

THE SHORT WAVE

Magazine

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TRIO R1000 TRIO

The R-1000 uses an advanced PLL system in an up-conversion scheme to a high (48MHz) first IF to remove any possibility of image responses. The receiver covers the entire frequency range from below 200kHz right up to 30MHz in 30 bands, each 1MHz wide. The bands are selected, not by ambiguous knob twiddling as in receivers using the Wadley loop but by a 30 position band switch which controls the PLL system.

The band switch also electronically selects the appropriate band pass filter network in the RF stages of the receiver so there are no "preselector" or "antenna trim" controls to twiddle — simply set the band switch to the range required — that's it!

A highly stable VFO tunes each 1MHz range and its linear, back lit scale makes readout easy. However, in addition to this dial, Trio have also provided 5 digit true frequency digital readout so as to guarantee spot on accuracy on any frequency. As a further feature, the digital display can also be switched to read time, this being derived from a quartz standard. Marvellous for accurate log keeping. The display uses high intensity readout units which can be dimmed for use in low light conditions.

As for what else is inside this superb instrument — selectivity is catered for by three custom made IF filters; a 12kHz wide AM filter; 6kHz narrow AM filter; and a new 2.7kHz SSB filter with a shape factor of better than 1:2.6:60dB. Selectable sidebands are available at the touch of a switch.

For the first time in mid-price receiver, a true noise blanker is provided to remove pulse type ignition noise.

To minimise front end overload, a step RF attenuator is included which gives 0-60dB attenuation in four steps.

All the rear panel connectors are recessed on a sloping panel so that you can stand the receiver either on its back, or pushed hard against a wall when used in conventional shelf mounting. The antenna inputs allow the use of either a high impedance wire aerial or a 50ohm balanced input so that the proverbial long lump of wire will work really well with the R-1000.

Almost forgot — the R-1000 will work from either 12V dc or any mains supply from 100-240V 50/60Hz so you can really take it anywhere with you.

LOWE ELECTRONICS LTD. CAVENDISH ROAD, MATLOCK, DERBYSHIRE.

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
TS180S without D.F.C. £712 inc VAT



TS120V only £408 inc VAT

Measuring only $9\frac{1}{2} \times 3\frac{1}{2} \times 9\frac{1}{2}$ — 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 8 1/2" wide and 2 1/2" 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 transceiver, 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.

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 synthesised 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?



FOR 2 METRES OR MARINE

TUNABLE + CRYSTAL CONTROL FOR UNDER £50

NEW PRICE £168 inc VAT

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Agents: John, G3JYG, 16 Harvard Road, Ringmer, Lewes, Sussex, Ringmer 812071. Sim, GM3SAN, 19 Ellismuir Road, Baillieston, Nr Glasgow. 041-771 0364

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

PAUL
G3VJF



IC-211E IC-245E IC-701

**THE LEADERS IN ALL SOLID STATE SYNTHESIZED RIGS
THE ONES WITH THE *FINAL* WARRANTY**



IC-245E
MOBILE →



← 2m
BASE
IC-211E

These three transceivers all use the patent Icom LSI chip to generate the operating frequency *digitally* — this gives you the stability of a crystal in a tunable rig. Coupling between the tuning knob and the logic controlling the synthesizer is optical. This is what gives the unhampered 'feel' to the large weighted flywheel knob used on the 211E and 701. The rate of tuning is varied electronically to provide rapid transit to the part of the band you want while maintaining superb fine 100Hz control for tuning in that SSB signal — this is equivalent to 5 KHz per revolution at the slow rate. Being digitally controlled beasts all can be controlled remotely — either by using the RM3 (Icom's 'Computer' key pad), your own 'Home brew' keypad or even your home computer. Thus it is much easier to add scanning etc at a later date.

All three transceivers employ broadband techniques which mean there is no pre-selecting, tuning and loading at all — giving instant transmit facility which means you get the Dx while the other chap is twiddling knobs — and this is achieved without loss of performance. The solid state PA's are protected against bad VSWR — but you won't get far with a rotten antenna! They are so reliable that we **GUARANTEE THEM AGAINST FAILURE** for 12 months. This same warranty applies to all components and labour costs on new equipment bought from us providing there has been no unauthorised tampering.

YOU CAN'T GO WRONG WITH ICOM

—SIMPLY THE BEST

IC-701 HF £899

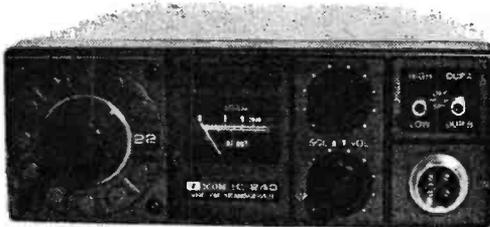


SEE THE WHOLE RANGE AT LEICESTER — Stand 7



DAVE
G4ELP

**NOW YOU HAVE A CHOICE OF THREE ICOM
SYNTHESIZED FM MOBILE RIGS FOR 2 METRES AS
WELL AS THE IC-245E — WHICH COVERS FM and SSB!
SEE THEM ALL AT LEICESTER — Stand 7**



IC-240 THE FAMOUS ONE

So well known that it is hardly necessary to say much about it! We told you a lot about it in September's issue so just as a reminder here are the main points:

- ★ Easy to use on the move without looking.
- ★ 22 Programmable channels — 15 popular ones already done and seven for you to program to your own choice.
- ★ Full reverse repeat at the flick of a switch.
- ★ Dial calibrated in channel numbers for factory programmed channels.
- ★ Automatic tone burst which operates on 'Repeat' mode.
- ★ Superb quality and performance — as thousands of owners will confirm.
- ★ Excellent value for money.

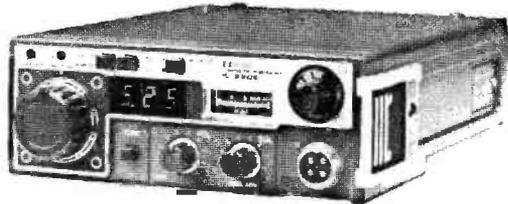
£193 inc. VAT

IC-280E THE REMOTEABLE ONE

Again we have often talked about this model before and there are now many in use. The scanning version is particularly popular and many find the 280 ideal for mounting in 'awkward' cars because of the remote facility. Main points are:

- ★ 80 channels in 25kHz steps.
- ★ LED frequency readout.
- ★ 3 programmable memories.
- ★ Complete front panel can be mounted remotely from the rest of the set by using the CK28 extension kit.
- ★ Scanner available for only £10 extra — this then also provides auto tone burst and instant facility for listening on the repeater input.

£250 inc VAT (£260 with scanner).



IC-255E THE NEW ONE

We will have a demo model on show at Leicester and hopefully a few to sell. Features are:

- ★ 25 watt output (1 watt low power).
- ★ 5 memories.
- ★ 2 VFOs.
- ★ Built-in scanner (with optional mic for scan control from the mic). Can scan the whole band, a selected portion, or just the memories.
- ★ Normal and reverse repeat — 600kHz shift built-in plus another user programmable shift, from the front panel (for 70 cm transverting?).
- ★ Size 64 × 185 × 223 mm.
- ★ Price **£255** inc VAT.



WHICHEVER YOU CHOOSE YOU CAN'T GO WRONG WITH



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INTRODUCING A SELECTION OF OTHER PRODUCTS AVAILABLE FROM

THANET



"NEW" 747 AIRCRAFT BAND SCANNING RECEIVER

Features—

- 16 channel capability
- Scanning or manual selection
- Operates from either 240V AC or 13.8V DC
- Includes built-in swivel telescopic antenna socket for connection to external antenna
- Built-in speaker and jack for connection to external speaker
- Delay facility to ensure that the whole of the conversation is received
- Swivel car mounting bracket supplied.

PRICE £119.00 including VAT fitted with 4 channels. Additional channels £2.00 each.

"NEW" TSI VHF FM AUTO SCANNER

Features:

- 10 channel capability
- Covers Marine or Amateur or High Band. State which.
- Very small pocket sized.
- Telescopic antenna (removable).
- External antenna socket.
- Earphone that can serve as an antenna too.
- Nicad rechargeable batteries 4.8V included.
- Carrying case.

PRICE £51.10 inc VAT. Charger and holder/antenna coupler available £9.20. Crystals Marine and Amateur £1.84.



LESON MICROPHONES

TW23 Desk mic ceramic 0-30dB variable compression	£25.00
DH18 500 Ohms Hand mic moving coil	£5.10
CH229 Hand mic ceramic 0-35 dB. var. compression	£15.40
DH233 Hand mic moving coil 0-15 dB preamp	£9.20
Vicom noise cancelling mic, moving coil very effective	£8.00

MORSE KEYS

BK semi automatic bug key	£20.35
HK706 Hand Key	£12.15
MK704 Manipulator Key	£12.25
GB Key	£10.00

TYPE APPROVED MARINE EQUIPMENT

ICOM ICM25D Synthesized 24 channel 25 Watt	£299 incl.
SMC Mariner 1 Watt portable 6, 8, 16 fitted + nicads and base charger	£199.00
V8001 1 Watt portable 6-16 nicads, charger + H.D. case	£189.75



IT'S HERE!! (OR SHOULD BE BY THE TIME YOU READ THIS)
**THE MOBILE OF CHOICE FROM THE WORLD
 FAMOUS ICOM STABLE — THE IC-255E**



**25 WATTS — 5 MEMORIES — SCANNING — 600 KHz AND USER SELECTABLE
 REPEATER SHIFT — FULL COVERAGE IN 5 KHz or 25 KHz STEPS**

We have had a poke around one of these little beauties and are certain that Icom, yet again, have come up with a winner. As you can see, it has the expected smart Icom appearance. Features include: —

- ★ Crystal controlled Tone Burst
- ★ Full band coverage — extendable to 148 MHz if required
- ★ Four digit LED display
- ★ 25 Watts output or 1W low power. A superb receiver using grounded gate FET front end
- ★ Scanning over a user programmable range
- ★ Memory scan
- ★ Stop on empty or busy channels
- ★ Tuning in 25KHz or 5KHz steps
- ★ 5 Memories — retained while the power is connected to the rig
- ★ Built-in 600 KHz Repeater shift
- ★ Alternative programmable shift
- ★ Reverse Repeater facilities
- ★ RIT (± 3 KHz) for those off channel stations
- ★ Scan control from the microphone (an optional mic available shortly)
- ★ Good loud audio
- ★ Optically coupled tuning between control knob and CPU
- ★ Multiway 24 pin socket on back for touchpad, computer, or external control (note the current RM3 cannot be used but a new version is to be introduced)
- ★ Rugged modular PA (guaranteed of course!)
- ★ Mobile mount which can be padlocked

At £255 including VAT these are such value for money that demand may exceed supply for a while — but they are worth waiting for! (Delivery is free of course by Registered First Class Letter Post.)

FROM

THANET

OF COURSE

ICOM® . . . Simply the Best . . .

There's not much more you can say!

It's over five years since we started to represent ICOM in the UK — and since then thousands of UK amateurs have bought it, tried it, and liked it. We are proud to represent Icom here and do our best to provide the back-up service which a product of this quality deserves. We have a service department to be proud of, with up-to-date (and expensive) test equipment, plus engineers whose job it is to know Icom equipment. If you can get over to see us, we will be pleased to demonstrate the range and let you operate our station (if you are licensed). If you find Kent too far away and would like to see before you buy then why not visit one of our agents and dealers scattered throughout the country? And of course you can SEE IT ALL AT LEICESTER.



AGENTS (PHONE FIRST — All evenings and weekends only, except Barnsley 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 — Don (022678 5031)

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THANET ELECTRONICS

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SEE THE **ICOM**® RANGE AT LEICESTER (STAND 7)

- 1 IC-215** The highly popular portable which gives out a healthy 3 watts of RF and runs from sensibly sized batteries. With 15 channel capability it comes fitted with 12 pairs of crystals — All 10 repeaters + S20 and S22.
Less VAT = £140.87 Inc VAT = £162.00.
-
- 2 IC-202S** The popular little SSB/CW portables which make the ideal rigs for portable or /A use when used barefoot with 3w out, or alternatively, as the signal from them is so clean, can be used as a prime mover for something bigger. The IC-202E ran USB and CW only, while the new IC-202S runs USB, LSB and CW.
IC-202S Less VAT = £173.03 Inc VAT = £199.
-
- 3 IC-402** ICOM's new portable in the same style case as the IC-202 which runs 3 watts of SSB on 70cm! Again ideal as either a portable or as a prime mover for the base station. Continuous tuning of the second oscillator gives coverage over ranges 432.0 432.2 and 432.2 432.4 using a stable VXO circuit — see page 560 of July RADCOM for specs.
Less VAT = £255.65 Inc VAT = £294.
-
- 4 IC-701** The ultimate in HF base station transceivers which is becoming very popular across the whole world. It uses a synthesizer to produce one of the nicest signals to be heard on HF. All solid state, with 200w DC input and complete with an electret desk mic. The ideal mobile rig — see our separate advertisement on page 561 of July RADCOM.
Less VAT = £695.65 Inc VAT = £800.
-
- 5 IC-701PS** Mains PSU for the IC-701 complete with extra forward facing matching speaker.
Less VAT = £86.09 Inc VAT = £99.
-
- 6 IC-SM2** A superb quality electret desk mic with a built-in pre-amp. Can be powered without modification from all ICOM equipment having a four-pin mic socket. Can also be used with other makes of equipment.
Inc VAT = £26.
-
- 7 IC-211E and IC-245E** The fully synthesized two metre multimode which is now well known and very popular. Using the ICOM patent LSI chip, this rig, and its mobile partner the IC-245E can be interfaced with the microprocessor-controlled IC-RM3 to provide facilities just not possible with other rigs.
IC-211E Less VAT = £477.39 Inc VAT = £549 IC-245E Less VAT = £346.96 Inc VAT = £399.
-
- 8 IC-RM3** The new and very popular remote controller for the IC-701, IC-211E and IC-245E. Using a microprocessor it provides facilities for scanning (the whole band or user selectable portions of it) and has four memories for frequency storage. Sorry about the waiting list, demand is greater than supply at the moment. Less VAT = £86.09 Inc VAT = £99.
-
- 9 IC-280E** The mobile transceiver introduced by ICOM for the man who wants the best and finds it difficult to mount mobile rigs in his car. Gives full coverage of 2m in 25kHz steps with digital readout of frequency. Has all the qualities and virtues expected of ICOM equipment. The front panel can be removed and mounted elsewhere in the car using the special remote mounting kit which is available as an extra. Also available with scanner for £10 extra.
Less VAT = £217.39 Inc VAT = £250 With scanner £260 inc.
-
- 10 IC-255E** The new 25W super mobile to beat them all using the latest microprocessor technology to provide full band coverage, 5 memories, memory or user selectable band sections. See our separate ad for more details.
Less VAT = £221.74 With VAT = £255.00.

Phone — or put a message on the ansafone for a colour catalogue and price lists

ALSO AVAILABLE FROM OUR SHOP IN HERNE BAY

MICROWAVE MODULES

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

FT-207R

**THE LATEST FROM
YAESU'S 2M STABLE**

**all-new microprocessor-controlled
front panel keyboard.**

Four channels of memory

Digital display.

Keyboard lock.

**SUPERB FT-225RD.
THE 2m BASE STATION THAT HAS
EVERYTHING, DESIGNED FOR THE
MAN WHO INSISTS ON THE BEST.**

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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.**



**THE FT-901DM IS THE HF 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
FULFILLS 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 A4040 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 M6 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, 1pm



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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

FT101ZD Series High Performance Transceiver

FULL COVERAGE

Full band coverage is provided on the FT101ZD: 160 through 10 metres, plus WWV/JJY reception on 5MHz. Teamed with the FTV-901R transverter, operation can be extended to 50, 144, and 430MHz 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, 500Hz, 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.

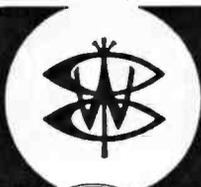
BRANCH: Amateur Electronics, UK — Coastal, Cliftonville, Kent, Ken McInnes, G3FTE, Thanet (0843) 291297, 9 am-10.30 pm.

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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BIRMINGHAM 8 **Telex 337045** **6313**



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
£89.00

**ACCESSORIES INCLUDE:
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 meter 12.3lbs. (11.7lbs for 120V) of compact efficiency.
- TS-120V £399 TS-120S £485

Accessories available:	
MB-100 Mobile Bracket	£16.85
SP-120 Remote Speaker	£23.50
VFO-120 Remote VFO	£91.00
PS-20 (PSU for 120V)	£49.00
PS-30 (PSU for 120S)	£89.00
AT-120 Antenna Tuner	£68.00

TRIO TS-820S

The pacesetter 10-160m Transceiver for the amateur who wants to keep up-to-the-minute! Loaded with features to make your operating even more enjoyable, among these are:

- ★ Advanced PLL circuitry and ultra-stable VFO for accurate and spurious-free frequency control
- ★ Factory-fitted digital readout of TRUE frequency—NOT just a "VFO counter" like some others
- ★ Speech processor gives true RF compression; front panel controlled and fully metered
- ★ IF shift to combat QRM on a busy band.



ALL ADVERTISED PRICES INCLUDE VAT — ACCESS/VISA/DINERS CLUB ACCEPTED

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**NATIONAL AMATEUR RADIO
EXHIBITION 8-10 NOV. 1979
GRANBY HALLS, LEICESTER.**

Electronics (UK) Ltd

2 METRES PORTABLE for less than £6 a WEEK!

The Trio TR-2300 2 metre FM portable can be yours NOW with a deposit of £20 and 9 repayments of £22.15 per month (approx £5.54 per week).

Just send your deposit and we will do the rest!
EX-STOCK NOW! CASH PRICE £193

CREDIT PRICE (9 months) £219.35 (other credit periods available — please ask).

- * A compact 80 channel FM transceiver for 2 metres.
- * Latest synthesised techniques
- * Full 2MHz coverage and repeater shift
- * 1750MHz tone burst, auto and manual
- * 1 Watt transmitter—high sensitivity receiver
- * Built-in telescopic antenna, helical whip available extra
- * Built-in battery pack for nicads (10XAA) or dry cells (9 x HP7)
- * Battery charger, carrying case, DC supply lead included
- * Optional extras: RA-1 Helical Antenna £6.90; MB-2 Mobile mount £18.95; VB-2300 10W amplifier £59.00.



CARRY YOUR QSOs WITH YOU NOW!

Western — FOR VALUE FOR MONEY WITH CHOOSE FROM THESE THREE SUPERB TRANSCIVERS



YAESU FT-901DM

£969

The Amateurs Dream! Tomorrow's Transceiver here Today!

Yes — The Yaesu FT-901DM is all of this . . .
Superb performance and state-of-the-art features makes the 901 a dream to own and operate under today's conditions.

- * Digital frequency display and memory circuit for transmit and receive frequency control giving the ultimate in versatility.
- * Variable IF bandwidth, tunable rejection notch and audio peak frequency tuning for optimum receiver performance under all conditions
- * Efficient RF speech processor for enhance transmission efficiency
- * Built-in Curtis electronic keyer
- * All-mode operation—including FM
- * Built-in AC and DC (12v) power supplies



YAESU FT-7B

£415

A High-Performance HF mobile transceiver at a realistic price.

- * Small size; lightweight
- * All solid-state 50 watts output
- * 80-10 metres SSB/CW/AM
- * Audio peak filter for CW
- * Single knob peaking of all circuits
- * Optional YC-7B digital display

YAESU FT-101ZD

£639

- * Latest in a famous line of HF transceivers
- * Digital frequency readout
- * QRM-beating Variable IF Bandwidth
- * High performance RF processor
- * Rugged 6146B PAs with RF negative feedback
- * Full-band coverage 160-10 metres
- * Compatible with all 901 accessories

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Our Agents

Southern: Alan Paxton, G4BIZ, Southampton, Hants. (0703) 582182

Scotland: Alan Cameron, GM30GJ, Alloa (0259) 214653

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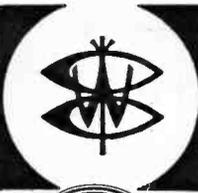
Opening hours:

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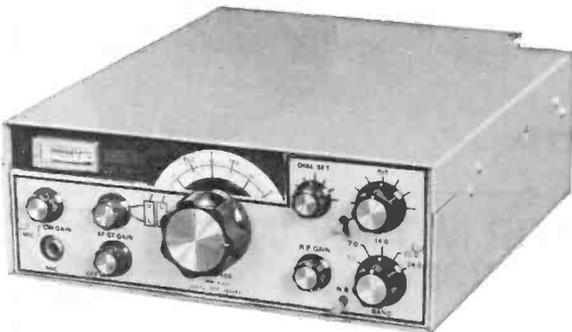


Western



ALDA 105

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



£ 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).

... AND TO COMPLETE YOUR MOBILE STATION ...

NEW-TRONICS

HF MOBILE ANTENNAS AT NEW LOWER PRICES!

HUSTLER

Due to price reductions and the change in exchange rate, we are pleased to announce significant **PRICE REDUCTIONS** on NEWTRONICS "HUSTLER" — the KING of MOBILE ANTENNA SYSTEMS.

BM-1 Bumper Mount	£9.43	RM-15 15m Resonator	£4.83
C-32 Ball Mount	£4.83	RM-20 20m Resonator	£5.41
MO-2 Mast	£13.40	RM-40 40m Resonator	£8.91
MM-10 10m Resonator	£4.03	RM-80 80m Resonator	£10.75

PACKAGE DEAL — SPECIAL PRICES!

Complete kits with all resonators and MO-2 mast and
 (a) BM-1 base £51.75 (a) C-32 base £47.15
 PLEASE ADD — CARRIAGE £2.30 per order.

The World's No. 1 HF Mobile Antenna can be yours now!



**A PROFESSIONAL GRADE MORSE
 KEY — SRK-1**

Made for the professional user and now available to the discerning amateur CW operator.

£11.96

P.S. VIBROPLEX KEYS ALSO STOCKED



A compact, con-type dummy load for checking your HF transceiver. 100 watts continuous rating, 300 watts intermittent; 1.8 to 30 MHz; SO-239 connector. Needs approx. 2 pints of oil (not included).

