May 1983

RADio COMmunication

FOUR MINUTES AFTER THE DOORS OPENED!

Just a few of the 10,000 visitors to the RSGB National Amateur Radio Convention at the NEC

Journal of the Radio Society of Great Britain

RSGB

ANNEE MONDIALE DES COMMUNICATIONS
WORLD COMMUNICATIONS YEAR
AÑO MUNDIAL DE LAS COMUNICACIONES
1983

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MAY 1983

VOLUME 59 No 5

RADio COMmunication

CONTENTS

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Technical articles on subjects of amateur interest are always welcome and should be sent to: The Editor, *Radio Communication,* 88 Broomfield Road, Chelmsford, Essex CM1 1SS.

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

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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the **TR3500** handheld for those seventy centimetre contacts.

Without a doubt one of life's great mysteries to me is why, when the two metre band is at times so busy, few people are to be found communicating on the wide open spaces of the seventy centimetre band.

I have come to the conclusion that misapprehensions exist about the band. The first being the lack of activity. From my first comments you will have gleaned the fact that seventy centimetres is not a busy band, however there are stations on it, myself G8GIY, my colleagues David G4KFN and Roy G8ROR form the nucleus of a UHF group here in Matlock, there are many others like us up and down the country. Seventy centimetre repeaters abound and are a perfect means of communication, their somewhat shorter range serving well their immediate area and, please remember, in the words of that doyen of seventy centimetres Jack G5UM, "Activity breeds activity," simple but true. The second misapprehension is that the equipment is expensive. Not so, the Trio TR3500 costs only slightly more than its matching stable mate, the TR2500, and here again, with the same sensible approach which we have all come to expect from Trio, the accessories which you bought for your TR2500 are compatible with the new TR3500. The appearance, size and weight are similar to the TR2500, output power is 1.5 watts high and 300 milliwatts low, repeater shift is programmable, ten memory channels are provided and frequency scan between operator-defined limits is included. The conventional memory scan and reverse repeater facilities help to make operating a pleasure no matter how difficult the conditions. With the Trio TR3500 handheld as part of your station, you are equipped to expand your operating and begin communicating on the wide open spaces of the seventy centimetre band.

£250.70 inc VAT carr £5.00

and the **TR7930** for the two metre mobile operator.

Any amateur who has used or owns a Trio TR7800 has had the finest piece of 2 metre mobile technology at his fingertips. The TR7800 had simply everything that the keen mobile operator could ever want. Of course, there were a few points which customers said could be improved on and, I must admit, we, in the majority of cases, agreed. Trio, with the introduction of the new TR7930, have taken note of this feedback of information and the result, I am sure you will agree, is as close to perfection as you will find in a rig.

The improvements are, a green floodlit LCD readout which does not disappear in strong sunlight, additional memory channels, both timed and carrier scan hold on occupied channels, selectable memory channel for the priority frequency and automatically corrected mode selection (simplex or repeater) without having to instruct the rig. The most significant change is the liquid crystal frequency readout on a green illuminated background, but closely following this must be the ability to omit specific memory channels when scanning, and the programmable scan between user designated frequencies. This gives the rig the ability to scan simplex channels only, without holding on repeaters.

The Trio TR7930. The mobile 2 metre FM rig designed with ease of operation coupled to outstanding performance.

£305.21 inc VAT carr £5.00

LOWE ELECTRONICS Ltd

CHESTERFIELD ROAD MATLOCK DE4 5LE TEL 0629 2430/2817

Now from Trio, the R2000 general coverage receiver. By taking all the superb features of the R1000 and combining them with the latest in microprocessor control Trio have, in one step, completely revised the standard by which short wave receivers are judged. Among the many features provided for the discerning listener are programmable scan, memory scan, memory retention of the mode set for a particular frequency and last, but not least, Trio have included an FM mode – why FM after all this time and our repeated comment that for a shortwave broadcast receiver FM is not really necessary. Take a look at the rear panel of the R2000: a socket marked VHF converter. Wouldn't it be superb if Trio produced a VHF converter covering from 118 to 174MHz – then you would require FM, you would also require AM. Study the features and I am sure you will agree the Trio R2000 is the receiver for you.

Continuous Coverage from 150kHz to 30MHz
Front panel up/down band switches allow easy selection within the full coverage of the receiver. The VFO is continually tunable throughout the full 150kHz-30MHz range.

All Modes SSB, CW AM and FM

Ten Memories Store Frequency, Band and Mode Data
Each of the ten memories can be tuned by the VFO, thus operating as ten built in digital VFOs. The original memory frequency can be recalled by simply pressing the appropriate memory channel key. All information on frequency, band, and *mode* is stored in the selected memory.
The "auto M" switch allows two types of memory storage: when the "auto M" switch is off, data is memorized by pressing the "M in" switch; when the "auto M" switch is on the frequency being used at that time is automatically memorized.

Memory Scan
Scans all memory channels or may be user programmed to scan specific channels. Frequency, band and mode are automatically selected in accordance with the memory channel being scanned.

Programmable Band Scan
Scans automatically within the programmed bandwidth. Memory channels 9 and 0 establish the scan limit frequencies. The hold switch interrupts the scanning process. However, the frequency may be adjusted using the tuning knob whilst in the scan hold position.

Clock Display with Integral Timer

Three Built In Filters with Narrow/Wide Selector
In the AM mode 6kHz wide or 2·7kHz narrow may be selected. In the SSB mode 2·7kHz is automatically selected. In the CW mode 2·7kHz is again chosen and if the optional YG455C filter is installed then 500Hz in the narrow position. In the FM mode 15kHz bandwidth is automatically selected.

Other important features are: squelch on all modes, noise blanker, a large 4 inch front mounted speaker, tone control, RF attenuator, AGC switch, high and low impedance antenna terminals, 13·8 V DC operation, record jack and, of course, provision for a VHF converter. All in all, a truly remarkable receiver.

£398.92 inc VAT carriage £5.00

"memorable"

the new receiver from Trio.

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George Moore Electronics
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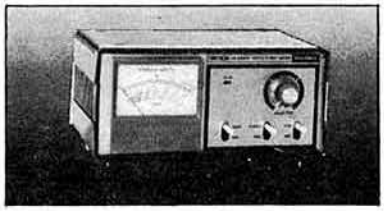
Belfast BT5
Belfast 647570

TRIO

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

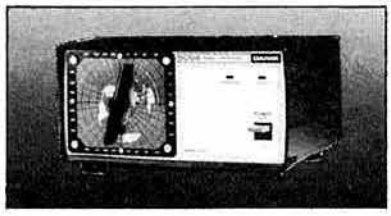
we recommend the DAIWA range.

		Price inc. VAT	Carr.
VHF AMATEUR RECEIVERS			
SR9	2m FM tunable/xtal receiver 144-146MHz	46.00	1.50
SR1000	2m synthesised VHF monitor receiver. Requires no crystals for full amateur band coverage 144-146MHz	72.50	2.25
POWER & SWR METERS			
CN520	1·8 60MHz mini cross needle power/SWR meter	36.50	1.50
CN540	50-150MHz mini cross needle power/SWR meter	39.50	1.50
CN550	144-250MHz mini cross needle power/SWR meter	39.50	1.50
CN620A	1·8-150MHz cross pointer power and SWR meter. Up to 1kW	57.00	1.50
CN630	140-450MHz cross pointer power and SWR meter. Up to 200W	85.00	1.50
CN650	1·2-2·5GHz cross pointer power and SWR meter. Up to 20W	114.00	1.50
CNW419	1·8-30MHz 200W gen. cov tuning unit	130.00	5.00
CNW919	2M power meter and antenna tuning unit	92.00	2.25
CNA1001A	Fully automatic all band ATU. Includes cross pointer power meter	156.00	5.00
CNA2002	As for CNA1001A but 2kW rating for tuner and power meter	228.00	5.00
ANTENNA ACCESSORIES			
CS201/TW2	Two way 50 ohm coax switch. 0-500MHz	13.95	1.00
CS401	Four way 50ohm coaxial switch 0-500MHz	43.50	2.00
ROTATORS			
DR7500X	For HF 3 element beams. Preset controller. 6 core cable	113.72	5.00
DR7500R	As for DR7500X but using the DAIWA round controller	125.00	5.00
DR7600X	Heavy duty. Will take up to 2 element 40m beam. Preset control	163.49	5.00



DR7600R	As for DR7600X but using the DAIWA round controller	176.29	5.00
KS065	Deluxe bearing for fixing stays to rotating mast	19.50	2.00
POWER SUPPLIES			
PS200D	Heavy duty power supply 9-15v 20 amps. Fully metered	118.00	5.00
PS300	Daiwa heavy duty PSU 30A max 22A continuous	135.00	5.00
PSR1250	Daiwa 50A max	338.00	5.00

INFRA-RED MICROPHONE			
RM940	New mobile mic with no connections between mic and rig	45.00	1.50
S9	Spare sensor for RM940 mic system	6.50	0.50
M9	Extra mic for RM940 system	13.00	1.50
F4	Set of four windshields for RM940 mic. Available singly at 75p	3.00	0.50



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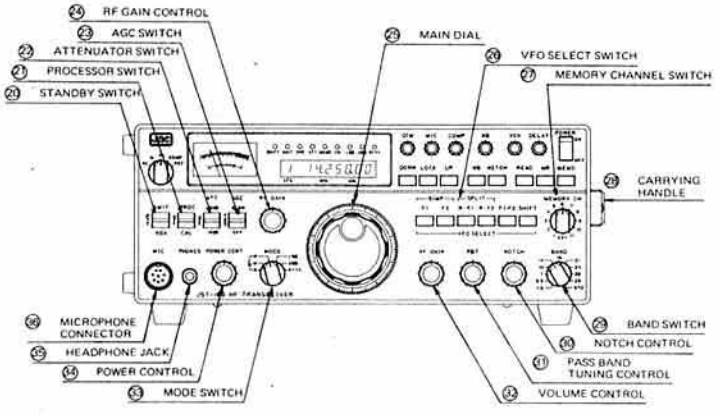
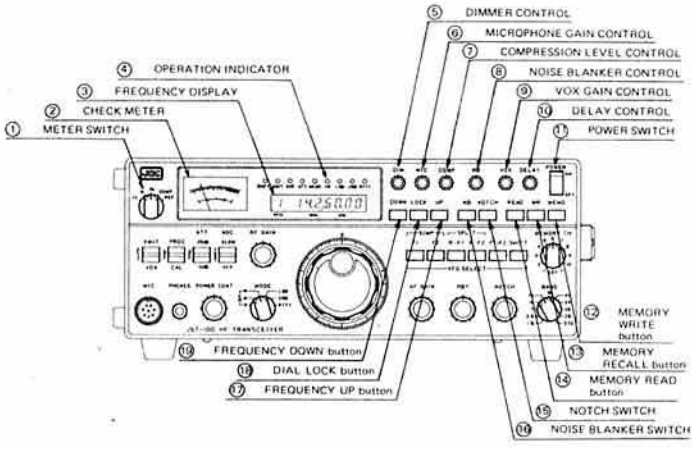
for the hf operator for whom only the best will do, the **JST100** amateur band transceiver.

JRC *Japan Radio Co., Ltd.*





JST100 £998.00 inc VAT carriage £5.00
PSU £149.50 inc VAT carriage £5.00

LOWE ELECTRONICS 03 1029670 1 | Access | BARCLAYCARD VISA | LOWE ELECTRONICS 03 1029670 1 | Access | BARCLAYCARD VISA

OBITER DICTA

Good morning

The first obiter since the NEC—what **a superb Exhibition** and thank you all for coming. The only thing that I can think of that was wrong and I'll get it over with first was **the lack of chairs.** I was listening to

G3BA Tom on 80 metres just after the show in conversation with a chap from Wales, one of the boys from the valleys he was, and complaining in a well-mannered way that "he could not find anywhere to park his bum". **A delightful expression** and instantly noted for this page and one that for me and the rest of the Lowe organisation behind the stand could echo. **Seriously though, top marks for the RSGB** and particularly to the organising team led by **Norman G3MVV.** I am sure that we all feel the need to get away from dubious venues, after all, we should be proud of our hobby and, to my mind, the **RSGB show** at the NEC, ***the* Exhibition Centre** for the country, has lifted the hobby to new heights. Next year **let's all help** to make the show the best in the world. The Germans have **Friedrichshafen,** the Americans the **Dayton Hamfest,** we now have the **"RSGB at the NEC".** More strength to their elbow for next year.

Whilst at the NEC I had a look at the **Jaybeam stand.** What a delight. Neatly set out, a large amount of the range on show, the item which particularly caught my eye and is destined to be at the top of my Strumech tower shortly is the **3 element Tribander. Priced at £189.75** including VAT, carriage £5, the TB3 looks good, is mechanically very sound and I am told by those who use one, is very good. I must admit that my Jaybeam experience is limited to VHF and UHF aerials but I have at all times **found them sturdy** and **good performers.** Remember for Jaybeam antennae, contact Lowe Electronics. Good advice and the best in aerials.

The shortwave receiver ATU, **the KX3** has now immense popularity with **the shortwave enthusiast**—another reliable and well-liked accessory. From Lowe Electronics **the KX3** is priced at **£42.50,** including VAT, carriage £2.25.

Well **we** now **have a shop** in the **North East.** As I write this we have today signed the contract for the shop and I have issued letters of instruction to builders, carpet layers, electricians, etc. Their completion date is the 22nd April.

As you sit reading this I hope **I am in Darlington** welcoming the **first customers** and not still struggling with the contractors. To add to our ever-increasing staff of **ex-Royal Signals men,** I would like to take this opportunity to introduce you to **Don G3GEA.** Out of the **hundreds** of applicants for the job Don has been selected to look after the Darlington Shop, **our venture in the North East of England.** In all sincerity, since I have been spending a considerable amount of time in the North East I have had some **extremely pleasant contacts** with the lads from the area. They all seem pleased that we have set up the shop and we trust that both parties will gain out of the operation. To those visiting the Shop **take along a QSL card** and I am sure Don will find a place for it. For those who do not know Don, **he is a talented artist** and if you stop in the shop long enough he could possibly do a quick thumbnail sketch. That's a new idea for a QSL card. Forget all these **maps of England** with blurred dots in the wrong places. **A personalized QSL card** featuring one's portrait. Of course for XYLs they could go one better: I understand that Don **has a way with a nude!**

The JST100 has arrived and David and I have put one on the air. I hereby record that the first person to be worked by a JST100 transceiver was **Charles G3AWI** from the Nottingham area. A good signal he was on 80 metres and we received a good report. The next contact was **DJ0KN** 5 9 in Germany. A good signal from Harry too but then again it would be, he was using a Trio TS830. Simple to use and a joy to tune the band with. 10Hz readout and all manner of operating features. 2 VFOs, 11 memories, etc, etc. **The most amazing thing** though about the rig is not its features, not its high quality of construction but **its price.** The **JST100** from JRC **is only £998.00,** including VAT. The separate power supply is £149.00, carriage being £5.00. It is amazing to me how JRC have managed to keep the quality of the NRD/NSD line and yet produce a rig within most people's grasp. **The JST100** is not on show in either London or Glasgow at the moment but can be seen here in Matlock but please ring before you journey here so that we may check that one is available for you. A transceiver destined to be a collector's item. **One of those rigs it is a pleasure to own** and to gaze at even when the bands are flat.

Just a word about **"trade in"** deals. We have here at Matlock carefully studied the second-hand equipment market. **We have always accepted items for trade-in against new equipment.** Of course there are companies who only want to sell you a new rig. They have neither the confidence in their judgement or abilities to accept your trusted equipment as part of the sale. **The second-hand shelves** here at Matlock, at Glasgow, London and Darlington are well known and the **source of genuine good quality selected rigs.** Selected because my Managers are instructed to politely reject a rig which they would not buy for themselves. **So how is our trade-in price arrived at?** Simple, over the years I, aided by the sales staff, monitor the selling prices of equipment. We can quickly judge what is a fair and realistic price for a rig. This sets **the market value** of a particular item, its trade in value is this figure less 15% which has to be given to the Government as VAT and less between 5% and 10% additional charge. A figure which enables us to put a **realistic three months' warranty** of the particular item, and is again a percentage which is carefully monitored by ourselves to give **the best deal** for you, our customer. So when you are offered a better trade-in amount than we would allow then just **consider this:** what are you getting, what is missing in the sale because it's not been **"accounted for".** The answer is undoubtedly after-sales "service". So that "good deal" may, in the long term, turn out not to be such a good deal after all.

Two new items for your consideration this month: first the **GP23** which is a **2 metre colinear** based on the well-known and much-loved GPV5 but being three 5/8th sections and having more gain. Secondly, **from Daiwa two models:** a standard selective tone call system and a de luxe version of the same. Contact us here at Matlock for further details and prices of these three new items.

Anyway, that's about it for now as I have just heard a rumour that **the first customer** into the **Darlington Shop** wins a **night out** with **one of our female staff,** all expenses paid, so I suppose I will have to get together some sort of **dossier** on each girl in order that the winner can make his choice wisely.

Until next time, Gud DXes, 73es FBYLS, XYLS, esFBOM, etc.

David

DATONG

NEW

AUTOMATIC NOTCH FILTER MODEL ANF

Why suffer when you don't have to? Model ANF provides the high-technology answer to tune-up whistles and other heterodyne interference to SSB communications. It also features an excellent 4-pole tunable bandpass filter to make life easier on CW.
Connected in series with the receiver's loudspeaker Model ANF continuously searches the audio spectrum for continuous tones. When it finds one it stops the search, locks on, and removes it with a really deep, narrow notch.
The filter's centre frequency is shown on a 10 LED bargraph-type display at all times. You can see at a glance the position of the sweep during the search or the approximate frequency of the interference during "lock".
The display is also useful when using the auto-assisted manual tuning mode or the CW mode.
A built-in compandor system eleminates the need for careful input level setting. The receiver volume control works exactly as normal yet the auto-notch performance and signal-to-noise ratio remain just as good at any volume setting.
Built to truly professional quality standards, Model ANF is available now either direct or via Datong Dealers, price £59 plus VAT (£67.85 total). Send for a free copy of the full data sheet.

COMING SOON

The amazing Datong Automatic Woodpecker Blanker – the star of the recent RSGB show at the NEC.

AUDIO FILTERS
MODELS FL2, FL3, FL2/A

Model FL3 represents the ultimate in audio filters for SSB and CW. Connected in series with the loudspeaker, it gives variable extra selectivity better than a whole bank of expensive crystal filters. In addition it contains an automatic notch filter which can remove a "tuner-upper" all by itself.
Model FL2 is exactly the same but without the auto-notch.
Any existing or new FL2 can be up-graded to an FL3 by adding Model FL2/A conversion kit, which is a Fully tested auto-notch module in P.C.B. Form.
Datong filters frequently allow continued copy when otherwise a QSO would have to be abandoned.

Prices: FL2 £78.00 with VAT £89.70, FL3 £112.50 with VAT £129.37, FL2/A £34.00 with VAT £39.67

GENERAL COVERAGE RECEIVER CONVERTER MODEL PC1

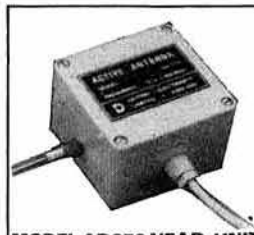
MODEL PC1

Once upon a time it was the norm to use a ten metre receiver to receive the two metre band. Now, large numbers of special purpose two metre SSB rigs are in use and conversion the other way becomes a very attractive possibility.
With the addition of Model PC1 each of these two metre SSB rigs becomes a really good general coverage receiver (from 50 kHz to 30MHz!).
Two metre SSB rigs are not cheap and it makes good sense to get the most out of them. They also tend to have very good performance in terms of sensitivity, selectivity, and big signal handling. Each of these features is just as vital for short wave reception and Model PC1 is designed not to degrade them at all. The result, your two metre SSB rig receives below 30 MHz as well as it receives on two metres. And compared to many medium cost general coverage sets, that is saying a lot!
Try this test. Listen on twenty metres after the band goes dead in the evening. With many general coverage receivers the band never dies. It remains populated with phantoms generated by the receiver from the many very strong signals on forty metres. This is the kind of effect that the higher quality receivers minimise, and that goes for PC1 plus a good two metre rig. Reviews: Rad. Com., April 1982.

PC-1 £119.50 with VAT £137.42

KEYBOARD MORSE SENDER
THE ULTIMATE "MORSE KEY"

- STRAIN-FREE sending: Converts "hunt and peck" typing to perfect morse. Just plug into any key jack and type.
- 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).



MODEL AD370 HEAD UNIT

COMPACT RECEIVING ANTENNAS
MODELS AD270/370

Datong Active Antennas solve the age-old problem of finding space for a 'good' receiving aerial.
Model AD370 mounted on a roof top or Model AD270 in a loft will give similar sensitivity to much larger conventional aerials yet are only 2½ and 3 metres long respectively.
Moreover they do not suffer from interference picked up by the feeder cable; such pick-up can be a problem with conventional dipoles because it is hard to maintain good balance over a band of frequencies.
Although active antennas were introduced to the amateur market by Datong only a few years ago they have long been used by military and commercial receiving stations. The performance specifications achieved by the Datong AD270/370 are very close to those of "professional" active antennas selling for ten times the price – a point which is not lost on our many professional customers.
The advanced design ensures two things: that you don't miss signals through inadequate sensitivity and that the antenna does not invent signals which are not there.
Datong Active Antennas represent an advanced solution to a common problem and so far as we know have no serious competition in terms of performance at the price. (Reviewed in Rad. Com., June 1982).

AD270 £41.00 with VAT £47.15 AD370 £56.00 with VAT £64.40

PRICES All prices include delivery in U.K. basic prices in £ are shown with VAT inclusive prices in brackets.

FL3	112.50	(129.37)	AD370	56.00	(64.40)	Codecall (Linked)	28.00	(32.20)
FL2/A	34.00	(39.67)	AD270+MPU	45.00	(51.75)	Codecall (Switched)	29.50	(33.92)
FL1	69.00	(79.35)	AD370+MPU	60.00	(69.00)	Basic DF System	149.00	(171.35)
FL2	78.00	(89.70)	MPU	6.00	(6.90)	Basic Mobile DF System	159.00	(182.85)
PC1	119.50	(137.42)	DC144/28	34.50	(39.67)	Complete Mobile DF System	214.00	(246.10)
ASP	72.00	(82.80)	DC144/28 Module	28.00	(32.20)	PTS1	39.99	(45.99)
VLF	26.00	(29.90)	Keyboard Morse Sender	119.50	(137.42)	Model ANF	59.00	(67.85)
D70	49.00	(56.35)	RFA	29.50	(33.92)			
D75	49.00	(56.35)						
RFC/M	26.00	(29.90)						
AD270	41.00	(47.15)						

DATONG ELECTRONICS LIMITED

ALL DATONG PRODUCTS ARE DESIGNED AND BUILT IN THE U.K.

Data sheets on any products available free on request –

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AMATEUR ELECTRONICS UK

G3FIK

AUTHORISED YAESU

THE SYMBOL OF TECHNICAL EXCELLENCE

Your number one source for YAESU MUSEN

KEEP AHEAD WITH THE YAESU FT-102!

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

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

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

Commercial Quality Transmitter
Introducing to amateur radio design concepts that have previously been restricted to top-of-the-line commercial transmitters; far above and beyond government standards in both freedom from distortion and purity of emissions.

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

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

New Purity Standard
Three 6146B final tubes in a specifically configured circuit provide a freedom from IMD products and an overall purity of emission unattainable in two-tube and transistor designs.

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

ANCILLARY EQUIPMENT

SP-102 EXTERNAL SPEAKER/AUDIO FILTER
The SP-102 features a large high-fidelity speaker with selectable low- and high-cut audio filters allowing twelve possible response curves. Headphones may also be connected to the SP-102 to take advantage of the filtering feature.

FC-102 1.2 KW ANTENNA COUPLER
1.2KW band-switched L-C pi-network antenna coupler. In-line wattmeter with three ranges (20, 200 and 1200 watts full scale), and "peak hold" system.

FV-102DM SYNTHESIZED, SCANNING EXTERNAL VFO

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.

FT-708R/208R Synthesized UHF/VHF Transceivers

NC-7 - Standard charger
NC-8 - Standard/quick charger/DC Power supply
NC-9C - Compact charger (220-234V)
PA-3 - Car adapter
YM-24A - Speaker/microphone
FL-2010 - 10 watt power amplifier for FT-208R
FL-7010 - 10 watt power amplifier for FT-708R

FT-290R/790R 2m & 70cm PORTABLES

10 memories, 2 VFO's, LCD display, C size battery, easy car mounting tray, FT-290R 0.5 low/2.5 high watts out FT-790R 0.2 low/1.0 high watts out (incorporates speech compressor).

FT-230R/730R 2m & 70cm FM MOBILES

- Two independent VFO's
- 10 memories
- Priority function
- Memory and band scan
- 12.5/25KHz steps (25/100KHz FT-730R)
- Large LCD readout.

FT-480R/780R 2m & 70cm MOBILES

The most advanced 2 metre and 70 cm mobiles available today — USB, LSB, FM, CW full scanning with priority channel, 4 memory channel, dual synthesized VFO system.

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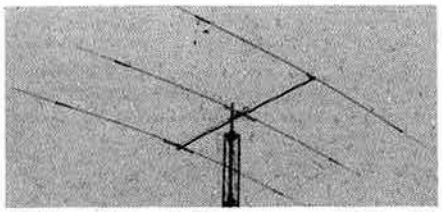
TET ANTENNA SYSTEMS



AX210N	10 ele. yagi for 2m crossed	74.95	(n/c)
HB10F2T	2 ele. 10m mono band beam	51.50	(n/c)
HB10F3T	3 ele. 10m mono band beam	74.95	(n/c)
HB15F2T	2 ele. 15m mono band beam	60.66	(n/c)
HB15F3T	3 ele. 15m mono band beam	93.46	(n/c)
HB15M25P	VP mini size 15m 2 ele.	69.50	(n/c)
HB15M35P	VP mini size 15m 3 ele.	102.30	(n/c)
HB34D	4 ele. tri band beam 10/15/20m	222.90	(n/c)
HB33SP	3 ele. tri band beam 10/15/20m	192.50	(n/c)
HB35C	Tri band array 10/15/20m	283.95	(n/c)
HB35T	5 ele. 10/15/20m	278.50	(n/c)
MV3BH	Vertical for 10/15/20m	37.99	(n/c)
MV4BH	Vertical for 10/15/20/40m	48.90	(n/c)
MV5BH	Vertical for 10/15/20/40/80m	63.95	(n/c)
MLA4	Loop antenna 10/15/40/80	105.60	(n/c)
SQ22	Phased 2 ele. swiss quad 2m	58.95	(n/c)
SQY06	6 ele. quagi 2m	45.75	(n/c)
SQY08	8 ele. quagi 2m	52.75	(n/c)
HB210S	10 ele. dual driven yagi 2m	47.99	(n/c)
TE214	14 ele. long yagi 2m	74.40	(n/c)
SSL720	9 x 2 ele. (18) slot fed 70cm	77.20	(n/c)
HB23SP	2 ele. tri band beam 10/15/20m	135.60	(n/c)
SSL218	9 x 2 ele. (18) slot fed 2m	144.79	(n/c)
TPH2	Phasing harness 2m	17.25	(n/c)
QYU10	10 ele. quagi 70cm	67.90	(n/c)
SQ007	70cm 2 ele. phased swiss quad	66.99	(n/c)
SQ10	Swiss quad 10m	97.50	(n/c)
SQ15	Swiss quad 15m	106.90	(n/c)
YAESU ANTENNAS			
Base			
RSL145GP	½ wave base ant. 2m	21.20	(1.50)
RSL435GP	½ wave co-linear 70cm	31.60	(1.50)
HF Mobile			
RSL3.5	3.5MHz resonator & whip	12.21	(0.50)
RSL7.0	7.0MHz resonator & whip	11.80	(0.50)
RSL14.0	14.0MHz resonator & whip	11.45	(0.50)
RSL21.0	21.0MHz resonator & whip	11.20	(0.50)
RSL28.0	28.0MHz resonator & whip	11.00	(0.50)
RSL2A	Mast to suit above	5.00	(0.50)
RSM2	Gutter mount/Feeder/PL259 suit above	10.94	(0.75)
VHF Mobile			
RSL145	2m ¼ wave fibreglass whip	12.10	(0.50)
RSL145S	2m ¼ wave steel whip foldover	9.25	(0.50)
RSL150SS	2m ¼ wave PL259 shock spring	3.90	(0.50)
RSM2	Gutter mount/Feeder/PL259 (RSL145)	10.94	(0.75)
RSM4M	Heavy duty mag/Feeder/PL259	13.25	(1.00)
UHF Mobile			
RSL453S	½ wave antenna	15.50	(0.50)
ANTIFERENCE ANTENNAS			
VHF Mobile			
TAP3009	½ wave 3db snap-in hinged whip	11.42	(3.00)
TAP3677	½ wave 3db snap-in shock coil	15.64	(3.00)
TAP3002	¼ wave unity gain snap-in hinged whip	8.81	(3.00)
UHF Mobile			
TAP3462	½ over ½ wave 3db	9.89	(3.00)
TAP3697	½ over ½ wave 5db	18.40	(3.00)
K220	Mag mount/Feeder to suit above	10.73	(2.00)

Antennas Various/Accessories			
HQ1	Mini beam 10/15/20m 2 ele. 1kW	TBA	(4.00)
C4	Vertical 10/15/20m	48.50	(3.00)
G4MH	Mini beam 10/15/20	85.00	(4.00)
KTLM-4	Gutter mount/Cable assy. SO239	6.90	(0.50)
DATONG PRODUCTS			
PC1	50KHz to 30MHz receive converter	137.42	(0.50)
VLF	Very low freq. converter	29.90	(0.50)
FL1	Frequency agile audio filter	79.35	(0.50)
FL2	Multimode audio filter	89.70	(0.50)
ASP/A	Auto RF speech clipper (YAESU)	82.80	(0.50)
ASP/B	Auto RF speech clipper (TRIO)	89.70	(0.50)
D75	Manual RF speech clipper	56.35	(0.50)
RFC/M	RF speech clipper module	29.90	(0.50)
D70	Morse tutor	56.35	(0.50)
AD270	Active dipole RX ant. (indoor)	47.15	(0.50)
AD370	Active dipole RX ant. (outdoor)	64.40	(0.50)
MK	Morse keyboard	137.42	(0.50)
DC144/28	2m converter	39.67	(0.50)
RFA	Broadband preamplifier	33.92	(0.50)
MPU	Mains power unit	6.90	(0.50)
MICROWAVE MODULES			
Transverters			
MMT28/144	10m transverter	109.95	(2.50)
MMT70/144	4m transverter	119.95	(2.50)
MMT432/144R	70cm transverter	184.00	(2.50)
MMT1296/144	23cm transverter	184.00	(3.00)
MMT70/28	4m transverter	119.95	(2.50)
MMT144/28	2m transverter	109.95	(2.50)
MMT432/28S	70cm transverter	159.95	(2.50)
Linear Amplifiers			
MML28/100S	10m 100W linear amp.	129.95	(3.00)
MML70/50S	4m 50W linear amp.	85.00	(2.50)
MML70/100S	4m 100W linear amp.	139.95	(3.00)
MML144/30LS	2m 30W linear amp. 1-3W in	69.95	(2.50)
MML144/50S	2m 50W linear amp.	85.00	(2.50)
MML144/100LS	2m 100W linear 1-3W in	159.95	(3.00)
MML144/100S	2m 100W linear 10W in	139.95	(3.00)
MML432/50	70cm 50W linear amp.	109.95	(3.00)
MML432/100	70cm 100W linear amp.	228.65	(4.00)
MML1296/10	23cm 10W linear amp.	199.00	(2.50)
MML432/30	70cm 30W linear amp. 1-3W in	99.00	(3.00)
Converters			
MM1000KB	ASC11 morse converter with keyboard	99.95	(3.00)
MM4001	RTTY to TV converter	189.00	(2.50)
MM4001KB	RTTY transceiver	269.00	(2.50)
MM4000KB	RTTY transceiver with keyboard	299.00	(4.00)
MMC28/144	10m to 2m converter	29.90	(1.00)
MMC50/28	6m to 10m converter	29.90	(1.00)
MMC70/28	4m to 10m converter	29.90	(1.00)
MMC70/28LO	4m to 10m with LO	32.90	(1.00)
MMC432/28S	70cm to 10m converter	37.90	(1.00)
MMC432/144S	70cm to 2m converter	37.90	(1.00)
MMC435/600	UHF ATV converter	27.90	(1.00)
MMC1296/28	23cm to 10m converter	34.90	(1.00)
MMC1296/144	1296MHz low noise converter	69.95	(1.00)
MMK1691/137.5	1691MHz meteosat converter	129.95	(2.50)
Morse Talkers			
MMS1	Morse tutor 2-20WPM Side tone	115.00	(2.50)
MMS2	Morse tutor (advanced) 6-32WPM + speak back	169.00	(2.50)
Amateur TV			
MTV435	70cm 20W (PSP) transmitter	149.00	(2.50)
MMC435/600	Converter ATV UHF output	27.90	(1.00)
Preamplifiers			
MMA144V	2m preamp RF switched	34.90	(1.00)
MMA28	10m preamp	16.95	(1.00)
MMA1296	23cm preamp	34.90	(1.00)
Frequency Counters			
MMD650/500	500MHz digital meter	75.00	(1.00)
MMD600P	600MHz pre scaler	29.90	(1.00)
MMDP-1	Probe	14.90	(0.50)
Filters			
MMF144	2m band pass 40W max	11.90	(1.00)
MMF452	70cm band pass 40W max.	11.90	(1.00)
Various			
MMS384	384MHz signal source	29.90	(1.00)
MMR15/10	15db 10W attenuator	11.90	(1.00)
HI-MOUND MORSE KEYS			
HK702	Up down keyer marble base	24.50	(0.50)
HK704	Up down keyer	16.68	(0.50)
HK705	Up down keyer	12.50	(0.50)
HK706	Up down keyer	13.75	(0.50)
HK708	Up down keyer	11.96	(0.50)
HK808	Up down keyer marble base	39.57	(0.50)
MK704	Twin paddle keyer	10.95	(0.50)
MK705	Twin paddle keyer marble base	22.00	(0.50)
MOULDINGS			
IK	Iambic keyer	19.95	(0.50)

TOKYO HY POWER			
HC150	HF ATU SWR/Power meter 200W PEP	62.50	(n/c)
HC2000	HF 2kW ATU SWR/Power meter 6 POS ant. switch. 6 to 1 vernier high Q coils 2kW peak 1kW continuous	276.55	(n/c)
Antenna Rotators & Accessories			
9502	Channel master med duty up to 8 ele.	57.00	(3.50)
9523	Alignment bearing for 9502	15.81	(1.25)
KR400	Med/Heavy duty 180° meter (inc. lower casting)	90.85	(3.50)
KR400RC	Med/Heavy duty 360° meter Load 200Kg 1¼"-2" masts	114.94	(3.50)
CASTING	Lower casting set (400RC)	15.00	(1.25)
KR600RC	Heavy duty 360° meter Load 200Kg Rot600Kg/cm Brake 4000Kg/cm 1¼"-2"masts	163.30	(3.50)
Antenna Switches			
SA450	SO239 connectors 1 in 2 out	9.75	(0.50)
SA450N	"N" type connectors 1 in 2 out	12.75	(0.50)
Baluns			
BL50A	RAK 50 ohm ferrite BALUN 1:1 1.8-38MHz 1kW	12.88	(1.50)
BL-40X	Balun 2K PEP 1:1	11.52	(1.50)
Dummy Loads			
T30	30W DC 500MHz PL259	6.61	(0.50)
T100	100W DC 500MHz SO239	20.12	(1.00)
T200	200W DC 500MHz SO239	31.36	(1.50)
T210	Wide band 10W 1.2G-2.4G	24.50	(0.75)
AW05	Pocket RF wattmeter 5W up to 500MHz BNC	19.75	(1.00)
Filters			
AKD	Hi-pass blocks 0-200MHz RF interference to UHF above 400MHz	5.50	(0.50)
Linear Amplifiers			
YAESU			
FL110	HF 160/80/40/20/15/10m 100W (10W drive)	155.25	(n/c)
FL2100Z	HF warc 1200w PEP, SSB 1kW CW, 400W AM/FM/FSK	449.00	(n/c)
FL2010	2m VHF 10W linear	54.00	(n/c)
FL2050	2m VHF 50W linear 10W drive	115.00	(n/c)
FL7010	70cm UHF 10W linear	91.00	(n/c)
TOKYO HY POWER			
HL32V	VHF 30W linear 1-5W drive HI-LOW output	53.50	(n/c)
HL82V	VHF linear preamp output meter 2-12W in 35-85+ out	144.50	(n/c)
HL160V	VHF linear preamp output meter 1-10W in 160W+ out	242.40	(n/c)
HL45U	UHF linear preamp 2-15W in 10-45W out	119.75	(n/c)
ADONIS MICROPHONES Mobile/Base			
MM202S	Mobile safety mic. (non scanning)	23.00	(1.00)
MM202HD	Mobile safety mic. (scanning)	30.00	(1.00)
AM502	Desk mic. (compressor selectable)	45.94	(1.00)
Miscellaneous			
Mutec			
SNL144S	2m preamp RF switched	33.90	(1.00)
RPCB	144UB FT221/225 front end board	64.50	(1.25)
Ni-cads			
AA	AA size Ni-cad	1.00	(0.20)
C	C size Ni-cad	2.40	(0.30)
NC1850	Ni-cad charger (4 x C or 4 x AA)	9.50	(1.00)
DRAE PRODUCTS			
DRAE4	4 amp PSU	30.75	(2.00)
DRAE6	6 amp PSU	48.00	(2.50)
DRAE12	12 amp PSU	74.00	(3.00)
DRAE24	24 amp PSU	105.00	(4.00)
DRAE WM	135-450MHz wavemeter	27.50	(1.00)
"N" Connectors (Silver Plated)			
N58	"N" Male connector RG58	2.25	(0.25)
N8	"N" Male connector RG8	2.40	(0.25)
N308	"N" T adaptor (three female)	2.40	(0.25)
N307	"N" L adaptor (1 male 1 female)	2.40	(0.25)
N306	"N" Double female adaptor	1.90	(0.25)
N310	"N" Double male adaptor	2.50	(0.25)
NB304	"N" Female to BNC male adaptor	2.10	(0.25)
N402	"N" Plug to SO239	2.05	(0.25)
N403	"N" Socket to PL259	2.00	(0.25)
N404	"N" Socket to SO239	1.80	(0.25)
Speakers/Headphones			
Various			
RT650	4 ohm, 8 ohm 3W nom 6W max	6.50	(0.50)
MS60	3W nom 5W max	7.50	(0.50)
S2	Headphones (cobalt magnets)	5.75	(0.50)
YAESU			
YH55	Headphones Low Z	10.00	(0.50)
YH77	Lightweight headphones Low Z	10.00	(0.50)
SWR/Power Meters			
YAESU			
YS200		52.90	(n/c)
YS2000		69.79	(n/c)
Other Makes			
RF2000	Twin meter 3.5-150MHz F/Scale 200/2000W	18.25	(1.00)
YM1X	Twin meter 3.5-150MHz F/Scale 12 or 120W	14.99	(1.00)
Sensor 500	1.8-160MHz 5/50/500W	37.08	(1.00)
T430	Twin meter 144-430MHz	34.85	(1.00)
T435	Twin meter 144-435MHz	39.10	(1.00)

Please send your order direct to Dept. MH at our main address below, including carriage charges where applicable and your full delivery address.

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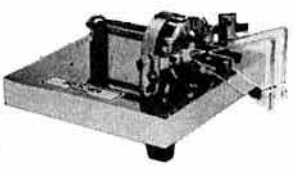

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BY-2 Chrome Base	**£43.72**
BY-3 Gold plated	**£92.00**
ZA-1A Balun	**£15.00**
ZA-2A Balun	**£17.25**
ZY-2 CW Audio Filter	**£57.50**

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The Transceiver others try to copy
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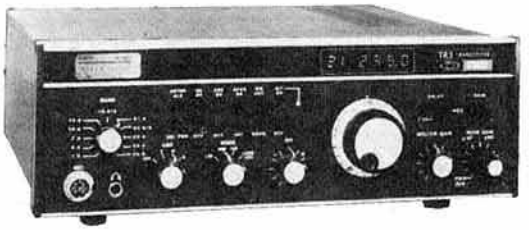
DRAKE TR5



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290H £399. 490E £429. inc.

The recently introduced IC-290H has proved so popular that we have decided to concentrate on this (25W) model 2m multimode. With its bright green display, 5 memories, scan facilities on either memories or the whole band, tone-call button on the microphone and instant listen input for repeaters, this little box really is a beauty. The 70cm version, the IC-490E has similar features (although the output is only 10W in this case). These two multimodes make an ideal pair.

IC-25E £269. inc.

The FM mobile of choice has to be the ICOM IC-25E. It is amazingly small yet has a powerful voice (25 Watts) and a sensitive receiver. There are five easily programmable memories and facilities for changing the repeater shift from the default value of 600kHz. You can tune the VFO while in a memory without losing or changing the memory. Of course you can instantly listen on the input and there are also priority channel facilities should you want to be sure of not missing that private message. The HM10 scanning mike is supplied as standard, but the HM11, with tone call on the mike, can be used.

IC-720A £949 inc.

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

Perhaps one way of dealing with the problem is to look at just What each model offers in its basic form without having to lay out even more hard earned cash on "extras". The IC-720A scores very highly when looked at in this light. How many of its competitors have two VFOs as standard or a memory which can be recalled, even when on a different band to the one in use, and result in instant returning AND BANDCHANGING of the transceiver? How many include a really excellent general coverage receiver covering all the way from 100KHz to 30MHz (with provision to transmit there also if you have the correct licence)? How many need no tuning or loading whatsoever and take great care of your PA, should you have a rotten antenna, by cutting the power back to the safe level? How many have an automatic RIT which cancels when the tuning dial is moved?

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

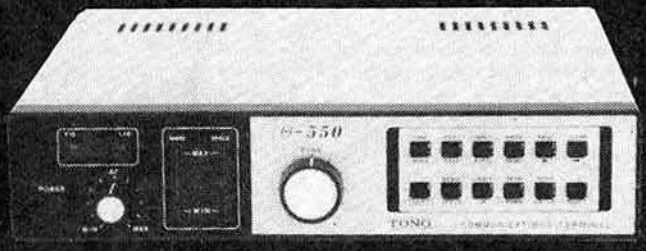
Securicor or post despatch free.

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

CWR-685E £789 inc.

Can YOU read the many RTTY and CW stations to be heard on the air?

Short wave listeners and amateurs are able to take more interest in other modes of transmission than speech with the new ranges of decoders and senders available. As well as amateur transmissions there is loads of interesting news and other broadcasts which can be read using these space-age devices. As UK importers of the renowned TONO and TELEREADER products we can offer you a wide range of devices from a simple morse and RTTY reader which can be plugged into your TV to complete send and receive systems with memories and built-in displays or outputs for a high definition VDU. MR-250 £325, 9000E £699, CWR-670 £289, CWR-685E £789 and CWR-610 £189. Please call us for further details or visit us or your dealer for a demonstration.



Tono 550 - £299 inc.

And remember we also sell **Yaesu, Jaybeam, Datong, Welz, G-Whip, Western, TAL, Bearcat, Versatower** and **RSGB** publications from our shop showroom at the address below.

Come in for a demonstration or just a chat, our qualified sales staff and technicians will be glad to assist you.

Listed below are other sets available from Thanet Electronics, a more detailed specification of these will appear in future advertisements, prices are inclusive of VAT. IC-730 £629, IC-2KL + PSU £1149, IC-SP3 £39, IC-410 £379, IC-AT500 £339, IC-2E £169, IC490 £429, IC-AT100 £249, IC-505 £299, IC-251 £559, IC-45E £289, IC-551 £369, IC-PS20 £139, IC-PS15 £119, IC-ML1 £59, IC-451 £689, IC-4E £199, TONO: MR250 £325, 9000E £669, TELEREADER: CWR-670 £289, CWR-610E £189.

Agents

(phone first – all evenings and weekends only, except Scotland).
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Midlands – Tony G8AVH (021 329-2305)
North West – Gordon G3LEQ Knutsford (0565)4040 Ansafone available

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POSSIBLY THE MOST ADVANCED FM TRANSCEIVER ON THE MARKET! AZDEN PCS-4000

MICROSIZE—ULTRA SENSITIVE—HIGH POWER

Feature:—

- Ultra compact size measuring a tiny 2" × 5½" × 6¾". Ideal for the modern car.
- Frequency coverage 144-146MHz in a choice of either 12½ or 25kHz steps.
- Microcomputer type keyboard offering sophisticated frequency control and back lighted for night operation.
- 16 memories in dual banks with frequency offset storage facility. Memory 1 in each bank may be recalled instantly.
- Remote control microphone with priority memory call.
- Comprehensive scanning facility. One or both memory banks may be scanned. In addition each 1MHz segment can be scanned or upper and lower limits may be set within that 1MHz segment all with 5 second pause.
- High power output of 25 watts with 5 watts low power position.
- Super receiver front end with better than 0.2uv for 20dB quieting. Comprehensive bandpass circuitry.
- Rugged modular assembly assuring many years of reliable service.

£229

SEND FOR COLOUR LEAFLET.

FDK THE NUMBER ONE FM RIG

M700AX NEW

- Full coverage of 144 to 148 MHz in 5kHz steps
- Concentric frequency control selectors—"aircraft style"
- Full 25 watts power output continuously variable down to 1 watt
- Receiver sensitivity better than 0·3μv for 20dB
- Single channel memory frequency instantly programmable
- 1750Hz tone-burst, 600kHz repeater shift, reverse repeater
- Large LED display and illuminated meter
- Complete with mic, mounting brackets, DC leads etc.

£215!

Carriage free

SUPER BUY

FULL FACTORY WARRANTY

ASK FOR WRITTEN CREDIT DETAILS

FDK 2M ALL MODES—NOW EVEN GREATER VALUE

M750X NEW

- Full coverage 144-148MHz in 5kHz and 100Hz steps
- High quality USB, LSB, CW, FM for base or mobile
- Power output 10 watts switchable 1 watt on all modes
- Receiver sensitivity better than 0·3μv/20dB and 0·15μv/10dB
- Dual programmable VFO's, 600kHz shift, automatic tone burst
- Automatic scanning and up/down frequency microphone control
- Complete with mic, mounting brackets and DC leads, etc

£315!

Carriage free

SUPER BUY

FULL FACTORY WARRANTY

WATERS & STANTON ELECTRONICS

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

SP15M POWER METER

1·8-150 MHz Flat
2·5/20/20 Watts
VSWR and power measurements
50 ohm/SO239/0·2dB
VSWR sensitivity - 1·5 Watts
Large, easy to read meter
Accuracy better than 10%

£35

WELZ AC38 HF ATU

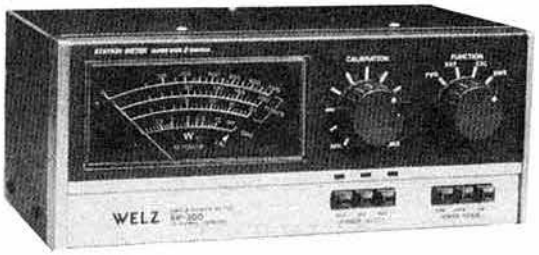
Ideal hf atu
8 bands 3·5-29·7 MHz
Power rating 200W CW 400W PEP
Input 50 ohm SO239
Output 20-300 ohm unbalanced
Insertion loss 0·5dB
Matches all modern transceivers

£65

STOP PRESS!

Back in stock: Sagant hand-held colinear	£23.50
Welz 80M & 40M base-loaded mobile whips	£32 & £37
Sagant EL40X compact 80/40 dipole	£32.00

DELUXE DIRECT READING POWER METERS



WELZ ® RELIABLE & ACCURATE

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SP600	1·8-500 MHz 2kW (HF) 200 watts VHF/UHF 3 power levels 0-20, 200 or 2000 watts 3 ant inputs	£95.00
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SEND FOR COMPLETE CATALOGUE OF WELZ POWER METERS AND AERIALS

TRIO AUTHORISED DEALER FOR SOUTH EAST

FULL RANGE ON DISPLAY

THE EXCITING NEW TS430S

£736

200 watts input.
All solid state.
9 bands + Gen.
Cov. 12V DC

*A new generation of HF transceivers from TRIO ★ SSB, CW, AM plus FM option ★ All mode squelch control ★ Gen. coverage on receive and transmit 150kHz-30MHz ★ Dual VFO's and 8 memory channels ★ programmable band scan ★ IF shift and tuneable notch filter ★ speech processor etc, etc. We could go on but maybe you should send for full details or come and see our demo model in action.

THE ULTIMATE TS930S HF RIG

£1216

250 watts input.
9 bands + Gen.
Cov. 12v DC/230v AC
Variable selectivity

*The big daddy of them all ★ completely self contained all solid state HF rig ★ Gen coverage 150kHz to 30MHz ★ SSB CW AM ★ Dual VFO's and 8 memory channels ★ Full break in operation ★ Comprehensive receiver selectivity control for both CW and SSB ★ Notch filter and audio filter ★ speech processor plus many more features ★ Send for leaflets.

TRIO'S TOP OF THE LINE RECEIVER R2000

£398

150kHz-30MHz
12v DC/230v AC
10 Memories
SSB-CW-AM-FM

★ A beautiful receiver designed for the serious listener ★ squelch on all modes ★ noise blanker ★ built in speaker ★ Send for full colour leaflet.

NEW PRODUCT STATIC PROTECTOR

CA-35A

£10.75
(post 75p)

Connects in antenna coax line and protects rig from static build-up on antenna system. Another great idea from WELZ.

GO MOBILE WITH TR9130 25 WATTS

★ Trios latest all-mode transceiver for 2m is proving a real winner
★ The extra power puts you head and shoulders above the competition
★ 25W FM - SSB - CW ★ 25, 12½ and 1kHz steps on FM ★ 5kHz and 100Hz steps on SSB.
★ Band

£433.00

NEW! 5 BAND CP5 Compact Vertical

10-80M 200W
"A vast improvement over its competitors"

A new exciting product from Welz. The CP5 is a truly superb 5 band aerial system where space is at a premium. Capacity loading and individually tuned radials ensure maximum performance and bandwidth. Height 14ft. approx.

£115

TRIO TS830S—A COMPLETE HF PACKAGE

£697

9 bands
100 watts output
230V AC

★ This well established transceiver has a host of features and a very attractive price tag! ★ 160-10m SSB -CW ★ Rugged valve PA and high performance receiver ★ speech processor ★ variable selectivity ★ very effective notch filter ★ variable noise blanker ★ built-in mains power supply. We can thoroughly recommend this transceiver as a top performer.

All prices were correct at 7/4/83 but exchange rates may make further revision necessary

SMC SERVICE: FREE FINANCE, FREE CREDIT COVER, GUARANTEE

Earning the title "The Communicators" in the amateur, commercial and marine fields was not gained easily, and we guard our reputation as jealously today, as we did a quarter of a century ago. Maintaining our reputation requires service with a capital 'S'. We offer free Securicor delivery on major equipment, take Access and Barclaycard over the phone, and have superb demonstration facilities.

On many regular priced items for an invoice over £120 we provide *free finance*, 20% down (balance over 6 months) or 50% down and the balance over a year; *you pay no more than the cash price*. Where this service is not available we have taken the worry out of finance: enter a personal loan agreement—remember the deposit can be as low or lower than your monthly instalments—for 12 months to 3 years (at a typical APR rate of 31·8%) and in the event of sickness, accident, compulsory redundancy or death *your credit is covered by SMC*. If you have a card (Access, Barclay or Bankers), or a UK call sign (bring your license with you, or show us the call book entry), it's *INSTANT*.

Should you need a radio repaired, remember we have our own expertly manned service department, equipment with over a hundred thousand pounds of spares and test equipment, and as the importer of most of our merchandise we are in daily contact with the manufacturer.

We are proud to be the largest representative in Europe of Yaesu Musen of Japan who produce the most diverse line of amateur radio equipment in the world. With them, communications is their only business not a sideline, thus providing you with premium products at the forefront of technology.

We are also proud to be chosen as UK representatives by such fine manufacturers as The Japan Radio Company, KDK, Nag, Hansen, Kenpro, TTE, Leson, Telewand, Dengineer, Comet, Fitlay, and Hokushin of Japan, plus HyGain, CDE, Van Gordon, Gem Quad, Channel Master, Mirage, ETO, Dentron, MFJ, and KLM from the Americas.

The items illustrated here form only a tiny fraction of our range: 200 stock lines of Yaesu Musen equipment, 600 different antennas, masts, rotators, coaxes, etc., etc., plus 300 general items of communications equipment, selected as offering the best value in the world from; Jaybeam, Mini Beam, G4MH, Mosley, G-Whip, Bantex, Ascot, Strumech, Microwave Modules, JIR, Bearcat, Delica, Ashidavox, Hi Mound, ICS, Datong, RSGB publications amongst others.

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SMC, your single stop source.

JST100 from JRC

FREE SECURICOR

- ★ 160-10 Metres (inc WARC) plus stand service Rx.
- ★ SSB, CW, FSK, 100 Watts output (adustable).
- ★ 2, 10Hz steps, digital variable frequency oscillators.
- ★ Split frequency or cross mode single frequency operation.
- ★ 3 PLLs (inc BFO) locked to 10MHz reference.
- ★ 11 Channel memory retains operating freq. and mode.
- ★ Listen on memory (fix Tx on VFO), microcomputer control.
- ★ Display of memory contents during operation. Up/down/lock.
- ★ Pass band tuning, tuneable notch, 10-20dB attenuator.
- ★ Adjustable noise blanker, switchable AGC, calibrator.
- ★ Adjustable RF output, RF speech processor, Vox.
- ★ Comprehensive metering including compression level.
- ★ Small 300(W), 327(D), 130(H), (mm). 10kg.

NBD500	Mains PSU.	**NFG97**	ATU
NVA88	Ext. speaker.	**CFL260**	600Hz filter
CHG43	Desk mic.	**CFL230**	300Hz filter
CHG44	Hand mic.	**KY3A**	Morse key

FT ONE £1,349 inc. VAT @ 15% & SECURICOR

* Option

FREE FINANCE

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

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FT980 £1,115 inc VAT @ 15% & SECURICOR

INSTANT HP

- ★ Notch filter in IF (AGC immune to hetrodynes).
- ★ Full break in keying. 500/600/700Hz beat.
- ★ Unique analogue scale of digital type.
- ★ Comprehensive twin meter metering.
- ★ Memory retains mode information.
- ★ Rx 150kHz-30MHz.
- ★ Tx 160-10m 9 bands + 3 × 500kHz Aux bands.
- ★ All modes AM, CW, LSB, USB, AFSK, FM standard.
- ★ IF shift + variable bandwidth 2·6kHz-300Hz.
- ★ Inbuilt keyboard operation + Scanning.
- ★ Switchable attenuator 10, 20, 30dB.
- ★ Audio peak + notch filter – 40dB.
- ★ RF process or Auto mic gain control.
- ★ 3rd order IMD – 40dB at 100W PEP.
- ★ AFSK shift 170, 425, 850Hz selectable.
- ★ Multi channel memory + programmable scan limits.

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 included.
- ★ Digital plus analogue frequency displays.
- ★ VOX built-in and adjustable.
- ★ Instant write in memory channel.**
- ★ Tune up button (10 sec, of full power).
- ★ Switchable AGC and RF attenuator.
- ★ Optional 350 or 600Hz CW, 6kHz AM filters included.
- ★ Clarifier (RIT) switchable on Tx, Rx or both.
- ★ Plug in modular, computer style constructor.
- ★ Fully adjustable RF Speech processor.
- ★ Ergonomically designed with necessary LEDS.
- ★ Incredible range of matching accessories.
- ★ Universal power supply 110-234V AC and 12V DC.**

'PLASTIC' BY PHONE

*Option ** D & DE Models

FT102 £785 inc. VAT @ 15% & SECURICOR

FREE CREDIT COVER

- ★ 1.8-3.5-7-10-14-18-21-24.5-28MHz
- ★ All modes: LSB, USB, CW, AM†, FM†, (†Option board)
- ★ Front end: extra high level, operates on 24V DC
- ★ RF stage bypassable, boosts dynamic range over 100 dB!
- ★ Variable bandwidth 2.7KHz→500Hz *and* IF Shift
- ★ Fixed bandwidth filters, parallel or cascade
- ★ IF notch (455kHz) *and* independent audio peak
- ★ Noise blanker adjustable for pulse *width*
- ★ External Rx and separate Rx antenna provisions
- ★ *Three* 6146B in special configuration – 40dB IMD!
- ★ Extra product detector for checking Tx IF signal
- ★ Dual meter, peak hold ALC system
- ★ Mic amp with tunable audio network

SP102: – Speaker, Hi and Lo AF filters, 12 responses!
FV012: – VFO, 10Hz steps and readout, scanning, QSY
FC102: – ATU, 1·2KW, 20/200/1200 W FSD PEP, wire
FAS-1-4R: – 4 way waterproof antenna selector

FT101Z £559 inc. VAT @ 15% & SECURICOR

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

SPECIAL OFFER

Buy any FT101Z and you get a free FV101Z VFO worth £112.00 (Limited number available)

FT101Z AM Board Special Price £11.00 inc. VAT and postage

*Option

FT707 £509 inc. VAT @ 15% & SECURICOR

2 YEAR GUARANTEE

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

*Option

SMC FM MODIFIED VERSION AVAILABLE; £40 EXTRA

FT230R £239 inc

VAT @ 15% & CARRIAGE

- 144-146MHz (extensions possible).
- 25W RF output, 3W on low.
- 25 and 12½kHz steps provided.
- ±600kHz repeater split, 1750Hz burst.
- Tx; 5A. Rx 300mA (standby).

- 150(W) × 50(H) × 176(D)mm.
- Up/down, memory/band scanning.
- Easy "write-in" memory channels.
- Memory backup "5 year" lithium cell.
- Ten memories with priority functions.
- Supplied with scanning microphone.
- Illuminated "any angle" LCD display functions.
- Display to 100's of Hz.
- Two completely independent VFO's.
- Operation between memory and VFO.
- Full reverse repeater function.
- Manual and automatic tone burst.
- Large "full sound" internal speaker.
- Concentric volume and squelch.

2 or 70!

- 430-434MHz (440-445MHz possible).
- 10W RF output, 1W on low.
- 25 and 100kHz steps provided.
- ±1.6 MHz repeater split, 1750Hz burst
- Tx 3A, Rx 300mA (standby).

FT730R £285 inc

VAT @ 15% & SECURICOR

'790 EX-STOCK

- Multimode USB, LSB, FM, CW
- Optically coupled main tuning
- 100Hz backlit LCD Frequency display
- 10 memory channels "5 year" backup
- Any Tx/Rx split with dual VFOs
- Up/down tuning from microphone
- AF output 1W @ 10% THD
- Bandwidth 2·4kHz and 14kHz @ −6dB
- LED's, "on air", "busy" m/c meter; S.PO
- 58 (H) × 150 (W) × 195 (D). 1.3kg

SMC8C	Slow Charger (220mA)	£8.80
MMB 11	Mobile Mount	£22.25
CSC1A	Soft carrying case	£3.45
FL2010	Linear Amplifier 2m 10W	£59.00
FL7010	Linear Amplifier 70cms	£91.00

6, 2 or 70!

FT290R £265 inc

VAT @ 15% & POSTAGE

- 144-146MHz (144-148 possible)
- 2.5W PEP, 2.5W 300mW out or FM
- FM: 25kHz and 12.5kHz steps
- SSB: 1kHz and 100Hz steps
- ±600kHz repeater split, 1750kHz burst
- Integral telescopic antenna
- Rx, 70mA, Tx; 800mA (FM maximum)

FT790R £325 inc

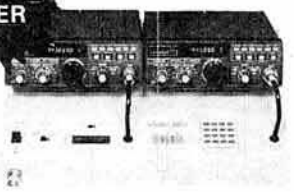
VAT @ 15% & POSTAGE

- 430-330MHz (440-450 alternative)
- 1W PEP, 1W/250mW FM/CW out
- FM: 100kHz and 25kHz steps
- SSB: 1kHz and 100Hz steps
- 1·6MHz shift with input monitor, 1,750Hz burst
- Rx: 100mA/200mA. Tx; 750mA maximum
- BNC Mounted ¼λ flexi antenna included

FT480R (2m) £369 inc

VAT @ 15% & SECURICOR

SPECIAL OFFER



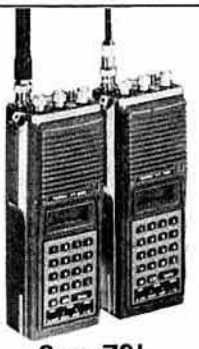
- USB-LSB-CW-FM (A3j, A1, F3)
- 30W PIP A3j, 10/1 W out A1 F3
- Any TX Rx split with dual VFO's
- Four easy write-in memory channels
- Memory scanning with slot display
- Up/down tuning/scanning from mic.
- Priority channel on any memory slot
- Digital RIT. Advanced noise blanker
- Satellite mode allows tuning on Tx
- 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
- LED's; "On Air", Clar, Hi/Low, FM mod.
- Size (Case): 8.3" D, 2.3" H, 6.9" W

- FT780R 1·6 fitted 1·6MHz Shift **£409** inc.
- 430-440MHz (440-450) possible
- GaAs Fet RF for incredible sensitivity
- FM; 100kHz, 25kHz, 1kHz, steps
- SSB; 1,000, 100, 10Hz steps

FT480R R.I.P.!

Sadly Yaesu has discontinued the FT480R. As a mark of respect on this dark occasion, to complete your VHF/UHF station, if you originally bought your FT480R from S.M.C. and you buy a FT780R we will give you a free SC1 matching station consol/power supply worth **£134.00**. Alternatively, anyone buying a FT780R will get a free FP80A matching power supply worth **£55.00**.

- Keyboard entry of frequencies/splits
- LCD digital display with backlight
- Any split + or − programmable
- Ten memory channels "5 year" back up
- Up/down manual tuning. Memory scan
- Manual or auto scan for busy/clear
- Priority channel with search back
- Scan between any two frequencies
- Auto scan restart. 1,750Hz tone burst
- Built in condenser microphone
- 500mW to int/ext speaker
- External speaker/mic available
- 168(H) × 61(W) × 39(D)mm
- C/w Quick change NiCad pack, helical



2 or 70!

FT208R £209 inc

VAT @ 15% & POSTAGE

- 144-146MHz (144-148 possible)
- 12.5/25kHz synthesizer steps
- ± 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

FT708R £229 inc

VAT @ 15% & POSTAGE

- 430-440MHz (440-450 alternative)
- 25kHz synthesizer steps
- ±7.6MHz EU split standard
- 1W or 100mW RF output
- Rx 20mA squelch, 150mA (max AF)
- Tx:500mA it 1W RF
- 0.4μV for 12dB SINAD

2 and/or 70!!

- 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 LED's for 'S' and PO. 7 status LEDs
- 1½W of audio to internal/external speaker

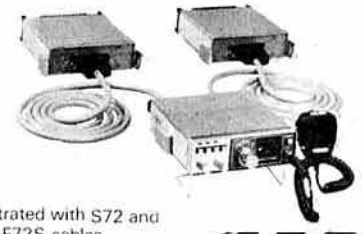
FT720 Control Head

- 3.3 (4.3)" D × 6" W × 2 (2.2)" H

S72 Switching box

- Pushbutton band change Auto steps/splits

E72S Extension cable, 2m long
E72L Extension cable, 4m long
MMB3 Mobile Mounting bracket for deck



illustrated with S72 and two E72S cables

FT720RV £199 inc

VAT @ 15% & SECURICOR

- 144-146MHz (144-148MHz possible)
- 12½kHz synthesizer, 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

- 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

FT720RU £229 inc

VAT @ 15% & SECURICOR

★ THE FT7B IS DEAD! LONG LIVE THE FT77! ★

The FT77 is an all new 80-10m (inc. WARC) 100 Watt, transceiver, ideal for mobile (no tune, inbuilt SWR meter, only 3¾" × 9½" and less than a foot deep—including heat sink!) or as the heart of a base station with its compatibility with the FTV707 transverter (N.B. FM option available), and the FV707DM digital external memory VFO etc. Operational simplicity is the keynote of this design, nevertheless features demanded by today's discriminating amateurs have not been neglected including dual selectable noise blanker pulse widths (eliminates woodpecker or impulse noise) and optional narrow CW filter. The FT77 is the perfect first rig or second transceiver for an OT. Computer aided design of circuit board for efficient component layout, automatic parts insertion for high reliability at low cost:

FT77	Transceiver 100W	**£475·00**
FT77S	Transceiver 10W	**£359·00**
MARK77	Xtal marker board	**£7·65**
FMU77	FM unit	**£23·75**

COMMUNICATION RECEIVER: NRD515 £985 inc VAT @ 15% & SECURICOR

- ★ 30MHz to 100kHz or lower, 100Hz steps.
- ★ PLL digital VFO, stable (50Hz/hr AWU).
- ★ Backlash free, 500Hz analogue calib.
- ★ Fast tune up/down switch, dial lockout.
- ★ SSB (USB/LSB), CW, AM, RTTY.
- ★ 6 and 2.4kHz, 600* and 300* Hz @ −6dB.
- ★ Passband tuning ±2kHz on SSB and CW.
- ★ Variable BFO on CW for preferred tone.
- ★ Modular plug in design with mother board.
- ★ Reliable—low power schottky & CMOS.
- ★ Designed for maximum ease of operation.
- ★ Noise blanker 0-10-20dB attenuator.
- ★ Small (140 × 340 × 300mm) light 7½Kg.

PROFESSIONAL MONITOR

- ★ Up conversion, 70.455MHz and 455kHz
- ★ No R.F. amplifier, balance U310 mixer
- ★ Crystal filter before first IF amplifier
- ★ Transceiver provisions; sidetone, trip etc.
- ★ Frequency data input/output port.

