output, sensitive rx, £200. Sony TC630 open-reel three-speed semi-professional recorder, stereo spkrs, inbuilt amplifier, accessories, £195. GM3WCS NOT QTHR. Tel 0383 26456.

Yaesu cpu 2500R 2m fm keyboard, mic, 25W, immac, £180 ono. G6AUW. Tel Weymouth 73240.

PET 2001 computer, 8k ram, new roms, manuals, programs, workbooks etc, exc cond, £290 ono. GI6ANC, QTHR. Tel Carrickfergus 66516.

TR2300, nicads, charger, reverse repeater, case, handbook, orig packing, exc cond, £130. G8IIQ. Tel Rainford (Merseyside) (074488) 2118, after 6pm.

PET 8k 200B new/rom, £300. PET 32k 3032 new/rom, £500. PR40 printer (matrix), £150. Heathkit RA1 rx, £40. PET rom Retrofit basic (4), £35. Many other small items. G4ANP NOT QTHR. Tel 0709 893995.

Realistic scanner, 50ch, search facility, 68-80MHz, 108-170MHz, 410-512MHz, cost £300, perfect, £125. Sony ICF2000 digital rx, 150kHz-30MHz fm, 78-108MHz, £85. FT202, nicads, charger, remote mic, etc, £75. Post free. G4GKX, QTHR Dorset. Tel 0202 690599.

AT5, set up for mobile use with TW top mobile rx, psu, 12rc, 160m G-whip, mains psu, leads, data, £45. KW Vespa Mk1, psu, mic, manuals, spare valves, £75. AR88D, spkr, manual, valves, vgc, £55. FC5M, £25. MM144/25W, £30. "D" wavemeter, phones, £5. Can deliver 50 mile radius. *Wanted:* FT101E. G4LTH, QTHR. Tel Stanford-le-Hope (Essex) 74301.

IC2E, mobile attachment, homebrew/module, 20W amplifier, λ/4 antenna, £155. G8TLQ. Tel 0946 61389, after 6pm or weekends anytime.

Trio TR7010, 2m, ssb/cw, mobile/fixed, mobile mount, orig packing, £110 ono. Pye Vanguard AM25T boot mount, mounting bracket, transistor rx, am/fm (Garex mod), handbook, fitted S20, S22, 145·8, R6, £35 ono. GM8MOQ, 22a Kidd Street, Kirkcaldy. Tel 0592 54308.

Astatic D104 mic with G-stand, in exc cond, £18. G4DRF. Tel 0526 52965.

Trio 2200GX, 6ch, £90 ono. BC221, mains psu, £5. Catronics 2m 10W pa, £15. Catronics 2m 40W pa, £15. Jaybeam 2m colinear, £15. PA3 2m preamp, £3. 2m 5/8 whip, £2. Eight-track stereo player, £3. G4DBW NOT QTHR. Tel Swanley 64356, after 6pm.

TR7200G 2m fm tx/rx, six repeater, three simplex, £100 ono. IC202, £90 ono. Both in good order, comp with orig accessories. G8NUN NOT QTHR. Tel 0935 872089, evenings.

Radio Communication: 1971/3/4 comp; 1968/78 in parts, historical manuals, 1934-51, nominal charge to good home. Proceeds to Scout station. *Wanted:* for same Scout station, Z-Match or KW E-Zee Match for KW2000A. John Hughes, G4KGT. Tel 01-920 8142 for details.

Azden PCS2800 10m fm tx/rx, 10W, comp, as new, £145. Trio 7200G 2m fm tx/rx, 10W, fitted 13ch, vgc, £75. Buyer collects of carriage extra. G3KZU, QTHR. Tel Oxford (0865) 63000.

Strumech std duty (20ft) top section tower, hd unit, gives 25ft total, modified for wall/telegraph pole, post mount, mounting hardware/winch, hinged brackets, pulleys, £140 ono for quick sale. Buyer collects or can arrange shipment at cost. Prefer buyer views. G3HJK, QTHR. Tel 061-437 3045.

Yaesu FRDX400 multimode rx, 160-10m, 6, 2m converters, xtal calibrator, WWV, spkr, manual, spare valves, £125. FT202R handitalkie, fully xtalled, S19-22, R5-6, nicads, NC1 charger, spkr, mic, earphone, telescopic, rubber duck, ae, case, £90. G8VXQ, QTHR. Tel 021-705 3583.

Trio TR9000, as new, mobile mount, £300 ono. IC240, vgc, £130. Six-el cubical quad, £12 ono. G4EXZ NOT QTHR. Tel Bitton 6206.

KW2000B, ac psu, mic, manuals, spare 6146Bs, £175, no offers. Owner abroad, delivery negotiable. Tel Canvey Island (0268) 694017.

Trio TR7200G 2m tx/rx, 22ch, 13 fitted, £120 ono. GW4NBY, 21 Fairfield Road, Bridgend, Mid-Glamorgan. Tel Bridgend 56576.

IC202S, nicads, charger, vgc, for re-sale due to time-waster, £110. FTV 250 with Sentinel preamp, immac cond, £100. G8HBW. Tel 09655 466.

Heath HW12A 80m single bander, mobile/fixed, comp with ac/dc supplies, HP13/HP23 bracket/mic/G-whip ant, spares, £135. Parmeko ht and lt transformers, components. Tel 0292 79245.

Collins linear 382A, psu, manual, £180. Drake T4XB, R4B, psu, 444 mic, £400. TS700S, £350. Wood & Douglas 144SYZ5B, built, tested, BCD switches, £48. MMT28/144, £55. ACCU keyer, ACCU memory, £44. SEM auto hf preamp, £10. G3XPD. Tel 0785 822978.

Trio TS520S, boxed, manual, top band, £340. IC249 Icom, three months old, £138. Heathkit gdo, comp all coils, £28. Goodmans Module 90 tuner amp, £75. G3UCE, QTHR. Tel Heysham 51760, after 6pm.

8XY and Stolle rotator, £60. Mizuho SB2M, one year old, £60. 25W 2m fm pa, switching, £15. G4NEY. Tel St Ives (Cambs) (0480) 66708.

2200GX, charger, soft case, S11, S17, S20-23, R0, R3-7, no mods, nicads, boxed, £90. G3GQR, QTHR.

Icom IC240, in orig packing, accessories, £120. SEM Europa transverter, fitted fan, manual, £35. Three spare QQVO640s, £6. Homebrew 2-10 convertor, neat, internal mains power supply, £10. G4KLX, QTHR. Tel Wirksworth 2037.

SRX30 or SSR1, digital display, unused, £15. D70 morse tutor, as new, £35. Philips 0085 pocket memo recorder, as new, £18. All plus postage. G3BWI. Tel Preston 743098.

2200GX, exc cond, no mods, later model 0·4-2W, orig packing, handbook, soft case, λ/4 whip, helical, nicads, S11, S17-20, S22, R0, R3, R5, R7, hb 10W linear, Modular Electronics design, £115. G4NBW, NOT QTHR. Tel 021-360 3438.

Icom IC22A, fitted preamp, auto toneburst, eight repeater, 16 simplex channels, mic, handbook, mobile mount, connecting leads, vgc, £105. Matching ac psu, 13·8V, 4A, regulated, £15. λ/4 magmount antenna, £5, or the lot, £120. G3HBZ. Tel Tony, Sunbury (093 27) 82262.

KW Vespa Mk2, Shure mic, psu, manual, vgc, £75. Sentinel 2m converter, 28-30MHz i.f., £13. KW2000A dc psu, £14. MCR1 rx, accessory box, chart, ac psu, wkg, £15. G4GEP, QTHR. Tel 0926 613237.

Trio 9R59DE, top cond, manual, £40. German marine rx, E75KMQ, Hagenuk maker, full manual, circuit, four ranges, 1·6-25MHz, +0·250-053, fairly heavy, £35. Grundig Satellit amateur 210, manual, base, all bands to 30MHz, case, bfo, mains units, Ferrograph series six, vgc, £40. Offers on all above. Some books, other bits/pieces, sae for lists. Buyer collects or pays carriage. Pensioner clearing shack. Tel Maidstone (0266) 61327.

