

*The*

# SHORT WAVE

*Magazine*

40p

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OCTOBER 1979

NUMBER 8

OPEN UP  
THE EXCITING WORLD  
OF SHORTWAVE LISTENING  
**SRX 30**

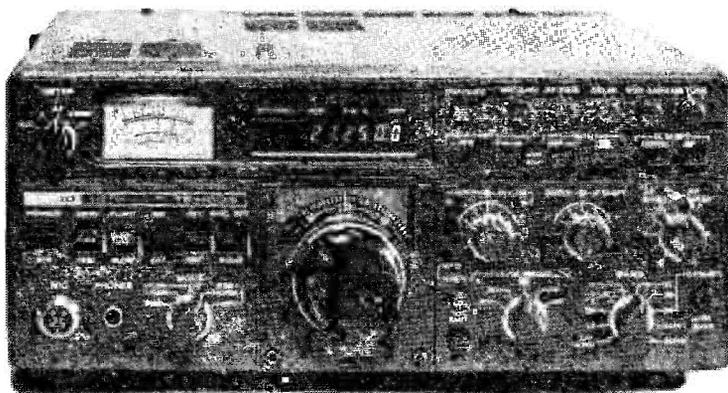


**contact LOWE ELECTRONICS**

119 Cavendish Rd., Matlock, Derbyshire. Tel. Matlock (0629) 2430 or 2817

# LOWE ELECTRONICS Ltd

## THE ALL NEW TS 180S



- ★ 160-10m (28-30 MHz)
- ★ ALL SOLID STATE
- ★ 200W PEP
- ★ VARIABLE POWER
- ★ PASSBAND TUNING
- ★ NEW DIGITAL FREQUENCY CONTROL
- ★ NEW COMPRESSOR
- ★ NEW STANDARDS OF PERFORMANCE

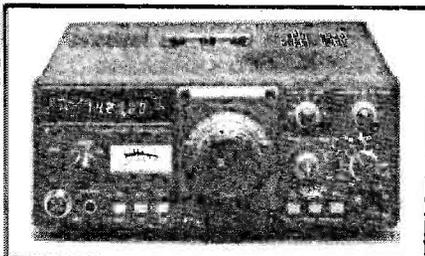
### GET READY FOR THE NEW HF LEADER

Well chaps, Trio have done it again. We proudly introduce the new top of the line HF transceiver from the people who lead the field.

The all new TS180S will delight the most demanding user with its combination of high power, small size, all solid-state design and an array of features like no other transceiver has had before.

The digital frequency control system is an operators' dream since it allows split frequency working, displays frequency dispersion, has multiple memories which not only store any frequency but also allow shifting around the memorised channel and much, much more.

Every facility you ever wanted is included in the HF dream machine — the TS180S from Trio. TS180S complete with digital frequency control £825 inc VAT



### TS120V only £408 inc VAT

Measuring only 9½" x 3½" x 9½" — which is about the size of a packet of cornflakes, the TS120V can best be described as a miniature TS820. The rig covers all bands 80-10 metres — and all of 10 metres 28-30 MHz so it's ideal for transverter driving, has digital readout built in, vox, break-in CW, RIT, noise blanker and the unique Trio passband tuning system used in the 820. The power output is 10W and a matching linear will be along shortly.

The TS120V is clearly a winner for mobile operation but is equally attractive at home and is perfect for the VHF/UHF enthusiast who requires a high performance I.F. system for his transverters.

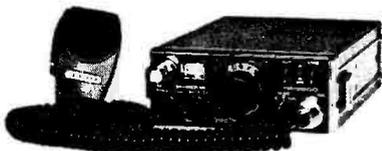
The transceiver is based on an advanced PLL system and the digital readout gives you the correct operating frequency at all times unlike many other rigs. Remember my previous comments about Trio attention to detail.

For ease of operation, the TS120V is unsurpassed; simply select the band required, tune the VFO to the frequency you want and there you are; no preselector or PA tuning to worry about, and a distinct safety feature for the mobile operator.

**STOP PRESS — TS120S now in stock. As TS120V but 200W P.E.P. £495 inc. VAT.  
SEND 50p IN STAMPS FOR COMPLETE CATALOGUE AND ANTENNA BOOK  
PLEASE SPECIFY ANY PARTICULAR INTEREST AND WE WILL SEND FULL INFORMATION**

# LOWE ELECTRONICS Ltd

## TRIO TR2300 £199 inc VAT



The TR2300 is a remarkable package which combines all the advantages of a portable station with those of a sophisticated mobile set. With the TR2300, you get full band coverage from 144-146 MHz in fully synthesized 25 kHz channels together with 600 kHz repeater shift (and reverse repeater if required) with automatic 1750 Hz tone burst.

The dial is directly calibrated in frequency and has switched illumination for ease of use at night. The transmitter puts out a very clean signal at a power in excess of one watt, and the receiver is very sensitive, in fact better than many big rigs. The external power and external antenna sockets allow one to use it as a fixed station when desired.

The TR2300 is amazingly small, much smaller than its predecessor the TR2200GX and uses a more sophisticated case design and modular construction making a really rugged rig. It comes complete with carrying case, shoulder strap, battery charger, external power cord, etc. Needless to say, you don't need any crystals!

## And now some new goodies from Matlock



An interesting new range of station accessories aimed at the advanced short wave listener. Based on a mini rack system, each unit measures only 8½" wide and 2½" high and is individually designed to fulfil a particular need in the station. Any unit or combination of units can be mounted in the mini rack or, of course, used alone.



**AX-1 Sky Changer. £27.00, including VAT** — This is a complete station aerial switching system to allow instant connection of up to six different aerials or accessories to any one of six receivers. Both single wire and coaxial feeds are available and the additional facility of a variable attenuator which can be switched into the system to reduce receiver overload.



**KX-2 Sky Coupler. £29.90, including VAT.** An entirely new wide range aerial tuning system which covers the frequency range 500 KHz to 30 MHz thereby not only catering for all HF aerials and receivers but for the first time the 500 KHz - 1.7 MHz range for the keen MW DX listener. Already selling like wildfire, this is the new standard for all SWL tuning units.

**AP11 Audio Processor. £45.15, including VAT.** A complete audio processing system to suit any receiver, the AP11 simply plugs into the receiver phone socket and provides a variable band width filter with variable frequency tuning as well as a tunable deep rejection notch to take out those difficult to deal with heterodyne whistles. Requires 12V DC for operation and really has to be handled to hear the benefits which a good audio processor can give. Transforms your DX listening.

**DX-008D Programmable counter. £115.00, including VAT.** The Rolls Royce of station counters, the DX-008D embodies more good ideas than any instrument we have yet seen. Incorporating its own 240V AC power supply, the DX-008D is basically a high stability digital frequency meter using a large easy to read 5 digit display. The frequency range extends to well over 50 MHz and therefore caters for all HF uses. The outstanding feature of the DX-008D is that each digit in the counter can be individually programmed by simple slide switches (20 of them!) so as to include any IF offset, whether it be 10.7 MHz, 455 KHz, 1.6 MHz, 3.18 MHz or almost any IF in current use. Thus, by measuring the VFO in your receiver or transmitter, the operating frequency is directly displayed. For the equipment such as Collins, Trio and KW in which the VFO tunes high to low when the rig operating frequency is tuning low to high, the DX-008D can be switched to count down from zero instead of up from zero (if it's confusing, just call and ask us to explain). It doesn't matter if the receiver oscillator is above or below the signal frequency, the DX-008D can accommodate it. Truly the ultimate accessory for the man who needs to know his frequency — and at a similar price to many ordinary counters not having the facilities.

## FS10 10 CHANNEL FM SCANNER



FOR 2 METRES  
OR MARINE

## NEW AIR BAND MONITOR



TUNABLE +  
CRYSTAL CONTROL

## SURELY THE MOST AMAZING HAND-HELD TRANSCEIVER YET!

The AR240 is a truly staggering rig. In a small hand-held unit, you have a fully synthesized 2 metre FM transceiver covering 144-148 MHz in 5 kHz steps. Frequency selection is by direct reading top mounted decade switches giving instant access to any frequency in the tuning range. Power output is over 1W and the receiver sensitivity is not only excellent, it's maintained across the full tuning range by automatic voltage controlled tracking. Both up and down 600 kHz repeater shifts are built in as is a 1750 Hz tone burst.

What more could you ask for in a hand held, except possibly a price of £195 including VAT?

### LOWE ELECTRONICS HEAD OFFICE AND SERVICE CENTRE

119 CAVENDISH ROAD, MATLOCK, DERBYS. TEL: 0629-2817 or 2430. TELEX 377482. OPEN 9-5.30 TUES-SAT. PHONE IN 9am-9pm.

Agents: John, G3JYG, 16 Harvard Road, Ringmer, Lewes, Sussex, Ringmer B12071. Sim, GM3SAN, 19 Ellismuir Road, Ballieston, Nr Glasgow. 041-771 0364

**COME AND SEE US SOON — IT'S WORTH THE VISIT. 73 DE G3PCY**

# AMATEUR ELECTRONICS UK

## AEUK — Your number one

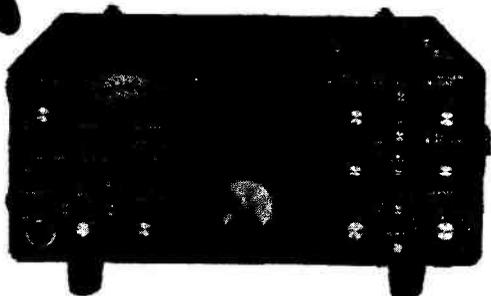
AS FACTORY APPOINTED DISTRIBUTORS WE OFFER YOU—  
WIDEST CHOICE, LARGEST STOCKS, PROMPTEST DEAL AND  
FAST, SURE SERVICE RIGHT THROUGH.

The widest choice from 2-10

The Yaesu range is now so great that it simply caters for every taste—this makes it a *must* to browse through Yaesu's main catalogue—please see our offer on facing page.



Above we show the now firmly established FT-227R 2m. Mobile now also available in its scanning versions. On the right is the superb FT-225RD, the 2m. base station that has everything, designed for the man who insists on the best. At left is the FT-202R Hand-held—so compact but so effective.



The FT-901DM is the base station *par excellence* and its receiver performance alone is simply out of this world. Together with the range of matching ancillary units—which are growing all the time—this builds a station which fulfils every conceivable requirement for the operator who demands the ultimate.



### HOW TO REACH US (EASY PRIVATE PARKING ON OUR 70ft. FORECOURT)

**FROM SOUTH AND EAST.** We are located approximately two miles from Junction 5 of the M6 from which follow signposts to Birmingham. Within ¼ mile turn right at Clock Garage and proceed towards city. After one mile look for traffic lights at Fox & Goose and immediately over the lights take minor left fork into Alum Rock Road. We are located one mile from this point.

**FROM NORTH.** Leave M6 at Junction 6 (Spaghetti) and follow left fork down to traffic island beneath motorway complex. Take third turning off to Lichfield. One mile further on follow A 4040 to the right and within 100 yds. veer again to the right, approximately one mile further on brings you to the Fox & Goose. Turn right and see preceding directions.

**FROM THE WEST AND SOUTH/WEST.** Follow M5 then M6 to Spaghetti Junction (see above). Alternatively, leave M5 at junction 4 or 3 and proceed to inner ring road. Turn South on ring road and leave on A47 (East). We are located three miles from this point.

**Hours: 9.30-5.30 Continuous including Saturdays—Early closing Wednesday, 1 p.m.**



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



# AMATEUR ELECTRONICS UK

## source for **YAESU MUSEN**



PLUS EX-STOCK DELIVERY OF THE FABULOUS NEW FT-101Z AND FT-101ZD, THE LATEST HF BAND TRANSCEIVERS FROM YAESU MUSEN.

NEVER BEFORE HAS THE RADIO AMATEUR BEEN OFFERED SUCH SOPHISTICATED EQUIPMENT AT SUCH REALISTIC PRICES — JUST STUDY THE CONDENSED SPECIFICATION BELOW AND YOU'LL FIND FEATURES AND VERSATILITY ONLY AVAILABLE ON MUCH MORE EXPENSIVE RIGS — CALL, PHONE OR WRITE FOR FULL DETAILS (PLEASE SEE FACING PAGE).

## FT101ZD Series High Performance Transceiver

### FULL COVERAGE

Full band coverage is provided on the FT-101ZD: 160 through 10 meters, plus WWV/JJY reception on 5MHz. Teamed with the FTV-901R transverter, operation can be extended to 50, 144, and 430 MHz from your desk top.

### CLEAN OUTPUT SIGNAL

With today's crowded bands, we all have the responsibility to keep our transmitted signal free of spurious radiation. YAESU engineers have included RF negative feedback, for a clean output signal.

### STATE OF THE ART NOISE BLANKER

The all-new noise blanker is extraordinarily helpful in reducing the level of impulse noise. The blanking level may be adjusted from the front panel.

### RF SPEECH PROCESSOR

A high-performance RF speech processor is built into every FT-101ZD, providing an increase in your average talk power of approximately 6dB. The processor level can be adjusted from the front panel, for optimum signal enhancement.

### WORLD-WIDE POWER CAPABILITY

The FT-101ZD has provision for operation from a variety of AC voltages, from 100 to 234 volts. When you're travelling, you'll never need a heavy, bulky transformer for operation with your FT-101ZD. A DC-DC converter is an available option, for mobile operation. The FT-101ZD is small enough to qualify as carry-on baggage on most airlines, and is equipped with a strong, side-mounted handle for ease of carrying.

### VARIABLE IF BANDWIDTH

Using two 8-pole crystal filters with superior shape factors, the FT-101ZD variable bandwidth system is a valuable tool on today's crowded bands. With the turn of a dial, high-pitched SSB "buckshot", or unwanted CW signals, can be eliminated from the IF passband.

Compare for yourself: other systems use a single filter in the IF; though you can move away from one interfering signal, you may move into more QRM. The YAESU design actually varies the bandwidth, *eliminating* the QRM. Other manufacturers would have you spend hundreds of pounds on different

filters for 2.1kHz, 1.8kHz, 1.5kHz, 800Hz, 1500Hz, etc. With the FT-101ZD, you have continuously variable bandwidth — from 2.4kHz down to 300Hz.

### DIGITAL PLUS ANALOG READOUT

The FT-101ZD features digital plus analog frequency readout. The display features big, bright LED digits, for maximum readability. For extra savings, the economy model FT-101Z gives you the same precision analog display, at a significantly reduced cost. You can add the digital display later, if you wish.

### INTERFACE WITH 901 SERIES COMPONENTS

Your FT-101ZD may be used with all of the exciting FT-901DM series accessories. The FV-901DM synthesized, scanning VFO provides storage and recall of up to 40 frequencies, in addition to its 3-speed scanner and auto scan function. See for information on other accessories.

HOW TO REACH US (EASY PRIVATE PARKING ON OUR 70ft. FORECOURT)



**ATLAS  
RADIO INC.**

AS DIRECT IMPORTERS AND MAIN AGENTS WE OFFER THE FAMOUS ATLAS 210X and 215X TOGETHER WITH ALL ACCESSORIES FROM STOCK.

- BRANCH: AMATEUR ELECTRONICS, UK — COASTAL, CLIFTONVILLE, KENT, KEN McINNES, G3FTE, THANET (0843) 291297. 9 am-10.30 pm.
- BRANCH: AMATEUR ELECTRONICS UK — SCOTLAND, 287 MAIN STREET, WISHAW, LANARKSHIRE, GORDON McCALLUM, GM3UCI. TELEPHONE WISHAW 71382. (EVENINGS CARLUKE 70914).
- AGENT: WALES & WEST — ROSS CLARE, GW3NWS, CAERLEON, NEWPORT. (CAERLEON 422232) — ONLY 20 MINUTES OVER THE SEVERN BRIDGE.



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## Tried — Tested and Popular . . .



### THE LEADER BASE STATION IC-211E

Fast becoming one of the most popular base station rigs because of its superb performance and advanced technology, the IC-211E leads the field in 2M base stations. With a full synthesizer which employs state of the art technology it provides all you want for full coverage on FM USB, LSB or CW on 2 metres with that extra bit of quality for which ICOM are so renowned, plus the chance to use the latest digital technology and even drive it from your home computer if you wish!

Less VAT = £477.39 With VAT = £549

### THE MOBILES

The IC-245E is probably the only multi-mode mobile on the market. Of course, it can also be used as a base station, and many own one for just this purpose. It employs all the same technology as the IC-211E, and is in fact virtually the same electronically with the exceptions that it only operates on USB, FM and CW and does not have VOX and sidetone or full seven digit readout. As with the 211 you have access, via a multi-way plug on the back, to the LSI synthesizer for connection of a keypad, computer or other bit of home-brewed logic.

Less VAT = £354.96 With VAT = £408



IC-245E  
NOW £399 inc.



IC-240  
NOW £193 inc.

The IC-240 is the ideal mobile rig for most people. Apart from the fact that it is quite a lot cheaper than most, it is, in fact, more suitable than many to use in the car while driving (and let's face it, it is under those conditions that most mobiles are used). It can be operated with ease without taking your eyes off the road and provides up to 22 channels (which is more than you are likely to need). Being synthesized, of course, there are no crystals to buy for extra channels. Full repeat, reverse repeat and automatic tone burst plus a low power facility are selectable from the front panel. By adding a 'Superscan' at a later date you can obtain full scanning facilities over the whole band at a VERY competitive price.

The IC-240 is a superbly built and very reliable piece of equipment as witnessed by the many thousands in use. All Icom equipment is built to a very high standard and the IC-240 is no exception. It has an excellently sensitive receiver and a very clean transmitter and will give you hours of headache-free pleasurable use — so why not get one now before the price goes up again!

240 Alone  
Less VAT = £167.91 With VAT = £193.00 (while stocks last)



IC-280E  
NOW £250 inc.

★ WITH SCANNER £260

As usual, ICOM have kept ahead with technology and have produced their revolutionary new IC-280E which uses a microprocessor to produce frequencies throughout the 2m band at the ideal 25kHz spacing required today. The IC-280 has the ideal advantage of being separable into two parts for easy mounting into today's cars which so often forget to leave space for a rig. The removable front panel, with all controls, is only 3" deep and will fit in any convenient spot — in the glove pocket, on the dash or even on the sun visor! The main part of the set can be mounted anywhere within 4 feet — or even further in many cases — under the passenger's seat is quite handy! Display is of frequency on an LED readout and there are three memories for your favourite channels. These are not cleared when the set is switched off as long as it is left connected to the car battery.

Less VAT = £217.50 With VAT = £260

#### AGENTS (PHONE FIRST — All evenings and weekends only, except Norfolk and Burnley)

Scotland — Jack GM8GEC (031-665 2420)  
Wales — Tony GW3FKO (0222 702982) Burnley — (0282 38481) Midlands — Tony G8AVH (021-329 2305)  
North West — Gordon G3LEQ (Knutsford (0565) 4040) Yorkshire — Peter G3TPX (022678 2517)

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YOUR SOLE AUTHORISED UK IMPORTER FOR ICOM

## THANET ELECTRONICS

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





## ... Simply the Best ...



**IC-215**  
**£162 inc.**

The IC-215 is getting more and more popular also as it combines the advantages of a portable, which can be operated anywhere, with the ability to double as a low power base station by virtue of its 3 Watts of output and S0239 antenna connector on the back. Of course there are facilities to operate it from an external power supply, and if it is fitted with Ni-Cads you can arrange to trickle charge these at the same time. The batteries used are of a sensible size being C type (or U11) instead of the 'penlight' batteries used by most of its competitors. This gives at least three times the operating power when you are away from home which you will appreciate if ever you have run out of battery in the middle of QSO! It comes already crystallised up for 12 channels, S20, S22 and all the repeater channels 0 to 9. We think the extra power and larger batteries far outweigh the advantages of having the extra channels produced from a synthesizer.

Less VAT = £140.87      With VAT = £162.00



**IC-202S**  
**£199 inc.**

ICOM's range of sideband portables has been recently expanded. The well known and tested IC-202E has now been improved in the form of the IC-202S which has lower side band fitted also and provides sidetone on CW. The receiver has been hotted up making it even more suitable for use as a base station, either barefoot or as a prime mover. The new IC-402 is the 70cm version of the 202S giving the same facilities as its 2m cousin over the range 432-435.2 MHz. Both use a very stable VXO circuit, to give fully tuneable coverage of the band in 200 kHz segments and both have extremely clean signals so that using them to drive a linear to the full legal limit presents no problems. We are very impressed with both the 202S and the 402.

The IC-202E was good . . . these are even better!

IC-202S    Less VAT = £173.04      With VAT = £199.00  
IC-402     Less VAT = £255.65      With VAT = £294.00



**IC-402**

### OR IF YOU WANT A HAND-HELD— HOW ABOUT THE AR-240!



**AR-240**

Although not made by ICOM, we decided to take this exciting new little hand held into stock because it fills the need for a really good portable where size is of prime importance. It has an amazing performance with a truly excellent receiver. A synthesizer is used, with decade switch read out to cover the range 144-148MHz in 5kHz steps and 600kHz repeater shifts and a tone burst are built in. It comes with NiCads, a charger and a telescopic whip antenna — though if you want to make things even neater then you can use the ICOM FA 1 flexible helical in place of this. At £195 inc VAT we think this is really good value for money.

**AVAILABLE NOW DIRECT FROM HERNE BAY**  
Less VAT = £173.13      With VAT = £199.00

#### **240 Channelizer**

We have now a new mod. for the IC-240 which gives 80 Channels, displayed as channel numbers selected on thumbwheel switches.  
**Kit £37 inc. VAT**

Phone — or put a message on the ansafone for further details

**ALSO AVAILABLE FROM OUR SHOP IN HERNE BAY**

**MICROWAVE MODULES**

**ANTENNA SPECIALISTS**

**J-BEAM**

**YAESU MUSEN**

**FDK**

HP AND PART EXCHANGE WELCOMED



## THE 'REMOTABLE' 2m RIG



**IC-280**

**£250**  
inc VAT

★ WITH SCANNER FOR £260! ★ (Contact us first)

**25kHz SPACING OVER THE WHOLE BAND:  
3 MEMORIES: LED READOUT:  
BUT MOST IMPORTANT — ICOM QUALITY**

Icom's new 2 metre mobile has a detachable microprocessor controlled head, easy to read LED's and a new style meter set in a brushed aluminium front panel.

The 280E comes as one radio which can be mounted in the normal manner but as an option the entire front one third of the radio detaches and can be mounted in that small location in the car (such as the glove pocket) where other sets are just too large to fit, while the main body tucks neatly out of sight several feet away — such as under the passenger's seat. No longer do you have to mount a radio in a position where it is poised all ready to smash your right kneecap should you have an accident!

With the microprocessor head the IC-280E can store three frequencies of your choice, which are selected by a four position front panel switch. These frequencies are retained in the 280E's memory for as

long as power is applied to the radio. Even when power is turned off at the front panel switch the programmed memories are maintained; and the 600kHz repeater shift is always retained.

It goes without saying that the usual high quality engineering for which Icom are renowned is found in the 280E. There are no nasty shortcuts to try to keep the price down to the detriment of performance.

It includes the latest innovations in large signal handling FET front ends for excellent intermodulation performance and good sensitivity at the same time. The IF filters are crystal monolithics in the first IF and ceramic in the second, providing narrow band capacity for today and tomorrow's crowded operating conditions. Modular PA construction with broad band tuning provides full rated power across the full 2 metre band.

FROM **THANET ELECTRONICS** OF COURSE



## DON'T WORRY — WE GUARANTEE ALL SOLID STATE RIGS INCLUDING PAs

# 1 IC-211E 2m All-mode

Covering the full 2 metre band with fully synthesised multi-mode operations, the IC211E is the most advanced, highest quality 2 metre transceiver available anywhere. The IC211E comes complete with ICOM's single-knob frequency selection and two digital VFO functions, standard features at no extra cost.

The large weighted flywheel knob mounted with low friction ball bearings is used to drive an optical chopper to provide pulses to the synthesiser LSI, which shows a full 7 digit readout. A breaking mechanism, which operates electrically, engages to provide a smooth feel at slow speeds; and a "dial lock" button holds the reading at the time it is pushed, even though the knob continues to rotate.

The IC211 incorporates computer compatible interface via the 24 pin accessory socket on the rear which enables PIA connection for the microprocessor buff.

The IC211's synthesiser steps are displayed, with positively no time lag, backlash or uncertainty in display stability, in increments of 100Hz or 5kHz from 144-146MHz. Any offset for repeater use can be programmed.



### SMALL ENOUGH FOR MOBILE!

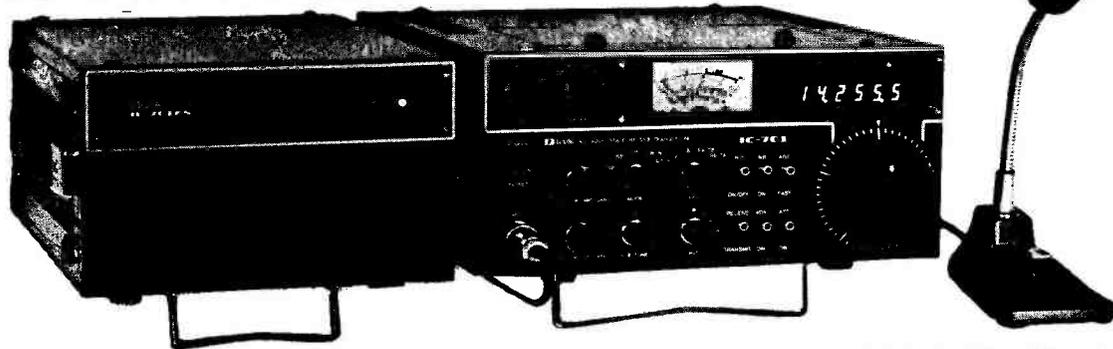
The IC211 contains both 240v ac and 13.6v dc power supplies and has a built-in high SWR autopower control. Variable output power contributes to the IC211's versatility. Output between 500 milliwatts and 10 watts may be front panel controlled on FM.