NHD518	96 (4 × 24) channel memory unit.
NCM515	Remote frequency keypad controller, LCD readout. 4 channel memory Up/down step tuning.
CQE515	Junction unit (NCM515 to NHD518).
NVA515	External 3W speaker.
CFL260	600Hz mechanical filter
CFL230	300Hz crystal filter

★ NEW—FT726R, 3 BAND, MULTIMODE, VHF/UHF ★

The FT726R is a revolutionary combination of a full feature VHF/UHF transceiver with the deluxe facilities (which you have always wondered why were only available on HF transceivers) such as IF shift and variable bandwidth for SSB and CW operations plus a full duplex option for the ultimate cross band and satellite transceiver!
The transceiver main frame accepts 3 modules, 2 metres (standard), 430-440MHz and 6 metres (options). Modes catered for are SSB-CW-FM with optimum provisions made for each: 20Hz steps for SSB/CW, selectable steps for FM (also preset and programmable repeater splits), plus a A & B VFO system with 10 memory channels. Surely the development of the decade in VHF/UHF transceiver technology.

FT726R(2)	Transceiver inc. 145Mhz	**£649·00**
SAT726	Full duplex unit	**£82·80**
430T726	430-440MHz module	**£208·90**
50T726	Six metre module	**£157·15**

RECEIVER WITH 12 MEMORIES: FRG7700M £399 inc VAT @ 15% & SECURICOR

- ★ 30MHz down to 150kHz (and below).
- ★ 12 Channel memory option with fine tune.
- ★ SSB (LSB/USB), CW, AM, FM.
- ★ 2·7kHz, 6kHz, 12kHz, 15kHz, @ −6dB.
- ★ 3 Selectivities on AM. Squelch on FM.
- ★ Up conversion, 48MHz first IF.
- ★ 1kHz digital, plus analogue, display.
- ★ Inbuilt quartz clock/timer.
- ★ No preselector, auto selected LPF's.
- ★ Advanced noise blanker fitted.
- ★ Antenna 500Ω to 1·5MHz, 50Ω to 30MHz.
- ★ 20dB pad plus continuous attenuator.
- ★ Switchable A.G.C. Variable tone.

'7700 THE ONE WITH FM!
NON-MEMORY VERSION £335

- ★ 110 and 240Vac, 12Vdc option.
- ★ Signal meter calibrated in "S" and SIMPO.
- ★ Acc; Tuners, Converters, LPF, Memory.
- ★ FRT7700; 150kHz-30MHz, Switch, etc.
- ★ FRV7700A; 118-130, 130-140, 140-150MHz.
- ★ FRV7700B; 118-130, 140-150, 50-59MHz.
- ★ FRV7700C; 140-150, 150-160, 160-170MHz.
- ★ FRV7700D; 118-130, 140-150, 70-80MHz.
- ★ FRV7700E; 118-130, 140-150, 150-160MHz.
- ★ FRV7700F; 118-130, 150-160, 170-180MHz.
- ★ FF5; 500kHz (for improved VLF reception).
- ★ MEMGR7700; 12 Channels (internal fitting).
- ★ FRA7700; Active Antenna.

SOUTH MIDLANDS COMMUNICATIONS LTD

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

GRIMSBY
S.M.C (Humberside)
247A Freeman Street,
Grimsby, Lincolnshire.
Grimsby (0472) 59388
9.30-5.30 Mon-Sat

STOKE
S.M.C. (Stoke)
76 High Street,
Talke Pits, Stoke.
Kidsgrove (07816) 72644
9-5.30 Tue-Sat

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

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

BUCKLEY
S.M.C. (T.M.P.),
Unit 27 Pinfold Workshops,
Pinfold Lane, Buckley.
Buckley (0244) 549563
9.30-5.30 (Lunch 1.30) Tue-Sat

JERSEY
SMC (Jersey)
1, Belmont Gardens
St Helier, Jersey
Jersey (0534) 77067
10-7 Mon-Sat

STOCK-CARRYING AGENTS WITH DEMONSTRATION FACILITIES

Edinburgh Jack GM8GEC (031-657 2430 Day (031-665 2420 Eve

Bangor John GI3KDR (0247) 55162
Tandragee Mervyn GI3WWY (0762) 840656

Neath John GW4FOI ((0639) 52374 Day ((0639) 2942 Eve

hy-gain

The TH7DXX is a new 7 element (10-15-20M) broadband VSWR less than 2:1 at band edges! Compact 20' (6·1M) turning radius—31' (9·4M) longest element dual driven element Yagi which by combining monoband *and* high Q, ultra high power, trapped parasitics provides an average front to back of 22dB on 20 and 15 and 17dB on 10 meters. The antenna weighs 75lbs (34kg) and its projected 9·4 sq feet (0·9 sq m) of wind area produces a load of 240lbs at 80 mph (129 kph).

Construction features include: 6063-T832 taper swaged thick wall aluminium, 18-8 stainless hardware, diecast ali boom/mast clamps, heavy gauge ele/boom clamp and rugged phasing lines. It uses a ß match for DC ground and comes complete with preformed feeder straps and the famous BN86 ferrite balun.

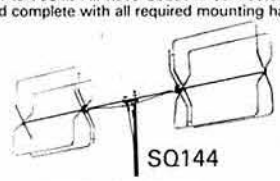
		inc VAT	p/p
12AVQ	Vertical 10-20m inc.	**£50.60**	£2.50
14AVQ/WB	Vertical 10-40m inc.	**£64.40**	£2.50
18AVT/WB	Vertical 10-80m inc.	**£113.85**	£2.50
14RMQ	Roof mounting Kit	**£38.52**	£2.50
18V	Vertical 10-80m inc.	**£36.22**	£2.50
103BA	3 Ele Yagi 10m	**£67.85**	£3.50
105BA	5 Ele Yagi 10m	**£155.25**	£3.95
153BA	3 Ele Yagi 15m	**£90.85**	£3.50
155BA	5 Ele Yagi 15m	**£236.90**	£5.90
203BA	3 Ele Yagi 20m	**£178.25**	£4.90
204BA	4 Ele Yagi 20m	**£286.35**	£7.30
205BA	5 Ele Yagi 20m	**£396.75**	£9.40
402BA	2 Ele Yagi 40m	**£247.25**	£6.50
DB10/15A	3 Ele Yagi 10-15m	**£198.95**	£4.80
TH3JNR	3 Ele Yagi 10-15-20m	**£202.40**	£3.50
TH2MK3	2 Ele Yagi 10-15-20m	**£169.05**	£3.50
TH3MK3	3 Ele Yagi 10-15-20m	**£274.85**	£5.30
TH5DXX	"Thunderbird" 5 el.	**£419.75**	£6.70
TH7DXX	"Thunderbird" 7 el.	**£511.75**	£8.75
HYQUAD	2'Ele Quad 10-15-20m	**£354.20**	£6.00
18TD	Dipole Tape 10-80m	**£121.90**	£2.80
BN86	Balun 1:1·3 30MHz	**£16.67**	£1.80
LA1	Lightning Arrestor	**£59.05**	£1.20

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

SMC-HS

HF, VHF, UHF, BASE STATION ANTENNAS

SMC-HS range of base station antennas covers from 80M through to 70cm. All have S0239M connectors and are supplied complete with all required mounting hardware.



			p/p
SQ144	2M Swiss Quad Vertical Mounting 2M ¼ c/w ground plane	**£57.60**	£2.50
GP2M	3·4dB ¼	**£18.00**	£2.50
GP144W	2M 2 × ⅝ colinear 6·5dB ¼	**£27.60**	£2.50
GP23	2M 3 × ⅝ colinear 7·8dB ¼	**£39.85**	£2.50
GP432	70cm 3 × ⅝ colinear 6·8dB ¼	**£29.90**	£2.50
70N2V	2M/70cm colinear 2·8dB ¼/5·7dB ¼	**£29.90**	£2.50
HS770	2M/70cm Duplexer 50W 30dB isolation	**£15.35**	£1.50
VHFL	65-520MHz Discone Rx only	**£15.70**	£2.50
GDX1	80-480MHz Discone 3dB ¼	**£40.25**	£2.50
GDX2	50-480MHz Discone 3dB ¼	**£49.45**	£2.50
GDXA	100-480MHz Discone 3dB ¼	**£33.75**	£2.50
LT606	50-500MHz Log Periodic 7-8dB	**£115.00**	£2.50
HF5V	Trapped Vertical 10-80M 5 bands	**£54.80**	£2.50
HF5R	Loaded Radial Kit	**£34.90**	£2.50
3Y1015D20	3 ele 10, 15M Dipole 20M	**£144.90**	£5.00
FT726R(2)	Transceiver inc. 145Mhz	**£649·00**	
SAT726	Full duplex unit	**£82·80**	
430T726	430-440MHz module	**£208·90**	
50T726	Six metre module	**£157·15**	

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

J-BEAM

				p/p
4 METRES				
4Y/4M	Yagi 4 element	7dBd	**£29.90**	£2.20
PMH2/4M	Phasing harness 2 way		**£16.10**	£1.50
2 METRES				
H0/2M	Halo head only	0dBd	**£5.98**	£1.20
HM/2M	Halo with 24" mast	0dBd	**£6.55**	£1.50
C5/2M	Colinear omni vert	4·8dBd	**£54.62**	£2.50
LW5/2M	Yagi 5 element	7·8dBd	**£14.37**	£2.50
LW8/2M	Yagi 8 element	9·5dBd	**£17.82**	£2.50
LW10/2M	Yagi 10 element	10·5dBd	**£24.15**	£2.50
LW16/2M	Yagi 16 element	13·4dBd	**£35.07**	£3.20
14Y/2M	Yagi 14 element	12·8dBd	**£36.23**	£3.20
PBM10/2M	10 ele Parabeam	11·7dBd	**£44.85**	£3.20
PBM14/2M	14 ele Parabeam	13·7dBd	**£55.77**	£3.20
Q4/2M	Quad 4 element	9·4dBd	**£29.32**	£2.50
Q6/2M	Quad 6 element	10·9dBd	**£39.10**	£2.50
Q8/2M	Quad 8 element	11·9dBd	**£44.85**	£2.50
D5/2M	Yagi 5 over 5 slot	10dBd	**£25.30**	£2.50
D8/2M	Yagi 8 over 8 slot	11·1dBd	**£34.50**	£2.50
5XY/2M	Yagi 5 ele crossed	7·8dBd	**£28.17**	£2.50
8XY/2M	Yagi 8 ele crossed	9·5dBd	**£35.65**	£2.50
10XY/2M	Yagi 10 ele crossed	10·8dBd	**£46.00**	£2.50
PMH2/C	Harness cir polarisation		**£9.77**	£1.50
PMH2/2M	Harness 2 way 144MHz		**£12.65**	£1.50
PMH4/2M	Harness 4 way 144MHz		**£28.75**	£1.50
SEVENTY CM				
C8/70	Colinear Omni Vertical	6·1dBd	**£62.10**	£2.50
D8/70	Yagi 8 over 8 slot	12·3dBd	**£25.87**	£2.50
PBM18/70	18 ele Parabeam	13·5dBd	**£32.20**	£2.50
PBM24/70	24 ele Parabeam	15·1dBd	**£42.55**	£2.50
LW24/70	Yagi 24 element	14·8dBd	**£27.02**	£2.50
MBM28/70	28 ele Multibeam	11·5dBd	**£21.27**	£2.50
MBM48/70	48 ele Multibeam	14·0dBd	**£35.65**	£2.50
MBM88/70	88 ele Multibeam	16·3dBd	**£48.87**	£2.50
8XY/70	Yagi 8 ele crossed	10dBd	**£42.55**	£2.50
12XY/70	Yagi 12 ele crossed	12dBd	**£52.90**	£2.50
PMH2/70	Harness 2 way		**£10.35**	£1.50
PMH4/70	Harness 4 way		**£22.42**	£1.80
1296 MHz				
CR2/23CM	Corner reflector	13·5dBd	**£40.25**	£2.50
PMH2/23CM	Harness 2 way		**£31.05**	£1.50

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

Kenpro

KR600RC
£163.30

360° round type meter Max. load 200kg. Rot, 600kg/cm, brake 4,000kg/m. 1¾in-2¾in masts Lower casting optional.

KR400RC
£114.94

360° round type meter Max. load 200kg. Rot, 400kg/cm, brake 1,500kg/cm 1¾in-2¾in masts Lower casting optional.

KR500
£112.12

Elevation Rotator (180°) Up to 50kg of Load. 1¾in-2¾in mast. 1¼in-1⅝in boom

KR250
£54.91

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

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

Channel Master

9508
£80.21

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

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

9502
£56.92

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

Takes 1-2" mast and 1-1⅞" stub.

Upper mast support bearing.

2" mast and 1¾" stub.

Post and packing **£1.80**
9523 **£15.81**

Rotary bearing 3-way guying.

Takes 1²³⁄₃₂" mast.

Post and packing **£1.50**
9525 **£16.67**

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

CDE

AR40
£90.85

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

CD45
£136.85

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

HAM IV
£258.75

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

T2X
£327.75

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 · GRIMSBY · STOKE · LEEDS · BUCKLEY · JERSEY

COAX SMC PLUGS

BNC PLUG 50 ohms		
UG88	Standard type 5.5mm	£0.78
UG599	Large type 11.2mm	£3.22
BNC SOCKET 50 ohms		
UG290	Standard 4 hole type	£0.78
UG1094	Nut fixing type	£0.76
UG69	Free, cable-end, 5.5mm	£0.94
BNC COUPLER 50 ohms		
UG914	Back to back female	£1.07
UG491	Back to back male	£1.66
UG274	'T' 2 female 1 male	£2.23
SMC3FBNC	'T' 3 female	£2.02
UG306	Elbow. Male-Female	£1.86
BNC INTERSERIES ADAPTOR 50 ohms		
UG255	BNC plug – UHF socket	£1.76
UG273	BNC socket – UHF plug	£1.76
UG201	BNC socket – N plug	£3.28
UG349	BNC plug – N socket	£3.16
UG606	BNC socket – N socket	£2.59
UHF PLUG		
PL259	Standard type 11.2mm	£0.55
PL259P	Push on type 11.2mm	£0.79
UG175	Reducer 5.0mm	£0.14
UG176	Reducer 5.6mm	£0.14
PL259R	Reduced type 5.0mm	£0.67
PL259A	Deluxe type 11.2mm	£1.50
PL259B	Deluxe type 5.0mm	£1.13
PL259SL	'Solderless' 11.2mm	£0.63
PL259SS	'Solderless' 5.0mm	£0.63
PL259E	Angle type 5.0mm	£0.95
PL259M	Metric type standard 11.2mm	£0.75
L42P	For LDF2/50 Heliax	£10.58
L44P	For LDF4/50 Heliax	£10.35
PL259PM	Panel mount 4 hole	£1.07
UHF SOCKET		
S0239F	Standard 4 hole fix	£0.48
S0239F31000	4 hole PTFE Au plate	£0.97
S0239T	2 hole fixing type	£0.48
S0239NI	Nut fixing inside type	£0.59
S0239NO	Nut fixing outside type	£0.59
S0239E	Free angle type 5.0mm	£1.01
	Free cable end 5.0mm	£2.22
MX913/C	Dust Cap c/w chain	£0.46
MX913/M	Dust Cap metric type	£0.46
UHF COUPLER		
PL258	Back to back female	£0.91
PL274	Back to back chassis	£1.07
SMCPL/PL	Back to back male	£1.38
M359	Elbow male-female	£1.07
M358	'T' 2 female 1 male	£1.38
M358AF	'T' 3 female	£1.70
M458	'X' 3 female 1 male	£2.13
UHF INTERSERIES ADAPTORS		
UG255	UHF socket – BNC plug	£1.76
UG273	UHF plug – BNC socket	£1.76
S0/25	UHF socket – 2.5mm jack	TOS
S0/35	UHF socket – 3.5mm jack	£0.79
S0/NF	UHF socket – N socket	£1.96
UG146	UHF socket – N plug	£2.25
UG83	UHF plug – N socket	£1.96
UHF CABLES		
PL36PL	3.0' RG58 PL259 ends	£1.85
N PLUG 50 ohms		
UG536	Small type 5.5mm	£1.66
UG21	Standard type 11.2mm	£1.89
L42W	For LDF2/50 Heliax	£8.51
L44W	For LDF4/50 Heliax	£12.42
N SOCKET 50 ohms		
UG58	Standard 4 hole fix	£1.12
UG1052	Free cable end 5.5mm	£2.12
UG23	Free cable end 11mm	£1.70
L42N	Free jack for LDF2/50	£8.51
L44N	Free jack for LDF4/50	£12.42
MX913C	Dust cap c/w chain	£0.46
N COUPLER 50 ohms		
UG107	'T' 2 female 1 male	£3.74
UG28	'T' 3 female	£3.16
UG57	Double male adaptor	£2.70
UG29	Double female adaptor	£2.13
UG27	Elbow male-female	£2.24
N INTERSERIES ADAPTORS 50 ohms		
UG201	N plug – BNC socket	£3.28
UG349	N socket – BNC plug	£3.16
UG606	N socket – BNC socket	£2.59
UG146	N plug – UHF socket	£2.25
UG83	N socket – UHF plug	£1.96
S0/NF	N socket – UHF socket	£1.96

NB: PRICES INCLUDE VAT AT 15%
Postage: £0.50 any quantity (UK)

HANSEN

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

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

FS710; PEP AUTO-SWR RMS LEVEL
FS710 £89.70

FS710H: 1·8-60MHz. 20, 200, 2kW
FS710V: 50-150MHz. 20, 200W
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 × 3¼"
Time Const: PEP follow 4 second

FS500 £69.75

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 £51.35

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 £46.40

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 £41.00

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

FS711 £36.80

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 × 1½"
coupler 3½ × 2½ × 1¼"

FS5E £37.20

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

FS300M £35.65

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 £26.45

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

SWR50B £26.45

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

8 new models in stock. See for details

NB· PRICES INCLUDE VAT AT 15%
Carriage free (surface post) worldwide

SMC-HS

HF, VHF, UHF ANTENNAS MOBILE VERTICALS

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

Model	Band	Gain	Type	Power	Length	Price
20SE	20m		(¼λ)	100W	1·72m	£17.65
17SE	17m		(¼λ)	200W	1·92m	£15.70
15SE	15m		(¼λ)	130W	1·72m	£14.55
12SE	12m		(¼λ)	200W	1·92m	£14.20
10SE	10m		(¼λ)	100W	1·72m	£13.80
4E	4m	0dB	½λ	150W	1·03m	£7.65
2H/PL	2m		(¼λ)	50W	0·17m	£3.45
2QW	2m	0dB	½λ	200W	0·49m	£2.30
2VF	2m	3dB	⅝λ	50W	1.06m	£11.50
2NE	2m	3dB	⅝λ	150W	1·30m	£6.90
78SF	2m		(⅝λ)	100W	1·42m	£13.80
78F	2m	4·5dB	⅝λ	100W	1·75m	£13.80
78B	2m	4·5dB	⅝λ	150W	1·72m	£13.80
88F	2m	5·2m	⅝λ	100W	2.03m	£18.80
70N2M	2/70	2·7dB 5·1dB	(¼λ) 2 × ⅝λ	100w	0·89m	£16.85
258	70cm	5·5dB	2 × ⅝λ	100W	0.91m	£12.65
358	70cm	6·3dB	3 × ⅝λ	100W	1·36m	£16.85

Model	Description	Price
SOWM	Wing Mount. SO239M upper SO239 under adjustable angle	£4.20
TMCAS	Boot Mount c/w 6 mtrs RG58 and PL259 plug	£8.45
GCCA	Gutter Mount deluxe cast type c/w 4 mtrs cable assemble and PL259	£9.95
SOMM	Mag Mount c/w 4 mtrs RG58 PL259 *For use with smaller antennas only*	£9.95

An alternative mounting for any of the two metre antennas listed above is the BSD stainless steel bumper strap at **£8.80** plus the HS88BK extension tube at **£18.80** which raises by 80 cms and acts as a counterpoise to the radiator.

Also fitting the bumper mount is the 10 foot, 3 section (quick disconnect and fold over jointed) mobile colinear element which provides about 7dB of gain for **£29.90.**

Stop press: ⅝λ ultra low radiation angle, typ. 30° below ⅞λ. Substantial improvement on DX (in clear).

For operation on 2 metres and 70 cms the dual band 70N2M is an elegant solution particularly when combined with the HS770 diplexer which provides 50W power handling, 30dB isolation between transceivers with an insertion loss of only 0·5dB for **£15.35.**

NB: PRICES INCLUDE VAT AT 15%
Mainland delivery: accs. £0.80, antennas £1.80

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Tel: Totton (0703) 867333, Telex: 477351 SMCOMM G, Telegram: "Aerial" Southampton
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ADVANCED MICROPROCESSOR CONTROLLED AMATEUR RADIO ACCESSORIES. HIGH PERFORMANCE VHF ANTENNAS.

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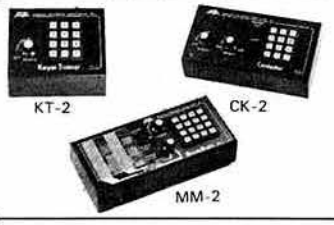
AMTOR/RTTY/ASCII/CW TERMINAL UNIT

Turns an SSB transceiver plus an ASCII Terminal or Personal Computer into a professional quality, error correcting data transmission system. An excellent 16 LED 'Frequency Analyser' tuning display plus full status indication make it easy to operate. Over 400 amateur radio/computer enthusiasts who are now on AMTOR world wide are waiting to welcome you to the mode.

12V DC operation **£275.00**


KT-2 CK-2 MM-2

A.E.A. MICROPROCESSOR CONTROLLED MORSE KEYERS: The Ultimate Keyer Range

MODES:	Ten Memories	Auto Contest Ser. No.	Trainer	'Bug'	Calibrated beacon	Message Repeat	
MM-2	●	●	●	●	●		£129
CK-2	●	●		●		●	£113
KT-2	●		●	●			£96

12V DC operation Send for further details.

MBA-RC

RTTY/ASCII/CW CODE CONVERTER/ TERMINAL UNIT

RTTY/ASCII/CW Terminal unit with inbuilt code conversion between any two modes at any standard data rates. Parallel, serial and morse key inputs and outputs plus current loop, Centronics printer drivers. 32 Column vacuum fluorescent display is built in. Excellent tuning indicator. The ultimate in versatility.

12V DC operation **£415.00**

MBA-RO

RTTY/ASCII/CW READER

Simply plugs into the speaker output of your receiver and allows copy of amateurs, news agencies etc. on RTTY. 170Hz and 425Hz shifts are switchable, as are all common Baud rates. Also reads clearly sent CW to 100 w.p.m. CW speed is self tracking. Built in 32 character vacuum fluorescent display. No separate monitor needed.

12V DC operation **£198.00**

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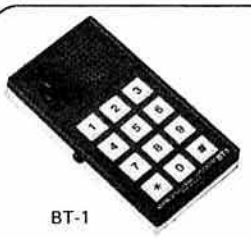
WB-1C

Connects in the antenna lead of your transceiver and attenuates 'Woodpecker' pulses by typically 45-50dB. Incorporates adjustable drop out time, carrier operated relay. Switchable for both 10 and 16Hz Woodpecker transmission modes. Variable blanking pulse width. No modifications to your equipment, and the most effective woodpecker blanker that we are aware of.

12V DC operation **£126.00**


BT-1

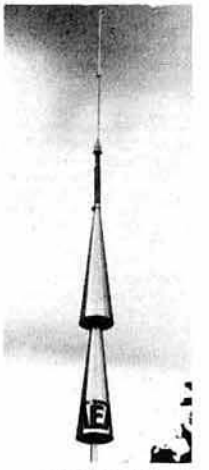
MORSE TRAINER

Each new character is introduced separately until familiarity is reached. Then new characters are mixed 50% with previous characters learned.

Groups go from 2 to 3 to 4 then 5 letters. All characters are sent at 20 w.p.m. with three second gaps between groups. Incorporates key input and speaker for sending practice.

For the serious student, it is possible to reach 20 w.p.m. in one month with no previous experience.

12V DC input **£65.00**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These antennas simply put your signal where you want it—on the horizon. Most other VHF verticals radiate at 10-15° above the horizontal, but the Isopole's unique (aesthetically pleasing) decoupling cones stop *any* feeder radiation and ensure a proper 0° radiation pattern.

All users report dramatic improvement over previous, similar sized, antennas they have used. One of the hottest selling antennas in the U.S.A.

Isopole 144	**£35.00**
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Founded 1913. Incorporated 1926. Member society, International Amateur Radio Union

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

The national society representing all UK radio amateurs

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

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

A list of QSL Bureau sub-managers was published in the January 1983 issue, and amendments appear under "QTC" in this and the February and March issues.

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Affiliated societies: £14.50 (including *Rad Com*); **£8.70** (excluding *Rad Com*).

RSGB HEADLINE NEWS—Tel 0707 59312

By telephoning the above number, members can receive up-to-date amateur radio news of immediate interest from a three-minute recording. This is generally updated twice or more weekly.

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 0707 59260 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/G3SZJ	0930
SW England/Wales	G8ML	G3JFH/G4IEY	1000
Northern Ireland	GI3GAL	GI3SXG	1030
NE England	G5VO	G3MCF	1100
E Scotland	GM4CUZ	GM4FLP	1430
Midlands	G8QZ/G3SZJ	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	G3SMM	1000
NNW from Cleveland	G4JJB	G8FTZ	1000
W from Carlisle	G4LAA	(Vacancy)	1030
SE from Lincoln	G3NRO	G8ZVF	1030
SW from London	G3FZL/G3VAG	G3IIR	1030
S from Aberdeen	GM8GHV	GM8MBP	1030
W from Bristol	G4CJZ	G3ZWY	1100
NE from Cambridge	G8HVV	G8BBK	1100
W from Bangor, Co Down	GI3TLT	GI3SXG	1130
Frequency: 145·525MHz (S21). Mode: fm (vertical polarization)			
Caithness	GM4KNQ	GM4LNN	0930
Cornwall	G2ABC	G3NPB	0930
North Hampshire	G8CKN	G3PZN	0930
Suffolk	G3ZNU	G4FZZ/G4HMF	0930
Leeds	G3SPX	G8XGN	0930
Co Down	GI3WEM	GI4DOR	0930
Edinburgh	GM4EHO	(Vacancy)	0930
E Cornwall/S Devon	G3ZYY	G8XTE	1000
Londonderry	GI2DHB	GI4AHD	1000
London	G3FZL/G3VAG	G3IIR	1000
Birmingham	G3BA	G4LCM	1000
Lincolnshire	G3NRO	G8ZVF	1000
Tyneside	G4LDT	G8TKU	1000
Glasgow	GM4HCO	GM4CXM	1000
Elgin	GM4ILS	(Vacancy)	1000
Southampton	G8LVC	G4COM/G4IDV	1030
E Sussex coast	G8SC	G3ZFE	1030
Bristol	G4CJZ	G3ZWY/G8NNU	1030
Cambridge	G8HVV	G8BBK	1030
Manchester	G3LEQ	G3JWK	1030
Dumfries	GM3MSG	(Vacancy)	1100
Brighton coast	G3ZYE	G8GEZ	1100
Preston	G8WAT	(Vacancy)	1100
Huntingdon, Cambs	(Vacancy)	G8TQI	1100
Jersey	GJ4JWA	GJ8YVL	1100
Porthmadog, Gwynedd	GW6CGR	GW6ARL/GW3KJW	1100
Clwyd/Merseyside	GW4IEQ	G8NNS	1100
W Glamorgan/N Devon	GW8VHI	GW3VPL/GW8TVX	1100
Aberystwyth	GW4JXB	GW8MAW	1130
Exeter	G3PBV	G4PCB	1130
Leicester	G4JYS	G4EYL	1130
Scarborough	G4OSD	G4EEV	1130
Enniskillen	GI4PCY	GI4CZW	1230

A report on the RSGB National Amateur Radio Convention, 5-6 March 1983

For many years the RSGB has held at least one major national amateur radio exhibition each year, and in recent times the venue has been Alexandra Palace in North London. This was always a popular event, and indeed the "Ally Pally Rally" has passed into amateur radio folklore. However, factors conspired to change what had become a set pattern. The first was the disastrous fire in 1980 which practically destroyed Alexandra Palace and left only the small hall available for exhibitions: the 1981 event was held there but it was of necessity limited to a small number of traders in modular shell stands. The second was the construction, in late 1981, of the brand-new Alexandra Pavilion, which was intended as a relatively short-term replacement for the Great Hall at Alexandra Palace. It was decided that the 1982 exhibition should take place there, and indeed it was a reasonably successful event. However, modular shell stands were mandatory in the Pavilion, and the cost of these meant that it was mostly the large commercial traders who took space: the "trestle-table" small business could not be accommodated, and this led to something of an imbalance. Equally, there were no facilities for lectures at the Pavilion, and this was disappointing to many visitors. There were other, minor, disadvantages associated with this venue. Car parking was always a problem at both the old Alexandra Palace and at the new Pavilion, and despite being a modern building the facilities for build-up and breakdown of stands left something to be desired from the Society's point of view.

It was necessary, therefore, to take a careful look at future venues for the RSGB national exhibition—bearing in mind factors such as location, cost, available floor area, facilities for lectures, car parking facilities and so on. Many possible sites were considered, ranging from the Barbican Centre in London to various other venues up and down the country, but it became obvious that for an exhibition of the quality and scope required, the National Exhibition Centre in Birmingham was the best choice. It was decided, in essence, to have two exhibitions in one. One, in Hall 6, would employ the modular shell stand which had proved popular with the larger dealers and main agents, and the other would cater for the small trader with an American-style flea-market in Hall 6a.

Forty-six stands were available in Hall 6, and 28 dealers took space. Some of the Society's committees were also able to have a small presentation of their activities and facilities to handle queries from members and visitors. Space in Hall 6a was quickly taken up, and the flea-market approach proved very popular both with traders and visitors. The exhibition was scheduled for two days, Saturday and Sunday, instead of three as in

The convention opening group, l to r: Norman Miller, G3MVV, chairman, Exhibition & Rally Committee; the Lord Mayor of Birmingham, Cllr Peter Hollingworth, JP; RSGB President, Don Baptiste; immediate past-President John Allaway, G3FKM; and Mrs Baptiste

previous years, and the official opening was performed by the Lord Mayor of Birmingham, Councillor Peter Hollingworth, JP, at 11am on the Saturday. Before this, however, the queues were building up: the exhibition opened at 10am, but by 9am there was a substantial queue which stretched back almost to the main entrance of the NEC. The NEC staff, who incidentally were most helpful and professional throughout the show, commented that the size of the queue was more commensurate with the Motor Show than with a hobby exhibition, and an additional pay kiosk was quickly laid on to cope with the numbers.

At 10am the doors were opened and the exhibition was on: there had been a few last minute snags behind the scenes, as is always the way with major exhibitions, but all was well and the visitors streamed in. By 11am, when Councillor Hollingworth; the Society's President, D. E. Baptiste, CBE; and the chairman of the Exhibition & Rally Committee, Norman Miller, G3MVV, were preparing for the official opening, the hall was already full and the visitors were still coming in. The President welcomed the Lord Mayor with a speech in which he hoped that Councillor Hollingworth would enjoy the exhibition and that he would find amateur radio an interesting and creative hobby. In his reply, the Lord Mayor welcomed the Society and its exhibition to Birmingham and asked why we had not taken the opportunity to come to the NEC before, since it was manifestly superior to anywhere else in the country! He hoped very much that it was the beginning of a long and close association between the RSGB and the City of Birmingham, and declared his interest in the hobby. The Lord Mayor was then shown round the stands by Mr Baptiste and Mr Miller, and he asked many questions about amateur radio and its adherents: he also visited some of the lectures, which had begun at midday in the Piazza. It should be mentioned that a comprehensive lecture stream had been organized in the course of the exhibition, and this is one reason why its title was the RSGB National Amateur Radio Convention—making the point that it was much more than simply a trade show.

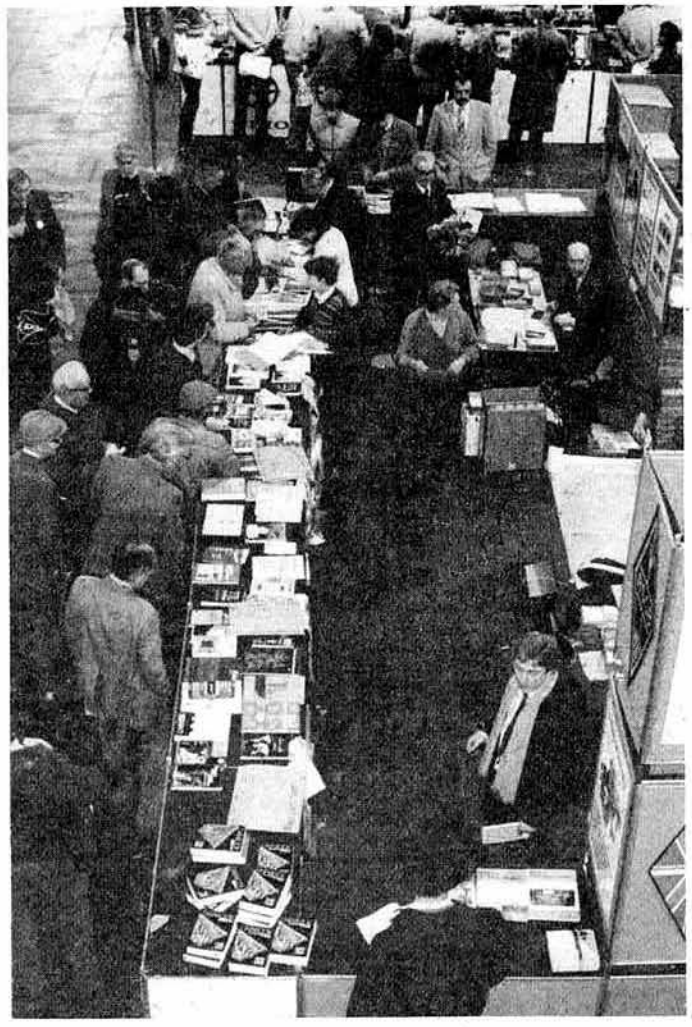
Janet Attfield, of RSGB HQ's Membership Services Dept, serving on the Society's stand.

Apart from the traders, there was comprehensive talk-in provided by the Solihull Amateur Radio Society, and an hf demonstration station run by the G-QRP Club.

By about half-way through the Saturday it was obvious that the exhibition was a success. The trade reported excellent business, and indeed the RSGB stand was snowed under at times: books and identity cards were in great demand, and many visitors joined the Society at the exhibition.

At the end of the day, when staff and volunteers had nursed their sore feet as far as some refreshments, several traders had said that they had never done such good business and virtually insisted on booking on the spot for the same pitch next year! There were relatively few problems: the catering was somewhat scarce, but the NEC took full responsibility for this. They had underestimated the radio amateur's hunger and thirst, and undertook to do much better in the future. It must be said that the NEC staff could not have been more helpful throughout the exhibition—they were a pleasure to work with and made the Society's job a good deal easier than it might otherwise have been.

Sunday's queue was not as long as Saturday's, but nevertheless there was a healthy crowd waiting to enter the exhibition on Sunday morning. The attendance figure for Saturday had been just over 5,500, which had at times



The RSGB bookstall

approached saturation of the two halls, and several small bets had been placed by staff and volunteers as to how many would visit on Sunday. In the event, the day was slightly quieter than Saturday, and business was not quite as good—however, just under 5,000 visitors came to enjoy the show, attend the lectures and meet their friends. The social aspect of amateur radio is never clearer than at a major event, but it must be confessed that there was one terrible disaster in the middle of the Sunday afternoon—the beer ran out! This must obviously never be allowed to happen again.

One of the trade stands

All in all, there can be no doubt that the decision to hold the Society's major annual event at the NEC was the correct one and that, with the exception of a few minor teething troubles, it was an outstanding success.

QTC
Amateur radio news

Centre-page supplement
This is a reproduction of a new four-page leaflet which is now being sent to all new members of the RSGB. It illustrates many of the services provided and the advantages of membership, together with other useful information which should also be of interest to existing members of the Society.

The latest on the "Schedule"
Since the problems experienced with the Schedule to the UK licence last year, the Society has had a number of special meetings with the Home Office. As a result of these meetings, we have recognized the very high level of complexity required in order to arrive at a final document which is accurate, but it is hoped to finalize this within the next few meetings. It is worth noting, however, that the basic concept of "modes in plain language", put forward by the Society, has been accepted by the Home Office.

Once the Schedule has been resolved, the Home Office and the Society intend to turn their attentions to the licence itself. Naturally any comments would be welcomed at this stage by the Licensing Advisory Committee, and should be addressed to the chairman of that committee via RSGB HQ.

Reciprocal licensing
The Home Office has recently had protracted correspondence with the Zimbabwe P&T Department, in consultation with our own Foreign and Commonwealth Office, and it now appears that the former reciprocal licensing agreement between the UK and Rhodesia has been cancelled.

As a general point, the UK has reciprocal agreements with: Austria, Belgium, Brazil, Denmark, Dominican Republic, El Salvador, Finland, France, Iceland, Irish Republic, Israel, Italy, Luxembourg, Monaco, Netherlands, Norway, Poland, Portugal, South Africa, Sweden, Switzerland, West Germany and USA.

However, in the case of the following countries, while there is no reciprocal agreement as such, they appear to issue visitors licences on the strength of UK Class A qualifications: Antigua, Australia, Bahamas, Barbados, Bermuda, Botswana, Brunei, Canada, Cyprus, Gambia, Gibraltar, Grenada, Guyana, Hong Kong, India, Jamaica, Kenya, Malawi, Malaysia, Malta, Mauritius, New Zealand, Nigeria, Seychelles, Singapore, Sri Lanka, Swaziland and Zambia.

At present, reciprocal negotiations are in the, rather long, pipeline for Spain, Chile, Yugoslavia, Greece and Japan.

IARU reception
On 8 March the International Amateur Radio Union sponsored a reception at the ITU headquarters building in Geneva for the delegates of the World Administrative Radio Conference on Mobile Services. It was hosted by Dave Sumner, secretary of IARU, with his wife, and Eric Godsmark, secretary of IARU Region 1. This year's RSGB President, Don Baptiste, was able to attend to represent the Society. The evening was most useful and enhanced the standing of amateur radio among approximately 200 delegates who attended.

144MHz band plan
The following correction to the band plan published in our January 1982 issue should be noted:

The frequencies 144·85 and 144·875 are being used by Raynet

QSL Bureau
The workers in the QSL Bureau are only human (well, almost) and with the present workload, not to mention the different sizes and textures of cards, it is inevitable that a certain amount of sorting errors and mis-routing will occur.

Members are requested, if they receive cards not intended for them, to refrain from writing thereon comments such as "NOT ME", "TRY G7ZZ", or "SENT TO G7AA IN ERROR" as these obviously lower the cards value in the eyes of the correct addressee.

Please return any such cards to the QSL Bureau manager when sending your next outgoing batch. *G3DRN*

Countries list
The Society's HF Committee has recently reviewed and revised the RSGB Countries List, and copies were first made available to members at the NEC exhibition/convention. This list now follows the one used by ARRL for DXCC purposes, and it will be amended and re-issued regularly (perhaps twice yearly) to reflect changes in the ARRL list and in the allocation of callsigns.

Copies of the Countries List (Form HF 100 Rev 0383) may be obtained from RSGB Publications (Sales)—see page 472 for details.

A revised countries check list will be produced shortly. This will include columns for checking-off countries worked on all the nine amateur bands between 1·8 and 30MHz. Details will be announced in due course.

G3NKS

RSGB Amateur Radio Call Book
The 1983 edition of the *Call Book* went to press at a time of uncertainty regarding the Society's future address, and quotes a Post Office box number for editorial correspondence. This was only a temporary arrangement, and all such correspondence should now be addressed, as before, to the book editor at RSGB HQ.

National Field Day
Members taking part in this year's NFD on 4/5 June should note that at least one European national society (USKA, Switzerland) will be starting their FD event at 1600gmt—one hour earlier than NFD. To avoid confusion over duplicate contacts, NFD entrants are advised not to work European stations actively contesting between 1600 and 1700gmt.

Can you help?
W. J. Hornsby, BRS25967, of 2 Glamis Close, Garforth, Leeds LS25 2NQ, would like to know of an economical source of mumetal screening material. The only commercial source he could find wanted £100 for only five square feet of metal.

Stolen equipment
On 6 February from a car at Heald Green, Cheshire: FDK Multi 700 EX, serial number 09110. Information to Cheadle Hulme Police, tel 061-480 7979.

From a car in Huddersfield: Trio TS7625, serial number 21011. Information to Huddersfield Police.

Radio Fraternity Lodge
Mr Peter Simpson, G3GGK, was recently installed as worshipful master of the Radio Fraternity Lodge of Freemasons for 1983–4. The secretary of the lodge is Mr G. Wakefield, G5WG.

Ham Stamps
This quarterly magazine deals with the theme of amateur radio and communications on stamps. The annual subscription is US $5 or 15 ircs. Any amateur who is interested in stamp collecting should write to Mathias Bjerrang, Longyear Airport, N-9170 Longyearbyen, Svalbard, Norway.

GB2ROG (Richard of Gloucester)
To celebrate the 500th anniversary of the granting of the Royal Charter to the City of Gloucester by Richard III, the Gloucester ARS will operate this special event station from 0900gmt on 2 September to 1700gmt on 3 September 1983. In addition the society is organizing an award for contacts with any GARS stations between 1 January and 31 December 1983. Fifteen points are required for the award, and may be obtained by working GB2ROG (15 pts), club station G4AYM (10 pts) and other GARS members (5 pts). A GARS station may only be worked once for points. G4AYM is operational on most Wednesdays between 2000 and 2200gmt and on some weekends. QSOs may be on any band or number of bands from 1·8 to 432MHz, and may be on any mode or number of modes.

Applications should be made to Gloucester Royal Charter Award, 7 Grasmere Road, Longlevens, Gloucester GL2 0NQ, listing the stations worked with date(s)/time(s) (QSL cards not required) and be accompanied by £1 or eight ircs.

A final reminder

RSGB REGION 19 ORM

2pm, Sunday 8 May 1983
The Ashmole Centre, Burleigh Gardens
Southgate, London N14
(Two minutes walk from Southgate Underground Station)

YOUR OPINION

UK PREFIXES

The Editor
Radio Communication

Sir—Reading, by chance, a somewhat out of date copy of *CQ Magazine*, I came across some comments about UK amateur prefixes and callsigns, and it would appear that consideration had been given but abandoned, for the time being, to some fundamental changes.

I am a bit puzzled why the Home Office or, for that matter, the RSGB, should think that we are running out of callsigns.

Reference to the international prefix list shows that two letters are allocated to the UK, *viz* G and M. What, therefore, is the objection when all the Gs are used up to starting all over again with M? For example: M2AA, M2AB, or even, perish the dreadful thought, M1AA, M1AB, MD, MI, MJ, MM, MU and MW could follow GD, GI etc, and we would be set for another 50 years.

I have never heard any good reason why G1, G7, G9 and G0 have not been used. Surely the handful of G7 calls used during the war and the few G9 experimental calls could be absorbed. Other countries seem able to use these other figures without causing any great national upheaval.

Why not use up the rest of the three-letter G2 series—G2IAA to G2ZZZ? And why, for goodness sake, not use the letter Q? No other country seems to have encountered any clash with the "Q" code by using this series. I cannot believe that anyone with enough sense to pass the RAE would ever confuse G3QRM with the "Q" code QRM, nor the letter M with the letter G.

In short, what is the problem?

Arthur Milne, G2MI

THE MORSE TEST—AGAIN

The Editor
Radio Communication

Sir—As a recently relicensed amateur, after many years absence from the hobby, I would like to add some further remarks to the correspondence on the Class A morse requirement issue.

It seems to me that many of your correspondents are missing the point which has been proposed. The question asked was simply "Why is it necessary/mandatory to still include morse as a requirement for a Class A licence?" Not one reply has given a valid reason. No one doubts the benefits/value/satisfaction from cw in particular circumstances, but the use of morse is only one mode of communication which an amateur should be able to chose to use or not as he pleases.

If it is considered necessary to test and licence cw operators then why not two classes of licence—one covering all modes/all bands and one for all modes excluding cw/all bands.

Would someone tell me why this could not be the case.

True there are international agreements, but they could be changed, and why should not the UK take a lead in forward constructive thinking? It is agreed also that this would possibly further load crowded hf bands, but is that a reason to exclude those who have passed the RAE from operating non-cw mode on hf? I don't believe there is any valid justification for doing so.

To add a final contentious proposal: why not think it through a little further and ask why have a morse test at all. If an amateur is not proficient in receiving he won't be able to receive. If he is not up to reasonable sending speed or accurate he won't make any QSOs, so surely the whole thing is self-limiting. Surely the test is unnecessary.

I would like to see the RSGB canvass all its members on this issue, for if there is a clear majority they should act on our behalf to do something about this anachronistic legislation.

J. H. Beardall, CEng, MIERE, G6ITX

But see *Technical Topics*, p424—Ed.

WHO INVENTED WIRELESS?

The Editor
Radio Communication

Sir—Most of us must have watched "The Mysterious Mr Tesla" in the BBC2 "Horizon" series and found the programme absolutely fascinating. But was Tesla really the very first man to transmit wireless signals? One thinks of Marconi, Hertz, Lodge, Branly and Popoff (did he work /MM in the early 'nineties?, as the Russians assert).

Long before any of these inventors, there was a certain Dr Mahlon Loomis, born in New York in 1826, who in 1865 sent intelligible messages between Mount Cochoctin and Mount Beorse Deer in Virginia—a distance of 14 miles, and without using any interconnecting wires! Dr Loomis was a dentist by profession, but his hobby was inventing. He obtained a patent for false teeth embedded in gutta-percha in 1854, and later experimented with heating soil by burying electric wires in his garden, and collecting electricity from the upper atmosphere by painting gold on to balloons—that must have been quite an expense!

For his wireless experiments Dr Loomis attached thin copper wires to the strings of kites, which he flew from mountain-tops at 1,500ft. Although he patented his invention in 1872, the technical details of his apparatus were lost in a fire at the US Patent Office in Washington, so we will never know how it worked—that is, if it worked at all!

Can anyone produce any further information about this inventive dentist, who was so far ahead of his time?

Douglas Byrne, G3KPO

OBITUARIES

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

Mr H. H. Berry, G4EJF
Harold Berry died on 16 January, aged 64. His main interest had always been "fault-finding" and overhauling equipment. Due to ill-health he had lately not been able to operate a transmitter, but listened on an all-band receiver. In former times he worked cw on the hf bands, and all-mode QSOs on top band.

Mr G. H. Cox, G3CCD
Harold Cox died on 7 February, aged 60. He spent the war years on Government research work and was first licensed in 1946, working on 5m and then on 2m. He was a member of a local Brixton Group until 1951, then a keen and active member of the Acton, Brentford & Chiswick Club of which, at the time of his death, he was the chairman. A keen constructor, he was always prepared to advise and help members on technical matters.

Mr K. Crossling, RS51474
Keith Crossling died on 17 March. He was 88 years old. At the time he had been taking a course for the RAE, although he had held an AA licence prior to 1939.

Mr W. Dixon, G3ZAX
Bill Dixon, who died on 20 November 1982, had been very active on 7 and 3·5MHz and had daily skeds with amateur radio friends.

Mr A. J. H. Field, G3TNR
Albert Field, who died recently, had been a keen operator on 1·8MHz, and an antenna experimenter, willing to give his help to all.

Mr W. Higgins, G4KMD
Walter Higgins died on 16 December 1982. He had been a member of the Ainsdale ARC for some years, and was a keen and excellent cw operator who enjoyed working the hf bands.

Mr J. F. Mortimer, G2MF
John Mortimer died on 22 January, aged 79. He was licensed in the early 'twenties, and was active on the hf bands, and also over the past five years, on 144MHz. He also participated in a 3·5MHz morning net. He was a keen constructor and was always willing to help and advise newcomers to the hobby.

Mr R. Pollock, GM3JRP
Russ Pollock died at the end of January. He had always been keen on constructional work, and was active on both hf and vhf until a few days before his death.

Mr M. Railton, G8AB, ex DL5XO, 2BIA, XACP
Martin Railton died on 22 February. He was a professional in the RAF for most of his life, retiring as a wing commander, and his duties included aviation electronics and communications. Following his retirement from the RAF in 1976 he joined the staff at the Ministry of Defence.

His interest in amateur radio commenced in 1936 when at the age of 16 he was then one of the youngest amateurs to obtain a licence, and used to cycle to local high ground, carrying his dry battery and accumulator with him in order to work portable. A member of the Loughton & DRS for many years, he was always prepared to give very interesting lectures ranging from antenna construction to automatic landing systems. He was a very proficient cw operator and his great love for field days was instrumental in giving a great deal of pleasure to his fellow members.

Martin won the Ostermeyer Trophy approximately 21 years ago for his design and detailed description of the Tom Thumb transmitter, which was published in the old *Bulletin*.

Mr C. Rudd, FCA, GW4BIQ
Cen Rudd died on 6 February, aged 53. His interest in radio and construction went back to boyhood days, but he did not acquire an amateur licence until 1972. He first joined Port Talbot ARC, but later joined the Swansea ARS, where he held a number of committee positions, including chairman. Not content with that, he was also treasurer of the GB3WW Repeater Group from its inception right up to the time of his death.

He was, he claimed, a "general purpose" ham, but his main love was hf dx working. He had been an operator in last September's SARS winning team in the RSGB HF SSB FD contest.

He was always available to give good advice and he gave the Society marvellous support. He was net controller of the Swansea 28MHz net on Sunday mornings and his contributions there will be sorely missed.

Mr F. Signey, MBE, BSc, G4DOB
Fred Signey, who died recently, was an active member of the Tynedale ARC. He had been secretary of the Tyne Wear repeater group for a number of years. He was active on all bands.

Mr N. C. Smith, ex-G5YX
Norman Smith, who died on 26 February, was first licensed in 1927. He only held the call for seven years, but was then a keen dxer.

Mr W. Stratton, G3XJJ
Bill Stratton died on 2 February. He was president of the Northampton RC, and was always ready to help anyone who was interested in amateur radio. He was a wireless telegraphist in the Merchant Navy before the second world war, and during the war joined the Royal Navy. He was a keen cw operator and gave regular Sunday morning slow morse practice transmissions.

Mr W. Vincent, G4OI
Bill Vincent died at the end of February. He was a constructor as far back as the 'thirties, when he was a member of the Midland ARS, and his wealth of experience was anyone's for the asking.

Also:
Mr R. K. Burns, RS51685;
Mr A. G. N. Fletcher, RS11379, on 15 March 1982;
Mr J. D. Harris, G8ROV, on 1 January;
Mr J. W. Harris, G3MZD, on 23 January;
Mr S. C. Hedges, G2CSH;
Mr H. G. Hunt, G3ECV;
Mr T. L. Jones, RS51718;
Mr H. Jordan, G2BNT, in December 1982;
Mr H. A. Judkins, G4ISL, on 14 February;
Mr A. G. Mabbutt, G3ILL, on 30 January;
Mr M. C. Pettit, G3ZAA, on 11 March, aged 72;
Mr F. Pike, G3BHL, in January;
Mr J. H. Routledge, G3NSR, on 2 January;
Mr J. R. Smith, G2BMS, on 20 January;
Mr C. Thomas, G3JGP.
Mr B. J. Welch, G3MNZ; and
Mr G. R. Wilkins, G8FKE, on 13 July 1982.

A MODERN HF TRANSCEIVER

(PART 2)

by G. N. FARE, G3OGQ*

Construction

General

The vast majority of the circuitry is contained on eight printed circuit boards, most of which are double sided, the top side being used as a ground plane.

Apart from the three transmitter amplifiers, the alc, af filter, swr and lpf, all the other circuitry is contained on one main board. This board may be in one piece or two and forms the chassis of the transceiver.

The cabinet consists of four sides made of double-sided printed circuit board material, as are the internal screens. The top and bottom of the cabinet are of 18swg aluminium sheet fixed to the sides with aluminium angle. Cabinet details are given later but are mentioned at this stage because if an exact replica is to be made then the sizes of the various boards must be exactly as specified.

Departure from the layout given here is not recommended, except by an experienced constructor. For instance, if the counter is positioned in a different place relative to the receiver input, then the output of the counter mixer, which is at the same frequency as that to be received, could affect the incoming signal. Unwanted feedback could also occur in transmitter stages. Using the layout shown, no interference from the counter can be detected.

It is recommended that the transceiver be constructed in the order following, and each stage checked before proceding with the next stage. Each stage has its own components list and numbers to facilitate this procedure.

*Cobblestones, Walton Old Hall, Walton, Warrington, Cheshire.

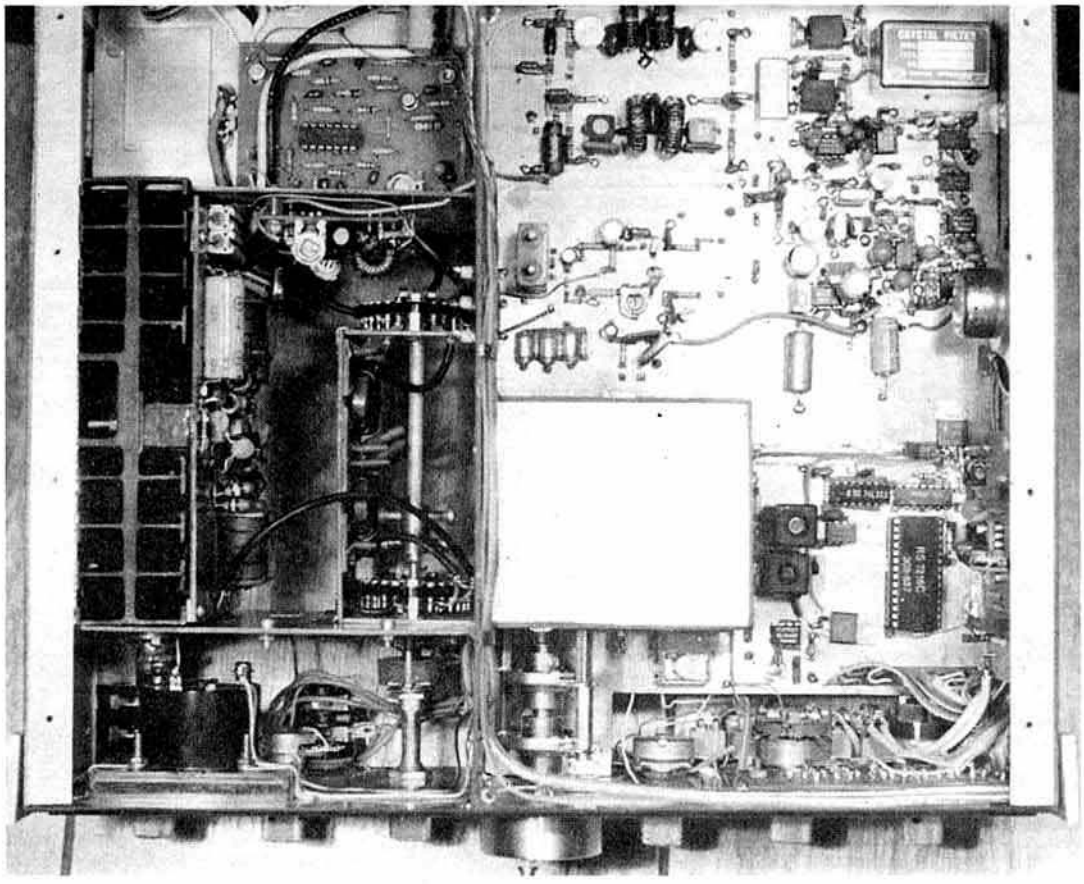
VFO

The pcb for the vfo forms part of the main board, which consists of double-sided glass-fibre board. The track layout is shown in Fig 3, and the components layout in Fig 5. After drilling all holes, those on the groundplane side should be enlarged either with a large twist drill or (more comfortably) with a Vero spot face cutter. All components should have the shortest leads possible, and wiring to the tuning capacitor and coil should be at least 18swg to minimize frequency wobble due to vibration. The circuit board forms the bottom of a box made from double-sided pcb material as shown in Fig 6. Two feedthrough 1,000pF capacitors are fitted in the positions shown. The front one is connected to the rit circuit at R104, and that on the side is connected to the pin at the junction of R113 and R114. The 10pF piston trimmer should be solidly soldered to the groundplane. The coil L101 must be very tightly wound on a ceramic or other stable former, and it is a good tip to warm the wire in a domestic oven before winding so that when it cools it will contract onto the former. Make sure that both ends of the wire are mechanically secure before soldering.

All ground connections are made by soldering directly to the groundplane. After fitting all components to the pcb, fit the front of the box containing the tuning capacitor to the pcb and, after testing, fit the other three sides.

To test the vfo, first disable the rit circuit by removing C101. Apply 12V regulated, and either listen for the signal on a receiver or connect a counter to the output. Adjusting the 10pF trimmer C102 should enable the vfo to tune from just below 5MHz to just over 5·5MHz. An oscilloscope or rf voltmeter on the output should show at least 1V peak to peak. The waveform should be a perfect sine wave with no thickening of the trace.

This circuit is well tried and proven and is extremely stable, not varying more than ±100Hz or so after 30 min warm-up. If greater drift than this



View of transceiver from top. Top left hand compartment contains alc board with driver board mounted on back panel. Right hand compartment includes main board. The vfo is contained in the box at left centre. The central left compartment includes final amplifier on the left, low pass filter on the right and wattmeter on the rear screen

Components list

VFO

RFC101, 102, 103	1,000μH Sigma	R101	100kΩ lin
D101	BB105	R102, 103, 109	10kΩ
D102	1N914	R104, 105, 107	100kΩ
D103	9V1 zener 400mW	R106, 112, 114	100Ω
LED1	Yellow 2·9mm dia (Electrovalue CQV13/5Y)	R108	330Ω
		R110	270Ω
		R111	3·3kΩ
S101	Min toggle dpdt (Electrovalue S7201)	R113	47Ω
		R115, 116	1kΩ
		All resistors 0·33W 5% carbon film except R101 carbon track potentiometer	
Slow motion drives	Two-off 6:1 Jackson 4511DA		
C101	7pF silver mica	L101	24t 24swg enam close-wound on 19mm ceramic or similar former
C102	10pF piston trimmer		
C103	30pF Jackson C804		
		L102	4·7μH rfc
C104	68pF silver mica	TR101, 102	MPF102
C105, 106	470pF silver mica	TR103	2N2222A
C107, 108, 110, 112, 115	0·01μF ceramic	RLY3	Sub-miniature (Electrovalue SMR12)
C109	33pF silver mica		
C111	1,000pF silver mica		
C113	250pF silver mica		
C114	560pF silver mica		
C116	0·1μF ceramic		
C117, 118	1,000pF feedthrough		

BPF, RECEIVER AND TRANSMITTER EXCITER

C201, 202, 204, 211, 214, 218, 226, 230, 232, 237, 279	0·01μF ceramic	R201, 202, 203, 204, 205, 206, 207, 213, 227, 231, 233, 235	1kΩ
C203, 205, 219, 220, 221, 228, 235, 236, 240, 243, 246, 249, 250, 251, 266, 268, 275, 276, 278	0·1μF ceramic	R208, 212, 214	560Ω
C206, 209	5·5-65pF Mullard	R209, 210	4·7kΩ
C207, 210	75pF silver mica	R211	22kΩ
C208	870pF silver mica	R215, 229	47Ω
C212, 216	2-10pF Mullard	R216, 217	100Ω
C213, 217	6·8pF silver mica	R218, 219	10kΩ
C215	220pF silver mica	R220	3·3kΩ
C222	220μF 16V elect	R221	12kΩ
C223, 224, 229, 242, 254, 260, 262, 267	0·001μF ceramic	R222	100kΩ
		R223	10kΩ log with switch
C225, 227	22pF silver mica	R224	2·2Ω
C231, 233	100pF silver mica	R225	3·9kΩ
C234	10μF 16V tant elect	R226	47kΩ
		R228	1MΩ
C238	0·002μF ceramic	R230	27kΩ
C239, 269, 270	100μF 3V tant elect	R232	68Ω
		R234	27kΩ
C241, 253, 255, 257	2·2μF 16V tant elect	All resistors 0·33W 5% carbon film except R223 carbon track potentiometer	
C244	15μF 25V tant elect	RFC201, 202	1,000μH
C245, 247, 277	150μF 16V elect	TR201, 204, 205	MPF102
C252, 256, 271	47μF 6·3V tant elect	TR202	BC239
		TR203	BF441
C248	470pF silver mica	TR206	2N3819
C258	0·005μF ceramic	IC201, 208	78L06
C259	1μF 35V tant elect	IC202, 203	SL1612
C261	10μF 6·3V tant elect	IC204, 210	SL1640
		IC205	741
		IC206	LM380
		IC207	SL1621
		IC209	SL6270
C263, 274	2-22pF Mullard	Mixer	SBL-1 or MD108
C264, 265, 272, 273	47pF silver mica		
D201-210	BA182 rf switching diodes (Ambit)		
S201	Two pole three-way rotary		
L201, 202	53t 30swg on FT68-2 toroid core		
L203, 204	36t 26swg on FT68-2 toroid core		
T201	2t pri, 6t sec, 26swg on FX2249 double aperture core		
T202	6t pri, 6t sec, 26swg on FX2249 double aperture core		
Filter	9MHz eight-pole 2·4kHz Seiwa YF90H2·4B (IQD) with crystals		
Sundries	8Ω loudspeaker 2·5in diameter 0·25in jack socket S2BNB Four-pin microphone socket		

TONE OSCILLATOR AND CW BREAK-IN

R301	4·7kΩ	R309, 313, 314	2·2kΩ
R302	10kΩ	R310	560Ω
R303	33kΩ	R312	12kΩ
R305, 306, 307	120kΩ	R315, 316	1kΩ
R308	100kΩ	All resistors 0·33W	
R304	4·7kΩ preset	D301-308	1N914
R311	10kΩ lin pot carbon track	D309	Red l.e.d. 2·9mm dia. Electrovalue QQV13/5R
TR301	2N4126		
TR302	BFR79	D310	Green l.e.d. 2·9mm dia. Electrovalue QQV13/5G
TR303	BC108		
TR304	2N2222A		
C301	220pF silver mica	S301	Min toggle dpdt S7203 Electrovalue
C302	470pF silver mica		
C303	1μF 35V tant elect	Jack plug	0.25in unswitched
C304	0.005μF ceramic	RLY1	Type 42 2 c/o heavy duty 12V coil (Electrovalue)
C305	0.47μF ceramic		
C306	0.1μF ceramic		
C307	47μF 16V tant elect		
C308, 309, 310	3,300pF silver mica		

COUNTER

R401	270Ω	C401	30pF silver mica
R402, 403	2·2kΩ	C402	0·001μF ceramic
R404, 406	3·3kΩ	C403, 404, 406, 409, 410, 411, 413, 419	0.01μF ceramic
R405, 407	1kΩ		
R408	100kΩ	C405	100pF silver mica
R409	10kΩ	C407	120pF silver mica
R410	22MΩ	C408	270pF silver mica
R411	68Ω	C412, 417	0.1μF ceramic
All resistors 0·33W		C414	5·5-65pF Mullard
IC401	SL1640	C415	39pF silver mica
IC402	SL1611	C416, 418	0·47μF ceramic
IC403	74LS13	D401, 402	BA182 rf switching diode
IC404	74LS90		
IC405	7216C		
IC406	7806		
IC407	7805		
X401	10MHz crystal		
LED	Six-off seven-segment MAN52 (Electrovalue) common anode		
L401	24t 24swg on 5mm dia former with slug, base and can (Denco 722/1, B1 base and type 10 can)		
L402	80t 33swg on 5mm dia former with slug, base and can (Denco 722/8, B1 and type 15 can)		

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is experienced, try changing C104 from mica to polystyrene, or fit two or more capacitors to make up the 68pF instead of the original single one.

DC and rf voltages are shown on the circuit diagram. All rf voltages are peak to peak.

Two slow-motion drives are connected in series, separated by 25mm spacers to give a 36:1 reduction. These should be fitted at this stage, but the spindle for the knob should not be cut to length until the main board is fitted to the cabinet. C101 should be reconnected and the rit circuit tested by grounding the input and then connecting it to 12V. The frequency should change by about ± 5kHz.

Main board

This board should be assembled and checked in sections. As mentioned earlier, it may be made in two pieces, one containing the counter and the other the rest of the circuitry, On completion the two boards can be joined together. Track layout is shown in Fig 3 and components in Fig 4.

The bandpass filters, receiver and transmitter exciter should be constructed first. L201, L202, L203 and L204 are all wound on T68-2 Amidon toroid cores. Each winding should occupy about 330° of the toroid, and the completed coil should be fixed to the pcb, on edge, by means of instant adhesive. Transformers T201 and T202 are wound on Mullard FX2249 double-aperture cores with 26swg wire. T201 has a two-turn primary (on the SBL-1 side) and a six-turn secondary. T202 has six turns on both windings. The filter should be perfectly flat on the board and securely bolted before soldering. When fixing the SBL1, note that four pins are connected to ground. This is effected by soldering a thin wire to the groundplane and passing it through the appropriate holes (pins 1, 2, 4 and 6).