Yaesu FT290R multimode portable, six months old, comp with nicads, charger, carry case, homemade 20W amp. 7/8 gutter mount whip, £265 ovno. G4IYA, QTHR. Tel Shorne (Kent) 3172, evenings and weekends.

SMC/KW monitorscope, as new, £40. MM4-10 converter, £15. KW lp filter, £5. Dash mount Westminster, R0, R5, S18, S20-22, automatic toneburst, mobile mount, £60. STC661 on V2 to ATC personnel only, £45. Above items very clean cond. All carriage extra. G3WWL, QTHR. Tel 021-353 8874.

2V panel dvm, four digit, also spare, £10. Decade oscillator Muirhead D890B, 1Hz-111·111kHz Lissajous comparator, £50. 10·7GHz doppler radar, £25. Adjustable ttl pp, 1A current limit, £7. Offers, swaps, w.h.y? G3KPW, QTHR. Tel 0474 62051, evenings.

Microwave Modules MML144/25 2m linear amp with preamp, £35. Antec 2m window clip antenna, £5. Helical antenna for IC202, £2.50. G3ZJF, QTHR. Tel Windsor 68364.

Microwave Modules transverter 432/144R, 2m-70cm with normal and reserve shifts, £150. *Wanted:* synthesized 70cm fm mobile rig C7800, or similar, G4JTR, QTHR. Tel Reading 476873.

National HRO500, fully reconditioned, synthesized gen cov rx, 5kHz-30MHz in 60 500kHz continuous bands, ssb/a.m./cw, 117/220V ac, 12V dc, £220. G3SWC or G3WZT, QTHR. Tel 0403 55832, evenings.

TR7, all filters, fan, PS7 supply, in tip top cond, £950. G5BBD, QTHR. Tel 01-954 4749.

TR2200GX, S20-23, S0, R3, R5-7, £90. Standard C146A handheld, with Basemaster, £80. Advance PM47 psu, 0-15V, 3A, £30. Vibroplex Vibrokey, £30. Kenwood world clock HC10, £50. Scope CT52, cased, £30. G3YMS, QTHR. Tel 032-94 43488, evenings.

MMC, all 28MHz i.f., 70MHz, vgc, £15. 432MHz, £13. 1,296MHz, £22. RTTY terminal unit, works 100 per cent ok, buyer inspects/collects or postage extra. G6GGE. Tel George, 01-747 1506, after 6pm.

G3PLX rtty video display, *Radio Communication* April 1977, keyboard, video monitor, psu, tu, £70 ono. Will split. VDU monitor, less case, wkg, £15 ono. Oscilloscope, double trace, Telequipment D31B, £15 ono. Lots modern junk cheap. G3YYG, QTHR. Tel for details Hemel Hempstead 64025, after 6pm.

10m multimode tx/rx, Belcom LS102, continuous tuning 26-29·999MHz in 1kHz-100Hz steps, digital readout, cw, fm, ssb, a.m., power output 1W, 3W, 10W, mint cond, still guaranteed, orig packing, cost £245, accept £185. G6EXY. Tel Sheffield 664453.

TS515 with PS515, exc cond, £200. G3HLG, QTHR. Tel 0636 72621, working hours, 0636 892384, home.

Lowe analogue rx SRX30, mint cond, £100. FDKTM56B, vhf monitor, 10 xtals, R1-8, S20/22, boxed, comp, £65. P&P extra or collect. Tel 051-924 1312 (Liverpool area).

Drake: R4C; T4XC with AC4 psu; MS4 spkr, £510. KW108 monitorscope, £70. KW107 Supermatch atu (incorporates swr/pwr, dummy load), £70. Datong rf clipper, £35. Datong FL1 filter, £35. Shure 444 mic, £20. Osker block SWR200, £20. Heathkit GD1V grid dip meter, £15. AR40 rotator, buyer collects, £30. KW trapped dipole, 80-10m, £20. Western Alumast, 30ft in three sections, buyer collects, £60. G4MH minibeam, £55. MEL202-25-P linear for IC202, £20. All ono. G4FYS, QTHR. Tel Yeovil (0935) 4773.

FT227RA 2m tx/rx, fitted 25/5kHz steps, scan from mic, automatic toneburst, reverse repeater, four memories, 10W out, very sensitive rx, in mint cond, £175. G8ZNC. Tel David, Garston (Herts) 79567.

Two 9-el Tonna Yagi antennas, £10 each. *Wanted:* Copies of full construction details for UPX4 cavity six valve amp, for 23cm, willing to pay all costs. G4IYA, QTHR. Tel Shorne (Kent) 3172, evenings.

3kW linear, Drake L4B, power supply, 80-10m, can be retuned elsewhere, sensible offers. All letters answered. G3CXX, UMIST Radio Society, UMIST Students Union, PO Box 88, Manchester.

CW filter for FTDX401/501, as new, £18.50. Single keyer paddle, chrome on marble base, £10. G2FDF, QTHR. Tel Weybridge 45214.

WB9LVI sstv converter (built by G3MNQ), third approx orig cost, needs small picture pull fault corrected otherwise ok, offers around £100 minimum. Going QRT on sstv. G2JR, QTHR. Tel 0203 455021.

Eddystone EC10 Mk2 gen cov rx, mains and batt supplies, vgc, very smart, £100. *Wanted:* FT225 (RD), pref with Mutek front end. Printer and monitor for home micro. G4BLT, QTHR. Tel Wakefield 255515.

G3PLX vdu rtty system, tx/rx, flashing cursor, 1k ram memory and keyboard, uhf modulator, £100. Datong UC1, £60. W0LMD sstv keyboard, £70. G3JDO, QTHR. Tel 0632 898239, evenings.

Heathkit equipment: HW32A 20m ssb tx/rx psu, instruction manual, £35; HWDX100V tx, 10-180m, ssb adaptor, £55. Buyer collects or pays carriage. GM4BGA, QTHR. Tel 0334 76161, ext 8398, office hours.

AR88D rx, good wkg order, £35. Oscilloscope, Cossor 1035 dual beam, £15. valve voltmeter, Marconi TF899 150V-2V, £10. All with manuals, G4FFK, Garston House, East Meon, Peterfield, Hants. Tel East Meon 391.

TS830S, a lovely rig but have not the time to make full use of it, £600. SB2M, 2m ssb/cw portable, nicads, charger, £85. Heathkit OS2, oscilloscope, factory built, hardly used, £40. G4CUS, QTHR. Tel Battle 3205.

RTTY and home computer for less than £180. UK101 with 8k ram, 8k rom, two monitors switchable, extended file handling, 300/600 baud switchable, rtty program, computer log program, QRA-distance program, plus others, £175. G8CVO, QTHR. Tel 0204 57775.

FT207R, no mods, nicad, case, strap, helical, manual, £130. NC2 quick charger/ac adaptor for base station operation, £20. Spare nicad, rarely used, free. Will not split. G8MRQ, QTHR. Tel Nottingham (0602) 280252.

Yaesu FT221RD, YC221 digital readout, immac, no mods, £325. GW3KLU, QTHR. Tel 0352 56745 (N Wales).

Icom 240, handbook, mic, etc, new, £115. Sig gen TF390F, £15. Freq meter LM14, £15. 14AVQ, not dismantled, £22. CT54 v/meter, £10. Sky Champion gen cov rx, circuitry, rough, needs rewire, £18. Meters, panel, various, offers. Buyer collects. G3FJ. Tel Waterlooville 52442.

Yaesu FRT7700, atu, £25. Datong FL2 filter, Datong mpu, £65. All new, unused. Browns A phones, 2000Ω, £10. All post free. Cameron, Coombe Cottage, Pitchcombe, Stroud, Glos. Tel Stroud 3081.