More of the maximiser's built-in standard features include: a pulse type IF noise blanker; front panel discriminator meter, SWR meter; VOX with adjustable VOX gain delay and antivoix; CW monitor volume level; and semibreak-in CW operation.

And your new IC211 carries the THANET 1 year warranty backed by spare parts and technical expertise if bought directly from us.

COMPARE THE IC211 WITH THE OTHERS! £549 inc. VAT

# 2. Computer compatible — the Best! IC-701 HF £899



ICOM's superior LSI technology takes the lead in Amateur HF. The extremely compact IC-701 delivers 100 watts output from a completely solid state, no tune (broad band design) final, on all modes and all bands, from 160-10 M. With single knob frequency selection and *built-in dual VFO's*, the LSI controlled IC-701 is the choice in computer compatible, multi-mode Amateur HF transceivers.

The IC-701's single frequency control knob puts fully synthesised instant tuning at a single finger tip. **WIDE** bandsread, with 100Hz per division and 5kHz per turn, is instantly co-ordinated between the smooth turning knob and the synthesiser's digital read-out with positively no time lag or backlash (no waiting for counter to update: less operator fatigue). And at the push of the electronic high speed tuning button, the synthesiser flies through megacycles at 10kHz per step (500Hz per turn).

The computer compatible IC-701 LSI chip provides input of incremental step or digit-by-digit programming data from an external source, such as the

microprocessor controlled accessory which will also provide remote band selection and other functions.

Full band coverage of all six HF bands, and continuously variable bandwidth on filter widths for SSB, RTTY, and even SSTV, help to make the IC-701 the very best HF transceiver ever made. IC-701 includes two CW widths, all of this standard at no extra cost.

Sold complete with the high quality electret condenser base mic (SM-2), the IC-701 is loaded with many ICOM quality standard features. Standard in every IC-701 are *two independently selectable, digitally synthesised VFO's* at no extra cost. Also standard are a double-balanced schottky diode 1st mixer for excellent receiver IMD, and RF speech processor, separate drop times for voice and CW VOX, optionally continuous RIT, fast/slow AGC, efficient IF noise blanker, fast break-in CW, and full metering capability.

from **THANET** of course.

# RADIO SHACK for TRIO



## TRIO EQUIPMENT

		Inc. VAT Carriage £ £			Inc. VAT Carriage £ £		
<b>TS820S</b>	160-10m transceiver 200W PEP (with DG1)	832.00	3.75	<b>BPF2A</b>	2m band pass filter 144-146MHz 50W rms 100W PEP	25.20	1.00
<b>TS820</b>	160-10m transceiver 200W PEP	710.00	3.75	<b>RD300</b>	High power dummy load	59.50	0.50
<b>DG1</b>	Digital readout to 100Hz	122.50	1.00	<b>TS700S</b>	2m all mode digital readout transceiver. Simply the best	549.00	3.75
<b>SP820</b>	Speaker	39.00	1.50	<b>SP70</b>	Matching speaker	20.50	1.00
<b>VFO820</b>	External VFO	123.50	3.75	<b>VFO700S</b>	External VFO	92.00	3.75
<b>TG88C</b>	CW filter 8 pole	38.00	0.50	<b>TS770</b>	2m/70cm all mode dual bander	t.b.a.	
<b>DS1A</b>	12V dc inverter	43.00	1.00	<b>TR7500</b>	2m FM mobile 10W transceiver PLL with all 80 FM channels	240.00	3.75
<b>R820</b>	The ultimate matching receiver to the TS820	790.00	3.75	<b>TR7600</b>	2m synthesised mobile/fixed transceiver 10Watt	247.25	3.75
<b>YG455C</b>	CW filter 500Hz	61.50	0.50	<b>TR7625</b>	2m synthesised mobile/fixed transceiver 25 Watts	273.70	3.75
<b>YG455CN</b>	CW filter 250Hz	69.00	0.50	<b>RM76</b>	Microprocessor control unit	74.50	1.00
<b>TS520S</b>	160-10m transceiver	542.00	3.75	<b>PS6</b>	AC PSU for TR7500/7600	59.50	3.75
<b>SP520</b>	Speaker	18.00	1.25	<b>TR2300</b>	2m FM portable transceiver PLL with all 80 FM channels	199.00	3.75
<b>VFO520S</b>	External VFO	103.00	3.75	<b>VB2300</b>	10W booster	59.30	1.00
<b>YG3395C</b>	8pole CW filter	40.00	0.50	<b>MB2</b>	Mobile mount	18.90	1.00
<b>DG5</b>	Digital display/counter	119.50	1.50	<b>RA1</b>	Helical rubber antenna	6.90	0.25
<b>DK520</b>	Conversion for older TS520	10.50	0.75	<b>VB2200GX</b>	10W PA for TR2200G/GX	46.00	1.00
<b>TS120S</b>	80-10m mobile transceiver 200W PEP	495.00	3.75	<b>PS1200</b>	Power unit and charge TR2300/3200/2200GX	29.50	1.00
<b>TS120V</b>	80-10m mobile transceiver 20W PEP	408.00	3.75	<b>TS180S</b>	160-10m solid state transceiver	712.00	3.75
<b>PS20</b>	AC power supply for TS120V	52.00	3.75	<b>TS180S</b>	As above but with digital frequency control	825.00	3.75
<b>MB100</b>	Mobile mounting bracket	17.00	0.75	<b>VFO180</b>	External VFO	120.75	1.00
<b>YK88C</b>	500Hz CW filter	29.00	0.50	<b>SP180</b>	Speaker	42.70	1.00
<b>SP120</b>	External speaker	25.50	1.25	<b>DF180</b>	Digital frequency control	t.b.a.	
<b>VFO120</b>	External VFO	93.00	3.75	<b>AT180</b>	1.8-30MHz antenna tuner	t.b.a.	
<b>AT120</b>	Antenna tuner (100W)	69.00	1.50	<b>PS30</b>	AC power unit for TS180S	98.00	3.75
<b>PS30</b>	AC PSU for TS120S	98.00	3.75				
<b>AT200</b>	1.8-30MHz antenna tuner	95.00	1.50				
<b>SM220</b>	Monitor scope	246.00	3.75				
<b>BS5</b>	TS520 scanboard for SM220	49.50	0.50				
<b>BS8</b>	TS820 scanboard for SM220	49.50	0.50				
<b>TR8300</b>	70cm FM mobile 10W transceiver fitted 4 channels	250.00	3.75				
<b>TR3200</b>	70cm FM handy transceiver fitted 3 channels	190.00	3.75				
<b>MB1A</b>	Matching mobile mount	9.20	1.00				
<b>PB10</b>	Pack of 10 Ni-cad batteries	10.35	0.50				
<b>PB15</b>	Battery pack (moulded case)	20.25	0.50				
	Spare power lead	1.30	0.15				
<b>TR7010</b>	2m SSB/CW mobile transceiver 10W output	193.00	3.75				
<b>R300</b>	General coverage receiver	189.00	3.75				
<b>HS5</b>	Communications headphones, tailored response	23.50	0.75				
<b>HS4</b>	Communications headphones, tailored response	10.75	0.75				
<b>TL922</b>	HF linear amplifier 160-10m/2 Kw PEP 2 x 3-500Z tubes	797.50	3.75				
<b>MC50</b>	De luxe desk microphone dual impedance PTT locking bar	27.50	1.50				
<b>MC35S</b>	50K fist microphone	13.30	0.50				
<b>MC30S</b>	500ohm fist microphone	13.30	0.50				
<b>LF30A</b>	HF low pass filter 1kw 90 dB. Stop band rejection	18.90	0.75				

## TRIO OSCILLOSCOPES

<b>CS1577</b>	Dual trace 30 MHz with signal delay	552.00	3.75
<b>CS1566</b>	Dual trace 20 MHz	397.00	3.75
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<b>CS1562A</b>	Dual trace 10 MHz. Auto run and trigger TB	310.00	3.75
<b>CS1352</b>	Dual trace 15 MHz battery portable	402.50	3.75
<b>B7-7E</b>	Battery pack	34.50	1.75

The above 5 scopes are complete with matching probes

<b>CS1575</b>	Dual trace with auto phase display. 1mV sens	319.50	3.75
<b>CO1303D</b>	Single trace 5MHz service/student scope	132.00	3.75
		155.00	3.75
<b>DM800</b>	Multi purpose dip meter	59.80	1.00
<b>AG202</b>	Sine/square audio generator. 20 Hz-200 KHz	82.80	3.75
<b>AG203</b>	Sine/square audio generator. 10Hz-1 MHz	132.00	3.75
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L-7	Linear 160-10m 2kW .....	£747.50
MN-7	ATU/CSWR/RF Wattmeter 250 watts .....	£115.00
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# Western



## TS-180S

**ALL SOLID-STATE  
HF SSB  
TRANSCEIVER**

The TS-180S with DFC (Digital Frequency Control) is an all solid-state HF SSB/CW/FSK transceiver with every operating feature a DXer, contest operator or any amateur would desire for maximum flexibility on the 160 to 10 metre bands. Its highly attractive and functional design will enhance the appearance and efficiency of any shack. Operating directly from a 13.8V DC supply, this compact, lightweight, high-power (up to 200w PEP input) transceiver is also suitable for mobile operation. Even with its advanced functions, the TS-180S with DFC is very easy to operate, thanks to sophisticated digital technology and two built-in microprocessors.

**DFC EXPANDS FREQUENCY CONTROL FUNCTION.** The TS-180S with DFC provides more operating flexibility than any other HF Amateur transceiver. DFC is much more than the frequency memory function found in other transceivers (which just memorises and recalls desired frequencies). DFC is designed around a dual-circuit PLL composed of a 4-bit microcomputer and four memories, usable in transmit and/or receive modes. Memory-shift paddle switches allow any of the memory frequencies to be tuned in 20Hz steps up or down one step at a time, or at slow scan speed, or fast scan speed, while retaining the original stored frequency for recall. After the memory frequency is tuned, the new frequency can be memorised if desired, simply with the touch of a button. It's like having four remote digital VFOs, in addition to the built-in analog VFO (with digital readout). Three of the four memory frequencies can be retained with the memory backup system (using an owner-supplied silver-oxide battery) when the supplied power is turned off. Even with the 20Hz shift function, oscillator (VCO) output has good linearity and purity because of a carefully designed dual-PLL system and crystal filter. RIT (receiver incremental tuning) is available on all memory frequencies, on the one fixed frequency, and with the VFO. The memories allow split-frequency operation (common with some DX pileups) with the TS-180S VFO or with the VFO-180 remote VFO. The digital display shows the memory frequency being used, whether in receive or transmit mode, or the TS-180S VFO frequency, or the fixed-channel frequency, or the remote VFO frequency, whether or not RIT is utilized. The microprocessor-controlled digital display shows the actual VFO frequency. When that frequency is stored in the "M1" memory, the digital display can be switched to indicate the stored frequency and the difference between the stored and VFO frequencies (with signs to show VFO above or below stored frequency).

**Western PRICE £ 795** PS-30 PSU

**ACCESSORIES INCLUDE:**  
£89.00 VFO180 VFO; AT-180 MTU; SP-180 Speaker

### TS-120S and TS-120V



### TWO OTHER COMPACT WINNERS FROM TRIO

- ★ Big rig features in a compact package
- ★ Digital frequency readout
- ★ 10-80 metres SSB/CW
- ★ IF Passband tuning and other
- ★ 200 Watts PEP input (TS-120S) or 25W PEP input (TS-120V)
- ★ A mere 12.3lbs (11.7 lbs for 120V) of compact efficiency.

**Accessories available:**

MB-100 Mobile Bracket .....	£16.85
SP-120 Remote Speaker .....	£23.50
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PS-20 (PSU for 120V) .....	£49.00
PS-30 (PSU for 120S) .....	£89.00
AT-120 Antenna Tuner .....	£68.00



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FT-7B .....	£415	2-year	CPU-2500RX .....	£335
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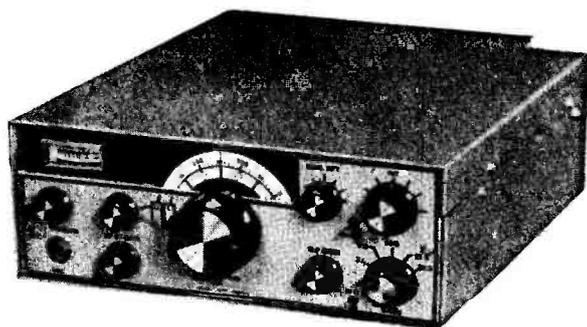
## Western

# Electronics (UK) Ltd



## ALDA 105

**SOLID-STATE HF SSB MOBILE TRANSCEIVER**  
**MOBILE POWER at a PRICE YOU CAN AFFORD!**



**PRICE  
ONLY**

**£495**

**FREE DELIVERY**

This includes—  
 Mobile Mounting Bracket  
 Hand Microphone  
 Noise Blanker  
 Calibrator

### BRIEF SPECIFICATION OF THE ALDA 105

Bands: 80-10 metres. Input Power (p.e.p.): 250W (200W on 10/15m). Power required: 13.8v DC (nominal) at 15A (receive 5.5W, transmit 260W). Dimensions: 3½" (82.5mm) H x 9" (228.5mm) W x 12½" (317.5 mm) D. Weight: 8½lbs (3.66kg).

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# G3MCN



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Freq. 3.5-30 MHz Amateur Bands and WWV. I.F. Shift System, Noise Blanker, Vox, Single conversion system using PLL circuit. Digital display dial.

TS120V 10 watts PEP £408.00  
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TS180s. HF Transceiver. An all solid state Transceiver with Digital Frequency Control. A rig that has the facilities that DXer, Contest operator or any Amateur would desire for maximum flexibility on the 160 through 10 metre bands. Up to 200 watt PEP input. No tune Final amplifier. £712.00  
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Due to delay in publishing secondhand lists please send SAE for our up to date lists. We have a very quick turn over in secondhand equipment, especially in receivers. If you require a specific model please let us know and we will inform you as soon as we have one available. Our secondhand equipment carries a three month guarantee. We would be pleased to sell your equipment on a commission basis, which saves you time and money advertising.

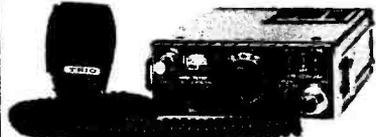
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TR2300 2m Synthesised Portable Transceiver. You have lost count of the number of this model we have sold over the last 12 months hikers, campers, climbers you can hear them all over the country and reliability which is the essence of TRIO equipment.

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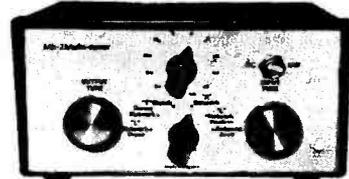
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Solid state Receiver 550 kHz-30 MHz £175.00

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5D Multi Band Trapped Dipole 80-40-20-15-10 metres. 50 ohm feed. 23 metres in length. This is complete, not a kit. High quality Traps and wire. 2kW PEP rating  
PRICE (inc. VAT) £50.00

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Full Range of Microwave Modules Converters, Transverters, Linears, etc.

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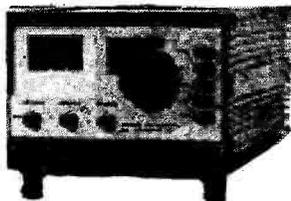
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ARAC 102 receiver, 28-30 MHz. 144-146 MHz. AM-SSB-FM-CW Price £105.00

**S.T.E. Prices include VAT and postage**

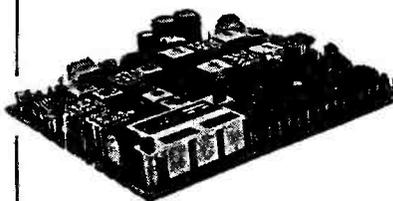
Arac 170 10m. and 70 cm. Receiver	... £129.00
AA1 Audio Module for AR10	... £4.10
AD4 FM Discriminator	... £5.00
ALB Linear Amplifier	... £27.60
AG10 Tone Generator	... £4.50
ATAL 2m. AM-FM Tx	... £129.00

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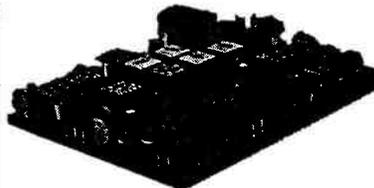
Tribander Helical 10-15-20m.	... £23.00
LF Coils for Tribander	... £6.55
LF Telescopic Whip Section	... £2.99
Basemount standard type	... £4.20
Multimobile 78, 10-15-20m.	... £26.45
MM Coils	... £6.55
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**Drake**

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MN7 ATU/RF Wattmeter	... £126.50
R4C Amateur Band Receiver	... £506.00



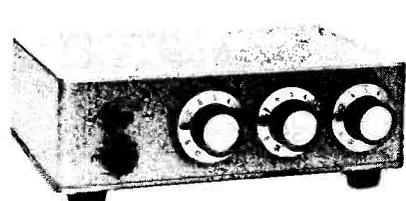
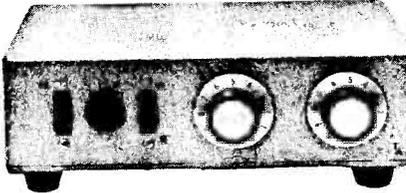
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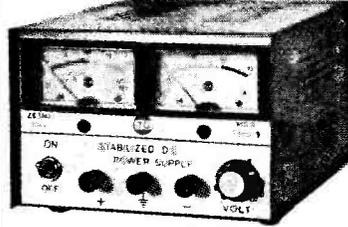


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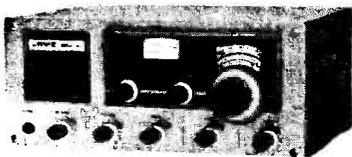
All are produced by acknowledged leaders in the communications field and all will give you hours of satisfactory and enjoyable listening, whether it be amateur or broadcast stations you wish to monitor.

But, to make sure you really are getting the best value for money, it's no good purchasing a sealed box. All the receivers listed below have travelled many thousands of miles and are produced on a production line where final alignment time is limited. That's why we test each receiver carefully before selling it. Our tests involve the use of several thousand pounds worth of instrumentation and it's because of this that we can guarantee you that a receiver purchased from us is quite likely to be better than a similar model purchased elsewhere.

Don't therefore take risks with your hard earned cash. Our advice is free and so are our pre-delivery checks — we can deliver anywhere in the U.K. and can quote competitive H.P. terms and accept telephoned orders against Access or Barclaycard — so if it's a receiver you want, come to Waters & Stanton Electronics, one of the largest amateur radio outlets in the U.K.!

Trio R3000 coming soon!

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The FRG7000 is based on the successful FRG7 design with a host of features that make it a deluxe receiver for the really serious short wave listener. Digital readout, electronic clock and timer, superb selectivity all go to make up the receiver that everyone aspires to own. Frequency coverage is 0.2 MHz to 30 MHz and the clear digital readout makes it one of the easiest receivers to use.

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The TM56B is a highly sensitive VHF monitor receiver for listening to the popular 2 metre FM transmissions from amateurs throughout the U.K. Hear your local amateurs transmitting from their cars, or from home or through one of the many repeaters sited around the country. 230 volt AC or 12 volt DC operation is possible and a built-in auto-scan circuit monitors 4 priority channels. The receiver is supplied with xtal for the 10 most popular channels in the U.K. Extra crystals are stocked at £2.45 each.

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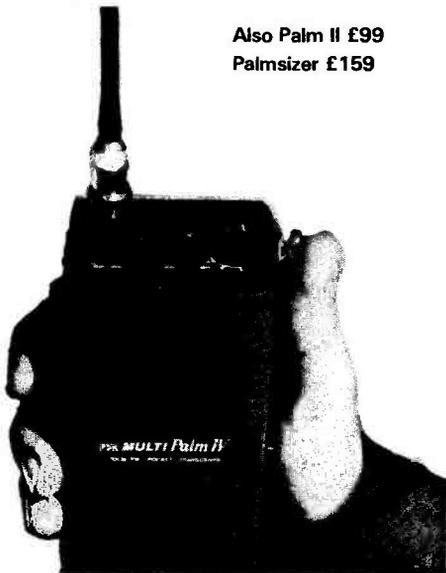
### 1 WATT 6 CHANNEL 70cms HAND-HELD

Another first from our Japanese factory. The smallest, cheapest and finest 70cms hand-held ever to be offered to the radio amateur. And if we sound enthusiastic about this delightful little package, you're right. Look at what £159 buys — Palm IV fitted SU20; 6 channel capability; simplex, plus and minus 1.6 MHz shift; single xtal per channel (E3); xtal controlled automatic tone-burst; quarter wave flexible BNC whip; ni-cad rechargeable battery pack; 240V AC mains charger; external 12 volt cigar lighter; power cord; built in condenser microphone; 1 watt output and English operating manual. This is the ultimate in portability and slips easily into ones coat pocket. Optional accessories include leather case, HP7 external battery pouch for prolonged life and all the popular simplex and repeater channels ex-stock (E3 each or 5 for £12!)

**£159 inc. 15% VAT ex stock**

Also Palm II £99

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## **FDK** MULTI-700E THE PERFECT 2M FM MOBILE TRANSCEIVER

12½ kHz or 25 kHz + 25 Watts

£229 inc. VAT & Delivery



When a transceiver has so many more features than its rivals and yet sells for less than most, then surely it can be rightly described as the "best buy" for 1979. Truly a concept of design that looks to the future as well as the present. Its powerful 25 watts makes it twice as powerful as its competitors and ensures more solid QSO's. 2 RF stages in the receiver ensure that the high power is matched by the most sensitive receiver on the market. No more xtals to buy, the Multi 700E comes 144.75 to 145.975 MHz in 25 kHz click tuned channels. And for the 1980's 12½ kHz channels can be interspaced at the touch of a button. Repeater operation is taken care of at the flick of a switch for either normal repeater mode or reverse mode for listening on the input channel. Automatic xtal controlled tone-burst is built in and the power output is continuously variable down to 1 watt. Altogether a remarkable transceiver at an amazing price. Included in the package is a quick release mobile bracket, matching microphone, mounting hardware kit, DC fused lead and English operating manual. Send SAE for full details of the "PERFECT" rig.

### STOP PRESS!

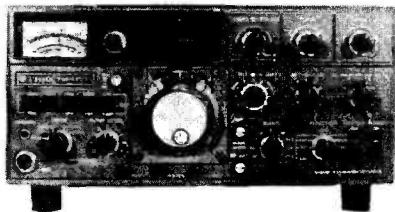
Mobile safety mics back in stock complete with boom and gear lever switching boxes. State transceiver model when ordering. **£20.95 inc VAT**

# WATERS & STANTON ELECTRONICS

It's now our pleasure to announce that we have been appointed official Trio stockists for the South East. We shall be carrying the full range of their products, including the new TS180S solid state HF rig and TS770 VHF/UHF transceiver.

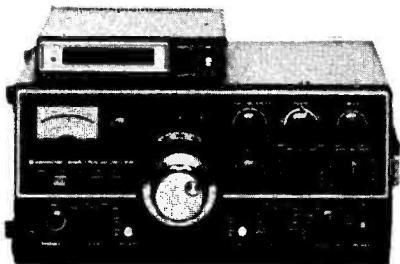
Please note that all our stocks of Trio, are supplied from the official UK importers, Lowe Electronics, and therefore have the full spare parts back up. The only two Trio dealers in the South East who have UK models (as against German and American models) are ourselves and Radio Shack—don't take chances—saving a few pounds now could prove expensive later.

## NEW MODELS R1000 TS180S TR7625 etc.



### ⊕ TRIO TS820S £832 inc VAT

The Trio TS820S must be the HF operator's dream come true. Many superlatives have been used to describe it and all are justly deserved. It's the transceiver that you'll hear from about every corner of the World with its distinctive, clean, crisp audio. A most effective RF processor ensures a remarkable improvement in readability under QRM conditions without any degradation of quality and RF negative feedback produces just about the cleanest signal you'll find anywhere. 160-10 metres. 200 watts PEP input and 0.2uv for 10db S-N all add up to an enviable package. Add to this the digital readout display and unique selectivity obtained by "bandpass tuning" of the IF section produces a transceiver that is today's DX operator's No. 1 choice. For further information or credit terms, just drop us an SAE.



### ⊕ TRIO TS520S £542 inc VAT

The TS520 is now the most widely sold HF rig in the World. Just listen for a while on the HF bands and you'll realise just how many TS520's there are about. Full 6 band coverage of 160-10 metres with 200 watts PEP input and built-in speech compressor will get your signal around the World with ease. And, of course, the TS520 gives you a remarkable receiver performance to match.

With the TS520 you are buying the best engineered HF rig in its price bracket — and that's our own opinion having tried them all! Ask any owner of a TS520 what he thinks of it — he'll tell you his only regret is all the QSO's he lost by not changing to Trio before! If you have a limited budget yet want performance and a rig that will hold its price, then the TS520 is your choice.

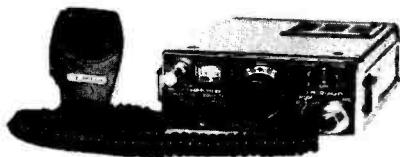


### ⊕ TRIO TR7500 £239.95 inc VAT

The TR7500 2 metre FM transceiver combines simplicity of operation with advanced design. Full coverage of 144-146MHz in 80 x 25kHz channels means no more crystals to buy. Dial indication meets the modern operator's requirements — if you want S20 you simply dial "20". For R6 you simply dial "6" — if you're one of those operators who finds channel numbers easier to use than frequency readout, then we can recommend this as a "best buy". Reverse repeater operation is, of course, a single switch action — as it should be. The package comes complete with microphone, mounting bracket and DC leads. Performance is equal to the best in a remarkably small package — 15-18 watts transmitter output and better than 0.2uv sensitivity matched with the unparalleled Trio quality and attention to detail makes the TR7500 hard to beat.