The mixer is then fitted into place and the wire is twisted round the pins on the track side and soldered. The same method is used for the ground pin of the crystals. Ground connections to the ics are made by soldering the appropriate pin to the groundplane, and all other grounded components are similarly treated. Do not use holders for any of the Plessey ics as instability will probably result. Both crystals have their cases connected to the groundplane by a short piece of wire. It is important that all ground pins on the af amplifier (LM380) be well soldered to the groundplane. All

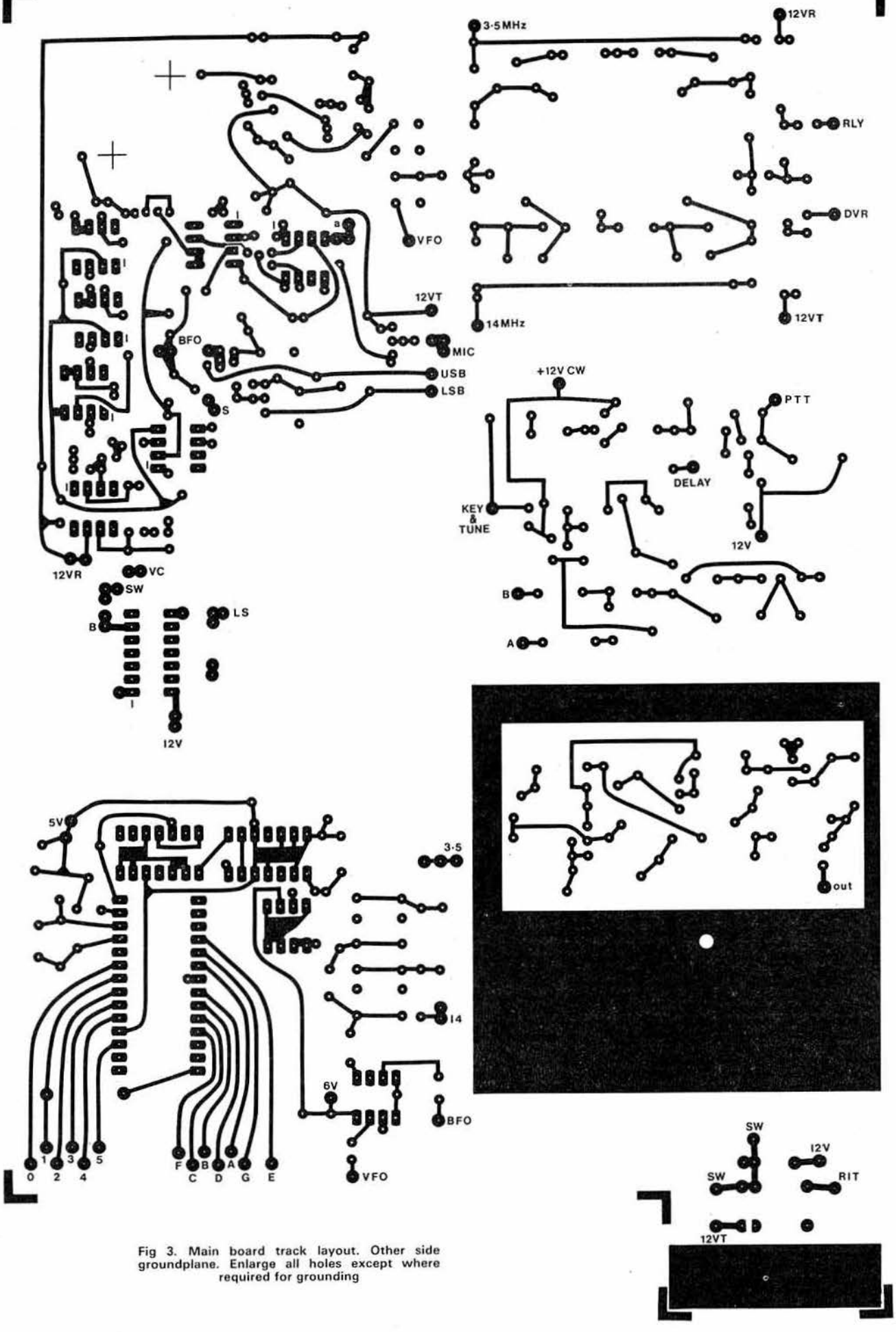


Fig 3. Main board track layout. Other side groundplane. Enlarge all holes except where required for grounding

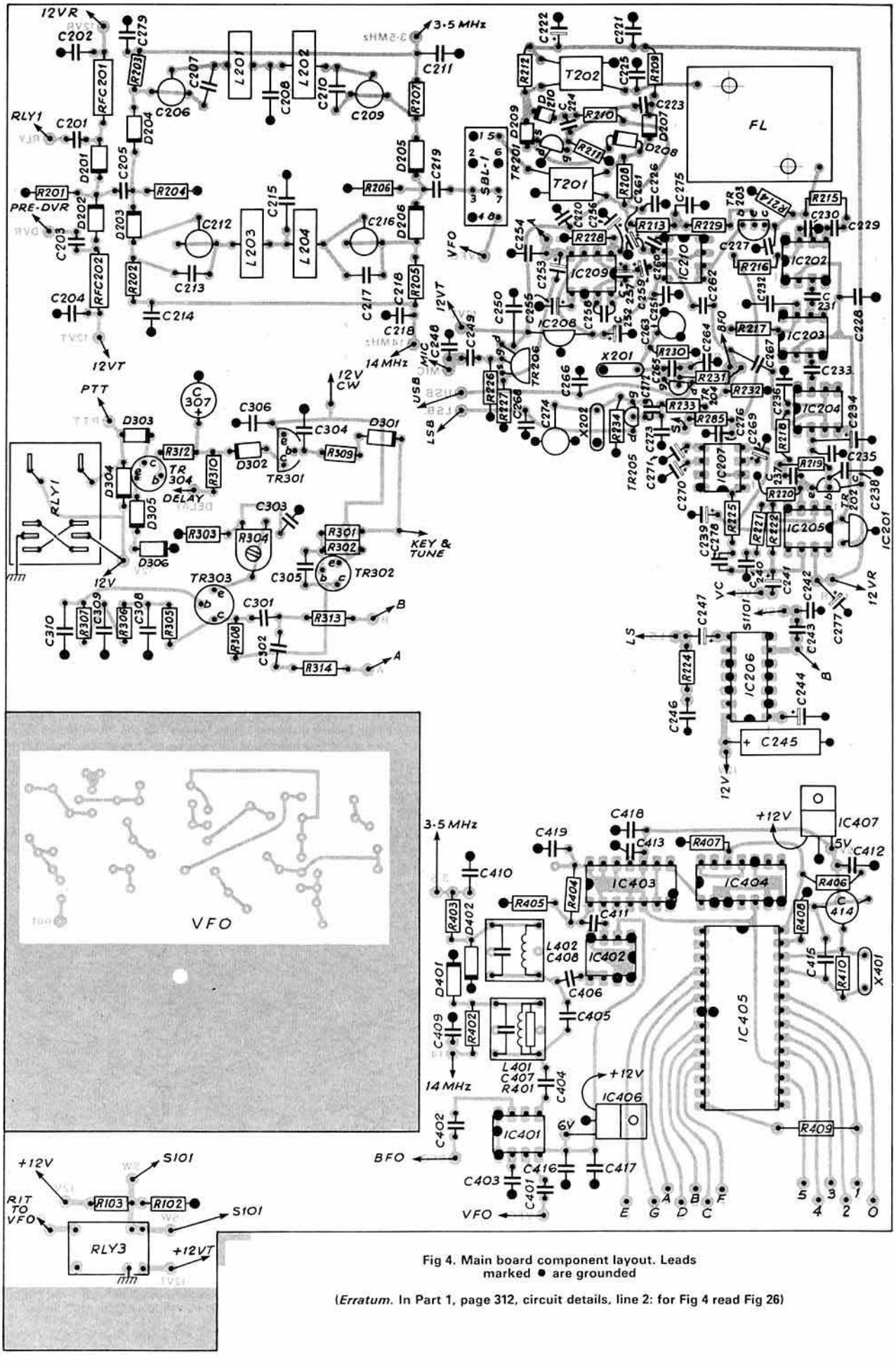
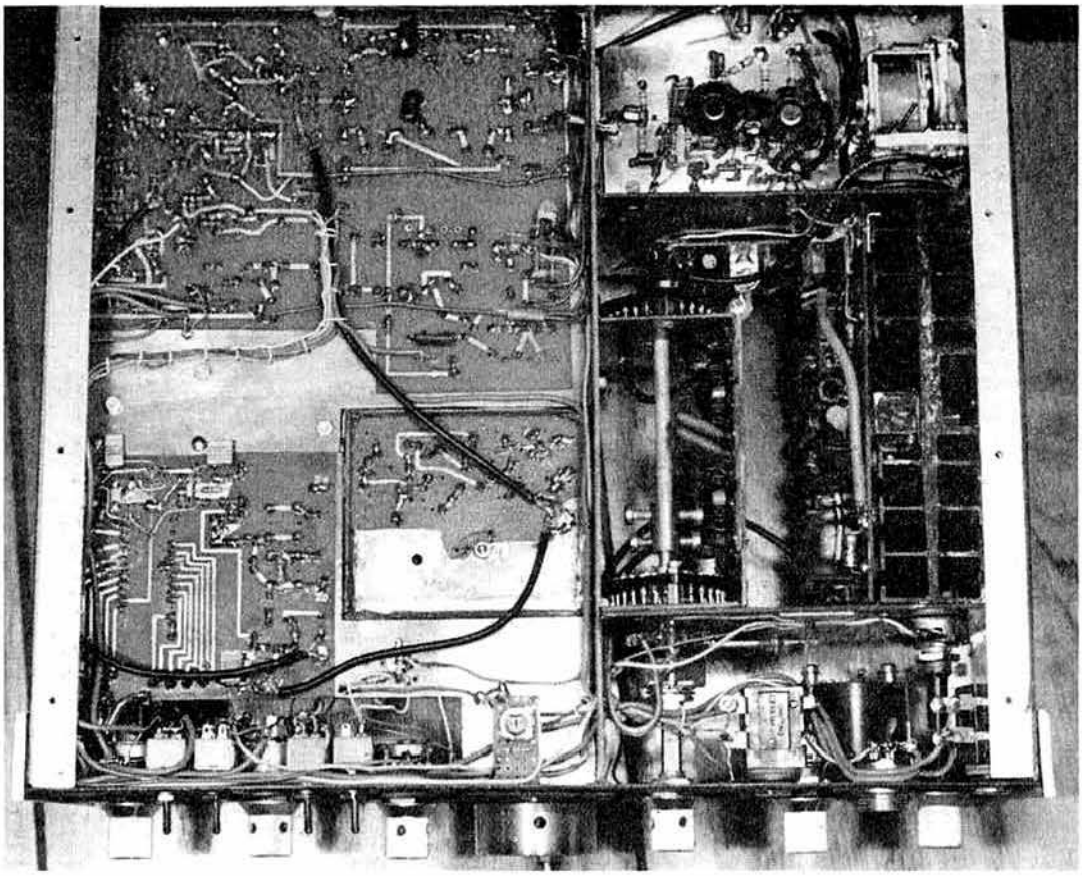


Fig 4. Main board component layout. Leads marked ● are grounded

(*Erratum.* In Part 1, page 312, circuit details, line 2: for Fig 4 read Fig 26)



View of transceiver from bottom. The main board is on the left of the central screen. The top right hand compartment includes the pre-driver and antenna changeover relay. The central right hand compartment includes final amplifier, low pass filter and wattmeter. The small preset resistor mounted on a small piece of Veroboard is the 'S' meter adjustment

connection points are fitted with Veropins. A connection is made from underneath the vfo at C115 to the SBL-1 in miniature 50Ω coaxial cable RG174.

When all components are fitted, check for a fairly high resistance on the 12V receive and transmit pins. Connect a 12V, preferably regulated, supply to the 12V receiver terminal, audio amplifier, receive pins on the bpf, 3·5MHz terminal, lsb and the vfo. Ground the usb and the two transmit pins. Connect the volume control and loudspeaker.

Apply voltage and rotate the volume control. A hissing should be heard in the loudspeaker. Touch pin 5 or 6 of 1C202 with a screwdriver and the hiss should increase, showing that the i.f. amplifier is working. Connect a 51Ω resistor across the antenna terminals and inject a signal in the 3·5MHz band. Tune the vfo until the signal is heard in the loudspeaker. Tune C206 and C209 for the loudest signal (do not worry too much about covering the whole band at this stage).

Change the 12V connection from 3·5 to 14MHz and earth the 3·5MHz pin. Retune the signal generator to 14MHz and repeat the procedure. A signal generator is not essential, and an antenna can be used instead. Leave the 51Ω resistor across the antenna pins to form a dummy load, ground the receive pins and apply 12V to the transmit pins, inject an audio signal into the microphone pin and switch on. An oscilloscope on the antenna output

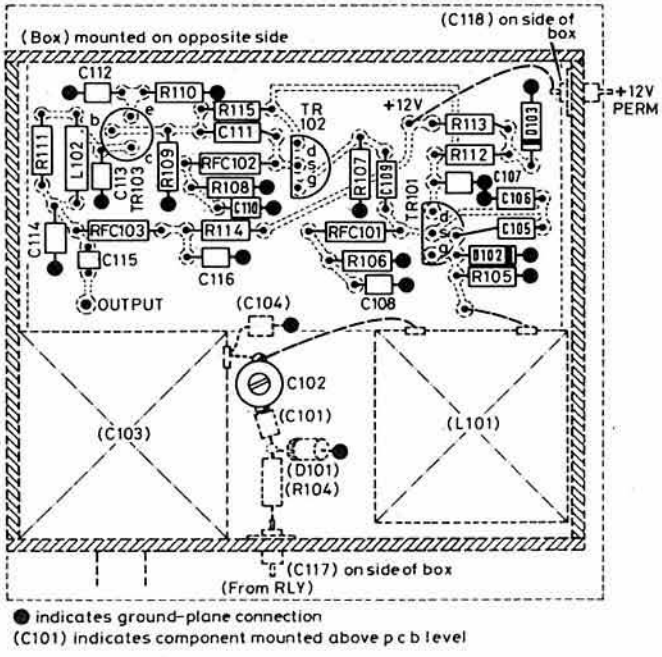


Fig 5. VFO components layout on main board. RIT components: mount C101, D101 and R104 between feedthrough on front panel of vfo and C102

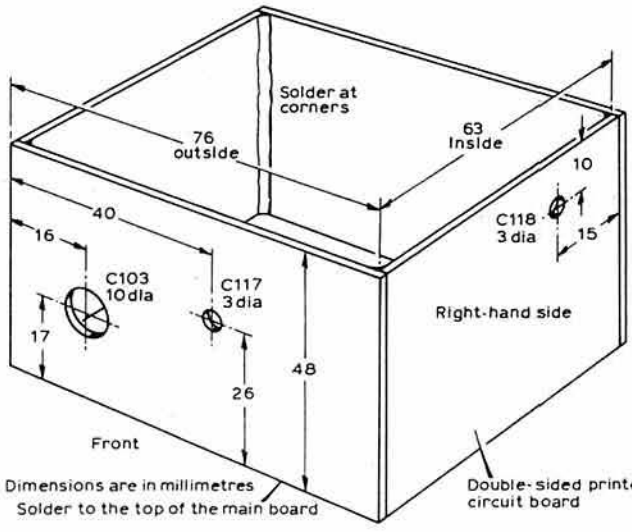
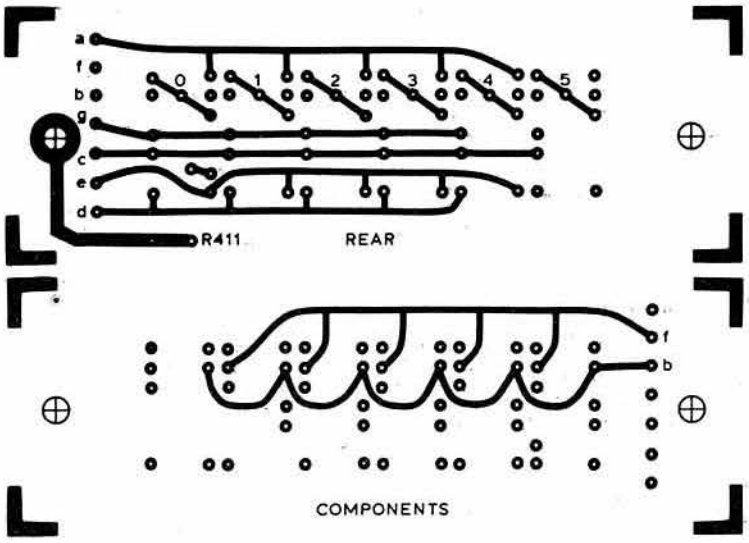


Fig 6. Details of vfo box made from double-sided pcb soldered together. The completed box is soldered to the top of the main board



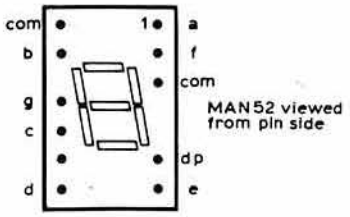


Fig 7. Display board track layout. Double-sided board. Before mounting displays, solder a fine wire to the B and F tracks on the component side, pass through the holes and, after mounting displays, twist wire round pins and solder. Carefully snip off pin 9 on all digits, and pin 6 on digits 1 to 5 before fixing

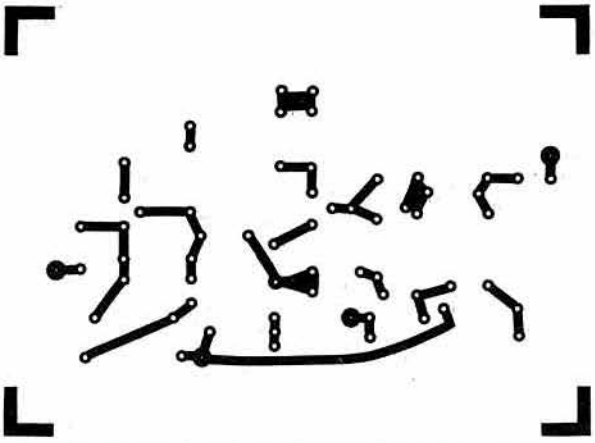
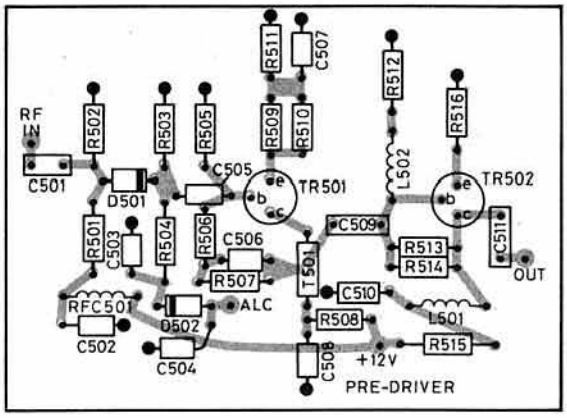


Fig 8. Pre-driver board track layout. Other side groundplane. Enlarge all holes on groundplane side before mounting components



● indicates connection to ground-plane

Fig 9. Pre-driver board component layout

should show 100mV peak to peak on both bands. The bpf can now be properly tuned by varying the vfo and tuning for maximum output at each end of the band.

The most likely cause of non-operation is faulty or incorrectly-polarized diodes. These are easily checked by means of a voltmeter. The carrier oscillator injection should be about 200mV peak to peak. If all the diodes are in good order, the usual method of tracing the signal through the circuit by means of a signal generator and rf voltmeter or oscilloscope should be employed.

The cw oscillator and break-in circuit should be constructed next. When all components are mounted, fit a temporary 10kΩ potentiometer to the delay pin. Apply power to both 12V terminals. Earth the push-to-talk pin to check the relay operation. Disconnect the earth from the ptt pin and reconnect to the "key" pin. The relay should pull in immediately and the potentiometer should change the length of time taken for the relay to drop out.

Connect a shielded wire from output B of the cw oscillator to the input of the LM380 audio amplifier. Applying 12V to the audio amplifier should produce an audio tone when the key pin is grounded. The amplitude is set by varying R304, and the output when monitored on an oscilloscope should show a perfect sine wave with a thin trace. The amplitude should be set at about 15mV, although this is not at all critical.

The counter and display boards should now be constructed. Coils L401 and L402 are wound on 5mm formers with cores, bases and cans, The 14MHz coil is wound on a 14mm long former and the 3·5MHz coil on a 27mm long former.

Connections to the display board (Fig 7) are made with ribbon-cable about 150mm long. The board contains its own 5V and 6V regulators which are soldered direct to the relevant pin and ground. Apart from providing the necessary voltages, these regulators form excellent decoupling devices. Do not try to economise by taking 6V from, say, the receiver board.

Apply 12V to the input of both regulators. In particular ensure that no drive is applied to the 7216C unless the ic is powered. The display should show a row of noughts with zero blanking on the last digit. A length of miniature (RG174) coaxial cable should be connected between the counter and the vfo and carrier oscillator. When 12V is applied to the 3·5MHz pin, the counter should indicate a frequency within the band and vary when the vfo is tuned.

Similarly, applying 12V to the 14MHz pin and leaving the 3·5MHz pin floating (or earthed) will give a display in the 14MHz band. If the reading is erratic or the last digit wobbles excessively, coils L401 and L402 may be tuned to stabilize the display.

With the main board completed, the rest of the transmitter can be constructed and tested in stages.

TO BE CONTINUED

Computer-aided ladder crystal filter design

by J. A. HARDCASTLE, G3JIR*

Introduction

Ever since the author's first experiments with ladder crystal filters, the principal objective has been to produce simple procedures for use by radio amateurs wishing to make filters of predictable performance. This was largely achieved, with a minimum of complicated mathematics, by using the Amstutz component coefficients [1] which allowed the design to be completed using a slide-rule or pocket calculator. During the intervening period personal computers have become generally available, so mathematical complexity need no longer be a constraint once the required programs have been written.

The procedure to be described has been developed from Dishal's design [2] to allow filters to be constructed from available inexpensive surplus crystals. This is the reverse of the usual procedure where the professional filter engineer calculates the parameters for the required crystals before ordering them to be made to his design.

Crystal parameters

Before the performance of a crystal filter can be calculated the electrical properties of the crystals themselves must be known. Resonance of a crystal depends on the mechanical properties of quartz but it can be represented by the equivalent electrical circuit shown in Fig 1. This shows that it possesses both a series resonance and, at a slightly higher frequency, a parallel resonance.

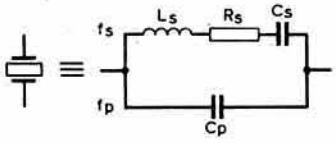


Fig 1. Equivalent circuit of a crystal

The shunt capacitance C_p may be measured on a component bridge, and is principally the capacitance of the crystal's electrodes and case assembly.

The equivalent series capacitance C_s cannot be measured directly, and must be derived from measurements made in the test circuit of Fig 2 which is loosely based on British Standard BS9610. Tuning the signal generator through the series resonant frequency f_s gives a peak on the signal detector, and a little higher in frequency a sharp null is found at the parallel resonance f_p giving a frequency response similar in shape to Fig 3. Initially S1 is set to position 1, and the series resonance f_{s1} measured. Similarly f_{s2} and f_{s3} are measured with S1 set to positions 2 and 3. Series resonance in these measurements is a rather broad peak, and if a double-beam, wide-band, oscilloscope is available this may be connected as shown in Fig 2 and a more precise indication of resonance obtained by tuning to the point where both signals are in phase.

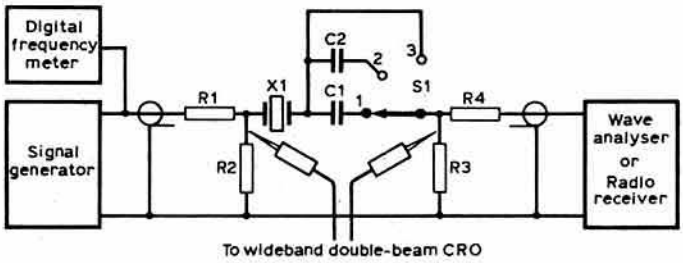


Fig 2. Crystal test circuit

*8 Norwood Grove, Rainford, St Helens, Merseyside WA11 8AT.

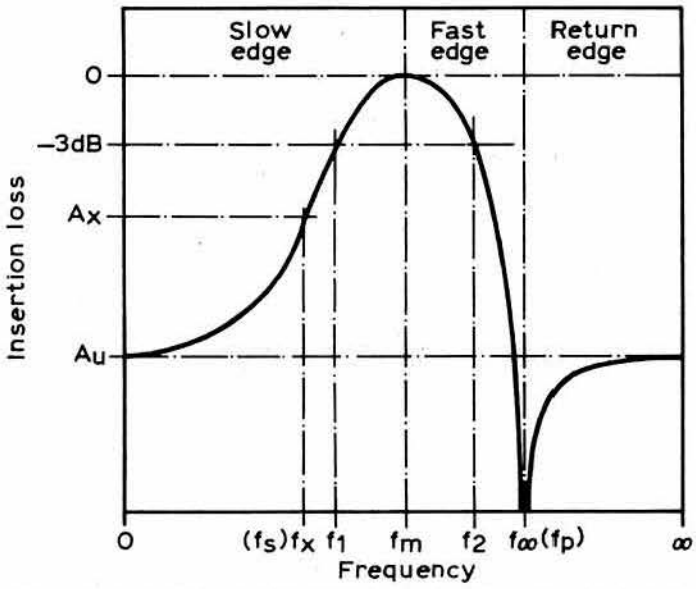


Fig 3. Generalized shape of ssb crystal filter showing the principal regions and frequencies referred to in the text

The equivalent series capacitance may now be calculated from

$$C_S = \frac{2(C2-C1)\ 10^{-12}}{f_{s3}} \times \frac{(f_{s1}-f_{s3})(f_{s2}-f_{s3})}{f_{s1}-f_{s2}} \qquad (1)$$

where C = pF and f = Hz

Typical values measured on nominally 9,681·2kHz crystals were:

f_{s1} = 9,684,598Hz; f_{s2} = 9,681,128Hz; f_{s3} = 9,676,669Hz

C1 = 9·61pF; C2 = 25·32pF,

which gives $C_S = 3{\cdot}308 \times 10^{-14}$ or 0·033pF.

For this measurement R1 and R4 were 1,000Ω, and R2 and R3 were 220Ω. The average value of series resonance for the batch of crystals was 9,677,200Hz.

The choice of R2 and R3 is a compromise since series and parallel resonance are both affected by stray capacitance. With R2 and R3 both 15Ω the parallel resonant frequency was 9,681kHz. This increased steadily as the impedance was increased, and eventually levelled off to 9,694kHz at 220Ω; the series resonance hardly changing up to this point. Ideally the measurements should be made at the same impedance as the final filter but this obviously cannot be known at this stage in the design.

Careful screening between input and output of the test circuit is essential because unwanted signal feedthrough and noise broaden the signal null at f_p, reducing the precision of the measurement.

The shunt capacitance was measured as 8·3pF and can be used in (2) to crosscheck the measurement of f_p.

$$f_p = f_s\sqrt{1+(C_s/C_p)} \qquad (2)$$
$$= 9{,}677{,}200\sqrt{1+(0{\cdot}03/8{\cdot}3)}$$
$$= 9{,}694{,}673\text{Hz}$$

Single sideband frequency response

Fig 3 shows a typical lower sideband filter response. For ease of description and calculation it has been divided into three distinct regions which Dishal has named "slow", "fast" and "return" edges. Fig 3 also shows the principal frequencies of interest, and it should be noted that for a lower sideband filter f_s coincides with f_x, and f_p with f_∞.

Upper sideband filters will not be considered here since to do so would double the length of the article, but it should be noted that for the usb case the frequency response is a mirror image of Fig 3, and may be calculated

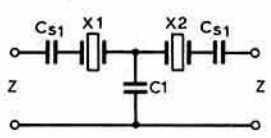


Fig 4. Two-pole filter. Table 1 gives components and other details

Table 1. Two-pole Butterworth filters

Fig. 5	Z (Ω)	Cl (pF)	fm (Hz)	BW (Hz)
a	658	25	9,683,163	6,266
b	328	50	9,681,084	4,685
c	164	100	9,679,518	3,017
d	55	300	9,678,091	1,225

Table 2. Attenuation at crystal's series resonant frequency

Butterworth filters		1dB Chebyshev filters	
Filter order	Attenuation A_x (dB)	Filter order	Attenuation A_x (dB)
2	7·0	2	9·3
3	9·5	3	11·4
4	11·6	4	12·3
6	29·9	6	19·9
8	56·5	8	29·0

Table 3. Dishal coupling coefficients

Butterworth filters

n	k_{12}	k_{23}	k_{34}	k_{45}	k_{56}	k_{67}	k_{78}	d	K
2	0·7071							0·7071	1·4142
3	0·7071	0·7071						1·0	1·4142
4	0·841	0·541	0·841					1·307	1·382
6	1·169	0·605	0·518	0·605	1·169			1·932	1·774
8	1·519	0·736	0·554	0·510	0·554	0·736	1·519	2·563	2·255

1dB Chebyshev filters

n	k_{12}	k_{23}	k_{34}	k_{45}	k_{56}	k_{67}	k_{78}	d	K
2	0·735							0·451	1·47
3	0·644	0·644						0·451	1·288
4	0·638	0·546	0·638					0·452	1·184
6	0·633	0·531	0·520	0·531	0·633			0·453	1·164
8	0·633	0·530	0·514	0·511	0·514	0·530	0·633	0·454	1·163

by reversing the sign preceding the brackets in equations (9) to (11) which are given later. It must also be noted that for the usb filter f_p provides f_x, and f_x produces the notch frequency f_∞.

The simplest ladder crystal filter is shown in Fig 4, and its component values are listed in Table 1. It uses only two crystals and, as Fig 5 shows, it has very limited selectivity. However, this is included because it exhibits all the properties of the more complex higher-order filters at levels which are readily measured. Fig 5 also shows how the filter behaves when the impedance is altered. As the impedance is reduced, not only does the bandwidth decrease but the whole passband is shifted lower in frequency. This is a complication which anyone planning a switched bandwidth filter must take into account.

A striking feature of Fig 5 is the manner in which the four frequency responses coincide at the crystal's series resonant frequency, which acts as a pivot. This applies to all orders and types of filter and is a useful datum for sketching approximate frequency responses. Table 2 gives data for other filters.

Bandwidth and centre frequency

As can be seen from Fig 5, bandwidth B depends on the position of the midband frequency f_m in relation to f_x and f_∞, and designers need a ready means of determining f_m for a given bandwidth. This is provided by the following formula:

$$(B/2)^2 - BK(f_\infty - f_x)/2 - (f_x - f_m)(f_\infty - f_m) = 0 \quad (3)$$

Solving for f_m gives

$$f_m = f_x + 0{\cdot}5(T - \sqrt{T^2 - 2BKT + B^2}) \quad (4)$$

where $T = f_\infty - f_x$

and $K = k_{12} + k_{23}$ (see Table 3)

Maximum bandwidth is obtained when f_m is midway between f_x and f_∞ and may be calculated from

$$B_{max} = (f_\infty - f_x)[K - \sqrt{K^2 - 1}] \quad (5)$$

The above relationships show that bandwidth reduces in a parabolic manner as f_m approaches either f_x or f_∞, but in practice only the half of the characteristic on the side of f_x produces realistic designs.

Computer program 1 (FM6) solves the above equations to provide an output of maximum possible bandwidth, and bandwidth for a given f_m, when provided with input data consisting of f_x, f_∞ and K.

As a further aid Fig 6 is a universal design chart which relates normalized bandwidth W to normalized frequency P. To use the chart, W is calculated from B as follows,

$$W = B/(f_\infty - f_x) \quad (6)$$

P is then read off the appropriate curve and f_m is calculated from

$$f_m = f_x + P(f_\infty - f_x) \quad (7)$$

The following example illustrates this procedure.

Measured f_∞ = 9,694,000Hz and f_x = 9,677,200Hz

For a required bandwidth B = 3,017Hz. W = 0·1796 is obtained from (6). For a two-pole Butterworth filter the chart gives P = 0·14 and from (7) f_m = 9,679,552Hz.

By comparison, program FM6 gives the value of f_m as 9,679,518Hz and its measured value was 9,679,544Hz at a measured bandwidth of 2,977Hz.

Frequency response

Having obtained the midband frequency, the program SSBBPF together with FRBUTT or FRCHEBY are used to calculate the filter frequency response. They apply the following formulas.

Firstly the frequency-bandwidth ratio R is calculated from

$$R = 2(f_\infty - f_m)/B \quad (8)$$

Then the ssb response is calculated in the three separate regions of Fig 3 using Dishal's frequency transformation [2] given in (9), (10) and (11).

Slow edge $$f(A) = f_m - \left\{\frac{B}{2} \times \frac{XR - 1}{R - X}\right\} \quad (9)$$

Return edge $$f(B) = f_m + \left\{\frac{B}{2} \times \frac{XR - 1}{X - R}\right\} \quad (10)$$

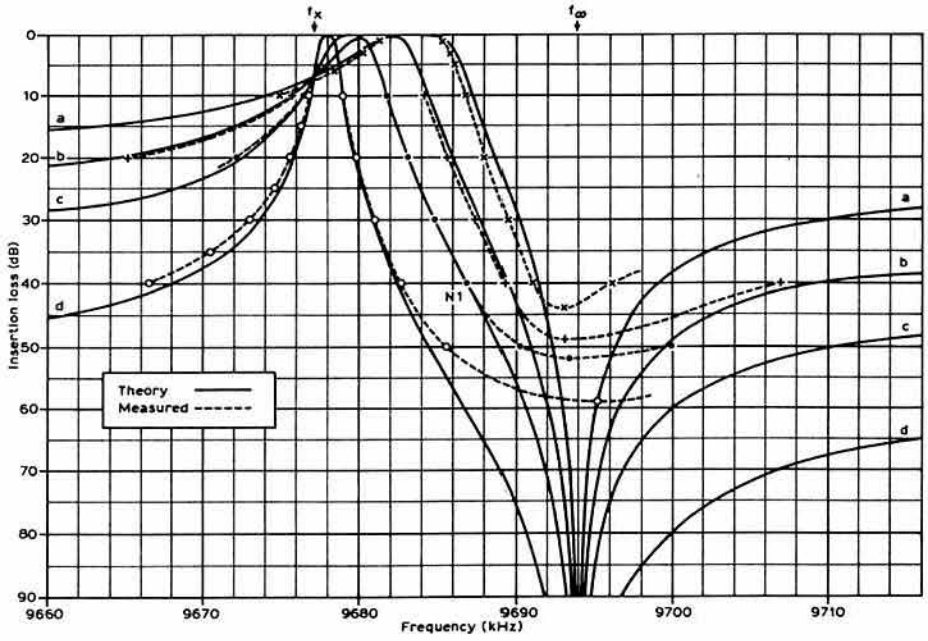


Fig 5. Two-pole Butterworth filter frequency response for the circuit of Fig 4

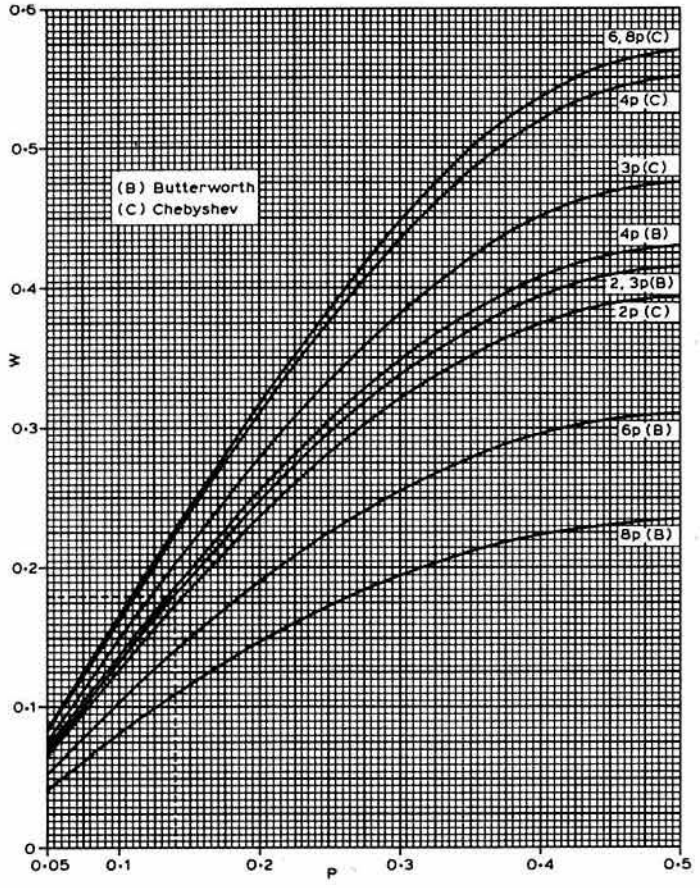


Fig 6. Universal design chart

Fast edge $$f(C) = f_m + \left\{\frac{B}{2} \times \frac{XR+1}{X+R}\right\} \quad (11)$$

where X is the normalized frequency ratio

$$X = f/f_c \quad (12)$$

and where f_c is the lpf −3dB cut-off frequency and f is the actual frequency.

This may be read off either Fig 7 or Fig 8 according to filter type.

Using B = 3,017Hz and f_m = 9,679,518Hz (8) gives a value for R = 9·60.

From Fig 7 it is found that at X = 10 the insertion loss is 40dB. Using (11) it is calculated that at −40dB f(C) = 9,686,984Hz. This is shown marked N1 on Fig 5.

As mentioned previously, the frequency f_x acts as a pivot for the frequency response and it is worth noting that at f_x

$$X = k_{12} + k_{23} = K \quad (13)$$

The ultimate attenuation reached at points far removed from the passband is attained when X is equal to R. Reading from Fig 7 gives an attenuation of 39dB.

To use Program 2, the main program SSBBPF is merged with FRBUTT or FRCHEBY according to filter type. For each value of attenuation entered, the program will calculate the corresponding frequency in the three regions of the filter. The "slow" and "return" edges will return zero values when the attenuation requested is out of their range. The frequency response calculated by FRBUTT is shown in Fig 5(c).

Transmitter filters

Using the value of f_p obtained in the initial measurements ensures the best approximation to a symmetrical frequency response for a receiver. However, a transmitter filter needs the steepest possible rate of cut-off and the best attainable discrimination to the unwanted sideband. This type of response is obtained by shunting additional capacitance C_p across the crystals to bring f_∞ closer to the passband. However, this results in a diminished rate of cut-off of the "slow edge", but this can be compensated by an audio filter to limit the bandwidth.

Having decided on a desirable value for f_∞, the previous procedure is repeated to find the new value of f_m. Equation (8) is again used to obtain R, and the crystal shunt capacitance is calculated from

$$C_p = C_s\left[\frac{f_m}{B}\right]\frac{R-K}{R^2-1} \quad (14)$$

The shunt capacitance obtained includes the crystal holder and stray capacitance measured previously, and this must be subtracted from C_p to determine the amount to be added. In practice the shunt capacitor may be made a trimmer which is adjusted to bring the attenuation notch to the required frequency.

This calculation is included in Program 3 (DISHAL) at line 1170.

Calculating component values

Having determined f_m and C_s, program DISHAL is run to obtain filter component values. It uses the following equations which are included for users of pocket calculators.

The reactance of the crystal at its series resonance is given by

$$X_x = \frac{1 \times 10^{12}}{2\pi f_s C_s} \quad (15)$$

where f = Hz and C = pF.

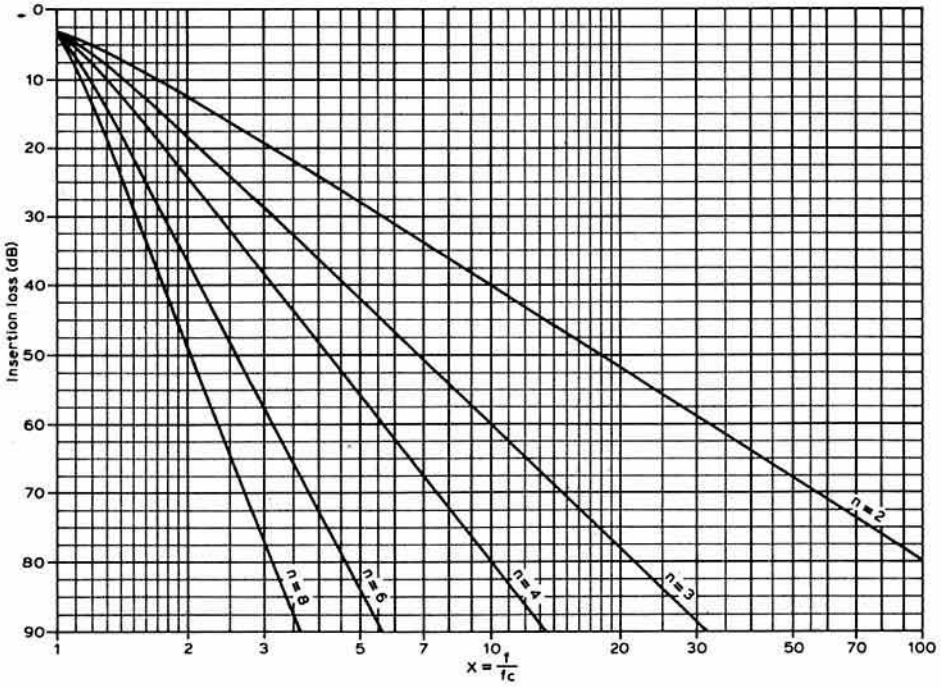


Fig 7. Butterworth lowpass filter. Attenuation/ normalized frequency response

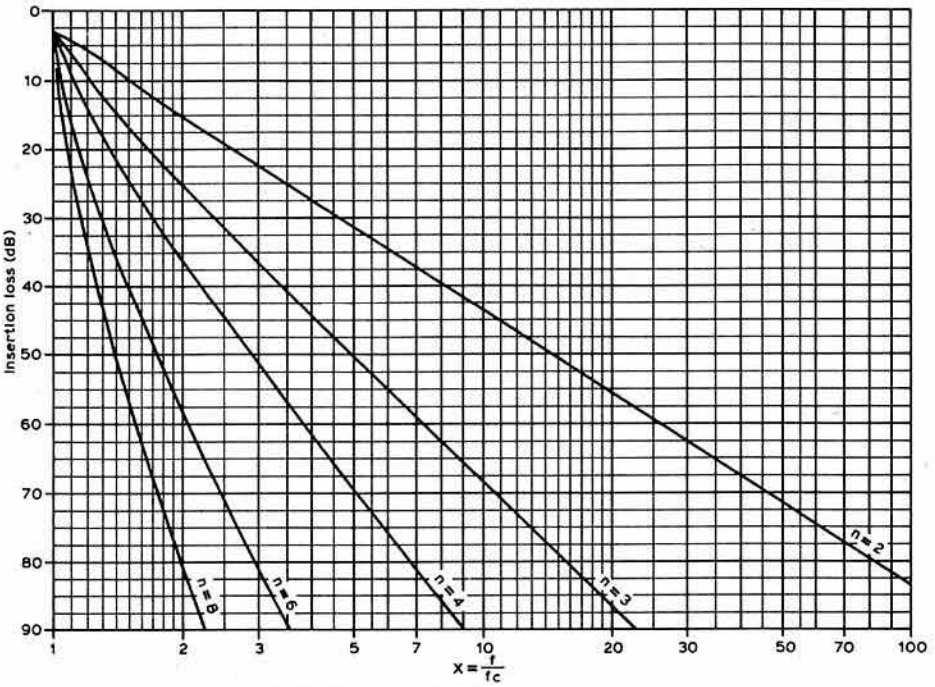


Fig 8. Chebyshev lowpass filter, 1dB passband ripple. Attenuation/normalized frequency response

This is modified next by a factor to allow for filter order and type

$$X_o = \frac{X_x}{[1-(K/R)]^2}. \quad (16)$$

The impedance is now calculated from

$$Z = d_1\left[\frac{X_o B\,(1-1/R^2)}{f_m}\right]\Omega. \quad (17)$$

Coupling capacitor values are then obtained from

$$X_1 = k_{12}\left[\frac{X_o B\,(1-1/R^2)}{f_m}\right] \quad (18)$$

$$C_1 = \frac{1\times 10^{12}}{2\pi f_m X_1}\text{pF}. \quad (19)$$

The other capacitor values are obtained by substituting the appropriate value of k_{nm} from Table 3 into (18).

Fig 9 gives the filter circuit and component designations.

d and k calculation

Throughout this article the Chebyshev designs have been calculated for 1dB passband ripple, but since other designers may want to use a different value the following formulas are included. They have also been used in Program 4 (DANDK) which will be found useful for calculating the variety of d's and k's used to design variable bandwidth filters of the type described by G3UUR [3]. These were derived by Dishal [4].

$$r = \text{passband ripple(dB)}/10 \quad (20)$$

$$E = 1/\sqrt{10^r - 1} \quad (21)$$

$$S = \sinh\left[\frac{1}{n}\sinh^{-1}E\right] \quad (22)$$

$$W = \cosh\left[\frac{1}{n}\cosh^{-1}E\right] \quad (23)$$

$$Q = 2\sin(\pi/2n)W/S. \quad (24)$$

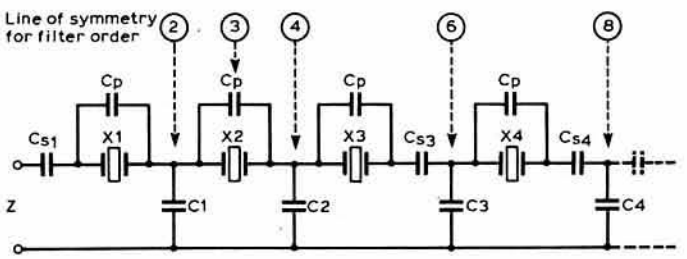


Fig 9. Generalized circuit diagram for ladder crystal filters. Filters are symmetrical about the line indicated for each order of filter

The dissipation coefficient is:

$$d = 1/Q. \quad (25)$$

The coupling coefficients are derived from:

$$k_{c,c+1} = \sqrt{\frac{S^2+\sin^2(c\pi/n)}{4\sin[(2c-1)\pi/2n]\sin[(2c+1)\pi/2n]}}\times\frac{1}{W} \quad (26)$$

where n = filter order

and c = 1, 2, – – –, n – 1.

Summary of design procedure

1. Measure f_s, f_p and C_p and calculate C_s from (1).
2. Use program FM6 to calculate f_m for the required bandwidth.
3. Use program SSBBPF with either FRBUTT or FRCHEBY to calculate the frequency response.
4. Use DISHAL to calculate filter component values.

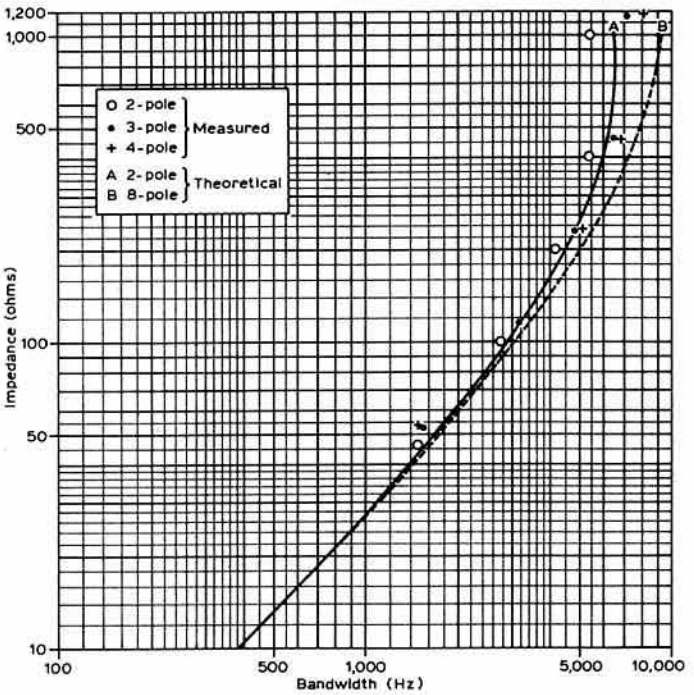


Fig 10. 1dB ripple Chebyshev filters. Impedance/bandwidth chart

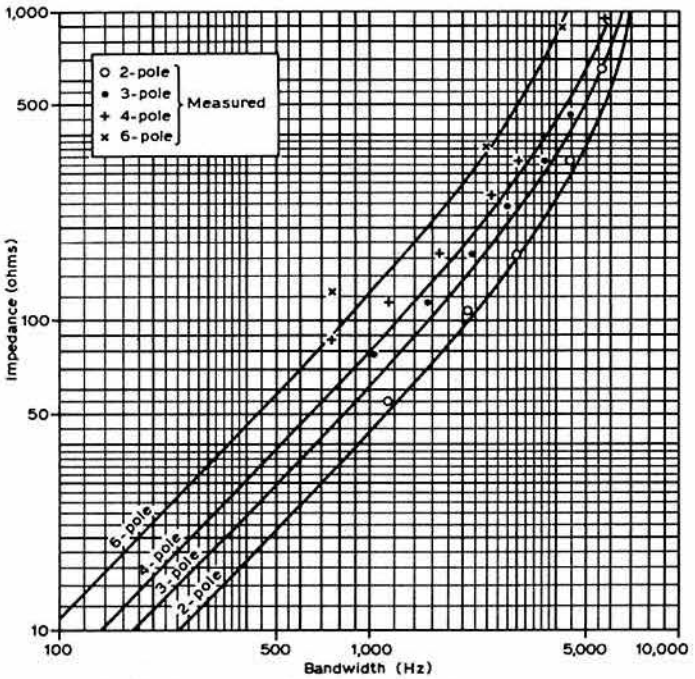


Fig 11. Butterworth filters. Impedance/bandwidth chart

Retrospect—Impedance and bandwidth

It has previously been found experimentally that for 1dB ripple Chebyshev filters, and for a given bandwidth, impedance is constant for all orders of filter. This important result was used as a means of rapidly extrapolating the design of high-order filters from measurements on second-order filters [1]. This has now been confirmed theoretically, as Fig 10 shows, and except at the very widest bandwidths there is very little difference between the bandwidths of second and eighth-order filters. Experimental results are also plotted on Fig 10, showing the good measure of agreement between theory and practice.

Unfortunately this simple relationship does not hold for Butterworth or low ripple Chebyshev filters, and the reason can be found in equation (17) and Table 3. Impedance can be seen to be proportional to the dissipation constant d and, while this remains almost the same for all orders of Chebyshev (1dB ripple) filters, it varies over a wide range for Butterworth filters as shown in Fig 11. This also shows the less satisfactory agreement between theory and practice for Butterworth designs. This has been investigated for second-order filters by using a general-purpose network simulation program, and this has shown that stray capacitance between ground and the junction of the crystal and series capacitor can account for these discrepancies. The lower impedance levels required by Chebyshev filters makes them less vulnerable to the effects of stray capacitance, and therefore they are usually more appropriate for amateur applications.

Conclusion

This article has described in detail a procedure for designing lower-sideband ladder crystal filters. Although the computer programs may be used without prior knowledge, sufficient supporting theory is provided to satisfy the requirements of pocket calculator users. Also for these readers there are graphical design aids and tabular data to assist them. It should be noted that while computers will provide greater digital accuracy than graphs, overall accuracy is limited by the precision of initial measurements of crystal parameters, and time spent on achieving this will be well rewarded.

Finally, attaining the theoretical performance depends on observing good hf construction practice, keeping high impedance points as far away from ground as possible, and screening each section from its neighbours.

Acknowledgements

The contribution of Mr M. Dishal as originator of most of the formulas used in this article cannot be too greatly emphasized and is gratefully acknowledged.

Also John Evans, G8IIQ, is thanked for examining the article at an early stage and for making constructive suggestions for improving its clarity.

It is less easy to thank the RSGB referees, as they must necessarily remain anonymous. However, they have succeeded in influencing this article beneficially, particularly by contributing simpler solutions for equations (4) and (5) used in program FM6. This replaces the author's more complex and longer-running successive approximation routine. Their great expenditure of time and effort is sincerely appreciated.

References

[1] "Ladder crystal filter design", J.A.Hardcastle, G3JIR. *Rad Com* February 1979, p116.

[2] "Modern network theory design of single-sideband crystal ladder filters", M.Dishal. *Proc IEEE* Vol 53 No 9 September 1965, pp1205-16.

[3] "Switched bandwidth ladder crystal filter", G3UUR. "Technical Topics", *Rad Com* December 1980, p1294.

[4] "Two new equations for the design of filters", M.Dishal, *Electrical Communication* December 1953, pp324-37.

Program 1. FM6 f_m calculator

```
]LIST

1  PRINT "FM6/9"
10  REM  CALC FM GIVEN BW
20  INPUT "FX     (HZ) = ";F2
30  INPUT "FINF   (HZ) = ";F9
40  INPUT "K (TABLE 3) = ";K
50 T1 = F9 - F2
60 B3 = T1 * (K -  SQR (K * K - 1))
70  PRINT : PRINT
80  PRINT "MAX BW      = ";B3
90  INPUT "BW     (HZ) = ";B1
100  IF B1 < B3 GOTO 140
110  PRINT : PRINT
120  PRINT "BW MUST BE LESS THAN ";B3;" HZ"
130  PRINT : PRINT : GOTO 90
140 T3 = 2 * K * B1 * T1 - B1 * B1
150 T2 = (T1 -  SQR (T1 * T1 - T3)) / 2
160 F1 = T2 + F2
170  PRINT "FM     = ";F1;" HZ"
180  PRINT : PRINT : PRINT
190  GOTO 90
```

Output example
Program then loops back to ask for another bandwidth.

```
]RUN
FM6/9
FX     (HZ) = 9677200
FINF   (HZ) = 9694000
K (TABLE 3) = 1.4142


MAX BW      = 6958.88223
BW     (HZ) = 3017
FM     = 9679517.59 HZ



BW     (HZ) =
```

Program 2. SSBBPF main program BPF frequency response calculator

```
 LOAD SSBBPF/4
]LIST

1  REM   SSB BPF FREQ RESPONSE(SSBBPF/4)
20  INPUT "FILTER ORDER = ";N
30  INPUT "FM           = ";F1
40  INPUT "BW           = ";B1
50  INPUT "FINF         = ";F9
60 B2 = B1 / 2:R1 = (F9 - F1) / B2: PRINT
100  INPUT "ATTENUATION(DB)   = ";D2
110  GOSUB 1000
120  PRINT "NORMALISED FREQ X = ";X1
130 J = ((R1 * X1) - 1) / (R1 - X1)
140  IF J < 0 THEN S = 0: GOTO 170
150 S = F1 - (B2 * J)
160  IF S < 0 THEN S = 0
170  PRINT "SLOW EDGE (HZ)    = ";S
180 L = ((R1 * X1) - 1) / (X1 - R1)
190  IF L < 0 THEN T4 = 0: GOTO 220
200 T4 = F1 + (B2 * L)
210  IF T4 < 0 THEN T4 = 0
```

```
220  PRINT "RETURN EDGE (HZ)  = ";T4
230 M = ((R1 * X1) + 1) / (R1 + X1)
240 U = F1 + (B2 * M)
250  PRINT "FAST EDGE (HZ)    = ";U
260  PRINT : PRINT : PRINT
270  PRINT "TO CONTINUE TYPE ATTENUATION VALUE"
280  PRINT "LESS THAN 200 DB. TO OBTAIN ULTIMATE"
290  PRINT "ATTENUATION TYPE 200": PRINT : PRINT
300  INPUT "ATTENUATION(DB)   = ";D2
310  IF D2 < 200 GOTO 110
320  GOSUB 1100
330  PRINT "ULTIMATE ATTENUATION (DB) = ";T3
340  PRINT "FREQ/BW RATIO R   = ";R1
350  PRINT : PRINT : END

]
```

Program 2(a). FRBUTT7 Butterworth subroutine for SSBBPF. Note the unusual type of "up"arrow used to denote exponentiation in line 1020 and subsequent lines and programs

```
]LIST

10  PRINT "FRBUTT7/3"
1000  REM  BUTTERWORTH FREQ RESPONSE
1010 D9 =  - D2 / 10:N9 = 1 / (2 * N)
1020 X1 = (1 / (10 ^ D9) - 1) ^ N9
1030  RETURN
1100  REM  ULTIMATE ATTENUATION
1110 V1 = 1 + R1 ^ (2 * N)
1120 T3 = 10 *  LOG (V1) /  LOG (10)
1130  RETURN

]
```

Program 2(b). FRCHEBY5 Chebyshev subroutine for SSBBPF

```
 LOAD FRCHEBY5/2
]LIST

10  PRINT "FRCHEBY5/2"
70  INPUT "PASSBAND RIPPLE(DB) = ";Y1
80  GOSUB 1200
1000  REM  CHEBYSHEV LPF FREQ RESPONSE
1010 A1 = 10 ^ (D2 / 20):A2 = 10 ^ (Y1 / 20)
1020 A3 =  SQR ((A1 ^ 2 - 1) / (A2 ^ 2 - 1))
1030 H2 = ( LOG (A3 +  SQR (A3 ^ 2 - 1))) / N
1040 X1 = ( EXP (H2) +  EXP ( - H2)) / (2 * P2)
1050  RETURN
1100  REM  ULTIMATE ATTENUATION
1110 V2 = A2 ^ 2 - 1:X2 = R1 * P2
1120 C1 =  LOG (X2 +  SQR (X2 ^ 2 - 1)) * N
1130 C2 = (( EXP (C1) +  EXP ( - C1)) / 2) ^ 2
1140 T2 = V2 * C2 + 1
1150 T3 = 10 *  LOG (T2) /  LOG (10)
1160  RETURN
1200  REM  CALC RIPPLE FACTOR
1210 E1 = 1 /  SQR (10 ^ (Y1 / 10) - 1)
1250  REM  CALC 2PI.F(3DB)
1260 P3 =  LOG (E1 +  SQR (E1 ^ 2 - 1)) / N
1270 P2 = ( EXP (P3) +  EXP ( - P3)) / 2
1280  RETURN

]
```

Output example from SSBBPF merged with FRBUTT7

```
]RUN
FRBUTT7/3
FILTER ORDER = 2
FM           = 9679518
BW           = 3017
FINF         = 9694000

ATTENUATION(DB)   = 40
NORMALISED FREQ X = 9.99975
SLOW EDGE (HZ)    = 0
RETURN EDGE (HZ)  = 10038249.7
FAST EDGE (HZ)    = 9686983.55


TO CONTINUE TYPE ATTENUATION VALUE
LESS THAN 200 DB. TO OBTAIN ULTIMATE
ATTENUATION TYPE 200


ATTENUATION(DB)   = 200
ULTIMATE ATTENUATION (DB) = 39.2918404
FREQ/BW RATIO R   = 9.60026517



]
```

Program 3. DISHAL4 filter component calculator

```
 LIST1-1200

10  PRINT "DISHAL4/4"
20  DIM C(4),K(4)
100  INPUT "INPUT FILTER ORDER 2,3,4,6 OR 8  = ";O1
110  IF O1 = 2 THEN S1 = 1:T1 = 2
115  IF O1 = 3 THEN S1 = 1:T1 = 2
120  IF O1 = 4 THEN S1 = 2:T1 = 2
125  IF O1 = 6 THEN S1 = 3:T1 = 3
130  IF O1 = 8 THEN S1 = 4:T1 = 4
140  INPUT "DISSIPATION COEFF D = ";D1
150  FOR S2 = 1 TO T1
160  PRINT "K";S2;S2 + 1;" = ";
170  INPUT "";K(S2): NEXT S2
200  INPUT "CS   (PF) = ";C2
210  INPUT "FM   (HZ) = ";F1
220  INPUT "FX   (HZ) = ";F2
230  INPUT "FINF (HZ) = ";F9
240  PRINT : PRINT
1000 M1 =  - (K(1) + K(2)) * (F9 - F2)
1010 N1 =  - (F2 - F1) * (F9 - F1)
1020 B1 =  - M1 -  SQR (M1 ^ 2 - (4 * N1))
1100 R1 = 2 * (F9 - F1) / B1
1110 R2 = 1 / R1
1120 R3 = R2 ^ 2
1130 P1 = 3.141593
1140 X3 = 1 / (2 * P1 * F2 * C2 * 1E - 12)
1150 X2 = X3 / ((1 - (R2 * (K(1) + K(2)))) ^ 2)
1160 R9 = X2 * D1 * B1 * (1 - R3) / F1
1170 C9 = C2 * F1 * (R1 - K(1) - K(2)) / ((R1 ^ 2 - 1) * B1)
1200  FOR S2 = 1 TO S1


]

 LIST1210-

1210 X1 = X2 * K(S2) * B1 * (1 - R3) / F1
1220 C(S2) = 1E12 / (2 * P1 * F1 * X1)
1230  PRINT "C";S2;"   (PF) = ";C(S2)
1240  NEXT S2
1300  IF O1 > 2 GOTO 1330
1310  PRINT "CS1  (PF) = ";C(1)
1320  GOTO 1500
1330  IF O1 > 3 GOTO 1360
1340  PRINT "CS1  (PF) = ";C(1)
1350  GOTO 1500
1360  IF O1 > 4 GOTO 1390
1370  PRINT "CS1  (PF) = ";C(2)
1380  GOTO 1500
1390  IF O1 > 6 GOTO 1440
1400  PRINT "CS1  (PF) = ";C(2)
1410 S3 = 1 / ((1 / C(1)) - (1 / C(3)))
1420  PRINT "CS3  (PF) = ";S3
1430  GOTO 1500
1440  PRINT "CS1  (PF) = ";C(2)
1450 S3 = 1 / ((1 / C(1)) - (1 / C(3)))
1460  PRINT "CS3  (PF) = ";S3
1470 S4 = 1 / ((1 / C(1)) + (1 / C(2)) - (1 / C(3)) - (1 / C(4)))
1480  PRINT "CS4  (PF) = ";S4
1500  PRINT "R         = ";R1
1510  PRINT "BW   (HZ) = ";B1
1520  PRINT "Z  (OHMS) = ";R9
1530  PRINT "CP   (PF) = ";C9
1540  END

]
```

Program 3 output example

```
]RUN
DISHAL4/4
INPUT FILTER ORDER 2,3,4,6 OR 8  = 2
DISSIPATION COEFF D = .7071
```

```
K12 = .7071
K23 = .7071
CS   (PF) = .03
FM   (HZ) = 9679518
FX   (HZ) = 9677200
FINF (HZ) = 9694000


C1   (PF) = 100.01006
CS1  (PF) = 100.01006
R         = 9.59871277
BW   (HZ) = 3017.48794
Z  (OHMS) = 164.407893
CP   (PF) = 8.64242679

]
```

Program 4. DANDK1 d and k calculator

```
]LIST

1  PRINT "DANDK1/3"
2  REM  CHEBYSHEV COUPLING
3  REM  COEFFICIENT CALCULATION
10  INPUT "RIPPLE  (DB) = ";Y1
20  INPUT "FILTER ORDER = ";O1
100  REM  CALC RIPPLE FACTOR
110 O2 = O1 - 1
120 R2 = Y1 / 10
130 E1 = 1 / ( SQR (10 ^ R2 - 1))
200  REM   EVALUATE SINH FUNCTION
210 S1 =  LOG (E1 +  SQR (E1 ^ 2 + 1))
220 S2 = S1 / O1
230 S3 = ( EXP (S2) -  EXP ( - S2)) / 2
300  REM   EVALUATE COSH FUNCTION
310 W1 =  LOG (E1 +  SQR (E1 ^ 2 - 1))
320 W2 = W1 / O1
330 W3 = ( EXP (W2) +  EXP ( - W2)) / 2
400  REM  CALC Q & D
410 Z = 3.14159 / 2
420 Q1 = 2 *  SIN (Z / O1) * W3 / S3
430 D1 = 1 / Q1
440  PRINT "DISSIPATION COEFF D = ";D1
500  PRINT : PRINT "COUPLING COEFFICIENTS": PRINT
510  FOR C1 = 1 TO O2
520 N1 = S3 ^ 2 + (( SIN (2 * C1 * Z / O1)) ^ 2)
530 D2 =  SIN ((2 * C1 - 1) * Z / O1)
540 D3 =  SIN ((2 * C1 + 1) * Z / O1)
550 D4 = 4 * D2 * D3
560 K1 = ( SQR (N1 / D4)) / W3
570  PRINT "K";C1;C1 + 1;"  = ";K1
580  NEXT C1
```

Output example

```
]RUN
DANDK1/3
RIPPLE  (DB) = 1
FILTER ORDER = 6
DISSIPATION COEFF D = .453494928

COUPLING COEFFICIENTS

K12  = .633495695
K23  = .531278928
K34  = .5201734
K45  = .531278789
K56  = .633494103
```

□

Notes on "An add-on capacitance measuring module for digital frequency counters"

by TONY BAILEY, G3WPO*

THE CAPACITY ADD-ON UNIT described in the September 1982 issue of *Radio Communication* appears to have been very popular judging by the correspondence which has resulted. Most of these letters have described problems that have resulted in getting the module going, and it was felt worthwhile to pass these on for the benefit of others who may have attempted construction but failed to finish the project for one or other of the following reasons.

7216 series ics

One of the major points has been an inability to achieve any results when using some samples of the 7216C/D integrated circuit. It appears that the required mip output on pin 2 was only added by the manufacturers in 1980, and prior to this date the pin was uncommitted! As the reference number for the ic was not changed, the only way of identifying this is by the date code which appears on the package. Anything starting with a year before 80 is definitely suspect, and, if 80, may be suspect. A large number of readily-obtainable units do employ this chip—if they are coded earlier than 1980, and have no measurable voltage at pin 2, the only course of action is to replace the chip (at around £20!).

The 7216A/B does not have any suitable outputs from which to take the gate pulse, and without considerable extra circuitry it is difficult to see how the unit can be used with these.

Other sources of the gate pulse

One point omitted from the original text was that if you are deriving the gate pulse from either the gate l.e.d., or a ttl voltage level source, then the resulting voltage obtained is likely to be insufficient to drive the circuit properly. A simple interface is required (Fig 1) which will give the correct voltage output. This circuit does invert the voltage, so the opposite input to the module will then be required.

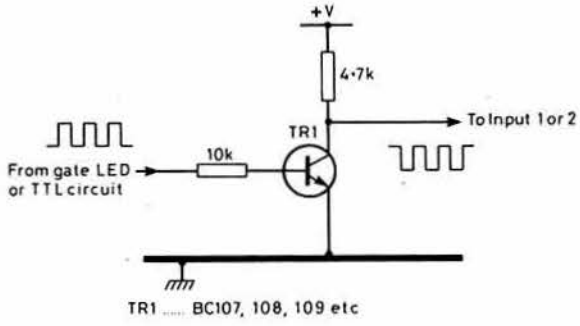


Fig 1. Interface circuit

DFM problems

A number of dfms have found difficulty in accepting the output of the unit and will not read correctly. The usual symptom is a brief correct reading followed by random or zero readings.

Part of the problem lies in the fact that the unit's output is a square wave, and most dfms prefer or are designed for a sine wave input. Also the dfm can be suffering from pure overload. In practice, the first problem can be overcome by adding a capacitor of around 330pF across the unit's output, and the second by the addition of a series resistor in the output, value from 100–470kΩ, sometimes both being needed.

Miscellaneous

It is important that the ics specified in the parts list are used—using buffered instead of unbuffered cmos, and vice versa, will result in failure (suffix A or UB types are unbuffered, B are buffered).

When constructing the unit, keep the leads from the terminals which take the capacitor under test to the pcb as short as possible, as otherwise the residual capacity may be in excess of that which the zeroing circuit can accommodate. □

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Automated spectrum monitoring using the Tandy programmable fm scanning receiver

by RAYMOND C. V. MACARIO, GW8SRW*, and SIMON A. KINGSLEY-SMITH

Principles

The Tandy programmable fm scanning receiver type PRO2001 is a readily available piece of equipment which represents the outcome of adding a microprocessor to a synthesized receiver. In particular the receiver has the ability to scan an entire band, in discrete frequency steps, from a LO frequency to an UP frequency, or scan up to 16 preprogrammable frequency channels. When a transmission, or carrier exceeding a pre-settable squelch level is encountered, the receiver will pause or wait on that channel. Clearly many alternative uses for this type of equipment can be envisaged.†

At the present time the subject of spectrum occupancy is of great interest. For example, one can establish which channels are most used, and at what time, or indeed whether some channels are never occupied. To do this one needs, in addition to the channel scanning capability, a means of recording the information about the occupancy as a function of time. Fig 1 is the diagram usually employed to show channel occupancy. The horizontal axis is divided into frequency channels which add up to the total bandwidth under surveillance; the vertical axis is time, which is also usually divided into intervals, while the occupancy is a mark in the appropriate frequency/time square.