FT221R with YC221 digital display, £300. Pye 4m base station, £30. 16X 4027 ram chips, £30. Rhythm box, £20. Watkins Copycat echo unit, £45. Polaroid camera with timer, £8. Cooker hood, £20. Comp shower cabinet, £150. Bonner. Tel Knockholt (Kent) 33296.

RTTY teletype 14 with auto transformer, £15. Creed printing perforator, with 80+80 transformer, £10. Collect or plus carriage. G3OMF, QTHR. Tel 05643 2190.

Yaesu FT107M, latest nine-band, digital, solid-state, DMST107 memory, FP107 internal ac power module, all brand new, boxed, cost over £900, bargain £695. FV107G external vfo, £75. SP107G spkr, £20. YM38 scanning mic, £20. All new. Tel Bournemouth 510400/513764.

FT901DM, comp, mint cond, mobile leads, boxed, £575. Datong FL2 filter, as new, £45. Farnell E350 power supply, switched, metered 0-350V, 0-200mA, £20. G3YEY NOT QTHR. Tel 021-353 9341.

Swan Astro 102BX all solid-state tx/rx, 100W output, £475. PS6 power supply/spkr, £69. G2KF, QTHR. Tel 072 681 2337.

FT290R 2m multimode with nicads, £200. G8DIU, QTHR. Tel 01-644 2719, evenings.

TS120V Trio hf five-band, £300 ono. G8SFM, QTHR. Tel 06668 307.

FDK2700 2m multimode base station, 240/12V 2VFO (one digital) vox, 10m rx built in, 10/1W, many other useful features, £250. G4NFL. Tel Stoke-on-Trent 658827, after 6pm.

Sony ICF2001 radio, £90 or swap for 2m handheld. Sony CR330K radio, £650 or swap for computer, eg TRS80. G6EAA. Tel Howard, Leeds (0532) 672122.

Icom IC720A, purchased for aborted dxpedition, used once, mint cond, extended guarantee, superb rig, dual vfos, ham bands plus gen cov tx or rx, ideal ship-to-shore duplex, simplex, £730. *Wanted:* tilt-over tower. TH33DXX. Tel Brookwood (04867) 6875.

AR8516L rx, exc cond, spare valves, manual, offers please. Buyer collects. Peter Chisholm, RS45276, 141 Stanmore Road, Glasgow G42 9AN.

Jaybeam 8-el Yagi for 2m, rarely used, £10.50. Datong morse tutor, £20. G6GBB. Tel Malcolm, Ashford (Middx) 44966.

FT227R 2m fm, 10W, 5kHz steps, good cond, manual, £125. 70cm converter, 2m i.f., homebrew, £7. G3ZUD, 61 Warwick Road, Broughton Astley, Leicester LE9 6SB.

WANTED

Valves type BW1121J, ESA1500 recs D94 or equiv, as used in rf industrial induction heating machines. G3SMK, QTHR. Tel Earlswood (Warks) 3423, after 7.30pm.

Colour monitor, rgb input. *For sale*: Pye Lynx camera, £30. RTTY terminal unit, new, suitable for computer input (ttl), £45. G8HBR, QTHR. Tel Rossendale (0706) 216701.

Transceiver: KW2000B or E, comp with power supply. G8WTY, QTHR. Tel Malvern 4968.

Books: *"Transmission and propagation"* Vol 5, by Glazier and Lamont; *"Antenna theory and design"* Vol 2, by H. P. Williams; *"Admiralty handbook of Line communication"*; *"Principles of aerial design"* by H. Page. G6GED, 95 Beaumont Road, Plymouth PL4 9EB. Tel 0752 25508, before 7pm.

HRO coil packs, 48-96MHz, 0·9-2·05MHz loudspkr output, trans 7000Ω primary, 3Ω secondary, HRO 21MHz bandspread coil pack. G2VF, QTHR.

FRG7700 rx or similar, in exc cond. O'Brien, G3LP, QTHR. Tel Cheltenham (0242) 512481, evenings and weekends.

Very urgently needed for Heathkit rx: SB300 or SB301 filters 404-202 3·75kHz a.m. FL3, filter 404-202 400 cps ew FL2. Valve compaction ref 6AS11 USA or equivalent manuals for Eddystone rx models 770R, 888 'S' meter 770 rx. GI3RNY, QTHR.

Dynamotor DM33A from command modulator BC456B. *For sale:* Leeds Northrup 9834 dc null meter, £35. General microwave model 451 power meter, £35. Pair Pye Pocketfone 70 switch chargers, diagrams, unmodified, offers. G3JDK, QTHR.

Trio TR9000 and 200W (min) valve linear. Must be in as new cond. G6ATW, QTHR. Tel 0442 41848, after 6.30pm.

Manuals or circuit diagrams for Viceroy 2 and Eddystone 750 for copying. All overheads paid. Any mods. Crawford, 32 Corporation Road, Darlington. Tel Darlington 64361.

8877s withdrawn normally after rated service for dx station. Postal info via G8KA, QTHR.

T&R Bulletins prior to 1930. Also Vol 8. 4CX1000 with base. G4HUE. Tel Andy, 01-554 0399.

Motorized winch for P40 Versatower, prefer 230V but consider 110V. Particulars to G4KDZ, QTHR. Tel 0375 78783.

For the Wireless Museum: old radio magazines, catalogues, books, QSLs, service-sheets, valves, etc. Pre-war Gamages catalogue. Info on Minimitter Mercury. Old multi-line, multi-channel Continental tv. Collection arranged. Details please to hon curator, G3KPO, QTHR. Tel Ryde 62513.

Suitcase or miniature tx/rxs (British, American or Polish), wartime and post-war, any spares, incomplete or damaged sets, orig manuals or associated literature welcomed. RA117E, WS62 (with transistorized psu); ex-Army tx No53 Mk2. Taylor, G3UCT, QTHR. Tel Fleet (02514) 6998.

Recent International Call Book, ARRL handbooks, 4CX250B valves, transmitter valve data, chokes suitable for linear pa for all band (new bands) working, roller coaster tank coils, lists of junk for sale. John Scott, 91 School Road, Meethill, Peterhead, Aberdeenshire.

PSU for Yaesu 301D. G3XMA, QTHR. Tel Coventry (0203) 410208.

7MHz xtals 7,005-7,050kHz, preferably 0·75in pin spacing. 14MHz 14,003-14,075kHz HC6U type. G8PP, QTHR.

General purpose communications rx for new member, broadcast and amateur bands. Pyatt, 23 Arundel Drive, Orpington, Kent. Tel 20281, after 8pm.

RX for 2m fm and/or ssb; or 29·5MHz ssb (ie UOSAT and Oscars), must be vgc. G8APX, QTHR.

Toroidal coils 88mH "open" or American type for rtty tu ST5. Good price paid. *For sale:* two tus, once aligned, £60 ono. Paul Bown, 181 Westford, Alness, Rosshire IV17 0SB. Tel Alness 0349 883858.

Buy or borrow service manual for GEC type RC410 communication rx. Operating manual for Yaesu FRG7700 rx, 40ft tiltover telescopic free standing tower. Tel 0222 491046.

UHF sockets 4CX250 and valves or comp amp. Brass pounder key. Pre- 1925 wireless sets. Xtal sets. Gramophone. Phonograph. Memory keyer. RF speech processor. GW2HIY, QTHR. Tel Holyhead 2763.

HF rx suitable for school radio club (20km S Lincoln), any amateur band rig such as JR310, FR50B etc considered. Could probably scrape together about £90. G4HVC, QTHR. Tel 063-684 450, home, 0400 72422, school.

Ex-WD rx R206 Mk1 (not Mk2), preferably unmodified. Looking for VRL rx. G8LIU, QTHR. Tel Uxbridge (0895) 30006.