### ⊕ TRIO TR2300 £199 inc VAT

The TR2300 is a remarkable package which combines all the advantages of a portable station with those of a mobile transceiver. In many ways it's the ideal "starter rig" in amateur radio. Full band coverage from 144-146MHz in 80 x 25kHz channels plus 600kHz repeater shift and 1750Hz automatic tone-burst complete its versatility. The dial is directly calibrated in frequency and has illumination for night use. The transmitter is exceptionally clean with an output power in excess of 1 watt. Receiver sensitivity is every bit as good as the best mobile rigs and either internal batteries or an external DC source may be used. Fits easily into a suit case or on the corner of a desk and makes a really compact mobile rig. Price includes carrying case, shoulder strap, battery charger, external DC cord and, of course, the Waters & Stanton 12 month warranty. An absolute bargain — we even sell them to our staff!





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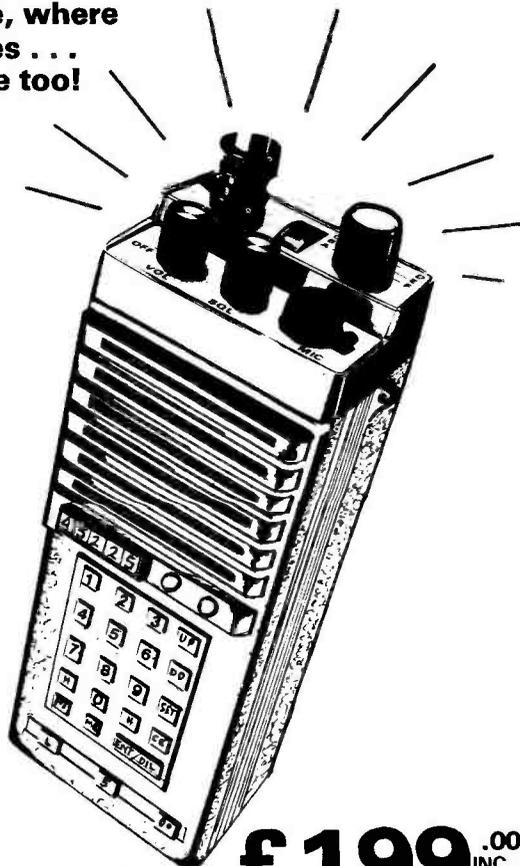
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# The SHORT-WAVE Magazine

## EDITORIAL

### *Here we are again*

If all goes according to plan, this issue should be in the distribution network within a few days of the correct date — to our relief and, we dare suppose, the satisfaction of readers and advertisers alike. Regarding the *Magazine* itself, we hope that our customers will approve of its slightly changed appearance, following our printers' changeover from letterpress to offset-litho (a change which will also speed up production considerably).

Talking of 'speed', we may be getting faster, but the postal service can still be very slow, and we ask readers who contribute to our regular feature articles to allow a *week* for first-class delivery of their letters to meet the deadlines (and deadlines they are!).

'Leicester' is nearly with us once again, held as usual at the Granby Halls, and this year to be on 8th, 9th and 10th November. Organised by Fred Hopewell, the new secretary of the A.R.R.A., it promises to be, as always, an interesting and exciting affair. We shall be there, and we look forward to meeting old and new friends — see you on the stand?

*Don't forget WARC '79 — use the bands whenever you can!*

*Ed. Hopewell*  
*L3KFE.*

# VHF BANDS

NORMAN FITCH, G3FPK

## Awards News

IT is over a year since a VHF Century Club Certificate for 4m. was issued, so it is a pleasure to report that No. 12 has been awarded to Derek Wrightson, G3BTO, from Tadley in Hampshire. Like his 2m. award issued in July 1977, it was endorsed for all CW operation. 4m. is Derek's favourite band although he did not take it up until July, 1975. The Tx is a modified-by-the-manufacturer *Microwave Modules* 2m. Mark 2, AM affair which used 72 MHz crystals. The modified job is CW only, crystal controlled. The original 12 watts input has since been boosted to the 50 watts maximum allowable with the addition of a 2N6084 class C amplifier from *Modular Electronics*.

The Rx comprises a *Microwave Modules* converter and a *BC-342N* used at 4 MHz as tunable IF. The aerial is a 4-ele. *Yagi* mounted 12m. *a.g.l.* on a chimney stack. Derek's QTH is 80m. *a.o.d.* in a saucer-shaped depression, badly screened between west and northeast — the only direction for long distance working on the band! He is also QRV on 70 cms. on CW only, with 25 stations worked so far. He is going for the "full house," all three CW VHFCC's. By the time this appears, G3BTO should be listening on 6m. with a view to possible 6/10m. crossband contacts. A suitable converter was being built and a 3-ele. *Yago* at 10m. was ready at the time of writing.

Alan Pullen, G8BXJ, receives 70 cm. VHFCC certificate no. 26 for operation from Bristol. His VHF activity started on 2m. AM, followed by FM and SSB. Later 70 cm. FM and SSB operation was added and equipment built and bought for 23 cm. and 3 cm. portable work. The 70 cm. station comprised a *Trio* TS-700, down-converted to 28-30 MHz,

then up-converted to the 70 cm. band with a *Microwave Modules* transverter. An amplifier using a pair of 4CX250B's fed the 46-ele. *Multibeam*, mounted 8m. *a.g.l.* Alan is now resident in California but does not have a U.S.A. licence. He can listen on the HF bands and on 2m. FM where he receives about *forty* repeaters using a five-eighths whip!

Certificate no. 27 for 70 cm. has been awarded to Ray Elliott, G4ERX, from Hutton in Essex. Although he has worked several hundred stations on the band, in common with many others, Ray finds it difficult to get the cards to prove it. Most of his QSO's were achieved with 10 watts output using a *Yaesu* FT-101E/*Microwave Modules* transverter combination feeding a 48-ele. *Multibeam*. A home-built 2C39-type amplifier has now been added, giving 40 watts output, and the aerial is a 21-ele. *Tonna*.

## Interference

For the best part of a year, London amateurs have been putting up with a band of interference in the CW end of the 2m. band, centred around 144.06 MHz. Many mobiles have pin-pointed the source to the Euston Tower building. In the latter half of August, the Tx responsible for the nuisance went berserk and created a lot of white noise over much of the band, plus numerous "sprogies" in the beacon sub-band. Vigorous complaints were made to the Home Office by organizations, such as the RSGB, and by individuals eventually resulting in a cessation of the terrible QRM on Sept. 3. However, the original rubbish around 144.06 MHz remains. A point made to the Home Office by your scribe was that, by international treaty, 144-146 MHz is an *exclusive* amateur allocation, apart from the two spot QRG's noted in our licences, one of which was completely obliterated anyway.

Joost Berden, G3RND, contacted your scribe on Sept. 8 to say that *Syledis* had turned up on his doorstep rendering 70 cm. operation impossible. Unfortunately, we are secondary users of the band so the *Syledis* operators have prior right to use their allocated frequency, however inappropriate for us. This particular installation is in the St. Catherine's Point Lighthouse on the southern tip of the Isle of Wight. The usual *modus operandi* is for continuous operation

for about a week, followed by merciful silence for many weeks. There are several other *Syledis* installations around our coastline which can be expected to operate from time to time.

## Repeater Topics

London repeater buffs will be delighted to learn that the Home Office has agreed in principle to three more VHF relays for the metropolis. These will be located at Hillingdon, GB3WL on R1; Enfield, GB3NL on R7; and Havering-atte-Bower, GB3EL on R0. The infamous GB3LO will become GB3SL and altered to channel R2. The theory is that more repeaters for London should cut down the interference and give a better service. Cynics suggest that it will give more scope for the "squeakies," "whispering Willies" and "Grandads" to do their thing, and for a larger number of unlicensed pirates using borrowed call signs to participate in this aspect of the hobby.

North Yorkshire UHF repeater GB3NY is now back again on RB0 with new gear and an 80 ft. mast. Reports to G4EEV. (QTHR).

## The Satellite Scene

AMSAT's *Oscar 7* continues to function when in sunlight, its equipment working directly off the solar cells. The telemetry indicates that the batteries are no longer taking any charge. *Oscar 8* is now some 16 minutes earlier than the predictions in the AMSAT-UK calendar, and about 4° further east crossing the equator. The latest information is best obtained from the AMSAT net on 3780 kHz on Sunday mornings from 1015, local time. (G3RWL, G3AAJ, G3IOR, etc.)

Secretary Ron Broadbent, G3AAJ, advises that an up-dated version of AMSAT-UK's calendar will be available in early October and at the Leicester exhibition. This will include predictions for 0-7, 0-8 and other non-amateur satellites. For details, send an *s.a.e.* to Ron at 94 Herongate Road, London, E12 5EQ.

## Contest News

*Results*:— Congratulations to the Martlesham RS and Ipswich RC, the overall winners of the 1979 VHF NFD. They notched up 3357 pts. to repeat their 1977 success. The

Bracknell ARC and G4ERP Group, who were 3rd last year, moved to 2nd spot this time with 3111 pts. Last year's winners, the March & District RAS, were 3rd with 3100 pts. and the Wulfrun Contest Group, 6th last year, came 4th with 3049 pts.

On 70 MHz, the Plymouth RC, G3KFN/P, won with 1286 pts. The South Scotland VHF/UHF Contest Group, GM3WOJ/P, were 2nd with 1169 pts. and the Isle of Man RS, GD3YEO/P, 3rd with 1069. The March & DRAS, G3PMH/P, won the 144 MHz section, as last year, with 7730 pts. The Wulfrun CG's 7670 pts. earned GW8BHH/P 2nd place, while G3VCP/P, the Crystal Palace & DRC and SOCOM Group, were 3rd with 7580.

On 432 MHz, the Martlesham/Ipswich team were 1st with 1930 pts. for G4CFI/P. Bracknell's G4BRA/P were 2nd with 1881 pts. and G4BEL/P, with 1774, gained 3rd spot for the March lads. On 1296 MHz, G3XDY/P with 14821 pts., were clear winners for Martlesham/Ipswich, ahead of 2nd placed Bracknell, GW4BRK/P, who scored 11828. In 3rd position was G3DY/P, the March station, who won last year. Acknowledgments to GB2RS for the foregoing.

Edmund Ramm, DK3UZ, has forwarded the results of the June 23 AGCW-DL 2m. CW event. Winner of the Class A section was DJ9IE/P (EL63f) who made 40 contacts. There were no U.K. calls in the 11 entries. The Class B part was won by DL6WT/P (DJ09b). All but two of the 13 entries were from Germany. The Class C section, over 25 watts, has 8 entries and was won by DL2OM (DK48d). G3MGL/DL (EN20c) was second and Bryn Llewellyn, G4DEZ, 6th.

**Coming events:**— October 6/7 weekend for the IARU Region 1 UHF/SHF event which runs concurrently with the RSGB's 432/1296/2304 MHz affair. 4m. buffs will be at it on Oct. 21 for the Fixed event, while Nov. 3/4 is reserved for 144 MHz CW addicts.

### Maltese Notes

Paul Galea, 9H1BT, sent an interesting account of activity this year which arrived too late for last month's column. University studies for an economics degree have curtailed AR

activity this year. Nevertheless, Paul was in on the E's events of May 25 and 29, June 15 and 28. The one on June 15 was notable: Paul and 9H1CD, were in tropo. contact with 4X4AS who said that OD5MR was on frequency, but that he wasn't permitted to talk to him. So 9H1BT called OD5MR, to be answered instead by UT5DL (LI32a). Reports were exchanged when he faded out to reappear 15 mins. later when 9H1BT worked him. Paul did work OD5MR for a "first" 9H1/OD5 contact on 2m. on June 15.

9H1BT reports quite a few good tropo. openings with good conditions to four distinct directions; viz. Barcelona and southern ISO; Rome; Athens and the west coast of Greece; and Israel. These multi-direction openings usually last two to three days. Paul has been persevering on 70 cms. too and worked 4X4IX on May 4 on CW. Paul reminds us that QSL's for him and 9H1CD must go *direct* as they are not members of their national society; cards sent *via* the bureau are not delivered, even though they have deposited *s.a.e.*'s with their local group.

### Four Metres

Angus McKenzie, G3OSS (London), operated for about half the total period in the Aug. 19 contest, completing 40 QSO's in "fairly reasonable" conditions. He mentions the excellent signal from GM3XBY/P, who was using four 6-ele. *Yagis*.

Ray Elliott, G4ERX, was up in Scotland during the event which proved entertaining. He had hoped to operate from XQ square but, as he was unable to hire a generator, settled for a site in Dumfries & Galloway (XO19a). The first battery lasted about 1½ hours supplying the FT-101E and *Europa*. A second battery was then rigged up to the car generator and Ray ran the engine for the rest of the contest with frequent pauses for cooling. "The static was a bit shattering after a while," he wrote! 30 stations were worked for 398 points in what seemed to be quite good conditions down to the south of England.

John Baker, GW3MHW (Dyfed), was on for the contest and his best DX was GM3WOJ/P. Although 900 ft. *a.s.l.* the ground rises to 2,500 ft. in the NE, E and SE directions. John

mentioned that GM4CXP is hoping to get a 4m. beacon on the GB3ANG site. It seems that a *Pye* base station and solid state keyer built by G4ENA has been offered. John asked that stations use SSB and listen for him in Dyfed at 2000 BST on 70.205 MHz. He reports that GW4BCD in Porthcawl (Mid-Glam.) is now active with good gear and is very keen. He hopes that 4m. will never get "channeled" and "FM-ed" as has 2m. (No chance, OM. No "profit" in it for the Japanese!).

From Co. Antrim, Peter Hallam, G14GVS, is now QRV on the band using a Yaesu FT-200 and *Magnum 4* transverter, with a 4-ele. *Yagi*.

### Two Metres

Eddi Ramm, DK3UZ (Kaltenkirchen) had completed *Perseids* MS QSO's with I2VRN (FF); SM2IUE (IZ); HB0BBD (EH) and HG4KXG/3 (JG). A sked with UA3OG (UR) and one with UA3TBM (WQ) were not completed. On Aug. 18, he worked GU5CYN (YJ) with 27 reports each way, in 25 mins. John Hunter, G3IMV (Bucks.), completed MS contacts with HB0BBD for his 37th country. Other *Perseids* successes included OH3TH (MV); DM2GPL (GL); YU3ULM/3 (GG); HG4KXG/3. Random SSB brought I4MJQ (GE), and EA3ADW (BB) with 39 reports all completed in about three seconds!

Paul Turner, G4IJE (Herts.) completed in 43 mins with SM5CUI (IT) but makes the point, as do many others, that most everybody gave up far too soon on the random SSB MS frequency. Brian Dwyer, EI6BD (Co. Dublin), is a welcome new contributor and was pleased to participate in the big Aug. 29 *Aurora*, his first major *Ar* in four years on the band. With only 10 watts from a Yaesu FT-221R to a crossed 10-ele. *Yagi*, he worked quite a few stations. Brian's country tally is 20.

Bill Hodgson, G3BW (Cumbria), has continued his MS activity and reckons some of the reflexions in the *Perseids* "... were astounding!" During a CW sked with OH7PI, at least five other stations were on the same QRG, including UC2AAB, an OK, a GW4 and two Germans. At 0430 on Aug. 12, Bill recorded a 119 seconds burst from DK4MM (EK) which took 10½ mins. to re-run at

reduced speed later. This was followed by a 54 secs. burst from HAIYA (IH).

Roger Thorn, G3CHN (Devon), was on for the recent Spanish 2m. contest and heard ED and EE prefixes. YC square was worked — EEIEH — who just would not QSY from 144.300 to clear the QRM. EDIECO was QRV from WD. The Aug. 29 *Ar* produced two new squares. Scores of G, GI, EI, F, DL, ON and PA stations were heard. Pick of the bunch worked were GM3JII (WS) on SSB, SM4HAI (HT): OH0JN (JU); SM5CNQ (HS); SM4IVE (HT) and OZ60L (FP). SM7CBA (GP) was still coming in at 1915.

Too late for any publicity in magazines was the recent operation from Tunisia by I4BXN. A few lucky operators fixed up MS skeds for a crack at 3V8ONU. Probably the first U.K. amateur to work them was Dave Price, GW4CQT, on Sept. 3, who got 11 reflexions from them. 3V8ONU confirmed later that they got a one minute burst from Dave. Clive Penna, G3POI, had a successful sked on Sept. 5 although nothing was heard for the first half hour. As far as your scribe is aware, these are the first GW and G contacts on 2m. with Tunisia unless any took place in the distant past.

Mike Lee, G3VYF (Essex), with 128 squares worked, is waiting for a few more cards to put in his QTHCC claim for the basic 100 squares. On Aug. 28, *via* tropo, he worked six Swiss stations; HB's 7YB, 9ARI, 9BBD, 9BDI/P, 9MTY and 9QQ in DG, DH and EH, plus Germans in EI, EJ, FH and FJ, bringing his 1979 totals to 105 squares and 25 countries. The *Ar* the next day provided LA8AK (ES) and SM6AEK (EQ), some OZ's and GM's. The IARU Contest on Sept. 1/2 enabled F6CJG/P (CE01d) and FIUO/P (DF15g) to be worked, plus GW2HIY in Anglesey for the rarish XN square.

John Cleaton, G4GHA (Dorset), monitors the band from 0800-2000 daily but did not hear any *E*'s signals in July. During the Aug. 10-12 period, he worked several of the group on Lizard Point in XJ, while F1FLH gave him AH square. Pete Milsom, G4GSA (Dorset), has moved along the road a bit and was busy fixing up aerials for 10m., 2m. and 70 cm. From Liverpool, Bob Mackean, G4HAO, confesses to a spell on the HF bands but admits; "I've decided I prefer 2m.

about 500% more!" He says there is very little activity on SSB from the city.

Ken Osborne, G4IGO (Bristol), has had several MS successes recently including SM3FGL (IV); OK1KKH (HJ); OH3TH (LV); OK1BMW/P (HK) and DM2DQO (GM). During the *Perseids*, Ken heard 18 countries and reports stations on "queer beam headings." These were lost when the beam was pointed at them but reappeared when returned to the odd azimuth. (Some of the offsets in showers can be quite appreciable, OM). Chris Baker, G8JGK (Essex),

#### QTH LOCATOR SQUARES TABLE

Station	23 cm.	70 cm.	2 m.	Total
G3POI	—	—	278	278
I4EAT	—	25	238	263
G31MV	—	—	197	197
DK3UZ	—	—	195	195
G3CHN	—	—	181	181
G3SEK	—	—	179	179
9HICD	—	13	178	191
9H1BT	—	11	163	174
G3FPK	—	—	157	157
GJ4ICD	—	48	141	189
G4CMV	—	30	140	170
GM4COK	—	12	135	147
G4ERG	—	—	135	135
GM4CXP	—	25	134	159
G8HVV	12	73	130	215
G3VYF	—	—	128	128
G8GML	11	74	122	207
G4BWG	—	29	118	147
GJ8KNV	—	34	115	149
G4IJW	1	30	108	139
G3BW	3	25	108	136
O4IGO	—	—	108	108
G3OHC	4	33	104	141
G4AWU	—	1	102	103
G8LEF	22	62	101	185
G8IXG	—	—	99	99
G4IJE	—	—	95	95
G8LHT	3	37	94	134
G4FBK	—	5	94	99
G3IXN	34	70	93	197
G2AXI	2	53	93	148
G8ATK	—	38	93	131
G8KGF	—	16	85	101

G3COJ	24	66	84	174
G3KPU	—	21	84	105
G8LGL	—	12	84	96
GM8NCM	—	12	84	96
G4HYD	—	40	83	123
G8JJR	—	—	78	78
G8KSP	—	2	76	78
G8LFJ	—	—	76	76
G8KPL	—	7	74	81
GD2HDZ	11	34	73	118
G8JAG	—	7	73	80
G3SPJ	10	36	71	117
G4GET	—	—	71	71
G4ERX	1	32	69	102
G8IFT	7	18	68	93
GJ3RAX	1	24	67	92
G3FIJ	—	27	66	93
G18EWM	—	22	63	85
G4IJE	—	—	63	63
G4AEZ	3	28	61	92
G8OPR	—	15	61	76
G8MFJ	—	11	61	72
G4GEE	—	28	60	88
G8KUC	—	7	60	67
G4GHA	—	—	60	60
G8KAX	—	29	59	88
G8ITS	—	16	56	72
G4DEZ	—	—	52	52
G4GSA	—	1	50	51
G8JGK	—	—	45	45
G4GXT	—	—	43	43
G8PRG	—	—	30	30

Starting Date January 1, 1975. No satellite or repeater QSO's. "Band of the Month" 2m.

lists assorted tropo and *Ar* contacts through August and now only needs Cleveland and West Glamorgan to complete all the G and GW counties. Any offers of skeds? Chris says that, "Only about six local stations . . ." were on in the IARU contest which gave his Rx a hard time.

Jon Stow, G8LFJ (Essex), was unable to participate in the *Perseids* because, ". . . unfortunately, on Aug. 11 my linear destroyed itself in spectacular fashion!" He found the random SSB MS QRG, ". . . turned out to be a shambles." Jon reports continuing use of FM by certain stations in the

international beacon sub-band. In the QRP contest, GJ3YHU and GM8MJV/P (YP) were worked but he didn't quite make it with GM3WOH/P on Islay (WP) on Aug. 7. In a long letter, Jon lists some nice DX worked including HB9ARI (DH75h) and F6CJG/P (BF21j) on Aug. 28 with only 10 watts to the 5-over-5 array. Some interesting observations on the *Ar* were made the next day including the "double curtain" phenomenon and resulting two distinct reflexions, in some cases 750 Hz apart. PE1CCN/A in "wet" square BN67h was worked the same day. He is on a North Sea gas platform, of course.

Arthur Breese, GD2HDZ, overlooked the Telford group's Welsh activity so missed out on Gwent and S. Glamorgan. He called GM3JIIJ in Stornoway during the Aug. 29 *Ar* repeatedly and later discovered his separate Tx and Rx were switched to "separate" instead of "transceive."

John Lovell, G8JHL, reports on the GD6UQ/P expedition for the *Perseids* period. The weather was very bad so they chickened out of erecting the four 16-cle. *Yagis* and made do with a pair. In 10 days, *via* MS, *Ar* and tropo, 66 squares and 27 countries were worked and 45 of the 62 MS skeds came off. John, Tony Horsfall, G4CBW, and Julian Niman, G8GAJ, threaten to do it again in 1980. QSL's *via* the bureau or direct to G8JHL (QTHR) with *s.a.e.* if direct reply needed.

Darrell Mawhinney, G18JPG (Co. Antrim), did well *via* MS in the July *Delta Aquarids* and August *Perseids* with DL, DM, I, LA and SM stations worked. In the Aug. 29 *Ar* 57 SSB contacts were achieved between 1535 and 1905 with stations in F, G, GM, GJ, GU, GW, ON and PA. He found conditions in the IARU contest poor from GI. As usual, Geoff Brown, GJ4ICD, turns in a good list including EE1EH (YC79b) on tropo. On Aug. 5. He was heard by EA8AK in the Canary Islands in the Spanish contest at S3. The *Perseids* brought successful SSB contacts with four SM's, two YU's, and DL, DM, OE and OZ.

Kevin Jackson (Leeds), sent in his usual interesting DX TV report and mentions several good bursts on Band 3 in the *Perseids* from DM, LA, OE and SP transmitters. *E's* up to 102.4 MHz was observed on Aug. 21. Kevin heard that during the EA contest on Aug. 4/5, EE1EH (YC) worked an IT9 in the Pantelleria group, IH9, *via*

THREE BAND ANNUAL VHF TABLE  
January to December 1979

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL Points
	Countries	Countries	Countries	Countries	Countries	Countries	
GD2HDZ	46	5	60	14	40	5	170
G2AXI	47	5	55	13	41	5	166
G3SPJ	36	5	58	12	36	6	153
G3FIJ	48	5	55	12	20	3	143
G3CO	41	4	47	10	22	4	128
G8LHT	—	—	70	19	28	7	124
G4ERX	45	5	30	8	26	6	120
G80PR	—	—	68	13	30	6	117
G3BW	—	—	52	18	39	6	115
G8KGF	—	—	57	15	33	3	108
G18EWM	—	—	69	8	25	6	108
G4ERG	—	—	67	28	—	—	95
G8GML	—	—	63	17	5	7	92
G3KPU	—	—	54	6	28	4	92
G3FPK	—	—	73	19	—	—	92
G8LEF	—	—	46	7	30	8	91
G4BYP	28	4	38	8	10	2	90
GM4COK	3	2	58	22	1	1	87
G8IFT	—	—	47	28	8	3	86
G4IGO	—	—	61	21	—	—	82
G8KAX	—	—	38	7	28	7	80
G8ITS	—	—	40	6	25	4	75
G4DEZ	—	—	56	15	—	—	71
G4FBK	—	—	49	16	—	—	65
GM4CXP	6	2	37	12	1	1	59
G8JJR	—	—	49	10	—	—	59
G4GHA	—	—	41	17	—	—	58
G4AEZ	—	—	27	10	13	4	54
G4HAO	—	—	48	6	—	—	54
G8PRG	—	—	44	9	—	—	53
G8JGK	—	—	37	10	—	—	47
G4GXT	—	—	38	7	—	—	45
G4FKI	6	1	6	1	4	2	20

tropo. That is FW square. EA9FV (YV) is QRV from the Spanish enclave of Melilla in Africa and has been worked from 14 and heard in YU2. EA8AK, who uses 300 watts to a 44-cle. array, is regularly active and looking for U.K. contacts. On July 27, he heard G and GW stations *via* tropo.