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EMOTO 502 SAX

The EMOTO 502

is now available with a new-style control unit featuring:

- ★ Smaller, compact size
- ★ Full 360° circular dial
- ★ Provision for fitting "map" dial

The rotor is mechanically identical to 502CXX but should be ordered as . . . **502 SAX** . . . Price: £00.00.

Other EMOTO products — available from **Western** — Sole Distributor

103LBX	Rotor for VHF and light HF beams	£92.00
1102MXX	Rotor for large HF beams	£212.75
1103MXX	As 1102 but slower turning rate	£217.35
1211	Mast bracket for 103LBX	£10.93
1213	Mast bracket for 502CXX/SAX	£14.38
1215	Mast bracket for 1102/1103MXX	£22.43
MB300	Rotary Mast Bearing	£14.95

8-way control cable 36p/metre plus £1.50 carriage plus VAT.

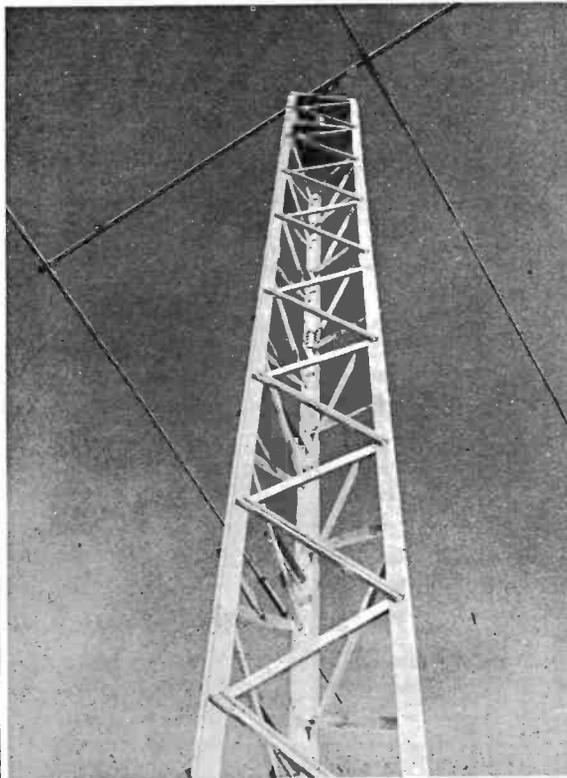
A SELECTION FROM THE **Western** LINE
PEAK READING (PEP) WATTMETERS
NOW — BRITISH PATENT PROTECTED!
 PM-2000 (HF) £51.75 PM-2001 (VHF) £51.75

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DX-103	3-el 10m beam	£69.00
DX-105	5-el 10m beam	£89.00
DX-31	Rotary dipole	£46.00
	2-el tribander	£80.50
DX-33	3-el tribander	£121.90
DX-34	4-el tribander	£161.00
BA-1	1:1 Balun	£9.20
BA-4	4:1 Balun	£9.20
AT-40	40m traps (per pair)	£9.20
DC-1	Dipole centre kit	£5.75

WESTOWERS

See previous ads for details. Price list on request.

The UNIQUE **ALUMAST** LIGHTWEIGHT ALUMINIUM MAST



- ★ Lightweight
- ★ Easily assembled by one person
- ★ No special tools needed
- ★ Self-supporting to 30ft
- ★ Guyed models to 250ft
- ★ Built-in climbing rungs
- ★ Corrosion resistant high strength alloy
- ★ "Nyloc" locking nuts for security

PRICES—INCLUDING CARRIAGE* and 15% VAT

375/PSS/330ft ALUMAST	£184.00
375/PSS/110ft sections	£62.68
TP-1 Top plate	£14.38
RMP-1 Rotor mounting plate	£13.23
HB-1 Hinged base	£31.05
GB-1 Guy brackets (set of 3)	£11.50

* Carriage extra on accessories not bought with mast.

Western Electronics (UK) Ltd

HEAD OFFICE (All Mail/Enquiries)

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We've Moved!

By the time you read this we should be firmly established in our new premises. The ground floor will comprise display, retail, and demonstration areas for our ever increasing range of products. The first floor will be devoted to increasing our mail order and back-up service to customers comprising mail order despatch area, office and administration area, newly equipped multi-thousand pound service department and pre-delivery test section, and of course warehouse unit. Hopefully we shall have succeeded in moving with the minimum of inconvenience to our customers and certainly upon completion we now have the most modern and well equipped premises in the South of England including our own private car park. Our main telephone number remains Hockley (03 704) 6835 and any mail addressed to our old premises at 31 Spa Road will automatically be re-directed to 18-20 Main Road, Hockley. How to find us? — as you descend the hill into Hockley, look to the left and we are the first double-fronted shop in the new office and shop development.

TRIO					
TSB20S 160-10m transceiver					
200w digital	£832.00	(3.75)			
TSB20 160-10m less digital	£710.00	(3.75)			
SPB20 External speaker	£39.00	(1.50)			
TS520S 160-10m transceiver					
200w	£542.00	(3.75)			
SP520 External speaker	£18.00	(1.25)			
VFO520S External VFO	£103.00	(3.75)			
TS120S 80-10m Solid state 200w	£495.00	(3.75)			
TS120V 80-10m Solid state 10w	£408.00	(3.75)			
PS20 AC PSU (TS120V)	£52.00	(3.75)			
PS30 AV PSU (TS120s & TS180s)	£98.00	(3.75)			
MB100 Mobile mount	£17.00	(0.75)			
AT120 3-30MHz ATV	£67.50	(1.50)			
MC50 Desk microphone (Super!)	£27.50	(1.50)			
MC30S Noise cancelling hand mic.	£13.30	(0.50)			
TS770 2m/70cm all mode transceiver					
TR7500 2m FM mobile 10w 80ch.	£240.00	(3.75)			
TR2300 2m FM portable 80ch.	£199.00	(3.75)			
MB2 Mobile mount (2300)	£18.90	(1.00)			
TS180s 160-10m solid state transceiver	£825.00	(3.75)			
TR3200 70cm portable 3 ch. fitted	£190.00	(3.75)			
YAESU					
FRG-7 General coverage receiver	£214.00	(N/C)			
FRG-700 Digital readout receiver	£375.00	(N/C)			
LOWE RECEIVER					
SRX30 0.5-30MHz AM/SSB/CW	£178.00	(N/C)			
ICOM (NOTE NEW PRICES!)					
IC215E 2m FM 3 watt 12 chs	£162.50	(N/C)			
IC202S 2m SSB 3 watt portable	£199.00	(N/C)			
IC240 2m 22 ch's 10 watts	£193.00	(N/C)			
IC280E 2m FM 80 ch's 10 watts	£250.00	(N/C)			
IC211E 2m All mode transceiver	£549.00	(N/C)			
MICROWAVE MODULES (New Prices!)					
MMT 432/2B-S transverter	£136.75	(N/C)			
MMT 432/144-R transverter	£173.50	(N/C)			
MMT 144/2B transverter	£90.75	(N/C)			
MMC 144/2-4; 4-6 or 2B-30 IF	£21.85	(N/C)			
MMC 144/2B LO converter	£24.15	(N/C)			
MMC 70/2B converter	£21.85	(N/C)			
MMC 70/2B LO converter	£24.15	(N/C)			
MMC 432/2B S converter	£29.90	(N/C)			
MMC 432/144 S converter	£29.90	(N/C)			
MMC 1296/144 or 2B converter	£32.00	(N/C)			
MMC 2B/144 10m up converter	£20.70	(N/C)			
MMD 050/500MHz counter	£69.00	(N/C)			
MMA 144 2m pre-amp	£14.90	(N/C)			
MMD 500P 500MHz pre-scaler	£23.00	(N/C)			
MMV 1296 varactor tripler	£34.50	(N/C)			
MML 144/100w linear amplifier	£142.50	(N/C)			
MML 432/100w linear amplifier	£228.85	(N/C)			
MML 144/25W	£48.30	(N/C)			
SEM					
2m converters	£23.00	(N/C)			
70cms converters	£23.00	(N/C)			
2m pre-amp	£13.22	(N/C)			
2m auto switching pre-amp	£17.83	(N/C)			
70 cms auto switching pre-amp	£20.90	(N/C)			
2m PA3 pre-amp	£8.00	(N/C)			
70cm PA3 pre-amp	£10.00	(N/C)			
2m 48 watt linear/pre-amp	£66.70	(0.95)			
SQ23q sockets	£1.73	extra			
HF auto pre-amp 2-40MHz	£14.95	(N/C)			
HF pre-amp 2-40MHz	£10.90	(N/C)			
HF Z-MATCH ATU 80-10m	£40.25	(1.00)			
VHF MONITOR Rx's					
TM56B 12V/240 AC auto scan 10 ch's	£106.00	(N/C)			
TM56B Marine model	£115.00	(N/C)			
SR9 12v DC Amateur model	£46.00	(N/C)			
Extra xtals	£2.45	(N/C)			
FDK					
Multi 3000 2m All mode	£519.00	(N/C)			
Multi 800D 2m 25 watts	£289.00	(N/C)			
Multi 700E 2m 25 watts	£229.00	(N/C)			
Multi Palm II 2m handheld	£99.95	(N/C)			
Multi Palm II 70cm handheld	£159.00	(N/C)			
M-11/016 xtals E5.00 Palm II & IV xtals	£3.00				
Multi-Palmsizer 2m synthesised 40 channel hand-held	£159.00	(N/C)			
PIV 70cms handheld	£159.00	(N/C)			
DENTRON					
MLA 2500 160-10m 2Kw linear	£699.00	(N/C)			
MT3000A 3Kw 160-10m tuner	£280.00	(N/C)			
MT2000A 3Kw 160-10m tuner	£180.00	(N/C)			
160-10AT Supertuner 1Kw	£99.95	(N/C)			
JR Monitor 160-10m tuner 300w	£59.95	(N/C)			
W-2 160-10m PEP/SWR meter	£59.95	(N/C)			
MT200A Transceiver	£399.00	(N/C)			
1Kw 80-10m linear 240v GLA1000	£295.00	(N/C)			
AR					
AR240 Synthesised hand-portable	£199.00	(N/C)			
MIZUHO					
2m SSB 1 watt portable	£165.00	(N/C)			
Extra xtals	£3.00				
NAIGAI					
2200 2m 500w PIP linear	£485.00	(N/C)			
ADONIS MICROPHONES					
AM802G Compressor — 3 outputs	£59.95	(N/C)			
AM502G Compressor — 1 output	£39.95	(N/C)			
ASP MOBILE ANTENNAS					
201 — 2m ¼ wave	£3.50	(1.00)			
2009 — 2m 5/8th wave	£9.25	(1.00)			
677 — 2m 5/8th wave deluxe	£14.95	(1.00)			
462 — 70cms colinear	£8.25	(1.00)			
667 — 70cms colinear deluxe	£17.95	(1.00)			
Magnetic base and cable	£8.50	(1.00)			
"No-hole" boot mounts	£3.75	(0.50)			
HF ANTENNAS					
HQ-120-15-10m mini-quad	£96.50	(2.50)			
C4 20-15-10m vertical	£48.50	(2.00)			
Mosley 20-15-10m mini-beam 600w	£99.00	(2.00)			
Mosley 2Kw version	£129.00	(2.00)			
TA32 600 watts 20-15-10m	£81.00	(2.00)			
TA33 600 watts 20-15-10m	£118.00	(2.50)			
Mustang 2Kw 20-15-10m	£135.00	(2.50)			
Hy gain 12 AVQ 20-15-10m	£43.00	(2.00)			
Hy gain 14 AVQ 40-10m	£60.00	(2.00)			
Hy-gain 18 AVT/WB 80-10m	£87.00	(2.25)			
Mosley TD3JR 20-15-10m dipole	£26.00	(1.00)			
Mosley RD5 SWL ham dipole	£31.00	(1.00)			
EL-40X 80-40 Mini dipole	£39.50	(1.00)			
HF5 5 band vertical	£41.50	(1.00)			
VHF ANTENNAS (JAYBEAM)					
4Y/4M 4el yagi	£17.20	(2.00)			
C5/2M 5db colinear	£40.00	(2.00)			
5Y/2M 5el yagi	£10.25	(1.50)			
8Y/2M 8el yagi	£13.25	(1.50)			
10Y/2M 10el yagi	£28.40	(2.00)			
PBM10/2M 10el parabeam	£33.60	(2.00)			
PBM14/2M 14el parabeam	£40.80	(2.50)			
5XY/2M X'd 5 element	£20.70	(1.50)			
8XY/2M X'd 8 element	£25.85	(2.00)			
10XY/2M X'd 10 element	£34.30	(2.00)			
Q4/2M 4el quad	£21.50	(1.50)			
Q6/2M 6el quad	£28.50	(2.00)			
D5/2M 5 over 5	£18.30	(1.50)			
D8/2M 8 over 8	£24.85	(2.00)			
SVMK vertical Kit	£6.60	(1.25)			
UGP/2 Ground plane	£9.35	(1.25)			
HO/2M 2m halo	£4.25	(0.75)			
HM/2M Above with 24" mast	£5.05	(0.75)			
C8/70cm 8db colinear	£45.40	(2.50)			
D8/70cm 8 over 8	£20.45	(2.00)			
PBM18/70 18 el parabeam	£24.75	(2.00)			
MBM/48 70 el Multibeam	£28.20	(2.00)			
MBM88/70 88 el Multibeam	£37.50	(2.00)			
8XY/70 8 el X'd yagi	£31.05	(1.50)			
12XY/70 12 el X'd yagi	£38.50	(2.00)			
D15 1296 15 over 15	£30.95	(1.50)			
ACCESSORIES					
950Z rotator	£55.80	(1.75)			
KR400 rotator	£105.80	(2.00)			
AR40 rotator	£54.50	(1.50)			
Tolle 2030 rotator	£55.00	(1.50)			
Tolle 2010 rotator	£50.00	(1.50)			
CE44 rotator	£109.00	(2.00)			
HAM-M MkIII rotator	£159.50	(2.00)			
Shure 444 microphone	£27.50	(0.75)			
Shure 201 microphone	£11.75	(0.75)			
Shure 526T microphone Type II	£36.35	(0.75)			
Hand Morse key	£9.70	(0.50)			
EK121 Electronic "Bug"	£31.00	(0.75)			
50ohm balun	£11.25	(0.50)			
UR67 per metre	£0.62	(0.05)			
UR43 per metre	£0.22	(0.03)			
5 core cable per metre	£0.30	(0.03)			
HP3A high pass filter	£3.00	(0.20)			
Drake low pass filter	£18.40	(0.75)			
TV 1 ferrite rings	£0.35	(0.05)			
Plastic antenna insulators	£0.25	(0.05)			
Twin SWR meters 3-150mHz	£13.50	(0.50)			
JAYBEAM (HF)					
TB 3 ele 2Kw Beam	£155.00	(2.00)			
VR3 Tri-band vertical	£39.00	(2.00)			
HILOMAST LTD					
PNAM-1 Telescopes to 9m	£244.00	(14.00)			
PNAM-2 Telescopes to 14j	£299.00	(15.00)			
SAE for details.					

All prices include VAT at 15%
Carriage costs shown in brackets

MONDAY-SATURDAY 9-5.30 **THE COMPLETE HAM RADIO CENTRE** EARLY CLOSING WED 1.00pm
 18/20 MAIN ROAD, HOCKLEY, ESSEX Telephone (03704) 6835 Telex 897406
 PHONE ORDERS ACCESS BARCLAYCARD MAIL ORDER RETAIL CALLERS
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WATERS & STANTON ELECTRONICS

HOLD IT!

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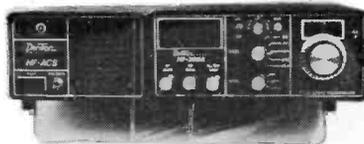
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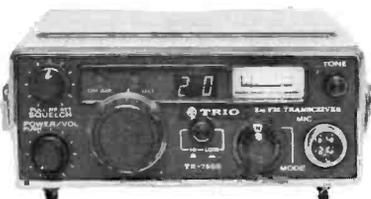
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(GB3SWM)

ISSN: 0037-4261

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Articles submitted for Editorial consideration must be typed double-spaced with wide margins on one side only of quarto or foolscap sheets. Photographs should be lightly identified in pencil on the back with details on a separate sheet. All drawings and diagrams should also be shown separately, and tables of values prepared in accordance with our normal setting convention — see any issue. Payment is made for all material used, and it is a condition of acceptance that full copyright passes to the Short Wave Magazine, Ltd., on publication.

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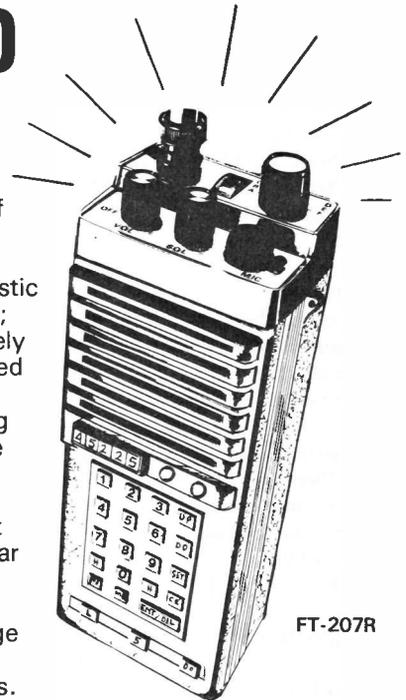
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COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

YOUR conductor is at his task again, for around the 150th time; a thought which startled him a little, if only because it means he has seen this column through most of a complete sunspot cycle! And still he can't bring to it the delicacy of touch of Tommy, G6QB, who was his predecessor at this piece for so long. An artist was G6QB, with both words and music, not to mention a Morse key.

Perhaps the nicest thing to happen this month was to return to one's desk after a trying afternoon under the "other hat" and find there a note saying "Ring Morgan Godwin before you go home", followed by a London phone number. Now those with long memories may recall W4WFL/1 appearing on occasion in this piece, usually with an exotic call in his pocket. Add to it that Morgan has been attached to the staffs of *QST*, *CQ Magazine* and *73*, and this time on passage to OD5-land, and you may guess we had much to talk about. A gallon of ale and much tobacco later it became time to catch the last train back to town, and this time we did manage to remember to put him on to a corridor train (a small thing overlooked when he had given a talk to the local club about ARRL and American amateur radio one evening a couple of visits ago, when we filled him with good cheer and put him in a non-corridor coach!).

There's not much doubt about it, the best part of DX-ing is the rare chance to sit down for a long natter with someone who has worked in the chase.

The Bands

Not bad, by and large. We are past the equinox as this is being typed, and the bands are "giving" each in their old time-honoured way: Ten, fickle at best, but capable of the world on a bit of wet string when the mood takes it, or Twenty, rather like standing on Piccadilly's pavement — wait long enough and everyone you've ever wanted to meet will appear. Even Top Band is livening up, though still but a

shadow of itself 15 years ago. Indeed some of the local nets are dropping back to Top Band or Eighty as relief from the strident idiocy that goes on between 145 and 146 MHz. One of the joys of this hobby is that you can be a pure operator or a pure constructor in your own mind, but in both there will be a bit of the other element; thus each of us, in the common hobby, has a different one — unique to himself as well as his call sign.

Perhaps one of the most notable trends in amateur radio of late years is the resurgence of interest in QRP — sparked in the States by Adrian, K8EEG, and in Europe by George, G3RJV; the G-QRP Club is now up to 615 members and of the last bunch to join some 19 have been from overseas. The word gets around! Your scribe was disbelieved when he commented to an SWL that he was using a rig which cost less than a tenner all-up; a look in the junkbox and without buying anything at all he could put another station on the air, VFO controlled and full break-in, CW or SSB, the latter either by phasing or filtering, the metalwork worked on the bench in the garage using scraps from the bottom of the metal-guillotine, and the actual construction being on copper-clad board offcuts salvaged from the skip. Even the aerial — a beam array at that — available from a junkbox which to this writer seems bare as compared with what he had in days gone by!

What it all comes down to is the sad story of the way in which the development this-or-that new technique or technology was offered to the amateur. In the first instance it was the transistor: instead of telling us the virtues of the device and how to use it in words of one syllable they merely told us how to avoid blowing it up and what the symptoms of that disaster were, forgetting meanwhile to tell us how to use the thing. Reams on holes and electrons, and damn-all on what resistors to tie to the emitter-base-collector to make it do something! Then a little later we had the explosion of articles on SSB

principles. They all summed up to one or two sentences: generate an AM signal, hack off carrier and one sideband, and amplify the signal linearly to whatever level you please or the licence allows. This means you mix to get to the final frequency, just like your receiver does, only backwards; and work on both receiver and transmitter for better stability — why not start by propping the lid open!

'CDXN' deadlines for the next three months—

(December issue—November 1st)

January issue—December 6th

February issue—January 3rd

March issue—January 31st

Please be sure to note these dates.

That's what we wanted — a sort of *Ladybird* book tale (with great respect to G4EVO who actually wrote one and was a regular contributor to CDXN until his final illness). Holes and electrons — whoever heard of a hole moving? Nobody told us of the scientific/engineering sense of humour in naming things. Ask an OT who was involved with W.W.II work about the "perhapsatron" — sounds complex and it was, but it was so named because "perhaps it'll play, and perhaps it won't." So — we all left it to the industry, and now we mostly use commercial gear. But one can still get on the air from scratch for a tenner (a tenner for the whole station that is) with world-wide communications capability; a struggle if we have to do the tin-bashing on the kitchen table, but no worse. That struggle, though, (and a bit of spare cash) caused everyone to sample the delights of commercial gear and either sigh or buy; the richer bought, and the poorer sighed until the stuff came down to their price range. In the end, the bushy-brains of that era blinded most of us with science, and to the detriment of our pocket and the delight of our XYL's sense of tidiness!

Events

That BY effort, in its own way was a non-event; but JA6HOZ, Yuji, says he was allowed to operate as JA6HOZ/BY from Canton City Hall, from 0607 to 0702, on 14120 KHz. Fifty-five minutes, and one wonders who and how many were able to take advantage of this. Perhaps the main thing is that it happened at all, and the general liberalisation of attitudes which lie behind it.