400Hz cw filter for Heathkit SB101, Heathkit SB610 monitorscope, Shure 526 hi-Z mic. *For sale:* HP13 dc psu for SB101 with leads, needs new 30A circuit breaker, offers around £25. G3YCP, QTHR Somerset.

Acorn Atom rtty software, Yaesu FTV901 transverter, must be reasonable price. Junkers hand key, all models considered. *For sale:* Yaesu FT221R, £285. FTV101E 2m transverter, plugs straight into FT101E, £80. G4MID. Tel Ted, Mildenhall (0638) 715178, working hours.

Pre-1934 *T&R Bulletins.* Any pre-1960 RSGB publications, callbooks, guides, etc. Price and details to G4HMF, QTHR.

KW Atlanta remote VFO4A, comp, wkg or non-wkg if clean and comp. G8HY, QTHR. Tel Worthing (0903) 61062.

HRO coil pack, 100-200kHz. G3HCO, QTHR.

Icom 720A or similar hf base station required by newly-licensed G4. Tel Sutton Elms 283432, during period 28 January to 14 February only.

Bird Thruline with or without inserts. All letters answered. G4JWY, White House, Eyke, Nr Woodbridge, Suffolk. Tel Eyke 202, afternoons or evenings.

Throat mic, preferably with straps and connecting lead. G4AGQ, QTHR. Tel Farnham (0252) 722649.

Mobile rallies calendar

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

14 March—Pontefract & DARS Components Fair, Carleton Community Centre, Pontefract. Open 11am. Talk-in, on-site parking, licensed bar, refreshments, bring & buy, RSGB publications, more space than last year. Emphasis on build-your-own. Details from G4AAQ, QTHR, tel 0977 71071.
21 March—White Rose RS Rally, now at University of Leeds. Open 11am. Talk-in on S22 and 432MHz. Details from Richard Hughes, c/o Moortown RUFC, Moss Valley, Alwoodly, Leeds 17.
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 and 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, G8SFH, QTHR, tel 06668 307.
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.**
23 May—Barry College of Further Education RS Mobile Rally. Barry Memorial Hall. Further details to be announced. Contact R. V. Belcher, GW8TCF, QTHR.
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.
29 August—BARTG Rally, Sandown Racecourse, nr London. Details from sec Edward Batts, G8LWY, 27 Cranmer Court, Richmond Road, Kingston-upon-Thames, Surrey.

LOWE in LONDON

With an increasing amount of our business coming from the South of England, in particular around the London area we have, for your convenience, opened a shop in the city—not out in the suburbs but only three minutes' walk from Kings Cross Railway Station.

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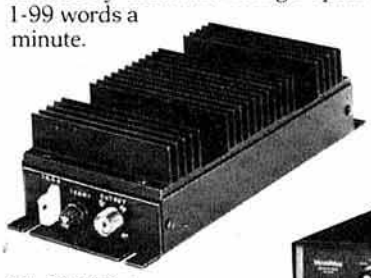

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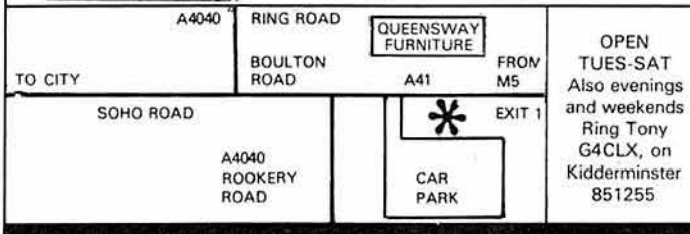

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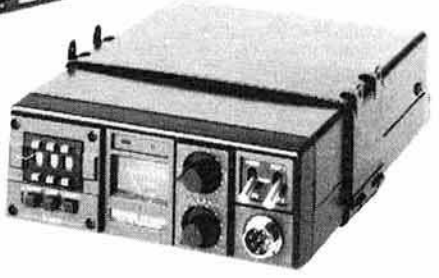

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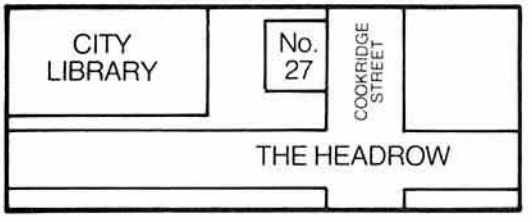

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SP40	New mobile speaker unit	£12.42
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MB100	Mobile mounting bracket for 130V	£17.25
PS30	AC PSU for TS120S, TS130S & TS180S	£88.56
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FM Transmitter (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
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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
TV Modulator (for 70FM05T4)	TVM1	8.10	5.30
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
3W to 10W	70FM3/10	19.75	14.20
Combined Power Amp/Pre-Amp (10W)	70PA/FM10	48.70	34.65
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Bipolar Miniature (13dB gain)	70PA2	7.90	5.95
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RF Switched (25W max)	70PA2/S	21.10	14.75
2M EQUIPMENT			
Transceiver Kits and Accessories			
FM Transmitter (1·5W)	144FM2T	36.40	22.25
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
Power Amplifiers			
1·5W to 10W (FM) (No Changeover)	144FM10A	18.95	13.95
1·5W to 10W (FM) (Auto-Changeover)	144FM10B	33.35	25.95
1·5W to 10W (SSB/FM) (O/P Changeover)	144LIN10A	26.80	19.87
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Low Noise, Improved Performance	144PA4	10.95	7.95
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STANDARD

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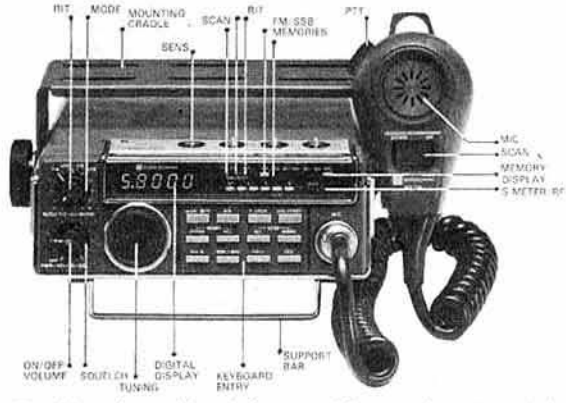

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SYNTHESIZED TRANSCEIVER

144MHz - 25W - 12½kHz

KDK 2025 MkII

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- ★ Memory scanning with hold facility
- ★ Standard ± 600kHz or any repeater split

The KDK FM2025E is a 12V dc two-metre FM transceiver for mobile or base station use. Although feature packed, operational ease is assured by use of a "custom microprocessor".

Digital frequency synthesis provides full band coverage in 12·5kHz steps. "Single knob" frequency selection is by an optically coupled encoder. A dialling speed switch increases tuning steps for rapid QSY's.

A 10 slot memory with Ni-Cad back-up, provides 10 simplex (with ±600kHz shift) and/or 5 semi-duplex channels, making the 2025 as easy to use mobile as a crystal controlled transceiver.

The 2025 embodies the best non-lockout scanner. It scans occupied or empty channels and a flick switch enables immediate transmission. The scanner works on the memories and across any selected portion of the band (the scan limits being defined by the contents of two of the memories). Scan stops only on squelch open *and* centre zero discriminator output.

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The single conversion transmitter uses a balanced mixer and a VCO on the signal frequency (directly modulated for superb FM) and a hybrid power module for 25W (for 3W) RF. The PA is impervious to breakdowns under infinite VSWR.

Necessary control function instructions are programmed into the micro-processor itself. But by re-arranging a diode matrix, the lower frequency transceive limit, the high frequency transmit limit may be altered to allow for changes of band plan or location.

Switchable auto-tone-burst, RF attenuator, squelch, microphone, microphone clip, power lead, mounting bracket, handbook are, of course, part of the package.

Additional features! Two more IC's, four more Tr, 19 more diodes but no increase in price!