Mike Allmark (Leeds), heard 22 countries in the *Perseids* excluding the home ones. He heard SV10U calling 10LYK at 0032 on Aug. 13 on 144.20

MHz and says the SV sounds like an Ex-G from the tape recording. During August 33 countries were heard! On the 26th, GM8SAU/P in St. Kilda (VR18g), was heard working into S. Yorks. Mike says that Boulder PRF predicted the Aug. 29 *Ar* the first phase of which lasted till 1910, with QTF's from 20° to 45°.

At G3FPK, there was only little time to operate in the IARU contest. Unfortunately, some of the signals

heard were decidedly poor and your scribe's list of "real stinkers" is longer than usual. As this is being compiled, confusion reigns concerning the scoring of the RSGB contest, due entirely to there being no prior publication of the rules. Also, nobody seems sure of the sections into which it was to be divided. Based upon the usual radial ring scoring system, GW8BHH/P notched up 8980 pts. from 730 contacts. 214 continentals were worked, best DX being DK00X at 920 kms. and F1EKU at 905 kms. Russ and his team just managed to launch their big, 80-ele. colinear array before the rain started. Conditions from Beacon Hill were reasonable to begin with but gradually got worse. By the Sunday afternoon, it was a real struggle to work any semblance of DX.

### Seventy Centimetres

G3BW is still very active on the band almost every night but finds it hard going except during contests. Chris Bartram, G4DGU (Oxon.), has now worked 21 different stations via *E-M-E*. Only Oceania is missing for a WAC. Chris's aerial array is a group of eight N.B.S. 4.2 wavelength *Yagis* mounted on a 10 ft. lattice mast section sitting in the middle of, "... a pretty average garden." The Tx uses a pair of 4CX250B's in a *K2RIW* design. The Rx uses a *Plessey GAT5* Gasfet pre-amp. with GAT2 second stage. G4GSA should be joining the Dorset 70 cm. scene soon: Pete has a transverter under construction.

Pete Connors, G8LEF (W. Yorks.), has been mainly on the band this year but, due to the lack of extended tropo. propagation, has only worked "... pretty mundane DX for this location." A move of QTH is in the offing with scope for more elaborate aeriels. Nick Grundy, G8PRG (S. Yorks), expects to be QRV soon and hoped to buy *Belcom Liner-707*. He has also bought a *PET* computer and has "... spent some time getting it house trained." Nick has finished a satellite tracking program and in the next version of it hopes to couple the thing to an *AZ-EL* aerial system. His *PET* can send and receive morse at 100 w.p.m. which is spurring him on to get that G4 call.

G14GVS is now on 70 cms. using the *FT-200* and *Microwave Modules* transverter MMT 432/28. A 40 watts *Ampere* amplifier is available, too,

the aerial being a 46-ele. *Multibeam*. GJ4ICJ is buying a *Trio TS-770* transceiver. Geoff says the band has been good and he has worked BC and BE squares on QRP. G5DAA on the Scillies (WJ09e) gave him the 48th square on 70 cms. On Aug. 5. He has a quantity of ELC-1043/05/06, 430 MHz tuners for sale cheaply to genuine amateurs only. Queries to "Lemnos," Longueville Road, St. Saviour, Jersey, C.I.

### Final Miscellany

While Brian Bower, G3COJ, was away on holiday in August, the gales brought down his aeriels but without serious damage. Bent elements on the 16-ele. *Tonna* 2m. one were straightened successfully by applying heat. The *Yagi* becomes unbalanced mechanically when UR67 feeder is attached. Accordingly, Brian balanced his by attaching a 20 inch length of steel wiring conduit at the front. He does suggest a neater way would be to stuff something weighty inside the square boom.

John Hill, G8HUY, is another computer buff with a *NASCOM I*. He is looking for other amateurs interested in data transmission. QTH is 32 Creek Road, Hayling Island, Hants. The *NASCOM I* has a UHF TV output and tape recoder interface, amongst many other useful features.

DK3UZ told you scribe that UA4NM was at a VHF meeting in Tallinn on Aug. 18/19 (MT square)

yet was giving his locator as YS29a. Some folk were startled to hear HW1KOB/P on 2m. This turned out to be a French station in Y116h on an island.

Certain fast scan TV operators have been heard by G3FPK operating on 144.125 MHz in the CW band on FM for 70 cm. talk-back. It is hoped this practice will cease as many MS types set up skeds in this part of the band.

G3GMJ monitors the *NAA* Tx on VLF on 17.8 kHz using a *Marconi* Rx and pen recorder. He watches for daylight signal enhancement which usually coincides with a major solar event, such as a large flare.

Finally, commencing Oct. 7, the GB2RS news service will be broadcast on Sunday mornings on SSB on a QRG of 144.250 MHz, there being 8 transmissions from various locations. Quite what will happen when contests are on remains to be heard. There will also be 19 FM bulletins on 145.525 MHz which, for those who do not understand frequencies, is S21.

### Deadlines

The continual unreliability of the post necessitates a slight alteration to future deadlines. All items for the November feature by Wednesday, October 3 and for December by November 7. Everything to:— "VHF Bands," *SHORT WAVE MAGAZINE*, 34 High Street, WELWYN, Herts., AL6 9EQ. 73 de G3FPK.



Mr. T. Constable of the British Vintage Wireless Society addressing a recent meeting of the Southgate Radio Club, G3SFG.

# PRACTICAL PROPAGATION

## A BASIC GUIDE

“Practical” propagation, one supposes, is not so much a question of knowing just how the ionosphere and the sunspots, the seasons and the lower atmosphere, all interact one with another, but rather a matter of knowing what time is most likely to produce signals from, say VK, on a given band, at workable strength, *if* the band in question happens to be open to VK on the chosen day! Perhaps one could put it differently, and say that it tells us what time a hearing of a VK should startle us out of our lethargy, because its the *wrong* time for them to be coming through on that band!

Either way, it implies some considerable practical experience of operating on the bands before the background “feel” for things is built up, either as SWL or licensed operator. However it is known that a majority of new licensees are, at the time they first get on the air, raw to the point where the locals have to remind them of the elements of amateur procedure such as appear in the licence.

It is to the raw novices on the band, whether SWL or licensed, that this piece is directed, in the hopes that it may guide their efforts into the right channels.

As a first step, let us make sundry reservations on our efforts. In the first place one may predict that, say, at noon,

in the spring, the Caribbean area may be workable on Fifteen — but that prediction can only come off if *on the day you choose to test it* there is an open 21 MHz band to the Caribbean on the one hand, and a station there who is prepared to either come on in answer to your CQ or to answer your call to him in preference to the other, maybe more DX’y to him, callers. And at that, it also pre-supposes you are using an aerial and transmitter which is capable in the right conditions of laying down a workable signal to the Caribbean! A heck of a lot of ‘ifs’ — but they are all important if the charts are to be read intelligently.

## The Charts

These have been prepared on a strictly practical basis, namely the late G2DC’s logs over a period of ten years. In this connection, as a standard for comparison, G2DC ran a beam, and 150 watts of CW/SSB on the HF bands, with the same transmitter working through an ATU to 265 feet of wire at forty feet on the LF bands from a site which was perhaps a trifle better than average in radio terms.

Top Band, it will be noticed, has been left out of the chart, and for a good reason, which will be dealt with later. The other bands are dealt with by dividing the world into nine areas, namely East and West of North America, Central America and the Caribbean, South America, Russia in Asia, the Far East, Africa, Australia and New Zealand, and finally the Central Pacific area. Each chart

	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300		
10m 28MHz									FE	FE AF	SA RA ANZ	SA RA ANZ	SA RA ANZ		AF CAR	AF CAR	ENA SA RA CAR	ENA SA RA CAR	WNA SA RA	RA						
15m 21MHz									AF	FE AF	RA FE	SA RA FE	RA FE	RA FE ANZ	WNA L ANZ	AF	ENA FE AF	ENA WNA SA AF FE CAR	ENA WNA SA AF	SA SA		VP8	VP8			
20m 14MHz								AF	AF	SA RA ANZ (L)	SA RA ANZ (L)	ENA RA FE	ENA RA FE	RA FE	RA FE ANZ	ANA ANZ	ENA AF	ENA AF	ENA WNA SA AF CAR	ENA WNA SA AF CAR	SA CAR	SA CAR	SA			
40m 7MHz	ENA	ENA					ENA	ENA WNA	SA ANZ CP	FE ANZ CP	FE ANZ CP		FE CAR	FE CAR	FE CAR	FE CAR	RA FE	RA		AF AF				ENA	ENA	ENA
80m 3.5MHz			ENA	ENA	ENA	ENA	ENA WNA CAR	ENA WNA ANZ CAR	ANZ													AF	AF			

covers a period of three months, and the time scale is marked in GMT; where the signal is probably coming in the long way round, this is indicated on a chart by adding the letter L in brackets after the area symbol. In such cases one turns a beam to the reciprocal of the heading shown on the Great Circle map for the short path.

**Using the Charts**

First catch your hare, then jug it, as Mrs. Beeton would have said. Let us assume an example: SWL Bloggs wants to hear a station from the Central Pacific. In the first place, it

Allowing a little time for the receiver to warm, we eagerly tune to Fifteen at the specified time, but, alas, the band has chosen today to be dead. So turn to Twenty, which seems pretty perky. Check the charts for Central Pacific on Twenty — it says 0600-0700Z. Groan, set the alarm-clock, and pray the band will still be open in the morning. Cheers, it is — and what's this? FO8 — Success at last!

The charts cover ten years, right through a cycle in fact; and so, it is fair to say that, for instance, around the trough of the cycle Ten will be dead for DX for some years and that part of the chart useless, and likewise that part of the

	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300					
<b>10m 28MHz</b>									FE AF	FE AF	FE AF	RA RA	SA RA	SA RA	ENA RA	ENA RA	ENA SA	ENA SA	ENA* SA	SA	SA								
<b>15m 21MHz</b>									FE AF	FE AF	RA FE	SA RA	SA RA	SA RA	ENA SA	ENA RA	ENA SA	ENA WNA	ENA SA	ENA SA	ENA SA	ENA WNA	SA	SA					
<b>20m 14MHz</b>	ENA SA AF	ENA SA AF	SA	SA	WNA SA	WNA SA	SA	ANZ (L)	ANZ (L)	ANZ (L)	RA FE	RA FE	RA FE	ENA SA RA FE	ENA SA RA FE	ENA SA RA FE	ENA SA RA FE	ENA SA RA FE	ENA SA RA FE	ENA SA RA FE	ENA SA RA FE	ENA SA RA FE	ENA SA RA FE	ENA SA RA FE	ENA SA RA FE				
<b>40m 7MHz</b>	ENA	ENA	ENA	ENA	ENA	ENA	ENA	WNA SA	WNA SA									FE	FE	FE	AF ANZ	RA AF ANZ	RA CAR	RA CAR	RA				
<b>80m 3.5MHz</b>	RA	RA			ENA	ENA SA	ENA WNA SA ANZ	ANZ						* Denotes conditions will deteriorate from the end of March												FE	FE	ANZ	ANZ

MARCH / APRIL / MAY

D  
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is as well to look in the Prefix List and memorise the applicable prefixes. The time is say, mid-November. Try Fifteen — one should, the chart says, be able to find the wanted ones during the two hours centred on noon GMT, or again between 1500 and 1700 GMT. Incidentally GMT is sometimes referred to as "Z" or as "UT".

chart for Fifteen, and to a lesser extent Twenty, covering night-time paths. Hence our statement that "if, and only if, the band is open . . ." When a band is just about alive, either as we go up or down the sunspot cycle, it will be noted that paths which go North and South are far more likely to be workable than East/West ones, which will only

start to open when the sunspots are ionising the ionosphere really thoroughly.

Exceptions to the predictions can always occur, as we have stressed. The band can be dead — always the most likely exception, especially if your operating time is limited! — or, particularly at the shorter ranges, say 1500 miles, it may be “open”, either due to the sorts of thing which the VHF lads love to exploit, or true short-skip conditions, or even scatter if the chap has QRO and beam to help. These are *not* accounted for in these charts.

some skeds, with each end calling the other at predetermined GMT times, for three or five minutes alternately. *Always* you are working split-frequency, as each side will pick the part of the band to transmit on which is (a) within their allocation, and (b) known to be as clear as may be of QRM at the listening end. Thus much of the DX transmits on about 1802 KHz and listens for Gs around 1823 up to 1830 KHz. Other DX may be right up at the HF end, or around 1910 KHz. When planning a sked, the secret is to fix an all-darkness path, with one end or the other —

	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
<b>10m 28MHz</b>									RA	RA	SA	SA	SA	SA	SA										
<b>15m 21MHz</b>																									
<b>20m 14MHz</b>	ENA SA RA FE	ENA SA RA FE	ENA SA SA	ENA SA	SA	WNA SA																			
<b>40m 7MHz</b>	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA
<b>80m 3.5MHz</b>	AF	AF	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA	ENA

JUNE / JULY / AUGUST



**Top Band**

Now this is a tricky one! For the run-of-the-mill stuff, say the first fifteen countries, just get on the band of a winter evening, and stalk them till dawn — you’ll get there in the end. However, if you aspire to beat WIBB at his own game, then you gang warily. In the first place, you organise yourself on to the “grapevine” to know when new countries are going to become available, and then if he is at all likely to be a tough nut to crack, you organise yourself

you won’t get both! — at the dawn or dusk period when signals seem to peak up for a few minutes.

**Conclusions**

If you want to work the DX, and you have your rig tuned up to its best, and aerials “on the nose,” then by looking at these charts you will at least be able to find the times when you have a sporting chance of working the place of your (DX) dreams, on the band of your choice, always assuming

	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	
<b>10m 28MHz</b>								AF	RA ANZ AF	FE RA AF	FE RA AF	FE RA AF	FE RA AF	ENA	AF	SA AF	SA AF	SA							
<b>15m 21MHz</b>							RA FE	RA FE	RA FE	RA FE	AF RA FE	AF RA FE	AF RA FE	AF RA FE	AF RA FE	AF RA FE	AF FE	SA	SA	SA	SA	SA	SA	SA	
<b>20m 14MHz</b>	ENA RA FE	ENA RA FE	ENA RA FE	ENA RA FE	ENA RA FE	ENA RA FE	WNA CPL ANZ(L)	WNA CPL ANZ(L)	RA FE(L) AF	RA FE(L)	RA	ENA	ENA	ENA	ENA	ENA ANZ	ENA ANZ	ENA ANZ	ENA ANZ	ENA ANZ	ENA ANZ	ENA	ENA	ENA	ENA
<b>40m 7MHz</b>	ENA	ENA	ENA	ENA SA	ENA SA	ENA SA	WNA ANZ	WNA ANZ	ANZ							WNA (L)							RA FE	ENA RA	ENA RA
<b>80m 3-5MHz</b>				ENA	ENA AF	ENA SA	ENA SA	ANZ (L)	ANZ (L)														RA FE	RA	

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it to be open on the night you try — but if it were any easier we'd all lose our interest!

And in any case there is always TVI to crop up just when the DX appears to be falling into the bag; but here are two authors who wouldn't have it changed for worlds, after

half-a-lifetime each at it.

*Chart code:* ENA = East Coast USA; WNA = West Coast USA; SA = South America; RA = Russia in Asia; FE = Far East; ANZ = VK/ZL; CP = Central Pacific; AF = Africa; CAR = Caribbean and Central America.

*Don't forget WARC '79 —  
use the bands whenever you can!*

## TOROIDS IN HF APPLICATION, PART III

### TESTING

N. H. SEDGWICK, G8WV

#### Dummy Loads

Bench testing transformers at full power raises the problem of a suitable dummy load which looks purely resistive. Fig. 1 shows a 75-ohms dummy load constructed from ten 2-watt, 750-ohm carbon rod resistors in parallel. The continuous rating of this is 20 watts and it is quite reasonable to feed it 30 watts for a few seconds whilst readings are being taken, but it is not the sort of thing one can use to see if the transformer core gets too hot on full load when used with a typical amateur transmitter giving 120 watts or so of CW power. Born in 1949, this device has earned its keep and continues to do so, but frankly the writer would not know where to obtain such resistors these days! The important thing about the construction is to make it compact, but with minimum capacity between the terminations.

Fig. 2 shows a bigger load which will cope with anything in the way of power that a UK amateur should need. In showing it one feels a little like a Victorian cook starting a recipe with "take three dodo eggs . . .", for the large Morganite carbon tube resistors rated at 90 watts each are long since obsolete, and one sees nothing like them now advertised in the amateur radio press.

(One could ask a dealer to order something suitable and pay the price asked, but whether one could find a dealer interested enough to do the necessary market research, or knowledgeable enough to get the right thing, is a matter for conjecture.) The three resistors in the picture are each 150 ohms and they fit into Terry clips so arranged that the wiring may be set to put two resistors in series to give 300 ohms balanced and fed at the left-hand end, or two in parallel to give 75 ohms, or three in parallel to give 50 ohms, fed at the centre. These resistors are ten inches long, and the normal tendency to fan out the wires of the line to make a 'V' connection simply makes an impedance transformer which falsifies the SWR reading and completely invalidates any measurements taken. The connections should be kept straight, and any changes of direction should be by right-angled bend, as provided by the screw terminal strip in the middle of the baseboard. Ideally the very broad angled 'V' of the two connecting wires in the picture should be eliminated by raising the screw terminal strip on a spacer to make the wires horizontal.

An alternative dummy load arrangement can be made by constructing a 2-wire transmission line long enough to prevent impedance variation at the input end at the lowest frequency to be encountered, using some form of steel or iron wire. The power will be dissipated down the line, and this can be shortened if a suitable terminating resistor is connected across the distant end; the power rating of the resistor will depend on the attenuation of the line.

The characteristic impedance,  $Z_0$ , of a 2-wire balanced transmission line is given by:—

$$Z_0 = 276 \log \frac{s}{r}$$

where  $s$  is the spacing between centres of the two wires and  $r$  is the radius of the wire, both expressed in terms of the same units. Thus:

$$\text{anti-log} \frac{Z_0}{276} = \frac{s}{r}$$

and if  $Z_0$  is 600, the  $s/r$  ratio is 149.2, or if  $Z_0$  is 400 the  $s/r$  ratio is 28.14. Plastic covered steel wire such as is sold in garden centres could be quite suitable for such a line.

A line may be regarded as effectively infinite in length (the input being independent of whether the distant end is short-or open-circuited) if its attenuation is at least 20 dB at the lowest working frequency. Since the reflected power will be attenuated by the same amount as the forward power, this will effectively give 40 dB attenuation of the reflected power at the line input, and the line will look resistive to all intents and purposes. It is generally accepted that a line giving 12 dB attenuation terminated with a resistor suitably rated to dissipate the remaining power at the distant end of the line is the best compromise for low power work. 12 dB loss leaves 0.0625 of the power for the resistor to handle, which is 7.5 watts if the transmitter output is 120 watts.

The line may be turned back on itself and run backwards and forwards between two or more poles provided each run is well spaced from its neighbours: the lower the characteristic impedance of the line, the greater the attenuation per unit length. Commercial dissipation lines, such as are used to terminate rhombic transmitting aerials, are commonly of 400 ohms characteristic impedance, and are made of stainless steel wire. Published figures show the attenuation related to the square root of the frequency, and

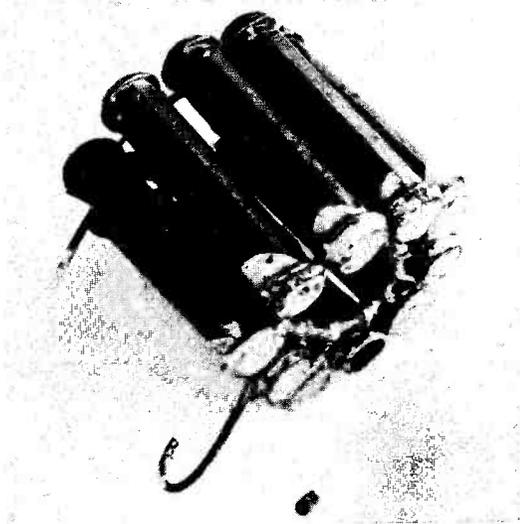


Fig. 1. A 20-watt, 75-ohm dummy load, consisting of ten 750-ohm 2-watt carbon resistors in parallel.

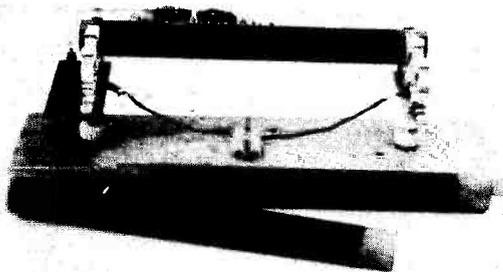


Fig. 2. Dummy load of 150 watts minimum rating, capable of being connected as 50, 75, or 300 ohms load.

greater than the actual resistance loss of the wires. This applies to a copper line where total attenuation is quoted in one record as exceeding copper loss by a ratio of 1.66:1. The conductor resistance will be increased by RF skin effect as frequency increases. In practical terms a 400 ohms line using 20 s.w.g. wires would have them spaced slightly over half an inch, and a 600 ohms line with the same wire would have spacing at 2.68 inches. Since such lines are deliberately 'lossy' the spacers can be in hardwood such as dowel stick which has been boiled in candle grease after cutting and drilling.

The disadvantage of the dissipation line is its high  $Z_0$  and the fact that a high performance transformer is needed to bring it to the impedance required for whatever test is in hand. The 50/75/300 ohms device shown in Fig. 2 is about the handiest RF power load an amateur can produce and is very simple to make. It is worth some time and effort in market research to obtain the right sort of resistors. They should be of carbon tube construction to minimise RF skin effect, rated at least at 75 watts each, and truly non-inductive.

### Testing Output Transformers

The transmitter output should first be connected through a reflectometer to a dummy load equal to the line characteristic impedance, and the transmitter tuned and loaded, when SWR will be unity. The dummy load should then be substituted by the transformer to be tested with its secondary connection loaded by a resistance equal to the square of the turns ratio times the line impedance. If all is well the transmitter tuning and loading adjustments should be little changed, and in fact if no reflectometer is available one can accept that as a good primary indication that the transformer is satisfactory. The SWR reading on the reflectometer measures any mismatch introduced by the transformer, and the check should be done at both high and low frequency ends of the pass-band. An RF voltmeter with diode probe can be used to measure RF voltage across both primary and secondary connections and the power at each calculated by solving  $V^2/R$ , where  $V$  is the voltage reading and  $R$  is the load or line resistance, according to whether one is looking at primary or secondary voltages. The difference between the two power readings is the transformer loss, and should be very small (but tending to increase as frequency increases); SWR should not be greater than 1.2:1. The transmitter should be kept on for ten

minutes or so, keeping the reflectometer under observation. If the transformer core overheats badly it will show up by a quickly accelerating change in power out, and the transmitter should be quickly switched off to avoid a complete runaway condition. Cores usually recover on cooling down.

Provided the preliminary design work has been done as described in *Part II* there is little that can go wrong. If the core overheats it is either too small for the power or the wrong material, and if the overheating is sufficient to cause a complete runaway condition the core is reaching the Curie temperature and is obviously *much* too small. If it is just a question of the core getting rather hot but not badly affecting the performance it can be put in a sealed container filled with transformer oil, but this is a messy business and it is better to go up a core size or so, or else stack two cores of the same size together.

If the SWR becomes excessive at the high frequency end, look first to the test set-up connections for stray capacities or inductances, or long haphazard wires. If these are faultless it is likely to be the core material. If the SWR becomes excessive at the low frequency end but improves as frequency increases, it is an indication that the inductance, and hence the  $X_L$  of the winding is too low and more turns are required.

If the winding gets hot before the core does, this is sheer copper loss and thicker wire must be used. Current in the winding is equal to the square root of the power divided by the circuit impedance, viz:

$$I(\text{current}) = \sqrt{\frac{\text{watts}}{Z_0}}$$

At 120 watts CW in a 75-ohm circuit this works out to 1.265 amps; and one must remember that RF skin effect reduces the area of conduction at HF, so raising the conductor's resistance and hence its power dissipation which turns directly to heat.

### Testing Driver Transformers etc.

Particularly in transistor power amplifiers there is a need for low impedance, untuned, coupling transformers capable of handling several watts of power. Most amateurs with any leaning towards technical work will have some sort



Fig. 3. Top view of an HF amplifier capable of 4 watts output for use in general HF test purposes.

of low impedance output signal generator limited to millivolts output, and the next power source up will be the transmitter, which is much too big for testing such transformers. Figs. 3, 4 and 5 show an amplifier which has a frequency range from 3 to 30 MHz, producing up to 4 watts of RF power, depending on the drive level. (This was constructed with the purpose of small transformer testing in mind, but in fact it is quite a useful QRP CW transmitter working from a 12 volt battery). It will be useful to deal with the design of this in some detail as it is also an exercise in the use of toroidal cored transformers particularly related to the low impedance circuitry involved in "big signal" transistor work.

The actual testing follows much the same procedure as that described for bigger transformers except that the reflectometer will probably not be suited to the work, both by reason of low sensitivity and its fixed circuit impedance. The amplifier has a choice of output impedance, either direct at 18 ohms or through a transformer at 75 ohms. One can obtain source impedances between 18 and 75 ohms by putting in series with the 18 ohms output a resistor of a value which makes the required source impedance when added to 18.

Suppose, for example, that the transformer under test has a design impedance match of 1:4 and the load is 200 ohms. The impedance seen by the source should be  $200/4 = 50$  ohms. We can first put a 50-ohm load across the free end of a 32-ohm resistor connected to the source output, return it to earth and then measure the voltage across it; then we replace the 50-ohm load with the transformer loaded with 200 ohms and the voltage across its input should be the same as it was across the 50-ohms load if the transformer is doing its job properly. Ideally we should expect to see a voltage across the transformer secondary load equal to twice the input voltage, as the turns ratio is 1:2. Any transformer loss will show up as a reduction of the voltage across the load.