Those EZ stations heard on Top Band are, according to Geoff Watts, Russian novices, with five watts and only permission to work other Russian novices.

Looking at 28 MHz, we see the G2NJ/G5NX due have been out /M again, G5NX on VHF and G2NJ banging away on the key on Ten, with some 20 Russians on the trot. One of them asked if the car was stationary, as there was no QSB; as a result, Nick makes a point of mentioning the car speed as part of the usual exchange of pleasantries.

On the QRP front, we have a copy of *Sprat* from the G-QRP club — seems hardly possible this could be the 20th issue already! Also another note from Nick, G2NJ; Nick knows full well that most of the QRP CW wallahs are to be found on 3560 KHz,

near Glasgow, who had a good signal from an HW-8.

G4EAN (Northingham) says he has been getting back into the swing of things a bit, and even cranked the tower up a bit to see if it would still move! Ian will be at Leicester throughout the show at the BARTG stand. On Ten, Ian found signals between 1500 and 2000 from North America, including, in time order WA8UMF, W8LWY, WB8APV, AD1J, KA4AGX, W8PBO, K1PAI, W6RNX/P/VE3, W7YX, K4SR, and WA2OQE. The K4SR contact was the more interesting because K4SR had to revert to two watts of exciter power when his linear decided to hang up its boots. A brief peep at 21 MHz after Ten had been cleared out, gave K4IQH and WA2SYR at 2000, followed by N9AHL around 2200. That left 14 KHz, and there we note K7DRN, VE1OK, and an evening VK3ADR.

All the HF Bands have been very good says G3NOF (Yeovil); around 0600z it has been possible most days to hear VK and ZL on four bands simultaneously: 7, 14, 21, 28 MHz. Ten was open long-path at this time of course, and there were also JAs to be picked up, after which the short path opening has been around 1200 to 1400z; from noon to 2100z, there have been Ws assorted to be had, and in the afternoons the odd African. SSB QSOs were made with A4XHK, DU4WLC, HS1ABD, UK6FAA, VKs, VE1CR/1 (St. Paul's Is), VP2ML, VS6AG, YB0WR, ZSs, ZS2MI on Marion Is, 5L2AK and all W call areas. On 21 MHz, Don found the VK/ZL/JA long-path open by 0600, and then the short path opened up at 0900 right through till 1600. The Ws have begun showing around 1000 and gone right on in to the small hours; around 1700 openings to the Pacific were noted, and the Africans were about during the afternoon and early evening. SSB all the way again, to A9XBS, DJ5RT/6W8, AH8A, FB8XW, HB7OP/5R8, JAs, J6LGG, K6SVL/VP9, OX3CO, TF3YK, VE1CR/1 (St. Paul's again), VKs, VU2AT, Ws in all call areas, W7EO1 (Montana), WB5VXW/HR3, XT2AZ, YB0ABW, YS9RVE, ZLS, ZS2MI again, 3B8CF, 3V8ONU, 4S7RM, 5R8TV, 5Z4CW, and 6W8BG. Down the stairs again, and 14 MHz is always the bargain basement, with activity like Bill Haley,



"... he says he was trying to access the Birmingham repeater or something..."

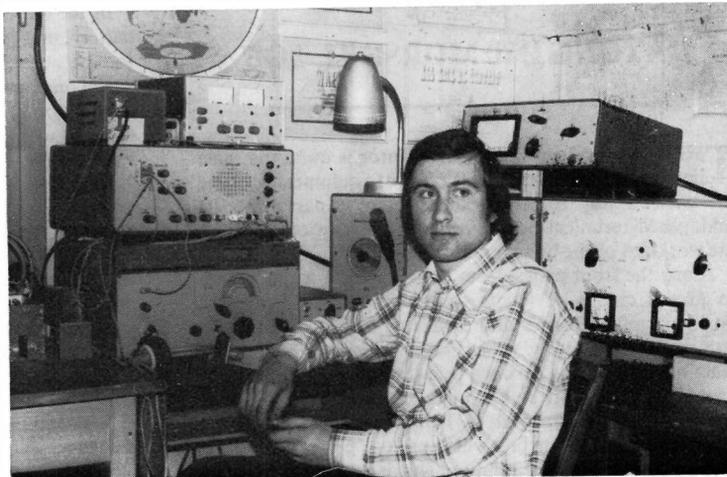
The first contact with Vendaland gave G4EZI her 175th country worked to another YL station — that must be something of a record by now. Diana also seems to have come across a 5T5XJ, Anna, in Mariadoro, but some reservations are evident.

Between November and January, OE3GEA and others are planning a longish trip by Mercedes 406 van; there will be operation from HB0, 3A, and C31, before the main part of the exercise which is to take in CN, 7X, 3V, 5U, XT, 5N, C5 and possibly others. QSL to OE3GBB, and for more details write to P.O. Box 20, A-4023 Linz, Austria. All who send a donation will be kept posted on the doings.

particularly at lunch-time, and so he looks around there. He reports the deep fading, from S8 or 9 right down to S1 or 2, or even right out, and says that others have commented on this to him as well. G2CAS of Harrogate was out /P again, this time from the grounds of Blenheim Palace estate using some 75 feet of wire end-fed; a couple of QSOs with G3LVZ of Loughborough were interesting, the latter's aerial being some 95 feet of retired GPO aerial land-line, plus the vertical bit from an old TV set! G31VF in Derby runs a full-wave on Eighty and mentioned that OK1DKW is looking for G-QRP Club members; and an early morning QRP contact for G2NJ was the one with GM3MXN

all around the clock. Opening time around 0600 to W6/W7, followed by the VK/ZL/JA chaps, and moving on into the Pacific, about which time the East Coast Ws are also very strong. The VKs have been noted in addition, on the short path, around 1300, 1700, 2000 and 2200. Little heard from Africa or Asia, but this, says G3NOF was probably the accident of his operating times. It added up to contacts with FK8BT, FK8CR, FW0CR, HK0BKX, KL7H, KX6PP, P29JS, PY2GWF/PY0 (Fernando do Noronha), T2AAA (at least we think that's the boy — Don wrote TA2AAA), UO5GD, VKs, VK9CGR/VK9Y (Cocos-Keeling), VP2AYL, VP2VBK, VS6BB, XE1XA, YJ8PD, YJ8XR, ZLs, 3B9CF, 3V8ONU. Not a bad little crop there!

A quite September for G3PKS (Wells), who spent much of his time stripping the ATU down for the pieces to make a balanced tuner covering all bands 160 to 10 metres. Jack attacked most of the bands, nonetheless: on Top Band SSB worked locals and stations from Lancashire to Cornwall and Kent, plus a nice solid QSO with G13PDN in Belfast. It seems Jack was at St. Mary Cray for a few days and took a QRP rig with him, with two 66-ft. wires hitched to the bedroom window and down to the fence at the far end all, of fifteen feet apart — more like a taper transmission line, one would have thought but, as usual with the "can't work" devices it performed quite well, and the two watts made contacts with the locals happily enough. 7 MHz wasn't used much, but it did give some excellent reports from UK and EU stations. 14 MHz, just one QSO, with PY2BSW. 21 MHz got a very brief look, and came up with PP2DV and LU9CV on CW, while 28 MHz was favoured for an hour, during which time VK6NC in Perth and G3YRM in Weston-super-Mare were raised, with a couple of Gotaways, from Africa and South America. Incidentally Jack got his copy on the day he wrote, so we now know it took seven working days to reach him. Just think, 100



Lothar Wilke, DM2DUK, is DX editor of the DM "Funk Amateur", and one of the operators of the special Contest station, DT7DK.

years ago it would have taken 24 hours: such is our "progress".

Oddly enough, the next letter is from G2HKU (Sheppey) who starts with exactly the same comment — his took five days to reach him from Tunbridge Wells. Be quicker to walk it round! However, it's nice to be hearing that we are getting into sync again, from the readership. Our own 'check' copy took some ten days to arrive! Anyway we digress. On Top Band G2HKU used SSB for PA0PN, and CW to work UA1QBM, UC2AAK, and FC6CNI. Nix on Eighty, but 7 MHz CW on the main rig saw off UA0AG and UC2WAZ, leaving F9NF to the tender mercies of the HW-8. On 14 MHz we saw the expected SSB QSOs noted to ZL1VN, ZL3SE, ZL3RS, and ZL3FV, while CW took care of FY7BF, VK5YD, ZL2OM, VK7RO, VK4ARI, and JH1CNT. All CW on 21 MHz; the HW-8 turned in OH3XX, and the Big Rig looked after the matter of FB8W, ZC4LP, and UA9CER. 28 MHz was CW as well, with W9VW, UI8AAM, HS1ABD, and 3B8CF. Tailpiece to the letter takes us back to Top Band, when the UA1 Ted was working asked him to QRX while he asked a UA9 to shift — Ted could hear the UA9 but not at workable strength. As for the

domestic QRM, a heron found the fish-pond, so that had to be covered with pea-netting; and a wasp colony have taken squatters rights up in the loft!

G2ADZ has an all-28 MHz report from Chessington; he mentions a - Gotaways 3B9CF, CP4EQF, VQ9KK, 9M2AV, AP2MC, YB1MF and ZL3GQ, but his CW connected with VQ9MR, LU3ZY (Antarctica), LU7XP (Tierra del Fuego), LU4UG (Gral Pico), CX2ET, HS1ABD, 9VOTL, ST2SA, CE3WD, FP8HL, XE3RT, HK2DP, KZ5OJ, TA2FM, VK4ZB (longpath), VK3XX, VK6NCD, VK5FM, ZP5XH, YBOADT, PY9EJ in Lagoas in the Amazon Forests, XT2AW (and the QSL!), all W call areas VP2MM, 3B8CF, JAs, a few UA0s, ZS, and ZE4JS.

Finale

There it is for another month; stick to the deadlines and if you're at all near the bone as far as the posts go, send direct to the writer at the Call Book address. Otherwise, "CDXN", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ. Meantime, may the autumn gales miss all your aerials!

Owing to pressure on space, there are no Readers' Advertisements this month.

REVIEW

DATONG D70 MORSE TUTOR

THE Datong Model D70 Morse Tutor is quite the most interesting (and instructive!) piece of equipment to come the writer's way for many a long day. Apart from its undoubted technical novelty, it has much to teach about the workings of the human mind!

Along the front panel, from left to right: a toggle switch to give a choice of letters, numbers, or, in the centre position, mixed letters and numbers, and to its right a control labelled 'delay' which sets the time in seconds or fractions of a second between characters. When fully clockwise (CAL) the space between letters will be correct for the speed of the letters themselves. Thus if the speed is set to 12, and delay to CAL, the box will churn out perfect five-letter groups at 12 words per minute. This is as good a point as any to mention the next knob on the panel which is a speed control going from 6.5 to 37 w.p.m. Finally, there is the volume control with its On/Off switch.

Inside the box one finds a small loudspeaker and a PP3 battery, and on the back panel a small jack of the size used for the headphone earpiece, and another similar one into which one can plug a Morse Key. In the latter case the noise coming out of the speaker is under the control of the student, which hopefully will sound as good as the perfect stuff the Tutor generates for itself!

Now, the first surprise one gets is to find that it is possible to copy Morse *faster* if the keying speed is raised and the interval between letters increased to suit. Perfect 12 w.p.m. Morse was not copy, but adjusted to 20, and the delay increased until the overall speed was the same against the stop watch, and 100% copy resulted every time; indeed one could get 100% copy above the magic limit. Others who tried the Tutor gave the same result, whether the basic student scratching at the "hump" speed, or the 20-25 w.p.m. old-timer.

A second exercise is to tape a few minutes of the output, copying it as it goes through. Once there is enough, one can play back the tape, and endeavour to send the same letters over the top. This test showed just *how* awful the reviewer's own Morse is, whether driving a straight key, or the mechanical bug, or the el-bug. Again, the tests seem to



indicate that most people do not send Morse the way the inventor of it intended, although a well-driven el-bug comes pretty close.

The device is truly a random Morse character generator, the selection of letters being based on a sample of noise. Inside is a memory device, on the PCB, which soaks up some 180 mA of current; this, incidentally, over and above the remainder of the IC circuitry *and* the audio amplifier. The secret of doing this on a PP3 dry battery and getting good life out of it is simple — don't look at the memory all the time!

Almost certainly the first impression will be that the box does *not* generate random numbers; however the writer, naturally enough, used the D70 as a method of bringing up the speed of his own copy and in the process filled quite a lot of sheets of paper. Analysis of this, representing umpteen minutes of copy, showed that the device is in fact generating the characters at random, which must be good as compared with the normal test set-up where such letters as 'Z' or 'Q' only occur once in a blue moon and take the student by surprise. Everyone who has seen it in operation has been fascinated by the output, and the several who have used its output for training are unanimous in praising the worth of the apparatus. Personally, the writer is saving up his pocket money for his own, and it is felt that any radio club could use one for the training of members aiming for a Class-A licence, and for those who have passed the test but let their Morse decline through staying on the phone ends of the bands.

Again there are those who listen round the CW ends of the bands and are somewhat put off operating there as they have only 'twelves' and no knowledge of procedure. The remedy for not knowing the procedure is simply to listen on the bands until one does, and if one only sends slowly, at a speed one can copy, and disregards the wag who comes back at 30 w.p.m., then there is really no problem. However, most amateur CW communication is at around 15 w.p.m. and to rise to this sort of rate is easy given a D70 in the shack.

On the construction side, the Tutor is made to the same high standard one has come to expect from all Datong products, so to comment here would be only nit-picking.

There is a rather amusing side to this review: when S.W.M. approached Dr. Tong, G4GMQ (ex-G8ENN), of *Datong Electronics Ltd.*, about the possibility of a review sample, it was suggested that he had knocked up the Morse Tutor for his own benefit. "No", came the reply, "I thought of it on the way back after passing the test!"

Conclusion

The reviewer likes it enough to want to own one: of necessity there are longish periods when one cannot be on the bands, and one's lack of practice shows. With a D70 one can make sure before starting back on the air that one is still able to operate, at least on the receiving side, as well as ever. Indeed, of the people who tried the review model, at least three immediately put in orders for them, and two club committees have a purchase on their agenda. What more need be said? Current price of the D70 is £42.55 including VAT, and it is available from Datong Electronics Ltd., Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE.

E.P.E.

AURORA

C.J. REED, G8MFP

Editorial note: The author of this article has gathered together information from many sources over a period of time, and sets out a theory which differs in some respects from that which is in general acceptance. What follows below can only be a distillation of his work if we are to keep within the bounds of reasonable length; therefore serious workers in this field should continue the debate direct with G8MFP, and either be convinced by him or disagree — the latter only after careful study.

ANYONE who has seen the visual marvel of the Aurora in the higher latitudes of this earth, whether north or south of the Equator is inevitably moved with awe and wonder. Apart from those who have seen it and then passed on to their duties of life, there are some groups of people from scientific disciplines who make it their business to record their observations — the word can be applied to a T7 DX signal as well! — and to try and gain understanding. Such groups can include, for example, radio amateurs observing the effects of Aurora on VHF propagation, or astronomers correlating the occurrence of phenomena on heavenly bodies and noting that radio or visual aurora follow after a fixed and definable time. These are the ones of main interest, of course, but we can mention that students of RF propagation in the widest possible sense will note the significance of an aurora to their speciality; so of course the meteorologists, and many other groups: In the context of our own interest in Aurora, the random spread of radio amateur stations gives us the chance to collect much basic data which can be obtained by no other group. Similarly, amateur astronomers are well spread geographically, so that despite the vagaries of the climate they can gather data of interest to our subject in a matter which is probably not practical for the professional astronomer, who is hampered by his high-powered instrument and facilities being in greater demand for more high-flow studies, worthy of his skills.

Let us look at the Sun and its relationship to the things in which we radio amateurs are interested. We are at the moment in Solar Cycle 21, and there is fairly wide-spread support for a belief that it will rise higher than the 1957 peak. The writer predicts a peak of 325 ± 45 sunspots, in the summer of 1980.

The writer's study of Aurora began at the sunspot minimum, in September 1976. He found a general belief that "Aurorae only occur between May-to-September, old chap", a generalisation that was rapidly dispelled by the observed Aurorae of 4th January 1977 and December 2nd 1977.

The Sun, which is this planet's nearest star, is the cause of various propagation effects, including Aurora, which are traceable back to sunspots and solar flares. Consider Fig. 1, a photograph of sunspots. Note the spot which has been arrowed: it has an area larger than the earth, and such spots

and groups eject large quantities of particles into space. The sunspot itself is due to magnetic forces within the sun, which vary with time — the familiar relationship we call the sunspot cycle, of nominally eleven years. The sun was once thought to be a stable star, but it is in fact not so.

Let us turn now to Fig. 2, a drawing of sunspots on the solar disc. A large flare is seen by an observer using a solar telescope, eight minutes after it has occurred; a radio burst is also received at about the same time, the difference being due to the slightly slower rate of travel of the electromagnetic waves. The earth can be considered as lying in the outer limits of the sun's atmosphere, and it is constantly battered by particles from the sun, called the 'solar wind' due to the causes mentioned. Depending on the velocity of the solar wind, particles so ejected from the sun take between 24 and 48 hours to reach the earth's atmosphere; an average of 44 hours seems to tie in with the radio aurora events, the time-lag being measured from the appearance of the flare or sunspot burst of energy.

Atmospheric Effects

Depending on the length of time the sunspot or flare is putting out energy, so is the duration of time in which it is ionising the earth's atmosphere. Clearly, we need to have some yardstick if we are to measure effects, and the base chosen is the *quiet sun*, a sun showing no signs of solar or flaring activity.

Tropo-scatter, Sporadic-E, Aurora, and even black-outs are all due to solar activity. The solar wind causes the Van Allen belt; the solar wind arriving at the earth has the effect of bending the magnetic field of the earth, and causing a large ionised region round the earth together with a "tail" behind earth.

Let us now look at Fig. 3: the arrows on the right are particles coming down from the sun, the arrowed circles being individual particles spinning. The magnetic field of the earth is distorted in the manner shown, and the ionised particles following the line of least resistance to the north and south Polar regions. They are now in the upper part of the earth's atmosphere, in the area called the *exosphere*. (The parts of the earth's surface and the various names and distances are shown in Fig. 4. Reference may be made to this figure as required.)

Up in the exosphere, particles now start to meet oxygen atoms; these collisions cause some more ionisation due to the energy and excitation imparted, and the heavier the bombardment, the more the number of ions so released. Working their way downwards they reach the F2 layer and intensify its ionisation which, lying some 60 kilometres above the earth, spreads out from the poles having affected the F2 and the F1 layers on the way (the height, it will be recalled, of the layers varies as between day and night anyway, as we learned in our RAE studies). Spreading southwards from the North Pole the bottom of the layer

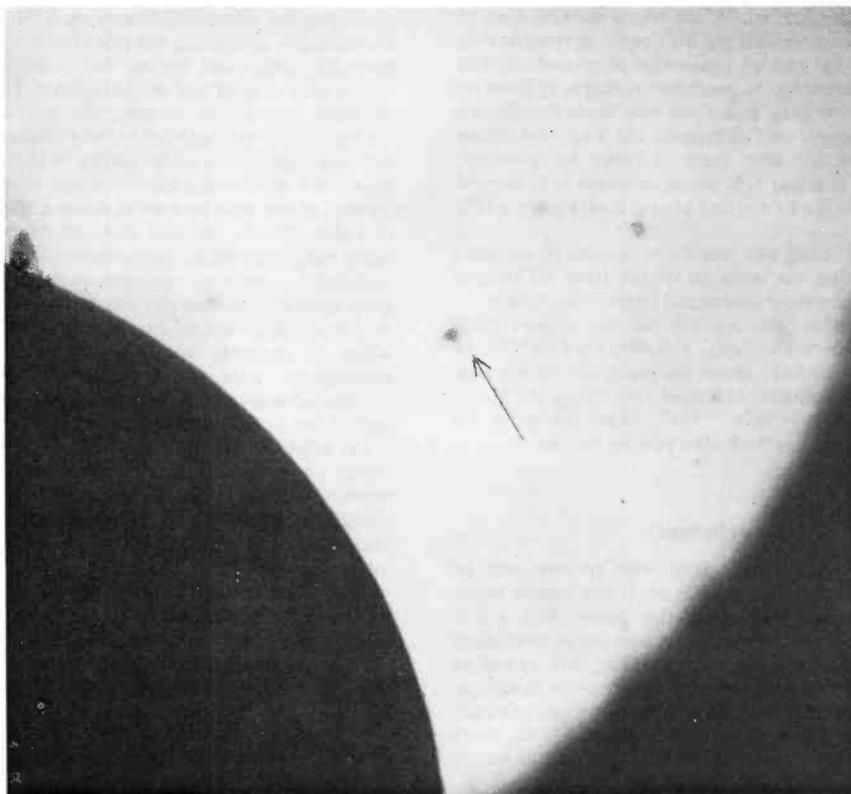


Fig. 1. Photograph of sunspot, see text.

will cross Greenland, Northern Iceland, Northern Europe and USSR, right down into the north of Scotland, and further south still, till we in the Midlands and South of England can make use of the aurora. Thus a vertical section through from ground to the upper edge of the earth's atmosphere looks like Fig. 4.

Timing and Prediction of Aurora

The prediction of aurora can be done by two methods. The first and most common is simply to recall the date of an auroral manifestation and the fact that the sun rotates once in 27 days relative to earth. Sit back then for 27 days and hope the same set of spots will cause another outbreak of aurora. The observed success rate at G8MFP is around 30% with this method. A second method is as follows: let us say a large sunspot is visible on the eastern limb of the sun; it is active and gives off a flare, and a radio burst is received. A time-scale would show that, some 24 hours before the onset of aurora the D layer seems to thin or even disperse. It will be recalled that this is an absorbing layer which causes the low daylight range of medium wave or Top Band signals. If the thinning effect occurs, then daylight medium-wave DX appears — stations from New Zealand or South America, or wherever. 13 hours ±2 before the aurora, bursts will be detected on Ten. Nearer still, if aurora bursts are detected on the HF bands, say at 1000 hrs., then around mid-afternoon a radio aurora will appear to affect 70 and 144 MHz. This aurora may fade after 2-3 hours and come back later, or it may stop altogether. If it comes back in the evening it may be around 2100 hrs., and a third phase may be after midnight. If visible aurora occurs, then normally no radio manifestation appears. Such a classical form was noted on August 28, 1978, and the large flares of April 28 and 30 from a "naked eye" sunspot behaved similarly. The method yields around 70% success rate.