To show the true occupancy, namely the actual signal field strength in a partition, a three dimensional or perhaps numbered display, is necessary, but usually an indication of a signal above a certain (squelch) level is sufficient. The present article, in fact, sets out to describe some simple additional circuitry which can be added to the Tandy receiver so that a channel occupancy display may be realized. In particular, examples of occupancy of the 145–146MHz band are illustrated.

Recording medium

In many spectrum monitoring situations a continuous crt display is arranged and one can "see" transmissions come and go. The storage medium is the phosphor of the tube, but clearly no permanent record is available. In our case a basic XY pen recorder was available and the recording medium then becomes the paper. A display similar to Fig 1 is then realizable. The outputs required from the receiver are a swept X-display (channels or frequency), a swept Y-display (time or interval) and the pen-operate signal (occupancy).

It will be clear that with these three signals a more sophisticated display can be arranged on a microprocessor-controlled vdu; eg, occupancy recall for any period, listing etc. However, the intention of this article is to explain an interface circuit which can be added to the Tandy receiver and which then produces at its output the three desired signals.

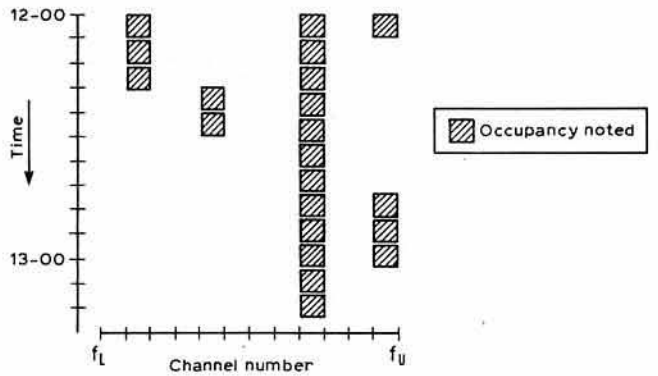

Fig 1. Channel occupancy diagram

Attaching to the Tandy receiver

The microprocessor scanning receiver is a complex and sophisticated piece of equipment, so clearly any non-standard alteration or connection should be as simple as possible and also cause the minimum disturbance to the existing receiver.

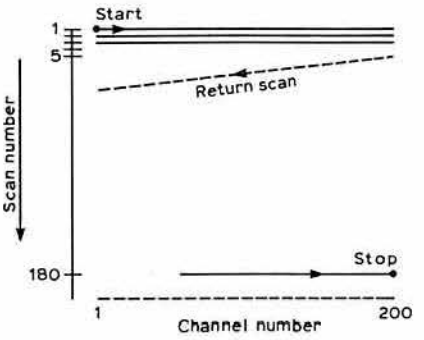

Fig 2. Practical scanning arrangement

Over the amateur vhf bands the receiver can scan about 10 5kHz channels/s. Therefore, over 1MHz with a 5kHz channel spacing a time of scan of 20s is implied. The probability of missing a transmission of duration Δt seconds is, in fact, approximately

$$P_{miss} \simeq \left\{1 - \frac{\Delta t}{20}\right\} \times 100 \text{ per cent}$$

Most transmissions in the band usually exceed 10s, so that most transmissions would be noted for a band scan 145–146MHz. The total number of scans required to study the occupancy over a period of 1h will be

$$\frac{60 \times 60}{20} = 180 \text{ scans.}$$

With a scan spacing separation of 1mm, this implies 18cm, which fits conveniently on A4-size paper. The actual spectrum occcupancy chart is now somewhat more complicated than Fig 1 and is depicted in Fig 2.

The other feature is that the time scale (Y-axis) is, in fact, determined by the receiver's channel scan rate so that the receiver only has to indicate a change of channel to the XY recorder. The position of the interface circuit is therefore as shown in Fig 3. Note that only two connections are needed to the receiver, namely:

(i) channel increment signal—which then provides both channel and time indication;

(ii) signal detected indication.

The first connection is fairly straightforward, since the shift-register†† in receivers' synthesizers always receives six clock pulses for each channel change. Therefore only *a connection to pin 6 (or 2-5) on the buffered output of IC25 of the program controller pc board* is necessary.

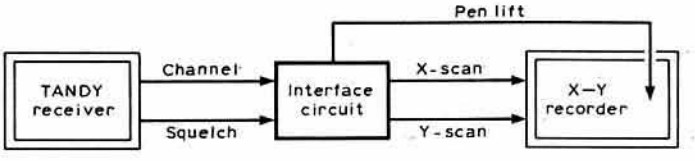

Fig 3. Interface circuit arrangements

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†Possession of the "Owner's Manual" is assumed.

††The data refers to the Service Manual, catalogue No 20-115/9115, which was available but is not essential for the data given here.

The second connection is the squelch control line to the program control board. Because the Tandy receiver is designed to DELAY on a channel if occupancy is sensed, it is necessary to break the link from the main receiver board to the program control board. This is easily achieved *by removing the brown lead to pin 7 of plug JA1* (on the control board). The receiver will now scan continuously from LO to UP frequency. The squelch control line wire just described can then be used to actuate a pen-operate mechanism.

The interface circuits

The waveforms associated with the channel and time increment circuit are shown in Fig 4. The six receiver clock pulses are "monostabled" into a single command pulse which is then fed to a binary counter, cmos type 4040, with an R-2R ladder array so as to produce a stepped waveform which forms the frequency axis.

During one scan the Y-axis remains constant. Since the number of channel increments is known, say N, a divide-by-N counter can be arranged to produce a pulse at the end of each scan, and a similar pulse-to-stepped waveform conversion can then be arranged to produce the Y-axis waveform. The counter N, cmos type 4059, must be programmed according to the number of channels scanned, and the instructions for doing this are given below.

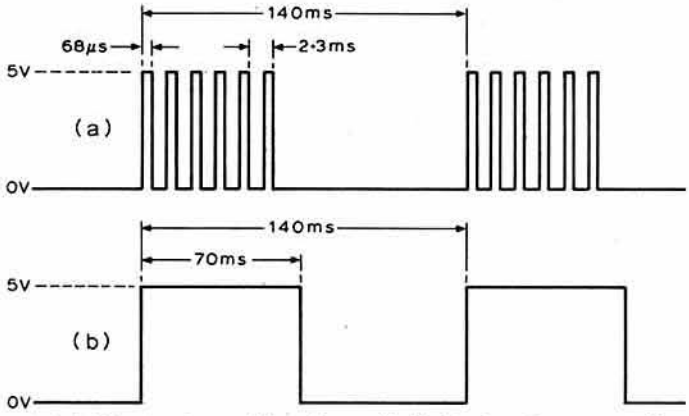

Fig 4. (a) Clock pulse to shift registers. (b) Clock pulse after monostable

A second similar ladder voltage circuit, now using a cmos 4024, allows for 128 time-interval steps and covers 16cm of paper with a 1·25mm spacing. (For a larger scan period a higher-order binary counter, as used for the channel increments, should be used.)

The overall XY scanning circuit is shown in Fig 5. The values of the R and C components on the monostable (4098) are chosen to match the waveform timing requirements of Fig 4.

The pen control circuit would at first sight appear quite simple. There are, however, two complications:

(a) The band channels being monitored are nominally 25kHz, whereas the scanning receiver channel bandwidth is 5kHz.

(b) The pen should not drop during the fly-back period, ie between the last channel and the first channel; eg Fig 2.

Taking point (a) first, the dwell-time of the receiver pen-channel is approximately 140ms. For five channels, ie 25kHz, the maximum dwell time is therefore 700ms. Therefore the pen-drop hold circuit (monostable) has the RC components set to lie in the range, using RV1 in Fig 6,

$$300 < t_p < 700\text{ms}.$$

For the pen fly-back situation, which took approximately half a second, it is necessary to program-in some extra channels into the receiver search. Fly-back occurs at the end of the count-by-N circuit in Fig 5; therefore, an extra 30kHz of frequency scan is programmed in the receiver to allow for the fly-back operation; ie the UP frequency should be 30kHz (six channels) beyond the end-of-scan frequency. Also, to prevent any pen operation during the fly-back period, a second monostable is actuated to prevent writing for this period. This lock-out period is timed by RV2 of Fig 6.

Fig 6 shows the pen actuation circuit; the circuit requires one lead from the receiver, and an end-of-count pulse from the X-Y interface circuit, Fig 5. Pen lift is controlled by the dil reed relay as shown.

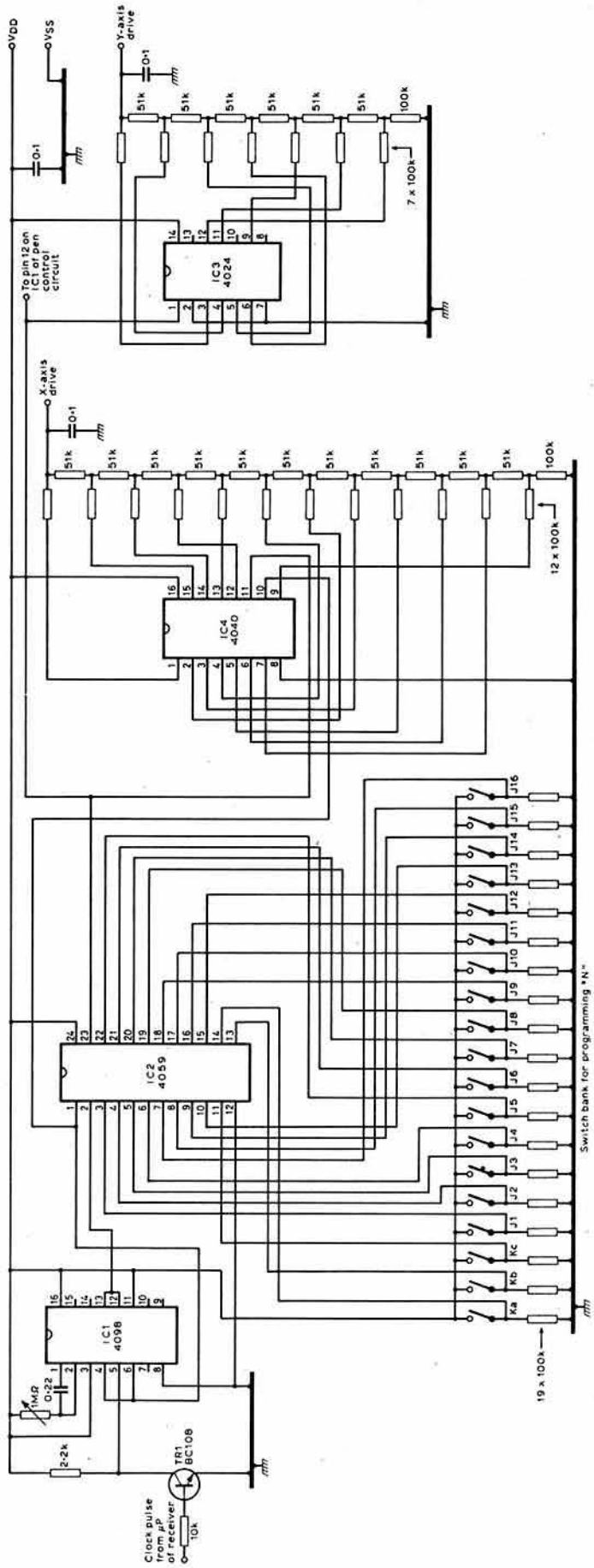

Fig 5. Time and frequency scale increment circuit

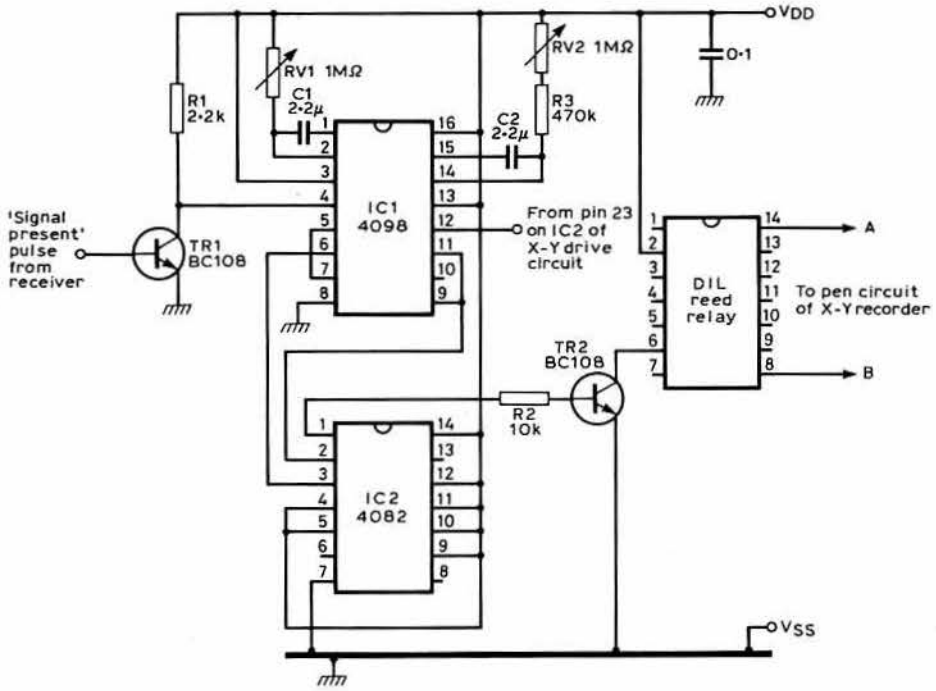

Fig 6. Pen control circuit

Construction

The interface circuits are all low-speed circuits and were constructed by using Veroboard and wire-wrap dil holders. DIL switches were used for the set-counter switches. The number-of-counts N is decided by the frequency scan required and is given by

$$N = \left\{ \frac{(\text{UP freq} + \text{'extra chs'}) - \text{LO freq}}{\text{step interval}} \right\} + 1$$

Thus for the band 145–146MHz we have

$$N = \frac{146 + 30\text{kHz} - 145}{5\text{kHz}} + 1 = 207.$$

Instructions for setting the cosmos 4059 counter are found in its data sheet.

In addition to a logical layout, it is important that screened leads are used from the receiver and to the XY recorder. A separate 12V power supply was used for the interface circuit.

Operation

For correct operation certain setting-up procedures need to be followed, in particular the END frequency of search, which, as explained above, needs the same 30kHz *below* the UP frequency of the scanning receiver. The procedures to be adopted are as follows:

1. Program into the receiver the frequency range to be scanned, including the extra frequencies, ie:
   - 5kHz on a vhf "slow" scan
   - 30kHz on vhf "fast" scan
   - 12·5kHz on a uhf "slow" scan
   - 62·5kHz on a uhf "fast" scan
2. Program the divide-by-N 4059 device for the appropriate counter using switches J1 to J16, and K_a.
3. To synchronize the interface circuitry with the receiver, set the receiver to "fast search". When the receiver comes near the END frequency, set switches K_b and K_c to appropriate positions. (These switches initiate and lock the counter in the master preset state.)
4. Halt receiver on LO frequency and align XY recorder zero position.
5. Start receiver scan and adjust X and Y control sensitivities for scan length (X) and scan spacing (Y).
6. Check operation of system using signal generator, ie input generator to the receiver. (Adjust pen write period per channel using RV1 and fly-back protection period using RV2 if necessary).

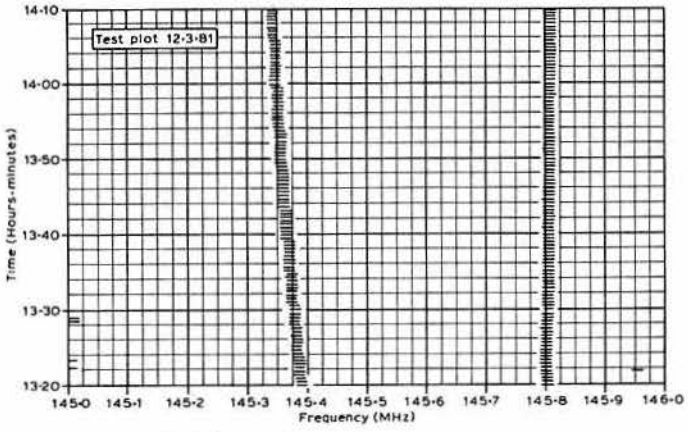

Fig 7. Channel occupancy scan example

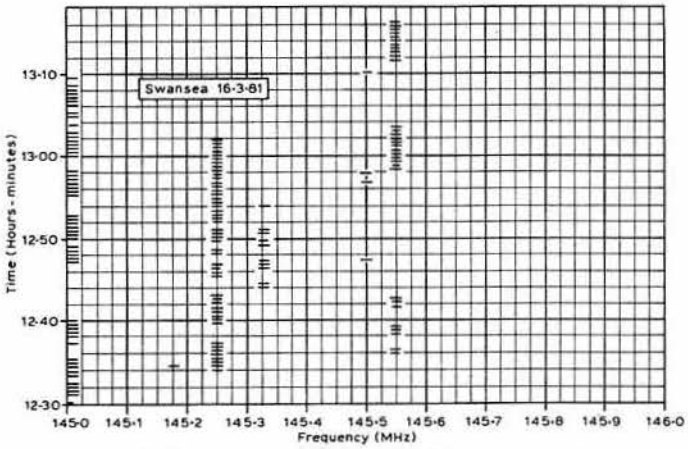

Fig 8. Channel occupancy scan on vhf amateur band

Illustrative results

To demonstrate the system, two illustrations are presented. Fig 7 shows a test set-up using a synthesized signal generator and a rather older valve generator in the early stages of "warm-up". The result is interesting in that it shows the consistency of the scanning arrangement plus the drifting of a signal source during a warm-up phase.

The second result in Fig 8 shows the vhf band activity in the Swansea area around midday. Clearly, with the monitor as described here all sorts of interesting statistics can be collected in a modest manner. □

TECHNICAL TOPICS

Pat Hawker, G3VA

ANYONE WHO READS DILIGENTLY the correspondence columns of the large number of magazines that are now targeted on the British radio amateur must be aware of, and uneasy about, the strident "anti-traditionalist" feeling that many of the letters seem to reflect. There is of course nothing new in the wish of many newcomers to abolish the "tiresome" morse test as a pre-requisite for hf operation, nor that the RAE should be conducted in such a manner as to achieve either a 100 per cent or a one per cent pass rate. But what *is* new is the suggestion that we should all accept the idea that amateur radio is a hobby based predominantly on the pleasure to be derived from *operating* (phone or inter-computer) and that as many amateurs now use complex factory-built equipment there is no reason why anyone should take any real or deep interest in the technical side —apart perhaps from reading consumer-guidance-type articles on the choice of equipment and antennas. In other words, amateur radio should become a hobby that is directly akin to, say, photography or home-computing, or even watching television: those who wish to would acquire technical knowledge; the others would enjoy themselves operating, with an absolute minimum of pettifogging restrictions.

To my mind the "anti-traditionalists" overlook one basic and very significant consideration. As an amateur I wish to make use of parts of an hf radio spectrum that are in *extremely* short supply, much desired by other (professional) users. Therefore I must surely be prepared to accept that I have some responsibility to so use this limited natural resource that the community obtains some benefit from my activities, if only in that I am educating myself technically in my own time and at no cost to anyone else: hence the classic definition of "self-training, inter-communication and technical investigations".

It is perhaps only those who, in addition to being radio amateurs, are also professionally concerned with radio communication, radio navigation or broadcasting—or with their regulatory aspects—who realize just how acute the pressure on the hf/vhf/uhf radio spectrum still is—and how dangerous it is to sit back and believe that with WARC 1979 safely behind us there is no need to worry about frequencies and intruders. If anybody believes, for example, that hf broadcasters have now abandoned their hopes of significantly expanding the hf broadcast bands, they should study the professional journals. It is also now very clear that satellite communications will not supersede, but only complement, hf for professional and defence communications. Unfortunately the development of over-the-horizon radar threatens to impose further new demands on the hf spectrum.

In the *entire* hf spectrum (3–30MHz) there can be only 9,000 ssb (3kHz) channels for a total European population of some 500 million people. With current allocations there are, in practice, for amateurs less than 950 such channels, of which the 28MHz band accounts for over 560. Clearly there has to be some limitation placed on citizens' access to the hf spectrum, particularly to bands below 28MHz. Even in the USA not more than about one person in 750 holds an amateur licence, and my guess is that about one in a thousand is a comfortable maximum if everybody used phone. So what *is* an equitable way of restricting access to the hf spectrum? Financially, by the cost of equipment or licences? By technical examination, (but if you make this too difficult you defeat the concept of on-air learning)? Politically or arbitrarily (eg only fully-paid-up members of X-party or those with surnames beginning with the letter A)? Professional graduate engineers? Professional radio operators? An IQ of 140-plus?

One has only to list such possibilities to come to the conclusion that the present combination of a reasonably simple technical examination and, *for the short-supply hf spectrum*, a reasonably simple morse test, is by no means an entirely bad system. Morse ability is still a potential asset to a country if only to provide a reserve of intercept operators. Learning morse is not a test of intelligence or education or even power of concentration but primarily of determination—egalitarian in the sense that everybody starts off equal—and few later regret the effort. I do not believe that there are many people *incapable* of learning the code, or that it is a waste of time.

If it is necessary to restrict access to hf then there is equally some obligation on amateurs to make good use of their hf allocations. Use or lose. For this reason there does seem a valid case for encouraging much more use in sunspot minimum periods of 28·0 to 29·7MHz—possibly by opening these frequencies to Class B licensees—including on-air cw training! Again, some of the lower frequency bands are less than fully utilized. I still believe the UK should have a novice licence.

Nor do I want to suggest, complacently, that the present system is perfect and could not be improved upon. Many criticisms could indeed be levelled at the RAE and at some aspects of the present licensing system, though perhaps *TT* is not the place to do so. There is the rising and not inconsiderable cost to a youngster or a retired person of taking the examinations, often with considerable travelling involved, and the consequent delays.

But the basic principle of making sure that, to obtain an hf licence, it is first necessary to overcome the hurdle of a morse test is surely by no means an out-moded or fundamentally bad principle. There simply is not enough hf sky-wave spectrum for every citizen to have an inalienable right to 3kHz or more (not even on 6·6MHz) without first doing something to stake a fair claim.

The inverted groundplane family

Almost 13 years ago, in *TT* (July 1970) I described an antenna that I called "the vertical-T or inverted groundplane". This was a simple antenna that I, and then John Brodzky, G3HQX, had tried out with reasonable success on 14MHz and other hf bands. It was a concept based partly on the traditional mf T-antenna, in which the top section provides electrical loading of a shortened λ/4 vertical radiator, and partly on a simplification of the "bobtail curtain" array originally described by Woodrow Smith, W6BCX, in 1947, as an outstandingly successful form of three-element vertically-polarized fixed array with low-angle radiation. An even earlier version of the same concept, but with two elements, is the "half-square" array, and such a system was described by PA0ZN as early as 1934.

Although the inverted groundplane antenna looks similar to the classical T-antenna there is a voltage node rather than a current-node at the base of the radiating element. Each of the three antennas in which the horizontal span is used as a matching element rather than as a radiating element has survived the test of time. My 1970 notes also suggested that it would be very easy to adapt the inverted groundplane into an antenna that could be readily switched to form either a horizontally-polarized dipole or the vertically-polarized igp. This idea was subsequently implemented and described by Ken Glanzer, K7GCO (*CQ* June 1972 and *ART*) simply by using an open-wire transmission line to provide a centre-fed dipole; then switching, when vertical polarization was required, so that the two ends of the transmission line were joined together.

I have followed the progress of the inverted groundplane with some interest, as to the best of my knowledge the notes in the July 1970 *TT* represent the first published discussion of this type of antenna. However, it is clear from W6BCX's articles that the technique had been used for 7MHz dx operation many years earlier, initially the result of serendipity when one of his friends discovered that an off-centre-fed Windom actually worked better when the tap was made to the centre of the top section; this in turn led to the development of the bobtail array that later was to be the starting point for my own work!

My excuse for bringing up this topic again is indeed partly the two-part article by Woodrow Smith, W6BCX, "The bobtail curtain and inverted groundplane" (*Ham Radio*, Part 1, February 1983, pp82–6, and Part 2, March 1983, pp 28–30) in which he discusses in some detail the history of this whole class of antenna, including the early "30-up and 30-out" (vertical plus single-wire counterpoise with top-loading provided by a copper toilet-ball (*ART*)), the inverted groundplane, the half-square and the full bobtail with its three vertical sections: Fig 1. But also it is partly

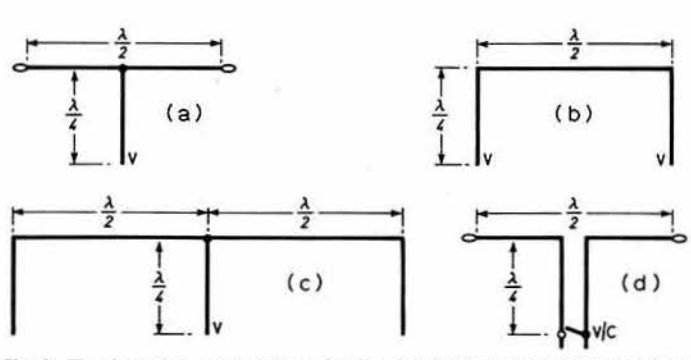

Fig 1. The inverted groundplane family. (a) Basic inverted groundplane antenna, voltage-fed at base. (b) Half-square two-element array. (c) The classic bobtail three-element array. (d) Combination dipole/igp formed by switching feeder at base, voltage fed as igp, matched impedance fed as dipole

because Les Moxon, G6XN, in the course of a long and interesting letter (including an important discussion on the optimum design of multiband beams that I shall refer to on another occasion), mentioned that he has been investigating how a 7MHz inv-gp can also provide an excellent dx antenna for 3·5MHz.

Two-band groundplane

Les Moxon, G6XN, moved QTH some months ago and, while further investigating the optimum design of multiband beam arrays, as a temporary measure for 7MHz put up an inverted groundplane. He writes:

"Have you noticed that this also makes an excellent dx antenna of the groundplane type for 3·5MHz? Mine *ought* not to be much good on 3·5MHz because the height is low (30ft) and the top is an inverted-V with the ends trailing down to about 8ft. The vertical portion is about 28ft of light-duty 75Ω twin feeder (ie the wire is much too thin). The 'earth' is one of my inductively-loaded counterpoises, see Fig 2. I made this much larger than would normally be required because of the extremely low estimated value of radiation resistance, and the need to keep loading coil relatively low. All of this results in very narrow bandwidth, about 40kHz, but then the ssb dx segment of 3·5MHz is only 20kHz wide. I have, in fact, only tried the system on 3·5MHz on three mornings, but reports have included RS54 from ZL, and RS46 from W0.

"Basically the antenna is a straightforward centre-fed, inverted-V dipole for 7MHz, although I have not used it for transmission in this mode yet. I have, however, fitted a switch so that it works *either* as an inverted-V dipole or as an inverted groundplane. Reception of dx signals, as expected, is better in the groundplane mode, though a CQ call resulted only in contacts with two Portuguese stations. Thin flex is used for the top. It has been up three months, blown down once, and it is time I overcame my dislike of 7MHz and tried it out properly.

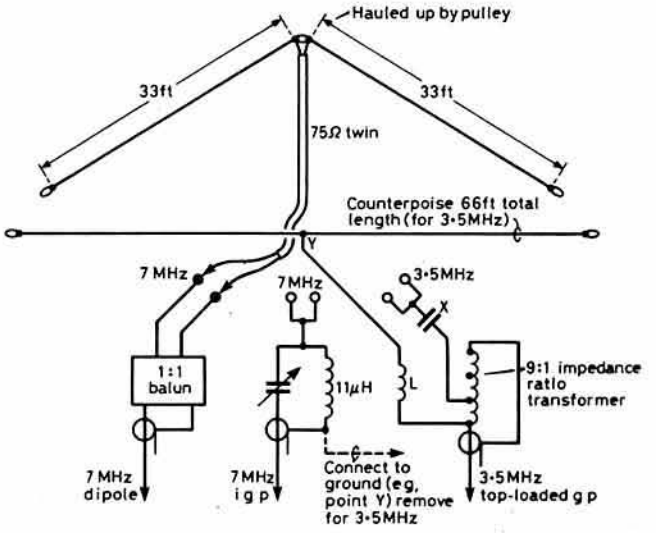

Fig 2. G6XN's 3·5/7MHz antenna, which can function as dipole or igp on 7MHz and as a top-loaded gp-type antenna on 3·5MHz

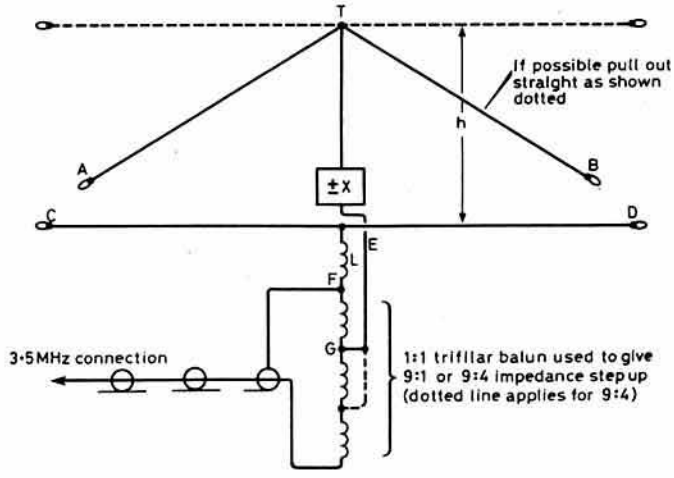

Fig 3. The antenna of Fig 2 re-drawn to show mode of operation on 3·5MHz

"To show the mode of operation on 3·5MHz more clearly, the antenna can be represented as in Fig 3. Note that the reactance 'x' depends on the height 'h'. I use a 250pF capacitor, though for greater height this would have to be reduced; for slightly less 'h', 'x' would equal zero, and for even less height a loading coil would be required. Point F must be as close as possible to ground potential. I used a temporary λ/4 wire, and adjusted 'x' to resonate the portion ET + ATB of the antenna against the temporary wire, using a gdo. Then one resonates CED, via inductor L, against the temporary wire in the same way. Connect as shown, with FG short-circuited. Resonance should then be at the required frequency, but may be slightly higher, depending on the layout. If necessary lengthen both the antenna and the counterpoise connections slightly.

"For an 'h' of about 40ft, with AB straight, the need for the matching transformer should disappear; for substantially greater heights a step-down transformer may be needed, ie as the radiation resistance increases.

"In my case L was a tapped coil. After adjustment the calculated inductance was about 13μH. However, as the radiation resistance increases one can shorten CD and increase L. As described, the loss resistance is probably about 3Ω and the radiation resistance not more than 4Ω. Straightening the top section could be expected to increase the radiation resistance to about 12Ω and reduce the loss from 2–3dB to about 1dB. Thicker wire should help a lot and losses should also disappear rapidly as the height increases.

"The 7MHz igp tuning arrangements can take care of length errors up to a few feet. For much larger values of 'h' alternative tuning arrangements could be worked out as for any 'random length' wire antenna."

Groundplane antennas

On a slightly different, but related, topic, Les Moxon, G6XN, disagrees strongly with the suggestion by Fred Brown, W6HPH (*TT* November 1981) that a groundplane antenna *in free space* is 3dB worse than a dipole. He points out that, in free space, or even at quite a modest height above ground, the orthogonal conducting plane does not exist. He considers that the right way to tackle this question is to realise that the groundplane antenna, like a dipole, is virtually a point-source of radiation, and both have a cos θ radiation pattern; so there can be no difference in gain between the two, other than a small correction analogous to the "short dipole" effect, ie less than 0·4dB.

It is important to realize, adds G6XN, that the groundplane is merely a matching device, not something in which an "image" can exist. If it were so it would also act as a screen, and in that case the inverted groundplane antenna would not work!

As we do not get the 3dB loss, the radiation resistance of the groundplane in free space *must* be 18Ω and *not* 36Ω. There was, recalls G6XN, an early *Proc IRE* paper which presented sets of measured figures hovering just above the 18Ω mark. The slight increase above 18Ω would reflect the "short dipole" effect mentioned above. The figures were based on an elevated groundplane, as is usual for the majority of groundplane antennas used by radio amateurs. Yet virtually all subsequent papers take the incorrect 36Ω figure for granted—though G6XN mentions that nobody so far has queried the figure of 18Ω given in his book *HF antennas for all locations*. The figure of "about 18Ω" also applies to the loaded-counterpoise arrangements devised by G6XN and to the "asymmetrical dipoles" of VK3AM, provided that in all cases the antenna is at an effective mean height of about a quarter-wavelength or more.

Antenna insulation

In his articles on the igp and bobtail, W6BCX underlines the importance, in any voltage-fed antenna, of using good insulation and providing sufficient spacing to avoid flash-over etc when running high power. For a bobtail, he counsels, always feed the centre element; he is not in favour of using a Zepp-type system as suggested in the original PA0ZN half-square, and as one of the possibilities in my notes on the igp. He points out that no antenna fed via an asymmetrical feed system can be completely ground-independent.

On the question of antenna insulation, some readers may have been following the correspondence over the past couple of years in *Wireless World* that has revealed the extent of the problem that can arise from the deposit of salt on insulators when transmitting on 500kHz with a relatively short whip or similar voltage-fed arrangement. Admittedly, this is usually far less of a problem at hf. However, it is worth considering some notes in *Amateur Radio (Australia)* February 1983, taken originally from an *ARNS Bulletin:*

"Aside from physical damage, the most common fault in an antenna system is low resistance to ground. Moisture in the system (impedance matching networks, coaxial cables etc), dirty insulators and coaxial-cable

dielectric breakdown all cause varying degrees of shunting resistance. Changes in weather, high humidity, or other natural causes mean that "infinite" resistance is seldom found. Tests with (preferably) a megger, but even with a simple ohmmeter, can be useful; insulation of transmission lines should be tested. Often resistance can be increased by cleaning the insulators (particularly in salt-laden or industrial atmospheres).

The following values are suggested:

(1) 200MΩ or more to ground indicates antenna system in good condition.

(2) 5–200MΩ suggests insulators need cleaning or that coaxial cable may be contaminated with moisture.

(3) Less than 5MΩ suggests the antenna system is in bad shape and that there is urgent need to locate the reason for the low resistance path and to correct it.

Antenna systems isolated from ground from an rf viewpoint may, of course, have a dc leakage path to ground for static, and this has to be taken into account when taking measurements.

Antenna masts

These days masts and towers do not come cheaply—and represent a good reason for using existing buildings and trees whenever possible. However, for vhf/uhf antennas it is still possible, without breaking the bank, to put together a useful antenna support mast about 20ft high by using, say, two standard 10ft sections of 2in diameter aluminium pole, with a 15in metal jointing sleeve and some other accessories, all of which can be found, for example, in the current catalogue of Jaybeam Ltd. Sections up to 14ft (2in diameter) in length are offered, but a 28ft mast needs rather more care in construction.

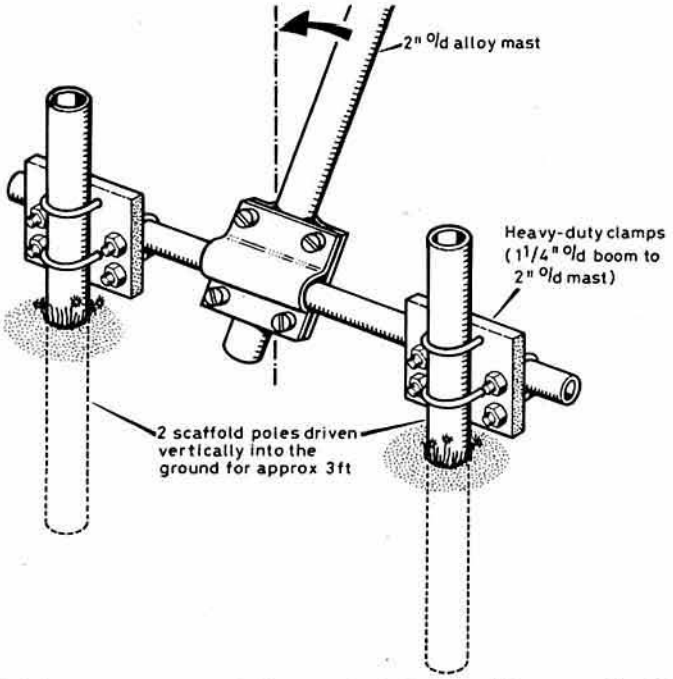

Fig 4. Low-cost antenna mast. Two metal poles hammered into ground (avoid underground pipes etc). The mast is supported by guy wires. Make sure uprights are truly vertical. Simpler and less costly than using wooden supports sunk in concrete. Mast may consist of two 10ft aluminium poles with jointing sleeve

A good article on "Practical tv aerial masts" by Keith Hamer and Garry Smith appeared some years ago in *Television* (March 1978), from which the relatively simple approach shown in Fig 4 is taken. The article also contained information on the use of wooden support poles, guy wires, using turnbuckles, wall-mounted poles, making a tilt-over lattice assembly etc, as well as using winches, including a winch attached temporarily but safely to an upstairs window.

Linear scale ohmmeter

Many of us manage to make do for resistance measurement with the conventional v-o-m multitestmeter despite its cramped, non-linear scale at the high-resistance end of each range. But there is much to be said for a linear-scale ohmmeter, particularly when it needs only a 1mA fsd meter, a 741 op-amp and a few resistors and diodes.

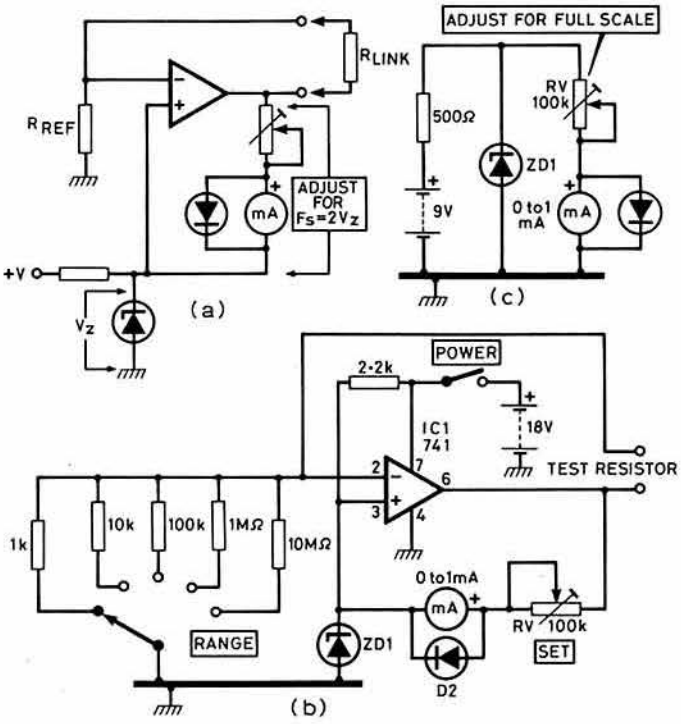

Fig 5. Linear-scale ohmmeter. (a) Basic concept. (b) Circuit diagram, ZD1 9V or less, 200mW zener diode, D2 IN914 silicon diode

Harry M. Neben, W9QB, describes such a simple yet useful device in *QST* November 1982, pp38–9. Fig 5 (a) shows the basic idea; (b) provides the full circuit diagram; and (c) a circuit that can be used to calibrate the meter against the zener diode voltage. The instrument works by comparing the voltages at the inputs of the op-amp, translating the voltage differential into a meter reading. W9QB describes the operation as follows:

"Assume the reference and the 'unknown' resistors are equal in value; then the voltage at the inverting input will equal half the output voltage. Feedback through the unknown resistor will cause the output voltage to swing until there is no input-voltage differential. This 2:1 divider will cause the output voltage to swing to 2 × Vz, causing the meter to read full scale. Any unknown resistance of less than the reference value will unbalance the op-amp input and cause the meter to read less than full-scale."

For each range the value of the reference resistor is chosen to represent the desired full-scale reading; the value of the reference resistor thus needs to be of higher value than the unknown resistor to keep the meter movement within scale. The circuit includes a meter damping diode (D2) which is desirable to protect the meter against any significant overload when a high value unknown resistor in fact approaches infinity (open circuit).

Before completing assembly, the first step is to calibrate the meter against the zener diode voltage using a 9V battery as shown in Fig 5 (c). Connect the meter and and 100kΩ series potentiometer across the zener diode, and simply adjust RV until the meter reads full scale. The RV setting should then be correct for the instrument, although accuracy on each range will depend on the tolerances of the fixed-value carbon resistors (0·25 or 0·5W) used.

High-efficiency regulator

Over the past few years many ideas have appeared in *TT* for improving the efficiency of low-voltage power supply units by permitting the reduction of the "drop-out" or minimum differential voltage between the unregulated input and the regulated output voltage.

In *Electronics* 27 January, 1983, Fred Cheng of the National Semiconductor Corporation shows how with just one regulator chip (LM2931), an external pass transistor (2N4777) and a few passive components, it is possible to make a high-current regulator which, when set for 5V output has a drop-out of only 0·7V at 5A load, and a still modest 1·3V at 10A: Fig 6. By changing some values, regulated output voltage can be set anywhere between 3V and 24V (with of course suitable unregulated input voltages).

Output voltage is that of the pnp chip regulator: Vout = Vref (R1 + R2)/R1, where R1 is equal to the ic regulator's reference voltage of 1·2V. For 5V output, R2 is set at 88·8kΩ (presumably if R2 is made variable the output voltage can be set to the required value).

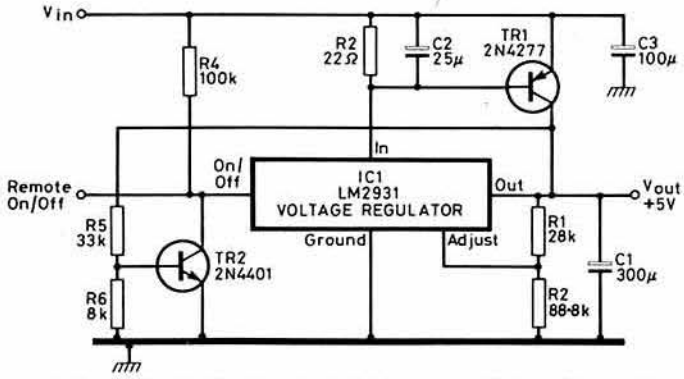

Fig 6. High efficiency regulator with low drop-out voltage. At 5A output the unregulated input voltage can be as low as 5·7V

High-current capability is provided by the use of an external pnp pass transistor (TR1) which should have low saturation levels for Vce and Vbe together with a high beta. Maximum output current is equal to maximum current sink of the ic regulator multiplied by the maximum beta of TR1. The germanium transistor type 2N4277 satisfies these requirements.

Protection is provided as follows: IC1 is biased to a minimum of 30mA by R3 which also forms a bleed for TR1. An on/off pin on IC1 permits additional remote on-off control and current-limiting facilities; pulling this pin to ground "enables" the circuit; keeping it open leaves the regulator in "stand-by" mode. As shown, the ratio R5:R6 limits maximum output current by switching TR2, so protecting TR1 and the load from overdrive and damage.

Easily-built 10, 18, 24MHz converter

From Jan-Martin Noeding, LA8AK, comes a simple but effective converter for the three WARC bands; Fig 7. Only a single 4MHz crystal is used, and the single-tuned rf input circuit covers all three bands so that no band-changing is needed in the converter. Instead, for 10 and 18MHz the main receiver tunes 14MHz, and for 24MHz it tunes 28MHz. Such an arrangement does of course carry some risk of 14 or 28MHz signal breakthrough and second-channel (image) response.

To reduce the problem of harmonics of the 4MHz crystal oscillator a low-pass filter is used in the output circuit. The correct oscillator injection level is obtained by selection of the emitter resistor for TR3.

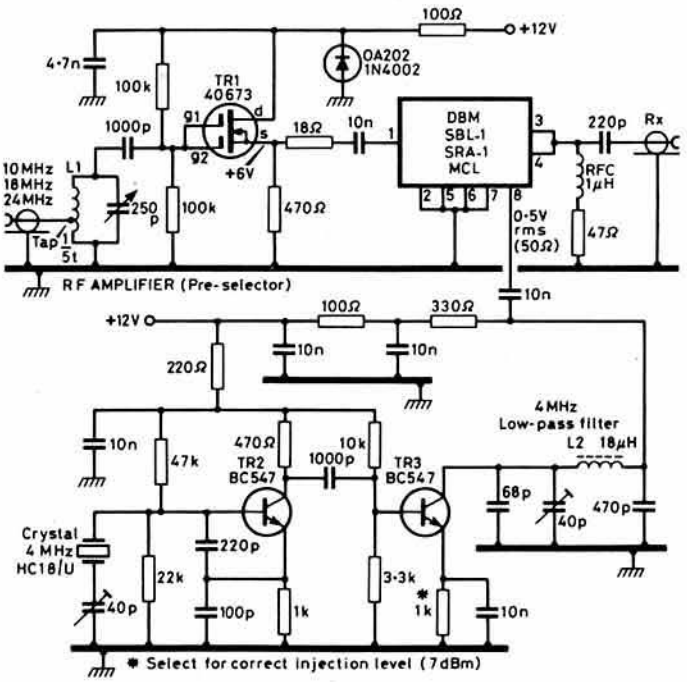

Fig 7. LA8AK's easy-to-build hf converter for the three WARC bands, 10, 18 and 24MHz using single 4MHz crystal and without any band-switching built into the converter. L1 10 turns, 15mm long, 15mm diameter without ferrite core. Tap at one-fifth turns. L2, 21 turns, 0·3mm enam copper wire on Amidon FT-37/61 core. TR2, TR3, PBC108, BC237, BC238, BC547 or similar. DBM, SBL-1 or SRA-1

Table 1. Shielding effectiveness of conductive coatings

	Coating thickness (mils)	Sheet resistance (Ω/sq at 1mil)	Typical attenuation (dB)
Plastic	125	00	0
Aluminium/panel (for reference)	62·5	0	65-100
Silver paint	1·0	0·01	65-70
Silver/graphite (two coats)	0·2/1·0	0·01/100	54-77
Copper	2·0	2·0	20-65
Copper/graphite (two coats)	2/2	8·0/100	27-62
Graphite	2·0	20	30-60
Nickel	2·0	1·0	65

LA8AK checked performance and operation, the converter being used with his Drake R4C receiver. On 10MHz sensitivity was not degraded and 14MHz leakage less than – 50dB. Image selectivity, if troublesome, could be improved by the use of a second tuned rf section. The Mini-Circuits SBL-1 double-balanced mixer is currently priced in Norway at about £3.50, considerably less than the MD108, but note that the SBL-1 is not pin-compatible with the MD108.

Shielding plastic cabinets and enclosures

In surveying the problems of emc and rfi (*TT*, April 1983) attention was drawn to the difficulties that have tended to increase as a result of the use of plastics rather than metal enclosures. Therefore, it is perhaps worth drawing attention to an article "Focus on emi/rfi shielding: the FCC forces the issue" (*Electronic Design*, 17 February 1983). Among the points covered in the article are the techniques that can be used to give to plastics enclosures some of the desirable shielding characteristics of the more costly metal enclosures. Among the treatment methods that are being offered are direct deposit of metal on plastic, use of a conductive filler in the plastic, application of conductive-particle paints, and lining the case with foil or wire mesh. In practice the most common metal for low-cost emi/rfi shielding is zinc, which is relatively easy to apply, is stable, and has minimum toxicity. A layer of from 2 to 5mils (one mil is one-thousandth of an inch) can attenuate frequencies from below 100MHz to over 10GHz by 60 to 90dB.

Conductive paints can be applied by conventional paint-spraying equipment. Conductive fillers include silver, copper, nickel and graphite, of which a blend of nickel and graphite is claimed to be the most cost-effective, with the nickel content effective at low frequencies. However, it is clear that different firms all tend to make strong claims for their particular technique.

Table 1, reproduced from *Electronic Design* and credited to Pac Tec Corp, provides some idea of the shielding efficiency of different conductive coatings, though it is not stated over what frequency range the figures apply. A wide range of emi/rfi-proof covers, gaskets and bushings, based on wire-mesh and conductive elastomeric products, is described. These include wire-mesh materials combined with silicone rubber or neoprene cores for joints that are also water- or gas-tight, made by a British firm, Knitmesh. Metal foils, including foils laminated between plastic sheets, and pressure-sensitive adhesive-coated foils are also used to reduce rf leakage, etc. Magnetic shielding foil is also available. A rather different technique is the use of "lossy" tubing that can be slipped over wires or cables to suppress both conducted and radiated interference, rather like the use of ferrite beads but without the problem of saturation and with increased attenuation at high frequencies.

All this material can help to make plastic enclosures rf-tight, though some techniques need to be applied during equipment manufacture rather than by users attempting to reduce rfi problems.

Portable solar chargers

Several recent items in *TT* have discussed the use of solar generators for amateur rádio applications—though it was pointed out that the large panels that would be needed to keep a complete station on the air, independent of mains supplies, are currently not only costly but also not readily transportable.

It is therefore interesting to note reports that the British Army is currently evaluating compact solar cell arrays made by TNS (Tactical & Navigational Systems Ltd) as a means of recharging in the field the batteries of hf manpack sets such as the Clansman PRC-320 ssb/cw radios.

The panels or arrays measure about 12 by 9in, with a nominal power rating of 350mA at 20V, and using American-made solar cells. Two panels are used to recharge 28V batteries, and provide a charging current of about 200mA in dense cloud, to over 400mA in bright sunlight. Presumably this

would be sufficient for field use provided the manpack had a fairly low transmit/receive duty ratio. The panels are noiseless in operation and could not be readily detected by any form of infra-red target sensor, etc.

The Plexiglass covering to the cells reseals automatically and the panels are said to stand up to the classic army requirement of being "bootproof". However, one suspects that these arrays bear "military" rather than "amateur radio" price tags.

Lower-cost solar cells

From the amateur radio viewpoint the prime need, if solar power generators are to find greater application for use from sites remote from mainspower, is reduction of cost. Progress continues to be reported, spurred on by a "sunshine project" sponsored by the Japanese government. A new Sunceram 11 screen-printed form of solar cell suitable for mass-production, which has been developed by Matsushita, is claimed to bring the cost per watt to below £2.50, compared with about £6/watt or more for more conventional types. Sunceram 11 cells have a conversion efficiency of about 12·8 per cent for small cells, and about 8·5 per cent for larger (300 by 300mm) units. The cells consist of glass substrate, a 25-micron layer of n-type cadmium sulphide, and a 5–10 micron p-type cadmium tellurite film, etc.

Sun-power pioneer

All-sun-powered amateur radio transmitters are perhaps older than you may think. J.M. Osborne, G3HMO, has reminded me of the detailed report (*The Short Wave Magazine*, October 1954, pp442-6) of his "world-first transmission by sun-power", when he worked G3IYX on 1·8MHz over a distance of eight miles on Sunday 5 September, 1954—and later (19 September) was able to use the output of his solar generator to run a two-stage transistor receiver as well, while G3IYX was also using a transistor transmitter. The ultra-low-power transmitter was a single-stage crystal oscillator using a *home-made* point-contact transistor and the solar battery, was also made by G3HMO using an array of 16 selenium photo cells which in bright sunlight provided 4·5V at about 3mA to give a transmitter dc input of around 12mW: Fig 8. Each of the selenium cells is about 1·5in wide by 2in long mounted on a perspex sheet 11·5 by 8in. Because the transistor oscillator was not always "self-starting" without momentary application of a negative potential to the emitter, keying was carried out in the antenna lead (a practice that even at low power tends to result in a spacer). The conversion efficiency of the selenium photo-electric cells was far below that of a modern silicon photo-voltaic diode. Among the amateurs who co-operated in these tests was the late Austin Forsyth, G6FO, editor of *SWM*, and contacts were also made with other amateurs in the Buckinghamshire and Northamptonshire area, including G3ITW, G5LP, G5RZ, G3ITW and G6KJ (who is believed to have been Britain's first pioneer blind amateur, having been licensed in 1923), while G3CCA and G3IZS of Leicester were also reported to be experimenting with sun-powered transmitters.

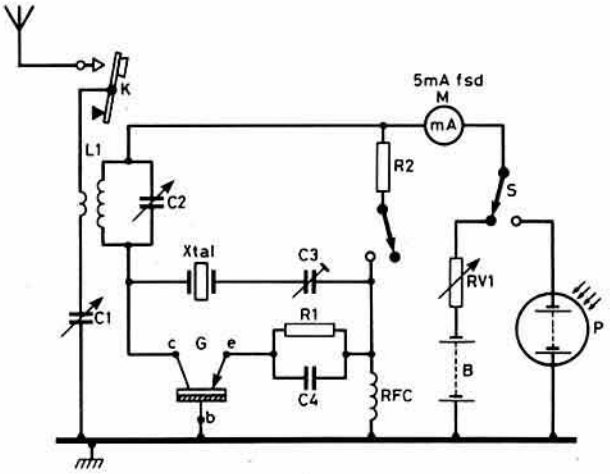

Fig 8. Circuit diagram of the original ultra-low-power sun-powered transistor transmitter used by G3MHO in 1954 to make his historic contacts. Note the home-made point contact transistor!

Apparently nobody challenged the *SWM* editor's claim that the "September 19 result may be claimed as the first occasion in history that radio communication, amateur or professional, has been achieved using daylight as the sole source of power for both receiver and transmitter at the one station."

Making rf switches

The supply at reasonable prices of new, high-grade switches, suitable for switching in high power rf amplifiers, antenna tuners and the like is yet another problem facing the radio amateur who wants to roll his own. An rf switch should be capable of handling high rf currents at low losses; this calls for large contact-surface areas, extremely low resistance, and good insulating materials with no tendency to arc.

This has encouraged Paul Johnson, W7KBE, to present (*QST*, February 1983, pp18-9) several designs of rf power switches that can be made in a home-workshop with the aid of such tools as a vice, electric drill, small hand-tools and using readily obtainable materials.

It would seem that for the amateur who seeks to build high-power equipment, particularly where this is based on thermionic valves and high voltages, the cycle has turned full-circle and we are re-entering the age of make-your-own components. The financial pressures are mounting: looking through the current advertisements one notes how easy it would be to spend around £5,000 for a legal-power hf station—not to mention such useful aids as a £10,000 spectrum analyzer, etc!

Magnifiers as constructional aids

In the February *TT* (page 134) I described an American binocular magnifier which I have been finding a useful aid, although I was then uncertain as to their availability in the UK. About a dozen readers have confirmed that similar magnifiers—and a wide range of other useful aids when working on miniature components—are sold by British firms specializing in tools for watch-repairing, jewellers and model makers.

Prices range from only £2.65 (plus 50p postage) from Bargain Buys, 4a Hadleigh Parade, High Street, Barnet, Herts (tel 01-440 7983) to over £30 for the American DA5 from Magniray Optical Company (advert in April *Rad Com*). Lower cost units tend to have plastic lenses and a fixed rather than a visor-type headband. Ellis Optical Company, 24 Mayday Road, Thornton Heath, Surrey CR4 7YD, offer a fixed high-quality magnifier at £15.75 (incl p&p). Remember that higher magnifications mean closer working.

Paul Wright, G3SEM, writes: "Headband binoculars are available in the UK from H. S. Walsh & Sons Ltd, 243 Bechenham Road, Beckenham, Kent BR3 4TS, telephone 01-778 9951, and with London showrooms at 12–16 Clerkenwell Road, London EC1. This firm supplies a wide range of optical aids and other tools for jewellers, silversmiths and horologists. One of my hobbies is that of amateur silversmithing. Now, with the miniaturization of electronic components and the use of silver and gold in high-performance vhf and uhf, there is a surprising amount in common between the two hobbies."

G3SEM sent along some pages from the firm's catalogue showing a number of eyeglasses, loupes for fixing to spectacles, an illuminated magnifier on spring-loaded balanced arms with clamp-on base, hand and stand magnifiers as well as trimmer keys for repair of quartz watches, jewellers' clamps etc. The current price of the basic headband binocular (Ref 8/50), which looks roughly similar to with the American model, is £20 plus VAT.

Jack Maling, G5JL, draws attention to a different form of hands-free magnifier. This is a device which hangs round the neck by an adjustable cord with a pair of legs supporting the magnifier from the chest. The lens is about 4 by 6in. Mrs G5JL uses it for knitting and scraper board drawing, but the om finds it effective for a number of other jobs, including radio. This was obtained from a local optician for about £7–8, and was made by Combined Optical Industries Ltd of Slough.

John Davies, RS52554, confirms that "head-glasses" or binocular magnifiers have been used in the jewellery trade in the UK for some 25–30 years, and could be obtained in the Hockley district of Birmingham which (like Clerkenwell in London) has long been a centre for jewellery and watch-repair accessories. Incidentally it was from the Birmingham jewellery trade that the original Eddystone firm (Strattons) emerged in the 'twenties as one of the very few British radio firms specializing in "short-wave" receivers and components. The story goes that it was when the demand for ladies "hairpins" (how many younger members still recall such objects?) suddenly fell off in the 'twenties that the firm moved into the then booming radio trade!

Ian Lever has sent some pages from the catalogue of the Akron Tool Supply Co, 21–23 Cherry Tree Rise, Buckhurst Hill, Essex IG9 6EB (01-505 8135), including details of the Edroy Mark 2 Magni-Focusor (price £14·95) which is a visor type headband magnifier designed for assembly workers, inspection technicians and hobbyists. It has no centre post; the lens is acrylic.

On one point, all correspondents appear to be agreed. The small size of current components does call for some form of magnification that leaves the hands freed. □

EPHEMERIS
Satellite news and views

R. O. Phillips, G4IQQ*

Satellite status reports

The change to the operating schedule for Oscar 8, reported last month, appears to be paying dividends. In particular somewhat stronger signals have been received from the mode J transponder, so much so that contacts are rather easier to come by on this transponder than on the busy mode A transponders. Progress with the commissioning of the University of Surrey experimental satellite continues, but the project still seems to be daunted with difficulties. On 7 March the deployment of the gravity boom was begun; however it appears that after only one metre, out of a total of four, had been deployed the magnetometer cables to the tip mass became entangled and thus prevented any further extension. It is understood that the cause of the problem has been identified and efforts are in hand to rectify the situation.

Further to the comments last month concerning the re-appearance of RS1 and RS2, reports have now been received from the USSR that it is highly unlikely that the signals are in fact from RS1 as it is almost certain that its battery and solar array both ceased to function some time ago. It must therefore be concluded that the signals are corrupted transmissions from RS2. The orbital characteristics are similar to those for the RS3 to RS8 series, ie period 120min and inclination 82·5°, with the telemetry beacon on 29·4MHz. Any reception reports would be welcome and will be passed to the appropriate group.

Phase 3

There is still no positive news about the launch of the Phase 3B satellite. Another casualty of the delay of the Ariane launch programme is the European X-ray satellite, Exosat. Due to the critical requirements for the timing of the launch of this satellite it has been necessary to make alternative arrangements. An American Delta class rocket will now be used.

Getting started—3

So far I have discussed the general equipment requirements for satellite operation and a simple method for deriving tracking data. The discussion has been based on use of the mode A transponders carried on the RS series of satellites. Again, I will take RS8 as an example to demonstrate the procedures that should be adopted in preparation for, and during, a useful satellite orbit. As with any new facet of amateur radio it is well worth spending some time listening to how the experienced operators carry out contacts via satellite before actually jumping in with both feet. Time spent listening over several orbits will be well rewarded later on and could help to avoid disappointment during the early attempts at QSOs.

The starting point is, of course, to establish by means of the appropriate orbital data, and the Oscarlator, the times during which the satellite can be accessed from your particular location. Deciding which is a suitable orbit depends to a large degree on the available equipment. If the 144MHz antenna is a Yagi with six elements or more then it would be better to avoid satellite passes which exhibit elevation angles above about 30°. On the other hand, where an omnidirectional antenna is to be used the high elevation orbits will produce better results. Draw up a table for the selected orbit, as indicated last month, which gives the azimuth required at, say, 2min intervals after the satellite crosses the outer range circle, ie acquisition of satellite. If like me you have problems of instant conversion from azimuth angles (0–360°) to the more usual compass bearings, then it would be wise to carry out this work in advance.

The frequency plan (the relation between the input and output frequencies) for the RS8 mode A transponder is given in Fig 1. Fortunately, the designers of this series of satellites gave considerable thought to minimizing problems for operators. As can be seen from Fig 1 it is a simple matter to calculate the nominal downlink frequency from the uplink. The uplink passband ranges from 145·960 to 146·000MHz, which corresponds to the downlink passband of 29·460 to 29·500MHz. Thus, for example, an up-link frequency of 145·985MHz would appear at the transponder output at a frequency of 29·485MHz, neglecting the effects of doppler shift which I will refer to shortly. There is a generally accepted segregation of transmission modes, as shown in Fig 1, which is applied to the nominal

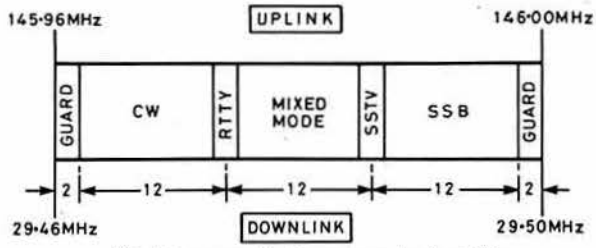

Fig 1. Transponder frequency plan for RS8

transponder downlink frequencies. It is important in particular to observe the guard bands at the extreme ends of the transponder passbands in order to avoid causing interference to the satellite telemetry beacons that are located in these areas.

If you have already listened to the mode A transponders you will almost certainly have noticed the changes in the frequency of signals. As the satellite approaches the receiving location the received frequency falls, quite slowly at first, then rapidly as the satellite passes the point of closest approach. The frequency continues to fall, though its rate of decrease reduces as it gets further away. This effect, known as doppler shift, is due to the relative velocity of the satellite with respect to the receiver. In practice the result is that the frequency received at the early part of the pass can be up to 4kHz higher than expected. It then falls to the expected value as the satellite passes at its closest point and continues to decrease by up to a further 4kHz.

When all the preparations have been carried out all that remains is to put the theory into practice. Allow plenty of time before the satellite is due to come into range and have close to hand the table of antenna bearings for the orbit and a large copy of the transponder frequency plan. Decide on a suitable transmission frequency depending on the mode of modulation to be used and make a note of the expected downlink frequency. At the calculated time for the satellite to be within range listen a few kilohertz above the frequency of the telemetry beacon. This is usually one of the first signals to be heard. Tune the receiver to the communications band to ensure the transponder is active and that other signals can be heard, then tune the receiver to the previously calculated frequency for your own signal. Make a short transmission and tune the receiver a few kHz around the expected frequency, not forgetting the effects of doppler shift. If you cannot hear your own signal, double check your frequency calculations and make sure the antennas are correctly pointed. Apart from the adequacy of your own equipment, the level of your returned signal will depend on the number of other signals passing through the transponder. Assuming you can hear your own returned signal, put out a CQ call and be prepared to have other stations call in without necessarily waiting for you to finish your call. Satellite working allows what must be the ultimate in break-in operation. The station responding to your call may not be quite on frequency, in which case retune the receiver but do not alter the transmitter frequency, otherwise you are likely to chase each other around the band. After a while you will wish to call other stations rather than calling CQ. The technique is to convert the received frequency to the nominal uplink value, then make a correction for doppler shift according to in which part of its path the satellite is located. Make a short transmission, and if necessary make minor changes to the transmitter frequency. However, do not make large frequency sweeps with the transmitter activated as you are likely to cause interference to others.

If success is not achieved in spite of everything appearing to be in order, try to contact a local satellite operator and ask for assistance. By listening to both his uplink and downlink transmissions you can check out your system calibration. If you then transmit on the same 145MHz frequency you should be in contact—good luck!

Other news

G6BMY drew attention to an article in *Flight International* that referred to the French amateur satellite project Arsene; Ron enquired if any information is available. The project involves the launch on Ariane 4 of an amateur satellite carrying several communication transponders and telemetry beacons. The objective is to provide a teaching aid for schools and colleges as well as making a contribution to the amateur space programme. Two transponders are planned—435 to 145MHz, and 435 to 2,400MHz, as well as a 10GHz beacon. More information will be provided when available, though the launch is unlikely to take place much before the end of 1984.

The 34th Congress of the International Astronautical Federation will be held in Budapest, Hungary, on 9–15 October 1983. Its theme will be co-operation on space, and a new feature will be the inclusion of a session for papers dedicated to the subject of amateur radio satellites. □

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4 - 2 - 70

Ken Willis, G8VR*

THIS MONTH *4-2-70* achieved its best dx to date with the arrival of a letter from the Solomon Islands enclosing a QSL card depicting a multicoloured sunset over a lagoon, and some relaxed-looking natives fishing from canoes. How unlike AL square! No, the propagation has not been good enough to work quite that far, but see the 50MHz section for further information.

Things have in fact been fairly quiet, but with a slightly earlier deadline due to the Easter break, Murphy dictates that something momentous probably occurred just after we went to press. There have been a few auroras, and even a little tropo, but by comparison with what was happening by the end of last summer, you could be forgiven for thinking that your front-end had given up the ghost. However, since this is being written towards the end of March, by the time it is read, things should be looking very much brighter on all of our vhf/uhf bands as summer approaches.

Tropo

In a period when not much tropospheric propagation occurred, there was an unusual event on 7 March when Northern Ireland stations were able to work into Spain on 144MHz. The weather map showed a well-defined high-pressure system over part of the British Isles, and this obviously favoured a path south from Ireland. Between 1855 and 2145gmt, GI4OMK (XO) located 5km south of Belfast worked EA1QJ, EA1TA and EA1ACD, all in VD square. The first contact was on cw, the others on ssb, and the signal levels were not very high, around S1-3. At the same time, GI8NBW (WP), using ssb, worked EA1ACD, EA1RCA, EA1QJ, EA1ED and EA1TA, again all in VD square, so the opening was very localized. GI8NBW is in Co Antrim. He tried a QSY to 432MHz with EA1QJ, but no contact resulted. The QRB for these contacts is about 1,300km. For newcomers to vhf dx, the moral is to keep an eye on the weather maps, and to monitor the band when things look even remotely possible. This ducting between two localized areas with nothing much being heard "in between" is another feature of this form of propagation.