### The Test Amplifier

It is not a good idea to operate RF power transistors incorrectly loaded at full drive; the BLY84 output transistor is very conservatively rated for the job it is doing with this point in mind, for inevitably it will meet with incorrect loading when transformers are being tested. The circuit of the amplifier is shown in Fig. 5.

To provide flexibility of operation TR1 can be switched as a crystal oscillator using any one of four internal crystals, or an externally plugged crystal to one of three crystal sockets parallel connected and catering for 10X, FT243, and HC6U types. A switch position on the selector also changes TR1 into a buffer amplifier from an external input via an RF transformer, wound on an FX2049 transformer core giving a 2:1 voltage step-up from a 75-ohm input socket.

TR2 is an FET voltage amplifier having a tuned drain circuit which allows harmonics of the drive frequency to be selected to drive the output stages. All of the tuned circuit coils, T4-T8, are wound on T-50-2 iron powder cores, each one having its tuning range roughly centred on an HF amateur band; the coils are all bifilar wound and the drive to TR3 is taken from their centre taps.

TR3 is an emitter-follower current amplifier having high input resistance. The coupling into the final stage is by T2 which is also wound on a T-50-2 core as a wide-band

transformer with a step-down turns ratio of 2:1. The input resistance of the BLY84 is very low, but its input capacitance appears high and it is essential that the drive source resistance should be very low if the input reactance is to be ignored at the higher frequencies. Tuning is indicated by a peak reading diode voltmeter connected across the output.

The figure of 18 ohms output resistance was arrived at experimentally by loading the output with a selection of quite low value resistors, measuring the RF voltage across each and solving  $V^2/R_1 = \text{Power}$ , until the value of  $R_1$  which gave the greatest power out was apparent as 18 ohms. This was very convenient, for it allowed a 1:4 impedance ratio transformer to provide an output impedance of 75 ohms (72 actual), and this was made using a bifilar winding on a 0.8 inch ferrite toroidal core. Big-signal transistor amplifier design practice quotes the output resistance as  $V_{cc}^2/2P$ , where  $V_{cc}$  is the DC supply voltage and P is actual power out; at 4 watts this exactly agrees with the experimental result.

TR3 is one of those annoying T05 metal packages where the case is connected to collector, and whilst the collector in this amplifier is at RF earth potential, it is at high DC voltage and cannot have direct metallic contact with the chassis, so it needs a good heat sink. The BLY84 bolts straight onto the die-cast box used as a chassis as well as being quite lightly run, so that gives no heating problem at all. Because its input and output resistances are so low it is very important that both the emitter connections are very

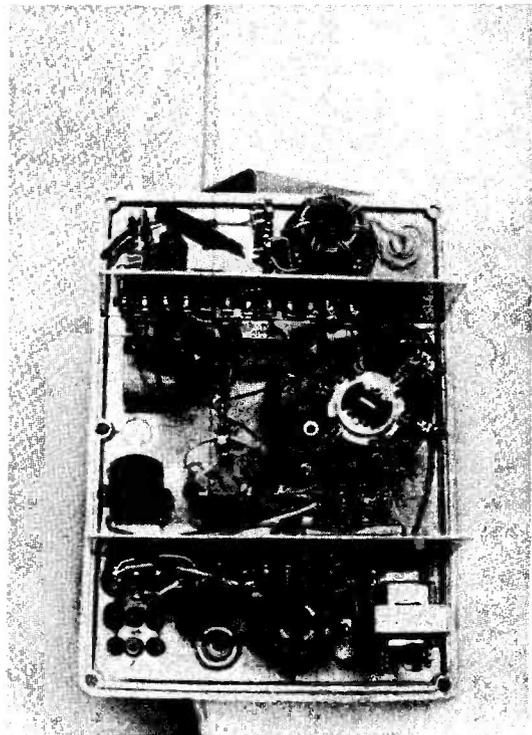


Fig. 4. Beneath-panel view of HF amplifier.

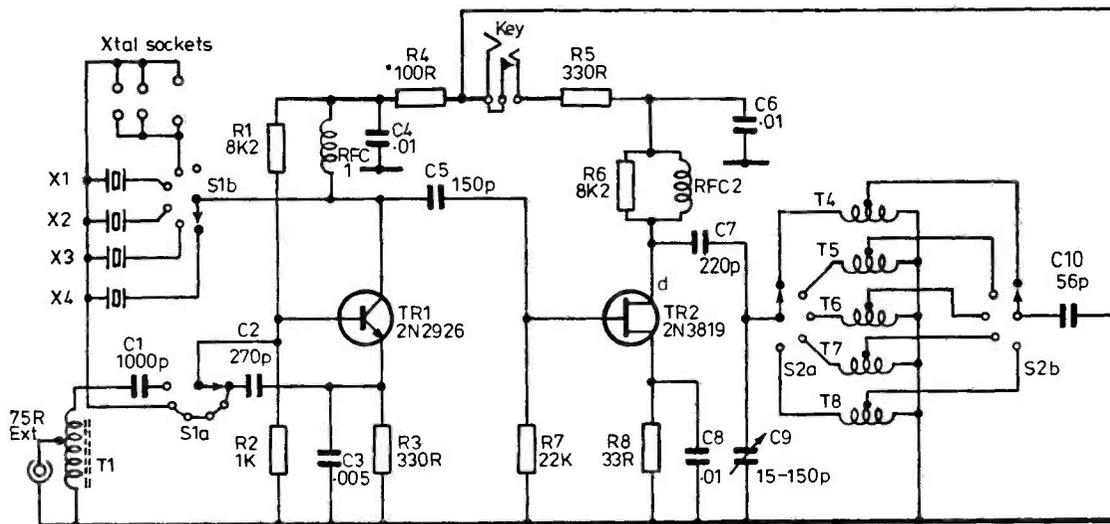


Fig. 5. GENERAL PURPOSE HF SOURCE AND AMPLIFIER

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well connected to earth to ensure stability.

The RF chokes used in the couplings need to have inductive reactance at the lowest frequency five times, or more, greater than the circuit impedance. RFC1 and 4 can be single layer windings and RFC4 needs to be capable of passing 400 mA, so one will not make its inductance any higher than necessary! RFC2 and 3 are in relatively high impedance circuits and the chokes in use are around half a millihenry, which works out to about 10K at 3 MHz. At the higher frequencies TR2 became unstable and it was found necessary to shunt RFC2 with 8.2K to stabilise the stage. (That resistor should only be included if found to be necessary, for it reduces somewhat the tuned circuit selectivity and also the drive, particularly when frequency multiplying).

#### Selective Output Coupler

If it is wished to use the amplifier as a QRP transmitter it will be necessary to put some selectivity between the output and the aerial to clean up harmonics. Although lightly run, both TR3 and TR4 are essentially in Class-C and the harmonic content of the output waveform is not acceptable for transmitter work. Purists will probably say it is not acceptable for test work involving measurements either, but in practice it serves well enough in the shack where most measurements are comparative rather than absolute.

It is usual to employ pi-tank circuits with transistors matching impedance up (rather than down!) to line, but when one comes to calculate inductance and capacity from the standard formulae for such matching, the component values work out to distinctly impracticable figures. Capacitors running into several thousands of picofarads and inductors of point-nought-something microhenries emerged from the calculator.

It seemed clear that a five-band device employing variable capacitors for tuning adjustment was going to be

several times the size of the amplifier, and also it was far from clear how one could make inductors of such low value and then switch them in circuit without the inductance of the connecting leads being at least comparable with that of the coils.

The 75 ohms output using the transformer was already available and very handy for using a separate "selectivity box" in the coaxial line to the load. The thought occurred that if only the inductance values could be made practical, the tuning adjustment of the circuits could be done by dust cores in the coils rather than variable capacitors. The only way to make the inductors practical whilst keeping the 'Q' at a useful value was to raise the circuit impedance, and

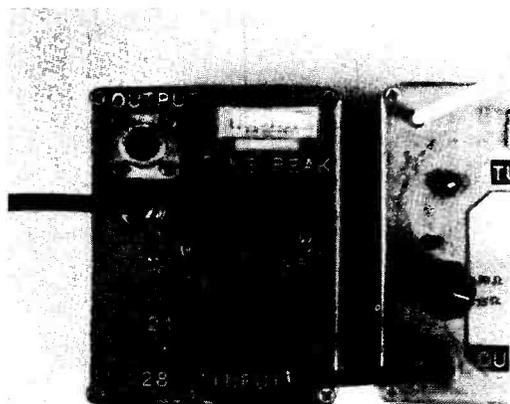


Fig. 6. Top view of HF 'selectivity box'.

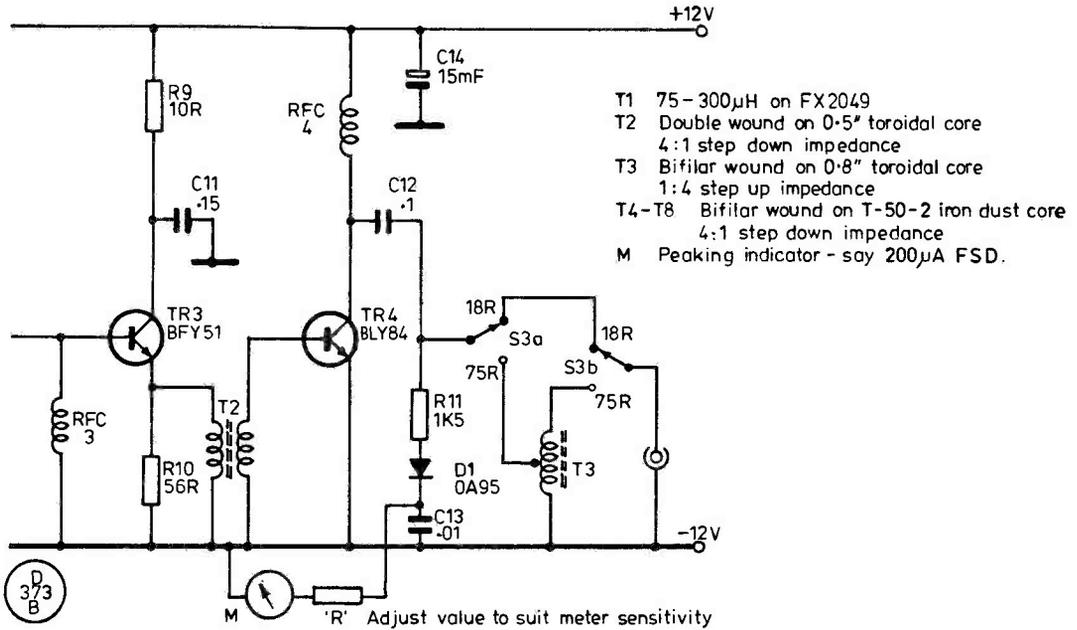


Fig. 5a. Continuation of Fig. 5: junction of RFC3 and TR3 connects to C10.

eventually the idea emerged to make use of a capacity tap for input and output connections, keeping the actual tuned circuit at much higher impedance. In this way one could keep the modified pi-circuit completely symmetrical and much simplify the calculations involved. Fig. 7 shows the basic circuit, and the mathematics came out as follows:

$C_1 = C_1$  and  $C_2$  in series: solution not required.

$$X_{C1} = \frac{R_0}{Q}, \quad X_{C1} = \frac{X_{C1}R_1}{R_0}, \quad X_{C2} = X_{C1} - X_{C1}$$

$$X_1 = \frac{2QR_0}{Q^2 + 1}, \quad L = \frac{X_1}{2\pi f} \text{ microhenries.}$$

$$C_1 = \frac{10^6}{2\pi f X_{C1}} \text{ pF.} \quad C_2 = \frac{10^6}{2\pi f X_{C2}} \text{ pF.}$$

$f$  is in MHz.

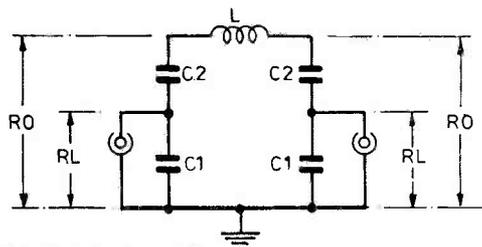
From the equations it can be seen that as 'Q' is increased the capacitor values increase and the inductance value decreases; also as  $R_0$  is increased the capacitor values decrease and the inductance value increases. The choice of 'Q' and  $R_0$  lies with the designer and provides the opportunity to choose a good practical compromise design. The writer chose 'Q' to be 5, and  $R_0$  to be 300.  $R_1$  is fixed at 75 ohms by the coaxial cable used for input and output connections.

At this low power miniature polystyrene capacitors are quite suitable; small ceramic types were found to be dicey, some heating and causing significant power loss which showed up as a falling-off of the output voltage over a

period of several minutes after switching on. Silver mica capacitors are ideal, of course, but rather big for grouping about the coils. The latter are wound on Paxolin formers of 7/16" diameter to accept 3/8" diameter dust cores fitted with threaded brass extensions, as these are more robust for frequent adjustment than the type that have the actual dust cores threaded. They were found to provide about 1.5:1 change of inductance ratio, so the coils were made to have an inductance of 0.8 of the design inductance without the cores; this gives a range of adjustment from 0.8 to 1.2 of the calculated L value. Cores of the type described are sometimes intended for 455 KHz IF transformers, and may be unsuitable for use at HF, so it is as well to check them first. This can be done by making up an HF tuned circuit using the core and then checking the 'Q' as described in Part I of this series.

The circuits tune smoothly using the cores with their brass stemming pieces projecting out of the panel of the box. The cores are placed on an arc around the selector switch, whose pointer knob points to the brass threaded stemming of the coil selected. Another diode voltmeter is required and this can be calibrated in actual power if required or just used as a peak tuning indicator; it is connected directly across the 75-ohm output sockets. Since only one of the three pi-circuit variables is adjustable the aerial must have a good SWR, for one cannot adjust the loading by varying the capacitor ratio. The tuning adjustment is simply one of bringing the circuit into exact resonance for the frequency in use.

This "Selectivity Box" has proved quite a useful device in its own right: apart from its application to low power



See text for L and C calculations

Fig.7 Pi circuit modified to give practical component values for the HF bands.

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transmitters it can be used as a passive filter in the aerial lead of an amateur bands receiver to improve front-end selectivity, reduce image interference, and protect against IP's caused by very strong off-tune signals causing nonlinearity in the front-end. In a portable rig, connected in the aerial feed line, it will serve as tank circuit for the transmitter, and front-end selectivity for a simple receiver automatically by placing the aerial changeover switch between its input and the equipments. In such service both 'Q' and  $R_0$  could be increased above the figures used by the author with advantage.

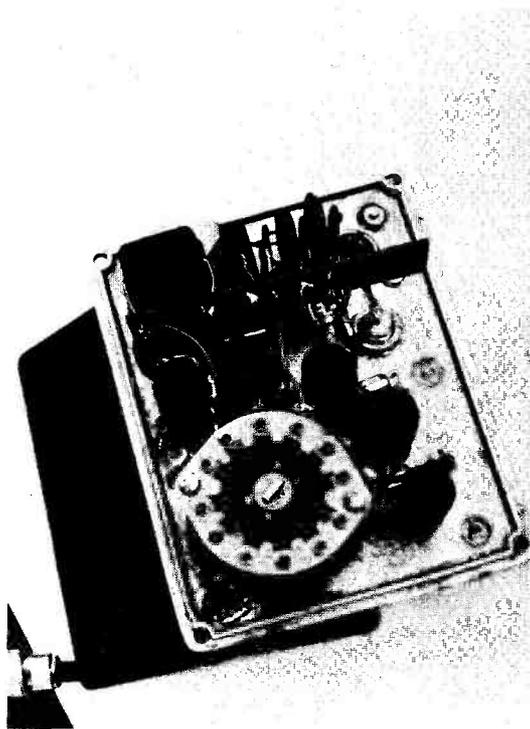


Fig. 8. Beneath-panel view of 'selectivity box'.

### Conclusion

In keeping with his usual practice, the author has been at pains to describe design procedures suitable for the shack, using simple mathematics and leaving the application of the formulae for the would-be home-brewer. The man who exercises his hobby by slavishly building to blue-print without understanding of the design is a bore when he boasts of his achievement if it works, and a nuisance when he expects his friends to diagnose the reasons for him when it does not!

There is enormous satisfaction about designing one's own equipment, knowing exactly what one is doing, and deciding the best options and compromises by calculation. On the other hand, nothing is more likely to extinguish an ardour for home-brew than to find after exercising much skill and ingenuity in mechanical design and assembly that too much guesswork has gone into the theoretical design and the thing can never work in the form constructed. Text books, professional handbooks, and manufacturers' handouts always assume the user has at his disposal the full range of laboratory test equipment that one would expect to find in a college of technology or a large firm's R. and D. department. In general, constructional articles for amateurs tend to be "take it or leave it" style where one buys the components listed and puts them together as instructed in the firm hope they will work. Any R. and D. professional will know how seldom it is that the first production models give anything like the performance of the sample produced in the lab. or model shop! As often as not the articles seem to be written by professionals who do not distinguish between designing for mass production by their employing firm and one-off production by a radio ham. Hence that essentially mass-production device, the printed circuit board, is always a "must" when actually all that is needed is often only a couple of tag strips!

The writer has concentrated on finding methods of either exact or approximate calculation which are compatible with the sort of test and measurement facilities that may be expected to be available to the ordinary amateur at home in the shack, and which will enable him to get within reach of a feasible working design before setting drill to metal.

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# SIDE-TONE FOR THE TS-700

(AND OTHER RIGS)

A.J. OAKLEY, G4HYD

HAVING spent many weeks learning CW in order to convert my G8 call to a G4, I thought that it was about time I plugged the key into the rig and had a go "live", so to speak. Now, maybe an expert can send good Morse listening to the 'key chatter' but I, for one, find it most disconcerting to be banging away at the key without the familiar dots and dashes to listen to.

The unit to be described can be assembled and fitted in less than an hour and there are no holes to be drilled, nor any wiring or components to be altered on the main rig. Thus the unit could be removed and the rig restored to its original condition for re-sale, should you wish.

Looking at Fig. 1, TR1 is an audio oscillator which generates an almost pure sine-wave at about 800 Hz. I find this much more pleasant to listen to than the square-waves produced by multi-vibrator type circuits. (If required the frequency may be altered by making slight adjustments to R2, in the range 560R to 2K7, to suit ones personal taste). The oscillator draws its supply from the CWB line in the TS-700, which is energised at +9v. when the mode switch is in the CW position. The output from this oscillator is taken via the level-setting preset RV1 and C4 to the audio amplifier in the rig, and is then audible through the speaker (or headphones) at the same level as the received signals.

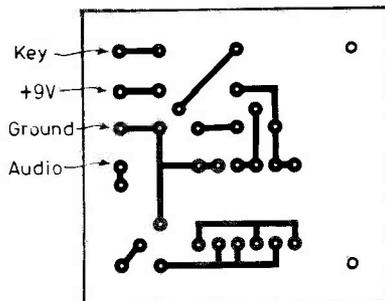


Fig. 2 (a) PCB layout

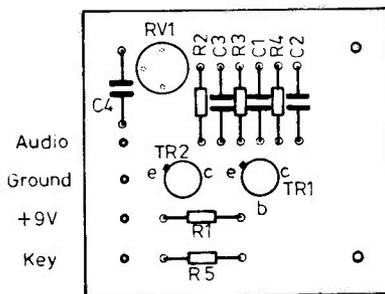


Fig. 2 (b) Component layout

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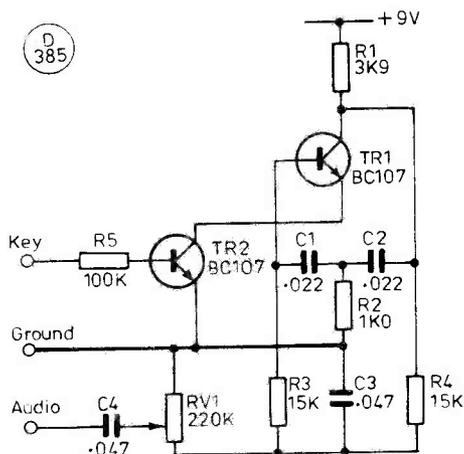


Fig. 1 CIRCUIT DIAGRAM

TR2 is a solid-state switch which is activated from the PWN line in the TS-700. This line is used to drive the output meter, and the few microamps needed by TR2 will not upset the circuit in any way. Also, being RF powered, the side-tone will only operate if the rig is actually generating RF, a useful facility.

Construction is non-critical. For the fastidious a PC layout is shown, Figs. 2(a) and 2 (b), but a small piece of Veroboard could be used instead. Plug in all the components, solder up, and that's it. A length of single screened wire is soldered to "Aud", with the screen to "Gnd", whilst two pieces of (different coloured) PVC insulated wire are used for "+9v." and "Key". To fit, remove the top and bottom covers of the TS-700, and turn the rig upside-down. Between the mix unit and the Rx NB unit is a metal screen, with the end flanged over; three earthing screws are fitted into this flange. Use the screw nearest the BPF unit to mount the PCB, and if you wish drill out and tap another hole in the flange for a second mounting screw, though this is not necessary. The component side should be uppermost. Connect the wire from "Key" to the connecting point PWM on the front edge of the Rx NB unit. Pass the other two wires to the other side of the set through the gap just in front of the flanged screen. Connect the "+9v." wire to connecting point CWB on the AF unit, and the screened wire to connecting point AFV, with the screen to "Gnd", also on the AF unit.

To set up, check all wiring, then set the AF Gain to a comfortable listening level. Remove the aerial, and replace with a dummy load, plug in a key, switch the mode switch to CW, and the "send/rec" switch to send. Press the key, and a tone will be heard in the speaker; adjust RV1 to make the volume of this tone the same as for a received signal. That's it! Replace the covers, and away you go with full side-tone facilities on CW. The volume of the side-tone will follow settings of the AF Gain to allow for different ambient noise levels.

What about other rigs? These should cause no problems. A supply of a few milliamps between 6 and 12 volts is required, switched by the mode switch in the CW position. The "Key" requires a current of 20 microamps for positive switching, though more will do no harm at all. With the values given, if the voltage on the RF Indicator is not less

than 3 volts there should be no problems, but if this is not so the value of R5 may be reduced. With rigs without an RF Indicator, a small pick-up loop and diode near the output will provide more than enough power, and the Audio output should be taken to the "hot" end of the AF Gain control.

## A SIMPLE ARITHMETICAL STUDY OF THE STRENGTH OF DX SIGNALS

RON BARKER

ALMOST any morning the 14,100 to 14,200 KHz segment of the 20 metre band carries numerous VK and ZL signals coming over the southern long path route. There are many of these stations that consistently put a 25  $\mu$ V signal on to the writer's indoor half-wave dipole and there is one outstanding VK station which regularly reaches 200  $\mu$ V (which, when conditions are really good, has actually topped 500  $\mu$ V). These signal strength readings were made on a receiver with an 'S' meter which has been calibrated against a good signal generator; to convert these signals into the more familiar 'S' units refer to Table 1. The writer's QTH is neither especially favourably nor unfavourably situated for reception of signals from VK and ZL on this path. If one latches on to one of these signals and listens through several QSO's, and to all the callers, it becomes evident that these DX stations are putting a similar strength signal into the whole of Europe and the Mediterranean. The implication of this is that if the whole of this huge area were to be filled with half-wave dipoles (spaced sufficiently to avoid mutual interference, of course), each one would pick up a similar strength of signal, and the question which inevitably arises is — how is it possible. Whilst the reference books go into great detail about the ionosphere and its behaviour, the ones read by the writer have offered no answer to this question.

Before getting down to the arithmetic, which is very straightforward stuff, there are several basics which need to be established and for this article only half-wave dipoles will be considered. The basics around which the arithmetic is developed are as follows:—

- Under normal conditions on 14 MHz signals arriving from a long distance come in at an average angle of about 10° (The ARRL *Antenna Book* 1977, p. 18).
- Under normal conditions the ground is not a good reflector of low angle radiation at 14 MHz and will be ignored for the purpose of these calculations (The ARRL *Antenna Book* 1977, p. 46).
- The captive area of a dipole is approximately equal to that of a circle having a diameter of half a wavelength (The ARRL *Antenna Book* 1977, p. 35).

- When a resonant dipole antenna is correctly terminated, half the picked up power is delivered into the receiver and half is re-radiated into space (The ARRL *Antenna Book* 1977, p. 35).
- The 'S' meter reading is a measure of the peak envelope power (p.e.p.) of the received signal.

A half wave dipole having a captive area equal to that of a circle having a diameter of half a wavelength would, at 14 MHz, have a captive area of:—

$$\left(\frac{\frac{1}{2}\text{-wavelength}}{2}\right)^2 \pi = \left(\frac{10}{2}\right)^2 \pi = 78.5 \text{ square metres.}$$

Intercepting a wave coming in at an angle of 10° it would capture the radiation which would otherwise have "illuminated" a ground area of 5.8 times that amount, which is near enough to 450 square metres (see Fig. 1).

Now to estimate the area of Europe and the Mediterranean. A study of the atlas shows that the east-west distance averages about 2,500 miles and the north-south distance is about 2,000 miles. Thus the area in square metres is:—

$$2500 \times 2000 \times 1609^2 \text{ (there are 1609 metres in a mile)} \\ = 1.3 \times 10^{13} \text{ square metres.}$$

Therefore the ratio of the area of Europe and the Mediterranean to that of the captive area of the dipole is:—

$$\frac{1.3 \times 10^{13}}{450} = 2.9 \times 10^{10}.$$

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'S' Units	$\mu$ V across 50 ohms
1	0.21
2	0.4
3	0.8
4	1.6
5	3.2
6	6.3
7	12.6
8	25
9	50
9 + 10	160
9 + 20	500
9 + 30	1600

TABLE 1

IARU Region 1 Operating Standards recommendations for 'S' meter calibration for amateur bands below 30MHz.