Auroral Effects

There are two noticeable auroral effects; one of course is visible aurora, and the second radio aurora. When one is trying to understand the radio aurora, it must be borne in mind that many different forms of the effect can occur. For example, the radio wave is not just reflected but refracted off the ionised layer of the aurora; and the aurora is not just a passive reflector but is emitting noise energy of its

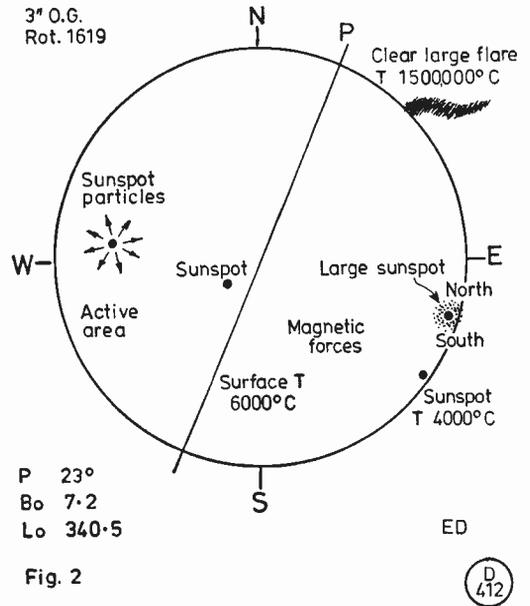


Fig. 2. Drawing of the sun on 9th September 1974, 1610z, 3-in. O.C.

own which was imparted to it by the sun which started the whole chain of events. Further, the curtain is not static but moves up and down in altitude, "sideways" to east and west, and of course north-south. Such effects are to be heard in the loud-speaker in the shack, in three ways: one is the fading, whether slow or fast, a second is the loss of a signal which is replaced by another from further north (which is an indication that the curtain has receded northwards, such that the lost station can no longer use it). In general it seems that, at G8MFP in the midlands, the beam heading to use is about north-east, but this is by no means invariable, as quite frequently one can follow the aurora from west to east; the height of the aurora may be between 40 and 100 Km.

The third way in which the speaker may tell us things are happening is the very characteristic combination of the

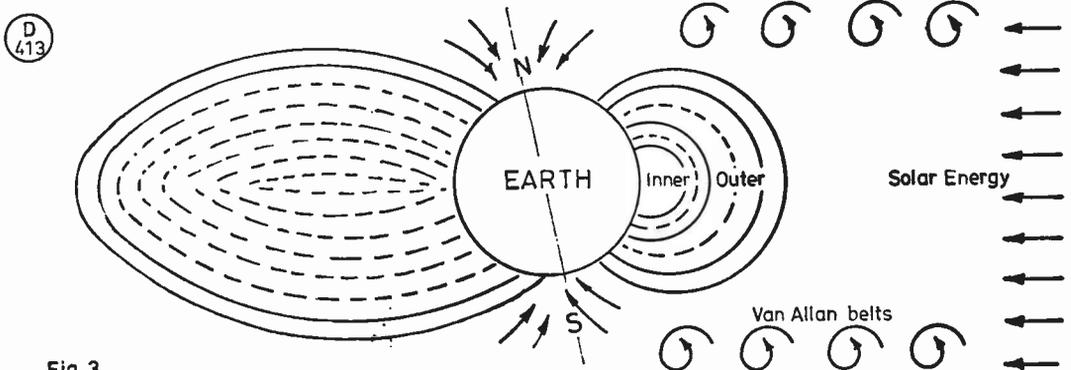


Fig. 3

Fig. 3. Solar wind meeting earth's magnetic field, and hence the distortion of the magnetic field and the generation of Van Allen belts.

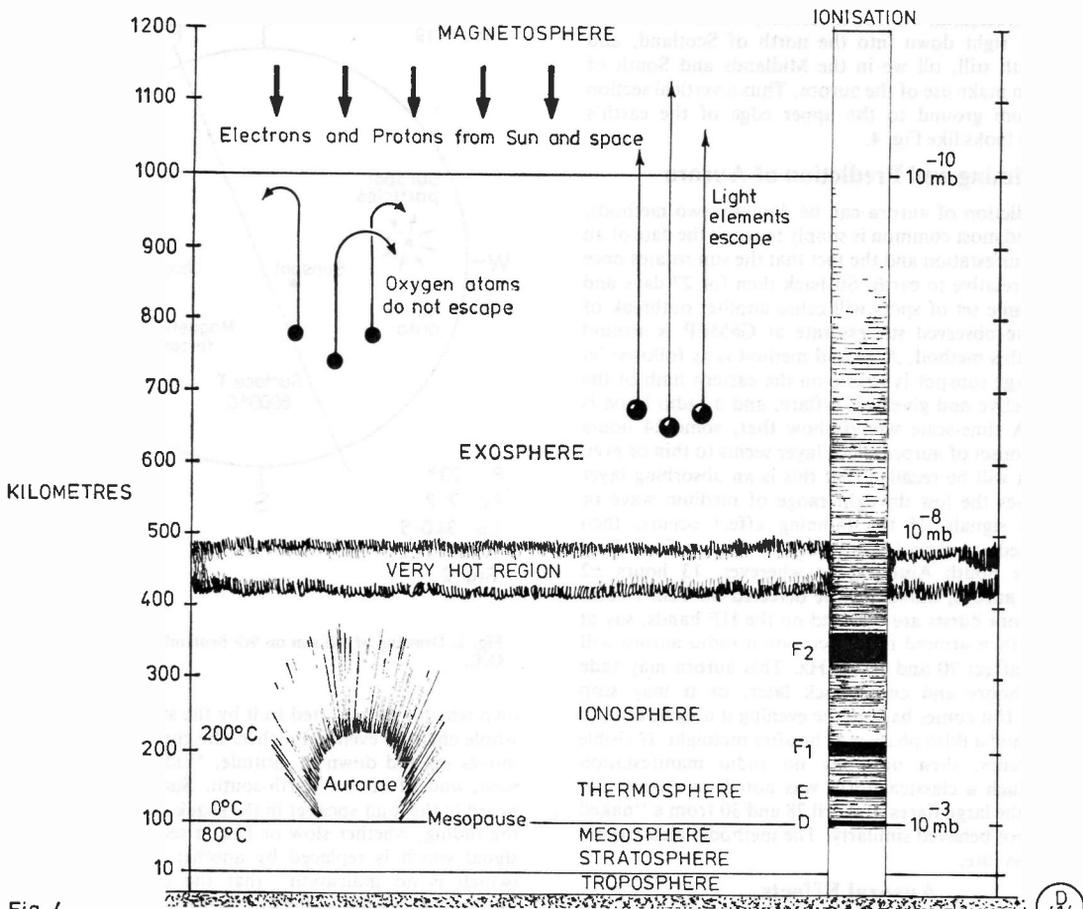


Fig. 4

Fig. 4. The zones of the atmosphere of the earth related to temperature, atmospheric pressure, and height above surface.

wideband noise from the auroral curtain and the Doppler shift on the carrier as the curtain makes its faster movements; the "clean" carrier wave sent out is heard at the other end as a nasty rasp, so the Morse *dit-dit-dah-dah-*

dah becomes *rit-rit-ror-ror-ror*. In general this effect is such that AM telephony is not copiable, SSB is very difficult, but CW can be taken if you can stand the noise coming out of the speaker.

It is interesting to note how the HF bands are the first to be affected as the ionisation reaches down to and through F2 and F1, then down to the D layer, followed by the VHF bands. At G8MFP the auroral effect is first noted at 150 MHz which is the solar noise output peak, then followed down and back up to 144 MHz and, if the manifestation is intense enough, even to 70cm. Fig 5 presents a picture of the aurora and its relationship to ground stations, provided one remembers that one cannot truly define in two dimensions that which exists in three.

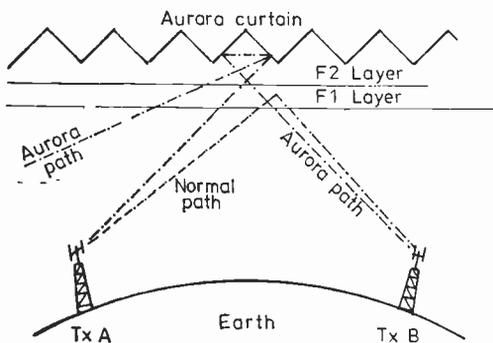


Fig 5

Fig. 5. The aurora curtain showing how signals use it.

Acknowledgements

Help came from many sources: Coventry and Warwickshire Astronomical Society; Chelmsley Wood Astronomical Society; B. Sowter, G3NAP; H. Ford, Dundee; B. Nash, G4GEE, P. Edwards, G8KGJ; K. Banks, G8FWZ; A. Rowley, G8MYK; M. Harrison, G3USF; G. Knight, GM8FFX; Cdr. H. Hatfield of the B.A.A.; D. Cluely who provided the solar drawing of Fig. 2.

SHORT WAVE LISTENER FEATURE

By Justin Cooper

LAST time round, we were talking about the station operator and aerials — or rather aerial supports. This time we will discuss the important matter of keeping the station at top notch. If you have a valve receiver and a standard signal generator, plus a testmeter, you can put right most things. If you are “modern” and own one of the earlier transistor receivers it isn’t quite so easy, since the testmeter will need to be high-impedance and the signal generator will have to be connected to the receiver with extreme care if one is not to blow up the works inside the receiver. If the thing has FET devices or MOS integrated circuits, it is even more important to be careful. And, when all that has been done, you still don’t know whether your instrument is telling the truth unless you calibrate it when it is first built, and at fairly regular intervals afterwards. How can this be done in the SWL shack?

It isn’t easy, but it is important. If any of your test gear is old, be aware that capacitors and resistors of those times were both far more troublesome than the modern equivalent. The capacitors would tend to leak, the resistors would change value and valves, of course, can age. On the other hand, it doesn’t really mean much that you can measure, say, one volt to an accuracy of better than 1%; so if your meter reads it as 1.2 volts, and you know about it, and you know it hasn’t changed by checking, then all your measurements will be OK for use in the shack. So, what can we use for standards? 1% tolerance resistors to BS9111 or DEF5115 are easy enough to come by, and even 2% tolerance would serve. Take, say, 100, 1000 and 100K resistors of this type — they are available from any radio shop which deals with RS Components (the old “Radiospares” outfit), and a couple of capacitors of similar known value. Now you need a source of voltage and current, and these are already around the place in the form of batteries; one under the car bonnet which will give current enough for your needs, and a dry battery. Should you want AC voltage ranges, you have the mains, and doubtless you can come up with a heater transformer. Don’t forget the mains are lethal and take care.

Now procedure. Assume the family carriage is on the drive after a longish run so you know the battery is fully charged. Leave it there an hour and it will have dropped from the fully-charged 15 volts or more, to 12.6 volts. If your battery is of the type which have all the lead links visible, then you can calibrate a ten or fifteen-volt range quite thoroughly.

Now for current ranges, and here we recall Ohms Law, which says that volts divided by amps equals resistance in ohms. Lick the pencil or get out the calculator, and find that 100 ohms across the battery will give us 12.6 mA. We must put the meter in series with this resistor, so clearly we need to know a bit more about the meter current ranges. The “basic” range would be the case of the meter all by itself, giving 100 μ A (if that is the meter full-scale deflection — maybe written as 10,000 ohms per volt), and perhaps 0.5 volts across the meter at full scale. If one is on the 1 amp range, and reading 1 amp, then 100 μ A is going

down the meter and 999.99 mA are diverted down the meter shunt. Bring Ohms Law into play again to see what is going to happen (if you don’t — take care!). So, knowing the ohms per volt, and/or the current for full scale, we put the meter on to a current range, put the 100 ohm resistor in series, and measure the current we are taking out of the battery. As we have 100 ohms we would have 126 mA were the meter perfect, but in practice it will read less because the resistance of the meter is present. Let us say we get a reading of 100 mA and that 100 mA is full-scale on this range. Thus for this range the combination of the meter and its shunt inserted in the circuit have caused the current to fall from 126 to 100 mA; total resistance is 126 ohms (100 in the calibrating resistance and 26 in the meter and its shunt). From which we can say that at full-scale our meter has 2.6 volts between its positive and negative terminals. This latter figure will probably apply on all the current ranges, with the meter shunt changed on each range to ensure that at full scale the surplus current all goes down the shunt . . . and it may indeed be the voltage drop required to get the meter to full scale on the volt’s ranges.

There is usually a shunt on the meter anyway, so that a meter is made a bit better than it need be and shunted down to read the advertised figure; this “setting-up” shunt may be a bit of resistance, or a magnetic one, adjusted to make the movement “just so”. Once the movement is right, they can be fitted out with standard resistors for each range and standard engraved panels just like shelling peas. The ohms range will have a battery, a variable resistor in series with it and the meter movement, so that you first short the prods to get a zero: thus zero ohms is full-scale deflection, and the scale is non-linear. As part of the calibration have a peep at the battery; throw it away if its old or leaking, even though it may still appear good. Check the ranges with your standard resistors. Don’t forget any moving-coil meter is most accurate at full scale and falls away at low deflections. Turn to AC Volts, and set the meter to read on the highest scale and measure the mains volts on those AC volts ranges which apply. Then take your heater transformer and read 6.3 volts AC (or 12.6 volts as the case may be). Record all your results.

Now, a word of warning. We have already pointed out the inaccuracy of the basic movement, which is best at full scale and falls away as the deflection reduces; this means that the Ohms range is not much better than an indication. Don’t however, think that if you go out and buy a digital meter that it’ll be perfect, just because it displays numbers you can read. It too will have an accuracy, given as plus-or-minus so many per cent, plus one digit in the least significant position. Work that out and you may find out your old meter isn’t too bad after all!

As for the signal generator, the first test is turn it to a frequency the receiver can look at, tune it in, and see if you can turn the attenuator down far enough to lose the generator output signal in the receiver noise. If you can’t, turn it to 50 μ V and look for something around S9 on the receiver meter, or at least the same value as you had last

time. If you have an RF probe and a valve voltmeter or DVM, you can look at the generator output and see if it agrees with the 50 μ V. Don't expect the calibration to be too good in frequency, even if it is a "standard" generator: 1% is good. If you have a transistor generator with batteries inside you might be able to get right down to 1 μ V or lower, but it's not likely. The alternative is to build a noise generator with which to make comparative measurements, using a silicon diode as the noise source, or a zener diode. The method then is just to check the noise diode battery volts are as before with the thing switched on, and adjust to give 3 dB of extra output. Note that this setting is the same as last time and you at least have some idea what the receiver is doing. If your receiver features transistors, it is well to always use transistor test gear; if you must use a valved generator or whatever, bond everything together and to earth before you switch on.

The Mail

Perhaps the first one should be the letter from **S. Mills (Cardiff)** who has been with us about a year, using an original 9R59 receiver, and who mentions that he finds the speech quality none too good, and that he has heard similar comments from other sources. We assume Simon is talking about, in particular, SSB, and that he is using headphones or a reasonable speaker in some sort of box: the lack of this last can make the response very odd. Now, most SSB rigs use the filter method to get rid of the unwanted sideband and some of the carrier. And it is a fact that the better the filter the worse the speech will sound, this being due to the unwanted phase changes that also occur. However, if we stay with the receiver itself for the moment, we must remember that the carrier wave which is suppressed at the transmitter is re-inserted by the receiver. Now, we know from our RAE class that if we have a carrier which is over-modulated with speech we will get severe distortion. Here is the clue. Our receiver BFO is not big enough for the sideband signal reaching the detector stage. Since we are "stuck with" the amplitude of the BFO, we must reduce the amplitude of the SSB so that it is not too much for the BFO. This is achieved quite simply by turning down the RF Gain control; when the correct level is reached you will note an improvement in the quality of the speech. This all assumes you have the receiver correctly tuned and the BFO correctly set — though many operators adjust the receiver in frequency until the speech is high-pitched to quite a degree, for some reason.

Nice to hear again from **B. L. Henderson (Chetnole)** who is shortly reckoning to move to Salisbury; his lack of activity is caused by travelling 45 miles daily each way to work for almost a year.

T. Grimbly (Hull) was surprised after his long lay-off to find call-signs in odd forms that used never to be heard — his latest one is C310E who was from Andorra.

Next we have **C. Stevens (Derby)** who sends in an up-date of some 80 new prefixes. A comment is that there is no need to enter just 35 on an A4-size sheet, which results in an entry of three A4 sheets; they could all have been written on one sheet, and still leave lots of room for J. C.'s red pencil. Paper is expensive, and heavy in bulk, and takes up space — the first matters to the entrant, as does the last in postage terms, while the bulk and weight of paper we have to hold here can get quite alarming at times!

G. F. Green (Middlesbrough) sends us a copy of his QSL from HV2VO which came by direct mail, complete with Vatican City stamp and postmark — no doubt now about that station being authentic! On a different tack we ought to dock one for George's "XZITA" which we would reckon was HZITA miscopied from a quick log entry — but we'll leave it in until George tells us what it was, as he was anxiously awaiting the arrival of the RAE pass. If he did get a pass — and it rather seems that most people did (!) then he will now probably be among some 700-odd applications which the Home Office are currently processing. And we would hazard a guess that the authorities will deal with all the new applicants before diving into the much smaller heap of upgrades to 'A' licenses.

S. B. Harris (Coventry) lost one of his prefixes — he claimed something which might be 'SJ H' or '5J H' so it combines the virtues of being a bit missing and unreadable too! This is a difficulty which is quite frequently the writer's lot, but SWL Harris has 5s and Ss which are like twins. However, he doesn't have any bother with I and l, which is a quite common problem, nor yet with the old favourites of 2 and Z.

FRG-7 Owners

We have a letter from **Mr. S. R. Potts**, 85 Eagle Court, Sandbank, by Dunoon, Argyll, who wants to know if there is an FRG-7 Owner's Club — we know of none such, and therefore if any readers are aware of one, would they get in touch with reader Potts. If we may add a *post scriptum* to that, if there in fact isn't one, why don't the enthusiasts get together and form one?

Waiting

We're all doing that, these days! However, **R. Middleton (Bury St. Edmunds)** has an addition to make to his total, but is waiting to see it in print before he sends any more. All we can say about *that* is that this issue of "SWL" will be out on time providing nothing really impossible occurs, and we hope to have more or less sold out before we get to Leicester!

Hoping

We couldn't resist this heading when we read the note from **M. C. P. Bennett (Datchet)** — he has it that the two chaps signing "Cactus Pete" and "Lucky Debonair" were

ANNUAL HPX LADDER

Starting Date, January 1, 1979

SWL	PREFIXES	SWL	PREFIXES
D. W. Waddell (Herne Bay)	499	R. Ford (Longlevens)	332
B. L. Henderson (Chetnole)	481	F. C. D. Barnes (Cardiff)	288
S. B. Harris (Coventry)	477	M. Pilsbury (Leyton E10)	241
C. Stevens (Spondon)	408	Miss J. Ribton (Oxted)	216
Mrs. R. Smith (Nuneaton)	350	B. P. Collinge (Enugu, Nigeria)	212
P. L. Spindler (Bradford)	344	R. Miller (Chelmsford)	209

200 Prefixes must have been heard for an entry to be made, all since January 1, 1979, and in accordance with HPX Rules.

helping hand should never be withheld, whether a raw newcomer or an OT is the one in need.

T. Grimbleby (Hull) seems to be getting back into the swing of things, and asks whether the presence of /P on a callsign counts as a new series. The answer cannot be an unqualified one, but Rule 3 in effect says that if the /P determines location as different from the basic call (e.g. G3SWM/W6) then it can be counted according to the rules, but not otherwise.

A. Twelves (Colwyn Bay) has nothing to add to his HPX score, but wishes us to thank for him all those kind folk who responded to his request for a copy of the Jan/Feb issue of *Short Wave Magazine*: and in particular G5875 of ISWL who didn't give his name, and another unsigned responder whose envelope was postmarked in Manchester. Let's hope Alan is now able to manage some time on the bands to get that total up!

We usually manage to collate when a reader has more than one letter in the pile, but we missed the second from G. F. Green, who has already been mentioned. The second one is memorable for the tail-end: "P.S. Still waiting for the blankety-blank RAE results. P.P.S. I've passed!" Congratulations George, and lucky you hadn't posted when the slip landed.

E. W. Robinson (Bury St. Edmunds) continues his merry way, the current one being his 50th list.

Nice to hear again from **M. Quintin (Wotton-u-Edge)** and welcome back aboard. Seems that Mike has been getting into such other interesting activities as aviation, and SWL temporarily went to the wall.

It's a long time since the name of **D. J. Reynolds** graced this column, as he is G3ZPF nowadays. David says that the funny noises mentioned by **M. Ribton** last time are probably the "sweepers" and "creepers" mentioned a while back by G3USF in an article for *RadCom*. David says that full details of these manifestations should go to G3USF who is doing propagation research. We agree but would underline the need for as much detail as is possible.

A. E. Newens (6 Patmore Road, **Waltham Abbey**, Essex EN9 3BN) had some correspondence with 'KFE about starting amateur-bands listening. Reader Newens is an OAP and he doesn't get around too well, so he feels the local club is 'out' for him. However, he is at the novice stage with his JR-310 receiver, and he lacks a handbook and — in a way more important — the knack of driving it to best advantage. Anyone able to help?

Going back to the piece about the FRG-7 in March, **A. J. Graham (Gillingham)** wrote in about the matter of pin connections to T1 primary in that article. However, he did raise a point of general interest in that he wanted to know of a better way of bridging two tracks than by a blob of solder. Such bridging is a regular problem for anyone using printed circuits and wishing to modify or update. What one needs is a tiny drill bit and something to chuck it into; one can then fit a pin into the holes so made, and use a

link of insulated single-strand wire between the two pins to make the connection. If, as in the case of the Toko filter PCB, there is a pin of the filter available, one can use this as one end and the pin in the hole as the other end. It should *always* be a sleeved or insulated link, and dressed carefully to the board. Occasionally, the problem arises of a broken or lifted track. Broken track needs the pin on either side of the break joined by a link, if only because a run of solder across the break (and any more flexing of the PCB) will result in more trouble. As for lifted bits of track, if they are complete and unbroken, they can be refixed with the faintest dab of *Araldite* and left overnight, at least, to set hard before the soldering-iron is brought anywhere near.