★ **£199** INC. VAT AT 15% AND SECURICOR ★

The 2025 is available from the importers or selected dealers

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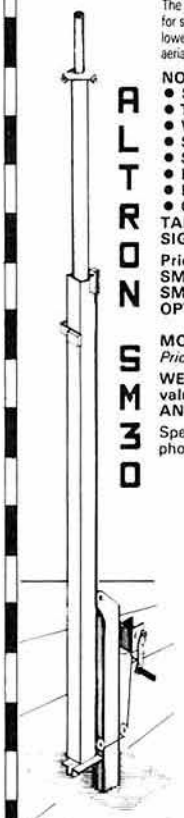
Tel: Totton (0703) 867333

SLIMLINE TELESCOPIC MAST



The SM30, a purpose designed telescopic tiltover mast with a slim unobtrusive silhouette, structured for single winch operation and either wall or post mounting. Extending from about 15ft up to 31ft it lowers down to about 3ft for easy access. It can be self supporting with many small or medium sized aerials or guyed for larger HF or VHF types.

NOTE THESE FEATURES

- SLIM UNOBTRUSIVE SILHOUETTE
- TELESCOPIC AND TILTOVER FOR EASY AERIAL TWEAKING
- WALL OR POST MOUNTING
- SIMPLE ONE WINCH OPERATION
- SAFETY UP LATCH TO RELIEVE CABLE
- HOT DIP GALVANIZED FOR PROTECTION
- ENGINEERED TO B.S.I. STANDARDS
- OPTIONAL ROTOR HEAD UNITS (extra)

TAKE THE STRAIN OUT OF AERIAL RIGGING AND GIVE YOUR SIGNALS A HEAD START WITH THE ALTRON SM30

Prices

SM30WM (Wall mounted)	**£215.50**
SM30PM (Post mounted)	**£225.00**
OPTIONAL RT1 1¾" Reducer tube	**£11.50**
RH1 Rotor Head	**£28.50**
MOBILE TRAILER AT1 for SM30 or others	**P.O.A.**

Prices are incl of VAT and UK Carr. C.W.O.

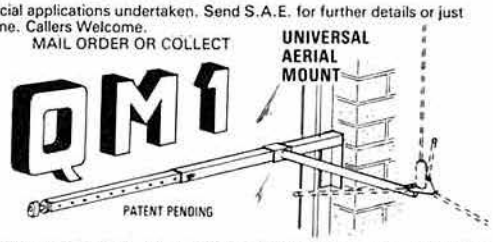
WE DESIGN, WE MAKE, WE SUPPLY DIRECT. You get unbeatable value. WE ARE THE ONLY MANUFACTURERS OF THIS MAST . . . AND OTHER ALTRON PRODUCTS.

Special applications undertaken. Send S.A.E. for further details or just phone. Callers Welcome.

MAIL ORDER OR COLLECT

QM1

UNIVERSAL AERIAL MOUNT



Simple easy fixing, just assemble, adjust to suit opening, extend foot and lock in position. — Up in a Jiff!! No roof climbing!! Suits most windows. 25" to 42" (extensions available). Accepts many types of CB, Amateur or TV Aerial.

Prices: QM1 std. £27.60 inc. VAT. UK P&P £2.00 C.W.O.

Allweld Engineering

FACTORY 6, 232 SELSDON ROAD
SOUTH CROYDON, SURREY CR2 6PL
Telephone: 01-680 2995, 01-681 6734

BNOS

100 WATT 2 METRE LINEAR AMP

1-18 WATTS RF IN 10dB GAIN. LINEAR ALL MODE OPERATION RECEIVE PREAMP 12dB GAIN STRAIGHT THROUGH OPERATION. SIZE 145 × 80 × 165mm

£105 + £3.50 p + p.

PROFESSIONAL STABILISED PSU

13·8V 12/25 AMP CONTINUOUS RATING, OVER VOLTAGE CROWBAR, FOLDBACK CURRENT LIMIT, SHORT CIRCUIT PROTECTED, SHUT DOWN INDICATION, CURRENT METER, REGULATION BETTER THAN 0·1%

12 Amp PSU £74 + £3.50 p&p.
25 Amp PSU £108 + £3.50 p + p.

CONVERTER PROJECTS

10-2 METRE £22.95 } inc case.
10-70 CMETRE £23.95 }

WE ARE PLEASED TO ANNOUNCE THAT WE WILL BE SUPPLYING BUILT AND TESTED VERSIONS OF PROJECTS FEATURED IN THE RADIO + ELECTRONIC'S WORLD MAGAZINE.

NI-CAD BATTERIES

AA SIZE £0.95ea 10 FOR £9
C SIZE £2.20ea 10 FOR £20
D SIZE £3.75ea 10 FOR £35
DISCOUNT FOR LARGER QUANTITIES

BNOS ELECTRONICS
GREENABOUR, DUTONHILL
GT. DUNMOW ESSEX CM6 3PT
TEL (037184) 345

BARCLAYCARD WELCOME

electronics

EUROVER ELECTRONICS

Phone 0621-891755

COAX UR67/RG213 50 ohms, 13·3mm, **53p/m** (6p/m—**£1** min) 60m max. by post
UR76/RG58 50 ohms, 4·95mm, **21p/m** (3p/m—**50p** min)

VALVES

6AJ8	**£1.60;**	6BM8	**£2.70;**	6EB8	**£2.75;**	6HF8	**£4.30;**	12AV6	**£1.75;**
6AQ5	**£1.65;**	6BN8	**£2.25;**	6EH5	**£1.80;**	6HS6	**£4.20;**	12AX7A	**£1.70;**
6AT6	**£1.50;**	6BQ5	**£2.45;**	6EJ7	**£2.61;**	6JB6A	**£3.30;**	12BA6	**£1.59;**
6AU6A	**£1.55;**	6BV8	**£3.60;**	6ES8	**£4.95;**	6JH8	**£3.10;**	12BE6	**£1.75;**
6AV6	**£1.50;**	6BZ6	**£1.75;**	6EV7	**£1.80;**	6JS6C	**£4.10;**	12BY7A	**£1.93;**
6AV11	**£2.85;**	6C4	**£2.95;**	6EW6	**£1.90;**	6KD6	**£4.90;**	12BZ6	**£3.75;**
6AW8A	**£2.40;**	6C10	**£2.90;**	6GE5	**£3.40;**	6KE8	**£2.80;**	12GN7	**£2.50;**
6BA6	**£1.80;**	6CB6	**£1.80;**	6GK6	**£2.65;**	6LQ6	**£3.85;**	0A2	**£1.40;**
6BA7	**£4.20;**	6CL6	**£2.15;**	6GM6	**£2.00;**	6MJ6	**£5.20;**	572B	**£34.00;**
6BE6	**£1.95;**	6DC6	**£1.90;**	6GW8	**£2.55;**	6U8	**£2.80;**	6146A	**£6.25;**
6BJ7	**£1.90;**	6DQ5	**£3.55;**	6GX6	**£1.90;**	12AT7	**£1.80;**	6146B	**£6.00;**
6BL8	**£1.60;**	6EA8	**£2.20;**	6HF5	**£5.75;**	12AU7	**£1.70;**	7360	**£9.20;**

Ask for quote for other types. (P&P **20p** each, free over £15) 8950 **£6.90;**

CONNS

50Ω N Series
Plug for UR67 **£1.00;**
Plug for UR76 **£0.97;**
Skt. for UR67 **£0.83;**
Skt for UR76 **£0.78**
4 hole socket **£0.97;**

50Ω BNC Series
Plug for UR76 **£0.63;**
4 hole socket **£0.50;**

PL259/SO239 Series
PL259 special, UR67 **£1.15**
PL259 special, UR76 **£0.98**
SO239 4 hole socket **£0.45**

(All connectors **50p** order, free over £15)

Mail Orders please (UK P&P in brackets) but callers welcome by appointment

EUROVER LIMITED, Chelmer Close, Little Totham, Maldon, Essex CM9 8JN

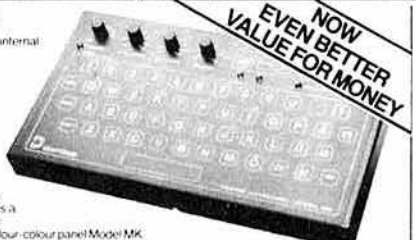
DATONG PRODUCTS

DESIGNED BY ENTHUSIASTS FOR ENTHUSIASTS!