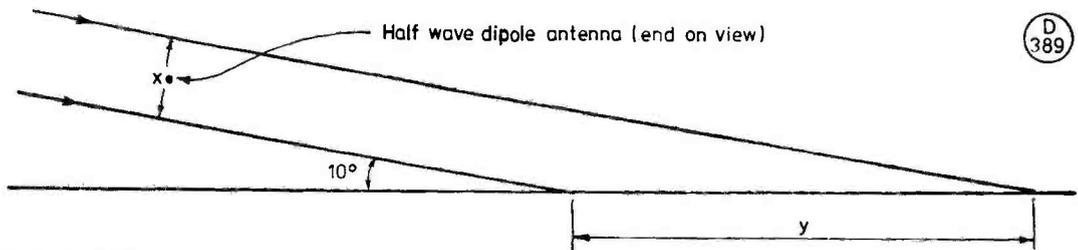


Fig. 1 SHOWING HOW RADIATION INTERCEPTED BY ANTENNA WOULD OTHERWISE HAVE 'ILLUMINATED' A LARGER AREA OF GROUND. WHEN RADIATION ANGLE IS  $10^\circ$ ,  $y = 5.8x$

The next step is to calculate the power picked up by a dipole developing  $25 \mu\text{V}$  p.e.p. across the input terminals of a 50-ohm impedance receiver. From Ohms Law,  $W = V^2/R$  (where  $W =$  watts,  $V =$  volts,  $R =$  resistance).

If the input tuned circuit of the receiver is correctly tuned then the receiver should present a resistive load to the antenna.

$$\text{Therefore } W = \frac{(25 \times 10^{-6})^2}{50} = 1.25 \times 10^{-11} \text{ watts p.e.p.}$$

But the dipole only delivers half the intercepted power to the receiver, the other half being re-radiated so the actual power intercepted is twice that delivered to the receiver as follows:—

$$1.25 \times 10^{-11} \times 2 = 2.5 \times 10^{-11} \text{ watts p.e.p.}$$

If this figure is then multiplied by the ratio of the area of Europe and the Mediterranean to that of the captive area of the dipole, the product will be the p.e.p. required to "illuminate" the whole area. We then get:—

$$2.5 \times 10^{-11} \times 3.3 \times 10^{10} = 0.73 \text{ watts p.e.p.}$$

Now most of the DX stations will be radiating several hundred watts p.e.p. so they only need to get a fraction of one per cent of their radiated power to this side to fill the whole Continent with a signal which will give  $25 \mu\text{V}$  on a dipole. It is not surprising, then, that stations with exceptionally good transmitting antennas should be able to put in very much stronger signals, especially under better-than-normal band conditions.

This, therefore, is my mystery about strong DX signals: they can be readily explained by simple arithmetic. But as this is the case, then why should the question have arisen in the first place? Well, although the explanation may be mathematically very simple, it is not easy to comprehend and in the opinion of the writer there are two main reasons for this. Firstly, in radio we regularly deal with very small and very large units and we tend to forget just how very small and very large they are. We casually refer to microthis and mega-that and the magnitude of the prefixes tends to be overlooked. The fact is that microvolts are very small units but by familiarity we tend to lose track of how small they really are. Secondly, and of even more significance in the context of this argument, is the way signal strengths are measured: signal strengths measured in 'S' units are meaningless unless translated into real electrical units. Invariably, when signal strengths are quoted in real electrical units the parameter is signal voltage across a

specified input impedance, but a much more meaningful measure of signal strength is the signal power measured in watts. There is no more logic in measuring received signal strength in volts than there is in quoting the output of a transmitter in volts; no one ever says that a transmitter is putting 70.7 volts into a 50-ohm load (which is 100 watts assuming a 1 : 1 standing wave ratio) — the actual power is quoted.

What, then, is the point of this argument, when signal voltage across a specified input impedance is just as precise as quoting signal power. It is, but when signal strengths are expressed in watts the numbers give a much more meaningful indication of the power being picked up by the antenna. As we have already seen,  $25 \mu\text{V}$  across 50 ohms is  $1.25 \times 10^{-11}$  watts; if we forget the mathematical shorthand and write this number out in full it is 0.000,000,000,0125 watts. When put this way it conveys much better just how very very small the signal power really is. Somehow,  $25 \mu\text{V}$  across 50 ohms does not seem nearly so small although it is exactly the same.

Another method of measuring signal power is the dBm scale where 0 dBm is equal to 1 milliwatt. On this scale  $25 \mu\text{V}$  across 50 ohms is  $-79$  dBm, and the power of a 100 watt transmitter is  $+50$  dBm. This scale has the advantage of producing very easily-manageable numbers, but when dealing with them it becomes even more difficult to retain a sense of their real meaning than when dealing in microvolts.

A further illustration of these points can be made by establishing what fraction of the transmitted power is actually picked up by the receiving antenna. We have already seen that the power intercepted by the dipole to give a  $25 \mu\text{V}$  signal on the receiver terminals is  $2.5 \times 10^{-11}$  watts. If the transmitter were putting out 250 watts p.e.p. the receiving antenna is intercepting only 1 part in  $10^{13}$  of the transmitted power. Translated into our familiar radio language the system loss between the transmitter and the receiving antenna is 130 dB which doesn't seem all that much. But  $10^{13}$ , or 10,000,000,000,000, is so large as to be almost beyond comprehension. Making an analogy on distance the equivalent of 1 part in  $10^{13}$  is approximately  $1\frac{1}{2}$  thousands of an inch in the distance to the moon; making an analogy in time it is equivalent to a millisecond in 317 years. For a signal of  $0.25 \mu\text{V}$ , which in practice would be about at the limit of readability on 20 metres, these ratios would be higher by a factor of 10,000. The incredible thing is that radio technology has provided us with equipment which can handle these extremes of power and so make possible the DX communication which we take for granted.

## CLUBS ROUNDUP

### BY 'Club Secretary'

#### 1979 MCC

AS you will see, we are giving the full Rules for MCC in this issue. Things on Top Band have changed a lot since we last ran an MCC — Loran is no longer taking up a large chunk, many more countries are available, and so on. We know that many club groups like MCC as an exercise to train new operators for the Big Time stuff, and we notice that we organise the only U.K. national contest on the band. So — a change of rules seemed to be indicated, and to a format which makes the appropriate allowance for this or that factor, to make an even balance and an equal chance for a club in any part of the country to win. What this means is that we have a simple set of rules, and given enough stations entering on both evenings, we can from the resulting logs work out the sums. We would like as many logs as possible, and so if any club or individual can only play in one leg — please don't be deterred from sending in a check log; this goes, too, for any overseas station. Indeed, we would be pleased if such a station could put in an entry and even win it!

So, there it is again. The biggest entry ever please, good sport and good conditions — for which last we have our fingers crossed. *CU in MCC!*

#### The Reports

Once again, for the umpteenth month on the trot, we have to make a start knowing we are *minus* some mail. Our wonderful postal service has excelled itself this time, with two packets awaited — none have reached us from Welwyn in much under a week for months! So we are certain to have to spend at least part of a Bank Holiday sitting at the typewriter instead of relaxing.

Our first stop is with **Acton, Brentford & Chiswick** who have their place at Chiswick Trades & Social Club, 66 High Road, Chiswick, on the third Tuesday in each month. The details are almost certainly in the missing packets — perhaps we should have nipped out and asked the Hon Sec last week about it, while we were sitting in the traffic jam outside his front door!

At **Addiscombe** the club's main interest is contests, and so they do not go in for the formal types of meeting; they are happy to get together on Tuesday evenings in the Spread Eagle, Portland Road, S. Norwood from around 9.15 p.m.

If you are interested in the amateur satellite game, chasing signals through *Oscar* or *RS*, then you should be a member of **AMSAT-UK**, this being the U.K. arm of the international AMSAT organisation.

Another special-interest activity is mobile: for this one needs to be a member of **A.R.M.S.** — contact the Hon Sec about membership at the address in the Panel.

At **Ashford** in Kent, they live on the top of a hill; Hart Hill to be precise, near Charing, where they can be found every Tuesday evening.

Thursdays are the evenings for **Barking** members to foregather, while Tuesdays are also available if you want to study Morse. Both are at Westbury Recreation Centre, Westbury School, Ripple Road, Barking. Incidentally, we note from the latest letter that there is a closed-circuit TV group associated who have Wednesday evenings at the same Hq — they ran a three-camera set-up at the local Town Show recently for a couple of days.

#### Deadlines for "Clubs" for the next three months—

(November issue—September 28th)

December issue—October 26th

January issue—November 30th

February issue—December 28th

Please be sure to note these dates!

Back to special interests again: this time to the RTTY buffs, and **BARTG**. All the details from the Hon Sec, at the address in the Panel. We might also note that the club is willing wherever possible to put on a talk about RTTY for a local club or group. Again, **GW3IGG**, the **BARTG** Hon Sec is the man to contact in the first place.

The **Cheltenham Newsletter** has changed its format, and seems to be carrying a little more material. October 4 sees them at the Old Bakery, Chester Walk, Clarence Street, Cheltenham, to welcome **G3BA** who will give his talk on radio in Prisoner-of-War camps (a subject quite a few old-timers know a bit about). It seems only yesterday we handed in our gear, and collected demob suits and ration books and tried to re-adjust our thinking to civilian life, to start out after a ticket and get on the air with the help of a surplus receiver, an 807 or two, and either a **BC-221** or a crystal with a certificate as to its frequency. Back to Cheltenham, and their Natter session, which is on October 19.

**Bishops Stortford** have their booking as always on the third Monday in the month, in the British Legion Club at the top of Windhill, Bishops Stortford. The committee have a programme complete until the earlier part of 1980, unless, as occasionally happens in the best-run clubs, something comes unscrewed . . . in which case something else will be fixed up!

Down on the South Coast, now, to **Bournemouth** and their Hq at the Dolphin Hotel, Holdenhurst Road, Bournemouth, where they are booked in for the first and third Fridays. We don't have the current details, but doubtless it is all in the packets we are awaiting. One thing about the bad postal service — it teaches one to contain one's soul in patience *and* to make bricks without straw!

For some reason the East of England and East Anglia are not heavily populated with radio amateurs or clubs, although there are a few. **Braintree** is one, on the western limit of the area; they are booked in on the first and third Mondays at Braintree Community Centre, which is adjacent to the Bus Park in Victoria Road.

A kind of knight's move in chess to the west and we land in the square occupied by **Bury**; Mosses Community Centre, Cecil Street on the second Tuesday is what we have on record, but we believe a visit on any Tuesday would be productive.

*Names and Addresses of Club Secretaries reporting in this issue:*

- ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnerbury Avenue, London W3 8LB. (01-992 3778)
- ADDISCOMBE: P. J. Hart, G3SJK, 42 Gravel Hill, Croydon, Surrey CR0 5BD. (01-656 9054)
- AMSAT-UK: R. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ
- A.R.M.S.: N. A. S. Fitch, G3FPK, 40 Eskdale Gardens, Purley, Surrey CR2 1EZ
- ASHFORD: J. A. Clarke, G3TIS, Yeomans Cottage, The Street, Brook, Ashford, Kent TN25 5PP. (Wye 812888)
- BARKING: A. Sammons, G81ZN, 80 Lyndhurst Gardens, Barking, Essex IG11 5BZ. (01-594 2471)
- B.A.R.T.G.: J. P. G. Jones, GW31GG, Heywood, 40 Lower Quay Road, Hook, Haverfordwest, Dyfed SA62 4LR
- B.A.T.C.: M. Cox, G8HUA, 13 Dane Close, Broughton, Brigg, South Humberside
- BISHOPS STORTFORD: T. E. White, G8LXB, 79 Elmbridge, Old Harlow, Essex
- BOURNEMOUTH: D. Wade, 70 Creekmoor, Poole. (Poole 695502)
- BRAINTREE: D. Holmes, G3JSV, Thaddeus House, East Street, Coggeshall, Colchester, Essex CO6 1SH
- BURY: M. Bainbridge, G4GSY, 7 Rothbury Close, Bury, Lancs. (061-761 5083)
- BYLARA: Mrs. D. Hughes, G4EZI, 3 Primley Park Crescent, Leeds LS17 7HY
- CHELTENHAM: G. Cratchley, G4HLI, 47 Golden Miller Road, Prestbury, Cheltenham. (Cheltenham 43891)
- CHESHUNT: R. E. Chastell, G8LNM, 4 Fairley Way, Cheshunt, Herts. EN7 6LG. (Walham Cross 35393)
- CHESTER: D. Cutts, G4FGC. (Gresford 3344). Address wanted.
- CHICHESTER: T. M. Allen, G4ETU, 2 Hillside, West Stoke, Chichester PO18 9BL. (West Ashling 463)
- CHILTERN: N. C. Ambridge, G4FRL, 53 The Avenue, Chinnor, Oxon. OX9 4PE. (Kingston Blount 52006)
- CORNISH: S. T. S. Evans, G3VGO, Glengormley, Carnon Downs, Truro, Cornwall.
- CRAWLEY: A. V. H. Davis, G3MGL, 41 Gainsborough Road, Crawley, West Sussex RH10 5LD. (Crawley 20986)
- CRAY VALLEY: P. Clark, G4FUG, 42 Shooters Hill Road, London SE3. (01-858 3703)
- CRYSTAL PALACE: G. M. C. Stone, G3FZL, 11 Liphook Crescent, London SE23 3BN. (01-699 6940)
- DERBY: Mrs. J. Shardlow, G4EYM, 19 Portreath Drive, Darley Abbey, Derby DE3 2BJ. (0332 56875)
- DERBY (Nunsfield): I. Cage, G4CTZ, 25 Petersham Drive, Alvaston, Derby DE2 0JU
- EALING: E. Batts, G8LWY, 27 Cranmer Court, Richmond Road, Kingston-upon-Thames
- EAST LONDON RSGB: R. Holmes, G3PKQ, 92 Dunedin Road, Leyton, London E10 5NJ. (01-558 2928)
- EDGWARE: D. L. Lisney, G3MNO, 119 Draycott Avenue, Kenton, Harrow HA3 0DA. (01-907 1237)
- EXETER: A. W. Bawden, 232 Exwick Road, Exeter EX4 2BA
- FULFORD: G. W. Kelley, G5KC, 10 Deepdale, York YO2 2SA
- G-QRP: Rev. G. C. Dobbs, G3RJV, "Willowdene", Central Avenue, Stapleford, Nottingham. (Sandiacre 394790)
- GUILDFORD: L. Bright, G4BHQ, 4 Dagleys Farm, Shalford, Guildford, Surrey. (Guildford 76375)
- HARROW: C. D. Friel, G4AUF, 17 Clitheroe Avenue, Harrow HA2 9UU. (01-868 5002)
- HELENSBURGH: A. McCudden, GM4DLU, Cruachan 1 Balloch Road, Balloch G83 8SR. (Alexandria 56118)
- HEREFORD: S. Jesson, G4CNY, 181 Kings Acre Road, Hereford. (Hereford 3237)
- IRTS: J. Ryan, E16DG, 23 Dollymount Grove, Clontarf, Dublin 3
- JERSEY: S. Smith, GJ3EZA, 19 Parade Road, St. Helier, Jersey, C.I. (Jersey 23249)
- LINCOLN: B. Bennett, G3EAM, 142 West Parade, Lincoln. (Lincoln 23958)
- MAIDENHEAD: J. Patrick, G3TGW, Bedford Lodge, Camden Place, Bourne End. (Bourne End 25275)
- MAIDSTONE YMCA: G. Hastie, 79 Rochester Crescent, Hoo, Rochester, Kent ME3 9JJ. (Medway 251387)
- MIDLAND: N. Gutteridge, G8BHE, 68 Max Road, Quinton, Birmingham B32 2AN. (021-422 9787)
- NORTHERN HEIGHTS: M. Topham, G8NUC, 1200 Great Horton Road, Bradford. (Bradford 73271)
- NORTH KENT: Dr. C. P. Conduit, 49 Baldwyns Park, Bexley, Kent DA25 2BE
- NOTTINGHAM: M. C. Shaw, G4EKW, 50 White Road, Nottingham NG5 1JR.
- PETERBOROUGH: L. Critchley, G3EEL, 36 Waterloo Road, Peterborough
- R.A.I.B.C.: Mrs. F. Woolley, G3LWY, 9 Rannoch Court, Adelaide Road, Surbiton KT6 4TE
- REIGATE: F. Mundy, G3XSZ, Westview, rear of Manor Farm, off Reigate Road, Hookwood, Surrey. (Horley 73878)
- ROYAL NAVY: M. Puttick, G3LIK, 21 Sandyfield Crescent, Cowplain, Portsmouth, Hants. (Waterlooville 55880)
- SALTASH: D. Bunce, 47 Hoffis Crescent, Saltash, Cornwall. (Saltash 2839)
- SOLIHULL: R. A. Hancock, G4BBT, 80 Ulleries Road, Solihull, West Midlands B92 8EE
- SOUTH BIRMINGHAM: Mrs. G. Apperley, G4GZI, 35 Denise Drive, Birmingham 7
- SOUTHDOWN: R. Jefferies, G8KQN, 84 Mill Road, Hailsham, East Sussex BN27 2HU
- SOUTHGATE: J. Fitch, G8EWG, 16 Kent Drive, Cockfosters, EN4 0AP. (01-440 7353)
- STAMFORD: G. Kay, G3QLD, 6 Westbrooke Park Road, Woodston, Peterborough. (Peterborough 43530)
- STEVENAGE: P. Byrne, G8MCV, 91 Jessop Road, Stevenage SG1 5LH, Herts.
- STOURBRIDGE: C. Williamson, G4IEB, 14 Lawn Street, Stourbridge. (Stourbridge 2006)
- SURREY: R. Howells, G4FFY, 7 Betchworth Close, Sutton, Surrey SM1 4NR. (01-642 9871)
- SUTTON & CHEAM: G. Brind, G4CMU, 26 Grange Meadow, Banstead
- THAMES VALLEY: R. J. Blasdel, G3ZNW, 92 Bridge Road, Chessington, Surrey KT9 2ET
- TORBAY: Mrs. G. Coker, 2 Causeway Cottages, East Street, Ipplepen, Newton Abbot. (Ipplepen 812117)
- TYNESIDE: M. P. Cranage, G8OFA, 69 Rectory Lane, Blaydon-on-Tyne, NE21 6PJ
- VERULAM: A. Clarke, G8MAE, 24 Kiln Ground, Hemel Hempstead, Herts. HP3 8EZ. (Hemel Hempstead 64751)
- WEST KENT: B. P. Castle, G4DYF, 6 Pinewood Avenue, Sevenoaks, Kent. (0732 56708)
- WINCHESTER: P. Simpkins, G3MCL, Lawn End, Park Road, Winchester, Hants.
- WORCESTER: M. Tittensor, G4EKG, 16 Durcott Road, Evesham. (0386 41105)
- YEOVIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil, Somerset.
- YORK: K. R. Cass, G3WVO, 4 Heworth Village, York

One we mustn't 'miss' out in **BYLARA**, the group of YL radio amateurs and SWLs. As a national group they have the usual snag of how to organise any sort of get-together, and their solution is to head for the tea room at every mobile rally at 1400 clock-time, not to mention the Saturday of the Leicester Show at the same time. In addition, they can be found on Monday evenings on 3.605 MHz at 7.15.

At **Cheshunt** the programme is extended out through November with firm dates. Another good idea they have is a printed "hand-out" sheet to give to anyone who makes interested noises; it contains a map indicating the ways of reaching Hq. and suitable welcoming words, plus an indication that it is up to you to introduce yourself to the

Hon Sec or a committee member, and to take part in full in the activity, even on a very first visit. We can't draw a map, but simply have to say Church Room, Church Lane, Wormley, Herts., every Wednesday, with cars to be parked in The Croft and Pembroke Close. October 3 is a VHF evening with station on the air at Hq, and 10th and 31st are down for a natter and CW practice. That leaves October 17, for a talk on home video by G8NDR, and the Chairmans lecture on October 24.

The **Chester** crew are based on the YMCA in Chester, on every Tuesday *except the first* each month; we have last month's programme(!) which tells us that they have something interesting set up for each evening.

**Chichester** live in the Lancaster wing of the High

School for Boys, Basin Road, Chichester, where they may be found on the first Tuesday and the third Thursday of each month.

Into the hills now, and **Chiltern**, now foregathering at the Canteen of the John Hawks works, Victoria Street, off Oxford Road (the A40), High Wycombe. The date is the last Wednesday each month.

Talking of hills, and travelling rather south and west, brings us to **Cornish**. On October 4, the group will be listening to the second part of a talk on Microcomputers by G30CB. The first part discussed the software and simple programming in BASIC, while this second talk will lead us on to hardware, the building blocks of a microprocessor, and elementary machine code. Venue for this one is, as usual, as the SWEB Clubroom, Pool, Camborne, starting at 7.30.

**Crawley** have the second and fourth Wednesdays; at the United Reformed Church, Ifield, for the latter, and an informal on the first date — the details of which may be had from the Hon Sec. On a different tack altogether, we hear from their newsletter that G3TR has been having heart attacks and complications — the shack is now all but out of reach. Get well soon, John.

The big news from **Cray Valley** is that they have two Morse passes. Nearly as big news is that the October main meeting will be the annual Surplus Sale; this is on the first Thursday, and the third will as usual be a ragchew evening at the Hq in Christchurch Centre, High Street, Eltham.

**Crystal Palace** newsletter comes in an unexpected hand this month, the Hon Sec, G3FZL, being for the moment unwell. However, it does tell us the vital thing, which is that the group foregather at Emmanuel Church Hall, Barry Road, East Dulwich, on the third Saturday in the month. Let us hope G3FZL is soon back in harness — he's much easier to read than his deputy!

One approach to getting members involvement seems to be to spread out the duties as far as possible, and this appears to be the approach adopted by **Derby**. On the programme side of things, we note Wednesdays October 3 for a Junk Sale, and on 10th a talk entitled "How to use transistors, diodes and silicon rectifiers without damaging your wealth." October 17 is a Night on the Air, and on 24th there is a talk on the D.R.I. Flying Squad, with illustrations. October 31 rounds things off with a talk on Non-Destructive Testing, by ultrasonics or radiography. This is an illustrated talk by GM30PW and will outline some of the problems of pipeline work in the North Sea. The venue for all these, of course, is 119 Green Lane.

Just a little up the road is **Nunsfield House**, in Boulton Lane, Alvaston, Derby, where they are to be found every Friday evening. There is something doing most evenings although this month we do not have details — possibly still in the post. So — the Hon Sec's name and address are in the Panel!

Back into the London area, to **Ealing**, who are based on Northfield Community Centre, Northfields Road, London W13. We understand they are there on every Tuesday evening. More details either form the Hon Sec — see Panel — or why not just pop along and find out?

Next we come to **East London RSGB Group**, Community Centre, 21 The Green, Wanstead, and the matter of a Sunday meeting (third Sunday in each month). Details from the Hon Sec — see Panel.

At **Edgware**, October 11 sees G3GC take the stand to discuss the selection of a good VHF site, while on 25th, G8FAT gives Part Two of his talk on personal computers, this one called the "Apple of my Eye." All at Waling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware.

**Exeter** are at the Community Centre, St. Davids Hill, on the second Monday of each month.

At the other end of the country we hear from **Fulford** in their home base at 31 George Street, York, every Tuesday evening.

Back to the special-interest stuff now, namely the **G-QRP Club**. Details from the Hon Sec — see Panel.

On to **Guildford**, who are based on the Guildford Model Engineers Hq at Stoke Park, where they can be found on the second and fourth Fridays of the month (still going strong in their Jubilee year). It is an interesting thought that Guildford S.M.E. is one of the big names in the model engineering fields as Guildford A.R.S. is in ours — is enthusiasm infectious?

**Harrow** foregather at Harrow Arts Centre, which is in High Road Harrow Weald — details from the Hon Sec at the address in the Panel.

North of the Border they seem rarely to mention the local radio club, though we know of quite a few. One that has been noted of late is at **Helensburgh**; here, as with so many other groups, the Hq is in a school — East Clyde Street school, on the first and third Wednesdays.



That well-known clerical QRP-er, Rev. George Dobbs, G3RJV.

Back to **Hereford** where the gang have the first and third Friday of October at the County Control, Civil Defence Hq, Gaol Street, Hereford. We have no details of the programme to hand, but they will certainly have plenty of interesting things on if the recent past is anything to go by.

We will admit to having wondered a bit about the **IRTS** newsletter's absence over the last few months. It now becomes clear that they did the sensible thing while their posts were disrupted by industrial action, and simply didn't publish. So — now we have the March copy, closely followed by a combined one for April-August. It is in the club constitution to have an AGM, but that also was put back because of the inability to send out the required notices. Thus, this copy gives notice of an AGM and a Special General meeting at the same session, the latter to regularise the AGM itself. However, while all that is happening, life goes on, and we reckon the best way to find out about activity in EI is to start by a letter to the Hon Sec, at the address in the Panel.

Still, as it were, 'offshore' we mention **Jersey**, where the contact is as shown in the Panel, and he will be pleased to tell all.

Back nearer home we have **Lincoln** who are regularly to be found at the City Engineers Club, Waterside South, Lincoln. For the dates and doings we must refer you to the Hon Sec at the address in the Panel.

At **Maidenhead** the home base is at the Red Cross Hall, The Crescent, on the first Thursday and the third Tuesday.

**Maidstone YMCA** have a place at the 'Y' Sportcentre, Melrose Close, Cripple Street, Loose, where they meet every Friday evening. Of late years they have kept pretty quiet about themselves, but we recall an earlier scribe expounding on facilities which would make the average group go green with envy!

**Midland** haven't sent us a newsletter for sometime and we must say we like the new format. Reading through it, we notice that October 23 is down for the AGM; it is shown as being at Room 118, University of Aston, or (the progress of alterations permitting) back at Hq in Broad Street. So we recommend a note or ring to the Hon Sec to see what the latest situation is.