As the high-pressure area moved away from Northern Ireland there was another brief opening around 1930gmt on 8 March. This time the pattern had changed to produce shorter path contacts, and GI8NBW worked GU6NCZ (YJ) while GI4OMK had a contact with F5JY in ZJ, with several other French stations being heard. Another aspect of this type of propagation is that when a high-pressure area which has been stationary for some time starts to decline, conditions are frequently very good. Sam, GI8NBW, used this to advantage and stuck to his receiver until 10 March when he had some very good 432MHz contacts. He worked F6APE (ZH) followed by F1FHI (ZH) who peaked at S9. Sam says that had he been equipped for 1,296MHz he could probably have worked F1FHI on that band also. He then went on to work GM4JCD (YP) who on 432MHz was running 12W to a 20-element antenna at a height of 20ft. Sam uses a 100W amplifier on 432MHz, and a 2 × 88-element Multibeam (Jaybeam) with a masthead preamplifier employing a selected BF981.

The more you operate on the vhf bands, the more convinced you become that there is so much still to be learned about the propagation mechanisms which give rise to the so-called "good conditions" or "lifts". G3KZR (Surrey) has been around for a long time, but was still surprised by conditions back in January (opening 21-23 January) by being able to hear G3BW in Cumbria at S9 plus, giving S8-9 reports to a wide range of Europeans which were inaudible in the south. He asks: "Do we have skip zones in tropo openings?" The answer is that we certainly seem to; not the ionospheric sort which our hf-band colleagues use to such advantage, but in the form of ducts which convey signals over large tracts of Europe with no apparent "fall-out" along the way. Ian, G3KZR, calls it "selective propagation", which seems a good enough description, and whatever the cause, it makes for a lot of fun on the vhf/uhf bands; so long may it continue.

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Aurora

Auroral activity was reported on 1, 2, 3, 11, 12, 19 and 20 March, though mostly confined to the north. There have also been some further reports of auroral-E (see *4-2-70* September 1982).

G3OUT (Leicestershire) heard the Lerwick beacon with auroral tone from his home QTH on the evening of 1 March, but no other auroral signals could be heard though he called repeatedly on a northeasterly beam heading. The event was shortlived, though afterwards he continued to hear GB3LER with a T9 note, and GB3ANG was steady at S3, somewhat above normal at that location. G3OUT mentioned having experienced visual auroras when visiting Finland on two occasions. In one, the display was bright enough to be clearly visible against the town's street lighting system, while in another the event appeared to be overhead and in the form of a rapidly moving thin cloud. It is this rapid movement associated with auroral "curtains" which contributes to the large doppler shift on signals so frequently in evidence during such events.

In Fife, GM4IHJ, one of the stations recently licensed for 50MHz operation, has been desperately hoping for some auroral activity outside tv hours so that the potential for working this mode on the band could be tested. On 2 March he heard an aurora start around 1240gmt, and right up to 2000gmt communication was possible with SM, DL and PA. GB3SIX was not audible. At 2030gmt, as the aurora faded, it was replaced by the best display of auroral-E ever heard at GM4IHJ. The muf went above 75MHz, with one tv station in the Baltic providing superb 70MHz signals, above which were occasional bursts of "noisy E type" from both Russian telephone links and tv. European tv channels at 48 and 65MHz were full of Swedish and Finnish signals, so John sat on his chair until midnight only to hear it all fade long before the BBC switch-off allowed him to start transmitting on 50MHz. After midnight, however, 144, 70 and 50MHz all displayed auroral characteristics. GM4DIJ was copied 52A on 50MHz but he could not read GM4IHJ. 70MHz was bereft of signals, and on 144MHz the lone occupants were a G and EI6AS. John believes that the aurora was just not strong enough to have attracted the attention of the G stations licensed for 50MHz, all of whom are unfortunately located a minimum of 250 miles south of the Mersey/Humber line.

Also on 2 March, G4BPY heard auroral signals on 50·743MHz, bearing due north from Staffordshire. This was noted at 1430gmt, and an hour or so later Gordon heard beacons EI4RF and GB3ANG, both on 70MHz, and finally, at 1717gmt GB3SIX on 50MHz was heard with auroral tone. During this same period Gordon operated on 144MHz and worked an all-time new country and new square in a QSO with UP2BJB (LP). He says that having now satisfied a longheld desire to work the USSR, he feels he can honourably retire. Knowing his enthusiasm for propagation matters, I think this highly unlikely. GB3SIX returned via aurora at G4BPY at 2130gmt.

GM4DJS (Wishaw) was also active during this event, and between 1338 and 1722gmt worked 40 stations in G, GM, GW, PA, DL, Y, F, EI, OZ and LA. He said that this was the longest-lasting aurora he had ever experienced. There were some notably longer ones during 1982 of course, but you cannot expect to catch them all.

Another Scottish station active on 2 March was GM4CXM. His "bag" contained quite different call areas than those being heard and worked by GM4DJS. Ray worked OK1KRA (HK), OK1KGS (HK), OK2TU (IJ), OK2BFH (JJ) and UP2BJB (LP), so this event was quite widespread.

GM4IHJ noted brief episodes of auroral-E propagation on 5 March at 1845gmt and on 6 March at 1855gmt. At no time during these events was anything heard on 70MHz by way of amateur operation.

The action now moves to 11 March. Andy, GM4IPK (Edinburgh) arrived in his shack to find the Lerwick beacon GB3LER auroral at 2230gmt. The first amateur station to come through with Au tone was LA2BBA (GU), followed by SM5BEI (JU) and LA1K (FX), all of whom were worked by GM4IPK. Then, from 2300gmt until about midnight, Andy worked mainly LAs, but he was hearing RQ2GAG at S4 on QTF 010°, but he could not be raised despite many calls. Andy says that all of his contacts were with beam headings between zero and 20°, indicating a northerly aurora.

Just as an indication of how auroral activity varies with location, GI4OMK near Belfast heard only one dx station during the entire event, SM4GVK (HT), whom he worked at 2318gmt.

The following day, 12 March, GI4OMK had better luck, and between 1648 and 1724gmt worked LA5IH and LA6CU, both in CU square, and four Swedish stations in GQ, HS and IS. No ssb dx was heard at all during this brief encounter.

GM4IPK also observed this aurora, starting up around 1600gmt, and found the cw end of the band very full of German and Dutch stations, peaking on a beam heading of about 50°. However, he decided to try the experiment of turning his beam to the north, and was immediately rewarded by contacts with three new squares. He worked several stations in SM4,

SM5 and SM0, with SM4HFI (HU) for one of the new squares. He was then called by none other than OH7PI (NW) for his best-ever auroral dx contact and another new one. This was at 1656gmt. After several more SM contacts, Andy was called by OH1DP to tell him that several other OHs were calling him, but they were apparently too QRP to be heard in the UK. Then at 1731gmt UR2RIW called, but the contact was a patchy one due to QSB. By 1800gmt things had gone very quiet, but there was a second phase at 2200gmt which continued until midnight. GM4IPK worked several DL, PA and G stations, with not much heard from SM/LA, but at 2305gmt he was called by OH2TI, believed to be in LU square, but the contact was incomplete. Andy's results confirm what has been mentioned here often before; the beam heading is very critical in auroral operation, especially if the beam is a sharp one. Hearing lots of activity on one heading does not mean that it is the *only* bearing to use. A change to another heading can often throw up a whole new area of distant activity, inaudible with the antenna in its original direction.

There was evidence of further auroral activity on 18 March when, in the early evening, GM4IPK could copy GB3LER with auroral tone. The aurora returned in the early hours of 19 March when GB3LER was again audible with Andy between 0210 and 0430gmt, when he finally quit to go to bed. No other stations were heard.

Beacon information

The report in *4-2-70* (March 1983) of reception in the UK of the French beacon FX8VHF resulted in a very interesting letter from Michele Monteil of Engletons, France. Michele has been a listener for 14 years, but in fact received an amateur licence with the call G5MZC while studying at Durham University.

The FX8VHF beacon was built and installed by a group of French amateurs living in and around the town of Brive, all of whom are members of the F1KLO/F6KLO Radio Club there. The beacon operates on 144·955MHz with an output of 15W. A "big-wheel" antenna with horizontal polarization provides an erp of about 50W. Frequency-shift keying (500Hz shift) is used, and the message format transmitted consists of callsign—AF79h—callsign—30s dash. The actual location is Lestrade de Lagleygeolle, some 1,500ft asl. Reception reports of this beacon would be very welcome, and should go to F6IAL or to the radio club, F6KLO.

G3COJ measured the frequency of the Wrotham beacon GB3VHF recently and found it to be two or three hundred hertz low. Most of us will find little cause for complaint, I think!

Recently GB3BUX on 70MHz exhibited some strange keying effects on a very cold day. This did not escape the notice of its keeper, G3RKL, for very long, and he cured the problem by installing a crystal oven.

GB3MLY has suffered an intermittent fault which took a little time to locate, but all is now believed to be well.

Though it was probably unnoticed, GB3ANG has changed frequency slightly from 432·99 to 432·98MHz to reduce interference with the Perth repeater on 433·00MHz.

The proposed new UK 50MHz beacon (see *4-2-70* February 1983) may be located at RSGB headquarters in Potters Bar, using callsign GB3NHQ. If this is all approved, it is intended to use an omnidirectional antenna and to transmit outside tv hours, though by 1984 it is hoped that it will be operating continuously.

Paul Johnson, ZS1BR, who is chairman of the Cape Town branch of the South African Radio League, has provided information on a new beacon on 50·945MHz, signing ZS1SIX. Operating from a site near the town of Piketberg, 807m asl, the beacon has an output power of 16W to a vertically-polarized groundplane antenna. The message format is quite complex. First, using frequency-shift keying, it sends "CQ de ZS1SIX QTH Piketberg SA FSK mode pse QSL to ZS1CT 73". The beacon then changes to fm, transmitting a 1kHz audio tone and constant carrier, sending "CQ de ZS1SIX QTH Piketberg RSA FM mode pse QSL to ZS1CT 73". The programmed memory is a 256 × 4-bit prom. Reports would be welcome, sent to ZS1CT PO Box 5100, Cape Town 8000, Republic of South Africa.

Repeater news and views

During the month of February, the following repeaters became operational:

GB3AM	(S Birmingham)	R6	GB3FN	(Farnham)	RB15
GB3BX	(N Birmingham)	R2	GB3UL	(Belfast)	RB2
GB3ES	(Hastings)	R3	GB3XX	(Daventry)	RB15
GB3LM	(Lincoln Cathedral)	R5			

The callsign of the Daventry repeater will remind old-timers of the early "wireless station" located on the site.

Two repeaters became operational on 6 March. GB3WU (Wakefield) started up on channel RB15, while GB3EV (Appleby, Cumbria) became operational on R4.

Site changes for GB3SR (from Brighton to Worthing) and for GB3HU Hull, (to the same site as vhf repeater GB3HS) are under consideration, the documents being with the licensing authority.

The Repeater Working Group of the RSGB normally functions as a working party of the VHF Committee. As part of the restructuring of the Society's committees, the role of the RWG as an independent group is now being discussed. It would not change its essential functions, but would give it increased status with direct links with Council and the Licensing Advisory Committee.

The Home Office has finally issued repeater licences for vhf Phase 5 and uhf Phase 6 applications, the first to be issued for more than two years. The policy of the licensing authority in respect of future repeater proposals is not yet clear, so the RWG is holding some applications until new guide lines can be agreed.

In recent months, the Black Isle Repeater Group was formed with the aim of establishing and maintaining a repeater at Mount Eagle on the Black Isle, north of Inverness. Paperwork is now with the RWG, but for the reasons stated above, an early decision is not anticipated. Meanwhile a Storno 25W base station has been donated by GM4COX, and this will be tested on channel R5 which has provisionally been allocated to this repeater. A GB3US logic board has been provided by GM4ILS, while GM3EDC and GM3SAE have promised assistance with the antenna and filter components. A site on IBA property is under consideration. The interim secretary of this group is GM4OIJ, and he would be glad to hear from prospective members.

The commentary in *4-2-70* (March 1983) on the use of repeaters by fixed stations, and for occasional dx working, resulted in a flood of correspondence. G4NVQ (Hastings) points out that repeaters, used in conjunction with a good vhf/fm guide (see *4-2-70* September 1982), can provide a very good indication of propagation. Since not everyone has a multimode rig to listen for beacons, the request through a distant repeater for an access report to check how far your signals are travelling can provide useful information on conditions, as well as sometimes leading to a pile-up. He cites a case recently when he was mobile near Fairlight in Sussex and requested an access report through a repeater he could hear on R2. It turned out to be ON0LG (Trooz, CK39g), and through this he went on to work three ONs, two DLs and an LX, all of whom were delighted to work him since their locations were poor and they normally could not reach stations in the UK using fm simplex.

G4NVQ goes on to say that a dx station heard on a repeater can often be persuaded to listen on the input, and if conditions are right, change frequency to make a direct contact.

This theme was the subject of a letter from G6MEN (Merseyside). He seldom uses his local repeater from the home QTH except during very quiet periods or when he needs to contact a friend who is mobile. However, during a tropo opening he found the going rather tough on fm (he is crystal controlled) so he attempted to access some distant repeaters to see how far his signals were travelling. He too asked stations hearing him on a repeater to listen on the input, and by making a QSY he was able to have some good dx direct contacts which otherwise would have been very difficult in the general scramble. He commented that during this opening when dx stations were being heard on repeater channels, behaviour was very good despite everyone wanting to work the dx.

From GW6AYM (Swansea) comes another view of repeater operation. He visited the Northampton area, and one Sunday morning while operating "static-mobile" from his daughter's house, made several pleasant contacts on 433MHz through repeaters 'NH, 'BD, 'CI and 'MK. He then accessed a repeater which was a very strong signal on RB10 (probably Luton or Peterborough he thinks). He was asked if he was a member, and on answering in the negative was told in no uncertain terms to "get off then". No callsigns were given. On a happier occasion, GW6AYM recalls working GB3IW from his home QTH in Swansea during a tropo lift. He was at the time using only 10W to an indoor antenna, and said that he received a royal welcome from that particular repeater's regulars.

G3GUD (Bucks) generally does not use repeaters, but while driving home in thick fog from the northeast recently, he was anxious to check the weather situation in his home area by monitoring the Aylesbury repeater, only to find it jammed by a station in Portsmouth trying to work dx through it. Foggy conditions often equate with good tropo of course! He fully supports the view that repeaters are for mobile operators.

Expeditions

The summer usually provides some interesting expeditions to hard-to-work squares and countries, and the first to be reported for this year offers a most welcome opportunity to work Lichtenstein, HB0. This country is not all that far from the UK, but since it does not boast an over-large amateur population, any vhf operation from there is very good news.

For the three days 10 to 12 June 1983, a group of Dutch amateurs will

operate from Lichtenstein using ssb on 144·265 and 432·265MHz, and cw on 144·065 and 432·065MHz. Callsigns will be PA3BXM, PA3CII, PB0ACG, PA3BGI and PA3BZO, all with /HB0 suffix. Operation will be from 0900 to 2000gmt daily on vhf. After 2000 the group will QSY to operate on the hf bands and will monitor the vhf net on 14,340kHz. QSLs should go to the station worked via the Dutch bureau or direct. Thanks are due to Piet van den Bos for this information.

From G8ZUK, news of a French expedition to the island of Yeu off the west coast of France in YG square. This is scheduled for 3/4 September 1983 during a contest period. Callsign will be F6CRP/P, and the operators will be F6CRP and F1FHI, both experienced vhf operators. Frequencies used will be 144·225 and 432·225MHz using stacked antennas and high power. Operation will be confined to 144MHz during the actual contest periods. The frequency of 1,296·225MHz will also be used. This is a very rare square indeed, so make a note in the diary so as not to miss the opportunity to work it.

Members of the Hadrabs plan to visit Andorra again to operate C31XV between 16 and 24 July 1983. They will be active on both 432 and 144MHz, with vhf net facilities and equipment for all modes, including ms and eme. Further details nearer to their departure date, but for sked information contact G8APZ, QTHR.

50MHz

A most interesting letter arrived from Peter Taylor, H44PT (home call G8BCG) who operates vhf from Guadalcanal in the Solomon Islands. He commented on the 50MHz reception report in *4-2-70* for March when G4CJG was in the Pacific and hearing a variety of dx. Peter said that this came as a shock to him since this reception occurred right in the middle of his "dead" season when nothing other than occasional sporadic-E would be expected. Openings from VK and ZL to the USA were only just beginning in mid-March, and he expected a little time to elapse before he heard anything from those directions in the Solomons. Peter thinks that for G4CJG to have heard what he did, there must be something very special about the Cook Islands, "apart from the young ladies, that is!".

H44PT will welcome skeds on 50MHz at any hour of the day or night, though he appreciates the problems in covering this very long path in non-tv hours and during a decline in the sunspot cycle. However, on the basis that nothing will happen unless people try, he gives the following details of his equipment and availability.

He uses an IC551 into a homebrew 4CX250 amplifier with 450W output on both ssb and cw. He has a five-element antenna, soon to be a 5-over-5, with masthead preamplifier. The location is 300ft asl with a very good take-off to the north across the Pacific to the UK. He also has monitoring and low-power equipment at his place of work, these forming part of his beacon station H44HIR which runs 24h on 50·005MHz. When at home he also monitors 28,885kHz, and when all else fails can be telephoned on Honiara 821 ext 40 or at work on Honiara 551 ext 310. He has telex on HQ66310, and for skeds will gladly split the cost of a call if a contact results, since he needs Europe for 50MHz WAC. It is unfortunate that this information is perhaps two or three years too late, or conversely, it was a great pity that the licensing authority could not see fit to issue 50MHz experimental permits at the height of solar cycle 21 when the chance of working into the Pacific area from the UK would have been much greater. However, nothing seems to be impossible in amateur radio, so for the record some further information on H44PT will not come amiss.

Since 1979, HH4PT has worked 55 countries on 50MHz, including 9N1, VS5, 5Z4, EL2 and ZD8 to the west. To his north is JA, with nightly openings via tep mode. From the north he also hears Chinese video on 49·750MHz, this sometimes peaking around 10mV on his fieldstrength meter.

Honiara time is ahead of the UK, gmt plus 11, so Peter is at work on weekdays from 2000 to 0530gmt. He says that 28MHz often opens to him from the UK between 0830 and 1200gmt, and has been known to open as early as 0530gmt and still be there at 1400gmt, all via the short path. In 1980 he had cw skeds with EI6AS and copied pings from him around 0900gmt, and he comments that he was heard by G5KW when "playing" with Korean ships on cw as they use the band commercially. Long path might be a possibility—he has heard PY2AA around 2200gmt, and other side-scatter paths may be possible. He expects to hear the beacon FY7THF from midnight to 0300gmt via the short path until about mid-May.

Having such a well-equipped, experienced operator in the Pacific, we can be sure that if anything startling happens in the way of propagation in that general direction there will be someone at the far end to take full advantage of it.

Meanwhile, back in the UK the 50MHz experiment continues, with most of the permit holders having been reported active in one way or another. GM4IHJ transmits every morning from just before 0700 until 0800gmt. GM4DIJ and GM3WCS are regular signals but both are local to John. GM3BOC, some 20 miles to the east, can only be reached through a lump of Scottish basalt one-third of a mile high and 12 miles long, but can be copied off the hills to John's north, though so far no contact has resulted. GW3HXO and GW4IIL/A are heard from time to time with deep QSB.

The main activity has been among the ms operators, and several stations are adopting this reliable mode, so suited to night-time operation. GM3WOJ and G4IJE have continued their tests, and on 8 March completed in record time, thanks largely to a 6s burst at S9 plus 30dB copied by G4IJE, so 39 reports were exchanged on this occasion. Chris is now using his preamplifier with good results, and on 15 March completed with G4IJE on a single burst which lasted some 2min, so they were able to exchange all required information using slow-speed cw. The experience of G4IJE in recognizing that the burst continued beyond the period-end enabled him to use "break" procedure to complete the contact.

On 9 March G4IJE worked crossband 50/144MHz ms with DK1PZ (EL), who was audible on tropo at 579. Heinz gave Paul a 27 report and copied 11 bursts and 29 pings from him, the longest being 11s. GM3WCS also worked Heinz crossband.

On 12 March G4IJE had his second crossband ms contact with DJ5MS (GI), with Peter using an indoor dipole this time instead of his 14MHz antenna. They completed easily, after which G4BPY and G4IJE tried backscatter with both beaming to the northeast. They completed in one hour, with Gordon using only 10W of ssb. They repeated this test on 19 March when G4BPY used higher power, and the much better reflections which resulted enabled them to complete in 20min.

On 22 March GM3WOJ tried again with G4IJE, and a burst of 20s at S9 was received in Essex from Chris. Paul copied both calls and an "R26" report which were being sent at slow speed while Chris was reprogramming his keyer. GM3WCS and G4IJE have been carrying out comparative tests between 70 and 50MHz which will be reported when more information is available. The receiving converter which Paul built for DJ5MS is now with DL3MBG. Sked details, contact G4IJE, QTHR.

VHF awards

Several awards were made by the vhf awards manager, G5UM, following successful claims lodged early in the current year. They can be summarized as follows:

4-2-70 Squares awards

	70MHz	
30 squares/8 countries	G3TCT	(Hants)
25 squares/6 countries	G4IDE	(Wolverhampton)
	144MHz	
100 squares/20 countries	G3BDQ	(Hastings)
	G8LZM	(Middlesbrough)
	G8LFB	(London)
	GM8MBP	(Aberdeen)
	G6ADH	(Surrey)
60 squares/15 countries	G3ZXZ	(Wakefield)
	432MHz	
50 squares/13 countries	G6ADE	(S. Yorks)
	G4MAW	(Devon)
40 squares/10 countries	G6ADE	(S. Yorks)
	G8FUO	(Windsor)
30 squares/6 countries	G4IOG	(Kent)
	144MHz receiving award	
100 squares/20 countries	Bob Treacher, BRS32525	(London)

Four Metres & Down certificates

	144MHz Senior	
	G3PBV	(S Devon)
	G6ADH	(Surrey)
	432MHz Senior	
	G8KGF	(Oxfordshire)
	G6ADE	(S Yorks)
	G6GN	(Bristol)
	G8FUO	(Windsor)
	432MHz Standard	
	G6JJY	(Brentwood)
	144MHz receiving award	
15 countries/60 counties	Bob Treacher, BRS32525	(London)

Here and there

The 50MHz band has always featured in these columns, but now that UK amateurs are actually transmitting on this band, it seems to me that the time may have come to change the title "4-2-70". The choice of a new title is not as easy as at first it might appear. For example, *QST* has adopted "The World Above 50MHz" by W3XO, but as *Radio Communication* sub-divides that part of the spectrum by having a separate contributor for microwave topics, any generally similar title would be inappropriate. The

same goes for *The Short Wave Magazine* feature "The VHF Bands" by G3FPK, who covers *all* bands above 28MHz in his columns. Readers are invited to send in their own suggestions for a new title. If one arrives which is finally selected, the originator will receive a small prize in the form of an RSGB *VHF-UHF Manual* or any other RSGB publication to the same value.

David Word, GM5DTB, whose home call is N4DYR, operates from Peterhead in ZR square, and his appearance on 144MHz has at times created some incredible pile-ups. He says that he expects to have some help this year in the form of GM6CAZ, GM6IRO and GM6IUE, all on 144MHz from the same square. Dave also plans to be active on 432MHz very soon, thus becoming (he thinks) the only ZR square station to be active on the band. He claims to be the most eastern station in Scotland, and pleads for patience with QSLs since whenever he is active on vhf, he is inundated by callers all wanting the square confirmed.

GI5MZC was due to have been active on 144 and 432MHz over the Easter period, operated by the group of French amateurs who built the FX8VHF beacon. If you worked them you can QSL via F8UM, QTHR, or through the bureau.

Geoff, G3NAQ, who will be better known as a regular operator of station 4U1ITU on the vhf bands, recently connected the club's Microlog to the 144MHz rig in rtty mode and made his first contact in that mode with DL6NY (FI) over a path of 465km. Geoff says he will be happy to change to this mode with any station contacting 4U1ITU, especially G stations when tropo permits. He was planning to be active during the spring BARTG contest, so users of the mode may already have heard his signals.

Also from 4U1ITU comes a complaint, coupled with a feeling of dismay at the way the hobby seems to be going, that some stations send him cards for contacts they have not made, while others, working through club stations, ask him to make out the QSL with their personal call so that they can claim it as a contact from the home QTH!

All 1982 issues of *Dubus* have now been distributed to subscribers, so now is the time to renew for 1983 if copies are not to be lost. Bob McHenry, G3NSM, QTHR, is the man to contact, and he can supply a few back-numbers for those wishing to complete sets of these volumes. Issue 4/82 contains a very interesting circuit from LA8AK for controlling the speed of a cassette recorder motor (for ms working) by using a pulse-width variation method.

John Branegan, GM4IHJ, who compiled the AMSAT Software booklet, says that since he did so he has been astonished by the size of his postbag. Many of his correspondents ask what they can next expect from him. He says that with the advent of good high-resolution graphic micros such as the Spectrum and BBC machines, he saw the need for a set of programs featuring world and sector maps of satellite footprints and interesting propagation features such as plotting the dawn/dusk line. He thinks that many amateurs appear to miss the point that most of the so-called high-resolution graphic machines will not mix text and graphics, an essential for propagation charts or scatter diagrams, or to use programs with such features developed by others. John's new programs will be eagerly awaited by the fast-growing band of micro users.

HH4PT in the Solomons will be on the Phase 3B satellite with a 12-turn helix and 400W on 432MHz, plus a gallium arsenide fet masthead amplifier on receive. He hopes to take full advantage of the northern passes since he is located only 9°S.

Pirates beware! GD8ODB reports having worked G6NSY in Central London: the QTH?—New Scotland Yard (See *Rad Com* August 1982, p 673). On 144MHz they are reported to be using a nine-element Yagi on top of their building.

Correction

Apologies are due to John King, G6ADH, whose call was misprinted as G6DAH in the January *4-2-70*. John was the first G6-plus-3 to receive the Senior 144MHz Transmitting Award, and has also qualified for the 100/20 Squares Award—a very fine effort in such a short time on the air.

BOOK REVIEWS

The UHF-Compendium (Parts 1 and 2), by K. Weiner, DJ9HO. Published by Verlag Rudolf Schmidt, West Germany. Obtainable from RSGB Publications (Sales).

What a splendid book! Over 400 pages of articles by numerous West German amateurs, dealing with 144, 432MHz and 1·3GHz, with the emphasis slightly on 1·3GHz. Readers of the English version of *VHF Communications* will recognize the style, as they will also recognize the slight feeling of frustration when they come across the one or two words of untranslated German on the illustrations. Perhaps someone will tell me what "Auskoppelschleife" means, for instance? But this is a minor grumble and even the corrections to the text which show the original error together with the correction add a certain freshness to the book.

The first 50 pages are on linear circuits (Terman would have called these "circuits with distributed constants") requiring maths up to "O" level only, followed by 270 pages of goodies all crammed with constructional articles on amplifiers (both pre- and power), with the latest on diode mixers, converters (all the way from germanium to gallium arsenide fets), transverters, test equipment, and filters. The final pages are on antennas, including some monsters, and related equipment.

For anyone who would like to know more about 144MHz and above, instead of just operating the knobs on his black box, this book is a must. *G3DVV*

TV for Amateurs by John L. Wood, G3YQC. First edition, published March 1983 by the British Amateur Television Club. 52pp (148 by 209mm). Obtainable from RSGB Publications (Sales), price £1.76 (members), £1.95 (non-members).

This well produced little volume is an unusual departure for BATC in that it is not primarily aimed at their members, most of whom presumably know quite a bit about atv already, but at newcomers.

I sometimes wonder if it is really a good idea for an expert in a subject to write a book for the uninitiated. After many years watching and participating in the evolution of techniques, it must be difficult to imagine just how much or little a beginner might know; how much detail to give without becoming trivial; how technical to get without losing the reader. G3YQC has done a very creditable job of finding the right balance in this new book.

It covers the terminology of tv, amateur standards, band plans, operating techniques, reporting methods, and circuitry. The style is pleasant, and most of the specialist terms used are clearly explained, aided by plenty of diagrams. There are one or two hiccups which really should have been caught before going to press. The figure numbering, for example, is idiosyncratic, and references to a couple of figures which do not actually appear anywhere mar the overall result.

This is not a book for the complete beginner to amateur radio, as it assumes some knowledge on the part of the reader. It is highly recommended for anyone who has been on the air for a while—transmitting or listening—and is thinking of exploring atv, or is just curious to know what it is all about. Constructional details of several quite simple circuits for receiving and sending atv are given, and these are likely to tempt quite a few operators into trying to receive pictures for the first time. I suspect that it will also find its way onto the bookshelves of many experienced atv operators as a handy reference, and to lend out to curious visitors.

Chapter titles: Principles explained; The station; Getting started; In vision; Transmitting; On the air; Colour tv; 1·3GHz tv; The BATC.

G4ANB

MICROWAVES

Charles Suckling, G3WDG*

Small dish success on 1·3GHz eme

Howard Ling, G4CCH, recently completed two eme contacts on 1·3GHz using only an 8ft dish, and 100W of rf. This is probably a record low erp for a successful contact via the moon! Details of the equipment were given recently in *Microwaves* (January 1983).

Success came during the January eme activity period, when Howard worked K2UYH, who has a somewhat larger station (a 28ft dish fed with 400W!). Howard received an "M" report, signifying that his signal was very weak, but sufficiently readable for callsigns and reports to be copied. K2UYH's signal was received at "O" copy at G4CCH (meaning that the signal was readable with little difficulty). G4CCH made his second contact during the February sked weekend, this time with Z25JJ, who has a 32ft dish and about 250W. Howard's signal was also received (at "M" copy) by W7GBI, who has a 24ft dish, and by OE9XXI, who uses a 20ft dish, so some more contacts should be possible. In addition to the stations he has worked, Howard has so far heard the following stations via the moon: SM6CKU, VE7BBG, OE9XXI, WB5LUA, OK1KIR, W7GBI, G3WDG and G3LTF.

It is quite interesting to calculate the signal levels involved in these tests. Assuming a 1·3dB overall receiver noise figure (including preamp noise, sky noise, ground noise, etc) and 100Hz receiver bandwidth, G4CCH's signal would have been 4dB above noise at K2UYH, and 1dB above noise at OE9XXI. For a good operator, the effective bandwidth can be as low as 50Hz, due to the "ear-brain" filter, which would add 3dB to these figures. These are very marginal levels for receiving information, and credit must go to the operators. Also, all the equipment must have been working at near optimum performance.

A feed horn for 3·4GHz

This month's technical item continues the series on 3·4GHz equipment, with a design for a 3·4GHz dish feed.

The feed horn consists of a short length of circular waveguide with a coaxial to waveguide transition, made from an N-socket and a short probe. Constructional details are given in Fig 1. The circular waveguide section was made from a tin (Tesco Italian peeled plum tomatoes—14oz size!), cut to the specified length. All the dimensions are fairly critical (especially the length of the probe) and hence care should be taken during construction if a low vswr is to be obtained without tweaking.

In the prototype the N-socket was fixed to the tin using two fixings, as shown in Fig 1. For a permanent installation it would be better to mount the socket with four fixings, using washers as spacers to accommodate the curved surface of the tin.

The vswr response of the feed horn is shown in Fig 2, and it can be seen that at 3·4GHz an excellent match was obtained. Field trials were very satisfactory with the feed used in conjunction with a 0·25f/D dish. This feed should also be suitable for use with shallower dishes, up to about 0·4f/D.

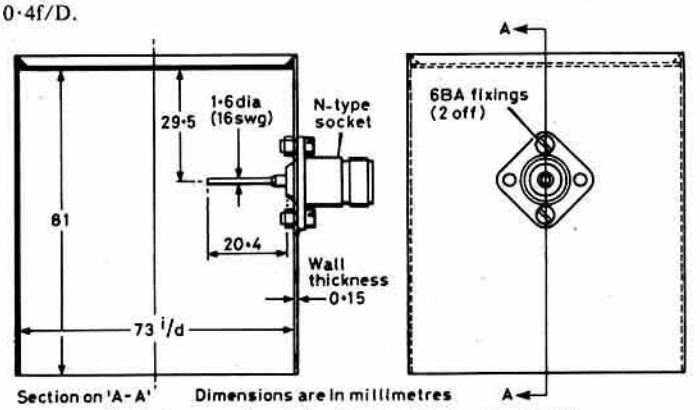

Fig 1. Constructional details of a dish feed for 3·4GHz

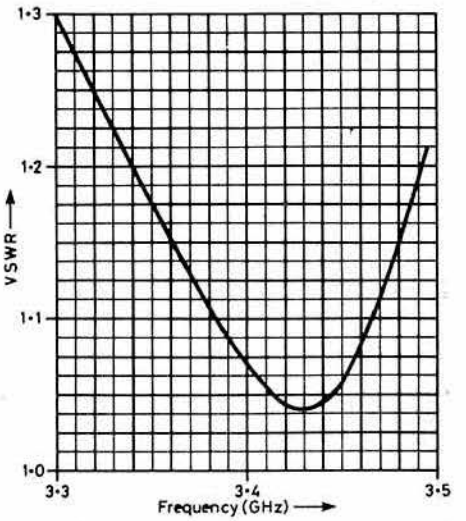

Fig 2. VSWR response of the 3·4GHz dish feed

Aircraft scatter propagation

One mode of propagation which has so far received little attention for microwave work is aircraft scatter. To my knowledge only a few contacts have been made where reflections/scattering from aircraft were deliberately exploited because no other mode of propagation was usable. These include contacts between G3OUF and G3WDG, GW8TVX and G4KGC, DJ5BV and DL9KR, and DJ5BV and DL7YC (all on 1·3GHz). Aircraft reflections have also been heard on 10GHz: GM3YGF/P and GM4KNZ/P received signals from G3JVL over a 500km path. Recently G4KGC has been monitoring the DB0JO beacon in DL48a (on 1,296·854MHz) over a 591km path. During weekdays, the beacon signal was heard on average 5–7 times per hour (a few dB above noise). The duration of each "opening" was about 1min. Throughout the monitoring period tropo conditions were very poor, with the GB3BPO beacon somewhat weaker than normal, and DB0JO inaudible except by the aircraft-assisted signal.

From all these results, it would seem that aircraft scatter has much to offer for regular dx working on the microwave bands, in much the same way as meteor scatter is used on 144MHz. Obviously, scheduled tests with strict procedure would stand the best chance of working—perhaps 1h skeds with 2·5min receive/transmit periods. Such is the volume of air traffic over the UK and Europe that the chances of making contacts over distances up to 500 or 600km seem good over most paths, although some paths may be more favourable, where aircraft density is greater.

I would be very interested to receive details of any tests made using aircraft scatter information, including beacon monitoring results, so that the usefulness of this mode of propagation can be assessed further.

Beacon news

A new 2·3GHz beacon, GB3LES, became operational on 19 March and has already been heard by a number of stations, including G4LRT and the writer. It is co-sited with the Leicester 10GHz beacon GB3LEX at ZM24j, at 220m asl, and is the first UK 2·3GHz beacon to operate in the "new" band—its frequency is 2,320·955MHz.

The beacon transmitter consists of a Wood & Douglas microwave drive source and 10W amplifier, a re-tuned Microwave Modules MMV1296 varactor tripler, giving 6W of rf, and a BXY27 varactor doubler (DF7QF design from *VHF Communications*) giving 2·5W output. Interdigital filters, DL3NQ design, are used between the varactor multipliers, and on the output, to ensure that the transmission is clean.

The antenna is an omni-directional Alford slot, mounted inside a 2in diameter plastic pipe for weatherproofing, and the erp is 5W. FHJ2 coaxial cable is used as the feeder, with about 3dB loss.

G4LRT, who built the beacon transmitter, would like to thank Wood & Douglas and Microwave Modules for supply of equipment, and G3JVL, who developed and built the Alford slot antenna (it is hoped to publish details of this soon). The beacon keeper is G8CAC, and no doubt he would be delighted to receive reception reports of GB3LES.

Microwave metalwork

Cyril James, G3VVB, (QTHR, tel 0726 842368) has recently been involved in a 2·3GHz amplifier project which involved building a number of amplifiers to the well-known WA9HUV design (originally described in *Ham Radio*). He still has a few amplifiers available and would welcome enquiries. In addition, Cyril is also able to supply 1·3GHz interdigital filters to the *RSGB VHF/UHF Manual* design. □

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SWL NEWS

Bob Treacher, BRS32525*

Newcomers

Several listeners have written to make themselves known for the first time. Colin Dawson, BRS52427, has regained his interest in amateur radio since retirement. It used to be a schoolboy hobby in pre-war days, when he built his own receivers. He also boasts a Heard All Continents certificate dated 1940. Nowadays Colin runs a homebuilt Heathkit SW717 receiver and atu, and has started an RAE course with an old friend, G6NZ. Even today dx chasing gives Colin immense pleasure, both on ssb and cw, and the Heathkit performs so well that Colin is doubtful whether a new "black box" would really handle the dx bands any better.

Karl Smith, ARS53739, has also been interested in the hobby for some time, although he is only sixteen years of age. Schoolwork permitting, Karl hopes to report regularly during 1983. He uses an FRG7700 with FRT7700 antenna tuner and a long wire. He has visions of grandeur, hoping to purchase a triband beam and rotator. Karl asked about the thickness of wire needed for an antenna. For reception use, antenna wire need not have a large diameter. Copper wire should be used if possible—it is commonly available and reasonably inexpensive. Insulated copper wire gives added safety and weather protection. For indoor antennas, a highly flexible, small-diameter insulated wire should be used, for example, ordinary light flex. The flex needs only to be split down the centre to obtain two lengths of insulated wire. It is preferable to keep outdoor antennas in a straight line, but for reception use, "bending" an antenna is not too detrimental.

The third newcomer is not really a newcomer at all! Don Piccirillo, BRS52868, has returned to amateur radio having held the callsigns ZD2DCP and 5N2DCP in the past. Don has unfortunately been unwell for some time, but the hobby gives him much pleasure. He was keenly looking forward to entering the receiving section of the BERU contest. Don was a member of FOC—No501—back in 1956, and also the equivalent ARRL A1 Operators' Club, so he has a great deal of experience in dxing. Further news from these, and other, new members of the Society will be gratefully received.

News from abroad

VU2RX has provided details of a special award that is available to listeners. It is the VU9 Award, and is available to commemmorate the 9th Asian Games Festival (ASIAD-82) held in New Delhi in November and December 1982. Listeners will have to scan their logs from 11 August to 15 December last year and locate 10 different VU9s to be eligible for the award. Applications should be forwarded to VU2RX, 5b Suresh Colony, SV Road, Bombay 400 056, India, with six ircs.

John Lord, ORS46084, reported poor hf conditions, which he expected would continue for several months. In 85°F of heat radio tends to take second place, but he had added several all-time countries.

VHF activity

The Society's March contest was for once favoured with reasonable dx conditions, with a high pressure system influencing the weather in the south. From this QTH conditions to the north were quite poor, but to the south stations in AG square were audible, and to the east, stations in DL and DK squares were copied. Nothing exotic, but at least the March contest provided some European dx during most of its course.

May usually marks the beginning of the summer sporadic-E season. Ron Ham, BRS15744, provided a detailed report on sporadic-E in the February issue of *Radio Communication*, but for those keen on vhf dx, the key to knowing whether sporadic-E propagation is possible or not is to monitor the 88-108MHz broadcast band. As a rule, if strong signals from Europe can be heard alongside *Radio 4, Capital Radio* etc then there is a chance that the propagation will reach 144MHz, but Es propagation at 144MHz cannot be guaranteed if EU dx is heard between 88-108MHz. The only way to make sure is to monitor the 144MHz band, as the propagation sometimes lasts for a very short time. In 1982, I was able to catch two Es openings —on 5 June and 9 July—the latter lasting only 15min, but enabling CT1 stations to be logged. The 5 June opening was a particularly long one, with IT9, IS0, I, IC8 and FC stations 59 from 1755 to 1945. This year let us hope that we get more Es openings. Hopefully, having whetted a few appetites, I will receive sufficient reports to have some real dx to report on 144MHz in the coming months.

*79 Granby Road, Eltham, London SE9 1EH.

1983 HF COUNTRIES TABLE

(Starting score 150)

Station	28	21	14	7	3·5	1·8	Total	Mode
BRS8841	108	132	158	110	113	31	652	ssb/cw
BRS48909	106	120	139	88	88	26	567	ssb
BRS50134	47	102	79	80	93	26	427	ssb
BRS25901	73	84	101	52	67	10	387	ssb
BRS46084/7Q7	82	116	124	42	18	0	382	ssb
BRS1066	63	68	70	73	55	34	363	cw
BRS49327	56	65	76	40	34	11	282	ssb/cw
BRS44703	72	44	22	23	81	23	265	ssb/cw
BRS25429	0	0	0	82	104	28	214	ssb
BRS52543	0	0	0	84	103	20	207	ssb
G6TEP (ex-BRS35509)	38	31	30	33	58	2	192	ssb
BRS42979	23	24	40	26	42	11	166	ssb/rtty/sstv
RS49875	22	39	57	24	13	5	160	ssb

ALL-TIME COUNTRIES LIST

(Entry score 750)

Station	28	21	14	7	3·5	1·8	Total	Mode
BRS25429	275	308	332	244	225	70	1,453	ssb
BRS32525	268	303	318	246	249	60	1,444	ssb
BRS25901	256	291	325	201	227	31	1,331	ssb
BRS8841	250	278	310	200	181	37	1,256	ssb/cw
BRS48909	208	238	248	156	112	41	1,003	ssb
BRS1066	188	201	260	154	99	61	963	ssb/cw
BRS44703	190	210	213	150	133	44	940	ssb
BRS47745	178	201	213	146	123	42	903	ssb/cw
GW4RGA (ex-BRS30694)	182	242	244	114	75	33	890	ssb/cw
BRS18529	127	186	231	139	105	39	837	ssb
BRS31440	173	183	215	112	96	31	810	ssb
ORS46084/7Q7	182	224	229	97	41	1	774	ssb
ORS45992/7Q7	196	232	234	75	32	0	769	ssb
BRS50134	133	175	206	100	118	32	764	ssb

Here and there

Peter Lincoln, BRS42979, sent an entry for the 1983 table, which included countries heard using rtty and sstv. That must be a first for the *SWL news* table! An Icom ICR70 receiver had recently been added to his line-up, and both 1983 callbooks have been purchased. Anyone needing QTH information can telephone Peter during all reasonable hours on Aldershot (0252) 317870.

DX news

Paul Crankshaw, BRS48909, mentioned FH8CB on 28MHz, PY1EFM/PY0 (Trindade Is) on 21MHz, and PY0SA, VK9YB and 8Q7BS on 14MHz. The trip to St Peter & Paul Rocks by several DL operators was probably the high spot of March, with PY0ZSE obliging on 7 and 3·7MHz for several listeners, including BRS62088.

Andy Smith, BRS50134, reported Ogasawara Is, 1Z9B—the new callsign for XZ9B (there is a possibility that this may be ok for DXCC), 9M2 and 5R8, to increase his all time countries total to 241. Other interesting dx loggings included TL8DC, VQ9CI, 3V8AA and 5T5TO on 21MHz. 9M6YY was new on 14MHz, while 3A3EE provided No100 on 7MHz.

Robert Small, BRS8841, felt conditions in early March were very good. He reported HAC in 2min on 14MHz at 1930. The countries heard were I, HS, C53, PY, VE and ZL. On 3·7MHz, PY0ZSE, LA2EX/3X1 and J73HA were all new, while on 7MHz, ZS3, 9Q5, ZF2, 4S7 and PY0ZSE were all first-timers. JT1AO, ZD8DX, VP2MKD, W2KW/KV4, 9J2LG, DU6BOB and 9K2QL were heard on 14MHz, while on 28MHz—when it was open—J28DT, W9DCN/C6A, TU2LT, 8Q7BT and FM7BB were the pick of the bunch. GU3HFN provided him with his 31st country on 1·8MHz. Robert also reported some good QSL returns—SM0AGD/KH1, FB8XAB, FB8ZP, JD1ALZ, EA4VD/3C1, W6KG/A7, KP4DEX/V2A, VP2MIX and JD1YAA.

Finale

News, views and table scores for the July issue should reach your scribe by Monday 16 May, with short late items received by Tuesday 25 May. □

THE MONTH ON THE AIR

John Allaway, G3FKM*

I WAS DISMAYED during a recent IARU meeting to discover that a number of UK stations have been heard using ssb on the new 10MHz band. This seems to be a great pity as it could encourage others—who perhaps do not see bandplans—to do the same. The decision to keep 10MHz for narrowband-mode use only was unanimous in all three IARU regions, and is the only solution to the problem of squeezing a large number of signals into a 50kHz-wide band. Perhaps readers who hear anyone using ssb might feel inclined to explain the position *politely* to the offender—at the same time pointing out that radio amateurs are well known for courtesy and helping each other to enjoy their hobby in the limited spectrum available to nearly two million amateurs all over the world.

G3ZXF has asked for publicity for the fact that he is *not* the QSL manager for T30AT, but if that station will send him some QSL cards and log extracts he will reply to the numerous cards which he is receiving!

A92P (see "QTH Corner") would appreciate information leading to those who have the logs belonging to XW8FA and XW8GF from 1973—and *DX News Sheet* would likewise like to know how to contact 5Z4LW (from June 1977), ZD7PV (March 1978), or KG4AH (December 1980).

DX news

The first European station in the NCDXF world-wide 14MHz beacon network—OH2B—became operational on 1 March. It is installed at Helsinki Technical University in Espoo, and is being managed by SRAL through OH6GJ and OH2BH. The transmitting sequence of the 14,100kHz beacons is now 4U1UN/B, W6WX, KH6O, JA2IGY, 4X6TU, OH2B, (vacant), and ZS6DN. 4U1UN/B starts the sequence at 0000 with each station transmitting four nine-second dashes at power levels decreasing from 100 to 0·1W. The sequence is repeated at 10min intervals.

ZL4OY, who was on Auckland Is recently, is now on Chatham Is and signing ZL4OY/C. He has been on 14,332kHz at 1130 and is expected to operate on 3·5 and 7MHz. *DXPress* reports that a new Pitcairn station —VR6KB—has been worked on 14MHz cw. VK6KY maintains schedules with NE5C on Mondays at 2000 on 21,300kHz. VK9YB, on Cocos Keeling Is, has been worked around 14,025kHz between 1200 and 1500.

A6XJC QSLs are now being accepted by ARRL for DXCC credit, and it seems that citizens of the UAR are now being given authorization, but not foreigners. Any other station on the air from A6 since February 1979 in the first category will be accepted for DXCC. Stations in Oman are now using the A44 prefix which is more in accordance with ITU regulations. VE2DVG/YK is in Syria until July, and is often found at the low ends of the 3·5 to 28MHz bands on cw, and on 3,793, 7,072, 14,120, 14,220, 21,295, and 28,520kHz. Tim Chen, BV2A/B, has now raised his antenna and is on the air between 14,025 and 14,040kHz, or 21,030 and 21,100kHz on Wednesdays from 1200 to 1400, and on Sunday from 0000 to 0200.

The stations located in the Karen state in Burma are now using the 1Z prefix. Rumour is that there is a possibility that they may receive separate DXCC status in due course.

N4HK, who formerly operated as TYA11 and N4HX/TT8, is now USA ambassador in 9U5. The prefix V9 is now being used by stations in Venda. Other news from Africa includes a rumour that OK3TAB/D2A will be back on the air from Angola soon. 9X5SP keeps schedules with DL8OA and 9X5NH daily at 1730 on 14,292kHz. ZD7WT will remain on St Helena until June, and should be active on all bands 3·5 to 28MHz. G4AVW/ST3 is located 400km south of Khartoum, and has permission to use 50W on 14, 21, and 28MHz. He should have a beam by now, and should be looked for on Fridays at 0730 on 14,240kHz, at 1300 near 28,530kHz, and from 1800 on 21,292kHz. He hoped to have rtty capabilities.

DX News Sheet reports that VP8SB (G4DMA) was due to leave Faraday Base (Argentine Is) for the UK before the onset of the Antarctic winter. VP8AEN will transfer from Rothera Base (Adelaide Is) to Faraday. VP8ANT remains at Rothera and should be much more active. VP8AQU (G4DNV) will return to the UK from S Orkney and will not be going to S Georgia. However, there is a possibility that someone will be on the air from S Georgia, as there is now a military garrison.

PY1EFM/PY0 should remain on Trindade Is a little longer. He often joins Eva, PY2PE, on 14,220kHz at 2300. Amateurs in Colombia are using 5J, 5K, and 5L as prefixes to mark the 50th anniversary of LRCA.

At least three special stations will be on the air from Japan on 17 May —World Telecommunications Day. They will be 8J1WCY (in Tokyo), 8J5WCY (Shokoku) and 8J0WCY (Shinetsu).

G4FAM will be on the air from St Lucia as G3FAM/J6L for three weeks from 24 April. QSLs should be sent to Chris' home QTH.

A reminder that QSLs for VK0HI should not be sent to N2DT or Japan —they must go to VK6NE, but cards sent for VK0CW contacts sent to K8CW will be answered.

Overseas news

Roger, G3UPK, reports that he made many fine contacts with the UK while he was in Brazil as PY1ZFX/M last year. He used an Atlas 215X and a home-made wire whip consisting of a wire wrapped around a piece of bamboo cut from the jungle! Roger and his Land Rover are continuing on the way northward and should be heard as G3UPK/KL7/M during July.

Roy Handley, CN8CY (also G3GJO), may have left Morocco by now after 16 months of all-band operation, which he thoroughly enjoyed—"despite the antics of some of our European friends". He worked 220 countries, achieved 5BDXCC on ssb and almost on cw, made WAC on all bands, WAZ, WAS on most bands—and best of all made many friends. All QSLs will be answered, including those from listeners, and QSLing via GW3IEQ direct is the best way (see "QTH Corner"). CN8 activity should decline somewhat as CN8s CO, CX, and EU are also leaving. Roy advises that it is best not to send ircs or any "green coupons" to the Moroccan bureau.

A sad note from G3JMH to the effect that Bill Stevens, ZD7SD, died on 4 March at the age of 70 years. Vin had completed a series of 593 QSOs with Bill and his wife Sybil during the past few years.

Gerald Ashcroft, VS5GA, has written to point out that JM1FHL is not the QSL manager for the Askar Melayu (Malay soldiers) club station VS5AM, which he runs on Monday evenings. The correct address is given in "QTH Corner". Cards for VS5GA himself should be sent to the address also given in "QTH Corner". During last winter there was a long-path opening into the UK from Brunei almost every day at 0900, and this sometimes also included Malaya and Singapore. Gerald and other VS5s will be looking for UK stations around 1600 on Saturdays during May and June on 21,160kHz (+ or − 10kHz)—signals should be better than last year as he now has a Fritzel FB3 beam at 48ft.

Dave Hardy, who many will remember as VP8HJ, G4BXH and G4BXH/VE4, is in Qatar, but his application for an A71 licence has been refused. He believes that A71BJ may have been the last licence to be issued. Dave is a keen cw user and is disappointed that he will not be able to operate until he gets posted to another exotic location; he feels some amazement that A71AD and A71BJ, although running at least a kilowatt input, do not seem to have tvi problems. TV sets in Qatar tend to have wideband preamplifiers and log-periodic antennas with up to 26dB gain in order to copy signals from Kuwait and Oman!

Keith Hollow (formerly ZD7KH, 9L1KH, MP4BJS, and A9XP) has been having problems due to the incorrect listing of his A9SP call in the *Callbook*. The correct QTH will be found in "QTH Corner".

WA4JQS, via GW3SB, has notified your scribe that he now has a further

The YASME dxpedition in Kuwait. L to r: Nasir, 9K2AN, Kuwait QSL manager; Iris, W6QL; Lloyd, W6KG; and Abdulhamid, 9K2AH. Iris and Lloyd Colvin first worked 9K2AN and 9K2AH some 25 years ago. They all met in person this year, and the Colvins worked a YASME dxpedition in Kuwait under the special call 9K2QL

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batch of 500 QSL cards for TA2TAT and that applicants should apply to the address in "QTH Corner" with an sae and two ircs. He also acts as QSL manager for VP8PU, VP8QG, VP8QJ, VP8WA, VP8ZV, ZS1DM, PY1YL/PY5YL, and PY1BB/PY5BB.

Expeditions

Ian, G4LJF, reports that he worked 1,700, stations during his two-week stay in Mauritius. The highlight was making some 45 QSOs with N America on 3·5MHz phone—mostly W6s. He was also called by BV2B.

Karl Renz, K4YT, has been making an extensive journey through the east and should be in China from 27 April to 16 May before returning home via Tokyo. QSLs for all Karl's operations should be sent after 1 June.

OH0NA, OH0NC, OH0RJ, G3JVG, and another operator will activate OJ0MA again from 22 July until 1 August. They will be on all bands cw and ssb.

The *DX Bulletin* says that a Clipperton expedition will take place late this year or early in 1984. The Club d'Oceanie Radio et Astronomie (president, FO8IW), had hoped to go in March this year but this had to be postponed. The group will probably consist of eight FO8s, six Americans, and maybe two Japanese operators.

Speculation continues over a possible expedition to Malpelo Is and *Informacion DX* suggests that it may take place in September. Visits to the island are usually made at special event times and this year is the 50th anniversary of the Colombian society, LCRA.

KP4AM still has logs for the first Desecheo operation KP4AM/D, and will answer requests for outstanding QSLs until 1 July.

Top band

Don Sargent, ZS5WT (formerly G3SXZ and 9J2XZ), has written to say that ZS5MY, ZS5BK, and he will be making an attempt to work into Europe and the UK this summer season. They have a 132ft vertical antenna and will be located on a local mountain, using 150W input. The band in ZS extends from 1,810 to 1,850kHz. Don believes that previous ZS-European contacts have been made during June and would welcome advice from those with experience—please write to him at 11 Weaver Rd, Yellow Wood Park, Durban, Natal, Rep of S Africa.

Some new claims for "firsts" on top band have been received from G2YS, who feels that many of the contacts listed so far may have been preceded by others made much earlier. The new ones are as follows:

D2CH-G2YS (23.11.46)
OK1HB-G2YS (17.11.47)
OZ1W-G2YS (21.11.48)
LA2OB-G2YS (21.11.47)

QSL via . . .

A71BH—G4HNP	F0F1C/TZ—F6CRS	4K1D—UA1AFM
HH2VP—W1FJ	V2AU—OE3ALW	KC7UU/5N6—K6EDV
S79ARB—WA2PPN	VK6AHI—K8CW	7P8CL—SM5GOY
T30CJ—VK3DAK	VP2EEA—W0RLX	8P6JA—VE3IUE
TL8CK—F6EWM	ZD7CW—N4CID	8Q7AH—HB9TL
TR8JD—F6AJA	ZD8FX—G3VBY	8Q7BS—DJ4KE

Pirates active

G4OPL, T. W. Bayliss, of Burntwood, Staffs, reports that his callsign is being pirated on 3·5MHz. He is not the only one in the Burntwood area to have this problem with callsigns being pirated in the Hampshire area, as G6PUR has also been pirated.

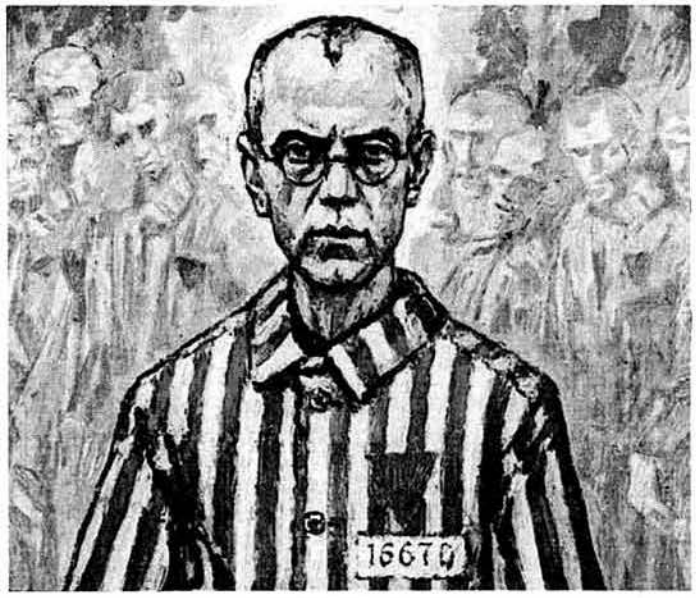
Paul Sergent, G4ONF, has been getting a lot of QSL cards for "Mike" "G4ONF", who is also a pirate.

EDR Summer Camp

The EDR (Randers Dept), OZ7RD, invites amateurs, their friends and families to its summer camp, which will be held between 9 and 17 July. It will take place on the camping ground of Gjerrild Nordstrand Camping, about 10km from Grenaa. This is one of Denmark's best camps and is within 400m of the beach, which offers excellent bathing and angling. Sightseeing and fishing trips will be organized, as well as ARDF events, and hf, vhf, and uhf radio stations will be available. Contact Knud Pank Jensen, OX1GFS, Skelvangsvej 75, 8900 Randers, Denmark, for more information.

1983 28MHz countries table

A very disappointing response to this challenge so far—perhaps the spring conditions may encourage more to test the band's potential more fully. Scores received are: G3GIQ (128), G3KDB (85, cw only), G3XBY (78), G4PKP (49), G4OBK (38), G4EHQ (29), and G3XBM (18).



SAINT MAXIMILIAN

Father Maximilian Kolbe, SP3RN, spent several years as a missionary before starting his amateur radio activities in 1938. He was arrested by the Gestapo in December 1939 and was sent to the infamous Auschwitz death camp near his home parish of Krakow. In 1941, when one of his fellow prisoners, who was the head of a large family, was selected for death Fr Maximilian volunteered to go in his place. He thus died on 14 August 1941.

He was posthumously awarded the highest Polish Military Medal—the Virtuti Militari Golden Cross.

Pope John Paul canonized Father Kolbe as a saint on 10 October 1982—the first licensed radio amateur to become a saint.

SP5HS & W6YY

Poland

PZK has announced that the decision to re-activate amateur radio communication in Poland has been taken and that the 1983 International SPDX Contest was due to be held during the first weekend in April. Several hundred SP stations were expected to be active.

Welcome

The Society is happy to say that the following joined RSGB during February—A4ZJV, EI3BMB, EI8OB, G5ACH and G5ACI (Lloyd and Iris Colvin, W6KG/W6QL), I2YBC, IW5ABD, LA5DW, LX1RJ, LX2PL, LX2RV, OE3FJW, ON1AK, SV1AB, SV1LA, TF3FF, YU2SUO, Z21AH, ZS1LM, 4S7EF. New listener members include M. Farooki (HZ), C. Youll (VE), K. Carlsen (OH), B. Trivett (DL), and C. Darribehaude (F).

Golden Antenna Award

This is being awarded for the "outstanding humanitarian performance in the field of amateur telecommunications" each year, and the presentation is made at the German-Dutch amateur meeting which takes place in Bad Bentheim during the last weekend in August. Round trip and accommodation expenses are paid by the town authorities. Radio amateur organizations everywhere are invited to submit nominations (by 31 May) to Stadt Bad Bentheim, Schlossstrasse 2, D-4444 Bad Bentheim, FR Germany. The winner will be selected by a joint committee including the chairman of IARU, and presidents of VERON, VRZA, and DARC.

Awards

The VU9 Award

This is being issued to commemorate the 9th Asian Games Festival (ASIAD-82) held in New Delhi in November/December 1982. Applicants need to send details of log extracts of 10 Indian stations worked (or heard) between 11 August and 15 December 1982 using the special VU9 prefix. The award is issued by the Federation of Amateur Radio Societies of India and applicants should send their requests (plus six ircs) to Awards Manager, V. J. Bhatt, VU2RX, 5B Suresh Colony, S. V. Road, Bombay-400 056, India.

World Communication Year Award

This award, issued by DARC, was described in March 1983 *MOTA*. Additional information is that listeners may apply, and that all modes and frequencies are allowed. The award can be requested between 1 June 1983 and 31 December 1984 by sending a list of QSLs (certified by two licensed amateurs) plus DM5, USA $3, or 10 ircs to: DARC WCY Award Manager,

QTH CORNER

A92P	K. Hollow, PO Box 14, Manama, Bahrain, Arabian Gulf.
CN8CY	via GW3IEQ, P. H. Hudson, "Silhill", Dinal Dinnle, Llandwrog, Caernarvon.
JY8KG	via YASME Foundation (see 9K2QL).
KH8AL	via WH6ANY, J. Alexander, Box 1536, Hilo, Hawaii, 96720, USA.
PY0SA	PY0ZSD, ZSE, ZSF, ZSG, and ZSH—R. van Holderbeke, PO Box 850162, 5000 Koln 80, FR of Germany.
PY0SA	etc (CW QSLs) DK9KX, H. Hannapel, Eschenbruchstr.1, D-5000 Koln 80, FR of Germany.
G4AVW/ST3	C. Beyfus, c/o Communications Dept, POB 2632, Khartoum, Sudan.
TT8AD	PO Box 815, Ndjamena, Tchad.
W6YB/V9	via KB7VD, B. W. Kordel, 5308 218th Av NE, Redmond, Wash, 98052, USA.
VK0DA	via VK3DKL.
VK0DX	via VK7LJ, L. Jarvis, 14 Waverley Av, Lenah Valley 7008, Tas, Australia.
VS5AM	PO Box 1200, BSB, Brunei.
VS5GA	(UK only) via G4CCM, H. DuV. Ashcroft, 86 Avondale Av, London N12 8EN.
VS5YY	via K5YY, S. Hutson, Box 5299, Little Rock, Ark, 72215, USA.
WA4JQS	A. DePrato, 205 Cherokee Trail, Somerset, Ky, 42501, USA.
9H3AM	via G3VLX, D. Buckley, 16 Wood Ride, Petts Wood, Orpington, Kent.
9K2QL	via YASME Foundation, Box 2025, Castro Valley, Cal, 94546, USA.
9M6YY	via K5YY (see VS5YY).
9V1VP	via K5YY (see VS5YY).

Hans-Peter Gunther, DL9XW, Am Strampel 22, D-4460 Nordhorn, FR of Germany.

Diploma del Millenario
This is being issued to celebrate the 1,000th anniversary of the foundation of the city of Udine and will be given to licensed amateurs and listeners who score 30 points during 1983 in the following way: QSOs with members of the Udine section of ARI count three points, with stations in the sites of the celebrations (Udine, Buia, Fagagna, Brazzacco, and S Margherita del Gruagno) six points. Contact with the special exhibition station active on 8 and 9 October will count 10 points, and with stations in the Friuli Venezia Guilia region (IV3) one point. Stations may be worked once per band but not cross-mode. Send copy of log details to ARI Udine Diploma del Millenario, PO Box 23-33100 Udine, Italy, before 29 February 1984. The award is free.

AMRS Award
Sponsored by the military section of ÖVSV and available to licensed amateurs and listeners. Twenty points are required—each QSO with one of the AMRS stations counts one, with the club stations two points, and with one of the stations in UN missions (presently in Syria and Cyprus), three. Stations may only be counted once and applicants should send log details (certified by a national society official or two other licensed amateurs) plus 10 ircs to AMRS-Award Manager, W. Hafner, OE8HFL, Hausergasse 30/1/16, A-9500 Villach, Austria. Note that AMRS reserves the right to ask to see the QSLs. Photocopies of the list of callsigns of stations counting for the award may be obtained from G3FKM (sae please).

Horndean & District ARC Award
Available to licensed amateurs and listeners for contacts with or reports of reception of members of the club. The hf section requires 10 points—each member counts one and G4FBS two. Special event stations GB2TSR, GB2MN, GB3RN, GB8ZU, and GB2RN also count two, as will any other special station run by the club. Contacts must have been made since 1 January 1981, and special endorsement will be made for the all-cw mode. Lists of members may be obtained from G6DWT, QTHR, in exchange for an sae. He also acts as award manager.

WKARS Award
For confirmed QSOs/reception reports from WKARS members or others living within 20km of Tunbridge Wells. WKARS members need 40 points, others in the UK 20, and overseas 10. Contacts with members count three points, with G3WKS five points, and with other stations one point. More details may be obtained from A. Korda, G4FDC, 5 Windmill Court, North Street, Tunbridge Wells, Kent TN2 4SU. A vhf version is also issued.

USA Counties Award
There is a new custodian for this award as Ed Hopper, W2GT, has developed problems with his eyesight after more than 18 years acting in this capacity. Future applications should be made to Dorothy H. Johnson, WB9RCY, 333 South Lincoln Av, Mundelein, Ill, 60060, USA.

WAZ and CQ DX Awards
A reminder that photocopies of QSL cards may be submitted instead of the originals when applying for all *CQ* awards.

Four Points of Scotland Award
Apologies from the CVDX Group for the delay in despatch of these certificates. The expedition made 10,000 QSOs and delivery from the printers of the award was very late.

QRP SSB Activity Weekend
The late spring QRP SSB Activity Weekend takes place over 7-8 May, and activity will be concentrated around the following frequencies at the listed times: 0900-1000 14,285kHz; 1000-1100 21,285/28,885kHz; 1100-1200 7,090kHz; 1200-1300 3,690kHz; 1300-1400 14,285kHz; 1400-1500 3,690kHz; 1500-1730 21,285/28,885kHz; 1730-2000 14,285kHz; 2000-2100 7,090kHz; 2100-2200 3,690kHz; and 2200-2300 14,285kHz.