KEYBOARD MORSE SENDER – THE ULTIMATE KEYBOARD – CHECK THESE FEATURES

- CONVENIENCE no need for a power cable four internal pen cells last for 300 hours **and** give continuous memory back up
- EXCLUSIVE COLOUR CODED KEYBOARD DESIGN Separate key switches beneath a tough polycarbonate membrane combine excellent feel with a splash proof wipe-clean surface
- LAVISH MEMORY four 64-character memories with auto-repeat and programmable "pause" function for all the routine sending
- BUFFER MEMORY ensures perfect sending despite less than perfect typing
- COMPREHENSIVE CHARACTER SET includes punctuation procedure signals, accented letters. Plus a "merge" key for making any non-standard character
- BEAUTY AND STYLE only one inch thin and with four-colour panel Model MK looks every bit the thoroughbred it is. Model MK is supplied with output leads and spare connectors but without batteries (four HP7 pen cells)

NOW EVEN BETTER VALUE FOR MONEY



Model MK

MODEL ASP – THE "INTELLIGENT" RF CLIPPER

Model ASP modifies your speech signal direct from the microphone and makes it more effective at modulating your transmitter. The effect is as if the transmitter peak power were to increase by between two and three times. "Intelligent" means that unlike other speech processors, Model ASP automatically senses your voice level and reacts accordingly to always maintain the degree of true r.f. clipping selected (in decibels) by the panel push-buttons. Special circuitry does this without the undesirable side effects of simple a.g.c. devices. Adding a Datong r.f. clipper to a normal SSB transmitter has a similar effect to adding a linear amplifier but without the high cost and risk of TVI

G8's – ARE YOU MISSING OUT?

Unless you can monitor the other bands you are missing a lot. If you have a 2 metre all-mode receiving set up, just add Model PC1 in series with its antenna and you have a superb general coverage receiver. What better way to listen in to all the non-VHF amateur bands, not to mention everything else from 60 kHz to 30 MHz? For sheer value for money there is no better way to get high performance general coverage reception. After all what a waste it is if your expensive 2 metre all-mode rig covers one band only?

Model PC1

ATTENTION VHF SCANNER OWNERS!

Did you know that Model PC1 will extend the coverage of your SX 200 type scanner to include all the long, medium and short wave bands as well? This is an excellent way to listen to your favourite short wave broadcast stations without the extra expense of a complete new receiver.

MINIATURE RECEIVING ANTENNAS

If you don't have enough space to put up traditional receiving antennas, our active antennas are the answer. They need no tuning yet have constant sensitivity from 200 kHz to well over 30 MHz. Results are quite comparable to full size conventional antennas but the space saving is enormous. The indoor version (AD270) is 3 metres long and the outdoor version (AD370) is 2 metres long.

A TV-type feeder cable of any reasonable length can be used yet because the antennas are balanced dipoles any interference picked up by the feeder is rejected. Because of their wide frequency coverage Datong Active Antennas are ideal accessories for modern general coverage communications receivers.

Model AD270

Model AD370

Model DC144/28

YET ANOTHER 2 METRE CONVERTER?

Yes but not **just** another. Model DC144/28 is designed to overcome the overload and spurious signal problems experienced by conventional converters. It uses a Schottky diode balanced mixer with about 7dbm of local oscillator drive. This, coupled with a 3SK88 r.f. amplifier, gives an excellent combination of low noise figure and strong signal handling capability. Its input and output gain controls also help you get the best out of your main receiver without flattening it with excessive gain.

Model DC144/28 is available either as a complete cased unit (die cast box, S0239 connectors) or as a ready built and tested PCB module.

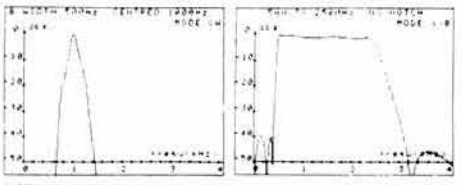
MODEL D70: THE GO-ANYWHERE MORSE CODE TRAINER

For building up your morse code reception speed there is no better method than the Datong "Morse Tutor".

You learn the code with the characters at normal speed but with an extra delay between each one. As you improve you reduce the "DELAY" control until, with it fully reduced, you find you are reading code at the chosen speed and with correct spacing.

An important feature is that the unit is completely portable. This allows you to practise wherever and whenever you find it most convenient. The all-CMOS design gives about 60 hours of practice from a low cost PP3.

Model D70



VARIABLE SELECTIVITY FOR ANY RECEIVER

Have a look at these curves (and the others in our data sheet) and you will see why a U.S. reviewer commented that the FL2 is "incredible – it's like having a tunable crystal filter."*

With Model FL2 connected in series with your speaker you can wipe out off-tune "monkey chatter", unwanted tones and sundry "burbles" from SSB, while for CW the ultra-steep skirts allow you to use wider bandwidths for a given rejection of off-tune signals. This makes tuning easier and reduces listening fatigue.

Model FL2 costs little more than a single special accessory filter yet it offers better performance, extreme versatility, and can be used with any receiver.

*R. S. Dicks, 73 Magazine, July 1981 p 119.

Model FL2

PRICES: All prices include delivery in U.K. basic prices in £ are shown with VAT inclusive prices in brackets.

FL1	59.00 (67.85)	MPU	6.00 (6.90)
FL2	78.00 (89.70)	DC144/28	31.00 (35.65)
PC1	105.00 (120.75)	DC144/28 Module	25.00 (28.75)
ASP	69.00 (79.35)	Keyboard Morse Sender	112.20 (129.00)
VLF	22.00 (25.30)	RFA	25.50 (29.32)
D70	43.00 (49.45)	Codecall (Linked)	24.00 (27.60)
D75	49.00 (56.35)	Codecall (Switched)	25.50 (29.32)
RFC/M	23.00 (26.45)		
AD270	33.00 (37.95)		
AD370	45.00 (51.75)		
AD270+MPU	37.00 (42.55)		
AD370+MPU	49.00 (56.35)		

Products not shown in this advertisement
Model Datest 1 Transistor Tester
Model Datest 2 Transistor Tester
RF Speech Processor Model D75
Model RFC/MRF. Speech Processor PCB Module
Model MPU Mains Power Unit
Accessory Leads
Model VLF
Model FL1

NEW PRODUCTS PREVIEW

Available Shortly

MODEL DF1

Direction finder attachment for FM, VHF receivers/transceivers, gives directional readout on circle of LED's. Connects to loudspeaker and antenna jacks.

BROADBAND PREAMPLIFIER – MODEL RFA

- Wide bandwidth, 5 to 200 MHz, lets Model RFA replace a whole collection of single band amplifiers.
- Low noise figure, high intercept point (+ 25dbm), and moderate gain (9dbs) make Model RFA ideal for improving the sensitivity of HF and VHF transceivers, scanner receivers, PMR, marine VHF, without difficulties with overload.
- RF switched for convenient use with transceivers.
- Solid construction (same die cast case as Models VLF and DC144/28) with S0239 connectors.

Price: £25.50 plus VAT (£29.32 total)
Expected Availability: early January.

"CODECALL" SELECTIVE CALLING DEVICE

The new Datong Codecall adds "selective call" to any radio voice channel. A single self-contained unit at each end of the link sends or receives a coded audio signal. When the correct code is received, the receiver bleeps loudly.

The only connection needed to a transceiver is to the external loudspeaker jack. Sending is via direct audio into the microphone.

"Codecall" allows totally silent stand-by operation yet with confidence that when that specific call comes, you won't miss it.