At **Northern Heights** we understand the Hq is at the Bradshaw Tavern on Wednesdays. The Grid Ref is 303083, and we understand Halifax buses 3 and 26 pass the door. However, it is a recent move and there is just the possibility they may have found somewhere better, so a call to the Hon Sec seems indicated.

The revived **North Kent** group are to be found at St Mary's Institute, 2 North Cray Road, Bexley, on the second and fourth Thursdays. We do not as yet have any data on the doings, but no doubt there will be something set up by the time this reaches you.

At **Nottingham** the venue is the Sherwood Community Centre, Mansfield Road, Nottingham; October 4 for a Forum, 11th for a talk on Logic by the Hon Sec, 18th for what they call an Activity Night, and finally on 25th they have a slide show of recent club activities produced by G3YUT (who was, incidentally, one of three club members who went to the Isle of Man for the 'GT' period and were overwhelmed with calls after the special prefix.) Another recent activity was in connection with the Bi-centenary of the Erewash canal, when GB2EC was set up. As a result of the heavy rain that weekend there was a lively debate as to whether more water was in the tent than the canal!

## MCC (Magazine Club Contest) — 1979 Rules

**1. Date, time and venue.** Top Band, 1700-2100 GMT on Saturday and Sunday, 17th and 18th November, 1979.

**2. Mode.** CW only Saturday evening, Phone only Sunday evening. A valid entry will show contacts on both evenings. (But see Rule 8.)

**3. Scoring.** Three points for a QSO with a club, one for a contact with a non-club. There will be a multiplier of one for each county or administrative area worked, whether by way of a club or non-club QSO, and for each country worked. Total score equals QSO points times multiplier on each evening. Final total is obtained by multiplying the CW score so found by 1.5, and adding to the Phone score. A station may only be worked once on each session.

**4. Geographical.** Entries from Scotland, Ireland, Isle of Man, Channel Isles, Devon, Cornwall or outside the British Isles may multiply the overall score obtained in Rule 3 by 1.5.

**5. Callsign.** If possible the club call shall be used; if not, a member's call may be used, preferably but not essentially the same on both evenings. This is intended to help a club which otherwise would be unable to make a valid entry.

**6. Contest Exchange.** The exchange shall consist of the report in RS(T) plus a serial number which may start at any number *except* 001, and rise sequentially with each successive QSO. Club stations shall so indicate ('CLB' would be acceptable on CW) and all stations shall give their county (in abbreviated form will be acceptable on CW provided no ambiguity can arise) or admin. area (Tyne & Wear, East Sussex, etc.).

**7. Disqualification.** Will be at the discretion of the Contest Committee, based on the reports of invigilators, for such as bad operating, poor signal, or excessive duplicate contacts in a session. The Editor regards the Contest Committee decision as final, and no correspondence will be entered into.

**8. Entries.** Logs should be *postmarked* not later than 21 days after the conclusion of the contest; this, plus a suitable allowance for logs delayed in the mails, will mean the results will not appear in January 1980 issue. All entries will be accompanied by the usual signed declaration, and a covering letter of comments on the contest as seen from that station would be appreciated. If for some valid reason a club cannot make a full entry covering both evenings, it will be acceptable as a check log, and if there are several in this category they will be listed with claimed scores. An entry may be accepted from any country in the world which is permitted operation on Top Band, anywhere in the 1.8-2 MHz band. U.K. stations should remember some countries have a limited part of the band, and adjust their operating techniques if necessary to take account of this.

**9. All entries** to MCC Contest Committee, SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts AL6 9EQ. Photographs of Stations with the logs will be most welcome.

**Peterborough** next, and here we must direct you to the Scout Hut in occupation Road, where they get together on the third Friday in each month.

**R.A.I.B.C.** stands for Radio Amateur Invalid and Blind Club, which since 1954 has been looking after an ever-increasing membership, not to mention supporters and representatives, so that now *Radial* goes out to more than 1000 addresses each issue. To help things along, there are the subscriptions of course, and donations, of which we feel we ought to mention the one by Dumfries and Galloway club who ran a "sponsored talk-in" which raised no less than £111.46 — good for them!

**Reigate** are next in the pile, and we see they are settled in the Constitutional Centre, Warwick Road, Redhill on the third Tuesday each month. Details from the Hon Sec — see Panel.

**Royal Navy** next, and they have a couple of good 'uns in the current *Newsletter*: The Ten Commandments occupied under 200 words, the Declaration of Independence under 500 — and the Common Market on duck eggs over 120,000 words! As for the other one, the Royal Navy has a statement that "visibility is reported in yards up to 5000 metres", written down as an instruction.

At **Saltash** the Hq is at Burraton Toc H on the first and third Friday of every month. For the record you can find the headquarters address at the junction of Warraton Road and Oaklands Drive.

It's the third Tuesday which is booked by **Solihull**, at Manor House, High Street — more details from the Hon Sec at the address in the Panel.

Not so very far away we have **South Birmingham**, and here we find them at Hampstead House, Fairfax Road, West Heath. The formal meeting is on the first Wednesday, but every Thursday is an HF operating evening in the club shack, and there is also an open evening every Friday.

Back to the South Coast, this time to call in at **Southdown** in their Hq at Chaseley Home, South Cliff, Eastbourne, where they are to be found on the first Monday of the month.

**Southgate** are based on the Scout Hut in Wilson Street, Winchmore Hill, where they are to be found on the second Thursday of every month. Details of the evening's entertainment from the Hon Sec — or go along and find out!

**Stamford** are back in operation again after a lapse, and it is understood that various interesting activities are planned or in the pipeline — all the latest gen from the Hon Sec.

**Stevenage** is yet another of the umpteen clubs the writer has been a member of, and some 15 years later we note they still have the same Hq, although now it is called the canteen of British Aerospace Plant B. They are there on the first and third Thursdays.

Which being said, the very first one we ever joined was at **Stourbridge** although at this distance in time we can't recall why we went there instead of the Bromsgrove club which we walked past every day; probably didn't know about it! Anyway the Stourbridge group has some of the same faces all these years later, albeit much older and in different Hq.

They now have the library at Longlands School, Brook Street, Stourbridge on the first and third Mondays. The former is a Constructors evening every month, the latter the "proper" meeting. G3KQJ has the floor on October 15, to give a talk on Microprocessors.

Once we get past ST in the alphabet we know we are on the home straight, which starts at **Surrey** and *T.S. Terra Nova*, 34 The Waldrons, South Croydon. The first Wednesday of the month is the main meeting, and the third one is an informal.

**Sutton & Cheam** have two different venues, namely Ray's Social Club, London Road, Cheam, and Sutton College of Liberal Arts, Cheam Road, Sutton. We believe there is some slight change of routine temporarily, and so we do suggest a contact with the Hon Sec — see Panel — before setting off on the third Friday or the last Wednesday of the month.

Giggs Hill Green Library is home for the **Thames Valley** group around Thames Ditton way, and we have it that they are at home to visitors on the first Tuesday in each month.

**Torbay** have their place at Bath Lane, rear of 94 Belgrave Road; however, we don't seem to have received any information as to when they foregather of late, so we must refer you to the Hon Sec — see Panel.

Now to **Tyneside**, and their Community Centre in Vine Street, Wallsend, where the locals are to be found every Monday.

The main meeting of the **Verulam** group seems to have settled at the Jubilee Centre, Catherine Street, St. Albans, on the fourth Thursday each month. There are also informals which are at Salisbury Hall, London Colney in summer, and the R.A.F.A. Hq in Victoria Street in winter.

The imposing Hq of the **West Kent** group is the Adult Education Centre, Monson Road, Tunbridge Wells, where the routine is to foregather on the first and third Friday of the month — their's is one letter we are sure is in the missing packet of mail, and we are equally sure they will have something set up.

If you can find the Crown Hotel, North Walls, **Winchester** you've found the local club Hq. The main date is on the third Saturday of each month but there is also an informal on the first Friday of every month.

**Worcester** are based on the Old Pheasant, New Street, Worcester on the first Monday of the month. More details on this one from the Hon Sec — see Panel.

**Yeovil** believe in regular weekly sessions, and they have them at Hut 101 Houndstone Camp, Yeovil on Thursdays.

Last of all we have **York**, who confuse everyone, including, we hear, themselves on occasion(!) by getting together on Fridays *except the third Friday*, at the United Services Club, 61 Micklegate, York.

### Finale

Deadline dates are in the 'box' in the body of the piece, and all we need to do now is to *remind you again about MCC* and to say your letters should be aimed at "Club Secretary", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. *Cu on Top Band!*

# COMMUNICATION and DX NEWS

*E. P. Essery, G3KFE*

There are, it must be admitted, some occasions on which the rapid return of *CDXN*-writing time is viewed with disfavour. This time there is all the joy of a late-summer heatwave and the thought that we have been chuntering on about holidays since January, and so far have not done anything practical about it, the while the grass grows apace and the nights draw in and get chilly; but isn't this the first indication of the autumnal peak of conditions on the bands? And isn't it likely that we are near the peak of a high sunspot cycle . . . we must have been suffering the results of a prolonged spell of instrument-making in the way of restoration of an R.A.F. aircraft compass of pre-war vintage. 12BA screws with round heads to be made, and for a change the gimbals have bearings locked in place with a locknut threaded in the style made popular by Joseph Whitworth. Alas for the task, these aged hands are a mite inadequate in the way of thread-chasing, having come to the craft late in life.

Then this morning we were looking at a circuit diagram and pondering the next step when there was a loud crash and a piece of Avometer was observed leaving the area in a low orbit. That ancient instrument now requires a polythene bag in which to keep its entrails; it has a well-cracked meter mirror, yet it still reads within its calibration limits! We haven't been so surprised since we put 1500 volts across a CMOS IC! However, they do say a change is as good as a rest, and we did get a change, even if it was all over in a matter of microseconds.

## The Bands

Are still there, and noises off seem to show some degree of hope for the outcome of WARC '79. One was quite shattered to hear that the RSGB HF Convention had to be crossed-out due to the lack of support, when it was known that those who attended would have gone home with a very good idea of the sales pitch for amateur radio world-wide; and it must be damnably

demoralising for those who would have left the meeting to go and plead on our behalf — we couldn't complain had they told us in basic English just what the bargee would do with us and our bands. If we escape lightly those same delegates, and the others who worked on our behalf, whatever their political colour, will be entitled to an apology from us.

However, now we've got that off our chest, let's get into the task in hand. Perhaps first we should mention that arising from the close-down of Hugh Cassidy's *West Coast DX Bulletin*, the mailing list was transferred to K5AAD, Don Busick, and on August 15 Vol 1 No 1 of *The DX Bulletin* was published. All those on the *WCDXB* mailing list have received this first one *gratis*, and anyone else wishing to receive a copy can write to: The DX Bulletin, 306 Vernon Avenue, Vernon, CT 06066, USA. It is, obviously, early times yet, and the effervescent style of WA6AUD is definitely missed, but it looks to be a worthy successor.

The noises about mainland China operations continue to rumble along. JA6HOZ is repeatedly named as the call who is in Peking and doing the educational activity there, with an Icom IC-701. There is talk of a beam and a permanent club station, but at that point it all starts to cloud over a bit. One guesses the point is very much the desire to avoid a full-blown pile-up which would not in any way be sensible — after all, to clean up the backlog of some 30 years thirst for BY would take a multi-multi group a time in the order of weeks. While BY activity is on the cards, a low profile operation is likely at first. In a more specific indication, it has been suggested that 14150 KHz at 0800z looks to be right, and your conductor checked this as being something like 1600 local time in China, which sounds reasonable even if it suggests a "wrong" time for us.

From VR3 it is understood there are some plans to activate Top Band on Christmas Island, when the static season dies down, with VR3AR.

driving. We also hear of the VR3s being augmented by the imminent arrival of another amateur there.

If you hear 18YRK on Tuesdays, around 1700, stick around as you might well find the 18 is MC for European QSOs with ZS2MI on Marion Is. Incidentally, one wonders whether ZS2MI is the call which has had the most owners — we seem to recall that back in the days before your scribe held a licence (and that's a long time!) G6QB used to note the arrival of a different operator, or the troubles with the gear or aerials there.

**'CDXN' deadlines for the next three months—**

(November issue—October 4th)

December issue—November 1st

January issue—December 6th

February issue—January 3rd

*Please be sure to note these dates.*

One place for a bit of confusion in the matter of prefixes — other than USA that is! — is the group of islands known as the Netherlands Antilles, of which perhaps the best known is PJ2, Curacao. In addition there is PJ3, Aruba; PJ4, Bonaire; and PJ9 covers aliens in any of these islands, which collectively are in CQ Zone 9. 'Sint Maarten' covers PJ5 for St. Eustatius, PJ6 Saba, PJ7 Sint Maarten itself, and PJ8 for aliens in any of these three islands which are in CQ Zone 8. As for PJ1 and PJ0, they are reserved for "specials."

We hear (but we haven't ourselves heard) that 5R8AL is back on from Malagasy. QSL via P.O. Box 3833, Tananarive.

Nicely timed for the time when this is in your hands is the Anguilla VP2E effort from October 20 by none other than W3HNK — so it would be likely that he would be QSL Manager to himself as well as all the others he handled. Look out for him in the CQ WW contest in the last week of October.

Those who go a bundle on RTTY may be interested in the IATG series of contests. Australia/Oceania/Asia is on November 3/4, logs to be received by December 15. The Americas, North and South, are honoured over the weekend January 19/20, while Europe and Africa have their's over weekend March 9/10. For these the logs are to arrive on February 20, 1980 and April 15 respectively. Each is a world-wide contest and the details are best obtained from Prof. Franco Fantì, Via A. Dallolio n. 19, 40139 Bolgna, Italy.

Reverting to the BY question, a later report has it that an Association of Radio Sport of the People's Republic of China has been formed, with several former active BYs on the slate of officers. With this report there came an indication of 14.225 MHz.

The new republic of Kiribati has been allocated the numbers T3A-T3Z, and it therefore follows that the VR1 and VR3 prefixes will now disappear. Another change is that ZD9GH, who has for long been on Tristan da Cunha, has been in the UK for three months and has been requested to change his call sign, and the prefix ZD9G is now being used for Gough Is.

Still with changes of prefix the established DM one used by the GDR, will change due to the allocation of the block Y2-Y9 to this country. Something like the following: Y21A-Y29Z, repeater station; Y21AA-Y29ZZ to individual stations; Y31AA-Y39ZZ Clubs stations; Y41A-Y49Z beacons; Y61A-Y69Z news-bulletin stations; and Y91AA-Y99ZZ club stations. In addition to all this they will keep the established system whereby a station's whereabouts is denoted by the last letter of the suffix, as: A, U, Rostock; B, Schwerin; C, Neubrandenburg; D, P, Potsdam; E, Frankfurt; F, X, Cottbus; G, W, Magdeburg, H, V, Halle; I, Q, Erfurt; J, Y, Gera; K, Suhle; L, R, Dresden, M, S, Leipzig; N, T, Karl-Marx-Stadt; and O for Berlin.

If you worked VR1BE, he is good; if you worked VR1BE/KH1, then you worked a dud — 'twould seem the small matter of the reciprocal licence was overlooked . . . hmm.

Turning to the BY question — again — we note that JA sources stated JA6HOZ was to arrive in Peking on August 12, and that operation would be confined to August 13-14. And then a JA6HOZ/BY was reported on

August 15, at 0645 working JA stations. It just *might* be!

## Contests

Naturally the most important is our own MCC — but it is dealt with elsewhere. Thus we come to the CQ WW DX Contest, with some 42 lumps of silverware, and certificates galore. There is a special section for the QRP addicts, in which the criterion is a maximum of five watts *output*. Phone is October 27/28 and CW is November 24/25. In each case operation commences at 0000 GMT Saturday morning and ends at 2400 GMT Sunday. The contest exchange will be RS(T) plus two digits indicating your CQ Zone. It should be noted that the contest rules require that a station out portable in a call area different from the one indicated by his callsign must ensure it is clear where he is located. The standards are the DXCC country list, the CQ Zone Map, WAE country list, and WAC boundaries. Outside the USA, the QSO points are one for a station within your own continent, three for a station outside your continent. A contact with one's own country is valueless for QSO points but may be made for multiplier purposes. The multiplier is a dual affair, in that a multiplier of one point may be made for each different country worked on the same band and, secondly, for a multiplier of one for each CQ Zone worked. Final score is the result of multiplying the total QSO points by the sum of the country multiplier and zone multiplier. Cross-check sheets are mandatory if you worked more than 200 stations on a band, and desired if you didn't. Disqualifications will be made on the basis of licence violations, contest rules, bad conduct, excess duplicate contacts; and unverifiable QSOs claimed as multipliers. An unverifiable QSO results when a mis logging of the other man's call occurs. While it is accepted that the odd duplicate will occur in every log, it has been found necessary to encourage good organisation by making a note that for every duplicate excised by the contest committee, a penalty of three additional contacts will be exacted. The only snag is that the rules don't say what constitutes a duplicate contact: one assumes that one may work the station once only,

and not once per band — but the Rules don't say so. If you are thinking of entering (and if you do, more power to your elbow) it rather sounds as though you need to get in touch with CQ's contest committee by letter or telephone. Logs go to CQ WW Contest Committee, 14 Vanderventer Avenue, Port Washington, L.I., N.Y., USA 11050, postmarked no later than December 1 for the Phone section, and January 15 for the CW section. It is stressed that it is very important that you mark the outside of the envelope containing the log as either CW or Phone, to help the CQ gang get the results out on time.

Still with W1WY, we notice that between October 10 and November 10, the Dutch will be adding a 5 to their calls to commemorate 50 years of amateur radio: so PA0PN, for example, will become PA50PN. Around the same time the HBs will also be celebrating 50 years of amateur radio in Switzerland by signing HB7. Still with Frank, we notice that this years J-O-T-A activity is over the weekend October 20-21.

## Recap

At the start of this piece we were commenting on how quickly CDXN-time came round . . . it was the writer who was out of sync, having completed the piece *a week early!* Then the mail arrived, leaving your conductor to recast the after-end of the piece. It's an ill wind that blows no one good — at least we had a delightful couple of days afloat in the last few hot days of 1979, and our restoration work now graces the steering position. But we must advert to the mail.

Our first letter is that from G2HKU (Sheppey) who notes the crackdown on CB transceiver operators on the island, with three of the pests being given £100 fines. However, the things are openly advertised in certain magazines, and the Citizens Band Association (Plessey getting ever more desperate for an outlet for their — admittedly very good — linear ICs against the Jap competition; but why the blazes can't Plessey call itself Plessey instead of hiding itself under the title Citizens Band Association? Their desire for an outlet for ICs is laudable, but to *hide* their connection with the C.B.A. seems rather to spoil the image) continue to bleat away about the "advantages" of CB

carefully avoiding any of the statistics that would kill their case stone dead. Luckily, the authorities are not quite the halfwits the C.B.A. assume them to be. However, to return to G2HKU; Ted worked the Top Band with his usual Phone PA0 contacts, and CW found him in contacts with UC2AAK, OL3AXN, OL5AXU, SP9DH, RQ2GGS(?), UC2AAW, DJ6ZB, DK3DZ, C3IOE, and UP2PAP. The next allocation noted is at 14 MHz, with the skeds to ZL1VN, ZL3FV, ZL3RS, and ZL3SE, plus CW to ZL1AM, LU7XP, YN1JCC, UI8ADQ, UH8DC, and JH1GUO; which leaves us with the QRP rig CW which managed S05KMB and OK2KTE. Fifteen was all-QRP, to UL7PBY, YU3AR, and 4N0MP. As for Ten, CW again was in favour, with PY6HL and UK9YAU as the victims. To revert to those CB-ers, as usual the local paper had the cheek to discuss these 'erbs as "local radio hams." We hope Ted explained to the reporter just what we all think of *that!*

Next we have G4CQK (Walton-on-Thames) breaking his long silence to note his contacts using the HW-8 to an inverted-L 36.5 metres long by 8 metres high; PY2FJP on 21.070 MHz. Interesting point is that Albert has always used a Z-Match on this band, but it was put to him that an L-Match was more 'correct' and the South Americans were the result — but on the old Z-match he had been knocking off the *North* American East Coast chaps like shelling peas, also on 21 MHz. Either way, Albert can be satisfied that it *works*, which is after all the object of the exercise.

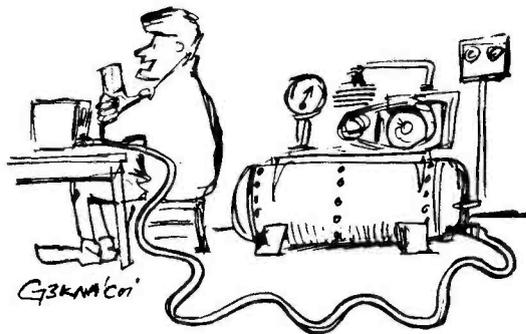
Now we have the analysis from G3NOF (Yeovil). Don again found Ten to be patchy, with short skip and some openings into Africa and South America, while towards the end of August there were the odd opening to N. America. Don notes his SSB QSOs as C6ACY, PY1BEH, and BE1. 21 MHz has on occasions been open for the full 24 hours each day; 0630z sees the VK/ZLs in full swing, or maybe Wb or South America; 0900 brought in the JAs, and the Yanks were around from about 1300 through to 2300. SSB QSOs are recorded with C31TA, C31TI, C5AAP, CM2RX, EA3ALD/EA9, H44LW, HS1WR, J7DAY, JAs, HK6BOG, KH6LW/KH8, KZ5OS, N2KA/SV9, OD5KV, OE2WSL/YK,

OH2OT/OH0, SV1KP/SV9, TU2WE/M, UA9VR, UA0QDH (Zone 19), UC20AV, UH8HAS, VE4CF/1 (Sable Is.), VE6CK/SU, VKs, VP9CP, VQ9DS, W2TDQ/SV9, W5YU (N. Mexico), W7JTT (Arizona), WD6CDU/KH6, YB0ADW, ZC4JG, 9M2BZ, Passing on to Twenty, which after all is where the real meat is always to be found (regardless of sunspot conditions), G3NOF found it to be open round the clock but, like Fifteen, having the odd dead spell. Most mornings around 0600z the W6/7 stations have shown, followed by VK/ZL and then again by the Pacific stations; little time was given to the band later in the day, but nonetheless Don rang the bell with HP3AAJ, K7ICW (Nevada), KZ5OS, M1Y, VE4CF/1 (Sable Is.), VE7AQR, VE8RJ, all the VK call

for review, he is fascinated by it.

Still with the *Datong* gadget, we have been passing it around 'selected ones' in the circle for opinions, it having very markedly revised our own views on learning Morse and indeed what constitutes *good* Morse — and the more the little clips of paper from the 'selected ones' accumulate the more we play with the thing ourselves and learn more.

G3PKS (Wells) is another QRP convert. On Ten he used CW to the Big Rig, to work PY3WJD, OJ0MA, HP7OP, 15YZ, OH3NM, PPSUG (a new variant of PY for Jack), SM4GLC, SP9AOA, EA3BEN, FOECH/M near Rochelle, 4X4VE, and EA7TL. As he says, generally poor — but brighter moments. 21 MHz CW was also somewhat like the curate's egg, with JH1EYM, AA7N,



"... the compressor here is rather bulky ..."

areas, VP2VBK, VR6TC, W0UR (Colorado), WB7DPM (Arizona), WB9VXK/HR1, YS9RVE, ZK1AM (Manihiki), ZK1CE, ZLs, and 4U1TU.

Ian at G4EAN (Nottingham) comes back after a long silence and has at last given up this optimistic idea of a long weekend session in favour of just leaving the rig running and grabbing anything worth having that may pop up, such as the VP8SB in his list. Stations were all worked on Twenty; around 1800z a lot of Europeans, 1900z A9XCF, C31SS/M and 4N0MP, 2000z Europeans, and 2100z Europeans plus VP8SB, for some 22 QSOs in the month — more than for many a long day. However, G4EAN has bought one of the *Datong* Morse boxes and, like the writer who has one

9V0OK ("where's that?" says Jack), JA11IX/4, VE2WQ, and WB4MVX. Twenty was looked at once, and yielded W4PG in very poor conditions, but G3PKS was given to understand that things had been brighter. Turning to the lower bands, Forty was excellent for the inter-G stuff by day, and autumnal conditions beginning to appear — W3DF at 0730z and RST579 both ways a week before he wrote. Eighty is also showing signs of the autumnal lift, but was unreliable during daylight. The usual SSB skeds were worked, and during a short trip to Weymouth, a crystal-controlled three-watt rig, simplest direct-conversion receiver, and ten-foot loaded whip on the car roof managed to net contacts in N. Wales, Stockport, Yorkshire and

Kent. To avoid the QRM the contacts were made either at breakfast time or early in the evening. Back home again, and the famous G3PKS Pyramid aerial was loaded up on the Top Band, using the G30TK transverter design, with G3TWO, G4AZB, G4FPZ/A (Cley, Norfolk), G3OZC, and GW3AX. Later G3WBC/M who was about 100 miles north of London — all these on SSB while G3GHS was worked on CW. So it all looks as though Top Band is on the upswing again.

A year or so back we ran an Editorial about the Morse test taken at one of the coast station by one who is now G4GOF (Hastings); we recall him as an SWL, at the RAE stage, then G8, then Morse, and this time we hear he is down to a Codar rig and AR88D 'cos the FT-101E is being mended. Meantime, Jesse asked if we would review the *World DX Guide*, preferably in this issue. No way, in the little spare time we have available, so we thought a bit, and realised that G4GOF was just the sort of chap to review such a tome. So — we twisted his arm and await the results! Meantime, we hope he is back on the air by now with the FT-101, and getting at the DX.