Contests
CQWW WPX Contest (CW section)
0000 28 May to 2400 29 May.
1·8 to 28MHz (excluding new bands). Single-operator single- or multi-band. Multi-operator multi-band single- and multi-transmitter. Only 30h of the 48h contest period may be used by single-operator entrants. The 18h rest period may be taken in up to five periods and must be clearly indicated in the log. Exchanges consist of RST and serial QSO number (from 001)—it should continue to four digits if over 1,000 QSOs are made. QSOs with stations outside own continent count three points on 14, 21, and 28MHz, and six on 1·8, 3·5 and 7MHz. With stations in own continent (but not in own country) count one and two points respectively. Own country may be worked for prefix credit only. The multiplier is the number of different prefixes worked and each is counted once only. A prefix is considered to be "the three letter/number combination which forms the first part of an amateur radio call". In the case of a station operating in a call area different from that indicated by its callsign the portable prefix would count as the multiplier (eg W8IMZ/4 would count as W4 and W8IMZ/LX as LX0 only). Stations may be worked on each band for points credit. There is a QRP section for stations running not more than 5W output and in this case "QRP" must be marked on the summary sheet and maximum power output stated. Logs should have 40 QSOs per page and official forms are available from *CQ Magazine*, WPX Contest, 76 N Broadway, Hicksville, NY, 11801, USA, in exchange for a large sae and some ircs. (NB: no forms are available from G3FKM). Home-made sheets may be used and must indicate multipliers the first time worked. An alpha-numerical check list of claimed prefix multipliers must also be included, together with the summary sheet and usual signed declaration. Post logs no later than 10 July (with "cw" written on the envelope) to *CQ* or the new WPX Contest director Steve Bolia, N8BJQ, 7659 Stonesboro Dr, Huber Heights, OH, 45424, USA.

Ibero-American Contest
2000 28 May to 2000 29 May
Phone only. Single-operator 1·8 to 28MHz. Same station may be worked on each band for credit and each QSO counts one point. Exchanges consist of RS plus serial QSO number. The multiplier list is: CE, CO, CP, CR, C9, CX, C31, DU, EA, HC, HI, HK, HP, KP4, LU, OA, PY, TG, TI, XE, YN, YV, ZP, 3C and their DXCC dependencies. The final score is the total of points from all bands multiplied by the sum of Ibero-American countries worked on each band. Post logs before 14 July to URE, PO Box 262, Granollers, Spain. (Note that these were the rules of this contest in 1982—no notification had been received of any changes for this year up to the time of going to press.)

Around the bands
No G8KG propagation summary this month, but many complaints about poor hf band conditions—particularly during the Commonwealth Contest weekend. Information and report sheets for use by those listening for the NCDXF beacons on 14,100kHz are still available (sae please).

Reporters this month were: G2HKU, G5JL, G3s AAE, GHY, GIQ, GVV, HCT, KSH, LPS, UKH, GM3YOR, G3YRM, G4EHQ, GW4KGR, G4s LDS, NKG, OBK, and RS44083.

Stations listed in italics were using A1A.

1·8MHz. 0000 *EA6JD,* EA9KQ, 5B4EP. **0500** *EA9CE, VP5FUX.* **0600** *VE1AE, W1, 2, 4, 8.* **2100** *4X4NJ.* **2200** *4U1ITU.* **2300** *EA8QO, EZ9MAZ, FC9VN, HZ1AB, N8DWI, UM8MAZ, XT2AW.*

3·5MHz. 0000 PY0ZSE, *9J2BO.* **0100** *ZC4BI.* **0600** *HK1ABU, PY0ZSF, VP2s EAA, ES, K8WW/VP9, XT2AW, 5T5BO.* **0700** *ZL4AV.* **2200** *9M6YY.* **2300** *VP5RAC.*

7MHz. 0000 *JY9CZ, VU2MDM, 9J2BO.* **0200** *VE5RA, VE7IG, KA1GDN/VP9, XO7CC.* **0300** *3B8CF, Z26JC.* **0400** *ZL2TX.* **0500** *VP2EU, ZL* (to 0800). **0600** *KH6CF, ZL1AMO/C.* **0700** *W2BBK/PJ7, W6TT, VK7LZ, ZL.* **1700** *UH8EAA, UJ8JAS, UM8MDX.* **1800** *CN8CY, UL7CBM.* **1900** *JD6DKW, JH4OLZ, ZL1AZE, W1BJ/3B9.* **2000** *VKs, VU2TTC, W6YB/3D6.* **2100** *KJ8G/J6L.* **2200** *VP9DR, ZS1JX.* **2300** PY0ZSE, *PY0ZSF, K7NHV/VP2V, VU2BK, ZD7WT.*

10MHz. 0700 *TU2GA, ZL* (to 0900), *3V8AA.* **0800** *EA8AFB, VK2PA, VK3s.* **0900** *FK8DZ, KV4CI, OY1R, VK2, 3, 7.* **1800** *4U1VIC.* **1900** *ZL1AH, 5Z4CQ.* **2000** *TR8JD, VP8ANT.* **2100** *KP2H, XT2AW, VK3MR, ZB2GR, 5N7HKR, 5Z4CS.* **2200** *N7ET/DU6, DL1JW/HP1, IS0PZR, VK8HA, K7NHW/VP2V, ZS6BPJ/3, 3V8AA.* **2300** *J37AE, KV4CI, TT8AD, DL2GG/YV5.*

14MHz. 0000 *7X4AN.* **0700** VK9NS. **0800** *HL1CX,* VS6DO, ZL. **0900** KA2PFV/SV9, *TJ0UC,* VS5GA, 9M8s DW, PW, 4L0ATC. **1000** *SU1IM, 9V1TL.* **1100** JY8KG. **1300** JW4EN, *VK2, 3, 5, 6, ZL3GQ,* 9K2QL. **1400** 8Q7BS, 9V1VP. **1500** AH2AN, UK1PGO, VS5GA, VE7GZ/VS6, 1Z9A. **1600** BV2B, J28AZ, 3B9DA, 4S7RR, 8Q7AH, 9M6BP. **1700** KC6SZ, VK6AHI, VS5GA, YI1BGD. **1900** FY7BO, PY0ZSD, 4K1D. **2000** KL7H, PY0ZSG, V2AU, VK4SD, VP8ALO (S Orkney). **2100** JA0GZZ, KJ8G/J6L, TL8CK, TT8AD, VP8s NY, SB, TD. **2200** CE1DZ, FY7KRU, HH2VP, V3HE, VU2BK.

18MHz. **1600** DJ0JV/5N0.
21MHz. **0800** JA. **0900** FB8ZQ, HL0CBD, JT1AO, JY8KG, TL8ER, TR8JD, KC7UU/5N6. **1000** PY1EFM/PY0T. **1100** C53DF, TA2TB. **1200** AP2AP, D44BC, DU6HM, FY7CG, PY0ZSH. **1300** FB8ZP, DG6MBT/TA, YC4FNO, 9V1VV. **1400** SV1OI/SV5. **1500** H5AK, VQ9CI, W6, 9V1VM. **1600** JY8KG, S79ARB, G4ABI/ST2, ZD8FX, 3D6AM, DL5SA/5N6, 7Q7LW, 9X5SL. **1700** A71AJ, C53DF, FR0FLO, HS1CZ, HZ1HZ, S79WHW, G4ABW/ST3, DJ5RT/TT8, V3PS, W6-W7, 5H3MI, 7P8BS, 7X2KBS, 8Q7AH. **1800** F6FIC/TZ, 5R8AL, 5Z4BD, 8Q7BC. **1900** PY0ZSD, OL1YL. **2000** VE7, W6-W7, 5H3BH. **2100** HC1BP, W6-W7-W0.
24MHz. No reports.
28MHz. **1000** AP2ZR, JY8KG, 8Q7BT. **1100** KL7IHP/VS6, 3B8FK. **1200** A71BJ, AP2HM, *FB8ZQ*, JY9CL, PY0ZSH, *VU2BK*, YB0ACL. **1300** M1J, *TR8JD*, *TT8AD*, DJ5RT/TT8. **1400** VK9YC, W1-W5 (to 1700) *ZC4CW*, *ON5KR/9Q5*. **1500** HZ1HZ, OD5PZ, PY0SA, 9H3AM. **1600** S83H, *KC7UU/5N6*. **1700** K0GVB/C6A, W1, 4, 5, 9, 7Q7LW. **1900** W6.

Thank you to all who contributed to this month's column, and also to the following for items extracted: *DX'press* **(PA0GAM)**, *CQ Magazine* **(W1WY)**, *DXNL* **(DL3RK)**, the *DX Bulletin* **(K1IN)**, the *Long Island DX Bulletin* **(W2IYX)**, *DX News Sheet* **(G3XTT/G3ZAY)**, the *Ex-G Radio Club Bulletin* **(GI3OEN/W6)**, *Long Skip* **(VE3EUP)**, and *Lynx DX Group Bulletin* **(EA2JG/EA3CBQ)**.

Please send items for **July** issue to **reach G3FKM no later than 26 May** and **August** by **24 June.**

HF propagation predictions for May 1983

Using the table
The time is presented vertically at two-hour intervals 00(00)gmt to 22(00)gmt for each band.
The probability of signals being heard is given on a 0 (indicated by a dot) to 9 scale; the higher the number the greater the probability, with 1 meaning 10 to 19 per cent of days, and so on. Additionally 50MHz F-layer and 1·8MHz openings are indicated by a dagger (†) sign in the 28 and 3·5MHz columns respectively. The higher probability figures are printed in bold type, lower probability in medium type and lowest probability in italic type.

	28MHz			21MHz			14MHz			10MHz			7MHz			3·5MHz		
GMT	0000	0111	1122	0000	0111	1122	0000	0111	1122	0000	0111	1122	0000	0111	1122	0000	0111	1122
	0246	8024	6802	0246	8024	6802	0246	8024	6802	0246	8024	6802	0246	8024	6802	0246	8024	6802
EUROPE																		
Moscow	....	....	....	...1	2322	332.	3246	6666	7896	8764	4444	5689	7532	1111	2468	42..	....	..45
Malta	....	....	....	...1	3333	353.	5247	7767	7897	9886	5444	5789	9863	2212	3578	††3.	....	.24†
Gibraltar	....	....	....	....	1111	122.	3115	7666	6886	8667	6555	5799	9975	3222	3578	††42	....	.24†
Iceland	....	....	....	....	....	....	1..1	3444	4564	7445	5555	5678	7765	3222	3356	5542	....	..24
ASIA																		
Osaka	....	....	....	....	2222	2.1.	1.11	4222	4563	....	1...	1462	....	....	.13.	....	....	....
Hong Kong	....	....	....	...2	3333	331.	2.11	2222	4675	2...	....	2475	....	....	.152	....	...	..2.
Bangkok	....	.1..	....	..13	3433	431.	3111	1222	4775	3...	....	2477	1...	....	.255	....	....	..22
Singapore	....	11..	....	..13	4444	321.	3111	2222	4674	3...	....	2477	1...	....	.256	....	....	..23
New Delhi	....	111.	1...	..13	3444	553.	4321	1222	5787	62..	....	2478	4...	....	.256	....	....	..24
Teheran	...1	1111	12..	..24	4544	6752	6552	1122	5798	852.	....	2478	63..	....	.257	4...	....	..24
Colombo	...1	1211	1...	..24	4544	511.	4411	1222	5676	72..	....	2478	4...	....	.257	2...	....	..24
Bahrain	...1	1221	221.	..25	4555	7763	7652	1122	5799	962.	....	2478	73..	....	.257	4...	....	..24
Cyprus	...1	1221	231.	1.26	6666	7873	8776	5555	6899	9853	2222	3689	8631	....	1368	†3..	....	..35
Aden	...1	2333	33..	2125	4566	7844	9762	1122	4789	973.	....	1478	741.	....	.257	52..	....	..24
OCEANIA																		
Suva (S)	....	....	....	....	..11	.1..	..23	3222	2541	..23	2...	143.	...1	....	.1..	....	....	....
Suva (L)	....	....	..1.	2214	....	..64	1256	3111	..363	..34	1...	143.	...1	....	.11.	....	....	....
Wellington (S)	....	....	....	....	....	..1.	1134	3212	1263	1133	1...	1342	..11	....	.12.	....	....	....
Wellington (L)	....	....	....	3212	....	..14	4566	2...	.165	1244	1...	.352	..11	....	.12.	....	....	....
Sydney (S)	....	....	....	..13	421.	....	1136	4212	3434	1..3	1...	2463	...1	....	.151	....	....	..2.
Sydney (L)	....	....	....	2..1	....	...4	4235	41..	..66	1.14	2...	.263	...1	....	.141	....	....	....
Perth	...1	11..	....	..25	552.	....	4323	4221	122.	41..	1...	1462	1...	....	.255	....	....	..23
Honolulu	....	....	....	....	....	111.	..12	3211	3411	..33	2...	12..	..11	....	....	....	....	....
AFRICA																		
Seychelles	...1	2223	31..	1.25	4556	7653	8652	1122	4799	963.	....	1478	74..	....	.257	5...	....	..24
Mauritius	...1	2333	42..	1.25	5666	7743	8262	1222	4789	963.	....	1478	751.	....	.257	52..	....	..24
Nairobi	...1	2334	551.	3.26	4566	8865	9773	1112	4799	9851	....	1478	772.	....	.257	54..	....	..24
Salisbury	...1	2245	55.1	4116	5566	8956	9775	2122	4789	9862	....	1478	774.	....	.157	54..	....	..24
Capetown	....	2245	41..	...5	6566	7621	63.6	4212	4788	9813	1...	1478	7741	....	.157	54..	....	..24
Lagos	....	2245	672.	3214	6556	8983	9976	3111	4789	9974	1...	1478	8741	....	.157	54..	....	..24
Ascension Is	....	2123	563.	1...	6555	7984	8732	4211	3689	9963	1...	.478	7741	....	.147	552.	....	..24
Dakar	....	2124	464.	3113	6555	6885	9876	5211	2689	9974	2...	.378	7741	....	..47	552.	....	...4
Las Palmas	....	1111	232.	2..2	6556	6884	9767	7666	6799	9986	4333	3589	8863	11..	1268	††3.	....	..35
S AMERICA																		
South Shetland	....	..13	43..	....	..56	775.	2.1.	.222	3687	7552	1...	1468	7741	....	.146	552.	....	...3
Falkland Is	....	..23	453.	1...	.256	7881	8552	1222	3688	9874	1...	1358	7741	....	.136	552.	....	...3
Rio de Janeiro	....	.113	354.	311.	.555	6885	9874	3221	2479	9974	2...	.158	7741	....	..26	552.	....	...4
Buenos Aires	....	.113	344.	31.1	.456	6785	9876	1222	2479	9974	1...	.148	7751	....	..15	552.	....	...2
Lima	....	...1	112.	3...	1134	4465	9755	4222	1137	8974	2...	...4	7741	....	...2	442.	....	....
Bogota	....	....	.11.	2...	1234	3455	8644	4222	1126	8864	2...	...4	6741	....	...1	342.	....	....
N AMERICA																		
Barbados	....	.1.1	112.	3...	1434	4465	9645	4321	1147	9974	2...	..15	7741	....	...2	442.	....	....
Jamaica	....	....	..1.	2...	.123	3344	8533	2222	1126	7864	2...	...3	4741	....	....	242.	....	....
Bermuda	....	....	..1.	2...	.223	2354	8532	3221	1136	7864	2...	..14	5741	....	...1	242.	....	....
New York	....	....	....	1...	.111	2233	7421	1222	1136	6863	2...	...3	3741	....	...1	.4..	....	....
Mexico	....	....	....	1...	..12	1232	5421	1112	1112	4763	2...	....	1541	...	....	.2..	....	....
Montreal	....	....	....	1...	.111	2133	7421	1222	1136	6863	2...	..13	3641	....	...1	.3..	....	....
Denver	....	....	....	....	....	..11	4311	..11	2112	3553	1...	....	.341	....	....	....	....	....
Los Angeles	....	....	....	....	....	..11	3211	...1	2111	1453	1...	1...	.241	....	....	....	....	....
Vancouver	....	....	....	....	....	....	2211	1..1	2112	1353	2...	1...	.141	....	....	....	....	....
Fairbanks	....	....	....	....	....	....	1112	3211	2221	.233	2...	121.	..11	....	....	....	....	....

The provisional mean sunspot number for March 1983 issued by the Sunspot Index Data Centre, Brussels, was 66·5. The maximum daily sunspot number was 109 on 1 March, and the minimum was 12 on 13 March. The predicted smoothed sunspot numbers for May, June, July, August and September are, respectively: (classical method) 81, 79, 77, 75 and 74; (SIDC adjusted values) 81, 79, 77, 75 and 74.

CONTEST NEWS

RSGB SSB Field Day/IARU Region 1 HF Phone Field Day 1983 rules

1. Eligible entrants. Members or groups of members of the RSGB located in the British Isles.
2. The general rules for RSGB hf contests, published in the January 1983 issue of *Radio Communication,* will apply.
3. Period. 1500gmt Saturday 3 September to 1500gmt Sunday 4 September.
4. Sections.
(a) Open. Multi-operator, maximum licensed power. Equipment: one transmitter and one receiver, or one transceiver plus an additional receiver if desired. Antenna: no restriction.
(b) Restricted. Multi-operator, 200W p.e.p. input maximum. Equipment: only one transmitter and one receiver, or one transceiver. Antenna: only one antenna may be used which must be a single element such as a dipole, long wire, W3DZZ, or trapped vertical, having not more than two elevated support points. No part of the antenna may be higher than 15m above ground level.
Notes (these apply to both sections).
(i) Stand-by equipment is allowed, but it may not be connected at the same time as the main equipment.
(ii) The use of support points for antennas from permanent buildings or structures is not permitted.
5. Location. Each portable station must operate from the same site for the duration of the contest and may not be located in a permanent building or use public mains supply.
6. Power. Power for all equipment may be derived only from a portable generator on the site, accumulators, or batteries.
7. Installation. No equipment or antennas may be installed or erected on the site prior to 24 hours before the start of the contest. This does not apply to the storage of equipment.
8. Contacts. Phone only in the 3·5, 7, 14, 21 and 28MHz bands.
9. Contest call and exchange. Call 'CQ Field Day". Exchange RS plus serial number starting with 001.
10. Scoring.
(a) QSO with a fixed station in IARU Region 1.....2 points
(b) QSO with any station outside IARU Region 1.....3 points
(c) QSO with a portable or mobile station in IARU Region 1.....5 points
See Appendix for list of IARU Region 1 countries.
11. Multiplier. Each DXCC country worked on each band gives one multiplier.
12. Final score. The total points scored on all bands is to be multiplied by the total number of different countries worked on each band to give the final score (ie total QSO points × multiplier = final score).
13. Logs. Separate logs are required for each band, together with a check list showing the countries worked on each band. Log sheets are to be headed: date/gmt; station worked; RS and serial number sent; RS and serial number received; operator; new country/multiplier; points. RSGB HF Contest Log Sheets should be used.
14. Declaration. Logs must be accompanied by an RSGB HF Contest Cover/Summary Sheet with the declaration signed by the person responsible for the contest entry.
15. Address for logs: RSGB HF Contests Committee, c/o M. Harrington, RS20249, 123 Clensham Lane, Sutton, Surrey SM1 2ND.
16. Deadline for logs: postmarked not later than the Monday 22 days after the end of the contest.
17. Awards. The leading station in the Open Section will receive the Northumbria Trophy. The leading station in the Restricted Section, and the entrants placed second and third in each section will receive certificates of merit. Certificates will also be awarded to the stations submitting the leading check log from each continent.
IARU Region 1 will award certificates to the top 10 stations in each section in the combined results table.
18. Any log found to contain more than five unmarked duplicate contacts for which points have been claimed will be automatically disqualified. Points to the rate of 10 times the contact value will be deducted for each unmarked duplicate contact up to five.
Appendix
IARU Region 1 countries include those in Europe, Africa, USSR, Mongolia, ITU Zone 39. For a precise definition refer to the RSGB *Amateur Radio Operating Manual.*

21MHz CW Contest 1983 rules

Special note for both sections: entrants are particularly requested to use standard size (A4) log sheets.

TRANSMITTING SECTION
Attention is drawn to the changes in rules 5, 7, and 12.
1. The general rules for RSGB hf contests, published in the January 1983 issue of *Radio Communication,* will apply.
2. Eligible entrants. Single operator stations only. British Isles entrants must be members of RSGB. Overseas entrants, all licensed amateurs.
3. Period. 0700 to 1900gmt, Sunday 16 October 1983.
4. Sections.
(a) British Isles section.
(b) QRP British Isles section. British Isles stations using less than 10W input.
(c) Overseas section (including EI).
(d) QRP Overseas section. Overseas stations using less than 10W input.
5. Frequency/mode. 21MHz. CW only. Entrants are requested **not** to operate in the band 21·075 to 21·125MHz.
6. Exchange. RST report plus a progressive QSO number starting with 001.
7. Scoring.
(a) British Isles stations. Only contacts with overseas stations will count for points. Each contact shall score three points. The final score is the number of countries worked multiplied by the total number of points. The ARRL Countries List will apply with the exception that VO1, VO2; VE, VK, ZL and USA and Japanese call areas, irrespective of prefix, will count as separate countries.
(b) Overseas stations. Each completed contact with a British Isles station will score three points. The final score is the number of British Isles prefixes multiplied by the total number of points. British Isles prefixes are; G2, G3, G4, G5, G6, G8, GD2, GD3, GD4, GD5, GD6, GD8, GI2, GI3, GI4, GI5, GI6, GI8, GJ2, GJ3, GJ4, GJ5, GJ6, GJ8, GM2, GM3, GM4, GM5, GM6, GM8, GU2, GU3, GU4, GU5, GU6, GU8, GW2, GW3, GW4, GW5, GW6, and GW8. Contacts with GB stations will not count for points or multipliers.
Duplicate contacts. Unmarked duplicate contacts for which points have been claimed will be penalized at 10 times the claimed points. Entries containing more than five such duplicates will be automatically disqualified.
8. Logs. Logs sheets to be headed: Date/time gmt; station worked; RST and serial number sent; RST and serial number received; multiplier; points claimed. They should be submitted with a cover sheet indicating antenna, equipment and power used and must include a separate list of countries worked as specified in rule 7 above.
9. Declaration. Each entry must be accompanied by the following declaration, signed and dated: "I declare that this station was operated strictly in accordance with the rules and spirit of the contest and agree that the decision of the Council of the RSGB will be final in all cases of dispute".
10. Address for logs. RSGB HF Contests Committee, c/o D. S. Booty, 139 Petersfield Avenue, Staines, Middx TW18 1DH, England.
11. Closing date for logs. British Isles entrants, 22 November 1983; overseas entrants, 31 December 1983.
12. Awards. The leading British Isles station will be awarded the T. E. Wilson G6VQ Cup, and will also receive RSGB publications to the value of £10. Certificates of merit will be awarded to the leading three stations in each section, and to the leading station in each overseas country.

RECEIVING SECTION
Attention is drawn to changes in rules 2 and 11.
Rules as transmitting section except where specified below.
2. Eligible entrants.
(a) British Isles. RSGB members only.
(b) Overseas (including EI) all swls.
Holders of transmitting licences for frequencies above 30MHz may also enter the receiving section.
7. Scoring. British Isles swls should only log overseas stations in contact with British Isles stations participating in the contest.
Overseas swls should only log British Isles stations in contact with overseas stations participating in the contest. Scoring and multipliers as in transmitting section.
11. Logs. Log sheets to be headed: date/time gmt; callsign of station heard; callsign of station being worked; multiplier; points claimed.
Note. In the column headed station being worked, the same callsign may only appear once in every three contacts except when the logged station is a new multiplier for the receiving station.
Each entry should be accompanied by a completed declaration: "I declare that this station was operated within the rules of the contest and that I do not hold a transmitting licence for frequencies below 30MHz".
12. Awards. Certificates of merit will be awarded to the leading three entries from the British Isles, and to the leading entrant from each overseas country.

21/28MHz Telephony Contest 1983 rules

Special note for both sections: Entrants are particularly requested to use standard size (A4) log sheets. Refer to general rule 7.

TRANSMITTING SECTION
Attention is drawn to changes in rules 5, 7, and 12.
1. The general rules for RSGB hf contests, published in the January 1983 issue of *Radio Communication* will apply.
2. Eligible entrants.
(a) British Isles. RSGB members only.
(b) Overseas (including EI). All licensed amateurs.
3. Period. 0700 to 1900gmt Sunday 9 October 1983.
4. Sections. (i) Single-operator. (ii) Multi-operator, multi-band only.
5. Frequencies/mode. 21 and 28MHz, phone only. Entrants are requested **not** to operate in the bands 21·400 to 21·450MHz; 28·200 to 28·400MHz and 29·100 to 29·700MHz.
6. Exchange. RS report and serial number starting at 001.
7. Scoring.
(a) British Isles entrants: Three points for each completed contact with a station in the rest of the world. Multipliers will be countries on the ARRL Countries List except that VO1, VO2, VE, VK, ZL call areas and USA and Japanese call areas irrespective of prefix, will count as separate countries.
(b) Overseas entrants: Three points for each completed contact with a station in the British Isles. Multipliers will be British Isles prefixes which are: G2, G3, G4, G5, G6, G8, GD2, GD3, GD4, GD5, GD6, GD8, GI2, GI3, GI4, GI5, GI6, GI8, GJ2, GJ3, GJ4, GJ5, GJ6, GJ8, GM2, GM3, GM4, GM5, GM6, GM8, GU2, GU3, GU4, GU5, GU6, GU8, GW2, GW3, GW4, GW5, GW6, GW8. Contacts with GB stations will not count for points or multipliers.
For all entrants the total score will be the number of points on each band added together, times the number of multipliers on each band added together. Unmarked duplicate contacts will be penalized at 10 times the points claimed. Entries containing five or more such duplicates will be automatically disqualified.
8. Logs. Log sheets to be headed: date/time gmt; station worked; RS and serial number sent; RS and serial number received; multiplier; points claimed. Separate logs must be submitted for each band and a summary sheet showing the multipliers worked on each band must be included.
9. Declaration. Each entry must be accompanied by the following declaration, signed and dated: "I declare that this station was operated strictly in accordance with the rules and spirit of the contest and agree that the decision of the Council of the RSGB shall be final in all cases of dispute".

10. Address for logs. RSGB HF Contests Committee, c/o Mr P. Miles, PO Box 73, Lichfield, Staffs, England.
11. Closing date for logs. British Isles entries must be received by 9 November 1983. Overseas entries must be received by 1 December 1983.
12. Awards.
(a) British Isles. The Whitworth Trophy will be awarded to the leading British Isles entrant and the Powditch Trophy will be awarded to the leading British Isles entrant on 28MHz. Certificates of merit will be awarded to those placed second and third overall and to the leading station in the multi-operator section.
(b) Overseas. Certificates of merit will be awarded to the leading station in each country and to the leading station in the multi-operator section.

RECEIVING SECTION
Attention is drawn to changes in rules 2 and 8.
Rules as for the transmitting section except as varied below.
2. Eligible entrants.
(a) British Isles: RSGB members only.
(b) Overseas (including EI): all swls.
Note that holders of transmitting licences for frequencies above 30MHz may enter the receiving section.
7. Scoring/multipliers. British Isles swls should only log overseas stations in contact with British Isles stations taking part in the contest. Overseas swls should only log British Isles stations in contact with overseas stations taking part in the contest. Scoring and multipliers as the transmitting section.
8. Logs. Logs to be headed: date/time gmt; callsign of station heard; callsign being worked; multiplier; points claimed. A summary sheet showing multipliers heard on each band must be included.
Note: In the column headed station being worked, the same callsign may only appear once in every three contacts logged except when the logged station is a new multiplier for the receiving station.
9. Declaration. Each log must be accompanied by the following declaration: "I declare that this station was operated within the rules of the contest and I do not hold a transmitting licence for frequencies below 30MHz".
12. Awards. The Metcalf Trophy will be awarded to the leading British Isles entrant. The Powditch Receiving Trophy will be awarded to the leading British entrant on 28MHz. Certificates of merit will be awarded to those placed second and third overall and to the leading entrants in each overseas country.

70MHz & SWL Contest rules

0900-1600gmt 12 June 1983
The following general rules, published in the January 1983 issue of *Radio Communication*, will apply: 1, 2, 3, 4e, 5a, 6a, 7a, 9, 10a, 11a, 12a, 13-26.
All entries and checklogs to: VHF Contests Committee, c/o Mr B. J. Morton, G4HWA, 39 Green Lane, Blackwater, Hampshire GU17 9DG.

Summer 1·8MHz Contest 1983 rules

1. Aim of the contest. To encourage the use of the 1·8MHz band.
2. Eligible entrants. Single or multi-operator. British Isles entrants must also be members of the RSGB.
3. Period. 2100gmt Saturday 25 June to 0100gmt 26 June 1983.
4. Sections.
(a) British Isles stations
(b) Overseas stations (including EI).
5. Frequencies/mode. 1·81-2·0MHz cw only.
6. Contest call and exchange. CQ test, RST plus serial number starting at 001.
British stations must also give their county codes as published in the January 1983 issue of *Radio Communication*.
7. Scoring.
(a) British Isles section. Three points for each contact, with a bonus of five points for the first contact with each new British Isles county/region and the first contact with each new country outside the British Isles.
(b) Overseas section. Three points for each contact with a station in the British Isles (not EI), with a bonus of five points for the first contact with each new county/region.
8. Logs. Log sheets to be headed: date/gmt; callsign; RST/number sent; RST/number received; code received; bonus; points.
9. Declaration. Each entry must be accompanied by the following declaration, signed and dated: "I declare that this station was operated strictly in accordance with the rules and spirit of the contest, and agree that the decision of the Council of the RSGB shall be final in all cases of dispute".
10. Address for logs. RSGB HF Contests Committee, c/o D. F. Beattie, G3OZF, Mayerin, Church Way, Stone, Aylesbury, Bucks HP17 8RG.
11. Closing date for logs. Logs must be postmarked not later than Monday 11 July 1983.
12. Awards.
(a) Certificates of merit will be sent to the first three stations in each section and to the leading entrant from each overseas country.
(b) A certificate of merit will be awarded to the highest placed entry from a station which has not entered the Summer 1·8MHz Contest before. Candidates for this award should mark their entries "First-time entrant".
(c) A certificate of merit will be awarded to the highest placed entrant in the British Isles section who has reached pensionable age on or before 25 June 1983. Candidates for this award should mark their entries "Senior Citizens' Award".

70MHz Contest January 1983 results

Propagation conditions for this event were described by most contestants as poor with deep QSB, and weather conditions were such that the human antenna rotators employed by the leading station had to be periodically thawed out with hot soup. Most stations now use single Yagi antennas with four elements, there being just three three-element arrays, one seven-element, two five-element, one six-element and a dipole shown on the cover sheets. However there was one more ambitious array consisting of four three-element Yagis.
Contest secretaries and log keepers should, perhaps, be a little more careful when completing the cover sheet (form 427), and the attention of all contestants is drawn to rule 15 of the general rules published in the January 1982 edition of *Radio Communication* (under which this contest took place).

Contests calendar

7-8 May	432/1,296/2,320MHz *(Rules in March issue)*
7-8 May	CQ M *(Rules in April MOTA)*
8 May	144MHz Low Power
8 May	DF Qualifying Event Chelmsford/Colchester *(Details in April issue)*
15 May	Region Round-up *(Rules in April issue)*
15 May	WAB LF Phone *(Rules in April issue)*
22 May	432MHz CW *(Rules in March issue)*
22 May	DF Qualifying Event Coventry *(Details in May issue)*
28-29 May	CQWW WPX (CW) *(Rules in May MOTA)*
28-29 May	Ibero-American (Phone) *(Rules in May MOTA)*
4-5 June	NFD *(Rules in February issue)*
12 June	70MHz/SWL *(Rules in May issue)*
12 June	DF Qualifying Event Rugby *(Details in May issue)*
19 June	BATC ATV Summerfun *(Rules in May issue)*
25-26 June	Summer 1·8MHz *(Rules in May issue)*
26 June	VHF 144/432MHz Phone *(Rules in April issue)*
26 June	DF Qualifying Event Dartford Heath
2-3 July	VHF NFD *(Rules in April issue)*
10 July	DF Qualifying Event Salisbury
17 July	3·5MHz FD
31 July	432MHz Low Power
31 July	DF Qualifying Event Mid-Thames
14 August	70MHz Trophy & SWL
21 August	DF Qualifying Event Slade
28 August	ROPOCO 2
3-4 September	144MHz Trophy & SWL (IARU)
3-4 September	SSB Field Day *(Rules in May issue)*
11-12 September	International ATV *(Rules in May issue)*
18 September	DF National Final South Manchester
October/ November	432MHz Cumulative
1-2 October	432-24GHz & SWL (IARU)
9 October	21-28MHz Phone *(Rules in May issue)*
16 October	21MHz CW *(Rules in May issue)*
16 October	1,296MHz Cumulative
5-6 November	144MHz CW
6 November	LF CW *(Rules in April issue)*
12-13 November	Second 1·8MHz
4 December	144MHz Fixed

The leading station was G3SYA/P, entered by the Preston ARS and operated throughout the contest by G3SYA. Second was G4ANT, the entry of the East Anglian CC, operated throughout by G3MPN. Both groups are congratulated and all stations that participated are thanked for making the contest enjoyable for those who entered.
G3LCH

Posn	Callsign	Points	QSOs	QRA	Best dx	Km
1	G3SYA/P	508	56	YO78	GU3HFN	510
2	G4ANT	465	51	AM27	GI4DBB/P	592
3	GD4IOM	442	40	XO67	GU3HFN	541
4	G3UKV	328	50	YM28	G3DAH	296
5	G3UVR	327	43	YN55	G3LVP	315
6	G3NUT	235	46	ZM77	EI2CA	377
	G3TCU	235	40	ZL67	GD4IOM	430
8	G3ZNU	191	34	AM77	GD4IOM	454
9	G4HON	186	32	YN50	G3ZNU	272
10	G4ENA	183	33	YL29	GD4IOM	313
11	G3PSP	174	38	ZL29	GD4IOM	399
12	G3TWG	146	30	ZL37	GD4IOM	390
13	G3OIC	129	33	ZM41	GD4IOM	265
14	GW4ALG	125	22	YL37	G4ANT	306
15	G3NRW	117	26	ZL08	G3SYA/P	261
16	G4IJE	112	22	AL12	GD4IOM	416
	G5UM	112	26	ZM34	GD4IOM	282
18	G3FIJ	93	19	AL05	G3SYA/P	325
19	G4EYD	86	22	ZM41	GD4IOM	270
20	G3UFY	79	19	ZL50	G3SYA/P	330
21	GW4HBK	75	11	YL25	G4ANT	340
22	GI4DBB/P	66	6	WP77	G3KMS	318
23	G4NBS	61	17	ZL48	G3SYA/P	309
24	G4FKI/A	54	16	YO78	G3SYA/P	319

Check logs gratefully acknowledged from G2DHV and G2FNK

432MHz Fixed Contest results

This year's event was again well supported and enjoyed by many operators, although the weather was bad, with "snow and static rain" (G6GAI) over the country. Conditions were also at their worst, so much so that G8ULU suspected the existence of a "rule No 27"—"contests will not take place during lifts". G8YEE and G6PNB suspected their equipment was not working properly! Troublesome deep QSB was also observed by many operators in all parts of the country: "Some rapid QSB allowed stations to the NW to be heard, but only for 10-20 seconds at a time" reported G4JNZ. GW8AAP/P described this effect as signals being switched on or off rather than fading up and down smoothly.
Quite a discussion ensued on the issue of geographic location of stations. G4LOJ remarked: "this contest I'm sure will prove how vulnerable east coast stations are to a drop-out in conditions to the Continent". G4FBE observed the same and in addition was "continually being given very high serial numbers by those west of Greenwich in the centre of activity". On the other hand G8TFI noted that "a good station operated well can achieve good results", irrespective of location, "provided it is not too remote from the main area of activity".
A number of stations suggested that this contest should be moved to a date later in the year and perhaps coordinated with other European contests. However, a contest of this type provides a good opportunity to evaluate a home-QTH or explore a new band as well as to test out equipment and improve operating skills for the main contest season when the calendar is very full.
There were a few problems with the logs this time: two stations transmitted different QTHs to those stated on the cover-sheet, one operator did not fill in the QTH

and QTH locator on the cover-sheet and another did not record serial numbers on the logsheet. Often it was left to the adjudicator to guess the section or to extract the "best dx" information. Some peculiar place names were also found in the logs: "Bilaricary, Brum and Sidcip, M'stone or indeed 10k West of Essex". On the other hand it must be said that most logs were in perfect order and few points were lost.

Congratulations to the winners and runners-up in both sections, who will receive awards.

Three checklogs were received: thank you to GW8AAP/P, G2DHV and G4HGT/A for their help with the adjudication.

G4KGC

MULTI-OPERATOR

Posn	Callsign	QTH loc	Points	QSOs	Best dx	Km	Pwr	Ant
1	G8FUO	ZL47b	487	111	G8PNN	427	180	2 × 21-el Yagis
2	G8ZHP	ZM29h	458	78	DF3EE	534	275	4 × 21-el Yagis
3	G4LOJ	AM37c	355	47	DB2VY	537	400	27-el loop Yagi
4	G2BRS	YK19a	294	55	GM8BDX	546	200	2 × 20-el loop Yagis
5	G3GJL	YM58b	273	67	G4FRE	258	35	48-el multibeam
6	G4RZO	AL45f	259	70	DF3EE	428	300	88-el multibeam
7	G6DOD	ZL09f	182	59	GD2HDZ	375	50	18-el Parabeam
8	G8EZM	AL51a	145	64	PA0FRE	310	10	19-el Yagi
9	G6CHK	ZL27c	115	50	G3GJL	143	50	19-el Yagi
10	G4RFR	ZK11f	97	19	G3DY	235	100	18-el Parabeam
11	G8YEE	YN69h	85	29	G4IOG	295	80	2 × 19-el Yagis
12	G6PNB	YL38f	19	9	G6GLP/P	132	40	19-el Yagi

SINGLE-OPERATOR

Posn	Callsign	QTH loc	Points	QSOs	Best dx	Km	Pwr	Ant
1	G8TFI	YL29j	543	80	DF3EE	645	400	4 × 16-el Yagis
2	G4JNZ	ZL39g	348	100	GD2HDZ	403	250	2 × 21-el Yagis
3	G8HHI	ZL56c	287	77	G4KCT	292	80	21-el Yagi
4	G4FRE	AL07a	280	47	G8MGY	334	170	19-el Yagi
5	G8DKK	ZL08d	208	66	PE1GVK	353	70	21-el Yagi
6	GD2HDZ	XO68b	190	21	G4FUF	444	100	18-el Parabeam
7	G3TDG	AL51g	182	62	GW8AAP/P	305	40	21-el Yagi
8	G8KAX	AL32g	178	60	G8BQO	298	100	17-el Yagi
	G4JSX	ZM45d	178	43	GD2HDZ	304	200	18-el Parabeam
10	G8ULU	AL56h	177	39	DF3EE	418	50	21-el Yagi
11	G4JLG	YN39f	159	35	G2BRS	296	100	88-el multibeam
12	G3UVR	YN55j	140	33	G4FRE	332	40	21-el Yagi
13	G4DCV	AL67d	139	27	DF3EE	390	10	48-el multibeam
14	G8XPZ	ZN74e	128	36	G3TDG	210	70	48-el multibeam
15	G8REQ	YN55a	114	34	G4JNZ	272	100	14-el Yagi
16	G8CTT	AL41j	104	44	G8XPZ	200	10	19-el Yagi
17	G6GAI	AM72f	99	31	G8REQ	269	8	19-el Yagi
18	G6GJD	YN15h	89	17	G4FUF	355	15	2 × 48-el multibeam
19	G6DER	ZN33c	84	20	G2BRS	307	80	48-el multibeam
20	G5UM	ZM35b	80	30	G4FRE	173	10	14-el
21	G8IEM	ZK05d	70	18	G4LOJ	248	40	16-el Yagi
22	G8SRL	ZL67h	69	31	G8TFI	118	10	19-el Yagi
23	G8JVX	ZL60f	67	35	G3UBX	198	100	88-el multibeam
24	G8KPS	ZL30d	31	18	G8TFI	156	10	21-el Yagi
25	G8WRS	ZN13h	28	9	G8TFI	246	10	12-el Yagi
26	G6CHD	YN78c	8	20	G8HHI	223	10	19-el Yagi

VHF/UHF Listeners Championship 1982 results

There were very few entries for the swl sections of vhf and uhf contests in 1982. Bob Treacher, BRS32525, could always be relied on to send in a log. In an effort to increase swl entries, contest rules will in future highlight the swl section. Congratulations to Bob for his long standing mastery of vhf swl contests. He will receive the Hanson Trophy.

Station	Mar		Apr	May	May	VHFNFD		Sept	Total
	144	432	432	144 LP	144	144	432	144	
BRS32525	520	91	149	550	727	1008	135	1706	4,986
BRS28198	197	60	–	–	–	–	–	206	463
BRS45019	–	–	–	–	–	–	179	–	179

21MHz CW Contest results—addition

These results, published in the April issue, should have included the following:

AFRICA			SOUTH AMERICA			OC		
Posn	Callsign	Points	Posn	Callsign	Points	Posn	Callsign	Points
1	3D6AK	2,070	1	PY4ZO	2,964	1	VK2AYD	483
2	EA8AGH	636						

DF Qualifying Event Coventry

Date: 22 May 1983
Map: OS Sheet 151, 1:50000 series, Stratford-upon-Avon
Assembly: 1300bst for start at 1320bst
Location: Near Woodbine Farm, 16km East of Leamington Spa. ngr482 657

Competitors requiring tea should notify Mr G. Whenham, Lavernock, 33 Chapel Street, Bishops Itchington, Leamington Spa, Warks CV33 0RB, tel 0926 612806, not later than 15 May 1983.

DF Qualifying Event Rugby

Date: 12 June 1983
Map: OS Sheet 152, 50,000 series, Northampton & Milton Keynes
Assembly: 1300bst for start at 1320bst
Location: Car park at New Wavendon Heath ngr925 336

Competitors requiring tea should notify Mr D. E. Newman, Haynes House, 78 High Street, Whittlebury, Towcester, Northants NN12 8XJ, tel 0327 857350, not later than 5 June 1983.

International ATV Contest 1983 rules

Section A: Transmit/receive stations
Date: 11/12 September 1983.
Time: 1800gmt Saturday-1200gmt Sunday
Bands: 432MHz/1,260MHz/10GHz
Scoring: 2 points/km for each two-way QSO. 1 point/km for each one-way QSO.
Exchanges:
1) Code-group consisting of four non-sequential digits individually chosen by each entrant eg 1865 or 9732. *This code group must be exchanged on video only.*
2) Call, QTH locator, report, serial number starting at 001. This data is to be exchanged via video or if necessary by phone.

Entries: Must include log sheets recording all above information and full postal address, locator and details of the station and be mailed not later than 30 September 1983 to: G. Shirville, G3VZV, 18 Church End, Milton Bryan, Milton Keynes, Bucks MK17 9HR.
Notes: Multi-op stations may only use one call. QSOs via repeaters do not count. Please keep video transmissions as brief as possible and QSY from the calling channels as soon as contact has been established.
Section B: Receive-only stations. The same rules are applied as above. Please note entrants in section B may not "give" points to those in section A.

BATC ATV Summerfun Contest rules

Please note that this contest is intended as a gentle opportunity for equipment testing prior to the International Contest. The summer weather will hopefully encourage some /P activity from the high spots.

Please also note the unusual format of the code group, which has to be exchanged by vision only. This is intended as an experiment, partly to make a change and partly to give the contest manager some amusement when checking the entries! Comments from contestants will be welcome.
Date: 19 June 1983.
Time: 1000-1700gmt (ie 11am-6pm bst)
Bands: 432MHz/1,260MHz/10GHz
Scoring: Two-way QSOs on 432MHz: 2 points/km; two-way QSOs on 1,260MHz: 8 points/km; two-way QSOs on 10GHz: 16 points/km (One-way only contacts count for half points.)
Exchanges:
1) Callsign, QTH locator, report and serial No (starting at 001) to be exchanged on phone or video.
2) Code group to be exchanged *in video only*. This code group to consist of:

a) For the first contact—the entrant's postcode.
b) For subsequent contacts—the postcode received from the entrant's previous (two-way) QSO.
Note—Portable stations should start with the postcode of their home station.
Entries: Must include postal addresses, locator, station details in addition to record of exchanges listed above and be mailed not later than 4 July to: G. Shirville, G3VZV, 18 Church End, Milton Bryan, Milton Keynes, Bucks MK17 9HR.
Please keep video transmissions as brief as possible and QSY from the calling channels 144·75/144·17MHz as soon as contact has been established.

International ATV Contest 1982 results

Most contestants benefited from above average conditions for the first time in many years. There were 128 entries on 432MHz alone, with around 100 contacts for the leading stations. In this section British results were as follows: 8, G3WOR/P, 13,383 points; 17, G6CAQ, 10,400; 23, G8DTQ, 8,667; 30, G8RZO, 6,764; 36, G4ARD/P, 6,206; 37, G8MNY/P, 6,198; 38, G4CRJ, 6,194; 45,G8GLQ/P, 4,640; 47, G8ZWM/P, 4,283; 53, G3YEO, 3,426; 57, G4NPS, 3,200; 65, G4BVK/P, 2,270; 66, GW8GZ/P, 2,233; 76, G3VQC, 1,801; 84, G8CHK, 1,430; 86, G3PTU, 1,363; 88, G8COE, 1,275; 96, G4NGV/P, 810; G4HJD, 326; 120, G3YBK/P, 135; 121, G8VBS, 134; and 126, G8ZOF, 52.

In the 1·3GHz section there were 17 entrants. British results were as follows: 10, G3YQC, 285; and 12, G4ARD/P, 231.

Looking ahead

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

8 May—RSGB Region 19 ORM, The Ashmole Centre, Burleigh Gardens, Southgate, London N14.
22 May—BATC ATV Exhibition, The Post House, Leicester.
27 August—Scottish Amateur Radio Convention. Cardonald College, Mosspark, Glasgow, followed by dinner/dance in Bellahouston Hotel, organized by West of Scotland ARS. Details from GM4JDU, QTHR.
8 October—Midlands VHF Convention. British Telecom Training School, Stone, Staffs.
15-16 October—EI—GI Convention, Ballymascanlon.

Special event stations

14 May, GB2CCC
The station will operate from Carreg Cennen Castle near Llandeilo in south west Wales as part of the Festival of Castles in Wales. Organizer, GW4JOQ, QTHR. Special QSL cards will be issued.

21-22 May, GB2LYL
The station will be operated by yl members of the White Rose ARS, Leeds, on all bands, conditions permitting, as part of World Communications Year. Details from Dorothy Payne, G4OAT.

22 May, GB2WCM
This station will be operated by the Blackmore Vale ARS at the West Country Marathon, from the Recreation Ground, Gillingham, Dorset. Special QSL cards will be available. Details from G6JBR, QTHR, tel Mere (Wilts) 860777.

29 May, GB4SWR
This will be the talk-in and hf demonstration station at the East Suffolk Wireless Revival. Details from Jack Tootill, G4IFF, QTHR.

10-12 June, GB2MMR
The Horndean ARS will operate this station in conjunction with RNARS as part of the Mercury Mobile Rally. The call will count towards RNARS and Horndean club awards. A special QSL will be available and swl reports will be appreciated. Visitors to the station at the club stand will be welcome.

25-26 June, GB2IRC
The Ipswich RC will operate this station as part of the Boy's Brigade Centenary Celebrations organized by their Eastern District at the Suffolk County Showground, Ipswich. Details from Jack Tootill, G4IFF, QTHR.

THE WHITE ROSE RALLY . . .

held on 27 March at Leeds University

Photos by Peter Thacker, G4HSZ

Club helper Sally Beaufort, G6VUE, finds it no great task to sell raffle tickets to visitors Alan Richardson, G4LHH, of Leeds, Mrs Margaret Abraham (ex-H44HI) and her father G6ENQ, Garry Greenwood and Frank Nikiel, G4RRE, of Blackburn

Darren Harper, G6EHU, of Doncaster, Jack Martin, G4OCC, of Morley, Alan Rose, G4LXV, of Wakefield and Gavin Wright of Morpeth busily sorting out the bargains. Jack Martin, now aged 83, sat and obtained his B licence in 1981, quickly followed in 1982 by passing his morse exam!

Mobile rallies calendar

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

1 May—Maidstone YMCA ARS Mobile Rally. Y-Sportscentre, Melrose Close, Cripple Street, Loose Road, Maidstone. For details and stand bookings contact G3ISD, QTHR, tel Sittingbourne 77431.

8 May—Lincoln Hamfest, organized by the Lincoln Short Wave Club. Lincolnshire Showground, (four miles north of Lincoln City on the A15). Opens 11am-5.30pm. Talk-in on 144MHz (S22) and 432MHz (SU8). Ample car parking, refreshments, licensed bar. Many attractions for junior ops. Facilities for the disabled. Further details from G8VRJ, c/o City Engineers Club, Central Depot, Waterside South, Lincoln.

8 May—Mid-Ulster ARC Mobile Rally. Parkanaur House. Open 12 noon. Trade stands, refreshments, entertainment for the family, bring & buy, flea market and homebrew competition. Details from Danny Cambell, GI4NKD, QTHR.

15 May—Northern Mobile Rally. The Great Yorkshire Showground, Harrogate. Organized by the Otley ARS. Doors open 11am (10.45am for wheelchair and blind visitors). Many attractions: Punch and Judy, films for junior ops, bring & buy stall, licensed bar, and excellent refreshments. Talk-in on vhf and uhf. Further details from G4KDV (G8DFZ) QTHR, tel 0943 463083.

15 May—Swindon & DARC Mobile Rally. Park School, Marlowe Avenue, Swindon, Wilts. Open 10am. Talk-in on 144MHz (S22) and 432MHz (SU8). Many trade stands. Film shows for children, and other displays of hobbies from groups in the area. Ample car parking, and refreshments. Details from K. A. Saunders, G8SFM, QTHR, tel 0666 89307.

22 May—Barry College of Further Education RS Welsh Amateur Mobile Rally. Memorial Hall, Barry. Open 11am to 5pm. Talk-in on S22, licensed bar, refreshments, bring & buy. Enquiries to Reg Rowles, GW4FOM, tel Cardiff 565656.

22 May—RATEC 83 Radio Rally. Woodford, nr Manchester, off the A5102. Open 11am-5pm. Talk-in on S22, 145·550, fm. Bring & buy, catering and bar facilities. Overnight camping and caravan parking by arrangement. Details from G3VFP, tel 061-439 2377.

29 May—Plymouth RC Rally. Tamar School, Paradise Road, Stoke, Plymouth. Opens 10am. Talk-in on S22 and SU8. There will be a variety of trade and general interest stands, and light refreshments and bar facilities will be available. Routes to the rally will be clearly signposted, and maps covering main routes to the rally are available on receipt of an sae from the rally secretary, G6EON. Further details of the rally from the organizer, G6EOM, QTHR, tel Plymouth (0752) 20224.

29 May—East Suffolk Wireless Revival, Civil Service Sportsground, Bucklesham, nr Ipswich. All the usual attractions as detailed in March *Rad Com* plus passenger carrying model steam engine, atv, operators' obstacle course, "big switch contest", antenna testing and transceiver clinic. See the new Orwell Bridge. Site convenient for Felixstowe and Harwich ports, small craft mooring, and Ipswich Airport. Talk-in by GB4SWR on S22 and R3 for 144MHz and RB4 for 432MHz. You do not need to desert the rest of the family—bring them all. Details from Jack Tootill, G4IFF, 76 Fircroft Road, Ipswich IP1 6PX, tel 0473 44047.

5 June—Spalding & DARS Mobile Rally. Springfields, Spalding. Open 11am. S22 and SU8 talk-in. Bring & buy stalls, 25 acres of gardens, bars, restaurants. Details from I. Buffham, G3TMA, QTHR.

12 June—Elvaston Castle Mobile Rally. Elvaston Castle Country Park, 5 miles south-east of Derby on the B5010. Organized by the Nunsfield House ARG. Opens 10am. Talk-in on 144 and 432MHz by GB2ECR. All the usual facilities including full on-site catering facilities. Further details from Ian Cage, G4CTZ, QTHR, tel Derby (0332) 799452. Trade enquiries to Mr R. Woolley, G4HIJ, QTHR, tel Ashbourne 43241.

12 June—RNARS Mobile Rally. HMS Mercury, nr Petersfield, Hants. Opens 10am-5.30pm. Refreshments will be available all day. Arena events, and trade stands. Details from G4DIU, QTHR.

19 June—Denby Dale & DARS Mobile Rally. The Shelley High School, Skelmanthorpe, nr Huddersfield. Open 11am. Something for all the family including excellent refreshments and bar. Details from J. Clegg, G3FQH, QTHR, tel 0484 862390.

26 June—Longleat Mobile Rally, Longleat Park, Warminster. Preliminary enquiries to G4FRG or G8GLQ, both QTHR.

10 July—Worcester & DARC Annual Mobile Rally, Droitwich High School, Ombersley Road, Droitwich. Open 11am-5pm. Attractions will include "strawberry fields", fancy dress competition, model aircraft displays. Details from rally manager, Brian Jones, G8ASO, QTHR, tel Worcester 351565.

17 July—RAIBC Picnic, The Fairground, Broadlands Estate, Romsey, Hants. Talk-in on S22. Details from G4COM, QTHR, tel 0703 693017.

17 July—Sussex Mobile Rally. Brighton Raceground. 10.30am to 5pm. Special event station GB2SMR will be in operation. Lots of attractions including free mini-bus trips to Brighton beach. Popular bring & buy. Many attractions for all the family. Unlimited free parking. Details from G4HUJ, QTHR, tel Worthing 200572, or office hours, Brighton 600235.

17 July—Cornish RAC Rally. Camborne Technical College, Camborne. Starts at 10am. For further details contact G4PEM, QTHR as G6DFE.

24 July—Anglian Mobile Rally, Stanway School, Colchester, Essex. Open 1000 to 1700. Talk-in on 144MHz. Further details from G3YAJ, tel 0206 39 3938.

24 July—McMichael ARS Mobile Rally, Bells Hill, Stoke Poges, nr Slough. Open 11am. Trade stands and fleamarket. ATV exhibitions, hf station, S22 talk-in. Details from David Cochrane, G8IHF, c/o McMichael Ltd, Wexham Road, Slough, Berks SL2 5EL.

31 July—Rolls Royce ARC (Barnoldswick) Mobile Rally, Sports & Social Club, Barnoldswick. Open 11am. Details from Leslie G. Logan, G4ILG, QTHR.

7 August—RSGB National Mobile Rally, Woburn.

14 August—Derby Mobile Rally. Lower Bemrose School, Derby. Further details nearer the date. Details from G4EYM, tel Derby 556875.

28 August—BARTG Rally. Sandown Park Racecourse, Esher, Surrey. Details from Edward Batts, G8LWY, 27 Cranmer Court, Richmond Road, Kingston-upon-Thames, Surrey.

28 August—Torbay Mobile Rally. Details from club sec Mrs M. Rider, 7 Kingston Close, Kingskerswell, Devon TQ12 5EW. Tel 0804 75130.

28 August—Preston ARS 15th Annual Mobile Rally. Note new venue at Lancaster University. Easy access, ample free parking, and free admission. Leave M6 at junction 33 and proceed north on A6 for 2 miles. Open 11am. Talk-in on 144MHz fm S22. Cafeteria. Licensed bar on campus. Bring & buy. All enquiries to Mrs D. Stevens, 13 Arrowsmith Close, Hoghton, Preston PR5 0DV, tel Hoghton (025485) 3304.

11 September—Telford Mobile Rally. Extensive venue as before: Town Centre Malls, Telford, Shropshire. Varied attractions, full catering, licensed premises on site, plus about 80 trade stands. Free entrance and parking. Further details from G8DIR, tel Shrewsbury 64273; G8UGL tel Telford 584173, or G3UKV, tel Telford 55416.

11 September—Vange Mobile Rally. St Nicholas School, Nicholas Lane, Basildon. Open 10am. Talk-in on 144MHz (S22). Details from Mrs D. Thompson, 10 Feering Row, Basildon SS14 1TE.

18 September—Peterborough R&ES Mobile Rally. Wirrina Sports Stadium, Bishops Road, Peterborough. Situated on the river embankment with good car parking, good food, and bar meals, with bar in the adjacent Gildenburgh rooms. Open 10.30am-5pm. Details from D. T. Wilson, 4 Conway Avenue, Peterborough, tel Peterborough 76238.

25 September—Harlow Mobile Rally. Harlow Sportcentre, Hammarskjold Road, Harlow. Doors open 10.30am. Bring & buy stall, refreshments and licensed bar, good parking, special interest stands. Talk-in on vhf/uhf. For further details contact G8FRG, QTHR.

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 issue.

RSGB affiliated organizations are requested to report all programmes and news items to their regional representatives regularly. Information for inclusion in the **July** issue should reach them by **13 May** and for the **August** issue by **11 June**.

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 (NW Repeater Group)—19 May, 8pm. The Globe Bowling Club, Willows Lane, Accrington. Sec Howard Aspinall, G3RXH.

Ainsdale (AARC)—10, 24 May. Ainsdale Scout HQ. "N & N" on alternate Tuesday evenings at the Railway Hotel, Ainsdale. Details from sec John Wollaston, G6JOE, tel 0704 27219.

Blackburn (East Lancs ARC)—3 May (A talk on "Home construction technique"), 7 June (A general get-together and quiz), 7.30pm. Shadworth Leisure Centre, Blackburn. PRO Graham Pountain, G4MWY, tel 0254 678933.

Bury (BRS)—10 May ("Confessions of a television repair man", by Clive Hardisty, G8XUR), 3,17,24,31 May (Informal), 8pm. Mosses Community Centre, Cecil Street, Bury. PRO Malcolm Pritchard, G3VNQ, tel 0706 355922.

Fylde (FARS)—3 May ("Certificate and awards", by Harold Fenton, G8GG), 17 May (Informal), 7 June (Equipment sales), 7.45pm. Kite Club, Blackpool Airport. Sec Wally Poupard, 14 Beach Street, Lytham, tel 0253 734596.

Leyland (LHARG)—9 May. Astley Park Sports Club, Hallgate, Astley Village, Chorley. Sec Arthur Jolly, G4JCO.

Liverpool (L&DARS)—3 May (Junk sale), 10 May ("Homebrew equipment", by Paul, G4OTI), 17 May (Talk and demonstration on the club's new equipment, an FT102), 24 May (HF NFD preparation), 31 May ("Stage sound and lighting", by Adrian Rees), 8pm. Wavertree Conservative Association, Church Road, Wavertree, Liverpool. Sec Gordon Purslow, G6MHG, tel 051-263 5837.

Manchester (South Manchester RC)—6 May (Talk by the winner of the homebrew competition), 13 May (AGM), 20 May (Direction finding practice), 27 May ("A birthday talk", by David Yorke, G4JLG), 8pm. Sale Moor Community Centre, Norris Road, Sale. Informal meetings Monday evenings in the shack. Sec David Holland, G3WFT, tel 061-973 1837.

Stockport (SRS)—11 May ("All aspects of vhf contest working", by G8JHL), 18 May (Natter night), 25 May ("NFD hf operation", by Ray and Gordon), 8pm. Blossoms Hotel, Buxton Road, Stockport. Pro Bill Egan, G4JQC.

Thornton Cleveleys (TCARS)—9 May (A talk by Harry Gregory, G3GIY), 16 May (A talk on ordnance survey maps), 23 May (Auction sale), 30 May (NFD, a discussion), 7.45pm. Norbreck 1st Scout Hut, Carr Road, Bispham. Sec Mrs Jen Ward, tel 0253 890114.

Warrington (UK FM Group Western)—5 May, 2 June. Grappenhall Community Centre, Bellhouse Lane, Warrington. Sec Gordon Adams, G3LEQ, tel 0565 4040.

Wirral (WARS)—4 May (Problems night), 18 May (Insight into micro-processors), 1 June (Pre-National Field Day meeting), 7.45pm. Minto House School, Birkenhead Road, Meols, Wirral. Sec Cedric Cawthorne, G4KFY, tel 051-625 7311.

Wigan (Douglas Valley ARS)—5 May (Visit to HMS Inskip—Naval communications), 8pm. Shevington Conservative Club, Shevington, Wigan. Note, the club net is 10pm Tuesdays on 1·980MHz. Sec Dave Harrison, G4NDJ.

Wirral (W&DARC)—11 May (Subject to be announced), 25 May, *note change in date* (Practice df hunt), 8pm. Irby Cricket Club, Irby Mill Hill Road, Irby. Sec Gerry Scott, G8TRY, tel 051-630 1393.

REGION 2—RR D. S. Smith, G4DAX, Red Roof, Goathland, Whitby, North Yorks YO22 5AN. Tel 094 786 333.

Denby Dale (DD&DARS)—11 May ("Northern communications", by G3UGF), 18 May (Rally committee), 25 May (Surplus sale), 1 June (Rally meeting), 7.30pm. Pie Hall, Denby Dale. This year's DD Rally is on 19 June, a date for your diary. Sec J. Clegg, G3FQH.

Goole (G&DARS)—3 May (Natter night), 10 May (HF operation), 17 May (Bill Richards DF Trophy), 24 May (SWL night), 7 June (Natter night), 8pm. The Junior Chamber Buildings, Boothferry Road, Goole. Sec Richard Sugden, G8IOH. Details from G8IOH or G8VHL.

Halifax (H&DARS)—First and third Tuesday in each month, 17 May (Demo by Lowe Electronics), 21 June (Surplus sale), 7.30pm. Clairmount Liberal Club, Belgrave Avenue, off Clairmount Road, Halifax. Sec G4LEC, tel 0422 33080.

Halifax (Northern Heights ARS)—4 May (Visit to Leeds airport), 18 May (Construction Contest), 1 June (Treasure hunt and family evening), 8pm. Bradshaw Tavern, Bradshaw, Halifax. Sec G6CJL. Club net frequency is 145·275MHz.

Hull (H&DARS)—Fridays, 7.30pm. RAE classes are held at 7.15pm, Tuesdays and Thursdays. Walton Street Recreation Centre, Walton Street, Hull. Note new evening for RAE class, and also new sec, R. P. Varey, 85 Albert Avenue, Hull HU3 6PG.

Leconfield (Army School of Mechanical Transport ASMT/RCTARS)—Fridays, 7pm, and coffee at lunch times. Signals Division, Normandy Barracks, Leconfield. CW classes 7pm, Fridays. Sec G4NQI, address as above. The club has a new chairman, Col P. B. Reger. Local amateurs are assured of a warm welcome.

Leeds (White Rose RS)—Wednesdays, 8pm. Moortown Rugby Football Club, Moss Valley, Alwoodly, Leeds 17. Club net 8pm, Thursdays, 3·775MHz or 21·35MHz depending on propagation. 11 May (AGM), 8pm. All members please attend. Sec G3KWT.

Sheffield (SARS)—First and second Monday in each month, Firth Park Pavilion. Third Monday, Sheaf House Hotel. Sec G8VQS, tel 0246 31696. The club has sent an interesting news letter, with some gen about the new hf beacons.

Spen Valley (SVARS)—Thursdays, 12 May (Committee night), 26 May (Computer night), 9 June (Surplus sale), 8pm. Old Bank Working Men's Club, Mirfield, W Yorks. Sec G4MLW.

UK FM Group Northern—1 May, 5 June, 7.30pm. The Royal Hotel, Church Street, Barnsley. Sec G4LUE.

Wakefield (W&DARS)—3 May (Junk sale), 17 May (On the air/natter night), 31 May ("2m df", by G4BLT), 14 June (DF hunt), 8pm. Holmfield House, Denby Dale Road, Wakefield. Sec G4BLT, tel Wakefield 255515.

Yorks (YARS)—Fridays, 7.30pm. United Services Club, Micklegate, York. Sec Keith Cass, G3WVO. The club were given an interesting talk on Raynet by Council member Joan, G4CHH, and a grand talk on AMSAT by G6GUW. Member Les, G4MIY/MM, is currently in the West Indies, and has had a QSO with club president, G3TMN, who is signing VK1TN at the moment.

REGION 3—RR L. W. Craven, G4EQI, Grass Moor, Radford Road, Alvechurch, Birmingham B48 7DT. Tel 021-445 1347.

Atherstone (AARC)—12 May (Informal general discussion evening), 19 May ("Computers in amateur radio", by G6IKQ, G6IQM, and G8SYE), 7.30pm. The Tudor Centre, Coleshill Road, Atherstone. Sec G6IQM, tel Fillongley (0676) 40946.

Birmingham (Midland ARS)—17 May ("Modern communications", by G4NCE), 7.30pm. 294a Broad Street, Birmingham B1 2DS. Sec G8BHE, tel 021-422 9787.

Dudley (DARC)—Second and fourth Tuesday in each month, 7.45pm. Central Library, Dudley. Programme sec G4NRA, tel Kingswinford (0384) 278300.

Hereford (HARS)—Club meetings suspended for building alterations to obtain a fire safety certificate. Further information from G4CNY, tel Hereford (0432) 273237.

Solihull (SARS)—17 May ("Space communications", by Phil Parker), 7.30pm. The Manor House, High Street, Solihull. Sec G4AXW, tel 021-742 3972.

Stourbridge (StARS)—The club has a new meeting place—The Garibaldi, Cross Street, Stourbridge. First Mondays in each month (Informal), third Monday (Main meetings), 8pm. Sec G8JTL, tel Lye (0384 82) 4019.

Stratford-upon-Avon (S-upon-A&DARC)—9 May ("Techniques of home construction" by Vic Peake, G4GEP), 23 May (Discussion on crime prevention and insurance as it applies to amateur radio), 7.30pm. Bearley Radio Station. Sec G6CWK, tel Stratford (0789) 68863.

Sutton Coldfield (SCARS)—9 May (Visit to Bourneville Police Communications Centre), 15 May (Members only), 23 May ("Operating techniques and procedures", by Tom Douglas, G3BA), 8pm. Central Library, Sutton Coldfield. Sec G8TUR, tel 021-353 2061.

Telford (T&DARS)—8 May (G3ZME/G6NOL/P on low power 144MHz contest, 0900-1700gmt. Operators and loggers required), 11 May (Annual construction contest), 7.30pm. Phoenix Centre, Webb Crescent, Dawley. Sec G8UGL, tel Telford (0952) 584173.

Walsall (WARC)—4 May ("RAE revision and test evening", by G4FAJ. RAE takes place on 9 May), 11 May (AGM), 8pm. Forest Community Centre, Hawbush Road, Leamore, Bloxwich. Sec G4GKC, tel Walsall (0922) 31675.

Warwick (Mid-Warwickshire ARS)—3 May ("Seeing is believing—demonstration of spectrum analyser", by Chris Reed, G8MFP). 17 May (2m foxhunt), 8pm. 61 Emscote Road, Warwick. Sec Mrs Finnis, G6LKP, tel Southam (092681) 4765.