Over 4000 different codes can be selected by internal link or by three 16-way panel switches, depending on the model. This practically eliminates false alarms.

NOTE: All transmissions must be identified as required by the licence conditions.

Price per unit: Link programmable £24.00 + VAT (£27.60)
Switch programmable £25.50 + VAT (£29.32)

DATONG ELECTRONICS LIMITED

ALL DATONG PRODUCTS ARE DESIGNED AND BUILT IN THE U.K.

Data sheets on any products available free on request – write to Dept R.C.

DATONG ELECTRONICS LIMITED

Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE, England. Tel: (0532) 552461

FOR QUALITY CRYSTALS—AT COMPETITIVE PRICES. POPULAR FREQUENCIES IN STOCK—MADE TO ORDER 10kHz to 225MHz

2 METRE STOCK CRYSTALS. Price **£1.83** for one crystal. **£1.74**/crystal when two or more purchased

	HC6/U 30pF TX	HC6/U 30pF TX	HC25/U 30pF and 40pF TX	HC25/U 20pF and 30pF RX	HC25/U 25pF and 20pF TX	HC6 & 25/U SR RX
R0	4·0277	8·0555	12·0833	14·9888	18·1250	44·9666
R1	4·0284	8·0569	12·0854	14·9916	18·1281	44·9750
R2	4·0291	8·0583	12·0875	14·9944	18·1312	44·9833
R3	4·0298	8·0597	12·0895	14·9972	18·1343	44·9916
R4	4·0305	8·0611	12·0916	15·0000	18·1375	45·0000
R5	4·0312	8·0625	12·0937	15·0027	18·1406	45·0083
R6	4·0319	8·0638	12·0958	15·0055	18·1437	45·0166
R7	4·0326	8·0652	12·0979	15·0083	18·1468	45·0250
S8	–	–	12·1000	14·9444	18·1500	44·8333*
S9	–	–	12·1020	14·9472	18·1531	44·8416*
S10	–	–	12·1041	14·9500	18·1562	44·8500*
S11	–	–	12·1062	14·9572	18·1593	44·8583*
S12	–	–	12·1083	14·9555	18·1625	44·8666*
S13	–	–	12·1104	14·9583	18·1656	44·8750*
S14	–	–	12·1125	14·9611	18·1687	44·8833*
S15	–	–	12·1145	14·9638	18·1718	44·8916*
S16	–	–	12·1167	14·9667	18·1750	44·9000*
S17	–	–	12·1187	14·9694	18·1781	44·9083*
S18	–	–	12·1208	14·9722	18·1812	44·9166*
S19	–	–	12·1229	14·9750	18·1843	44·9250*
S20	4·0416	8·0833	12·1250	14·9777	18·1875	44·9333
S21	4·0423	8·0847	12·1270	14·9805	18·1906	44·9416
S22	4·0430	8·0861	12·1291	14·9833	18·1937	44·9500
S23	4·0437	8·0875	12·1312	14·9861	18·1968	44·9583

SR = Series Resonance. *HC25 only

Also in stock: R0 to R7 and S8 to S23 for following: Belcom FS1007, FDK TM56, Multi 11 Quartz 16 and Multi 7, Icom IC2F, 21, 22A and 215, Trio Kenwood 2200, 7200, Uniden 2030 and Yaesu FT2FB, FT2 Auto, FT224, FT223 and FT202.

Also in stock: 4 and 8MHz TX in HC6/U for 145·8MHz. Icom crystals TX for 145·6MHz (RRO). 44MHz RX crystals in HC6 for 145·8 and 145 (RRO). All at above price.

4 METRE CRYSTALS for 70·26MHz in HC6/U at **£2.25.** TX 8·78250MHz. RX 6·7466 or 29·78MHz in stock.

70cm CRYSTALS in stock 8·0222 and 12·0333 in HC6 **£1.85.** Pye Pocketfone PF1, PF2, PF70 and Wood and Douglas **£4.50** a pair or TX **£2.25,** RX **£2.50,** SU8(433·2) RB0, RB2, RB4, RB6, RB10, RB11, RB13, RB14 and RB15.

CONVERTER CRYSTALS in HC18/U at **£2.85.** In stock 38·666, 42·000, 70·000, 96·000, 101·000, 101·500, 105·666 and 116·000MHz.

TONE BURST AND I.F. CRYSTALS in HC18/U at **£2.25** in stock. 7·168MHz for 1750Hz and 10·245MHz for 10·7MHz I.F.'s.

FREQUENCY STANDARDS in stock **£2.75,** HC6 200kHz, 455kHz, 1000kHz, 5·000MHz and 10·000MHz. HC13 100kHz. HC18 1000kHz. 7·000MHz, 10·700MHz, 48·000MHz and 100·000MHz.

MADE TO ORDER CRYSTALS SINGLE UNIT PRICING

	Price Group	Adjustment Tolerance ppm	Frequency Ranges	Price and Delivery A	B
Fundamentals	1	200 (total)	10 to 19·999kHz	–	£23.00
	2	200 (total)	20 to 29·999kHz	–	£16.50
	3	200 (total)	30 to 99·999kHz	–	£10.50
	4	200 (total)	100 to 999·999kHz	–	£6.00
	5	50	1·00 to 1·499MHz	£9.00	£6.00
	6	10	1·50 to 1·999MHz	£4.75	£4.20
	7	10	2·00 to 2·599MHz	£4.75	£4.00
	8	10	2·60 to 3·999MHz	£4.55	£3.70
	9	10	4·00 to 20·999MHz	£4.55	£3.60
	10	10	21·00 to 24·000MHz	£6.00	£5.40
3rd OVT	11	10	21·00 to 59·999MHz	£4.55	£3.60
5th OVT	12	10	60·00 to 99·999MHz	£5.00	£4.00
	13	10	100·00 to 124·999MHz	£6.15	£5.20
5th, 7th & 9th OVT	14	20	125·00 to 149·999MHz	–	£6.00
	15	20	150·00 to 225·000MHz	–	£7.50

Unless otherwise requested fundamentals will be supplied with 30pF load capacity and overtones for series resonance operation.

HOLDERS—Please specify when ordering—10 to 200kHz HC13/U, 170kHz to 170MHz HC6 or HC33/U, 4 to 225MHz, HC18 and HC25.

DELIVERY. Column A 3 to 4 weeks. Column B 6 to 8 weeks.

DISCOUNTS. 5% mixed frequency discount for 5 or more crystals at B delivery. Price on application for 10 or more crystals to same frequency specification. Special rates for bulk purchase schemes including **FREE** supply of crystals used in UK repeaters.

EMERGENCY SERVICE SURCHARGES (to be added to A delivery prices). 4 working days £12. 6 working days £7. 8 working days £5. 13 working days £3 (maximum of 5 crystals on 4 day delivery).

CRYSTAL SOCKETS HC6/U and HC25/U **16p.** MINIMUM ORDER CHARGE **£1.50.**

TERMS. Cash with order, cheques and postal orders payable to QSL Ltd. All prices include postage to UK and Irish addresses. Please note Southern Irish cheques and postal orders are no longer acceptable. Please send bank draft in pounds Sterling.