G2NJ (Peterborough) seems to have had quite a crop of CW QSOs with QRP stations — there's no doubt at all that there is a definite challenge in the fleapowered machinery. GM4HBG in Glenrothes for example, had just that moment (0315z would you believe!) completed a five-watt transceiver and wanted to test it — reports 589 both ways would have done much to make the late-night work worthwhile. Another one was G3AHS/P near Basingstoke, early in the evening, using 100 feet of end-fed wire. G3SYC/P was near Ludlow, West Yorks with 66 feet end-fed just before lunch, and G3IVF near Derby who was interesting insofar as he had added a counterpoise to his end-fed and made quite an improvement. Straight after this, Nick was called by G4OO, who was running 3 watts and peaking S9. Yet another end-fed merchant with a counterpoise was G4HNI, while G3PTO was on with 2 watts; G8IB in Abingdon had an HW-8, and G3BLN down in Dorset had three watts.

G2ADZ reckons that Ten — his specialty band — has not had such a good summer as either of the past two

years. Nonetheless, the sage of Chessington had his moments on CW; for example, SU11M and SU1MI who are father and daughter, VK6NDB, VK5ARA, DA1WA/OHO, OH2UBF/OHO, HB0AFI, ZSs, 9J2CJ, CE3WD, LUs, FY0EOO, 1G9DMK (Lampedusa) ZD8TC, ZP5XH, J3ABP, FG0DDV/FS, KP2A, CO2PY, 7X4AN, PYs, YVs, HH2T, A2CDW, JA2XW, FH8CY all worked, plus Gotaways 5N0DOG, C31KJ, and VQ9KK. Not content with all this, he came up on 21 MHz to work VP2KJ, JA8DFK, and YV1BVJ before retiring into the distance muttering about "too easy on Fifteen!"

Yet another new reporter — or at least one who hasn't reported in the writers' time! — is ZE3JO, still active as ever from Zimbabwe-Rhodesia. Mal is still active, with over 300 worked, but apart from his regular skeds with G5VQ and G61F rarely hears G stations between BERU and the CQ WW Test! However, Mal gets out as this lot will show: on 7 MHz, JAs, VK6HD, VP8s, 3B6CD, all CW on a noisy band. Twenty was used for both CW and SSB, to FC6FPH, WB5VZJ/H5, P29JS, TF3IRA, TU2HS, VE8MA, XE1UF, and 3A2CP. Phone and CW likewise on Fifteen, where ZE3JO worked stacks of VKs, including VK7s, VK2AGT (Lord Howe Is.), VK9NW (Norfolk Is.), ZLs and 3B6CD. On Ten, against mixed-modes, with C311RR, FC6GDR, KL7CYL, PJ2CZ, PZ1BS, TU2JB, VE8AW, VP2ML, and VP2MAY. All this was done with and HW-101 and TA33Jr., or an HW-32A, with dipoles for 7 and 14 MHz.

G4BUE (Upper Beeding) writes on behalf of the G-QRP Club gang, and kicks off by mentioning the QRP Activity Weekend of October 6/7 — the previous two were very good indeed. As for the QRP Winter Sports, they run daily from December 26-31, bands and times (GMT) as follows: 1000-1100 21060 KHz, 1100-1200 on 14060, 1200-1500 on 21060 and/or 28060 KHz. Forty will be looked at between 1130 and 1230, and around 7030 KHz, while the 3560 KHz area will be buzzing between 1330 and 1530. QRP Club members tend to gather round the 3560 KHz region at lunchtime on Sundays too, with a morning whirl on 7030 also. Turning to the members, we see GM3OXX set out to have a *real* bash at the AGCW-

DL Test over July 21/22 weekend. A 21 MHz GP was toted to the work QTH and raised to 100 feet, the rig coupled up and immediately down came the rain accompanied by thunder and lightning, which meant that it was impossible to touch the rig without a shock. After a couple of QSOs with W, GM3OXX pulled it all down again and went home, soaked through, to change and get back on the contest from home. Keen type!

G3ZXK was the operator of C31DV in the QRP contest, and managed to make the HW-8 deal with a TR8 and a YV on 21 MHz, plus a VE on Forty. Turning to G4FJF, Mike was in QSO with DL7VK who indicated a need to QRT owing to the dreaded TVI — he was persuaded to stay on the air but reduce power, and the TVI cleared so that he can now operate when he pleases — perhaps more G stations would do well to try this ploy.

For himself, G4BUE has been concentrating on working countries with 1 watt, with a view to the CQ DXCC Milliwatt award. 28 MHz SSB made it to YV2BYT, PY5EG, OH2OT/OHO, while CW on the same band gave XT2AW, OD5LX, and LU8DQ. 21 MHz SSB did the trick with A4XGC, 5B4HF, W2TDQ/SV9, C31SS/M, SV1KP/9, N2KA/SV5, UF6VAG, SV11W/9, and CW to ZK1MB, LU3EX, VU2GO, UM8MBN, LU6EF, JD1ALM/JDP, FM0EVQ, and 9G1JX. That left 14 MHz and SV11W/A on SSB and EA9EO using CW. On occasion, Chris got down to as low as 150 milliwatts *input*, to manage JA3KYC on 21 MHz CW. On the low bands, Chris has been largely concentrating on other QRP Club members, and he certainly manages to find them — a list of some 42 of them at inputs between one and five watts.

## Finale

So, there it is, and it all came right in the end; and if the weather right now is anything to go by, the writer got a bonus couple of days of sun on the water, about which he will *not* complain.

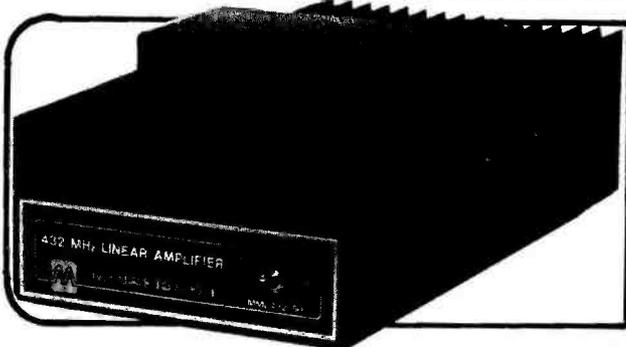
For next time, the deadline is as always in the 'box' in the body of the piece; and the address, as ever, "CDXN", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts., AL6 9EQ.



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Power requirements	:	12.5 volts at 8 amps for 50 watts output. 13.8 V maximum.
Quiescent current	:	1 amp nominal at 12.5 volts (with zero drive)

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RF input connector	:	50 ohm BNC.	Weight	:	4kg (8lb 13oz)
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### DESCRIPTION

This 432 MHz solid state linear power amplifier, MML432/50, is intended for use with any existing 432 MHz equipment having an output power of 10 watts. When used in conjunction with such a drive source, this linear amplifier will provide a power output of 50 watts, and the incorporation of a low-noise receive preamplifier will provide an improved overall system noise figure.

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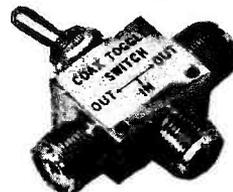
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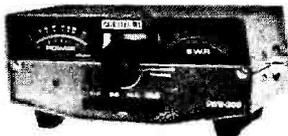


**CT-1** — Coax Toggal 3 SO239's at £5.75 plus VAT p&p 25p.

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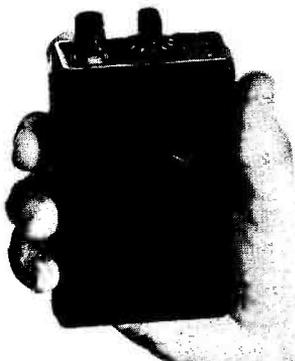
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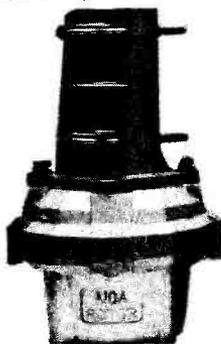
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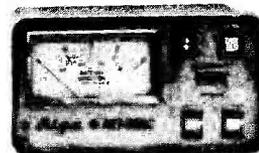
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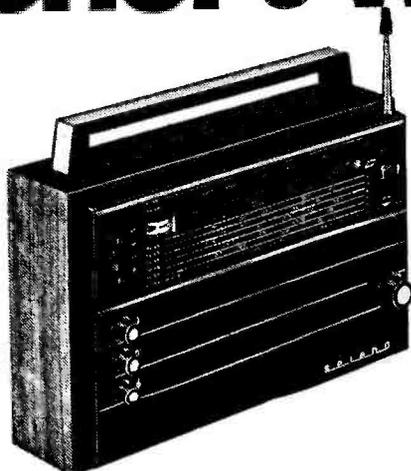
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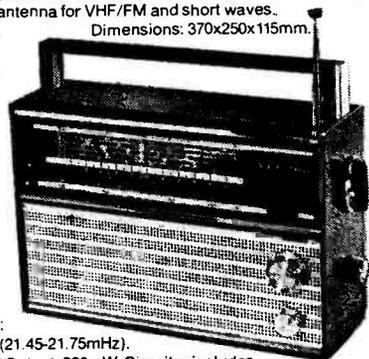


Vega value is convincingly demonstrated in the superb short-wave coverage of the 206, Spidola and Selena models: no less than six short-wave bands on the 206 and Spidola, five (including "trawler" bands) on the Selena. Engineered in the USSR to the highest electronic standards, these powerful portables – and the other models in the range – give you top performance (for complete "home" listening too) and reliable service at competitive prices.

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Same as the Sentinel Auto but for 240V mains operations in a pretty little case. Size: 3½" x 6½" front panel, 2½" deep. SO239 sockets. Price: £28.75 ex. stock.

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Same performance as the Sentinel Auto but no r.f. switching. Price: £13.22\* ex. stock. 70 cms version £20.90\* ex. stock.

**PA3 DUAL GATE MOSFET 2 METRE PRE-AMPLIFIER**  
Mini 2 metre pre-amp. Size 1 cubic inch to fit inside transceivers. N.F. 2dB gain 18dB. 9-15V. £8.00 ex stock. 70 cm version £10.00 ex. stock.

**S.E.M. Z MATCH**  
The updated unit uses much more reliable slow motion drives, which make adjustment and re-setting easy. It will match aerials of 15-5000 Ohms, to your equipment. BALANCED or UNBALANCED at up to 1kW. SO239 and 4 mm terminals for co-ax or wire aerials, both end fed and open wire. Ex stock. Price: £45.00.

**SENTINEL H.F. WIDEBAND PRE-AMPLIFIERS**  
2-40MHz, 15dB gain. Ideal units for pepping up receivers on 15 and 10, for OSCAR reception and as an ACTIVE AERIAL. 9-12V supply. Size: 2½" x 1½" x 3". We make the following two versions:

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Same performance as above with a change over relay operated by your transceiver relay for direct connection in your aerial co-ax. £14.95\* ex. stock.

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F.S.D. 500W ½ scale 100W 1/10th scale 1W. 1-30 MHz. Separate pick up unit £29.17 ex. stock.

**S.E.M. EUROPA C 2 METRE TRANSVERTER**  
200W input. 2dB N.F. Plugs straight into Yaesu equipment for any mode 2 metre use. £126.65. Repeater shift £12.80. CPS10 for use with other equipment. £57.57 ex. stock.

**CONVERTERS**  
SENTINEL 2 metre converters: IFs, 28-30MHz, 4-6MHz, 2-4MHz. 2dB N.F. 30dB gain. £23.00 ex. stock.  
SENTINEL X 2 metre converters — same as above with internal mains supply — £26.50 ex. stock.  
SEM 70 70 cms to 2 metres — £23.00.  
SENTINEL TOP BAND CONVERTER — £20.80.

Prices include VAT and delivery. \*Belling Lee sockets standard, SO239s £1.73 extra. 12 months guarantee. To order: C.W.O. or credit card. Phone your credit card number for same day service.

Need more info? Ring or write.

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## PROFESSIONAL COMPLETE CRYSTAL SERVICE AMATEUR

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### TWO METRE — CRYSTAL RANGE

CRYSTAL FREQUENCY RANGE USE (Tx or Rx) and HOLDER	4 MHz-TX-HC6/U	6 MHz-TX-HC25/U	8 MHz-TX-HC6/U	10 MHz-RX-HC6/U	11 MHz-RX-HC6/U	12 MHz-TX-HC25/U	14 MHz-RX-HC25/U	18 MHz-TX-HC25/U	36 MHz-TX-HC6 & 25U	44 MHz-RX-HC6/U	44 MHz-RX-HC25/U	48 MHz-TX-HC6 & 25U	52 MHz-RX-HC25/U	72 MHz-TX-HC25/U
144.4 (433.2)	b													
144.480	b													
144.800	b													
144.850	e	e	e	e	e	e	e	e	e	e	e	e	e	e
145.000 ROT	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.025 RIT	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.050 R2T	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.075 R3T	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.100 R4T	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.125 R5T	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.150 R6T	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.175 R7T	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.200 R8T	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.300 S12	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.350 S14	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.400 S16	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.425 S17	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.450 S18	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.475 S19	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.500 S20	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.525 S21	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.550 S22	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.575 S23	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.600 ROR	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.625 R1R	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.650 R2R	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.675 R3R	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.700 R4R	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.725 R5R	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.750 R6R	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.775 R7R	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.800 R8R	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145.950 S38	a	a	a	a	a	a	a	a	a	a	a	a	a	a

PRICES: (a) £1.95; (b) £2.32; (c) £2.80; (e) £3.94.

AVAILABILITY: (a), (b), (c) stock items, normally available by return (we have over 5000 items in stock). (e) 4/6 weeks normally but it is quite possible we could be able to supply from stock.  
N.B. Frequencies as listed above but in alternative holders and/or non stock loads are available as per code (e).

ORDERING. When ordering please quote (1) Channel; (2) Crystal frequency; (3) Holder; (4) Circuit conditions (load in pf). If you cannot give these, please give make and model of equipment and channel or output frequency required and we will advise if we have details.

JAPANESE AND AMERICAN EQUIPMENT  
We can supply crystals for YAesu (FT2F, FT2 Auto, FT224), most of the ICOM range and the TRIO-KENWOOD range. We can also supply from stock crystals for the HEATHKIT HW202 and HW17A.

S18 and S19 are now added to our stock range

### CRYSTALS FOR BRITISH 70CM CHANNELS

Due to the much higher multiplication involved (3 times that on 2m.) all our stock 70cm. crystals are now to much closer tolerances than our standard amateur range.

We are stocking the following channels R80 (434.60/432.00), R82 (434.66/433.05), R84 (434.70/433.10), R86 (434.75/433.15), S8 (433.20), R810 (434.85/433.25), R814 (434.95/433.35), SU18 (433.45) and SU20 (433.50) — TX and RX for use with: PYE UHF Westminster (W15U), UHF Cambridge (U10B), Pocketfone (PFI) and STORNO COL/CQM 662 all at £2.32. For the U450L Base Station we have the Tx crystals for all the above channels. The RX crystals for the U450L Base Station, together with the TX and RX crystals for the remaining SU channels (SU12—433.30-RITTY, SU16—433.40 and SU22—433.55) for all the above equipments are available at £3.94 to Amateur Spec. or £4.64 to same spec. as stock items. Delivery approx. 4/6 weeks.

#### 4M. CRYSTALS FOR 70.26 MHz — HC6/U

TX 8.7825 MHz and RX 6.7466 MHz or 29.780 MHz £2.32.

10.245 MHz 'ALTERNATIVE' IF CRYSTALS £2.32. For use in Pye and other equipment with 10.7 MHz and 455 kHz IF's to get rid of the "birdy" just able 145.0 MHz in HC6/U, HC18/U and HC25/U.

CRYSTAL SOCKETS — HC6/U, HC13/U and HC25/U (Low loss) 16p each (18p) + 10p p&p per order (p&p free if ordered with crystals).

#### CONVERTER/TRANSVERTER CRYSTALS — HC18/U

All at £3.00, 38.6666 MHz (144/28), 42 MHz (70/28), 58 MHz (144/28), 70 MHz (144/4), 71 MHz (144/2), 95 MHz (342/52), 96 MHz (1,296/432/144), 101 MHz (432/28), 101.50 MHz (434/28), 105.6666 MHz (1,296/28) and 116 MHz (144/28).

#### TEST EQUIPMENT FREQUENCY STANDARD CRYSTALS

100 kHz in HC13/U and 100 kHz in HC13/U and 200 kHz and 455 kHz in HC6/U, £2.95.

1 MHz and 5 MHz in HC6/U and 10 MHz and 10.7 MHz in HC6/U and HC25/U, £2.80 (£3.02).

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5-500 MHz supplied with full details for only £5.95

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Prices shown are for one off, to our amateur spec., closer tolerances are available, please send us details of your requirements.

##### A Low frequency fundamentals in HC13/U or HC6/U

Adj. tol. ±50ppm. Temp. tol. ±100ppm 0 to +70°C.  
6.0 to 19.999kHz £28.12 (£31.63) 60 to 99.999kHz ... £7.30 (£8.21)  
20 to 29.999kHz £17.75 (£19.97) 100 to 149.99kHz ... £6.68 (£7.51)  
30 to 59.999kHz £15.51 (£17.45) 150 to 499.99kHz ... £6.20 (£6.97)  
60 to 79.999kHz £12.41 (£13.19) 500 to 799.99kHz ... £7.30 (£8.21)

##### B High frequency fundamentals/overtones in HC6/U, HC18/U or HC25/U

Adj. tol. ±20 ppm. Temp. tol. ±30 ppm — 10 to +60°C  
\* £80 to 999.9kHz (fund) ... £9.50 \* 25 to 30 MHz (fund) ... £7.56  
\* £1.0 to 1.499 MHz (fund) ... £9.45 \* 15 to 20.99 MHz (3 O/T) ... £4.72  
\* £1.5 to 2.599 MHz (fund) ... £4.21 \* 21 to 62.99 MHz (3 O/T) ... £3.94  
\* £2.6 to 20.99 MHz (fund) ... £3.94 \* 60 to 105 MHz (5 O/T) ... £4.53  
\* £3.4 to 3.999 MHz (fund) ... £5.43 \* 105 to 125 MHz (5 O/T) ... £7.09  
\* £4.0 to 5.999 MHz (fund) ... £4.21 \* 125 to 180 MHz (O/T) ... £6.48  
\* 6.0 to 20.99 MHz (fund) ... £3.94 \* 180 to 25 MHz (O/T) ... £10.64  
\* 21 to 24.99 MHz (fund) ... £6.14

Delivery \* Normally 4/6 weeks (express available), all other frequencies 6 weeks. Holders: Low frequencies HC13/U or HC6/U dependent on frequency. High frequencies are available in HC6/U, HC18/U or HC25/U unless marked \* only available in HC6/U or \* only available in HC18/U and HC25/U. HC17/U (replacement for FT243) and HC33/U (wire end HC6/U) available as per HC6/U above at 25p extra on HC6/U price. Unless otherwise specified, fundamentals will be supplied to 30pf circuit conditions and overtones to series resonance.

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**2 METRE STOCK CRYSTALS.** Price £1.83 for one crystal  
£1.74/crystal when two or more purchased

**MADE TO ORDER CRYSTALS SINGLE UNIT PRICING**

HC6/U 30pF TX	HC6/U 30pF TX	HC25/U 25pF and 40pF TX	HC25/U 20pF and 30pF RX	HC25/U 25pF and 20pF TX	HC6 & 25/U SR RX	
RO	4.0277	8.0555	12.0833	14.9888	18.1250	44.9666
R1	4.0284	8.0569	12.0854	14.9916	18.1281	44.9750
R2	4.0291	8.0583	12.0875	14.9944	18.1312	44.9833
R3	4.0298	8.0597	12.0895	14.9972	18.1343	44.9916
R4	4.0305	8.0611	12.0916	15.0000	18.1375	45.0000
R5	4.0312	8.0625	12.0937	15.0027	18.1406	45.0083
R6	4.0319	8.0638	12.0958	15.0055	18.1437	45.0166
R7	4.0326	8.0652	12.0979	15.0083	18.1468	45.0250
S20	4.0416	8.0833	12.1250	14.9777	18.1875	44.9333
S21	4.0423	8.0847	12.1270	14.9805	18.1906	44.9416
S22	4.0430	8.0861	12.1291	14.9833	18.1937	44.9500
S23	4.0437	8.0875	12.1312	14.9861	18.1968	44.9583

Fundamentals	Price Group	Adjustment Tolerance ppm	Frequency Ranges	Price and Delivery	
				A	B
1	200 (total)	10 to	19.999 kHz	—	£23.00
2	200 (total)	20 to	29.999 kHz	—	£16.50
3	200 (total)	30 to	99.999 kHz	—	£10.50
4	200 (total)	100 to	999.999 kHz	—	£6.00
5	50	1.00 to	1.499 MHz	£9.00	£6.00
6	10	1.50 to	1.999 MHz	£4.75	£4.20
7	10	2.00 to	2.599 MHz	£4.75	£4.00
8	10	2.60 to	3.999 MHz	£4.55	£3.70
9	10	4.00 to	20.999 MHz	£4.55	£3.60
10	10	21.00 to	24.000 MHz	£6.00	£5.40
11	10	21.00 to	59.999 MHz	£4.55	£3.60
12	10	60.00 to	99.999 MHz	£5.00	£4.00
13	10	100.00 to	124.999 MHz	£6.15	£5.20
14	20	125.00 to	149.999 MHz	—	£6.00
15	20	150.00 to	225.000 MHz	—	£7.50

**NEW STOCK CRYSTALS £2.52**

S15	12.1145	14.9638	18.1718	44.8916*
S16	12.1167	14.9667	18.1750	44.9000*
S17	12.1187	14.9694	18.1781	44.9083*
S18	12.1208	14.9722	18.1812	44.9166*
S19	12.1229	14.9750	18.1843	44.9250*

\*HC25 only

We regret that it has been necessary for us to increase the prices of our made to order crystals, because of increasing costs of supplies and overheads. NOTE the cost of crystals on our B delivery have only slightly increased so should you be able to accept the longer delivery it will be possible to make considerable savings.

Unless otherwise requested fundamentals will be supplied with 30pF load capacity and overtones for series resonance operation.

**HOLDERS** — Please specify when ordering — 10 to 200 kHz HC13/U, 170 kHz to 170 MHz HC6 or HC33/U, 4 to 225 MHz, HC18 and HC25

**DELIVERY.** Column A 3 to 4 weeks (this service is subject to availability); Column B 6 to 8 weeks.

Please note that it is not always possible to provide the A delivery service but a telephone call will confirm its availability. Any orders received for A delivery when it is not available will automatically be placed on B delivery and a credit note issued for the difference in price.

**DISCOUNTS.** 5% mixed frequency discount for 5 or more crystals at B delivery. Price on application for 10 or more crystals to same frequency specification. Special rates for bulk purchase schemes including FREE supply of crystals used in UK repeaters.

**EMERGENCY SERVICE SURCHARGES** (to be added to A delivery prices) 4 working days £8, 6 working days £6, 8 working days £4, 13 working days £3 (maximum of 5 crystals on 4 day delivery).

**CRYSTAL SOCKETS** HC6/U and HC25/U 16p.

**MINIMUM ORDER CHARGE £1.50.**

**COMMERCIAL USERS.** Crystals can be supplied for MPU, industrial control, etc. in the range 4-21 MHz fundamental and 3rd OVT 18 to 60 MHz at £1.15 for 100 off. This is only a limited example of our capabilities. Please enquire about other quantities, frequency ranges, watch and sub-carrier crystals. We can supply crystals for marine and land mobile radio telephone use. Send for details.

**TERMS.** Cash with order, cheques and postal orders payable to QSL Ltd. All prices include postage to UK and Irish addresses.

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Denmark — Asbjorn Jorgensen, Aabrinken 1, Tapdrup, DK800, Denmark  
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**4 METRE CRYSTALS** for 70.26 MHz in HC6/U at £2.25. 7X 8.78250 MHz, RX 6.7466 or 29.78 MHz in stock.

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**CONVERTER CRYSTALS** in HC18/U at £2.85. In stock 38.666, 42.000, 70.000, 96.000, 101.000, 105.666 and 116.000 MHz in stock.

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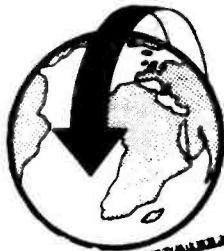
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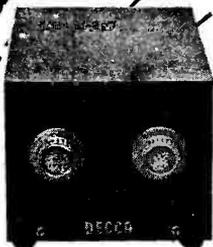
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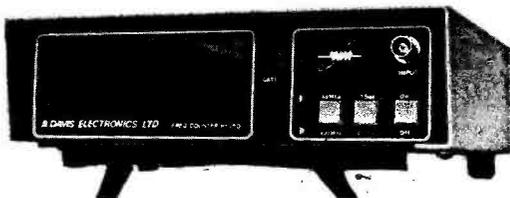
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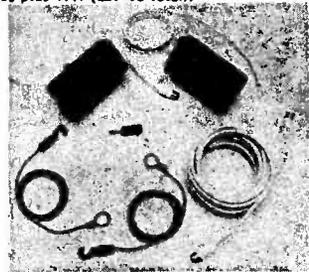


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**Sale:** Yaesu FR-400DX receiver with 2 metres, instructions, mint condition, £200 cash. Buyer collects. — Ring Constable, 0284-66661.

**For sale:** National panasonic DR-48 communication receiver, ten bands, FM/AM, digital SW readout, first class condition, £230. — Ring 0271-890500.

**November issue:** Due to appear November 2nd. Single copies at 55p post paid will be sent by first-class mail for orders received by Wednesday, October 31st, as available. — Circulation Dept., Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

**For sale:** AR88D Rx with manual and spare valves etc., £45. Lafayette HE-30 with manual and speaker, £45. Codar PR-30 preselector, £10. Garex 2-metre converter, 28-30 MHz, £6. — Ring Turton, Hornchurch (04024) 54056.

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