Worcester (W&DARC)—2 May (No meeting, bank holiday), 9 May ("Amateur radio on a shoestring", by Rev George Dobbs, G3RJV), 8pm. Oddfellows Club, New Street, Worcester. Sec G4NRD, tel Evesham (0386) 41508.

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

Derby (D&DARS)—4 May (Junk sale, members only), 11 May ("Computer arithmetic", a talk by Prof Chaddock), 18 May ("Batteries", by Gordon Anderson of BR), 25 May ("Underwater acoustic imaging", illustrated talk by G8TSQ of Loughborough University), 1 June (Junk sale, members only), 7.30pm. 119 Green Lane, Derby. Sec Jenny Shardlow, G4EYM, tel Derby 556875.

Grantham (GRC)—17 May (Junk sale), 8pm. Shirley Croft Hotel, Harrowby Road, Grantham. Sec John Kirton, G8WWJ, tel Grantham 5743.

Lincoln (LSWC)—8 May (Lincoln Hamfest, Lincolnshire Show Ground), 23 May (Visit to Lincolnshire Police HQ, Nettleham), 25 May (AGM), 8pm. City Engineers Club, Waterside South, Lincoln. Sec Pam Rose, G8VRJ, tel Gainsborough 788356.

Mansfield (MARS)—6 May (Demo of rtty by G6CUK), 3 June ("The RSGB and its services", by Martin Shardlow, G3SZJ), 17 May (Social evening). Victoria Social Club, Princes Street, Mansfield. Sec Graham Ridgeway G8UYD, tel Mansfield 652093.

Melton Mowbray (MMARS)—20 May (Construction contest), 7.30pm. St John Ambulance Hall,

Mrs Joan Heathershaw, G4CHH, with members of York ARS

This photograph, taken at the 50th anniversary dinner of the Coventry Amateur Radio Society held in September 1982, shows, l to r: (front) J. Swinnerton, G2YS, founder (also a former President of the RSGB); A. Noakes, G2FTK, president of CARS; B. Chater, GJ2LU, founder; C. Taylor, G2ZT, founder; (back) J. Brown, G3EUR; J. Whitby, G3HDB; B. Mead, G5YY; S. Peyton, G2DRW; and K. Lines, G3FOH. *Photo:* G3WCQ

Asfordby Hill, Melton Mowbray. Sec Richard Winters, G3NVK, tel Melton Mowbray 63369.

Newark (N&DARS)—5 May (Auction sale), 7.30pm. Palace Theatre, Appleton Gate, Newark. Sec Roger Hiscock, G4MDV.

Spalding (S&DARC)—13 May ("The RSGB and its services to amateurs", by Martin Shardlow, G3SZJ), 8pm. Maple Room, White Hart, Market Place, Spalding. Sec Ian Buffham, G3TMA, tel Spalding 3845.

Wigston (WRC)—Fridays, 7.30pm. 20 May (AGM). United Reform Church, Long Street, Wigston. Sec, Alan Faint, G6GWH, tel Market Harborough 62827.

REGION 5—RR J. S. Allen, G3DOT, 77 Rosslyn Crescent, Luton LU3 2AT. Tel 0582 508515, or at work, 0582 21151, ext 700.

Bedford (B&DARC)—New venue and time: now last Wednesday in each month, starting in June. Meetings held at RAFA Club, near the railway station, Bedford. A visit has been arranged in May. Further details can be obtained from the local 432MHz net, or from sec J. Ferguson, G6JJT.

Cambridge (C&DARC)—6 May (Constructor's evening, award of Constructors' Trophy), 13 May (Informal, morse class, operating club transmitter), 20 May ("Happy homodynes—direct conversion receivers", by Martin Cranage, G8OFA), 27 May (Informal, morse class, operating club transmitter). Coleridge Community College, Radegund Road, Cambridge. Club press officer D. Leary, G8JKV, tel Swavesey 31120.

Dunstable Downs (DDRC)—6 May (Magnetic tape processing), 20 May (DF hunt, top band and 144MHz), 8pm. Chews House, Dunstable High Street. Sec C. Asquith, G4ENB.

Leighton Linslade (LLRC)—9 May (Quiz versus the Milton Keynes club, to be held at the MK Club QTH), 23 May ("The atu really explained", by Dave White, G3ZPA), 29 May (DF hunt No 7), 7pm. Van Dyke Community Centre, Room A64, Van Dyke Road, Leighton Buzzard. Sec P. Brazier, tel Heath & Reach 270.

Peterborough (GPARC)—26 May (Films and preparation for VHF Field Day), 7.30pm. Southfields Junior School, Stanground. Sec Frank Brisley, G4NRJ.

Shefford (S&DARS)—It is hoped to entertain amateurs from Hitchin's twin town of Bingen, West Germany. More details later. Thursday, 8pm. Church Hall, Shefford. Sec Brian Elliot, G4MEO.

St Neots (SN&DARS)—2 May (1983 contest briefing by the club's contest sec, Rob Nelson, G8BBK), 16 May (Beer and skittles evening at *The Plough Inn*, Abbotsley. Wives and girl friends welcome, eats available, also a raffle to defray the cost), 30 May (Bank holiday, an informal meeting at *The Horseshoe*, Offord Darcey). Sec G4FOH.

Wellingborough (Nene Valley RC)—New venue for this club too. Meetings, lectures and natter nights will be held at the *Dolben Arms* public house at Finedon, while transmitting and constructional activities will be held at the 1st St Mary's Scout Hall, also at Finedon. 4 May (VHF/hf transmitting from the scout hall). 8-10pm, natter night *Dolben Arms*, 8 May (Visit to Lincoln Hamfest), 11 May (Open meeting, *Dolben Arms*), 18 May ("The RNARS", by Ken, G4PZR). Sec L. Parker, tel Wellingborough 79539.

REGION 6—RR F. S. G. Rose, G2DRT, 84 Cock Lane, High Wycombe, Bucks HA3 7EA. Tel Penn (049481) 4240.

Chesham (C&DARS)—Wednesdays, 8pm. The Stable Loft, Bury Farm, Pednor Road, Chesham. Contact sec John Alldridge, G6LKS, 15 Whichcote Gardens, Chesham, tel Chesham 786935.

Harwell (HARS)—21 June (Talk by John Gilbert of the Rutherford & Appleton Laboratories on ionosound measurements in the Falklands), 7.30pm. Harwell Social Club. Contact the area rep, Cliff Sharpe, G2HIF, tel Wantage 3497, not later than 48h before the event.

High Wycombe (Chiltern ARC)—11 May (Natter night), 25 May (Presentation). Sir William Ramsay School. Details form G3NCL, tel High Wycombe 712020.

Maidenhead (M&DARS)—17 May (Arrangements for National Field Day), 7.30pm for 8pm. Red Cross Hall, THe Crescent, Maidenhead. Sec Roger Hemmings, G3VCT. tel Bourne End (06285) 20136.

Milton Keynes (MK&DRS)—Second Monday in each month, 8pm. Lovett Hall, Silver Street, Newport Pagnell, Bucks. Please note new sec, Dave White, G3ZPA, tel Milton Keynes 501310.

Reading (R&DARS)—5 May (The away leg of a quiz against the Maidenhead club). Red Cross Hall, The Crescent, Maidenhead. The home leg will be on 11 October. 10 May ("HF receiver parameters", Peter Chadwick, G3RZP, of Plessey will tell us how to drag the last dB out or our "pride and joy" hf rig!). The Club Room, The White Horse, Peppard Road, Emmer Green, Reading. Details from Chris Young, G4CCC, tel Reading 471761.

Vale of the White Horse (VWHARS)—7 June (John Morris on "Computing and the amateur"), 5 July (AGM). Sec G3SEK, tel 0235 31559.

REGION 7—RR to be appointed

Bexleyheath (North Kent RS)—3 May (CEGB videotape about Sizewell nuclear power station), 17 May (144MHz df hunt), 7 June (Final arrangements for VHF Field Day), 8pm. The Pop-In Parlour, Graham Road, Bexleyheath. Sec Pelham Conduit, G4KCZ.

Biggin Hill (BHARS)—Last Tuesday in each month, 17 and 24 May (Visits to Kent Police HQ), 8pm. Biggin Hill Memorial Library. Sec Ian Mitchell, G4NSD, tel Biggin Hill 75785.

Croydon (Surrey Radio Contact Club)—First and third Mondays in each month, (In May, second and fourth Monday), 9 May (Constructional contest), 8pm. TS Terra Nova, 34 The Waldrons, Croydon. Sec Ray Howells, G4FFY, tel 01-642 9871.

Crystal Palace (CP & DRC)—21 May ("Running a QSL bureau", by Arthur Milne, G2MI), 8pm. All Saints Church Parish Rooms, Church Road, Upper Norwood SE17. Details from sec Geoff Stone, G3FZL, tel 01-699 6940.

Redhill (Reigate ATS)—17 May (Junk sale), 8pm. Constitutional & Conservative Club, Warwick Road, Redhill. Sec Chris Barnes, G8FEE, 25 Hartswood Avenue, Reigate RH2 8ET.

Sutton & Cheam (S & CRS)—13 May (Meeting at SCOLA), 27 May (Meeting at Beddington), 7.30pm. Sutton College of Liberal Arts, Nicolas Way, Sutton, and at the Carshalton Sea Cadets HQ, Church Path, Beddington. Sec G4CMU, tel Banstead 54497.

Thames Ditton (Thames Valley ARTS)—3 May (NFD briefing and talk by Bill Hall, G4FRN, on maritime mobile net operation), 7 June ("Clandestine radio", by Pat Hawker, G3VA), 8pm. Thames Ditton Library, Watts Road, Giggs Hill, Thames Ditton. Sec Julian Axe, G4EHN, tel 01-946 5669.

REGION 8—RR K. A. Crouch, G8KEN, 14 Victoria Road, Capel-le-Ferne, Folkestone, Kent CT18 7LR. Tel 0303 55241

Crawley (CARC)—25 May (Quiz—Crawley versus West Kent ARC), 8pm. Trinity United Reformed Church Hall, Ifield Drive, Crawley. Second Wednesday in each month (Informal meeting at a member's home). Details from David Hill, G4IQM, tel 882641.

Dartford (DDFC)—6 May (AGM, please will all members attend and cast their vote), 11 May (Malt Shovel PH), 15 May (DF hunt). Meetings normally at Malt Shovel PH, Eynsford, Kent, on Wednesday prior to df hunt to sort out problems and have a good time. Contact Steve, G4NKM.

Dover (SEKYMCA ARC)—4 May (Natter night and committee meeting), 11 May ("RSGB, by David Evans, G3OUF, General Manager and Secretary of RSGB, or senior member of staff. Please let's have a big turnout), 14 May (Spring cleaning rally, 10.30am-4pm). YMCA, Dover. Contact G3VSU.

Eastbourne (Southdown ARS)—First Monday in each month, 9 May ("RTTY", by Marvin Wallis, G5CRD, editor of BARTG). Chaseley Home, South Cliff, Eastbourne. Details from Tom, G4MVN, or tel Peter, G8IQO, 763123.

Hastings (HERC)—Wednesdays, 18 May ("QRP (low power operation)", by Chris Page) 8pm, either at Ashdown Farm Centre or West Hill Community Centre. Details from Alan, G8VEM, tel Hastings 216516.

Horsham (HARC)—First Thursday in each month, 5 May (Construction contest), 8pm. Girl Guide HQ, Denne Road, Horsham. Details from Tony Wadsworth, G3NPF.

Medway (MARTS)—Fridays, 20 May (Social evening at MARTS HQ). Details from Peter Poole, G4EVY.

Tunbridge Wells (WKRS)—13 May (Construction contest), 27 May (HF and vhf contests final arrangements). Adult Education Centre, Monson Road, Tunbridge Wells. Informals on alternate Tuesdays, at Drill Hall, Victoria Road, Tunbridge Wells. Details form Brian, G4DYF.

Worthing (W&DARC)—3 May ("DF techniques", by Dave, G6GAW), 10 May ("Plastics and their use in amateur radio", by Peter Fanning), 17 May ("DF contest", by Stan, G3LQI), 24 May (Aerial circus—video film), 31 May ("Earthing techniques", by Peter, G8MSQ), 7.30 for 8pm. Pond Lane Amenity Centre Worthing. Details from Joyce Lillywhite, tel Worthing 63062, after 6pm.

Members of Skegness & DARC in the main studio of BBC Radio Lincolnshire. *Photo* Ben Hardaker, G6TCO

Nene Valley Radio Club chairman, Harry Williams, G4MOP, watches 11 year old Jane Nightingale (daughter of G6CZV) passing on her greetings message using the club's special event station, GB2WGG, which commemorated the 73rd anniversary of Girl Guides Foundation Day. *Photo* Courtesy of Northamptonshire Newspapers

REGION 9—RR W. J. Colclough, G3XC, Highview, Indian Queens, St Columb, Cornwall, TR9 6LL. Tel 0726 860485.

Camborne (CRAC)—5 May ("Test equipment and how to use it", by G3OCB, G3VWK, and G3XFL), 2 June ("Repeaters—differences in usage, with various repeaters through the country", by G3NPB). SWEB Club Room, Pool, Camborne. The annual dinner had to be cancelled due to lack of support. Will members please note sec G6GKZ's new address: Gill-Creet, St Ives, Cornwall. A most interesting lecture was recently given by Wallace, G6CZX, on hi-fi.

Exmoor (ERC)—Thursdays, 8pm. Loughrigg, East Street, South Molton, Devon. The club made their first foray into contests, entering the 5/6 March 144MHz event from a site 1,500ft asl on Exmoor. 328 contacts were made, 13 countries and 64 squares were worked. Congratulations! Sec Peter Dixon, G4JBR, tel 07695 2738.

North Devon (NDARC)—Odd months, fourth Wednesday, 7.30pm. Community College, Abbotsham Road, Bideford, Devon. Even months, fourth Wednesday, 7.30pm. Community College, Chaddiford Lane, Pilton, Barnstaple. Chairman, Les Hawkyard, G5HD; sec, George Hughes, G4CG; treasurer, Geoff Beal, G4ELU; assistant sec, Charles Searl, G4LST. The RR would like to thank all members of NDRC fot their help in organizing the recent ORM.

Torbay (TARS)—Fridays, 28 May (Junk sale), 25 June (Talk on computers by Colin, G4FCN), 7.30pm. Bath Lane, rear of 94 Belgrave Road, Torquay. Pro Les Mays, G2CWR. Details from sec Mrs M. Rider, 7 Kingston Close, Kingskersell, Devon TQ12 5EW, tel 0804 75130.

Plymouth (PRC)—2 May (Rally brief), 16 May (HF NFD brief), 7.30pm. Tamar School, Paradise Road, Millbridge, Plymouth. Contact Peter Connor, G8XTE, tel 0755 37319.

REGION 10—RR to be appointed.

Mr Philip Jones, the representative for Region 10, has resigned for personal reasons.

Any affiliated clubs or groups in the region who would like to have an entry in "Club News" should send it direct to the editor until a new regional representative is elected.

Abergavenny & Nevill Hall (A&NHARC) (GW4GFL)—Thursdays, 7.30pm. A new section for ZX81 users has been incorporated, which will meet on the fourth Tuesday in each month, 7.30pm. Above Male Ward 2, Pen y Val Hospital, Abergavenny. Amateur radio programs for the ZX81 would be most welcome, as would anyone wanting to give a lecture. RAE classes Tuesdays, except fourth in each month, 7.15pm. Seminar Room, Nevill Hall Hospital, Abergavenny. Details from sec D. F. Jones, GW3SSY, tel 0495 791617.

Cardiff (CRSGBG)—9 May ("Trio's answer", by Alan Bartlett, GW3YSA), 7.30pm. Pantmawr Hotel, Tyla Teg, Pantmawr Estate, Whitchurch, Cardiff. Details from Cyril Laws, tel Cowbridge (04463) 3212.

Pembroke (PRSGBG)—27 May ("Computers and microprocessors in amateur radio", by GW6BDM), 7.30pm. Defensible Barracks, Pembroke Dock. Details from GW3XJQ, tel Pendine (09945) 267.

REGION 11—RR B. H. Green, GW2FLZ, 1 Clwyd Court, Tan-y-Bryn Road, Colwyn Bay, Clwyd LL28 4AH. Tel 0492 49288.

Anglesey (ARG)—3,17 and 31 May, 7pm. Primary School, Benllech, Anglesey. Sec Mr C. Williams, GW6DOK, tel Gaerwen 603.

Colwyn Bay (Conwy Valley (ARC) (GW6TM)—12 May (The postponed talk by Dr David Last, GW3MZY, "Radio navigation for aviation"), 7.30pm. Green Lawns Hotel, Bay View Road, Colwyn Bay. Sec Mr J. N. Wright, GW4KGI, 46 The Dale, Woodlands, Abergele, Clwyd LL22 7DS, tel 0745 823674.

Dolgellau (Meirion ARS) (GW4LZP)—5 May (A problem and discussion forum), 7.30pm. Nannau Country Club, Llanfachreth. Sec Mr Bob Halhead, GW3KOR.

Rhyl (R&DARC)—12 May (Activity night), 26 May (DF hunt), 7.30pm. 1st Rhyl Scout HQ, Tynewydd Road, Rhyl. Sec B. Jones, 6 Rhodfa Maes Hir, Rhyl, Clwyd, tel 0745 37284.

REGION 15—RR J. T. Barnes, GI3USS, Whitegables, 95 Crawfordsburn Road, Bangor, Co Down BT19 1BJ. Tel 0247 3948.

Bangor (B&DARS) (GI3XRQ)—6 May ("Wire antennas", by Des Kernaghan, GI3USK), 8pm. Sands Hotel, Bangor. Sec GI4JTF.

Belfast (BRSGBG)—18 May ("Setting up an amateur station—the nuts and bolts", speaker to be announced), 8pm. 90 Belmont Road, Belfast. AR GI6GP.

Coleraine (NWARC) (GI4DBB)—3 May ("Raynet", by Dr R. Elder, GI4AHD), 7 June ("Meteor scatter", by T. Hamilton, GI4HVI), 8pm. British Red Cross Room, New Row, Coleraine. Sec GI8NBW.

Craigavon (Mid-Ulster ARC)—Mobile rally at Parkanaur, Sunday 8 May, starting 12 noon. Lecture on antennas by Joe Derhan, EI8EG. Usual trade stands, bookstall, attractions for xyls and children, refreshment, tour of Parkanaur House. Talk-in on S22. Proceeds divided between Parkanaur Training School and UNICEF. Further details from sec D. C. Campbell, GI4NKD, tel 0762 42620, evenings.

Larne (L&DARS) (GI4PHA)—First and third Wednesdays in each month, 6.30pm. Room 270, Larne Technical School. RAE and cw tuition available. HF and vhf stations. Visit to Planetarium proposed in June. Further details from GI4CPP.

More regular information is required from club secretaries, sent to the RR in good time. Please include secretaries' phone numbers so that any doubtful items can be speedily cleared up. *RR15*

REGION 16—RR T. D. Howe, G3PLF, 18 Vange Hill Drive, Basildon, Essex SS16 4DD. Tel 0268 24453.

Canvey Island (South Essex ARS)—4 May (Practical evening), 7.30pm. The Paddocks Community Centre, Long Road, Canvey Island. Details from G6BYH, tel Canvey Island 683526.

Colchester (CRA)—5 May (Preparation for NFD and Anglian Mobile Rally), 19 May (QRP operation), 7.30pm. Colchester Institute, Sheepen Road. Details from Frank Howe, G3FIJ, tel Colchester 70189.

Ipswich (IRC)—11 May (DF hunt), 25 May (Final planning for ESWR), 29 May (East Suffolk Wireless Revival. Mobile Rally at the Civil Service Sportsground, Bucklesham). Meetings 8pm. Club Room, Rose & Crown, Norwich Road. Details from Jack Tootill, G4IFF, tel Ipswich 44047.

Loughton (L&DARC) 13 May ("Sounds of the 'sixties", by G8FVI), 27 May (CW practice/field weekend planning), 8pm. Loughton Hall, Rectory Lane. Details from R. Mills, G6AMY.

Vange (VARS)—5 May (No meeting), 12 May (Construction by G3OCI), 19 May (Microdot demonstration), 26 May (Discussion of HF NFD), 7.30pm. Main Hall, Barstable Tenants 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)—10 May (Planning for VHF Field Day), 7.30pm. British Legion Hall, Crown Lane, Old Basing, Basingstoke. Sec G6KVN, tel Tadley (07356) 3004.

Bournmouth (BRS)—6 May ("Ordnance survey maps", by G4ERO), 20 May (RTTY and computers", by G3VPC), 7.30pm. Kinson Community Centre, Kinson, Bournemouth. Sec G4EKE, tel Ferndown (0202) 877945.

Bournemouth (RAIBC Group)—14 May (Special event station GB2WEC will be active, 10am to 5pm, hf bands, ssb and cw, vhf bands, fm, from the Old Power Station, Bargates, Christchurch, home of Wedgewood Electrical Collection. Talk-in on 144MHz fm. Details from G6DUN, tel 0202 474305.

Fareham (F&DARC)—4 May (DF project night), 18 May ("Amtor", by G4CJO), 11 and 25 May (On the air, natter night), 7.30pm. Portchester Community Centre, Portchester. Sec G4ITG, tel Fareham (0329) 23904.

Farnborough (F&DRS)—Second and fourth Wednesday in each month, 25 May (HF Field Day preview), 7.30pm. Railway Enthusiasts Club, Access Road, Farnborough. Sec G4BJQ, tel Farnborough (0252) 543036.

Jersey (JAEC)—11 May (Junk and secondhand gear sale), 8pm. The Communication Centre, St Brelade. Sec Mrs M. Smith, tel 0534 23248.

Weymouth (SDRS)—3 May (Demonstration of the Apple computer, by G8ZVL), 7.30pm. Army Bridging Camp, Wyke Regis, Weymouth. Sec G3ZGP, tel Weymouth (0305) 812893.

Wimborne (FRARS)—1 May ("Early days of two metres and tvi", by G8CEZ), 8 May ("Paging radios and selective calling", by G8JMB), 15 May ("VHF NFD 1983", by G8MCP), 22 May ("Nick's rambles ", by G8MCQ), 29 May ("Commercial versus amateur vhf propagation paths", by G8BCC), 7.30pm. Flight Refuelling Social Club, Merley, Wimborne, Sec G8VFY, tel Wimborne (0202) 882271.

REGION 18—RR W. A. Ricalton, G4DD, 4 South Road, Longhorsley, Morpeth, Northumberland NE65 8UW. Tel Longhorsley 259.

Prudhoe (TARC)—5 May (Talk by Ken Hatton, G4IZW, with film supported by British Board of Trade: "Micro computers in industry"), 3 June (Talk by Ken, G4IZW with film: "Microelectronics applications"), 7.30pm. Falcon Hotel, Prudhoe. Sec Ken, G4IZW, tel 0632 678828, evenings.

Chesham & DARS giving a demonstration to the local Physically Handicapped and Able Bodied Club. A special event callsign, GB8CFC, was issued. Chesham club operator, Peter Cabbin, G4OST, is shown with PHAB members using the station

The winner of the Cheshunt & DARC annual 144MHz inter-club competition for contacting the most radio club members over two weekends, held in November 1982, was Stuart Tyler, G8YGP, who is seen here after receiving the Lew Stone, VK2LW, Trophy. The trophy is made from an ex-BBC medium wave transmitter valve of pre-war vintage. L to r: Jim Sleight, G3OJI, chairman; Richard Ludwell, G3ZZQ; Nick Burridge, G8NDR, contest organizer; Stuart Tyler, G8YGP, hon treasurer; Trevor Grey, G6KWL; Keith Rawlings, G4MIU, librarian; Roger Frisby, G4OAA, hon secretary; John Crabbe, G3WFM; Robin Chapple, G8IFC/VK3XIE, and (seated) Chris Day, G4MAS. *Photo:* Julie Frisby

REGION 19—RR R. J. C. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ. Tel 01-989 6741.

Cheshunt (C&DARC)—4 May ("The principles of contest operation", by G3OJI and G8NDR), 11 May (Natter), 18 May (Equipment), 25 May (144MHz portable on Baas Hill Common), 8.15pm. The Church Room, Church Lane, Wormley, nr Cheshunt, Herts. Details from Roger Frisby, G4OAA, tel 09924 64795.
Chiswick (ABCARC)—17 May (Going mobile, a discussion opened by G3IGM). Committee Room, Chiswick Town Hall, High Road, London W4. Sec W. G. Dyer, G3GEH, tel 01-992 3778.
Edgware (E&DRS)—12 May (Informal and technical topics), 26 May (To be announced). The Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. Sec Howard Drury, G4HMD, tel 01-952 6462.
Grafton (GARS)—13 May ("More about the radiophonic workshop", by Dick Mills (BBC)), 27 May (To be announced), 8pm. Five Bells Pub, East End Road, East Finchley, London N5. Sec Jim Chambers, G4IBK, tel 01-346 5841.
Harrow (RSH)—6 May (Informal and practical), 13 May (Junk sale), 20 May (Informal and practical), 27 May (Fault finding without tears), 7.30 for 8pm. Roxeth Room, Harrow Arts Centre, (opposite the Alma Pub), High Road, Harrow Weald, Middx. Come up on GB3HR for instant talk-in to the premises on club night. Info from Chris Friel, G4AUF, tel 01-868 5002.
Havering (H&DARC)—4 May (Informal), 11 May (144MHz pre-contest briefing), 18 May (A talk—Smith chart?), 25 May (HF contest pre-briefing), 8pm. Fairkytes Art Centre, Billet Lane, Hornchurch, Essex. Details from A. Negus, G8DQJ, tel Upminster 24059.
Wanstead (ELGRSGB)—15 May (A talk on df equipment, plus an explanation of antennas and on how to make same). Wanstead House, The Green, Wanstead, London E11. Details from G6DXW, tel 01-550 7013.

MEMBERS' ADS

CONDITIONS OF ACCEPTANCE

These subsidized flat-rate advertisements are accepted as a service to members of the RSGB only. They must be submitted on the Members' Ad form printed on the back of a *recent* address label carrier used to mail *Rad Com* to the advertiser: this will automatically provide proof of membership and should not be more than two months old. No acknowledgement of receipt will be sent, and advertisements not clearly worded or punctuated, or which do not comply with the conditions of acceptance, will be returned. No correspondence concerning this service will be entered into.

Trade or business advertisements, even from members, will not be accepted for "Members' Ads" but should be submitted as classified or display advertisements in the usual way. Traders who are members must enclose a signed declaration that the items for sale or wanted are part of, or intended for, their own personal amateur station.

The RSGB reserves the right to refuse advertisements, and accepts no responsibility for errors or omissions, or for the quality of goods offered for sale. Advertisements for citizens band equipment will not be accepted.

Warning. Members are advised that they should, as far as possible, ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The "purchase" of goods legally owned by a finance company could result in the "purchaser" losing both the goods and the cash paid.

The current rate is £1 for 40 words or less: advertisements containing more than 40 words will cost an additional £1 for every additional 40 or less words. Each advertisement must be accompanied by the correct remittance, either as a cheque or postal order made payable to Radio Society of Great Britain.

Closing dates in 1983 for issues in brackets, are **18 May** (July); **16 June**(August); **14 July** (September); **24 August** (October); **22 September** (November); **20 October** (December); **17 November** (January); **15 December** (February).

Post to: MEMBERS' ADS, RSGB, 88 BROOMFIELD ROAD, CHELMSFORD, ESSEX CM1 1SS
Do not post to RSGB HQ or Advertising officer.

FOR SALE

Due to the recent death of G4AGF the following items are for sale: FRG7 rx, good cond, £110. Yaesu FLDX400 hf tx, £120. Reace SWR3 bridge, £10. Two sets headphones, offers. Tel Blandford (0258) 55995.
Trio R1000 gen cov rx, 200kHz-30·0MHz, a.m., ssb, cw, exc cond, used little, £205. G8TUL, 11 Willaston Avenue, Blacko, Nelson BB9 6LU. Tel Nelson 68548.
100ft free-standing heavy duty mast, not erected, in 0·5 acre site with superior detached four bedroomed house, features include double garage with space over for granny flat or playroom, utility room, two bathrooms (one en-suite), two further double bedrooms possible in roof space, somewhat isolated location 13 miles south of Norwich, £65,000. G3RUI. Tel 0508 30973.
TR2200GX, fitted S20, 22, 23, R2, 144800, provision for 12 xtals, nicads, charger, case, etc, perfect, Catronics Eurocat ES80 synth, needs setting up, £100 ovno. G3UJB NOT QTHR. Tel Brayford (05988) 327.
Detached bungalow, three beds, games room, lounge, kitchen, bathroom separate wc, integral garage, large garden, full gas ch, some double glazing, semi rural situation, 4 miles Leigh, 5 miles Bolton/Wigan, near M6, M61, M62, good vhf site, planning permission 60ft tower, carpets included, garden shed/shack, reduced to £33,500. G4IAV, QTHR. Tel 0942 870954.
Bargain: Icom 720A, brand new. Tel Derby 557705.
Trio TS700S, all mode 144MHz tx/rx, fitted preamp, £380. Trio PS10 psu/spkr, 13-8V, 4A, matches TR9000 series, £30. MM rf switched 144MHz preamp, £15. G4FBK, QTHR. Tel Mike, 01-864 1412, after 7pm.
Katsumi twin paddle electronic keyer MK1024, 6-60wpm, ac/dc, four memories, bought new Leicester, Joymatch 3A atu, £5. MFJ SBF2 ssb audio filter, £5. SX200N, £200, or straight swop for TS700G, FDK750E, Trio R1000 rx, terminals for long wire, SO250 etc, clock timer, 2-30m. G4IAV, QTHR. Tel 0942 870954.
FT208R, NC8 charger, psu, spkr mic YM24A, 78F 7λ/8 mobile antenna, £200. Hameg HM412 double beam scope, cost £490, unused, £350 ono. Datong FL2, £60. Hi-lo 30ft mast, wall brackets, £200 ono. AR40 rotator, controller, £40. NAG 144XL linear amp, model 2200, £350. Daiwa atu, CNA1001A, £100. 12AVQ antenna, £35. Daiwa audio filter, £30. Tel Dronfield 413413, evenings and weekends.
Icom IC202S, exc cond, £100. Grundig transistor, 850, mw, marine band, 1·6-4·5MHz, sw 6·0-16·00MHz, fitted bfo, 455kHz, i.f. band, 5kHz, very good for broadcast rx, FM88108, £20. Microwave Modules MMC4321 144S, £20. Tel Bideford 70049, or 70840.
Facsimile machine Muirhead K401, 180rpm, a.m., easily driven at 240rpm for meteosat, £60. G8NFU, QTHR. Tel Erith (03224) 37033.
Yaesu FT208R handheld nicads, charger, car adaptor, spkr, mic, all as new, £150. Tel A. Crowther, Tuxford 870135, after 6pm.
Trio 9R59DS gc rx, fitted voltage stabilizer, good cond, buyer collects or carriage extra, £35. D. Bunyan, 16 Hearne Close, Sittingbourne, Kent.
Drake R4C, brand new cond, narrow cw filter, £220. Clarion car cassette player, 2m colinear, 2m λ/4 wave mag mount, 2m 6-el quad, all exc cond, offers. G4JBH, QTHR. Tel 0935 23873, evenings.
QTH Solihull, West Midlands: three bed, ch, semi, double width garage, shack, 40ft mast, with planning permission, mast, antennas, fittings negotiable, £29,950. G4NRR, QTHR. Tel Rollason 021-707 3684.
Yaesu FT7 tx/rx, as new, only used on rx, 12V 20A psu, swr meter, any offers. RS45440. Tel Huntingdon 218288, anytime.
Yaesu FT227R, £120. Datong D70 morse tutor, £30. G4IAG, QTHR. Tel 0676 41814.
Sirius computer, £1,500, collect. PET computer morse send and receive programs, £5 each. *Wanted:* KW lopass filter; Thruline elements 250H, 25C; FV901DM; YO901P; FAX equipment; bencher lever; microscope slides, etc; Modem; Commodore dual disk. G3AZI, QTHR. Tel Preston (0772) 37815.
IC2E, comp with charger, rubber duck, manual, very strong leather case with shoulder strap, used little, immac, £100. G3RRD, QTHR. Tel Amberley (Glos) 2365.
Yaesu FT101ZD Mk2, a.m., as new, £400. FC902, as new, £75. SP901, £15. Rotator, Daiwa DR7500R, £60. Tel Southampton 29548, daytime.
PKW inverted-V hf antenna, 50Ω, 3·5/28MHz, as new, £25. Pye vhf marine rt, ch6, 12, 14, 16, vgc, £65. GU3HKV, QTHR. Tel 0481 47278, 6-7pm only.
FR50B rx, 80-10m, manual, £70. G8LPO, QTHR.
Eddystone EC10 Mk2, battery/mains, vgc, £70. Trio

oscilloscope CO1303G, mint, £70. Icom IC240 plus 80ch extender, mint, £110. G3BOQ, QTHR.

SB101 tx/rx, matching spkr, hb psu, Shure 201 mic, comp, £125. 12AVQ vertical, varnished from new, incl radials, £32.50 incl postage. Microwave Modules 2m tx, cw, gives 12W output, six xtals, £25 incl postage. G4BLI, QTHR. Tel 051-722 9538.

Photax 1·A-40·5mm filter, lens hood for same, like new, £5. APS auto-teleplus 3x lens fit Zenith "E" or similar cameras, like new, £25 or sensible offer. One pair Telefunken book shelf spkrs, lovely cond, £20 ono. 10 Dulverton Square, Leeds LS11 0LL. Tel 0532 771090.

FL2100Z linear, nine months old, £325, or swop for FT901/2 monitor scope, Sinclair micro vision tv with pw, £50. G4MVZ, 28 Lumley Avenue, Skegness, Lincs.

Sony MX650 mixer, £95. Albol 3MHz oscilloscope, £80. FRG7700M, FRG7700, FRV7700E, £350. Roland Juno-6 synthesizer, £500. All are new or as new, boxed, with relevant instructions. G6IBC, QTHR. Tel 01-790 8163.

Bearcat 220FB scanning rx, 66-88, 118-136, 144-174, 420-512, info, how to scan 30-50, 50-66, 88-118, vgc, £165 plus carriage. *Wanted:* cheap Robot 70 or 80 monitor or MBA-R0. RS43694. Tel Dave, Fakenham (Norfolk) 710513, evenings.

Four 813s, £8 plus postage. Part-built 813 linear incl cabinet, all major components, £40. Buyer must collect. Dave Blake, G3MWV, Kandy, 5 Mill Road, Cromer, Norfolk NR27 0BG. Tel 0263 512872.

TR9000, all modes, two vfo, five mem scan, etc, mobile bracket, well-used but fb cond, recent check, £275. 40W MML 144/40 linear and preamp, £50. 8XY beam, £20. Hi-mound paddle MK701, mint, £15. G4HZF. Tel 0472 71215.

Rad Coms October 1969 to December 1982 inclusive, offers. G8PHB, QTHR. Tel Whitley Bay (0632) 524191, 6-7pm.

Yaesu FT707 hf mobile, exc cond, hardly used, bargain, £425. Can deliver. Tel 061-766 6078 (Manchester).

FT102 hf tx/rx incl 300Hz cw filter, four months old, £665, plus carriage. Going hf mobile. G4EVS, QTHR. Tel 0287 38434, after 6pm.

FT290R 2m multimode portable, ARE mods, nicads, charger, case, mobile mount, £175. Sentinel 144 30W amplifier, £50. Datong D70 morse tutor, incl up-down key, £45. All ovno and as new. *Wanted:* IC25E for cash or p/ex. FT290R with cash adjustment. G6GOT, QTHR. Tel 01-458 7677.

TS830, vgc, fitted 500Hz cw filters at 8·8MHz i.f. and 455kHz i.f. giving superb skirt selectivity, ideal for keen cw operator, £625. G3JKS, QTHR. Tel 0727 59318.

Westower 75ft heavy duty, 2-el gem quad, 16-el 2m Tonna, 2m colinear, all exc cond, £590. G4HXQ. Tel Rotherfield (E Sussex) 2817.

Trio 2300 plus nicads, as new, £100. G8NPK, QTHR. Tel 01-422 2100.

DX302 synthesized communications rx, 10kHz-30MHz, digital display, usb/lsb, a.m. triple conversion, two bandwidths, ac/dc, mint cond, £125. Eddystone EB36 gen cov communications rx, 150kHz-22MHz, ac/dc psus, perfect cond, £35. G3ZHC, QTHR. Tel Walsall (0922) 26659.

Trio JR599 Custom Special rx, 160-10, 2m converter, £150. Eddystone EC10 Mk2, mains, battery power packs, £60. R. Cox, 8 Aldred Road, London NW6. Tel 01-794 6309.

Hammerlund HQ215 comm rx, solidstate a.m., usb, lsb, cw, very rare item, in exc cond, £150 ono. Crumar fully portable keyboard, nine flutes, percussion for Hammondy sound, bass synth, absolutely mint cond, £475. G3LEZ, QTHR. Tel 0702 230489.

TR2200G, carrying case, nicads, charger, mag mount, λ/4 whip, full xtals, manual, £60. G4LYH, QTHR.

Super beginner's station: Heathkit SB401 tx, the superb SB303 rx, SB600 matching spkr, all cables, Shure 201 mic, £275, carr extra. All in fine cond. G3UML, QTHR. Tel 01-202 7071.

14AVQ, as new, £50, or exchange for 18AVT/WB with cash adjustment. Andrews LDF4-50 heliax coaxial, two lengths, 70ft and 90ft, offers please. Various SL600 series ics. G3YGM, QTHR. Tel Falmouth 311506.

TX, a.m./cw, similar KW Vanguard (Geloso vfo), 2 + 807s mod, pa 80-10m, separate power supply for each section, set and supply large. *Wanted:* S-meter for FR100B, good cond, callers only for tx, low price. G4BWS, QTHR. Tel Orpington 73474.

RTTY Siemens T100 teleprinter tape punch, reader, own loop supply, exc order, 75 bauds, £35. Siemens full works manual for T100, £5. Datong FL2 filter, £70. UT4 buffer storage up/down speed converter, £70. G3RDG, QTHR. Tel 01-455 8831.

Datong morse tutor D70, £35. G8ZCK, QTHR (1982). Tel Potters Bar 43879, evenings.

Circuit diagrams for amateur band txs, tx/rxs, ancillaries etc, large assortments, £2 incl postage. Sets of alignment tools (eight hex ends, two screwdriver, extender) £3 plus 20p postage (no postage if ordered with diagrams). 20 Kenmare Gardens, London N13 5DN.

Yaesu FT102, mint cond, cw and ssb filters fitted, four months old, exchange for Icom IC720A, IC740, with psu. *Wanted:* Bencher keyer. G4LOP, QTHR. Tel Skegness 810192.

Marconi TF801D/2/S sig gen, 10-480MHz, comp with leads, manual, £45. Feakes. Tel Huntingdon (0480) 811931.

KW tx Vanguard, R107 rx, good wkg order, all sensible offers considered. G4MOL, QTHR. Tel Woburn 545.

Heathkit units: HD 1410 electronic key, £40. HM102 swr bridge/power meter, £20. IT28 res cap ind bridge, £25. Prefer buyer collects or add five per cent p&p. All ono and with some spares. IM16 fet vom, £30. G3MA, QTHR.

KW2000A, ac psu, KW101 swr meter, E-Zee Match, £200. Yaesu desk mic, £10. Creed 7EAC, separate reader, puncher, terminal unit, £70 ono. G4JHJ, QTHR. Tel 0245 64081, ext 273, before 9am, ask for Kevin.

Yaesu FT102, frn pcb, £580, no offers, no split. Trio TS700S, remote vfo, no offers, no split, £400. G4MPQ, QTHR.

Tech TE20D rf generator, £30. Tech TE22D audio generator, £30. Central 280 vtvm, £28. Heathkit AV3U millivoltmeter, £28. Eagle rf indicator, £4. High impedance mic, £8. Lafayette TE18 grid dip meter, £16. Three Creed spring gauges, £10. G3RDG. Tel 01-455 8831.

New, boxed, unused valves, EF50s, £1; 807s, £1.50, plus post. Wide-spaced variable capacitors, several values and sizes ranging from large up to enormous, ideal for that high power linear, please tel for details. G4AZC, QTHR. Tel 0843 61448.

FT707, FP707, FC707, mic, mounting frame, mobile brackets, all mint, buyer to collect, £500 the lot. G3LBO, QTHR. Tel Leeds (0532) 586889.

Computer: Video Genie, 1yr old, as new, £175 or swap 200W+2m linear. G6NFQ NOT QTHR. Tel Dover (0304) 820031.

AR88LF spares or repair, £10. Z80 cpu and 2·4576MHz xtal, £5. 14 4027 4k dynamic ram, £10. All new and unused. Tel Atherton (0942) 891140.

KW2000E, spare new 6146Bs and others, handbook, psu, good cond, £225. Tel Helston 61431.

KW Atlanta, exc cond, used daily, any trial, £275. Creed 7E, mint, sil cover, £26. Cintel monitor, £10. Solarscope CD711S2, £20. 40m UR67, £20. Comp psu, £5. Ferrograph, £25. Two Digicom 1000, £30 pair. VDU case incl tube, £2. FDK Multi 2700, base station, vhf, superb, £360 ono. ZX81, 16k ram, Scarab rtty interface, seven 1k games, one 1k morse tape, comp, £60. Heathkit OSC1 scope, £30. VHF Omni-Match, £12.50. Sharp uhf tv clock-radio, £75. HB sstv SC160 pcbs, in case, psu, £300. Air-band portable, £5. Stereo seps system, £55. Daiwa elect keyer and bencher key, £50. Creed 54RP, sil cover, £30. Creed 6S/6M, £15. Over 100 picture tapes, £15. Catronics CT103 terminal unit, £90. CT300 vdu unit, £75. Datong VC1, £80. TRS80 green screen monitor, £50. SEM Z-Match, £40. B&D Workmate, £15. Grundig 4x4 2000 series video rec, 30h tapes, £300. G4RSA, tel 0253 405271, after 7pm, before 10.30pm.

RTTY terminal unit ST6, single/double current, £75. Heathkit SB610 monitorscope, £65. Amtor Mk1, all interfaces, documentation, etc, £60. RTTY time clock, prints and sends time, £60. 1024 character message store with counter, (G3PLX/G3MEJ), £60. G3RDG, QTHR. Tel 01-455 8831.

Multi 2700 2m + Oscar, IC4E, IC2E, MM2000, IC202S, ARAC 152 (2 + 10m rx), MML 432/50, 2 to 70 transverter, B&H 642 16mm sound projector, 3m dry photocopier, cross hatch generator. G8APX, QTHR.

Daiwa CN630 vhf/uhf pwr/swr, Daiwa CN620A pwr/swr, hf, £30 each, or £50 pair. CCTV camera, HV model, £60. 5A 12V psu, £10. Trio 8400, £150. Several years *Rad Com, PW,* etc, BARTG, BATC, AMSAT, free to good homes. Hundreds of books incl sstv, rtty, ants, etc, sae list. Old books for museums, trusts, groups, etc. SAE list. Lots of psus, bits, pieces for clubs, fund raisers, etc, ring for info. *Wanted:* Sugiyama 8500 (info appr). Tel Blackpool (0253) 405271.

FT101B, comp with cw filter, all in as new cond, £325. M. Skelding, 2 Church Avenue, Clent, Stourbridge, W Midlands. Tel 0562 730484.

Drake T4XB, R4B, AC4 power supply, separate or tx/rx capability, notch filter, passband, 4·8, 2·4, 1·2, 0·4MHz filters, xtals fitted all bands incl WARC frequencies, a.m. capability, 200W p.e.p., mint cond, £475. Buyer collects. G4LW, QTHR. Tel Trowbridge 3166.

TS120V 25W p.e.p. hf tx/rx, incl MC35S, 13·8V psu, not used mobile, mint cond, boxed, service manual, £325. GW4AEC, QTHR. Tel Llanelli (05542) 53186.

Trio TS700, brand new vox unit, mint cond, £275. Trio AT200, mint cond, £75. Osker SWR200, £25. Eddystone Edometer gdo, as new, instructions, polished mahogany case, £55. GW8IQC, QTHR. Tel 0633 894708, after 6pm or weekends.

Cushcraft A3 tribander, used but reasonable cond, buyer to collect, bargain, £50. G3DPR, QTHR.

IC30A 70cm mobile, 22ch, 11 fitted, six repeaters, five simplex, £125. Base colinear, 70cm, £25. New EP2500 25A power supply, cost £120, £90 ono. TD3JR, 10, 15, 20, dipole, new cost £40, £25. Tel Eddie, 01-606 1234, G4RWP, QTHR as G8SXW.

BC348R, £25. Eddystone 358, £5. Marconi TF144G, £10. AVO vtvm, 56 ranges, £25. AVO sg, 85kHz-80MHz, £10. Minimitter tx, 12V heaters, £10. AR88D, pvc wired, spare chassis, £100. Offers. 14 Canterbury Way, Croxley Green, Herts. Tel Watford 20977, after 6pm and weekends.

4CX250B, 250M, 350As, ex equip, £15, new, £25. 4CX hf bases, £8. 811As, new, £5. KT66s, new, £5. Racal RA117, no case, £230. Meters, ex equip, 2in square, £2. 4in square, £3. All items ono. G8ZGK, QTHR. Tel Watford 40848.

BBC model B microcomputer program to teach you morse code: letters, numbers, punctuation, arranged in nine lesson groups, 12 speed settings from 7 to 32wpm, many different exercises incl learn code, keyboard test, random groups, mixed letters and numbers, random words from 200 in store, colour or b&w screen, fully adjustable pitch and master, menu driven, 80 frames of advice. Put your machine to good use, £7.50. D. F. Briggs, 57 Charlton Drive, Sheffield S30 4PA.

Racal TR931 hf manpack tx/rx, 1 to 30MHz synthesized, a.m., lsb, usb, 25W, handset, whip antenna, mains psu, £195. Sommerkamp TS280 fm 50W 2m mobile tx/rx, 80ch 12V dc, £60. S100, Z80, cpu card, new, £50. Cromemco S100 12-slot card cage, high quality, unused, £50. Stag SE15 eprom eraser, new, £75. Microprocessor computer board, Z80 system, display, keyboard, new, £45. Two 500pF, 8in long variable capacitors, roller coaster, lot, £10. Tel Swansea (0792) 872297.

MMA 144V low-noise rf switched 2m preamplifier, up to 100W through power, £25. G4ABF. Tel Malvern (06845) 66202, before 7pm.

Jaybeam three trap vertical antenna, 10-15-20m fitted, measured ground planes, £30. Hygain 3-el 10m beam antenna, as new, £30 ono. G4SFO. Tel Norman, Rugby (0788) 810344, evenings. Can deliver within five miles of M1 between Rugby and London.

FT707 with fm, FC707, FP707, FTV707, YM37 mic, £600. Datong auto speech processor, £45. 2m 6-el quad, £20. MMA144V preamp, £20. Tel 01-640 2599.

Yaesu FT480R, exc cond, £300. *Wanted:* Crank-up tiltover 40ft tower, Versatower or Westower. Tel Norwich (0603) 614167.

Cushcraft A3 3-el hf beam, exc cond, dismantled, ready for collection, £130. G3VQL, QTHR. Tel Shrewsbury 55179.

Yaesu FRG7700 high performance all mode communications rx, 12ch memory fitted, cost £425, only four months old, Securicor delivery at cost if required, will sell for £325 ono. Tel Graham, 061-740 4126, anytime.

FT902 dm, all mode, all band, hf tx/rx, fitted with all accs, memories, keyer, dc supply etc, absolute mint cond, six months old, only used to drive tx/rx so no pa use, £750. FTV901R transverter (2m board) three months old, mint cond, £225, pair together, £925. Gives best system for all mode hf, vhf, and uhf with add boards. QTH makes inspection difficult but would prefer. Could deliver for inspection. Phone to discuss. GD6OXG, QTHR. Tel IoM (0624 82) 2753.

Video Genie and Aculab floppy tape drive, £20 worth of floppy tapes, loads of software, ideal for use in the shack, total value new £500, will accept £300 ono. Will sell separately. Tel Glen, Coventry (0203) 616941.

Trio TS120V, PS20 power supply, AT120 atu, mic, HF5 vertical antenna, all exc cond, £400 the lot, or will split. G4DCF, QTHR. Tel Barnsley (0226) 790540.

HF linear amp, homebrewed to good standard in Imhof cabinet, two valves 5B/254M, passive 50Ω input, producing 200W, integral power supply with oil filled transformer, tunes 10-30MHz, £65. Pair spare valves, £5. G3GOT, QTHR. Tel Terling 229.

Morse tuition programs on tape for VIC20, Spectrum, ZX81-1k, ZX81-16k (specify) with full operating and learning instructions. A complete, flexible system, sending characters in easy, selectable stages, to get you that A licence, £5 each. GW3RRI, QTHR. Tel 0286 881886.

Trio 2300, as new, 7W homebrew pa, preamp, £135 or will separate, offers. G4NTY, QTHR. Tel 061-790 7673, after 6pm.

Yaesu FRG7700 rx, eight months old, boxed, as new, surplus to requirements of new G4, £210. Tel Guildford (0483) 65982, evenings.

Microwave Modules 2m converter, 4-6MHz, £15. Class D wavemeter, handbook, less xtal, £5. Datong

speech clipper, £25. 2E26 valves (two only), £5 each. Jaybeam 6-el and 10-el 2m beams, £8 each. Scope, 3in, wkg, £10. G4BLI, QTHR. Tel 051-722 9538 (Liverpool).

Yaesu FR101S rx, bc, amateur bands, ssb, a.m., fm, rtty, 2m int conv facility for 6m conv board, manual, mint cond, £265. TR2300 2m portable, nicads, charger, one month old, £115. 20V 20A transformer, £12. MFJ ssb filter, £3. Shure 444 dual imp desk mic, as new, £28. Carr extra on all items. Tel 0202 522796, after 6pm.

Drake TR7 (late model) gen cov tx, PS7 300Hz filter, latest i.f./audio board, brings tx/rx to TR7A specs, vgc, £800. TS820 cw filter, vgc, £400. Need cash for house repairs. Tel Mold (0352) 740101, evenings and weekends.

CT600 rtty system for TRS80 or Video Genie, 16k level 2, £70. YD148 dynamic mic, £5. Tel Kilmarnock 26530.

Trio JR310 rx, in vgc, 3·5-29·7MHz, WWV, ext channel, i.f. matched with TX310, will transceive, manual, £75 incl carriage. RS52891. Tel 0563 21318, evenings.

Square lattice tower, 38ft, dismantled, £60 ono. Leslie spkr unit, high power, £100 ono. *Wanted:* Yaesu FR101 rx. GW3HOJ. Tel Swansea (0792) 845284.

Sony CRF320 rx, in as new cond, six months old, worth £800 new, will accept sensible offer around £425. Need money for new rig. Tel Charles Crane, Ashtead (Surrey) 75883.

Drake SPR4, gc rx, comp with loop antenna, handbook, xtals fitted for amateur and broadcast bands, going abroad, must sell by end May, best offer secures. GW8ZNR. Tel Bridgend (0656) 61877.

Trio 7500 2m fm 15W mobile rig, full band coverage, mint cond, hardly used mobile, very simple and safe to use in car, must be seen, complete with mobile mount and all orig packaging, etc, £150. G4IZL, QTHR. Tel Northwich 48424.

FT101E, exc cond, cw filter, all leads, spare pa, valves, £350. YO100 monitor scope, matches 101E, £65. FV101 remote vfo for FT101, £50. Could deliver radius 50 miles. G3PRO, QTHR. Tel 0532 503987.

FT230R 25W output, 10 memories, dual vfo, extended coverage 144-148, three months old, no mobile use, genuine new cond, £175 plus registered postage. GD6OXG, QTHR. Tel 0624 82 2753.

FT200, FP200, good cond, buyer collects, £180. G3PJT, QTHR. Tel 022026 3137.

AR88 rx, good cond, spkr, £45. Geloso G222 tx, class D wavemeter, £10 for both. Jeremy Browne, 33 The Cornfields, Hemel Hempstead, Herts. Tel Hemel 47627, evenings.

Sale or exchange: Collins S-line tx, rx, psu, for new FT102 and SP102 or sell, £750. *Wanted:* KW109 atu. G4RGJ. Tel 0905 421908.

Modified Nagai 144XL 4CX350FJ, 320W out, extra blower, under 200h, buyer collects, £300. G4LXJ, QTHR. Tel 0803 559813.

Class A licence tuition; RAE correspondence course and three (three-speed) morse code records course, used with success, £20 incl postage. Wakeman, 50 Merridale Street West, Wolverhampton, West Midlands.

HW8 QRP tx/rx, 80-15m, £95. Heathkit 2m pa, 2W ip, 10W op, fm/cw, £20. G4LMS, QTHR. Tel 0924 469288.

Datong up-converter model UC1, covers 90kHz-3MHz in 30 switched bands, outputs 28/29MHz and 144/145MHz, incl 144/28MHz converter, instructions, £75. Datong universal rf speech clipper, a.m./fm/ssb, instructions, £30. G4ALV, QTHR. Tel 01-460 3852.

IC215 2m fm portable, case, 15 channels, helical, £90. Liner 2, ssb, two-band segments, £80. Microwave Modules converters, 70cm-2m, £15. 144-4-6MHz, £12. Jaybeam MBM48, 70cm, £12. G8APB, QTHR. Tel Chris, Alton 62839, or daytime, Basingstoke 61211, ext 2513.

Yaesu FT480R multimode, mint cond, boxed, manual, hardly used, £310 ono. Tel Broadstone (0202) 699875.

TR2300, used little, one owner, charger modded to plug into 13A socket, cw nicads, helical whip, carrying case, fb cond, £120. Homebrew power amp, 40W (10in) with built-in psu, £30. G3VRT, QTHR. Tel Chippenham 651008, evenings.

Yaesu FT707 and FP707, power supply, YD844 mic, AR40 rotator, £550. Tel Harrow 4220519.

Racal RA117E rx, £220. Racal RA98D ssb unit, comp with handbooks, in vgc, £60, or £250 the pair. KW a.m./cw tx, handbook, in good cond, £35. G3UGE NOT QTHR. Tel 021-553 0409 (Midlands), after 6pm.

Jaybeam 6-el 2m quad (Q62M), length 2·5m, £15. Valve voltmeter No 2, cat No WYO213, 1·5-150V in five ranges, £5. G3BDK, QTHR 1982 only. Tel Towcester 52309.

NAG linear, 144MHz, 250W, preamp, £300. IC211E tx/rx, 144MHz multimode, £350. FT221RD tx/rx, 144MHz multimode, £300. IC2F, 10W fm, xtalled S20, S22, R3-6, £50. G8BCL, QTHR. Tel 0296 34455, day, 0844 208074, night.

Racal MA197B protector/preselector, £40. Racal If adaptor RA237B, in good wkg order, handbooks, £60. Various other Racal style units: swr bridge, audio amps, Racal knobs, valves, transformers, etc. G3UGE. Tel 021-553 0409 (Midlands area) after 6pm.

YL forces sale of Ultra Valiant 79-100MHz a.m. tx/rx, manual, £8. Drake TR22 (Trio TR2200), three channels xtalled, £55. Three ASR33 teleprinters, incl stands, paper, manuals, scruffy, £20. Oil-filled, vhf, 50/75Ω dummy load, £10. 70cm tv tx QQVO320 tripler/pa, £10. Solartron CD1220 scope, dual timebase, three plug-in Y-amps, 50MHz min, manual, £85. Three Burndept 70cm tx/rx, one mobile, two base stn, manual, £35. Handhelds, us nicad, £15. CDR TR44 heavy duty rotator, £15. Two electric typewriters, as seen, £10. 100-150MHz sig gen, needs 150+6·3V psu, £10. Pye 26in colour tv, decoder fault, recent tube, £25. Back copies (75 of) *WW, PW, PE, ETI, TV, Elector,* offers. Everything must go, all ono. G8MVS, QTHR. Tel Nick, 01-462 1860.

Datong asp automatic rf speech processor, £50. G8NWR, QTHR. Tel 0905 820167.

Trio 9000 multimode tx/rx, 2m, boxed, exc cond, two mobile mounting brackets, £265. Realistic DX100L gen cov rx, £35. Buyer collects. G6NIS NOT QTHR. Tel Coventry (0203) 610511, evenings, weekends.

Trio TS520, vgc, £250. Yaesu FT207R 2m handheld, mint, £130. Four-el quad, £15. Stolle rotator, £30. Homebrew colinear, £5. Mobile λ/4 magmount, £6. Large psu, unsmoothed, 12V 6A, £6. G4LWU, QTHR. Tel 021-308 2458.

FT101B, as new, fitted cw filter, YD148 mic, base or mobile station, no mods, £325 ono. TA33JNR conversion to Mustang, unused, £30 ono. G3BDS, QTHR. Tel 0905 424722.

Heathkit SB102 tx/rx, 80-10m, fitted cw filter, HP23A psu, mic, manuals, phones, good cond, £160. G4MUW, QTHR. Tel Winchcombe (Glos) (0242) 603682.

KW204 tx, Shure 201 mic, spare 6146s, KW202 rx, matching spkr, handbooks, inter connecting cables, KW107 Supermatch, all mint, may split, £375. *Wanted:* C58. G4KKG. Tel Yeovil (0935) 25327.

AOR240, TR2400, spkr/mics, £120 each. IC215, £89. IC260E, £245. TR3200, £120. Creed 75s, 50/45 baud, auto cr/lf reperfs, £65 and £50. VCR Philips N1700, £98. Marine df rx transistor, 250kHz-4MHz, £55. Telephone autodialler, 99 memories, £52. All in good order, ono. G3LZN, QTHR. Tel Warwicks (05643) 2014.

Revox B77 reel recorder, variable speed, remote controls, used little, comp, £600. Pair Calrec CM652C cardioid condenser mics, mains power pack, all leads, case, £100. Nyman, G4OMP NOT QTHR. Tel 021-382 3606, evenings and weekends.

Sony ICF2001 gen cov rx, six memories, scan, as new, orig packing, nicads, mains psu, £105. GW6MNC NOT QTHR. Tel Cardiff 842774.

TR4C with remote vfo, RV4C, psu, spkr, Drake desk mic, in vgc, £450 ono, or would consider exchange for 70cm multimode. G3UKS, QTHR. Tel 073529 2672.

G2AKQ closed down: Yaesu FRDX400 rx with four mechanical filters, built-in 2 and 4m converters, manual, exc cond, no faults, £160. Buyer to arrange collection. G2AKQ, QTHR. Tel Ringwood 5643.

Jaybeam PMB14 2m 14-el beam, as new, £25. Muirhead Decade sig gen, 1Hz-111kHz, internal xtal checker, oscilloscope for accurate setting, £40. G3VWE, QTHR. Tel 0272 656783.

Acorn Atom, rtty in eprom, (utility) 1-150 baud, tx/rx, auto string, auto cr/lf, auto letts/figs shift, full details of hardware required (terminal and interface) included, £14. PCB for terminal and interface, £6. Tel Melton Mowbray 69119.

FT207R Yaesu handheld, 144-146, 2·5W charger, spkr/mic, etc, mint, £130. FTDX 401, 10-80m tx/rx, high power, space two extra bands, mint, £260. Datong FL2 audio filter, tune out whistles, QRM, £65. Auto speech processor (asp), £60. G4ILQ. Tel Ray, Kidderminster 4930.

KW dummy load, £10. KW low-pass filter, £10. Hansen swr meter, £6. All 75Ω, vgc. Morse key No2, £2. Heavy duty mains transformers and chokes. Collect or postage extra. G2HLU, QTHR. Tel Reading (0734) 61622.

Racal RA17 professional communications rx, 0·5-30MHz, vgc, £145. Marconi TF 1041B vtvm, £25. Solartron 1420·2 digital voltmeter, £20. Philips dc millivoltmeter GM6020, £20. G8JDE, QTHR. Tel 095-279 375.

ZX81, 16k, various tapes, books, morse progs, learning lab, tapes, £30. Datong morse tutor, £25. LAR psu PS1200, £15. Datong up-converter UC/1, offers. GW8TKM, QTHR. Tel Ferryside 649.

FTDX401 tx/rx, 10-80m, high power, ssb/cw, space for extra bands, mint, £260. Handheld Yaesu FT207R, 144-146, 2·5W charger, spkr/mic etc, mint, £130. Datong auto rf speech processor, asp, £60. Datong multimode filter, FL2, £65. G4ILQ. Tel Ray, Kidderminster 4930.

C78 standard 70cm portable tx/rx, fully synthesized, charger, 70cm mag mount, mobile bracket, which supplies power and antenna immediately, as new, £170. G4FYA, QTHR. Tel 039-17 4094, after 6pm.

IC290E 2m multimode, exc cond, only used for base station, orig packing, £280. G6HSO, 14 Holly Close, Broadstairs, Kent.

Class D wavemeter, power supply, 6AV6 valve, slow motion Vernier drive type D, ref 10A/8510 vibrator supply unit, 160m long wire, comp with insulators, relay 20-32V, 650Ω cor/amps, 1·5-110V, OC44, large variable condenser, offers. G3XWV, 13 Grimpits Lane, Birmingham 38. Tel 0564 82 2280.

Yaesu FT101ZD Mk3, comp with fm board, mic, fan, £500. G6RVG. Tel Astwood Bank (Worcestershire) 2571, after 6pm.

Marconi 10-500MHz prescaler, tunable, £25. Dymar RMS v/m, £10. CT53 sig gen, £12. Airmec wave analyser type 853, £25. HP noise generator type, £15. EXE tuning head, pcb, built, £30. UK101 in case, £125. HP 431C power meter, no head, £25. Carriage extra. G3BNL, QTHR. Tel 01-950 4239.

Going QRT: all must go, TR9000, £275; C58, £200; C78, £220; IC2E, £150; IC4E, £200; SEM Ezimatch, £30; SP820 spkr, £20; SP101 spkr, £5; 7λ/8 and 5λ/8 for 2m, £10 each; three 5λ/8, two 5λ/8 for 70cm, £10 each; 70cm/2m dual band, £10. All antennas mobile with coaxial, mag or gutter mount, portable rigs with nicads/cases, 30AA nicads, £20; swr bridge, £5; various coaxial plugs, £5. G4MBY, 52 Abbotswood, Yate, Avon. Tel Paul, 0454 310811, leave daytime phone number and will ring following day.

Mobile ham station: VW Danbury three-berth seven-seater motor caravan bus, X reg, 12,000 miles, 1600cc engine, green colour: fitted Yaesu FT301 200W p.e.p., a.m., cw, ssb, Icom 260 2m multi-mode rig, FDK Multi U11 fm rig, York 11m fm rig, fitted 2m antenna, 70cm antenna, G-whip, hf antenna, fm antenna, Sharp digital stereo fm radio cassette, clock, Philips hi-fi spkrs, back-up battery, £7,500 cash, hp arranged. G2DUS/M, 40 Regent Street, Stotfold, Hitchin, Herts. Tel 730480.

Yaesu FT101B, cw filter fitted, £325. MMT 432/144R, 70cm transverter, £120. 70cm/2m receive converter, £12. HF5 antenna, ground plane kit, unused, £60. Tel Derby 674582.

Morse tutor, Datong model D70, as new, never used, cost £56, will sell for £45. Tel Graham, 061-740 4126.

FT707/FP707, exc cond, £425 pair. Morse keyboard with psu, £80. Going QRT. G3TAN, QTHR. Tel 0748 832421, evenings.

Datong FL1 audio filter, automatic suppression of unwanted signals, search, lock, track notch filter, auto frequency control, ideal for hf, ssb, cw, mint cond, box, £45. Tel Ruislip 31240, after 6pm.

Trio 770, as new, Mutek preamp, £480. Three 13ft tower sections, heavy duty, buyer collects, £40. Morse record course, £4. G8MXP, QTHR. Tel 0249 814315 (Wilts) after 5pm evenings, anytime weekends.

2m monitor, Woolfsen 1200 scanning monitor, vfo, 12ch scanning, xtals fitted R0-1, R4-5, R7, S17, S20, S22, £42 incl p&p. G6LEU. Tel Dave, or Tim, Truro 501566.

Yaesu FT101Z, fm, new nine-band model, bought Nov '82, £460. Price includes carr. Chinon CE4S camera, flash gun, power wind, gadget bag, good cond, £150. Price includes Securicor. Tel John, 0632 462606.

Teletype ASR33 110 baud ASCII, in good order, stand, psu, etc, 240V ac, ready to go on current loop, £55. Will deliver for petrol. G3RDG, QTHR. Tel 01-455 8831.

FRG7700, vgc, £255. Pye 3210 cassette recorder, orig packing, workshop manual, £25. Two pairs PF1 tx/rx, RB6, SU8, 1·5 sets batteries, lots spares, incl circuits, manuals, £30 each. Car PF1 rx adaptor, £5. All ono. Lockwood, G3XLL, QTHR. Tel Mellis (Suffolk) 596, evenings, weekends.

TS830S tx/rx, AT230 atu, SP230 spkr, all in mint cond, no mods, £750. MC50 mic, £20. MMT 144/28 transverter, cables to suit TS830S, £85. LF30A low pass filter, £15. G2DYM dipole, matching unit, £50. G4JXU. Tel Reading 598276, evenings.

Trio TS830S, SP230, VFO230, £600 the set. FL2100Z linear, hardly used, £280. MM transverter, 4m, 70/28MHz, £75. MX4 4m tx/rx etc, £55. Osker block, £20. Medco filter lp, £10. Yaesu lp filter, £15. Admiralty morse key (heavy), £10. 444D cartridge, £10. 813 valves, £5. Daiwa rotator (preset), £55. Enquire re other sundries. Cash & carry or add post smaller items. G3CUN, QTHR. Tel 021-783 3628.

FRG7, new Jan, unused, £125. MM 23cm transverter, £130. German 23cm linear, 150W rf out from 2X7289, £175. Mutek dipole, splash plate, dish feed, £25. Mutek preamp boards, LNA 645-35 gain block, bpf all three, £25. G3SPJ, QTHR. Tel 01-311 8405.

Yaesu FRG7000 gen cov rx, exc cond, hardly used, as new, features 250kHz, 29·9MHz, a.m./ssb, digital

frequency readout, digital clock/timer, preselector, fine tuning, volume/tone control, £169. Harding. Tel Ingrebourne (Romford area) 45374.

G4MH minibeam, 10, 15, 20m, all clamps etc, four months old, vgc, £65. Pye Ranger, low band, vgc, £15. Heatsinks for linear etc, 12 fin, five available, £3 each. *Wanted:* 2m 8XY or 5XY, must be cheap. G4RGB. Tel Medway 30822.