Such a long letter from **H. M. Graham (Harefield)**, who spent most of his time on 28 MHz; 21 MHz infested with Woodpeckers as was 14 MHz, and the latter mainly short-skip EU heard through the QRM anyway. One query noted was T4VEN — T4 is noted in the latest issue of Geoff Watts' *Prefix List* as Vendaland, one of the ZS 'homelands' which have been set up. Doubtless it will eventually become another new country.

We always manage the odd chuckle over the mail, and this one is from **M. Law (Chesterfield)** who was a bit worried over some prefixes accidentally claimed twice — so much so that he forgot to put his name on the letter! All's well, though, as we were able to sort him out at this end.

A quick up-date from **S. Foster (Lincoln)** who also wonders whether we will be at Leicester. *Short Wave Magazine* will certainly be there, but whether J. C. is himself present will be up to G3KFE on the one hand and his own commitments on the other.

Another long-time entrant to this piece is **L. Stockwell (Grays)** who notes that he is down for RAE classes at Brentwood — quite a trot on a winter's night, and it takes a bit of will-power to struggle through to the time of the examination. Essex are not the cheapest county for evening classes either! Anyhow, good luck; and good luck to any other readers who are slogging away at it.

P. L. Spindler (Bradford) has met up with the Woodpecker/Gas engine/Poltava Pestilence by the sound of it — and it is indeed the over-the-horizon radar. As for getting any copy through it, it *can* be done, but it most certainly needs both skill and a mite of luck.

Others

Lists without letters — thanks for them to **M. Shaw, Huddersfield; M. Rodgers, Harwood; and H. A. Londesborough, Swanland.**

Next Time

We will be on schedule, and November 14 is the deadline. Address, as ever, to your J. C., "SWL", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.

A C-MOS KEYSER

WITH NOVEL DESIGN OF CHARACTER STORE AND
OSCILLATOR

R. H. J. GOULDSTONE, G3TAG

OVER the past few years a number of digital keyers have been built by the writer. These were all TTL circuits and all suffered from two main faults: the first problem was current consumption, this was so high that battery operated units were always dead when one came to use them. Mains power supplies were bulky, expensive and inconvenient. The second problem was poor oscillator performance, causing shortened characters and a great deal of frustration.

There follows a description of a C-MOS keyer that was put together after some hours of research and experimentation. It has extremely low power requirements, doesn't bother with a battery switch, and the oscillator never fails to start. No originality is claimed for the general circuit layout, this type of logic design having been used by a number of other people. The character store and oscillator are thought to be novel and are described below.

Set/Reset Latch

IC1 forms two set/reset latches, one for entering dots and the other dashes; this circuit is common in applications where it is important to prevent contact bounce from generating more than one pulse per operation of the switch.

After switch on, IC1 pin 3 will be at "O", this also holds pin 6 at "O". Since pin 6 is at "O" the output at pin 4 will be at "1", holding pin 2 at "1". Pin 1 is held at "1" by R2 and pin 5 at "1" by IC7A. If pin 1 is taken to "O" (even momentarily) pin 3 will go to "1" taking pin 6 to "1". The output pin 4 and pin 2 will then go to "O" and the latch will remain in this state, with a "1" on the output pin 3, until it is reset at the completion of the character by pin 5 going momentarily to "O". It is important to remember that it only requires the set or reset inputs to go to "O" for a fraction of a microsecond for the latch to change state.

Character Store

The function of the store is to prevent the generator receiving new instructions while it is busy processing a character. Operation of the store is best understood by referring to Fig. 2. Two *nand* gates and two sections of a 4016 quad-bilateral switch make up the store, and operate as follows. In its quiescent state, Fig. 2a, it will be seen that both the switches are closed (IC2a & IC2b). As long as there is a "O" at the input to these switches they will remain in a closed condition, each switch held closed by the inverted output of its opposite numbers gate. If a character is now sent, as shown in Fig. 2b, the output of the selected switch will become a "1". The gate connected to the output of this switch will invert the signal and apply it as a "O" to the control pin of the opposite switch, turning it off. In the example shown a dash has been programmed and it will be obvious that any change to the dot input will have no effect on the following circuits. Switch IC2a will not close again

until the dash latch has been reset at the completion of the character. It will be noticed that the dot latch can be set during the processing of a dash, *i.e.* a dot can be stored; this dot will be processed as soon as dash latch has been reset. A dash can be stored in the same way.

The Oscillator

It is important that the oscillator starts reliably as soon as the paddle contacts are made. The delay before the first character pulse starts in this circuit is about 10 microseconds and is fixed by R5 and C1. For practical purposes this is an instant start circuit.

Operation is as follows: A "1" on IC4 pin 6 causes pin 4 to go to "O". This negative-going edge triggers the monostable IC5a which produces a negative-going 10 microsecond pulse at pin 7. The positive-going back edge of this pulse triggers IC5b pin 12. This section produces the clock pulses for the character generator and the pulse length is variable by means of VR1. Negative going pulses from pin 11 are fed back to IC4 pin 5, where the positive-going back edge re-triggers the circuit again. The oscillator will continue to run as long as IC4 pin 6 is held at "1".

Generation of Characters

When the paddle is moved to the dash position the dash store (IC1c, IC1d and IC2b) will latch as described above. A "O" appears at IC3c pin 9 and a "1" on pin 10 which starts the oscillator. At the same time IC6a and IC6b are enabled by a "O" appearing on pins 4 and 10. On the first positive-going edge from IC5 pin 10, IC6 pin 2 goes to "O" causing IC4 pin 11 to go to "1" and activating the relay.

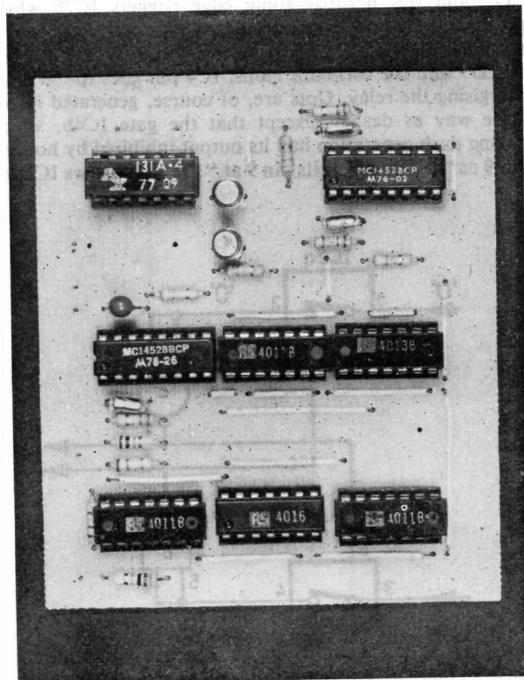


Fig. 1. The C-MOS Keyer; actual board size is 3-in. by 3.6-in.

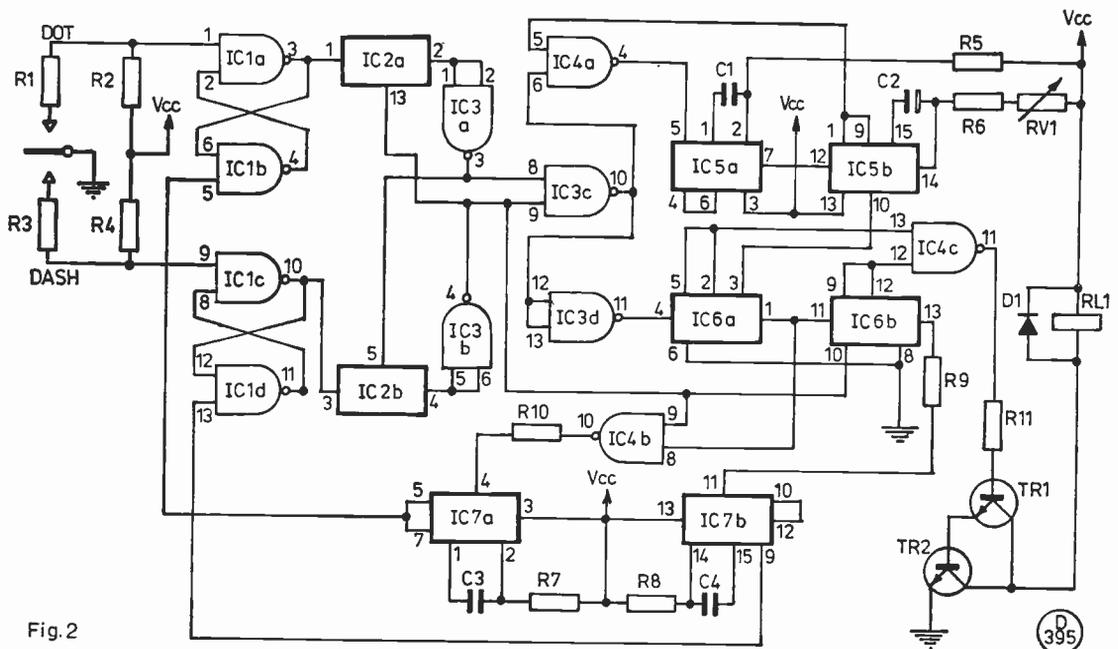


Fig. 2

Fig. 2. Circuit diagram of the G3TAG C-MOS keyer. See also Figs. 2a and 2b.

The next positive-edge from the oscillator causes IC6 pin 2 to go to "1", but at the same instant IC6 pin 12 goes to "0" so the relay stays energised.

At the fourth positive edge from IC5, IC6 pin 13 goes to "0" and this negative-going edge triggers IC7b which produces a 10 microsecond negative-going pulse which resets the dash latch. At the same instant pin 6 of IC4 drops to "0" and the oscillator stops, IC4 pin goes to "0" de-energising the relay. Dots are, of course, generated in the same way as dashes, except that the gate IC4b, which during dash generation had its output inhibited by holding pin 9 at "0", now has its pin 9 at "1". This allows IC7a to

Table of Values

Fig. 2

IC1, IC3, IC4 = 4011	R2, R4 = 820K
IC2 = 4016	R5, R7, R8 = 22K
IC5, IC7 = 4098	R6, R10, R11 = 47K
IC6 = 4013	C2 = 2 F, 15v. tantalum
TR1, TR2 = BC108	VR1 = 250K linear
C1, C3, C4 = 220pF	RL1 = Astrulux 131A-4/77-09
R1, R3 = 10K	

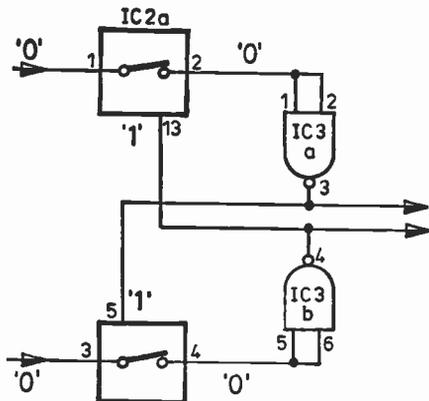


Fig. 2 (a)

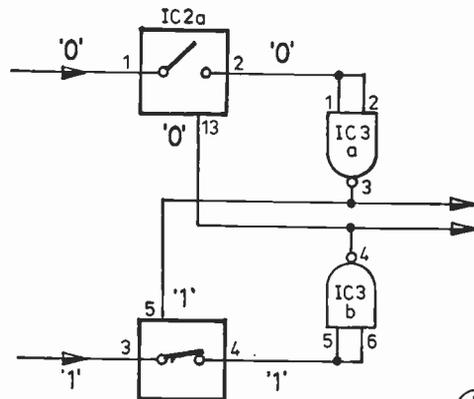


Fig. 2 (b)

Fig. 2a and 2b. Showing character store.

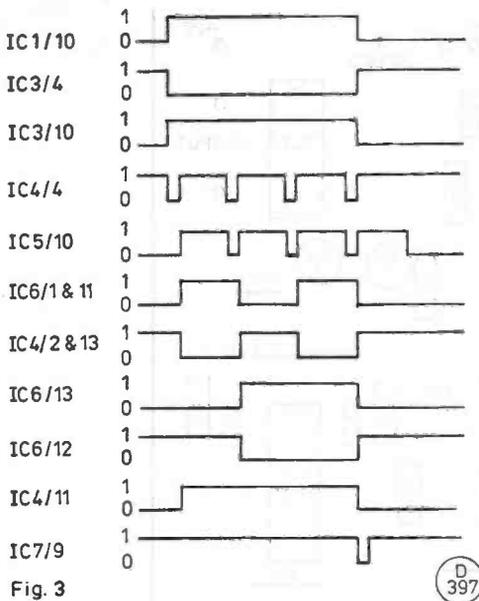


Fig. 3. Logic timing diagram for dash generation.

be triggered on the first negative-going transition of IC6 pin 1, thus terminating the output after one clock pulse instead of three. IC6b is also prevented from operating because its pin 10 is held at "1".

As can be seen from the timing diagram, Fig. 3, the oscillator always produces one clock pulse after the end of a character. This gives correct character spacing.

Construction

The original keyer was built using a patch board and yards of wire. Next the unit was constructed on *Veroboard* and then on the printed circuit board shown, Fig. 4. No trouble was experienced with instability but some spurious triggering of IC7 occurred: the trigger inputs on some samples of this IC were found to be very sensitive and could be tripped by noise pulses leaking through IC6 and IC4. This problem manifested itself by the dot store being reset half-way through a dash being processed. The trouble was cured completely by the insertion of R10 and R9.

If the relay specified in the parts list is used, diode D1 is included in its construction. Should a relay without an integral diode be used an external diode should be connected across its coil as shown, to protect the transistors. In its quiescent state the power requirements are almost non-existent, being about one microamp at 9 volts. Under key-down conditions the current rises to about 10 mA, most of this being taken by the relay circuit.

Component Layout overleaf

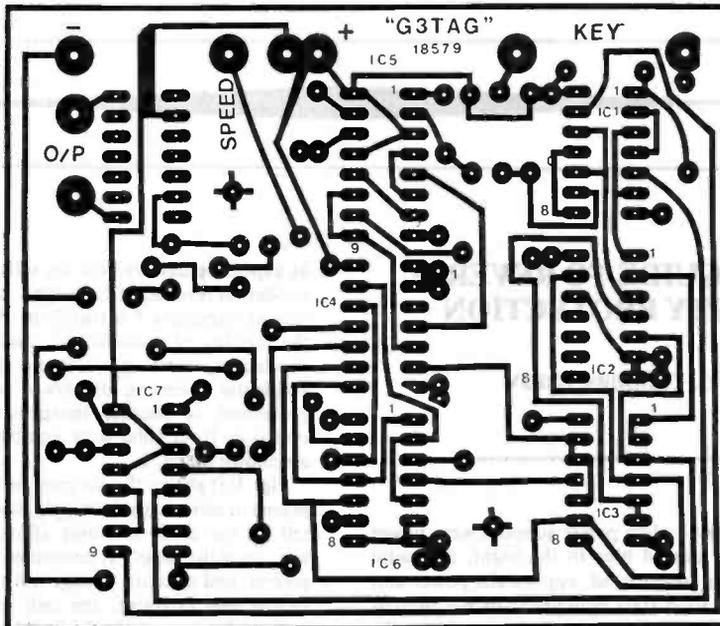


Fig. 4. Printed circuit layout of C-MOS keyer, showing foil side.

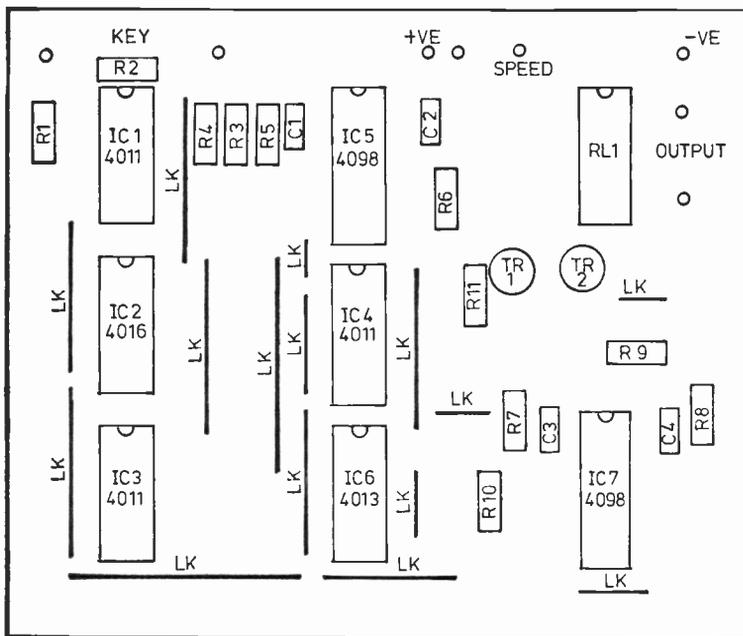


Fig. 5 COMPONENT LAYOUT

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A QUICK GUIDE TO REVERSE POLARITY PROTECTION

REV. G. C. DOBBS, G3RJV

In those 'glorious days' when power supplies were *power* supplies and 807's glowed blue in the night, the radio amateur threw caution to the wind, applied the power and pressed the key. The solid-state equipment of the present time demands a rather more delicate approach to the handling of power. Everyone who has fallen into the oh-so-simple trap of connecting a battery or power supply unit to a piece of cherished solid-state equipment, the wrong way round, will understand the need for caution. W9SCH once said that the problem with transistors is they suffer from "quantum-mechanical necromancy" and are apt to curl up their toes and die. Although it is false to think of transistors

as expensive devices bent on self-destruction, even a brief accidental reversal of the supply polarity can be enough to ruin an expensive PA transistor. What does surprise me is the number of constructors, and worse still, commercial producers, who provide no protection against the accidental reversing of power supply polarity. Polarity protection is simple, inexpensive and an inexcusable omission from solid-state equipment. Four basic circuits are shown in Fig. 1.

Fig. 1(a) shows the simplest arrangement of all: a diode placed in series with the supply line. As every schoolboy can tell us, the diode will only allow the current to pass one way, so if the supply is connected the wrong way round no reverse, and noxious, voltage will reach the equipment. Very simple and effective, the only problem being the small voltage drop across the diode. This will usually be about 0.3 volts, although it can be up to half a volt. This is probably no grave loss in most equipment, but bear in mind sluggish relays and internal stabilisation circuits which may like to see the correct input voltage. The current rating of D1 must be above the total current required for the operation of the equipment.

Fig. 1(b) is the idiot's wonder of polarity protection. A

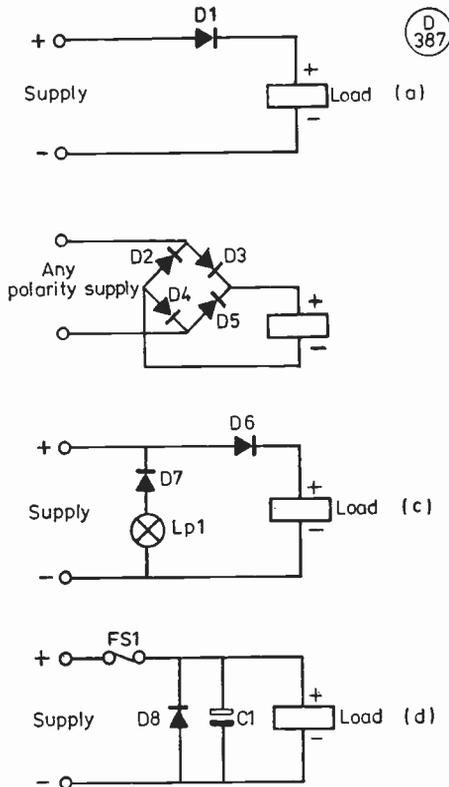


Fig. 1 SUPPLY POLARITY PROTECTION

Table of Values
Fig. 1

- D1 to D7 = Silicon Diodes, current adequate for equipment.
- D8 = Silicon Diode, several amps rating
- LP1 = Indicator lamp, voltage to suit supply.
- F1 = Fuse (fast blow) to suit equipment.
- C1 = 25 μ F electrolytic, voltage to suit supply.

full diode bridge D2 to D5 is provided. This circuit means that the supply may be connected to the equipment anyway round and it will still work in safety; whatever the polarity of the input, the correct polarity will appear across the equipment. Positive will always appear at the junction of D3 and D5, negative will always appear at the junction of D2 and D4. Simplicity itself, but the voltage drop is twice that of the circuit in Fig. 1(a) which may give problems. Again the diodes must be capable of handling the total current of the equipment.

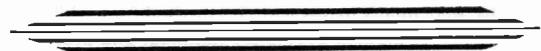
Fig. 1(c) is a fancy version of Fig. 1(a): D6 provides exactly the same protection as did D1 in that circuit. The additions are D7 and LP1 which provide a light to indicate the error of one's ways. (I think my fellow clergy would

agree that if we *all* had a built-in light to show us the error of our ways, life could be better!). If the supply is wrongly connected to the circuit, D6 protects the equipment, but D7 conducts and lights LP1.

LP1 can be any indicator lamp of the supply voltage, D7 must be able to handle the current of LP1 and again D6 must be able to pass the current required by the equipment. It would also be possible to use an LED in place of LP1: the diode action of the LED would preclude the need for D7, but a suitable series resistor would be required to match the LED to the supply voltage.

Fig. 1(d) is probably the best of the four and is certainly my favourite. This circuit does not give any voltage drop between the supply and the equipment. In normal operation the supply feeds directly to the equipment via FS1. The diode D8 is reverse-connected across the equipment and should the supply be reversed, D8 will provide an effective short circuit and FS1 will blow. The capacitor, C1, provides extra protection. The slight time delay of its charge cycle prevents any voltage transients reaching the equipment. It is vital that FS1 is a normal fast-blow fuse rather than a slow burn type, and D8 must be capable of handling quite a high current, since if it blows before the fuse the circuit action, and perhaps your equipment, is useless.