PRICES ARE EX VAT. PLEASE ADD 15%

QuartSLab

MARKETING LTD. P.O. BOX 73 SUMMIT HOUSE, LONDON SE18 3LR
Telephone: 01-690 4889 24hr Ansafone: Erith (03224) 30830
Telex: 912881 CWUKTX-G (Attention QUARTSLAB). Cables: QUARTSLAB LONDON SE18

MAIL ORDER

Photo Acoustics Ltd

MICRO COMMUNICATIONS DIVISION

BUDGET ACCOUNT

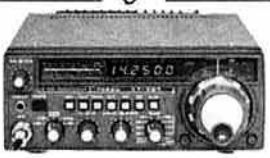
WE ARE AUTHORISED DEALERS FOR:—

APPROVED TRIO DEALER

AUTHORISED ICOM DEALER

FDK

TR-7730



FT-707

IC-251

MULTI-750E

H.F. Transceivers

Trio TS830S	£694.83 (4.50)
Trio TS530S	£534.98 (4.50)
Trio TS130S	£525.09 (4.50)
Trio TS130V	£445.05 (4.50)
Yaesu FT1 (New)	£1295.00 (4.50)
Yaesu FT902DM	£885.00 (4.50)
Yaesu FT101ZDFM	£665.00 (4.50)
Yaesu FT707	£569.00 (4.50)

2 Metre & 70 cms

Trio TS770E	£784.99 (4.50)
Trio TR9000	£374.90 (4.50)
Trio TR7730	£247.94 (4.50)
Trio TR2300	£166.75 (4.50)
Trio TR8400	£334.88 (4.50)
Trio TR9500	£449.88 (4.50)
Trio TR2500	£207.00 (2.50)

2 Metre & 70 cms

Icom IC251E	£499.00 (4.50)
Icom IC290E	£366.00 (4.50)
Icom IC25E	£259.00 (4.50)
Icom IC2E	£169.00 (2.50)
Yaesu FT290R	£249.00 (4.50)
Yaesu FT708R	£219.00 (2.50)
Yaesu FT208R	£209.00 (2.50)
Yaesu FT480R	£379.00 (4.50)
Yaesu FT780R	£449.00 (4.50)
FDK M700EX	£199.00 (4.50)
FDK M750E	£299.00 (4.50)
Azden PCS3000	£219.00 (4.50)

AERIALS: J Beam, Cushcraft, Avanti, Hoxin, Hokushin, G Whip

RECEIVERS

Trio R1000	£297.85 (4.50)
Lowe SRX 30D	£195.00 (4.50)
Yaesu FRG7700	£329.00 (4.50)
Yaesu FRG7700M	£409.00 (4.50)
SX200N	£264.50 (4.50)
R517 Airband Receiver	£49.45 (1.00)

ACCESSORIES

Ferrite rings	£0.40
AR40 Rotator	£65.50
DR7500R Rotator	£107.98
9502B Rotator	£56.50

COMPUTERS

Video Genie I £327.99
PET and APPLE

FULL RANGE OF MICROWAVE MODULES

ACCESSORIES

5 amp PSU Bremi	£11.60 (1.25)
10 amp PSU PP1310	£49.50 (4.50)
20 amp PSU Yaesu	£125.00 (4.50)
FX1 Wavemeters	£33.00 (1.25)
DM801 G.D.O.	£60.03 (1.25)
SP15M SWR & Power Meter	£29.99 (2.50)
AC38M Matcher	£59.00 (2.50)
SP300 1·8-500MHz	£79.99 (2.50)
SP400 130-500MHz	£59.99 (2.50)
CNA 1001 Auto ATU	£129.95 (2.50)
CNA-2002 2·5kW Auto ATU	£228.00 (4.50)
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CN620A Twin Pointer SWR	£52.81 (2.50)
LAR VHF Omni Match	£34.90 (2.50)
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muTek limited's SLNA144s is the better alternative to the previous generation of in-line, rf-switched 2m preamplifiers

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  Noise measure of 1·2dB typical
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Delivery: ex stock

GET MORE UP WITH DL6WU YAGIS

2 × 16 elements for 432MHz providing: approximately 19dBi gain (genuine!) for *only* 210N (22kg) windloading at 160km h ⁻¹!!

With DL6WU yagis from Hamburger-Antennen-GroBhandel you can obtain more real antenna gain per unit windload than with any other 'competitive' vhf/uhf yagi range. By the use of advanced mechanical engineering concepts and materials the strength isn't compromised however, and with HAG's unique 3-year guarantee against structural damage due to corrosion you won't see your antenna investment fade away.

The range

MHz	Length (m)	Eles	3dB beam-width° horiz.	vert.	Windload N at km hr 120	160	Gain dB	Weight kg	Price £
144	1·04	4	55	70	15	26	9·7	0·45	**18.00**
144	2·75	7	44	51	35	63	12·3	0·98	**22.00**
144	4·91	11	35	38	83	147	14·5	2·20	**36.50**
144*	6·72	13	31	33	160	285	15·6	3·70	**55.00**
432	1·55	10	36	40	22	39	14·3	0·68	**30.00**
432	3·10	16	28	30	59	105	16·5	1·69	**33.50**
432	5·06	23	24	25	91	160	17·9	2·10	**38.00**
1296	2·00	26	20	21	42	—	18·1	0·82	**POA**
1296	4·00	48	15·5	16	135	—	20·6	1·41	**POA**

Prices include precision teflon balun where appropriate, but not VAT or carriage.
* This antenna has 8mm dia elements and a 20mm square boom.

Carriage: 2m 4-element £1.50. All others £4.50. This price reflects the cost of shipping the long packages necessitated by HAG's insistence on not compromising structural integrity for ease of shipping.

We now have a new application note on antennas and their gains: an SAE with a request for AN09-81 will bring a copy.

Access BARCLAYCARD VISA

Please remember that all our other products as listed in previous advertisements are still available. By the time you read this we should have preliminary stocks of our new range of 432MHz pre-amplifiers—why not give us a ring for details? Most of our products should now also be available from your local dealer, and if they aren't then ask him why not? *Stephen G8KQB.*

muTek limited — the rf technology company

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BARCLAYCARD VISA

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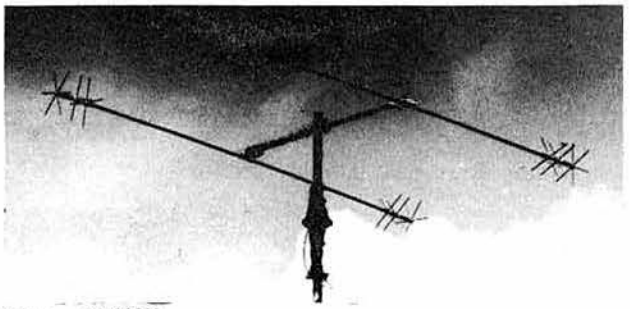

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Members' Ads must be sent to the editor at Chelmsford.

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Amateur Radio Awards (2nd edn)	£3.41	£3.07
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Amateur Radio Operating Manual (2nd edn)	£4.96	£4.46
Morse Code for Radio Amateurs	£1.31	£1.18
OSCAR-Amateur Radio Satellites	£4.50	£4.05
RSGB Amateur Radio Call Book (1982 edn)	£4.71	£4.24
Radio Amateurs' Examination Manual (9th edn)	£3.12	£2.81
Radio Communication Handbook (5th edn) Vol 1 (*Out of print*. A single-volume paperback reprint of Vols 1 and 2 is in preparation)	—	—
Radio Communication Handbook (5th edn) Vol 2	£9.06	£8.15
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Television Interference Manual (2nd edn)	£1.95	£1.76
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QTH Locator Map of Western Europe (wall)	£1.34	£1.21
QTH Locator Map of Europe (card for desk)	69p	62p
UK Beacon List	32p	29p
UK Repeater List	32p	29p
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Miscellaneous		
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Members' headed notepaper (50 sheets) octavo	—	68p

**Delivery approximately five weeks*

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NON-MEMBERS. Use left-hand price columns. Note that members' sundries are only available to members of RSGB.

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PRICES. These include postage, packing and VAT where applicable. For airmail despatch, please ask for price before ordering. Goods are obtainable, less p & p, at RSGB headquarters between 10am and 4pm, Monday to Friday.

POSTAL TERMS. Cash with order. Stamps and book tokens cannot be accepted. Cheques and postal orders should be crossed and made payable to "Radio Society of Great Britain". Giro A/C No 533 5256. Please write your name and address clearly on the order, and allow up to 28 days for delivery.

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Active-filter Cookbook (Sams)	£12.69	£11.42
All About Cubical Quad Antennas (RPI)	£2.92	£2.63
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