Sinclair Spectrum tape containing four morse tutor programs, QRA locator, with European map, proven morse tutor aid, now awaiting arrival of new class A licence, £3.50. G6EIB, 8 Cowper Road, Worthing, Sussex BN11 4PD.

Icom IC22A 2m tx/rx, channels 13-23, repeater frequencies R1-7, comp with mic, λ/4 magnetic mount ant, £90 ono. G4MVS, QTHR. Tel 01-644 8249.

TS770E 2m/70cm multimode, £550. 10m Andrews heliax LDF4-50, two L44W plugs, all unused, £38. *VHF Comms*, comp years, 1971-2, 1976-80, £2 per year. Carriage/post extra on all above. G8BWR, QTHR. Tel 0926 498388.

Sommerkamp FL200B tx, FR100B rx, manuals, recently overhauled professionally, £90 each. Could possibly deliver. G4DMG, QTHR. Tel 096 273 4408.

KVG XF9A ssb filter, carrier xtals, £15. 1·4MHz ssb filters, two, £6. Valves, unused: boxed Eimac 4CX250B, £15; QV06/20 (6146), three, £5; QQV03-10, two, £1. Small vhf pa, 4CX250B, blower (115V ac) etc, £15. Xtals 1, 5, 10MHz, £1. Plus ics etc. G3XYV. Tel Bedford 60584.

Heath HW32A, 20m tx/rx, less psu, £30. Heath HD10 keyer, £12. Both with manuals. Electroniques front end, £12. Mosley V3JR antenna, £15. All carr extra. Davies, 30 Wern Isaf, Dowlais, Merthyr Tydfil, Mid Glam CF48 3NY. Tel 0685 75294.

Superb Drake TR7, latest specifications, incl ext vfo, cw a.m., filters, noise blanker for woodpecker, fan, heavy duty psu, 10kHz-30MHz receive, 1·5MHz-30MHz transmit, no gaps, £900. KW1000 linear, mint, £265. Icom 211F + RM3, £365. G3NAC, QTHR. Tel 0954 60584.

Datong FL1 audio filter, £55. Datong asp automatic rf speech processor, used little, £59. Microwave Modules MMT 144/28 transverter for hf rig, unused, new, £75. G3AUB, QTHR. Tel Macclesfield (0625) 25910.

TR2200G 2m fm portable tx/rx, 12ch, S19-23, R0, R2-7, comp with nicads, charger, case, handbook, 12V lead, λ/4 fibreglass whip with sturdy mag mount, £85. Mains psu, Slim Jim antenna, spkr, etc, available. Paul Swain, G4GXQ. Tel 061-485 7752.

FT902DM, mint, used very little, orig packing, prefer buyer inspects/collects, £725. G4FXS, QTHR. Tel 021-458 3537.

TH5DX Hygain beam, good cond, 18ft boom, exc dx antenna, £180. Four unused gem quad spreader arms, £50. GM4EAW, QTHR. Tel 041-956 2113.

FT480R, no mods, good order, bargain, £225 ono. DX301 digital hf rx, exc cond, £100 ono. G6BOF, QTHR. Tel Frensham 4107.

Yaesu FT101ZD AM, new cond, £485. Tel 0483 65982.

Microwave Modules MMT432/144R transverter, £115. Dual band colinear, £20. 2m Jaybeam 5XY, phasing harness, £30. PBM10/2m, £20. G4LVK. Tel Alan, 021-445 2088, evenings only.

TS120V power supply, mic, £320. TL120 100W linear, £90. GW3IVR. Tel Cardiff (0222) 709595.

TH6DXX Thunderbird Hygain 6-el tribander beam, comp with BN86 balun, instruction manual, recently overhauled, very good wkg cond, new cost over £400, accept £185. Purchaser to collect or pay carriage. G4HHH, QTHR. Tel Whitby (0947) 880 245.

TR2300, nicads, charger, rev repeater, helical, MML/30LS 30W amp, £160. Heath GC1U Mohican rx, £20. G3RFI, QTHR. Tel 0767 260800.

Microwave Modules transverter, 2m, MMT144/28, just over 18 months old, £80. Telequipment oscilloscope D54R dual beam 10MHz bandwidth, £250. Icom IC240, 2m fm synthesized, £110. Yaesu FT7 hf tx/rx, incl a/b 10m, £250. Microwave Modules transverter, MMT144/28, £75. G4ITF, QTHR. Tel Cosham 386184.

FL2100B Yaesu linear ampl, mint cond, £240. G3YWS, QTHR. Tel Newark 702413.

MM2001 rtty converter, £155. Datong FL2 filter, £54. Heath SB610 scope, £65. IT7400 ic tester, £55. IT121 transistor tester, £35. Hustler 80-10 mobile antennas, fold over base, £75. All items mint. Prefer buyer collects. G3NAC, QTHR Cambridge. Tel 0954 60584.

Trio 2300, as new, incl nicads, mobile mount, £130. G6BAP NOT QTHR. Tel Tunbridge Wells 28947.

88mH toroids, suit BARTG, ST6, etc, £2.25 each incl. *Wanted:* 14AVQ or 18AVT; 2m fm mobile IC240, or w.h.y. Chris Pedder, G3VBL, Thorncliffe, 5 Royalty Lane, New Longton, Preston, Lancs PR4 4JD. Tel 0772 612289.

Miniscope tubes, 1·5in, new, E4103/E, £5. DH3-91, new, £6. 13·8V 5A p/p, unused, £8. Auto/tr 1kVA, 110V, £10. 12/24V trans, 1kVA, £10. 813s, £7 each. SAE for other items or phone. carriage by arrangement. Barnes, G4DVH, QTHR. Tel 0229 54466.

IC2E, spare nicad pack, regulator pack, £130 ono. G4LVI, QTHR. Tel 061-865 2535.

Kasama 30A power supply 6 or 12V variable o/p fully smoothed continuously rated, offers. Mr W. Duce, G6NYQ, 16 Gillmans Road, Orpington, Kent.

Atari 400/800 world callsign locator program, over 400 callsigns, simple and effective aid to swl, £3 for cassette inc postage. RS49283. Tel 042 15 4166.

70cm uhf PF70 Pocketphone, unmarked, very clean, 600mW tx, good receiver (later active front end, ac xtalled SU8, two spare channels, spare battery, 12V mobile adapter, flexible antenna, BNC adapter, service sheet, demonstrate on air if you like, £75. Pye F461 base station, very clean, unmodified, will align your freq if required (uhf), £130 ono. PC1 also available, £50. *Wanted:* AOR240/245 or 2E style handheld. GDX1 discone or similar. Phil Bridges, G6DLJ, QTHR. Tel Southampton (0703) 891975.

DX300 rx, 0-30MHz, digital readout, exc cond, carton, manual, £95. Carriage extra at cost or delivery at cost West Midlands area. Peter Martin, G4SDK. Tel 021-300 7488, office hours.

IC730, £460. ICPS20, £50. ICAT500 auto antenna tuner, £250. EK150 squeeze keyer, £40. Fritzel GPA30 10/15/20m vertical antenna, £20. SA33 10/15/20m beam antenna, £65. Emotator rotator 201AX, comp with control box and cable, £25. G4LRG. Tel 04446 42727.

Collection of vintage and veteran radios, tape recorders, test gear, magazines, incl Mullard high speed valve tester. Frustrated sale due to lack of space. Lists and photos. Joe Longley, G6RXM. Tel Whitstable (0227) 264850, evenings and weekends.

Original Vibroplex deluxe key, mint, £35. BC221 with charts, £15. 18AVT/WB, £35. Hustler mobile antennas, 20m, 10m fender mounting, £25. Buyer arrange collection. G3BEZ. Tel 0732 358370.

Versatower, P60HD, post mounted, comp with raise and lower winches, tower head unit, very substantial, galvanized, vgc, purchaser to dismantle and remove off site, possible include coaxial and rotator, £250 or offers. G4FXU, QTHR. Tel 061-980 4252.

Yaesu FT707 with FP707 psu, £475. TA33JNR antenna, £60. 6-el 2m antenna, £7. Mic, mods, 2m converter, 28-30 i.f., £12. *Wanted:* FT101ZD fm Mk3. G4MH minibeam. Light weight 2m Yagi. Tonna etc. G4DIC, QTHR. Tel 0455 636315, evenings or weekends.

Trio R1000, no mods, SP100 external spkr, Mizuho KX2 atu, £180 the lot. Sinclair ZX Spectrum 48k, ZX printer, five rolls paper, Abacus tape controller, eight software cassettes, £95 the lot. MM2000 rtty decoder, £95. G6UZM. Tel Swindon 721313.

New 8mm cine projector, never used, many refinements, £45. Realistic DX100L gen cov rx, £40. Will consider part exchange 2m linear or rotator. G6UNX NOT QTHR. Tel Barry, Skelmersdale 25991, evenings.

Realistic DX300 communication rx, quartz synthesized, digital, 10kHz-30MHz, four years old, recent service by supplier, £60. Sentinel X 2m converter, ac power integral, unused, £15. 2m antenna, Slim Jim Super, genuine G2BCX model, technical details, unused, £9. Joystick vfa, atu (Joymatch), swl or 250W max transmit, £20. BRS44395, 9 Pan Close, Newport, Isle of Wight PO30 2AE. All letters answered.

TS120V, TL120 linear, MC35S, cw filter, HF5 vertical, £400. Will split. MM432/144 70cm transverter, £80. Palm 4 70cm handheld inc case, nicads, £85. G4JNZ, QTHR. Tel 01-868 2159.

Heathkit Mohican, 580kHz-30MHz, £35. B&O Beomaster tuner, amplifier, £25. Leak point one stereo, Wharfedale vhf feeder, £15. Two No38 sets, spares, 1930s vintage Telsen 3VI rx, large cabinet, offers. G6CAJ, QTHR. Tel Clacton-on-Sea 812170.

FT101E hf tx/rx, fitted with Holdings double-balanced modulator, recently realigned, a fine tx/rx, in good clean cond, together with SP901 spkr unit, £330 ovno. Going QRT. G4POL. Tel Bryan, Oxford 67452, evenings or weekends.

TL120 linear amp to match TS120V or TS130V, boxed, all connectors, in unmarked first class cond, £120. GM3RXU, QTHR. Tel 041-884 5365.

Rotator CDR model TR44, £35. Western Electronics model PM2000 peak reading wattmeter, £30. G3SJH, 9 St Peter's Road, Birmingham 17. Tel 021-427 1115.

Trio TR2200GX, fully xtalled, helical, nicads, charger, case, £75. G8IZW, QTHR. Tel Luton (0582) 27906.

Drake C-line, R4C, noise blanker, MS4, extra xtals, three optional filters, 0·5, 1·5, 6kHz, T4XC, AC4, fan, dxing speech processor, extra valves, £600. C4 station console, remote ant switch, 50 cycle clock, ac outlet, £225. MN4C ant tuner, £100. Package price available, RT4 must sell first. Drake TR4NB, RV4 remote vfo, AC4, fan, noise blanker, extra valves, £250. Heathkit HD10 keyer, no manual, £10. Extra xtal for R4, 25·6, £3. HB 10m fm QRP tx/rx, repeater offset, £25. Postage extra. In previous ad sent phone number wrong, sorry! Bob Lusby, G5EBA, QTHR. Tel Eriswell 2705.

Yaesu FT902DM, cw filter, brand new, used few hours, £750. FT480R, used only few hours, DRAE power supply, perfect, £350. Heathkit antenna tuner SA2060 (2kW), brand new, unused, £240. Tel 041-639 2173.

Yaesu FL50B tx, 80-10m, companion to FR50B rx, £70. G4HLX, QTHR. Tel 03677 503.

Icom IC720A cw filter, brand new, £750. Tono 9000E, virtually unused, £575. Trio TS430S, ac power supply, brand new, £700. GW4ACO, QTHR. Tel 0492 515240.

Codar AT5, comp, £35. Miniature 15m QRP xtal, tx, 13V, £25. National Panasonic RF4800 gen cov rx, bfo etc, £225. DNT upgraded converted cb for 10m, repeater shift, £45. GI4PCY. Tel Enniskillen (0365) 4993.

Shack clearance: 2050 rotator, mint cond, £30. 2m Storno Viscount, xtals for 8ch, £25. Jaybeam 8-over-8 2m Yagi, mint cond, £25. *Rad Com* 1964-83, binders, offers. Lots more equipment, components, ics, valves, klystrons, etc. SAE list. G3ZDN. Tel 0625 610686.

MMT 28/144 transverter, puts 2m rig on to 10m, incl 15dB attenuator, £65 ono. Tel John, Warburton (0908) 72182, after 5.30pm.

FRG7 gen cov rx, fine tune, mint cond, used little, Heliscan antenna, instruction manual, orig packing, £125. G4OUM. Tel Lichfield 51851.

Yaesu FT480R 2m multimode, vgc, orig packing, £295. G6BBS, QTHR. Tel Cosham (0705) 388488, evenings.

MK Products rtty terminal unit, rx only, vgc, was going to use as standby but not wkg, cost £60, offers. Please write, all letters answered. G6ISM, QTHR.

Jaybeam antennas, surplus to requirements, one 6-el quad, £20. Two 5-el Yagi, £5 each. Buyer collects. G3YDZ, QTHR. Tel Lowestoft 65922.

Belcom Liner 2, as new, mobile mount, mic, all hardware etc, £80 ono, or swap for IC202S or w.h.y? Frequency counter, scope? *Wanted:* handbook or photocopy of above for Eagle RX60N rx. G4PLM, QTHR as G6JGO. Tel Simon, Ashby 415936.

FT101ZD, as new, £430. With desk mic, SEM Match, £30. TA33JNR, £45. Electronic keyer with bencher paddles, £30. 2m standard 146A 2W base unit, charger, case, mic, xtals fitted, 20, 22 mp rf, R5, £60 ono. G3XCE, QTHR.

Admiralty rx, 60kHz-30MHz, Murphy-make beautiful cond separate psu, will exchange for KW Supermatch or similar atu. HRO, tatty but wkg, psu, five coil pack, exchange for heavy key. Tel John, Crosskeys (Gwent) (0495) 270900.

WANTED

Prop pitch motor (with or without motor). Not cowl gill. G3AAG. Tel 01-499 0264 and leave message. Will call back.

Young enthusiast, awaiting licence, requires a TR2400 base station and/or 12V charger. G. Stanway, 2 Hawthorn Road, Redcar, Cleveland TS10 3NU. Tel Redcar 484343.

Telescopic tilt-over tower, prepared to dismantle and collect within a distance of 200 miles from Cardiff. Service manual for GEC RC410/R rx, will purchase or short term loan would be appreciated. GW3UZS. Tel 0222 66065, evenings.

Circuit diagram and/or handbook for Telford communications model TC12 freq counter. G3VKM, Tel Aldeby (Norfolk) 622.

Circuit diagrams for Telequipment oscilloscope type D53S. Timebase type TD51. Amplifier type A. Will pay expenses. W. Gleave, G8YWK, QTHR. Tel 0385 45425.

6LQ6, 6KD6, 6HF6, 6LF6, PL509 and other valves for linears and bases for any of them. Blowers. High voltage capacitors, 500pF upwards. Chimneys for 4CX250Bs. 40V mains transformers. Scott, 91 School Road, Peterhead, Aberdeenshire. Tel 0779 76062.

Datong morse tutor. G4AIB. Tel Ilkeston (0602) 301527.

Circuit diagram for JD Y amp in Telequipment D53 double beam scope. Can anyone help? Buy or borrow to copy. Thanks. G8CKV, QTHR. Tel 0733 68422.

ST1 quick charger, base stand, mic/spkr if available for TR2400. Tel Bristol (0272) 615690.

Handbook or instructions or copies thereof or information regarding the circuit and connecting in data for the Sommerkamp YC7B digital read-out unit for the FT7. Advice also appreciated. G3BDK, QTHR. Tel Towcester 52309.

G2DAF rx and tx with psus, in good cond. Two 150/250pF tx variables. 2in ceramic coil former. Two-pole four-way ceramic switch. Details to J. Boyle, G3EXV, 23 Dob Lane, Walmer Bridge, Preston. Tel 616929, weekends.

Copy of instructions for Avo valve tester. No model No on it. Consists of flat separate box with valve bases, lead which plugs into main box which has following controls: anode; select anode; set MA/V; on/off; MA.V/C ins; screen; heater; set zero, contains two transformers, one large meter; MA/V and C ins MΩ, instr as advertised in *UK Amateur Radio Handbook,* 2nd edition, Feb 1946, page 315. Replies to EI1DA, QTHR.

For the National Wireless Museum: old radio books, magazines, catalogues, QSL cards, service manuals, callbooks, valves, keys, cartridge eight-track player, any old knobs! Neon tube 30-line televiser. Traxtrix horn. Details please to hon curator, G3KPO, QTHR. Tel Ryde 62513.

Vacuum valve voltmeter, Marconi Instruments TF1041, any information, manual, etc, your price paid. *For sale:* TCS12 tx/rx, comp, no mods, wkg order, exc cond, with pa, reasonable offers please. G3SGH. Tel Ashford (Kent) 21158, evenings or weekends.

Marconi sig gen TF144H/4, operating and maintenance handbook, either on loan to photocopy or purchase. GW3HPS, QTHR. Tel 0222 701558, after 5pm.

KW107, KW109, good price paid. G3ANG, QTHR. Tel 02572 79665.

Mobile mount for Trio 2200/2300. G6NXM, QTHR. Tel Roger, Fareham 238305, evenings and weekends.

Marconi cavity filter type (W38420 EDD) for repeater group. Tel Mike, West Drayton 43524, anytime after 12 noon.

Two-pole Bulgin free sockets, quantity 12. G8DPS, QTHR. Tel 01-399 8787, evenings.

Bird coaxial switch, model 7441, or similar. 1,296mm transverter, 28MHz i.f. G6DER, QTHR. Tel Barnsley (0226) 296108.

Central Electronics multi-phase 100V tx, wkg or not. Any copy of *Editors and Engineers* radio handbook covering valve equipment. RX type BC348, preferably unmodified. *For sale:* Wayne Kerr low capacitance bridge, £20. G3JDK, QTHR. Tel Wickersley 541606.

Trio TR2200G, case, nicads, charger, orig packing, S18-23, R2, R4, R7, £50. Microwave Modules MML144/30LS 30W linear, as new, £55. G3OZF, QTHR. Tel 0296 748354, evenings and weekends.

Drake MN2000 or MN2700 atu. Manual for GEC RC/460S synthesizer. G4AQA, QTHR. Tel 0482 655856.

Quad 33 and 303 amp, a.m./fm tuner, £130. Money needed for good rx. A. Baker, 34 Wenny Estate, Chatteris, Cambs PE16 6BA.

Hammarlund HQ180A rx, no mods, must be in good cond, cash waiting. G3RJK, QTHR. Tel 0983 753122.

Racal TR931. Accessories for TRA921. G3KVT, QTHR. Tel 0603 860452.

Post Office morse key type 610 with large knob. Split stator capacitors, 250pF + 250pF – 200pF + 200pF, ceramic end plates if possible. Price to GW4JKR, QTHR. Tel (0248) 715582.

A pair of new or good 813s with bases and clamps. GU4GT Brimar valves. G3LBN, QTHR. Tel 043 886 352, evenings or weekends.

Antenna tuner, suitable for FT101E, KW107 or similar. GM4LQS, QTHR. Tel 0776-81 393, day, 0776 2570, evenings.

Loudspkr to suit FTDX560 and FRDX400. External vfo for the aforementioned. Will collect. J. Baylis, G4LMA. Tel Telford (0952) 49306, evenings only.

RTTY for ZX Spectrum. Have you got the software and circuit diagram of the hardware for the ZX Spectrum computer? Split-screen version preferred (type while receive). Details to H. L. Hall, G6JLB, QTHR. Tel Telford 594959.

For Yaesu FT221R: YC221 digital display, SP120 matching spkr and orig front end board. G8WRV, QTHR.

Professional ssb tx. Racal, Collins etc. Prefer solidstate if available but not essential. Your price paid. Have Racal 117E rx, ssb, and tuner units, part exchange if preferred. G3UGE. Tel 021-553 0409 (Midlands area), after 6pm.

Manual or circuit and any other info on Centronics dot matrix printer type 101. G3NPF, QTHR. Tel Horsham 66290.

FT221/225, Mutek front end board. Fix unit xtals for FT225. Tel 0224 643131, after 6pm.

Manual for telequipment scope D53A, buy or copy. Eddystone slow motion dial unit type 898, must be in good cond, plus if possible template. G4PNM NOT QTHR. Tel 0203 318301.

Circuit or handbook for Marconi TF995A/1 sig gen, orig or photocopy. G3XWL, QTHR. Tel 021-356 8632.

National HRO rx coils: 1·7-4MHz, 7-14·4MHz, both bandspread types. 1·7-4MHz gen cov type. A.R. Bartle, 105 Mayfield Road, Thornton Heath, Surrey. Tel 01-684 0610.

3ft dish. Waveguide relay in WG16. 7GHz ITT twt W5/2GF (to fit WM107DF mount). Diodes BXY27, BXY28, BXY39, BXY40, BXY41. Waveguide components WG20, WG24. G4MBS, QTHR. Tel Alton (Hants) 62316.

Commodore VIC20 or similar. ASCII, rtty, morse-tv converter. 100kHz-30MHz rx. W.H.Y.? I do not want rubbish, nor sky high prices. Cash available. B. Nicholson, 28 Wood Street, Norton, Malton, N Yorks YO17 9BA. Tel Malton (0653) 4646, anytime.

Kenwood DG5 digital readout unit for TS520SE. Please state age and cond. G3FWJ, QTHR. Tel 044-94 475.

4CX250Bs and bases for hf linear. Electrolytics to 2kV (450V/100μF ok). Snail blower, 240V. G4PXW, Parsonage Farm, Frittenden, Kent. Tel Ashford (Kent) (0233) 37238, weekday evenings.

Amateur band rx FR50B, FR100B or similar, must be in good cond. Please state price, all letters will be answered. B. Bond, 28 King Court, Capworth Street, Leyton E10 5AJ.

TS820S tx/rx, good cond essential. G3WEX, Sutton Coldfield. Tel 021-354 4265.

Sommerkamp FR100B in wkg order. G6UYW NOT QTHR. Tel Tony, South Benfleet 53984.

KW107 Supermatch. Matching spkr for KW202 rx. Vox unit for KW204 tx. G8BWR, QTHR. Tel 0926 498388.

Heathkit S8610 or KW108 or similar monitorscope. Microwave Modules 4m transverter, any i.f. valved 70cm linear, commercial or homebrew. Codar AT5 tx and matching rx. G4LVK, QTHR. Tel Alan, 021-445 2088.

TS180S or TS530S, matching accessories, ie vfo, antenna tuner, spkr, station monitor, M220, desk mic. G4ILQ. Tel Ray, Kidderminster 4930.

Circuit diagram or info for Sony TR2000 rx, all costs paid. G4LNT, QTHR. Tel 0375 671238.

Valves, bases, data, transformers to build linears using say 813s, 3/500s, 572Bs, 4/125s, etc. High voltage reservoir capacitors (paper type preferred ie 4kV working). Scott, 91 School Road, Peterhead, Aberdeenshire. Tel 0779 76062.

RADIO EXCHANGE

YAESU

FT980CAT	NEW all-mode transceiver with AM/CW/FM/SSB/AFSK	P.O.A.
FT102	160-10M 9-Band Transceiverr	NEW 775.00
FT ONE	Gen. Coverage Transceiver	NEW 1345.00
FT790R	70cm all-mode portable	NEW 309.00
FT101ZFM	160-10m 9-Band Transceiver	535.00
FT101ZDFM	160-10m 9-Band Transceiver	599.00
FC902	9-Band atu, swr/pwr etc	135.00
SP901	External speaker	31.00
FL2100Z	9-Band 1200W linear	445.00
FT77	8-Band solid state 100W	469.00
FP707	230 volts AC power supply	125.00
FC707	Aerial tuner (unbalanced only)	85.00
MR7	Metal rack for above	15.70
MMB2	Mobile mounting bracket	16.00
FRG7700	SSB/AM/FM recvr. dig. readout	319.00
MEM7700	Memory unit for above	90.00

CONVERTERS FOR ABOVE

FRV7700A	118-150MHz	69.75
FRV7700B	50-60MHz & 118-150MHz	75.50
FRV7700C	140-170MHz	65.95
FRV7700D	70-80MHz & 118-150MHz	72.45

FRT7700	Receiver aerial tuner	37.85
FF5	LF filter for above	9.95
FT480R	2m all-mode transceiver	*365.00
FP80A	230V AC power supply	63.00
FT780R	70cm all-mode transceiver	*399.00
FT290RD	**SPECIAL** 1983 version with ARE mods and 3SK87 f/end	269.00
NC11C	AC charger	8.00
CSC-1	Carrying case	3.45
MMB-11	Mobile mounting bracket	22.25
FT208R	2m synthesized portable FM	199.00
NC9C	AC charger	8.00
FT708R	70cm hand-held	209.00
YH55	Headphones, low Z	10.00
YH77	Lightweight h/phones, low Z	10.00

ICOM

IC740	Multimode H.F. transceiver	NEW 725.00
IC720A	HF transceiver and gen. cov. rec	849.00
IC730	HF mobile transceiver 8-band	599.00
ICR70	New multimode receiver	499.00
PS15	Power supply for 720A	109.00
IC251E	2m multimode base station	559.00
IC25E	2m synth compact 25W mobile	259.00
IC290H	2m multimode mobile 25W	399.00
IC2E	2m FM synthesised handheld	169.00
IC4E	70cm handheld	189.00
ICL1/2/3	Soft cases	4.25
ICHM9	Speaker/microphone	15.00
ICCP1	Car charging lead	3.75
ICBP2	6V Nicad pack for IC 2E	33.00
ICBP3	9V Nicad pack for IC 2E	23.00
ICBP4	Empty case for 6 × AA Nicads	6.95
ICBP5	11.5V Nicad pack for IC 2E	44.00
ICDC1	12V adaptor pack for IC 2E	9.75

TRIO-KENWOOD

TS430S	Gen. coverage multi-mode	NEW 699.00
TS930	Gen. coverage transceiver	NEW P.O.A.
TS130S	8-Band 200W pep	469.00
TS130V	8-Band 20W pep	445.00
AT130	100W antenna tuner	79.00
TR2500	2m FM synthesised handheld	217.00
HC10	Digital desk World Clock	58.75
DM801	Dip meter	P.O.A.
R600	Gen. coverage receiver	235.00
R2000	Gen. coverage receiver	395.00

SCANNING RECEIVERS

	ARE Communications	
AR3000	720 channel synthesised air band receiver	99.00
	Fairmate	
AS32320	VHF/UHF scanning receiver, air band/military/police	149.00
	FDK	
ATC720	720 channel air band handheld	129.00
ATC720SP	Professional version of above	189.00
	JIL	
SX200N	16 channel memory, synthesised AM/FM	259.00
	Maximal-Mickey	
MK4000	8 channel memory, 70-80MHz, 140-176MHz, synthesised	99.00
	Bearcat	
BC100FB	16 channel memory, synthesised, handheld	345.00
BC150FB	10 channel memory, synthesised	144.90
BC2020	20 channel memory, AM/FM, synthesised	249.00
BC250FB	50 channel memory, synthesised	249.00

TONO

THETA 9000E	RTTY/CW/ASCII, Tx/Rx	669.00
THETA 550	RX only	299.00
	AMPLIFIERS	
UC70	430MHz 55W + preamp	159.00
2M-50W	144MHz 30-50W	69.00
2M-100W	144MHz 100W + preamp	129.00
MR 150W	144MHz 130-150W + preamp	169.00
MR 250W	144MHz 250W + preamp	325.00

TASCO

TeleReader CWR685 RTTY/CW/ASCII	769.00
TeleReader CWR670E As above Rx only	345.00
TeleReader CWR610E Basic unit	189.00

TOKYO HY-POWER

HL32V	VHF 30W linear 1-5W drive HI-LOW output	53.50
HL82V	VHF linear preamp output meter 2-12W in 35-85 + out	144.50
HL160V	VHF linear preamp output meter 1-10W in 160W + out	242.40
HL45U	UHF linear preamp 2-15W in 10-45W out	119.75
HC150	HF ATU SWR/Power meter 200W PEP	62.50
HC2000	HF 2kW ATU SWR/Power meter 6 POS ant. switch. 6 to 1 vernier high Q coils 2kW peak 1kW continuous	276.55

HI-MOUND MORSE KEYS

HK702	Up down keyer marble base	24.50
HK704	Up down keyer	16.68
HK705	Up down keyer	12.50
HK706	Up down keyer	13.75
HK708	Up down keyer	11.96
HK808	Up down keyer marble base	39.57
MK704	Twin paddle keyer	10.95
MK705	Twin paddle keyer marble base	22.00

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12/6A Power supply, 13.8V.6 amp fully protected	48.30
12/12A Power supply, 13.8V.12 amp, fully protected	86.40
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ELH 230	2M RF amp 3W in/30W out	39.00
ELH 720	70cm RF amp 1W in/10W out	59.00
EMR 400	Rotator—heavy duty	39.00

TET ANTENNAS

AX210N	10 ele. yagi for 2m crossed	74.95
HB10F2T	2 ele. 10m mono band beam	51.50
HB10F3T	3 ele. 10m mono band beam	74.95
HB15F2T	2 ele. 15m mono band beam	60.66
HB15FT	3 ele. 15m mono band beam	83.46
HB15M25P	VP mini size 15m 2 ele	69.50
HB15M35P	VP mini size 15m 3 ele	102.30
HB34D	4 ele. tri band beam 10/15/20m	222.90
HB33SP	3 ele. tri band beam 10/15/20m	192.50
HB35C	Tri band array 10/15/20m	283.95
HB35T	5 ele. 10/15/20m	278.50
MV3BH	Vertical for 10/15/20m	37.99
MV4BH	Vertical for 10/15/40m	48.90
MV5BH	Vertical for 10/15/20/40/80m	63.95
MLA4	Loop antenna 10/15/40/80	105.60
SQ22	Phased 2 ele. swiss quad 2m	58.95
SQY06	6 ele. quagi 2m	45.75
SQY08	8 ele. quagi 2m	52.75
HB210S	10 ele. dual driven yagi 2m	47.99
TE214	14 ele. long yagi 2m	74.40
SSL720	9 × 2 ele. (18) slot fed 70cm	77.20
HB23SP	2 ele. tri band beam 10/15/20m	135.60
SSL218	9 × 2 ele. (18) slot fed 2m	144.79
TPH2	Phasing harness 2m	17.25
QYU10	10 ele. quagi 70cm	67.90
SQ007	70cm 2 ele. phased swiss quad	66.99
SQ10	Swiss quad 10m	97.50
SQ15	Swiss quad 15m	106.90

ANTENNA SWITCHES

SA450	SO239 connectors, 1 in, 2 out	9.75
SA450N	N-type connectors, 1 in, 2 out	12.75

ROTATORS

KR250	Kenpro Lightweight 1-1½" mast	48.00
9502B	Colorotor (Med. VHF)	56.60
KR 400RC	Kenpro—inc. lower clamps	P.O.A.
KR 600RC	Kenpro—inc. lower clamps	P.O.A.

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BY1	Keyer Paddle (black base)	35.84
BY2	Keyer Paddle (chrome base)	43.72
BY3	Keyer Paddle (gold plated)	92.00
ZA 1A	Balun 3-5-30MHz for dipoles	15.00
ZA 2A	Balun 14-30MHz for beam ant	17.25

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MS10	Mobile speaker and message pad, visor mount	16.25

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SP200	1.8-160MHz 20-200W-1kW PWR/SWR Meter	69.95
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SP400	130-500MHz 5-20-150W PWR/SWR Meter	69.95
SP600	1.8-500MHz 20-100-2kW PWR/SWR Meter	97.00
SP15M	1.8-160MHz 5-20-200WW PWR/SWR Meter	35.00
SP45M	130MHz-470MHz POWER/SWR Meter	51.00
SP-10X	Compact version of SP15M	24.45
SP250	1.8-60MHz 20-200-2kW	49.50
SP350	1.8-500MHz 5-20-2kW	59.95
SP380	Compact version of SP300 (200 watts max)	49.00
AC38	3.5-30MHz ATU 400W PEP (8 bands)	65.00
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CT15N	15-50w dummy load. ('N' plug)	13.95
CT150	150/400w dummy load. Rated 250MHz (SO239)	35.50
CT300	300/1kW dummy load 250MHz (SO239)	49.50
CT03N	3W dummy load 1.3GHz ('N' socket)	30.00
CH20A	2 way coax switch 1kW 900MHz (SO239)	17.95
CH20N	2 way coax switch 1kW 1.3GHz ('N' socket)	31.95
TP05X	50-500MHz power meter with load	13.95
TP25A	50-500MHz 25W power meter with load	17.50
TP20G	30-1500MHz power meter with load	139.00
CA35A	Static discharge protector. DC 500MHz 300w SO239	10.75
CA23N	Static discharge protector. DC 1500MHz 300w 'N'	12.50

MICROWAVE MODULES

MMT 144/28	2M Transverter for HF Rig	109.95
MMT 432/28S	70cm Transverter for HF Rig	159.95
MMT 432/144R	70cm Transverter for 2m Rig	184.00
MMT 70/28	4m Transverter for HF Rig	115.00
MMT 1296/144	23cm Transverter for 2m Rig	184.00
MML 144/30LS	2m 30W linear Amp (3WI/P)	69.95
MML 144/50S	2m 50W linear Amp (10W1/P)	85.00
MML 144/100S	2m 100W linear Amp (10W1/P)	139.95
MML 432/20	70cm 20W linear Amp (3W1/P)	85.00
MML 432/50	70cm 50W linear Amp	109.95
MML 432/100	70cm 10/100W linear Amp	228.65
MM 2001	RTTY to TV converter	189.00
MM 4001	RTTY transceiver	269.00
MM 400KB	RTTY transceiver with keyboard	299.00
MMC 50/28	6m converter to HF Rig	29.90
MMC 70/28	4m converter to HF Rig	29.90
MMC 144/28	2m converter to HF Rig	29.90
MMC 432/28S	7cm converter to HF Rig	37.90
MMC 432/144S	70cm converter to 2m Rig	37.90
MMC 435/600	70cm ATV converter	27.90
MMK 1296/144	23cm converter to 2m Rig	69.95
MMD 050/500	500MHz dig. frequency meter	75.00
MMD 600P	600MHz prescaler	29.90
MMDP 1	Frequency counter probe	14.90
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MMA 144V	2m RF switched pre amp	34.90
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MK	Keyboard morse sender	137.42
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GLNA 432u-2	432MHz gasfet unswitched preamp 0.65dB nf/ 13dB gain	56.90
BLNA 129ub	1.3GHz bipolar unswitched preamp 1.8dB nf/ 12dB gain	24.50
GLNA 1296u	1.3GHz two-stage ultra-low noise gasfet unswitched preamp 20dB gain	82.25
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HDRA 95u-2	11.5dB gain variant (input intercept + 16dBm)	29.90
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BBA 860u	250-860MHz broadband low-noise preamp	20.50
XBPF 700ub	Band IV-V bandpass tvi filter	2.95
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SP430	Matching Speaker	29.44	(1.50)
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TS130S	8 Band 200W Pep Transceiver	559.00	(–)
TS130V	8 Band 20W Pep Transceiver	456.00	(–)
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MB100	Mobile Mount for TS130/120	18.60	(1.50)
SP120	Base Station External Speaker	26.40	(1.50)
AT130	100W Antenna Tuner	93.00	(1.50)
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TONO 500	299.00	(–)
TONO 9000	669.00	(–)

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FC102	Matching A.T.U.	209.00	(2.50)
FT101Z	160-10m 9 Band Transceiver (FM)	590.00	(–)
FT101ZD	160-10m 9 Band Transceiver (FM) Dig	665.00	(–)
FC902	All Band A.T.U.	135.00	(1.50)
SP901	External Speaker	31.00	(1.50)
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YH55	Yaesu standard	10.00	(–)
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CD 6000


SX 200N

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RFA	Wideband Preamplifier	33.92	(–)
DC 144/28	2 Metre to 28MHz converter	39.67	(–)
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CT15A	WELZ PL259 50W Max 450MHz	7.95	(0.75)
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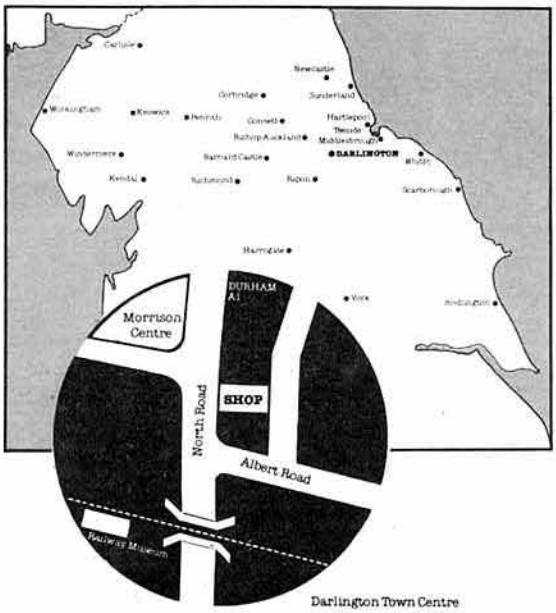

Darlington Town Centre

A huge free car park, a shopping complex which has within it a large supermarket, a wine and spirits shop, a bistro restaurant and convenient banking facilities has nothing at all to do with amateur radio.

However, as all these facilities are to be found across the road from our new amateur radio shop in the North East of England, then you will appreciate that we take great care in positioning the Lowe Electronic shops to help both you and other members of your family. The shop is in Darlington, 56 North Road, that is on the A167 road to Durham, only a few minutes from the town centre. Darlington is a delightful market town with extremely good links to the A1 north or south and to the west and east. Indeed, Darlington is easy to get to from towns such as Scarborough, Bridlington, York, Harrogate, Penrith and Carlisle. To the fortunate Radio Amateurs of the North East, then you have Lowe Electronics in your own backyard.

A Lowe Electronics' shop means the opportunity to browse, to try out, without sales pressure, a new or second hand piece of equipment before you buy it. And not only that, the shop will stock all the usual accessories, aerials, swr meters, cables, rotators, tuning units, plugs, sockets, etc. All equipment bought from the Darlington shop will carry the now well-known Lowe after sales service. It is a fact that today's equipment, although very reliable, is extremely complex and although not beyond the amateur, the expensive test equipment required for the repair leave most of us in the hands of the person who sold us the rig.

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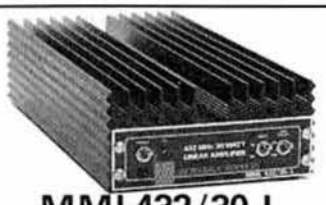

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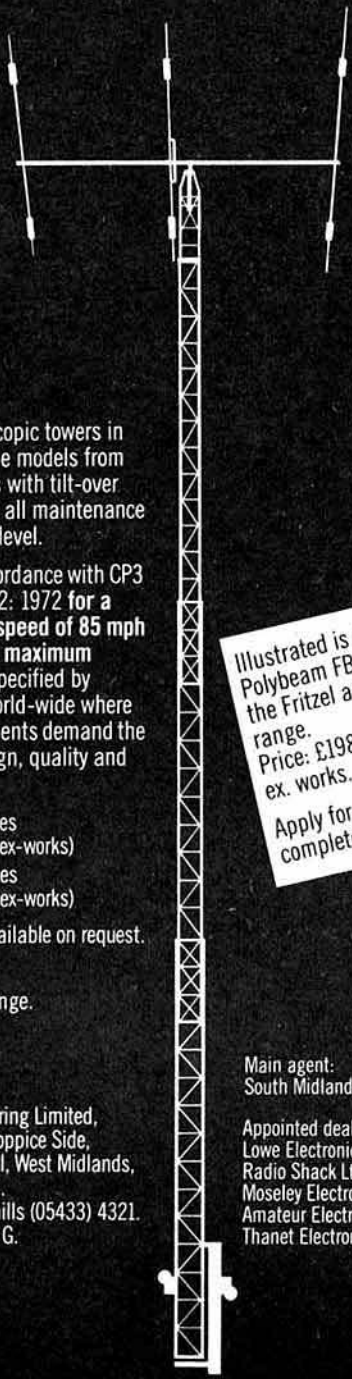

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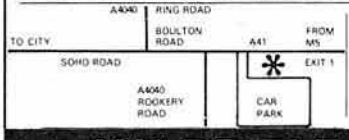

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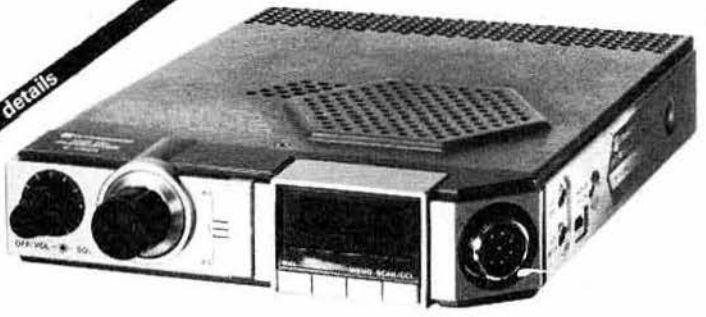

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6 to 9.999khz HC13/U	£32.80	1.5 to 2.59MHz (fund) HC6/U	£5.36
10 to 19.99kHz HC13/U	£31.0	2.6 to 21MHz (fund) HC6/U	£4.87
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100 to 149.9kHz HC13/U	£11.32	25 to 28MHz (fund) HC6, 18 & 25/U	£9.00
150 to 159.9kHz HC6/U	£11.32	18 to 63MHz (3 O/T) HC6, 18 & 25/U	£4.87
160 to 399.9kHz HC6/U	£7.83	60 to 105MHz (5 O/T) HC6, 18 & 25/U	£5.61
400 to 499.9kHz HC6/U	£7.00	105 to 125MHz (5 O/T) HC18 & 25/U	£8.44
500 to 799.9kHz HC6/U	£7.83	125 to 147MHz (7 O/T) HC18 & 25/U	£11.25
800 to 999.9kHz HC6/U	£11.01	147 to 175MHz (9 O/T) HC18 & 25/U	£12.66
1.0 to 1.499MHz HC6/U	£11.25	175 to 250MHz (9 O/T) HC18 & 25/U	£13.50

TOLERANCES: Up to 800kHz—Total tolerances = ± 100ppm 0°C to +70°C
Over 800kHz—Adj. tol. = ±20ppm, Temp. tol = ±30ppm −10°C to +60°C

Unless otherwise specified fundamentals will be supplied to 30pf circuit conditions and overtones to series resonance.

DELIVERY: 1MHz to 105MHz—4/6 weeks, other frequencies—6/8 weeks. Prices shown are for "one off" to our standard amateur specifications, closer tolerances are available. Please send us details of your requirements.

COMMERCIAL AND PROFESSIONAL CRYSTALS
NEW FASTER SERVICE

We are now supplying crystals to most commercial and MIL specifications in the range 1MHz to 60MHz, ordered in small quantities, within 2½ weeks AT NO EXTRA CHARGE. We also have an even faster EXPRESS SERVICE for that very urgent order. We can also supply crystals for commercial applications e.g. Microprocessor, TV etc at very competitive prices. Let us know your needs and we will send a quote by return, alternatively telephone or telex our Sales Engineer Mr Norcliffe who is normally available in the office for technical enquiries between 4.30 and 6.30 p.m.

DOUBLE BALANCED MIXER

We are now stocking two new double balanced mixers which are pin compatible with both the MD108 we used to stock and also the SBL 1, but have much superior specifications covering 500kHz, to 500MHz. The M8 is hermetically sealed @ **£7.83**
The M18 is non-hermetically sealed @ **£6.09**

4 METRE, 2 METRE AND 7 CENTIMETRE STOCK CRYSTALS

We stock crystals for 70.26MHz on 4m. On 2m we stock R0 thru R8 and S18 thru S24. For 70cm we have RB0 thru RB15 plus SU8, SU18 & SU20. For full details of the above stock crystals plus details of our Converter, Marker and Alternative IF crystals, crystal sockets and our AERIAL RANGE see April, 1983 *Radio Communication*, page 294 or send SAE to the above address.

Some still in use after 30 years —THAT'S RELIABILITY!

Mustang	3 elements, 10 15 and 20 metres	£192.00
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TD-2	Trap Dipole 40 and 80 metres	£49.00
TD-3 Jr.	Trap Dipole 10, 15 and 20 metres	£38.00
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Atlas	Trap Vertical, 10, 15, 20 and 40 metres	£70.00
SWL-7	Dipole 11, 13, 16, 19, 25, 31 and 49 metres	£42.00
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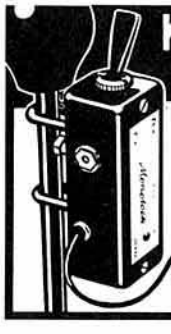
with the *Monolock* safety microphone system



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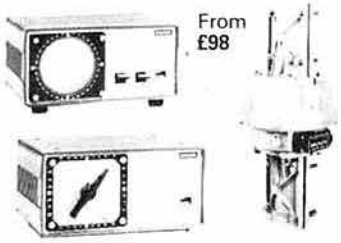
DAIWA Full range of reliable antenna rotators



From £98

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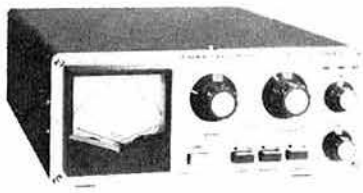

CN1001A 200 watt £156.00
CN2002 2kW £228.00

DRAKE

TR5 HF Transceiver/AC PSU	£625.00
MN2700 ATU	£219.95
MN75 ATU	£162.95

Full range of Drake equipment available to order.

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Model 156S 4 15V 6A Twin Meter	£40.00
Model 121OS 4 20V 10A Twin Meter	£75.00

Maximum ratings quoted.

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4-way Antenna switch (V4)	£11.00
2-way Antenna switch (VHF)	£13.95
DL50 50 watt dummy load 50ohm	£7.00
DL50 Dummy load/wattmeter	£38.00
DL1000 1kW Dummy load	£37.95
VHF Wavemeter	£27.75
WELZ range of SWR meters, switches etc.	
Welz SP200 swr/power	£59.95
Daiwa CN620A	£54.00

Full range of aluminium tubing, wall clamps, brackets "V" bolts for the caller.

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AR22 Hand held 2m receiver	£83.00
FRG7700 Receiver	£329.00
SR9 2m FM Receiver	£46.00
FDK750E Transceiver	£289.00

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18AVT/WB 10·15·20·40m-80 Vertical	£113.85
TH2 MK3 2 Element Tribander Beam	£169.05
TH3 JNR 3 Element Tribander Beam	£202.40
TH3 MK3 3 Element Tribander Beam	£274.85
TH6 DXX 6 Element Tribander Beam	£396.75
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The new TET range of VHF and HF antennas now available

Complete range of Jaybeam Yagi's Co-linear etc available

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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 ● Attenuator ● 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 **£985.00** inc VAT

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

Shop Hours: Mon to Fri 9.30am to 5.30pm
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£420.00 inc. carriage
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- Users callsign programmed in
- Receive CW speed tracking and display
- Self checking facility
- Char. by char. or 'page' transmission modes
- Stylish two tone metal cabinet

OPTIONAL FEATURES

- Printer interface board (Centronics compatible)
- On-board 40 column printer (12V)
- External 80 column printer (SEIKOSHA GP100A)

B.N.O.S. ELECTRONICS

HIGH QUALITY NiCAD BATTERIES

	Type	1-9	10-24	25-99
'AA'	0·5Ah	**0.90**	**0.85**	**0.82**
'C'	2·2Ah	**2.40**	**2.30**	**2.20**
SUB 'D'	1·5Ah	**2.30**	**2.15**	**2.00**
'D'	4·0Ah	**3.40**	**3.20**	**3.05**
PP3	0·11Ah	**4.25**	**4.00**	**3.80**
* SUB 'C'	1·2Ah	**1.62**	**1.55**	**1.50**

*(supplied with solder tags)

NiCAD CHARGERS

AC.1	Charges up to 4 'AA' cells.	**£5.90**
MC.2	Charges up to 4 × 'AA', 'C' or 'D' cells or any combination of the above as well as PP3s.	**£8.50**
MC.3	Charges 2 or 4 'AA', 'C' or 'D'	**£7.50**
PC3	Charges 1 or 2 PP3 cells.	**£7.40**

All battery prices include VAT, and FREE postage on orders over £5, for orders under £5 please add 60p to cover P&P.

PREAMP TRANSISTORS

3SK88	145MHz, 26dB gain, 1·1dB NF	**1.05**
BF981	145MHz, 18dB gain, 0·7dB NF	**1.38**
BFR91	432MHz, 18dB gain, 1·9dB NF	**1.50**

R.F.POWER TRANSISTORS

MRF260	145MHz, 10dB gain, 5W output	**6.56**
MRF261	145MHz, 6dB gain, 10w output	**8.74**
MRF262	145MHz, 6.3dB gain, 15W output	**14.40**
MRF264	145MHz, 5.2dB gain, 30W output	**15.26**
MRF221	145MHz, 6.3dB gain, 15W output	**17.60**
MRF247	145MHz, 7dB gain, 75W output	**40.74**

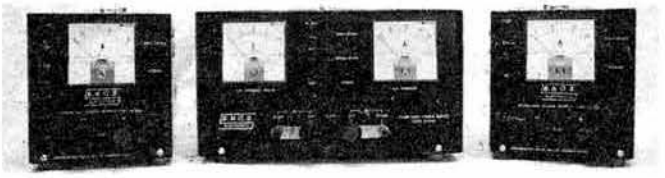
All figures for gain and output power are minimum values, full data supplied with all orders. Send SAE for free data on any of the above transistors.

BNOS 'A' SERIES POWER SUPPLIES

Primarily designed and ideally suited for both amateur and professional mobile transceivers. Now extending our range to meet a growing requirement the model 12/6A and 12/40A have been introduced.

The 'A' series of fixed voltage (13·8V) power supplies are designed to operate at full rated current continuously with voltage regulation better than 0·1%. Short circuit protection, foldback current limit and over voltage crowbar protection circuits are incorporated, along with full RF protection, to minimise equipment damage due to user error or equipment failure.

All of the 'A' series of power supplies incorporate output current meters, well rated output spade terminals (with integral 4mm socket on 6A and 12A models).



12/6A ★★NEW★★ **£48.30**
- ★ 13·8V, 6A continuous output
- ★ 7A maximum output current
- ★ 10A current meter
- ★ 10A output terminals
- ★ LED shut down indicator
- ★ Fully protected

12/12A **£86.40**
- ★ 13·8V, 12A continuous output
- ★ 15A maximum output current
- ★ Large 20A current meter
- ★ 15A output terminals
- ★ LED shut down indicator
- ★ Fully protected

12/25A **£125.45**
- ★ 13·8V, 25A continuous output
- ★ 30A maximum output current
- ★ Large 30A current meter
- ★ 30A output terminals
- ★ LED shut down indicator
- ★ Fully protected

12/40A ★★NEW★★ **£225.40**
- ★ 13·8V, 40A continuous output
- ★ 50A maximum output current
- ★ Large 50A current meter
- ★ Large output voltmeter
- ★ LED shut down indicator
- ★ LED out of regulation indicator
- ★ Output sensing terminals
- ★ Fully protected

UHF CONNECTORS

PT. No.	TYPE	PRICE
Plugs		
BU 01	PL259 for Ø 0·4in cable (UR67)	**0.47**
BU 01A	Reducer for Ø 0·2in cable	**0.12**
BU 01B	Reducer for Ø 0·25in cable	**0.12**
BU 02	as BU 01 but with metric thread	**0.56**
BU 03	PL259 for Ø 0·2in cable	**0.56**
BU 04	PL259 push on connector	**0.81**
BU 05	PL259 elbow plug for Ø 0·2in cable	**0.78**
Sockets		
BU 11	SO259 square flange	**0.40**
BU 12	SO259 single hole, inside nut	**0.47**
BU 13	SO259 single hole, outside nut	**0.47**
Couplers		
BU 21	Back to back female	**0.57**
BU 22	Back to back male	**0.79**
BU 23	Male to female elbow	**1.13**
BU 24	1 male, 3 female 'T'	**1.35**
BU 25	3 female 'T'	**1.46**
BU 26	Female to female lightning arrestor	**1.22**
Adaptors		
BU 31	UHF plug to BNC plug	**1.75**
BU 32	UHF plug to BNC socket	**1.15**
BU 33	UHF socket to BNC plug	**1.49**
BU 34	UHF socket to BNC socket	**1.64**
BU 36	UHF plug to N socket	**2.90**
BU 37	UHF socket to N plug	**2.90**
BU 39	UHF socket to phono/car aerial plug	**0.52**

DUMMY LOAD

BL 01	PL259 connector, 50 ohm impedance, 30W max, 15W continuous rating, DC-150 MHz, VSWR less than 1·2:1	**6.78**

FERRITES

Ferrite rings for TVI suppression (data supplied)	Small type	**0.42**
	Large type	**0.80**
Ferrite Beads	Single hole type O/D 4mm	**0.05**
	Six hole type O/D 6mm	**0.15**

★ ★

NEW 2 metre 100 watt LINEAR/PREAMP

B.N.O.S. announce a whole new range of quality British made 2 metre Linears/Pre-amplifiers.

The new range of 144MHz solid state linear amplifier has been introduced to use with the increasingly popular low power transceivers currently available. Utmost care has been taken to produce a reliable unit with performance characteristics and extra features previously not available in the UK.

The pre-amplifier uses the highly regarded BF981 ultra low noise MOSFET transistor at 12dB gain level to give significant improvement in system performance. The LED Bar-graph power meter facility gives clear bright indication of peak power available during transmission. Modern push button switches are used for all function controls.

Models available to suit the following transceivers:

FT290, C58, IC2, TR9000, IC290, FT480 etc.

U.K. AGENTS

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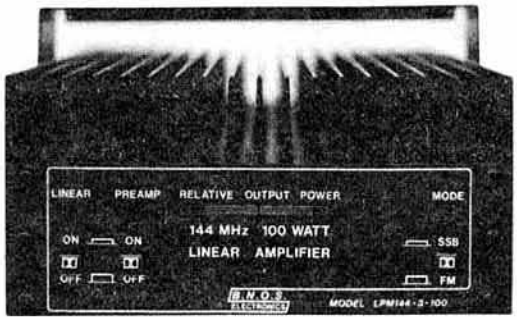
Bredhurst Electronics	Southern England
Dewsbury Electronics	Midlands
Radio & Electronic Serv'	Channel Islands



FEATURES

- ★ 100 Watt RF output power
- ★ All mode operation
- ★ Straight through mode when switched off
- ★ 'State of the Art' low noise pre-amp
- ★ RF and 'HARD' switched change over with selectable delay
- ★ LED Bar-graph power meter
- ★ Custom extrusion for cool operation
- ★ Mobile mount supplied
- ★ All RF connectors supplied
- ★ Excellent input match to drives
- ★ UK designed and manufactured by B.N.O.S. ELECTRONICS

SPECIFICATION

Power outputs	100 Watts nominal
Power inputs	1, 3 or 10 Watts (according to model)
Power requirements	1, 3 Watt models—14 Amp at 13·8V DC 10 Watt model—12 Amp at 13·8V DC
Pre-amp gain	12dB (typical)
Pre-amp noise figure	1·0dB (typical)

BNOS Electronics, Dept RC, Greenarbour, Duton Hill Gt Dunmow, Essex CM6 3PT. Tel: (037 184) 767

All prices inclusive of VAT: SAE for further details

POSTAGE FREE ON ALL MAINLAND UK ORDERS OVER £5. for orders under £5 please add 60p for P&P

LPM144 — 1—100 1 Watt input **£172.50** inc. VAT
LPM144 — 3—100 3 Watt input **£172.50** inc. VAT
LPM144 —10—100 10 Watt input **£149.50** inc. VAT

QUARTZ CRYSTALS

STOCK CRYSTALS

CRYSTALS FOR 2 METRES
£1.96 FOR ONE CRYSTAL
£1.74 WHEN 2 OR MORE PURCHASED

TX CRYSTALS	RX CRYSTALS	CHANNELS IN STOCK
HC6/U 4 & 8MHZ 30PF	44MHZ SERIES RES	RO TO R7, S11, S20 TO S23
HC25/U 12MHZ 30 & 40PF	44MHZ SERIES RES	RO TO R7 S8, TO S23
HC25/U 18MHZ 25 & 20PF	14/15MHZ 20 & 30PF	RO TO R7 S8, TO S23

4 METRE CRYSTALS FOR 70.26 IN HC6/U AT £2.25 each
TX 8.78250 RX 29.78000 6.74666
70CM CRYSTALS £5.00/pr or £2.50 each
For Pye PF1 PF2 & PF70 series. Also Wood & Douglas
SU8(433.2) RB0 RB2 RB4 RB6 RB10 RB11 RB13 RB14 RB15.
ALSO in HC6/U 8.02222 and SU22 for W15U (13.5484 & 11.7458)
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22.000, 38.666, 70.000, 96.000, 101.500, 116.000
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IN HC13 100kHz
HC6/U 200kHz 1000kHz 3.50MHz 5.00MHz 10.000MHz 10.700MHz
HC18/U 1000kHz 7.00MHz 10.70MHz 48.00MHz 100.00MHz
TONEBURST, I.F. & MPU CRYSTALS IN HC18 £2.25 EACH
7.168MHz (For 1750 HZ Tone), 10.245 (for 10.7 I.F.)
3.2768 4.0000 5.06888
YAESU CRYSTALS for FT101s FT901 & etc £4.00 each
Many available ex stock (A list is available on request pse send S.A.E.)

A stamped addressed envelope with ALL enquiries please

MADE TO ORDER CRYSTALS

FUNDAMENTALS

FREQUENCY RANGE	PRICE
6 TO 30kHZ	**£23.00**
30 TO 80kHZ	**£15.00**
80 TO 159kHZ	**£10.50**
160 TO 999kHZ	**£7.00**
1 TO 1·5MHZ	**£10.75**
1.5 TO 2.5MHZ	**£5.00**
2.5 TO 4.0MHZ	**£4.75**
4 TO 21MHZ	**£4.55**
21 TO 25MHZ	**£6.50**
25 TO 30MHZ	**£8.50**

OVERTONES

	FREQUENCY RANGE	PRICE
3rd OVT	21.00 TO 65.00MHZ	**£4.55**
5th OVT	60.00 TO 110.00MHZ	**£5.10**
5th OVT	110.00 TO 125.00MHz	**£7.00**
5th, 7th & 9th OVT	125.00 TO 150.00MHZ	**£8.00**
	150.00 TO 250.00MHZ	**9.50**
DELIVERY	2.0 TO 125.0MHZ 2 TO 3 weeks	
	1.0 TO 2.5MHZ 3 TO 4 weeks	
	Other frequencies 6 to 8 weeks	

Unless otherwise requested fundamentals will be supplied for 30pf load capacitance and overtones for series resonant operation.
HOLDERS: PLEASE SPECIFY WHEN ORDERING—else HC25/U supplied for XTLS above 3MHz HC13/U 6-200kHz HC6/U & HC33/U 170KHZ-170MHZ HC18/U & HC25/U 2-250MHZ
DISCOUNTS: Price on application for 10 + units to same frequency/spec. or bulk purchases of mixed frequencies. We supply xtals for use in U.K. repeaters.
COMMERCIAL CRYSTALS: available on fast delivery and at competitive prices.
Please send for list stating interests
EMERGENCY SERVICE: for XTALS 1 to 125MHz. Add the surcharge for each XTAL. Days refer to working days. 4 days +£12, 6 days +£7, 8 days +£5, 13 days +£3.
CRYSTAL SOCKETS HC6 & HC25 £0.20 each. MINIMUM ORDER CHARGE £1.50
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ALL PRICES ARE EX VAT PLEASE ADD 15%

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Telephone: 01-690 4889 24Hr Ansafone: Erith (03224) 30830
Telex: 8813271 GECOMS—G (Attention QUARTSLAB)

WOOD & DOUGLAS

NEW PRODUCTS are appearing— such as the 144LIN25B and MPA2. Send for further details

PROJECT	CODE	ASSEMBLED	KIT
70cms EQUIPMENT			
Transceiver Kits and Accessories			
FM Transmitter (0.5W)	70FM05T4	38.10	24.95
FM Receiver	70FM05R5	68.25	48.25
Synthesiser (2 pcb's)	70SY25B	84.95	60.25
Synthesiser Transmit Amp	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 2 (Synthesised)	70PAC2	163.00	128.00
TV Products			
Receive Converter (Ch 36)	TVUP2	26.95	19.60
Pattern Generator	TVPG1	39.95	32.53
TV Modulator	TVM1	8.10	5.30
3W Transmitter (boxed)	ATV-1	87.00	–
3W Transceiver (boxed)	ATV-2	119.00	–
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TRIO

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TONNA

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TONO

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Send for details NEW RANGE.

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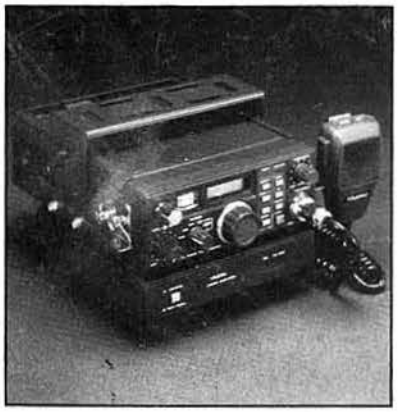

FT-790R
FT-290R
(+FT690R, 6 metres)
MULTIMODE
MULTI-ROLE
VHF/UHF TRANSCEIVERS

MULTIMODE OPERATION
Never before possible from such a compact package, true multimode —USB, LSB, CW & FM—operation is yours to enjoy. With CW and SSB activity at an all-time high, you will not be left out of the satellite or DX action and you can still ragchew on FM simplex or even via a repeater (inbuilt shift and 1750Hz tone burst).

ADVANCED MICRO CONTROL
Advances in microprocessor circuitry allows selectable synthesizer steps, up/down scanning from the microphone, priority channel operation, and ten memories (with memory scan), all called up with fingertip ease.

LCD DISPLAY
A large, newly developed Liquid Crystal Display provides readout of the operating frequency, and an indication of a number of the control functions. It is highly readable under conditions of bright sunlight and is backed up by a lamp for night-time operation.

PROGRAMMABLE SYNTHESIZER
The optimum synthesizer steps for SSB/CW or FM operation are very different. That's why Yaesu gives you the flexibility of two synthesizer steps per mode: 100Hz or 1kHz per step on SSB and CW, and 12½/25kHz (2m), 25/100kHz (70cm). When changing modes from SSB/CW to FM, your transceiver is automatically set to the nearest standard channel when you start scanning or tuning.

TEN MEMORY CHANNELS
As many as ten frequencies may be stored into memory, for instant recall. The priority feature allows you to check a favourite frequency every few seconds, with automatic halting (FM mode) when the channel is clear or busy, as desired. Memory backup is provided by a built-in lithium cell, with an estimated lifetime of five years.

DUAL VFO SYSTEM
These transceivers feature a digitally synthesized dual VFO system which provides tremendous flexibility in day to day operation. For example, one VFO may be set up in the SSB portion of the band, and the other in the FM sub-band, for immediate QSY when changing modes.

CONVENIENT FEATURES
Among the many features adding to the convenience of the transceiver is a supplied portable antenna, a high-performance noise blanker, a high/low power switch, and a battery condition meter. A clarifier (offset tuning) allows you to follow unstable or Doppler-shifted signals.

FT690R
In addition to the two metre and 70 centimetre units detailed here, the FT690R six metre (50-54MHz) transceiver completes *for the time being*, the range. The general specifications are similar but modes are USB-CW-AM-FM, power is 2½W PEP [0.8W AM—for which a 4kHz filter is fitted]. Further details on request.

GENERAL FEATURES

Modes of operation:
SSB (USB, LSB) CW & FM

Frequency response:
300-2,700Hz @ −6dB

Carrier Suppression:
Better than −40dB

Sideband Suppression:
Better than −40dB

FM Deviation:
±5kHz (max)

Tone burst frequency:
1,750Hz

Selectivity:
SSB/CW: 2.4kHz @ −6dB
4.1kHz @ −60dB
FM : 14 kHz @ −6dB
25 kHz @ −60dB

Image rejection:
Better than −60dB

Audio output:
1 Watt @ 10% THD

Audio output impedance:
8 Ohms

Dimensions:
58H × 150W × 195D mm
1.3kg (without cells)

Power requirements:
8 × C size dry cells
8 × C size Nicad cells
External 8.5-15.2VDC
Memory backup: Lithium cell

Microphone:(YM47 supplied)
600 ohms ppt with scan

ACCESSORIES

YM49
Remote speaker mic

YM50
DTMF keyboard mic

MMB11
Mobile mounting bracket

FL2010
2 metre 10W amplifier

FL7010
70cms 10W amplifier

CSC1A
Vinyl carrying case

NC11C
Battery charger

FLC11
H.D. Leather case

YHA15
Helical antenna (FT290R)

FT-290R

Frequency coverage (MHz):
144-146 or 144-148

Synthesizer steps:
SSB/CW: 100Hz/1kHz
FM : 12.5/25kHz

Current consumption:
70mA receive
800mA Tx (2.5 W RF FM)

Antenna:
SO239 on rear
Telescopic ¼ Wave supplied

RECEIVER

Intermediate frequencies:
1st IF 10.81MHz
2nd IF 455kHz (FM)

Sensitivity (better than):
SSB/CW: 0.5μV for 20dB S/N
FM : 0.25μV for 12dB SINAD

TRANSMITTER

Power Output:
2.5 Watts at 12VDC

Spurious radiation:
Better than −60dB

Repeater split:
600kHz (+ and −)

FT-790R

Frequency coverage:
430-440MHz

Synthesizer steps:
SSB/CW: 100Hz/kHz
FM : 25/100kHz

Current consumption:
100mA receive
750mA Tx (1W RF FM)

Antenna:
BNC on top panel
¼ Wave flexi supplied

RECEIVER

Intermediate frequencies:
1st IF 67.3MHz
2nd IF 10.7MHz
3rd IF 455kHz (FM)

Sensitivity (better than):
SSB/CW: 0.16μV for 10dB S/N
FM : 0.25μV for 12dB SINAD

TRANSMITTER

Power Output:
1 Watt at 12VDC

Spurious radiation:
Better than −50dB

Repeater split:
1.6MHz (input listen)

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