A final word of warning. If polarity protection is being added to home-built equipment, do it first, not last. Only a week before I wrote these words I damaged a PA transistor on a QRP rig because I had not added the protection before I completed my early testing. Also do not hang the protection circuit outside the equipment as an external extra: I knew a bright fellow who did this and then accidentally connected the leads from the protection circuit the wrong way to the equipment, so — put it inside the equipment! Polarity protection is simple but worth the effort.



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SLOW-SCAN TELEVISION, PART III

J. BROWN, G3LPB

IN the first two parts of the series, we talked about a monitor, and then a flying-spot scanner for transmission. However, soon we will want to spread our wings a bit, and the next step will be to a camera; then live pictures from the shack, a "programme" for a QSO, or just plain entertainment.

Once again we come back to Cop Macdonald; the first cameras used a vidicon in the "shuttered" mode, wherein the camera is allowed to look at the picture for a moment and then shut off while the scan carried on. Good pictures were obtained, but the vidicons used were scarce and expensive even in the States. So not unnaturally, people began thinking along the lines of a conventional TV camera and some sort of "scan conversion" from fast to slow. This isn't quite as hard as it sounds, because for example with 50 Hz mains a divide-by-three gives us the SS/TV line frequency, so we can use the camera's frame coils for our line side. This raised an immediate snag in that the camera had to lie on its side, or the coils had to be wangled. Fig. 1 shows this.

Turning to Fig. 2 we have the block diagram of the unit (shown at the Leicester Exhibition in 1974) in which the test subject lies on its side, a fast scan receiver shows it lying on its side, and the slow-scan picture is correct, as seen on a standard monitor.

One takes composite signals out of the camera (composite in this context means combined video and sync pulses) in two ways, one of which is the video path and the other the sync stripper. Video goes to the Sampler, where it runs at the desired rate, the trigger being itself derived from the line sync out of the camera; the slow-scan syncs are developed in the unit, and the output is fed to the VCO from which we end up with slow scan. Suitable controls are provided for setting the "black" and "white" frequencies. People were mildly happy with this method for a while.

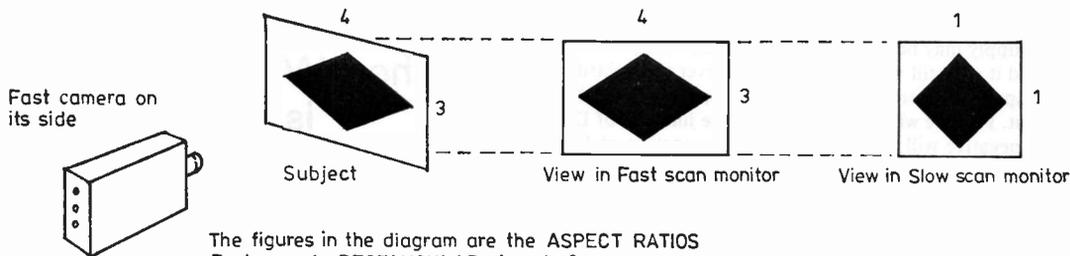
As always, though, people are thinking, and progress is progressing: digital ICs came along and it occurred to some to 'digitise' the fast-scan signal (with circuits due to W0LMD, W6MXV, DJ6HP, and probably best-known of all the DL2RZ converter which offers excellent pictures — and PC boards are available).

Take a look at Fig 3. Out of the camera we have composite signal. The sync side of this goes through a sync processor, and then to a slow-scan converter circuit, at the output of which we have both fast and slow scan "clocks." Another pair of outputs are the slow-scan line and frame pulses proper, which in their turn are sent to a sync mixer. Now we turn to the other line from the camera: first a comparator with a pot to set the voltage level of black and white, between which levels we will have shades of grey. Having, as it were, pinned down the limits to suit ourselves, we can pass the signal on to a video processor/encoder, at the output of which we have the digitised video. Now we need to store it somewhere so the slow-scan side of things can take out of store the bit it happens to be working on at the moment. A 4×256 -bit shift-register used as a memory will do the trick nicely, if we enter it with the digitised video, the fast clock and the slow clock — the last two serving to put in and to retrieve the information. Out of this comes a digital/analogue conversion, which gives us slow-scan video, and finally a mixer will enable us to rejoin the video to the syncs and we have a slow-scan composite signal, all ready to offer to our VCO and transmitter.

The cunning bit is in the memory; while one line of video is being clocked 'in' to the shift register by the fast clock, during the next three frames it is clocked 'out' by the slow clock and so we get one line of slow scan information. The fast scan is now fed in two lines further down the fast-scan picture and the process is repeated to give a second line of slow-scan output, repeating to get 128 lines out of the first 256 lines of the fast-scan signal. 50 Hz frame pulses are used to generate the slow-scan line pulses by division-by-three.

The DL2RZ design has recently been updated by its designer, and now has no less than sixteen shades of grey between black and white, and with different circuitry round the "clip" pots a very fine picture can be obtained. It does its stuff on 625 lines, excellently as we have said, but doubtless it would work on the 525-line cameras also.

The latest trend is to make a composite unit, of which one half is as just described for the transmit mode, and the other takes in the slow-scan signal and turns it into something which can be looked at on a 625-line monitor — in other words a slow-to-fast scan converter for the receiver side. W0LMD, W6MXV, and WB9LVI dreamed up circuits of which the last mentioned is perhaps the most popular; the secret is the large numbers of storage ICs used — some 65 thousand-bit ICs for this function alone. Practically, it means that the picture seen by the user is



The figures in the diagram are the ASPECT RATIOS

Fast scan is RECTANGULAR i.e. 4:3

Slow scan is SQUARE i.e. 1:1

Aspect Ratio is the relationship between Height and Width

Fig. 1

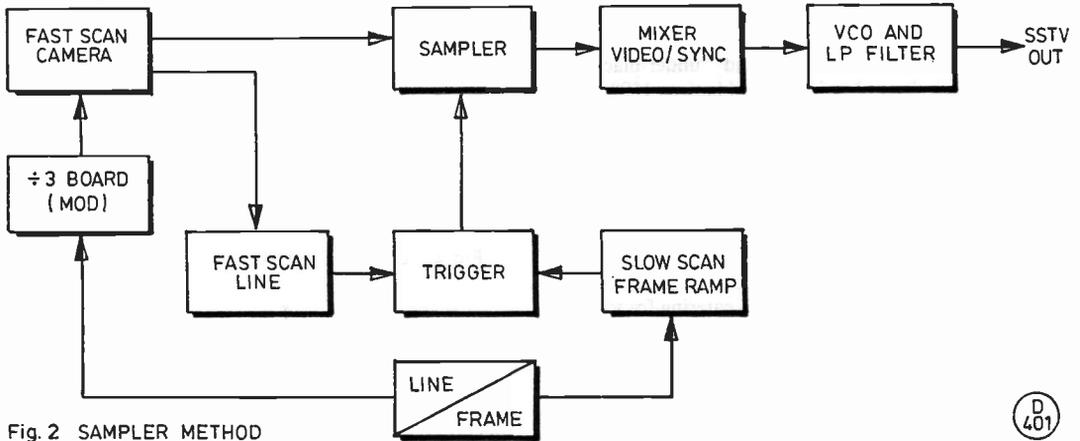


Fig. 2 SAMPLER METHOD

D 401

continually being, as Thoroughly Modern Millie would say, "up-dated". There is a slight disturbance in the excellent detail and the picture has changed without one really noticing. Naturally, it costs a lot to construct, but it will become more simple as memory ICs of greater power become economic. The writer knows of three British designs; one was a "one-off" job, G8CGK has one, and at the time of writing the G3OQD design has appeared, which includes such features as a "light pen" with which one can electronically write on the picture. So, that sums up the fast-to-slow scan story in a few words.

What about cameras in general? The obvious source is from the commercial ones by Sanyo, Sony, and so on, or one can look out for the ex-surveillance jobs which are used with monitors to keep watch in shops and other buildings; they may often need some service attention but finding them is a matter of looking in the advertisement columns of suitable magazines. Yet another route is by way of a vidicon which can be obtained from BATC, or one can build from a kit — *Crofton Electronics* based their's on a Mullard design and initially comprised some six PCBs, but the

current version has just one, and the firm offer a good assembly/instruction manual for a box which is self-contained right down to the power-supplies for the vidicon heater. Back in 1974, *Practical Electronics* did a series on a camera, and if you can get hold of copies it is well worth a winter-evening or two, building it and getting it going; even if you have already got a camera, it is an interesting way of getting a second one together.

The ex-commercial cameras, as we have mentioned are often sold as not running, and here there is a trap for the unwary, in that the reason may be that some spares may be unobtainable — but it may be useful as the basis for a rebuild. Image orthicons are not too good, as they have most of their drives external; vidicon cameras may be thought about as a build-from-scratch exercise.

In use, such a fast-scan camera is best viewed also on a fast-scan monitor in parallel to the fast-slow-scan converter feeding the transmitter, as any adjustment made to the camera will be immediately noted on the fast-scan monitor — rather than waiting for several seconds while the slow-scan picture builds up and is looked at for several scans to

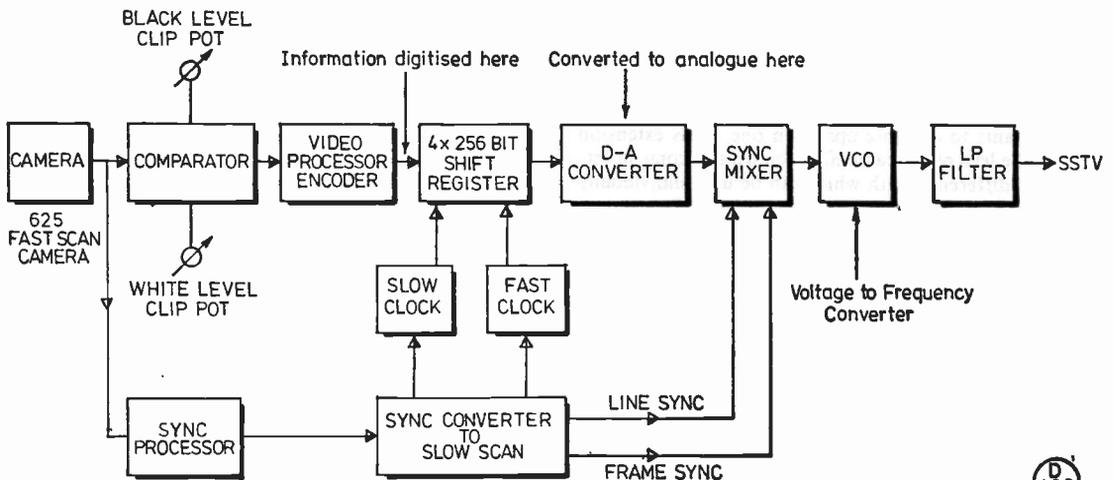


Fig. 3 DIGITAL METHOD

D 402

be sure what has happened. The two "clip pots" we mentioned while talking around the DL2RZ design are designated respectively "over-white" and "under-black"; the requirement is to keep the video signal between 1500 and 2300 Hz while sync is at 1200 Hz as the reference. Keeping the video in its place is required if the composite output on the air is to be right, and there are various modifications providing the facility of monitoring this — one such gives its indication as a couple of LEDs, while another, due to G8CGK, uses a 'scope to tell the story.

In the "black-box" area there are such as *Robot*, *Venus*, *Hamvision*, and *SBE* from the States, and indeed there is one firm over there whose entire output is catering for video cameras and ancillaries. On the surplus front perhaps the most likely camera would be a Pye Lynx in one or other of its variants.

What else does one add to the SS/TV station? A popular one is to have a keyboard and character generator so that a message may be superimposed on the picture sent, at will; there are mods. to produce a grey scale, character enlarging circuits, and G8HBR has produced a "slow-scan message generator" which has an electronic stylus to "write" on the screen. These are great for slow-scan, all having been developed for use with SS/TV; however there are some electronic telewriters about using fast scan, often known as VDUs (Visual Display Unit) which contain a keyboard and electronics to write on a fast-scan monitor — they need to be watched because even the earliest ones could produce far more than the maximum of six lines of information which is the maximum the writer has seen on slow-scan received pictures. And, of course, there are umpteen variants: for example Cossor DIDS devices, where there is a service manual for each model group, and the collection of handbooks used for reference fill shelves some 6½ feet high by 4 feet wide without duplicating!

Of course the results obtained using a camera are only as good as the camera, its lens setting, the adjustment of the controls, the lighting and, mainly, the operator. As any photographer will tell you, the camera looks at what is placed in its field of view, and it records what it sees, with no "mental adjustment" such as the human mind deceives itself with. Thus lighting is quite important, as reflection into the camera lens can cause the same sort of flare often noted in photographs taken with a flash on the camera. A couple of lights, of say 40 watts, one either-side of the camera is usually about right, and a means of dimming them by way of some form of diffusion, or whatever, is a help.

If one wants to do close-ups, then one needs extension tubes for the lens of the camera, which usually come in sets of three of different length which can be used individually or together. The usual mount of the lens is the C-type, and there are adapters to go from the C-mount to various 35mm. camera lens fitting.

Perhaps the main warning is in the matter of too much light; a few seconds of bright sunlight and the vidicon is scarred, and the only cure is to replace it. Another point is to never use it vertically, lens downward, lest bits of heater or cathode fall downwards and damage the internal photoface of the vidicon. A final note in this area of "dire warnings" is that the vidicon was originally designed for moving pictures, and using it for slow-scan can result in time of a "stick on" effect where the picture has become permanently imprinted on the vidicon face.

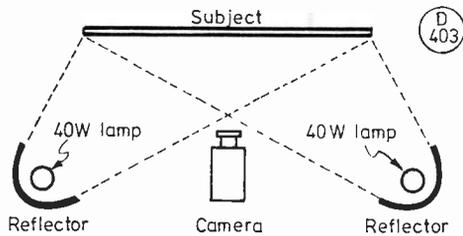


Fig. 4 LIGHTING PLAN

So — we have taken up a lot of space and, we hope, stirred up some interest in SS/TV; if the latter, you will no doubt want to read further. The following selection takes you from here: "Slow-Scan Television," published by BATC; "Amateur Television," published by BATC; "Slow-Scan TV Handbook," published by *73 Magazine*; "All You Want to Know about Slow-Scan," published by Foulsham-Sams.

Practical

From reading, to building. PCBs from *Wasco*, Queens Street, Lancaster. For bits and pieces, and camera kits, *Crofton Electronics*, 35 Grosvenor Road, Twickenham, Middx. Commercial cameras are handled by *S.V.S. Ltd.*, 91 High Street Edgware. If you want spares, *B. Bamber* and *Garex Electronics* are both well known in the amateur world. DJ6HP and DL2RZ can both be looked up in a current *DX Listings Call Book* (bearing in mind their designs are available as PCBs, kits, or built units). *Stop Press*: Grant Dixon, G8CGK, QTHR, has developed a brand new SS/TV monitor which is available as a set of PC boards (taking the drudgery out of construction and making a most respectable monitor).

In conclusion, there are SS/TV nets on Twenty and Eighty into which you can break and be welcomed, and you will be surprised at the help you will receive. Copthorne MacDonald started it all while still a student and he is still active, and still very much into SS/TV.

Conclusion

G3LPB would like to make it clear that he has no connection whatever with any of the firms or groups mentioned, other than BATC; the information given is purely a matter of helping the newcomer to this type of ham radio to get going. Much of the information has been gained the hard way, and thanks are due to all those firms and individuals who helped to make it a little smoother.

Concluded

Always mention "Short Wave Magazine" when writing to Advertisers — it helps you, helps them and helps us.

CLUBS ROUNDUP

BY 'Club Secretary'

Updating

THIS is a most important part of the system if at this end we are to accept entries for several months at a time; if you don't appear this time, you'll know you are overdue to update the story with us.

Newsletters. Many clubs have these, and some are very good. But, it has to be said that they eat articles at a rate of knots, as well as news. Several newsletters end up with the editor moaning that he "doesn't get enough contributions and if nothing is forthcoming he'll close down", etc. etc. Though if that's how he feels, he shouldn't have started the task in the first place! The answer is either to find someone else to do the job who realises that he won't get much help, or close the newsletter down before the editorial grizzling starts to have an adverse effect on the club. (Your scribe was once a member of a club with a "moaner" doing the newsletter, who eventually got into the habit of chucking the thing into the WPB before it got him down!) A good newsletter, however, can be an enormous asset to a club.

Deadlines for "Clubs" for the next three months—

(December issue—October 26th)

January issue—November 30th

February issue—December 28th

March issue—January 25th

Please be sure to note these dates!

The Mail

For a change from the alphabetical, not to mention the difficulty of remembering it, we'll run straight down.

Our first stop is at **Guildford**, and we owe them an apology for the rather vague data of recent issues on their doings. However, we have their Hq data on file, as second and fourth Friday in the month at the Guildford Model Engineers Hq in Stoke Park. Their newsletter, called "The Natter", is a fine example of what a newsletter can be — nothing in the way of spectacular articles, but putting out the impression of a happy group enjoying their hobby.

Ormskirk's new Hon Sec's name appears in the Panel, his predecessor having left the district. So we refer you to the name and address in the Panel for the latest details — we believe this group meets in one another's homes on a weekly basis.

Now at **York** where the gathering is on Fridays *except* the third in each month, at the United Services Club, Micklegate, York. We have never visited the club ourselves, but we judge from the regular letter of two successive secretaries (and the fact that both stayed in office quite a while) that this is a happy group, getting a lot of fun out of their hobby.

For **Verulam**, the programme is all-important, and they try to maintain a standard. Thus for November 22 they have G5XB to talk about the Intruder Watch. They also have their informals on the second Thursday in every month, at the R.A.F. Association Hq in Victoria Street, St. Albans. The main meeting already mentioned is taken at the Jubilee Centre, Catherine Street, St. Albans. As a postscript we might remark that their Hon Sec's letter dated late August sent their Christmas Greetings — how's *that* for foresight?

Cray Valley seem to have the first and third Thursday each month booked at Christchurch Centre, High Street, Eltham, SE9. The first one is the "main" one while the later date is a natter.

Over to **Surrey**, where we see November 7 booked for a talk on Synthesizers. They too have a couple of gatherings each month — first and third Wednesdays — and the second in each month is usually down for a ragchew.

Most unusually, we have an issue of the "Cornish Link" far enough out of date to mean we don't know what is going on with **Cornish**. However we can tell you it's always the first Thursday in the month at SWEB Clubroom, Pool, Camborne, Get there early if you want a seat — they start at 7.30 sharp.

Enthusiasts from as far away as Windermere and Anglesey attended the **Peterborough** Rally, visitors totalling some 700 people. As for the club, there is a place for them in the Scout Hut, Occupation Road, on November 16.

Quite an interesting picture on the front page of the R.N.A.R.S. newsletter of the first /MM operation from an RN ship since 1970 — (but before it was in condition to wear the White Ensign! It really is about time this ridiculous overkill by the authorities in the matter of granting /MM permits was killed off once and for all. But, the **Royal Navy** group still thrive on it!

Over the water to the Emerald Isle now, to **IRTS** Region 1, where we read of a spectacular method of getting the aerial up. They were at the lead mine at Ballycorus, where



The participants, and some of the gear, of a 160m. expedition to the Western Highlands of Scotland in July this year. Left to right: Phil Daniells G4CBQ, Tim Dabbs, Simon Dabbs G4GFN, Dave Sharred G3NKC, and Bob Harris G4APV. Top Band was worked from several locations, using an 800w. Honda generator to power a KW-2000 feeding a full-wave antenna supported by two kites; this arrangement proved very effective and many stations throughout the UK were worked.

there is a big chimney. So they filled balloons with helium, to which they attached the line, waited for them to emerge at the top and then rise the height of the chimney again, when they shot the balloons down with an air rifle! The only snag was that once up the monster didn't want to radiate in the expected fine fashion. But, they had fun which is what matters. For details on IRTS, contact the Hon. Sec. — see Panel.

New One

First we must refer to **South Cheshire**, where a new group has been formed, based on Crew library on the second Wednesday in each month. Details from the Hon. Sec. at the address and telephone number in the Panel.

Our second in this category is at **St. Helens**, who are booked in weekly at the YWCA Hq, 107 Corporation Street, St. Helens. Strictly speaking, one supposes this is a re-formation, because there was a club there who wrote in regularly about ten or more years ago, but which just faded away.

Northern Heights foregather at the Bradshaw Tavern on Wednesdays; November 7 features a visit by G4DAX, on 14th there is the surplus sale, and on November 28 they will welcome Dr. Bailey (a lecture which had already been stood over once due to pressure of commitments).

Kite-flying at **Hereford** amused some of the gang last summer — they should persuade G3MWF to tell 'em all about the best ones for DX. The group get together on the first and third Friday in each month, and their Hq is at County Control, Civil Defence Headquarters, Gaol Street, Hereford.

Not so very far away is **Worcester** where the venue is the Old Pheasant in New Street. The only November date we have on record is on 5th, for a talk on Practical Aerials by G3JFH. For the rest, contact the Hon Sec — see Panel.

We have a late change to record for **Acton, Brentford & Chiswick**: on November 20, they will have a talk and demonstration of Seventycems by G8BBE. As always they will gather for this at Chiswick Trades and Social Club, 66 High Road, Chiswick.

M.C.C.

We've mentioned before that this is on; refer back to the Rules in the last issue, get your battle lines set, and may the best man win!

Back now to the mail. This one is from **Bournemouth** where we observe that by the time this comes to be read they will have had an AGM, and make good the disastrous loss caused by the sudden and unexpected death of their Hon Sec, G4EMN. Meantime, details from the stand-in, at the address and phone number in the Panel.

The British Steel Corporation Port Talbot Sports and Social Club, Groes, Margam, is open to anyone interested in amateur radio; we gather that **Port Talbot** have talks lined up on microprocessors and SS/TV, but meantime, they are in session every Thursday evening at the address above.

It would appear that things are still being arranged at **Chiltern** for their November 28 date; the canteen of the John Hawkins furniture factory, Victoria Street, High Wycombe.

The **Melton Mowbray** group write in on average once a year, to advise us of the forthcoming AGM. Unfortunately it has already "forthcome" so we must refer you to the Hon Sec for the latest story.

There was a misprint in the telephone number of **Derby's** Hon Sec, we are advised — it would appear to have been a printing error as we have the right one on file. Our apologies go to anyone inconvenienced by this. Now, to the

Names and Addresses of Club Secretaries reporting in this issue:

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, London W3 8LB. (01-992 3778)

BOURNEMOUTH: D. Wade, 70 Creekmoor, Poole. (Poole 695502)

B.S.C. PORT TALBOT: R. Thomas, GW4BCD, 13 Northways, Porthcawl, Mid-Glam.

CHELTENHAM: G. Cratchley, G4ILI, 47 Golden Miller Road, Prestbury, Cheltenham. (Cheltenham 43891)

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 (Devon 864255)

CRAY VALLEY: P. J. Clark, G4FUG, 42 Shooters Hill Road, London SE3. (01-858 3703)

DERBY: Mrs. J. Shardlow, G4EYM, 19 Portreath Drive, Darley Abbey, Derby DE3 2BJ. (0332 56875)

EDGWARE: D. L. Lisney, G3MNO, 119 Draycott Avenue, Kenion, Harrow HA3 0DA. (01-907 1237)

GLENROTHES: I. Robertson, GM4HBG, 123 Alyre Avenue, Glenrothes, Fife.

GLOUCESTER: E. A. Perkins, G3MA, 40 Calton Road, Gloucester GL1 5DY.

GUILDFORD: L. Bright, G4BHQ, 4 Dagley Farm, Shalford, Guildford, Surrey. (Guildford 76375)

HEREFORD: S. Jesson, G4CNY, 181 Kings Acre Road, Hereford. (Hereford 3237)

IPSWICH: J. Tootill, G4IFF, 76 Fircroft Road, Ipswich, Suffolk IP1 6PX. (Ipswich (0473) 44047)

IRTS REGION: J. Ryan, El6DG, 23 Dollymount Grove, Clontarf, Dublin 3

MELTON MOWBRAY: R. Winters, G3NVK, 32 Redwood Avenue, Melton Mowbray. (Melton Mowbray 3369)

NORTHERN HEIGHTS: M. Topham, G8NUC, 1200 Great Horton Road, Bradford. (Bradford 73271)

NOTTINGHAM: M. C. Shaw, G4EKW, 50 White Road, Nottingham NG5 1JR.

ORMSKIRK: J. Higgins, G4IGX, 8 Delph Top, Greetby Hill, Ormskirk L39 2DX.

PETERBOROUGH: L. Critchley, G3EEL, 36 Waterloo Road, Peterborough, Cambs.

ROYAL NAVY: M. Puttick, G3LIK, 21 Sandyfield Crescent, Cowplain, Portsmouth, Hants. PO8 8SQ.

ST. HELENS: P. Gaskell, G8PQD, 131 Greenfield Road, St. Helens, Lancs.

SOLIHULL: R. A. Hancock, G4BBT, 80 Ulleries Road, Solihull, West Midlands B92 8EE

SOUTH CHESHIRE: H. Pallen, 20 Burlea Drive, Shavington, Crewe CW2 5BZ. (Crewe 67003)

SURREY: R. Howells, G4FFY, 7 Betchworth Close, Sutton, Surrey SM1 4NR. (01-642 9871)

SUTTON & CHEAM: G. Brind, G4CMU, 26 Grange Meadow, Banstead

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.

WORCESTER: M. Tittensor, G4EKG, 16 Durcott Road, Evesham WR11 6EQ (0386 41105)

YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

goings on for November: A Junk Sale on 7th, and a talk on the basics of Electronics Logic by G3URU on 14th. GM3OPW takes the stand on November 21st when he talks about the business of laying a 36in. pipeline on the bed of the North Sea; finally on 28th, there will be a Construction Contest.

Now in its 53rd year of life we have a note from **Gloucester** about the doings. The gang are based on the Chequers Bridge Centre, Painswick Road, Gloucester; the first Thursday is a formal with any business being dealt with and a talk following it up, while other Thursdays are devoted to Activity Evenings, when there is the club rig available and construction facilities, and room for a natter as well. The current paid-up membership is about 40, of whom a large proportion hold a "ticket" — either 'A' or 'B'.

Not so far from Birmingham is **Solihull**, where the locals are booked in at the Manor House, High Street, on the third Tuesday in each month; November 20 will see G8MFP giving a talk on Amateur Radio Astronomy.

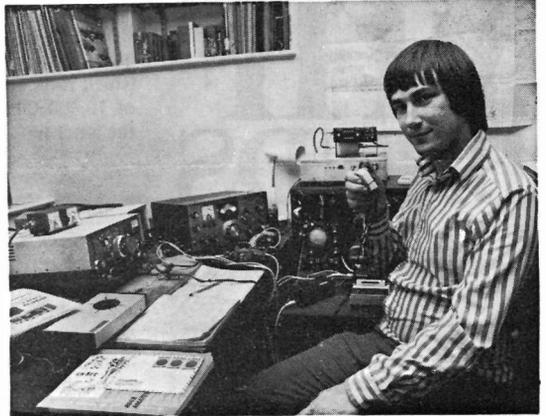
Up north of the border now, to **Glenrothes** and the familiar writing of GM3YOR. They have an RAE class and a Morse class, respectively Monday and Tuesday evenings, at Balnearie School, Kirkcaldy. GM3YBQ does the technical stuff, and GM3PFQ the Morse. As for the Glenrothes club itself, they have a date for every Wednesday evening, and the third Sunday in each month, at the Clubrooms, Provosts Land, Leslie, Fife.

Those with a long memory will recall that **West Kent** occasionally challenge members to design some odd device which will do things to a target. The latest one was to achieve the loudest noise, for a given number of seconds from a single specified dry cell. The winner used an inverter of germanium transistors to turn the 1.5 volts to 18, which was a sure starter even if the capacitor bank it charged was already half up. When 18 volts was achieved a relay operated to close the power to a square-wave oscillator at about 2.5 KHz, made from two sections of a 4069 hex inverter; the remaining four sections drove the output transistors (which have no bias components as they run into a square-wave condition). A telephone earpiece was used to take the power, and placed at the centre of a 10½-inch parabolic reflector from an old bowlfire; when focussed up the result was 104 dBA at the specified one metre! No details of the meetings, save that they are at the Adult Education Centre, Monson Road, Tunbridge Wells. The details are obtainable from the Hon Sec — see Panel.

Cheltenham seem to be going quite nicely, at the Old Bakery, Chester Walk, on the first Thursday and the third Friday each month; thus November 1 is a Junk Sale, and November 16 a natter night. Perhaps we should also mention the AGM on January 3 next year.

Edgware get together on the second and fourth Thursdays of each month, at Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. Club newsletters are always interesting in their various different ways and we could recommend G4HMD's reflections upon his first year of operation to anyone.

The **Crystal Palace** newsletter indicates a certain amount of programme-building going on, so we can't give you a firm statement; what we do know is that it will be at Emmanuel Church Hall, Barry Road, on the third Saturday evening in the month, and we think it might be a talk on SS/TV.



Richard Crabb, G4GHI, of Marston Magna, Yeovil, was a short wave listener for only six months before passing the RAE in December 1976; first call was G8NAB, the present one coming in August 1977 after successfully taking the CW test. Station gear consists of an FR-50B used as a monitor receiver, a home-brew 2m. FM 40-watt transceiver into a rotatable 10-ele cross-yagi, a K.W. Atlanta using a trap dipole, and a home-made 2m. SSB transverter; under construction is a 70cm. transverter. Test gear includes a signal generator, valve voltmeter and oscilloscope. G4GHI's favourite band is 2m. SSB, and his best DX so far on 144 MHz was under Spor-E on 4th June 1978 when he worked LZ1AB and CN8CC. Richard, who is a regional rep. for RSCB and a committee member for Yeovil ARC, would like eventually to have his whole station home-built and operational on 160m. to 10 GHz; greatest amateur radio ambition is to work a 'W' on two-metres.

We have a letter from **Ipswich** to indicate that the new committee has begun the programme-building task, and that in addition they are seeking a new headquarters. This being so we feel sure that anyone interested in visiting or joining should get in touch with the Hon Sec — see Panel for his address. At present they are at Handford House, Ranelagh Road, which is on the corner of the latter and the A12, with car-parking at the main school premises in Paul Road, on the second and last Wednesday of each month in term-time.

At **Sutton & Cheam** they still seem to be having problems about their alternate venue, so perhaps we should pass you on to the Hon Sec — see Panel — for the very latest details of the venue for November 16.

That leaves us just **Nottingham** who are firmly entrenched in Sherwood Community Centre, Woodthorpe House, Mansfield Road, where on November 1 and 22 there is an activity night; a Forum on 8th; a talk, untitled, by G4CKG on November 15, and finally on November 29 a talk on components by G8JYF.

Finis

All for now. Deadline dates are in the 'box' as usual, and all your letters addressed to "Club Secretary", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.

VHF BANDS

NORMAN FITCH, G3FPK

Contests

IN the single operator section of the 144 MHz QRP Contest run on July 29, the winner was G4ERG/P with 935 points. Runner-up was G8DVK/P (780) with G8LEF (654) in third place. First place in the multi-operator part went to GW4EZX/P with 1590 pts, followed by G3SPJ/P (1360) and GW3NNG/P (1280).

Winner of the singles operator part of the August 19, 70 MHz contest was GM3XBY/P whose 56 QSO's scored 790 pts. 2nd spot went to G3UKV with 416 pts. from 52 contacts. The multi-operator half was won by G3FDW/P with 819 pts. from 67 exchanges, runner-up being GM3WOJ/P with 721 pts. from 54 QSO's. Congratulations to all competitors, and thanks to GB2RS for the foregoing.

Coming events:- For brass pounders, the evening of November 3 sees the 144 MHz CW contest. The 2nd and 3rd legs of the 432 MHz *Cumulatives* are scheduled for Nov. 9 and 21 from 2000-2230 GMT, scoring on the radial ring system. The first three sessions of the 1296 MHz *Cumulatives* will be on Nov. 3, 15 and 27 at the same times but with one point per kilometre for scoring. There are no separate classes for either contest. The 144 MHz fixed contest takes place on Dec. 2.

Beacon Notes

In the 13 cm. band, GB3LDN was scheduled to come into operation on Sept. 15, on a QRG of 2304.05 MHz. In the 3 cm. band, two more beacons are operational. GB3SWH (ZL29f) located at Bushey, Herts., is QRV on 10.368 GHz running one watt to an omni-directional, slotted waveguide

aerial, with F2/F3 modulation. The Leicestershire Repeater Group has built a beacon, GB3LEX, (ZM24j) which runs one watt *e.r.p.* on a QRG of 10.400 GHz. Reception reports of the latter to G8CAC.

Satellite News

A check with AMSAT-UK Secretary Ron Broadbent, G3AAJ, revealed very little news. The group will be at the Leicester show and *Oscar News* No. 27 should be available by then. Ron Glaisher, G6LX, told your scribe that he had visited the Russian amateur radio stand in the Russian area at the big Geneva telecommunications exhibition which coincided with the start of WARC 1979. He met several of the amateurs concerned with the U.S.S.R. satellite programme and learned that they hope to launch RS-3 between December and March when a launch vehicle is available. Ron says they were a bit vague about the orbit but they confirmed that most everything this time would be duplicated in an attempt to provide a more reliable system. The prototype was on display.

RS-3 will be another 145/29 MHz device. Questioned about the failure of RS-1 and RS-2, they reckoned that radiation damage, plus damage to the batteries caused by excessive drain when QRO stations were transmitting, were the prime causes. They insisted that the main aim in making the transponder receivers so sensitive was to enable amateurs with hand-held, QRP equipment to enjoy satellite operation. RS-3 is reputed to be better able to deal with overload problems from QRO signals.

Propagation Notes

Solar activity is building up to the expected maximum for Cycle No. 21 within the next few months. The 2.8 GHz *solar flux* has exceeded 230 units on a number of occasions. Geomagnetic activity has been relatively low. Consequently HF band conditions have been quite superb but there have been few notable *Auroral* events on VHF. If the high *solar flux/low "A" indices* conditions continue, there should be some trans-Atlantic 50 MHz activity any time.

Past experience has shown that the geomagnetic activity peaks some 18 months *after* sunspot maximum and

this suggests summer/autumn 1981 as a likely period for *Auroral* propagation.

Slow Scan TV

Most readers will know that slow scan TV has been transmitted on the amateur bands for many years, mainly on the HF bands. However, a number of SS/TV enthusiasts use the 2m. band and they operate around 144.230 MHz. One of these is Richard Thurlow, G3WW, (AM31e) who worked his 103rd. country on the mode on Sept. 4. This QSO was with GJ8GDX and happened by pure chance when Richard came across the signal while turning his beams into the wind for overnight parking. Incidentally, this was G3WW's 1292nd new SS/TV station.

CQ Magazine sponsors a DX Award for 100 countries on two-way SS/TV and, as Richard has 101 confirmations, he has applied for this certificate. The magazine has been sold to three former employees and the first copy of the new "CQ" will appear in December. G3WW's 2m. station comprises a *Yaesu FT-221R* with *Lunar Rx* preamplifier and *Nag 144XL* power amplifier feeding two, stacked 16-ele. *Tonna* aeriels. On the TV side, there is a *Sony* 10 inch monitor and a *Robot 400* converter.

Four Metres

Syd Harden, G2AXI, (Hants.) has the distinction of being the only entrant in the Three Band Table to have worked six countries on 4m. this year, thanks to GJ3YHU/A, caught in the contest on Aug. 19. His county total of 51 is also the highest. Derek Wrightson, G3BTO, kindly praised our nice VHFCC certificates individually produced for each band. He sent along a colour print of part of the G3BTO aerial farm showing the 4-ele. *Yagi* mounted on the chimney and turned by an *Ar-40* rotator. A recent addition is a 3-ele. beam for 6m.

"I thought it was about time I got back in the *S.W.M.* tables..." is how Dave Sellars, G3PBV, (Devon) begins his letter, in which he mentions his having recently got going on 4m. for the first time. The "prime movers" consist of a *Yaesu FT-200* and a set of *Pye* "Manpack" transceiver boards, modified to tune 28-29 MHz. A solid-

state transverter plus QQV06-40A amplifier feeds either a dipole or 4-ele. Yagi at 15ft. Unfortunately, Dave reports that, apart from contests, 4m. is a dead loss from Newton Abbot. He wrote;- "I was so disgusted with the lack of activity in the last contest that I replaced the 4-ele. beam with a dipole as activity didn't seem to warrant wasting most space on anything larger!"

Two Metres

Ladies first, this time. Sheila Williams, G8KPL, (Cumbria) was in on the Aug. 29 *Aurora* which she reports lasting for three hours during which 28 stations were worked. Unfortunately, no new countries were worked, but her squares score has gone up to six more than her OM's, Dave, G8JAG. During the event, Dave worked DB2EU in DL square. "Nothing worth mentioning" was worked during the Sept. 1/2 contest. G2AXI got a couple of new 1979 countries from the *Ar* on Aug. 29 — EI and GI — and four more countries.

There were excellent tropo. conditions on Sept. 16 during which George Pearson, G3AWZ, (Somerset) heard HB9ARI (DH) working I2MCV (FF) the Italian being Q5 too. Other 2m. operators in various southern parts heard I2MCV, too. G3PBV had been off 2m. for four years and, "... crept back on in February this year." Dave noticed a considerable change over the period, finding SSB activity much higher now with regular contacts being made under flat conditions that would have been considered "DX" a few years ago. He likes the competitive aspect of chasing QTH squares and, since his return to the band, has probably worked more French stations than in all his previous 14 years on 2m. The QTH is 620 ft. *a.s.l.* on the edge of Dartmoor with a good take-off NE through SE but, "... pretty hopeless to the West." Dave uses a *QM-70* "Scorpion" transverter feeding a 10-ele. *Jaybeam* at 20 ft.

It would seem that Mike Lees's, G3VYF, QTH at Basildon, Essex, is ideally suited for European DX-ing. He has turned in an outstanding list of DX for the first half of September starting on the 1st. with SM7AED (GQ), OZ1OF (EQ), OZ9FW (GP) and OZ1BNW (EP). Sept. 3/4 period brought DK5A1A (FL) and many French stations in AE, AF, AG, ZE

THREE BAND ANNUAL VHF TABLE
January to December 1979

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	
G2AXI	51	6	60	15	44	7	183
GD2HDZ	47	5	67	14	44	5	182
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
G8OPR	—	—	69	14	33	6	122
G4ERX	45	5	30	8	26	6	120
G3BW	—	—	52	18	39	6	115
G8KGF	—	—	57	15	33	3	108
GI8EWM	—	—	69	8	25	6	108
G3PBV	15	3	54	12	13	4	101
G4ERG	—	—	67	28	—	—	95
G8GML	—	—	63	17	5	7	92
G3KPU	—	—	54	6	28	4	92
G3FPK	—	—	73	19	—	—	92
G8KAX	—	—	47	9	28	7	91
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	—	—	63	22	—	—	85
GM4CXP	12	3	42	15	4	3	79
G4DEZ	—	—	57	20	—	—	77
G8ITS	—	—	40	6	25	4	75
G8JJR	—	—	53	13	—	—	66
G4FBK	—	—	49	16	—	—	65
G4GHA	—	—	43	18	—	—	61
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

and ZF squares. DK3LL (FO) and DK5LA (EO) were worked on the 5th and 8th respectively. On the 11th, OK1AOX/P (GJ), DC6ZZ (FM) and DF2RF (GI), while the period 12/13 produced QSO's with OESHZM/5 (HL), OK1KKH (HJ), OK1GA (HJ), DM2DXN (GK), DM2CKK (FK), DK2EA/A (FK) and DF3AR/P (FL). On the 15th, F1ETM/P (BE) and F1DTC/P (CE) were netted but the finest effort was on the 16th which

produced contacts with 9 HB's in DG, DH and EH, LX1GR (DJ), LX2RW/P (DJ), F1EPB/P (BD) and F1FKJ/P (ZD), along with others in CG, CH, etc. Follow that! Mike runs a relatively modest station comprising an *Icom* IC-202E with 3N204 preamplifier, a *Nag* linear amplifier feeding a 16-ele. *Tonna* at 45 ft. The QTH is 150 ft. *a.s.l.*

Anthony Turnbull, G4CUS, from Battle in East Sussex, now has a 32-

ele. array using two *Tonna* beams. He did well on Sept. 16 working into Denmark, Poland and East Germany, and being called by an Austrian. Some 15 new French squares were worked, as far south as ZD. Ken Osborne, G4IGO, (Bristol) mentions working DF9CY (EL02e) and GM4IGS (XP37c) in the Aug. 29 *Ar* event. On Sept. 12, LX1CR (DJ41h) brought him country No. 26 on the band, along with Germans in DJ, DK, EI and FL squares. On the 15th, contacts with FIETM/P (BE) and F1BHO/P (CG) were made and the following day produced F1NQ/P (AC), F1CDI and F1FKJ/P (ZD), F1BUT (AD), F1FIB/P (BD), F6BEG/P (BE), F1BUU (ZE) and HB9ARI (DH). Ken has also been mobiling on 2m. SSB to good effect, working stations in Wales, France and the Irish Republic.

Your scribe recently worked G6UW, the CUWS club station in Cambridge, being operated by Bob Carpenter, G4BAH, now in his last year at the University. He mentioned that all the enthusiastic amateurs who used to mount the highly successful VHF/UHF DX-Peditions in past years have now departed but he hoped that the new intake would include a few more dedicated folk. G6UW now has a new 16-ele. *Tonna* beam and the station re-enters the Squares Tables with 88.

George Gullis, G8MFJ, (Wilts.) worked several stations during the Aug. 29 *Ar* between 1550 and 1725, in squares XL, XQ, YO, YP, YQ and ZO.

He was one of the many who worked LX1CR on Sept. 12 for a new square. The same evening produced a couple of Germans in EI and DJ, while on the 15th. EI9DC (Dublin), G14GVS and F6DKW (BE) were worked.

From GD-land, Arthur Breese, GD2HDZ, managed three new 1979 counties in the Aug. 29 *Ar*; GM8HEY (Fife), GM3ZXE (Tayside) and GW8JLY (Gwent). On the 18th. Sept. G8LZM (Cleveland) was added. Geoff Brown, GJ4ICD, continues to blast his way up the table with four new squares; F6CJG/P (CE) and OZ1OZ (EP) on Sep. 1, GM4IGS (XP) on the 4th. and F1ESE/MM (XE) on the 11th. During the Sept. 2m. contest, Geoff managed 467 QSO's as a single operator entry, worth 148,799 points. Derrick Dance GM4CXP, (Borders) confesses to not spending much time

on the bands these days. He heard the Aug. 29 *Ar* but could not find the time to participate. This year he caught just one *E*'s event on June 2 when EA3LL (AB) and YU1IW on SSB and CW respectively, were worked.

Mike Allmark, (Leeds) thought that conditions in the Sept. 1/2 contest were "generally poor." Only three stations over 600 kms. DX were heard; DL0RQ/P (DK23h), DJ1RL/LX/P (CJ19j) and F9FT/P (CI04e). On the 4th. and 5th. conditions to the south were good and stations heard

GM4COK	—	12	135	147
G8LGL	—	12	84	96
GM8NCM	—	12	84	96
9H1BT	—	11	163	174
G8MFJ	—	11	64	75
G8KPL	—	7	84	91
G8JAG	—	7	78	85
G8KUC	—	7	60	67
G3PBV	—	7	46	53
G4FBK	—	5	94	99
G8KSP	—	2	76	78
G4AWU	—	1	105	106
G4GSA	—	1	50	51
G3POI	—	—	278	278
G3IMV	—	—	197	197
DK3UZ	—	—	195	195
G3CHN	—	—	181	181
G3SEK	—	—	179	179
G3FPK	—	—	157	157
G4ERG	—	—	135	135
G3VYF	—	—	131	131
G4IGO	—	—	112	112
G8IXG	—	—	99	99
G4IJE	—	—	95	95
G6UW	—	—	88	88
G8JJR	—	—	80	80
G8LFJ	—	—	76	76
G4GET	—	—	71	71
G4DEZ	—	—	67	67
G4GHA	—	—	62	62
G8JGK	—	—	45	45
G4GXT	—	—	43	43
G8PRG	—	—	30	30

Starting Date January 1, 1975. No satellite or repeater QSO's. "Band of the Month" 70m.

QTH LOCATOR SQUARES TABLE

Station	23 cm.	70 cm.	2 m.	Total
G8GML	11	74	122	207
G8HVY	12	73	130	215
G3JXN	34	70	93	197
G3COJ	24	66	84	174
G8LEF	22	62	101	185
G2AX1	2	53	93	148
GJ4ICD	—	48	145	193
G4HYD	—	40	83	123
G8ATK	—	38	93	131
G8LHT	3	37	94	134
G3SPJ	10	36	71	117
GJ8KNV	—	34	115	149
GD2HDZ	11	34	73	118
G3OHC	4	33	104	141
G4ERX	1	32	69	102
G4CMV	—	30	140	170
G4IJW	1	30	108	139
G4BWG	—	29	118	147
G8KAX	—	29	61	90
G4AEZ	3	28	61	92
G4GEE	—	28	60	88
G3FIJ	—	27	66 ¹	93
I4EAT	—	25	238	263
GM4CXP	—	25	134	159
G3BW	3	25	108	136
GJ3RAX	1	24	67	92
G18EWM	—	22	63	85
G3KPU	—	21	84	105
G8IFT	7	18	68	93
G8KGF	—	16	85	101
G8ITS	—	16	56	72
G8OPR	—	15	68	83
9H1CD	—	13	178	191

included; F6CJG/P (BF), F1EWP (AG), FIAGR (ZE), F1FJM (AH), F6BNI (ZE), F1BUU, F1TC (ZI), F1FKJ (ZH), F8AU/P (AG), F6ELI (ZE) and a few Germans in DK and DL squares. On the 12th., best DX heard was OE5VHL (GI) and OE5HZM/5, along with other Germans in EI and FK squares. Mike found conditions on the 15th. very good with some rare QTH's heard; F1DTC/P (CG), F6APQ (CH), F1FJM (AH), F1FRL/P, F1ETM/P (BE) and F1DYD/P (CF). But the best was F1BHO/P in DD15c, a QRB of

1273 kms. On Sept. 18, there was an *Ar* event from 1530 to 1645 with some GDX heard. OZ1QQ (EP) and ON5QW were the only continentals heard.

Without a 30 hour day and ten day week, activity at G3FPK has markedly diminished of late. Extreme business pressure has resulted in little serious operation. A local mound on which G3KEQ is perched, knocks some 30 dB. off EDX signals from the east so the nice stuff others were working with ease on Sept. 16 was not enjoyed by your scribe. A 100 ft. tower would help but it is doubtful if the neighbours would appreciate it! Some good inter-G periods have been noticed towards the end of the month — e.g. on the 29th when GM8FFX was very loud — but quite often there has been very deep fading.

Seventy Centimetres

G2AXI is hoping to test out his new 70 cm. Tx soon. Aug. 28 produced two new 1979 countries; GM3YGF/P and F6ECI to put Syd top of the table on the band, as well as overall. The GM in Dumfries and Galloway, was the first Scottish station on the band since operations started in late 1963! Patience rewarded at last.

G3PBV is back on the band using a *Microwave Modules* transverter and a couple of 10-ele. beams at 25 ft. A 3CX100A5 linear amplifier is to be added to the gear soon. Dave finds activity low but quite good contacts are made occasionally over ranges that are, "... comparable with 2m. in the good old AM days." John Lemay, G8KAX, (Essex) following the publishing of his request for skeds with Welsh and Cornish stations in the August issue writes; "I haven't been exactly overwhelmed with requests . . ." Perhaps this note might prod some kindly souls to answer John's pleas.

For GD2HDZ, the month has brought four more counties; G8LZM (Cleveland), G3AWZ (Somerset), GW4DRR (Gwynedd) and G8CQS (W. Sussex), thus equalling G2AXI's tally of 44 this year. From Jersey, it is

clear that GJ4ICD does not believe in doing things by halves. Geoff has two K2RIW amplifiers ready for *E-M-E* work to feed eight 21-ele. *Tonna* aeriels. One thing is certain, he will not be short of customers!

Twenty-Three Centimetres

GD2HDZ writes that the RSGB Region 1 VHF/UHF contest on Sept. 16 gave a welcome boost to his score with three more counties worked; G3LRP (W. Yorks.), G3HGT/A (Merseyside) and G8BHH (W. Midlands). "I actually worked five stations on that band!" he wrote. Dave Cox, G8OPR, (Hants.) is now QRV on 23 cms. running 6 watts of FM at present. These are the only items on band activity this time so more reports would be welcomed, especially after the contest on Oct. 6/7.

Aerial Preservation

The article in the April issue of the *Magazine* by G8MRH drew attention to the general topic of aerial and mast design. With larger arrays on taller masts being used or contemplated by VHF/UHF amateurs, it is plain commonsense to ensure they will survive the rigours of the British climate. In their excitement to launch their latest shiny, new aerial, some people overlook the need to protect the metal parts from corrosion. This is especially advisable when dissimilar metals are in contact. For example, one very popular range of VHF aeriels have been noticed to exhibit corrosion at the elements and boom connexion after just a few weeks exposure to the weather in a non-aggressive environment.

To combat unnecessary corrosion, it is good practice to paint at least the joints with a polyurethane paint. U-bolts connecting booms to stub masts and stub masts to rotators are sometimes of poorly plated mild steel, almost certain to rust very quickly. While galvanizing can be quite effective, a process known as

sherardizing is far superior. A "finger-walking" exercise through the local *Yellow Pages* directory should help find firms specializing in anti-corrosion treatment.

It is not easy to keep water out of feeder connexions, particularly when several beams are to be fed *via* a power divider. In severe cases, water has been known to dribble out of the coaxial aerial in the shack! While temporary lash-ups may be satisfactory for a weekend of portable operation, it is essential to ensure that permanent home installations are more soundly engineered. Even half an element from a VHF beam falling from 30 ft. due to corrosion could cause a bad injury if it hit someone. A large array crashing down on a neighbour's property could result in "deep QSB in the wallet," unless covered by comprehensive insurance.

Concerning insurance, the "small print" would probably require the insured to keep the installation in a satisfactory state. So, if there was an expensive collapse and the assessor discovered that metalwork was badly corroded and little attempt had been made to preserve the structure, the insurance company might have a case for not paying out.

Apart from the safety aspect of any installation, an aerial with corroded parts and coaxial cable which has deteriorated will drastically reduce the gain of the system and contribute to noisy reception. It is pointless to spend scores or even hundreds of pounds on aeriels, cables, rotators and masts if little effort is to be made to keep everything in good repair. The well-known "rusty bolt effect" could well give rise to TVI and BCI problems, too.

Deadlines

That's it for November. All your reports, comments and claims for December by Nov. 7 and for the January piece by Dec. 5. Everything to; "VHF Bands," *SHORT WAVE MAGAZINE*, 34 High Street, WELWYN, Herts., AL6 9EQ. 73 de G3FPK

Owing to pressure on space, there are no Readers' Advertisements this month.

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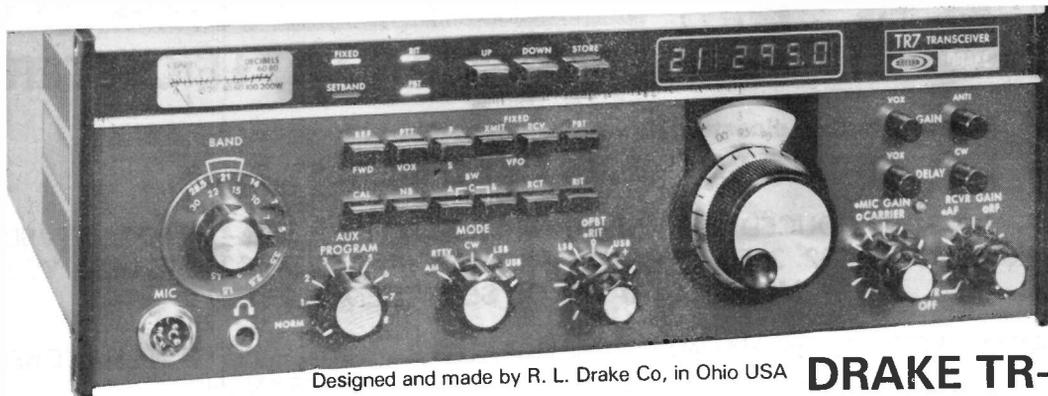
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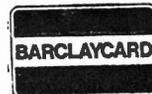
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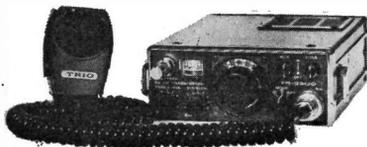


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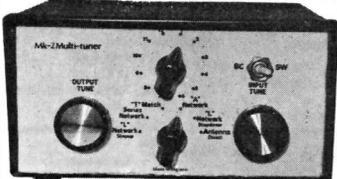
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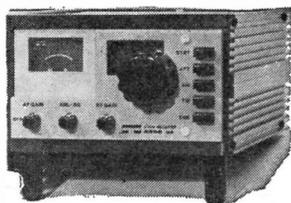
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Type 2 for SWL without relay **Price £27.25**

Crystal Calibrator. Seven ranges down to 1 kHz. Selected from front panel. Complete with antenna. ... **Price £22.80**

New R.F.S. Receiver Filtering System available at the Leicester Exhibition
Some Models in New Type Cabinets

These prices include VAT and postage.



ARAC 102 receiver, 28-30 MHz. 144-146 MHz. AM-SSB-FM-CW Price **£106.50**

S.T.E. Prices include VAT and postage

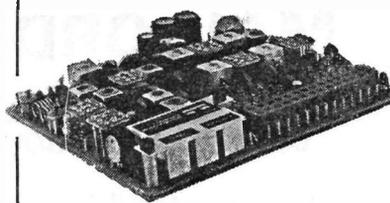
Arac 170 10m. and 70 cm. Receiver	£129.00
AA1 Audio Module for AR10	£4.10
AD4 FM Discriminator	£5.00
ALB Linear Amplifier	£27.60
AG10 Tone Generator	£4.50
ATAL 2m. AM-FM Tx	£129.00

G-WHIP

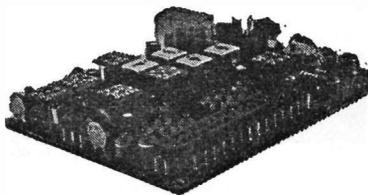
Tribander Helical 10-15-20m.	£23.00
LF Coils for Tribander	£6.55
LF Telescopic Whip Section	£2.99
Basemount standard type	£4.20
Multimobile 78, 10-15-20m.	£26.45
MM Coils	£6.55
MM Telescopic whip section	£2.59
Flexiwhip basic 10 metre section	£16.10
Basemount standard	£4.20
Ball type Basemount	£5.75
Coils for Flexiwhip	£6.55
Base thread adaptor USA/G Whip Extendarod 40"	60p
	£10.93

Drake

TV3300 Low Pass Filter	£18.40
TR7 Transceiver and AC psu	£1021.00
MN7 ATU/RF Wattmeter	£126.50
DL1000 Dummy Load	£32.00



AR20. 12 channel FM receiver 144-146 MHz. Input impedance 50-75 ohm. AM-FM modes. Sensitivity 0.2uV AF output 3 watts. 12v. DC operation. Price £50.00



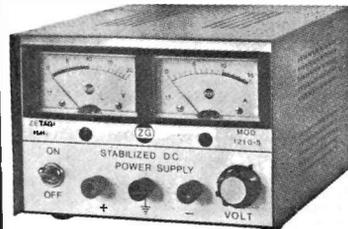
AT23. 12 Channel PM Transmitter. 3 watts. 144-146 MHz. Frequency deviation 3-10 kHz adjustable. 12v. DC operated AF input sensitivity 2mV adjustable to 50 mV. Price £50.00



455 kHz FM Discriminator Amplifier. Limiting threshold 100uV. Amplitude modulation rejection 40dB. Audio output voltage at 1 kHz 200-300mV frequency deviation + or - 3 kHz. Price £5.00

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Model 122 12-6V 2.5A	£15.55
Model 125 10-15V 2.5A Meter	£28.00
Model 153S 4-20V 3 amp Dual Meter	£29.35
Model 156S 4-15V 3 amp Twin Meter	£35.00
Model 1210S 4-20V 10 amp Twin Meter	£85.00
Model 1210S 4-20V 10 amp Twin Meter	£85.00
Model 1210SV 4-20V 10 amp Digital Readout	£110.00
Model 153SV 4-20V 3 amp Digital Readout	£38.00
Model 1220/1 13-5V 20 amp	£90.00
Model 1220/2 13-5V 12 amp	£80.00



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This Receiver offers high stability, high sensitivity and general performance that has made it almost the 'standard' receiver for amateur and short wave enthusiasts.

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IDEAL FOR PORTABLE,
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A fully synthesised 25kHz spaced rig offering full band coverage, digital readout of frequency and auto tone burst. The excellent 1 watt transmitter and very sensitive receiver make this rig excellent value for money and comes complete with case, charger, power lead etc.

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MMT 432/28S Transverter £136.75
MMT 432/144R Transverter £173.50
MMT 144/28 Transverter £90.75
MMT 28/144 Transverter £90.75
MML 144/25 Linear £44.95
MML 144/100 Linear £142.50
MML 432/50 Linear £113.85

MARINE RECEIVERS



SR11 VHF
Receiver

ONLY **£87** inc VAT
& carriage

6 Channel Scanning + Tunable 156-162 MHz

The SR11 is a self-contained VHF Monitor Receiver suitable for use at home or mounted in a car or boat using the bracket supplied. It requires only a 12V supply. The automatic scanning of up to six crystal controlled channels is ideal for continuous monitoring of the important services whilst the VFO allows you to listen to the complete band.

Also in stock

SEARCH 9 VFO + up to 11 crystal channels £59.00
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2 METRE RECEIVERS



FDK TM56B
Monitor Receiver

12 fixed + 4 scanning
channels

£105 inc. VAT
& carriage

This receiver is designed for use as either a base station or incorporating a 240V ac supply or as mobile monitor in a car or boat. The four scanning crystal channels can continuously monitor priority channels and immediately lock onto any signal. The rig comes complete with mobile mounting brkt, hardware, power lead etc.

Also in stock

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THIS EXCITING NEW RANGE OF
EQUIPMENT IS NOW
AVAILABLE . . . COME IN SEE
THEM FOR YOURSELVES!**



C7800 70cm FM Mobile

The C7800 is one of the most advanced mobile 70 cm transceivers available covering 433.00-442.75 a full 10 Mhz, in 25 kHz steps. Tuning is accomplished either by the main tuning control or with the Up/Down control on the mic. A Mhz button is provided to step the frequency up by 1 Mhz at a time to save hours of knob twiddling. Su20 is available at the touch of a button, two repeater offsets are supplied 1.6 Mhz and 4.6 Mhz for European use. Just look at the features — ★ Digital readout ★ Easy to read display ★ Five programmable memories ★ Scanning of the band in 1 Mhz or memories stopping on inuse or vacant channels ★ Two speed scan rate ★ Tone burst ★ L.E.D. power and S meter 10 watts RF output ★ Back-up for memories ★ Spare button on front for user's use ★ at £239.50 + VAT carriage free.

C8800 2m FM Mobile

The C8800 is a matching unit to the C7800 with the same features covering the 2m band in 5 or 25kHz steps (this is switchable from the rear panel). S20 and S22 are pre-programmed and available at a touch of a button, the unit has a 3 position RF gain to attenuate strong signals such as repeaters. Provision is made for two repeater offsets (600 kHz is fitted as standard) at £219.50 + VAT carriage free.



C432 hand held UHF 2.2 Watt this unit has 6 channels capability and is supplied with 433.200 and 433.500, tone burst, carry case and carrying strap. The performance of this is excellent outperforming its rivals at £169.50 + VAT carriage free.

C146G hand held 2M 2/.2W hand held. This new unit replaces the C146A offering 6 channels with 2 or .2 watt output power. The unit is supplied with S20, belt strap, tone burst and carrying strap at £109.50 + VAT carriage free.

A FULL RANGE OF ACCESSORIES ARE AVAILABLE FOR BOTH MODELS

SEND STAMPED ADDRESSED ENVELOPE FOR FURTHER INFORMATION ON OUR RANGE.

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PROFESSIONAL COMPLETE CRYSTAL SERVICE AMATEUR

Prices shown exclude VAT — UK Customers please add 15%.

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
OUTPUT FREQUENCY														
144.4 (433.2)	b													
144.480	b													
144.800	b													
144.850	b													
145.000/ROT	c	c	c	c	c	c	c	c	c	c	c	c	c	c
145.025/R1T	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/R0R	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

S18 and S19 are now added to our stock range

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.

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 RB0 (434.60/432.00), RB2 (434.66/433.05), RB4 (434.70/433.10), RB6 (434.75/433.15), SU8 (433.20), RB10 (434.85/433.25), RB14 (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-RTTY, 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).

ANZAC MD-108 DOUBLE BALANCED MIXER

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

EXPRESS SERVICES

Many types made to order crystals are available on our EXPRESS SERVICE with a delivery of three days on our class "A" service. Telephone or Telex for details.

TERMS: CASH WITH ORDER—MAIL ORDER ONLY—S.A.E. WITH ALL ENQUIRIES—PRICES INCLUDE P.&P. (BRITISH ISLES) EXCEPT WHERE STATED—OVERSEAS CHARGED AT COST.

CRYSTALS MANUFACTURED TO YOUR SPECIFIC REQUIREMENTS

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 19.999 kHz £28.12 (£31.63) 80 to 99.999 kHz ... £7.30 (£8.21)
 * 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

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
 £800 to 999.9 kHz (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 6/8 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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 Tel: 051-342 4443. Cables: CRYSTAL BIRKENHEAD. Telex: 627371



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POPULAR FREQUENCIES IN STOCK
MADE TO ORDER 10 kHz to 225 MHz**

QSL leads the field in supplying crystals world wide to major communications companies, broadcasting authorities and posts and telecommunications administrations. As a result we can supply the amateur with a high quality, competitively priced product over a frequency range from 10 kHz to 225 MHz. Get the power of the professionals in crystal supply behind you!

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

	HC6/U 30pF TX	HC6/U 30pF TX	HC25/U 30pF and 40pF TX	HC25/U 20pF and 30pF RX	HC25/U 25pF and 20pF TX	HC6 & 25/U SR RX
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
S10	—	—	12.1041	14.9500	18.1562	44.8500*
S15	—	—	12.1145	14.9638	18.1718	44.8916*
S16	—	—	12.1167	14.9667	18.1750	44.9000*
S17	—	—	12.1187	14.9694	18.1781	44.9083*
S18	—	—	12.1208	14.9722	18.1812	44.9166*
S19	—	—	12.1229	14.9750	18.1843	44.9250*
S20	4.0416	8.0833	12.1250	14.9777	18.1875	44.9333
S21	4.0423	8.0847	12.1270	14.9805	18.1906	44.9416
S22	4.0430	8.0861	12.1291	14.9833	18.1937	44.9500
S23	4.0437	8.0875	12.1312	14.9861	18.1968	44.9583

SR = Series Resonance *HC25 only

Also in stock: R0 to R7 for FT221 R0 to R7 and S10, S15 to S23 for following: Belcom FS1007, FDK TM56, Multi 11 Quartz 16 and Multi 7, Icom IC2F, 21, 22A and 215, Trio Kenwood 2200, 7200, Uniden 2030 and Yaesu FT2FB, FT2 Auto, FT224, FT223 and FT202.

Also in stock 4 and 8 MHz TX in HC6/U for 145.8 MHz. Icom crystals TX for 145.6 MHz (RRO). 44 MHz RX crystals in HC6 and HC25 for 145.8 and 145 (RRO) and HC6 only for 145.475 MHz (S19). All at above price.

4 METRE CRYSTALS for 70.26 MHz in HC6/U at £2.25. TX 8.78250 MHz. RX 6.7466 or 29.78 MHz in stock.

70m CRYSTALS in stock 8.0222 and 12.0333 in HC6 £1.85. Pye Pocketfone PF1, PF2, PF70 and Wood and Douglas £4.50 a pair or TX £2.25, RX £2.50, SU8 (433.2) RB0, RB2, RB4, RB6, RB10, RB11, RB13 and RB14.

CONVERTER CRYSTALS in HC18/U at £2.85. In stock 38.666, 42.000, 70.000, 96.000, 101.000, 101.500, 105.666 and 116.000 MHz.

TONE BURST AND I.F. CRYSTALS in HC18/U at £2.25 in stock. 7.168 MHz for 1750 kHz and 10.245 MHz for 10.7 MHz IF's.

FREQUENCY STANDARDS in stock £2.75. HC6 200 kHz, 455 kHz, 1000 kHz, 5.000 MHz and 10.000 MHz. HC13 100 kHz, HC18 1000 kHz, 7.000 MHz, 10.700 MHz, 48.000 MHz and 100.00 MHz.

PRICES ARE EX VAT. PLEASE ADD 15%.

MADE TO ORDER CRYSTALS SINGLE UNIT PRICING

	Price Group	Adjustment Tolerance ppm	Frequency Ranges	Price and Delivery A	Price and Delivery B
Fundamentals	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
3rd OVT	12	10	21.00 to 59.999 MHz	£4.55	£3.60
5th OVT	13	10	60.00 to 99.999 MHz	£5.00	£4.00
	13	10	100.00 to 124.999 MHz	£6.15	£5.20
5th, 7th & 9th OVT	14	20	125.00 to 149.999 MHz	—	£6.00
	15	20	150.00 to 225.00 MHz	—	£7.50

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

HOLDERS — Please specify when ordering — 10 to 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.

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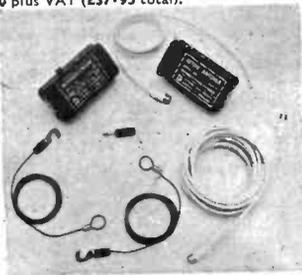


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Owing to pressure on space, Classified Advertising for this issue has had to be held over until the December issue.

We apologise to readers for any inconvenience caused as a result.

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