

The SHORT WAVE

Magazine

VOL. XXXVII

APRIL 1979

NUMBER 2

FOR THE FORTUNATE FEW — THE ULTIMATE RECEIVER



TRIO R 820

ALL BANDS : 160-10m. PLUS SW BROADCAST
ALL MODE : AM, CW, USB, LSB, RTTY

including : Fully variable I.F. Bandwidth *plus* Passband Tuning *Plus* Accurate Rejection Notch *Plus* Automatic or Manual choice of Selectivity.

FULL TRANSCIVEIVE CAPABILITY WITH TS820 OR TS520/520S

PRICE FOR THIS SUPERB RECEIVER — £841 inc. VAT

LOWE SRX- 30



New Receiver

500 kHz 30 MHz. AM.SSB.CW

Mains/12v Operation

Drift Cancelling System for Spot On Accuracy

£175.00
carr. £3

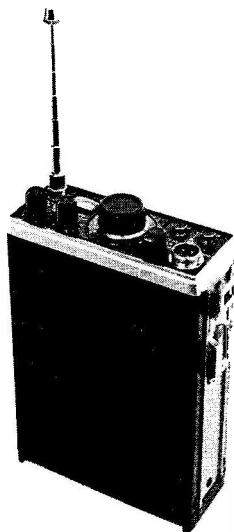
Ask
about the
CL22 Aerial
Tuner made
specially for the
Short Wave Listener
only £16.41 inc. VAT & postage

For full details of these and many more Receivers contact us now

LOWE ELECTRONICS

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

LOWE ELECTRONICS LTD



TR2300

2 METRE SYNTHESISER PORTABLE

Trio once again lead the field with the introduction of the new TR2300 2 metre FM portable. Following the established TR2200 line, the all new 2300 combines all the virtues of small size, ease of use and rugged go-anywhere construction but introduces for the first time full band coverage in 25 kHz steps from the same advanced synthesiser used in the TR7500. The synthesiser provides 80 FM channels from 144-146 MHz together with 600 kHz repeater shift, and a single auxiliary channel which can be crystal controlled to your favourite net frequency.

Automatic tone burst is provided for repeater operation and all in all, the TR2300 looks like being the new definitive 2 metre FM portable.

Although not so obvious from the photo, the TR2300 is actually smaller than the existing TR2200 and is a totally new design with an improved specification. The high sensitivity receiver section uses a combination of effective RF filters providing optimum cross modulation rejection across the entire band. An extra low-profile speaker uses a samarium cobalt magnet to reduce equipment size whilst improving speaker efficiency and clarity of reproduction.

Switchable dial illumination is provided so as to ease dial readout in dimly lit situations.

Needless to say, in line with Trio advance planning, the TR2300 will allow for incorporation of the new IARU region 1 adoption of 12½ kHz FM channels as this is gradually introduced.

Once again, Trio sensible design, attention to detail and care in providing equipment designed specifically for the user, rather than hand-me-down Japanese designs, is reflected in the TR2300—why settle for anything less! Price: £195 including VAT



TR7500

THE SENSIBLE 2 METRE RIG

The TR7500 is really the commonsense 2 metre FM mobile. In a small 6" x 2½" x 9½" package, Trio have packed a 15 Watt transmitter, a sensitive and selective receiver and an advanced synthesiser which gives you operation across the whole 2 metre band 144-146 MHz in the recommended 25 kHz channel spacing.

Ease of operation is the hallmark of the TR7500 with its brilliant channel number display. Need to operate on S20? Turn the main knob until the display reads 20; move to S24, simply turn to 24. Repeater operation is equally easy, requiring only the touch of a switch to have repeater or reverse repeater functions. Dial readout? You guessed, it's simply 7 for R7, 4 for R4, and so on.

Designed especially for the U.K. market, the TR7500 is a good example of the Trio advanced engineering approach as an inspection will show. Why not see it at your nearest authorised Trio stockist and make up your own mind about commonsense plus quality.

P.S. A scanner is available for the TR7500 from M.R.S. Communications—see our address box.

TR7500 — £235, including VAT. Matching PS-6 — £63.00, including VAT

ANNOUNCEMENT

Some firms in the U.K. are not officially authorised Trio dealers and Trio equipment purchased from these companies is not backed by the Trio service and spares organisation in the U.K.

**FOR FULL CATALOGUE AND ANTENNA BOOK,
SEND 45p IN STAMPS TO MATLOCK**

LOWE ELECTRONICS LTD



TS120

MULTUM IN PARVO

We introduce yet another exciting innovation from Trio in the new TS120V HF transceiver. Equally at home in mobile or home station situations, the TS120V packs more features into a small package than any other comparable model.

Measuring only 9½" x 3½" x 9½"—which is about the size of a packet of cornflakes, the TS120V can best be described as a miniature TS820. The rig covers all bands 80-10 metres—and all of 10 metres 28-30 MHz so it's ideal for transverter driving, has digital readout built in, vox, break-in CW, RT, noise blander 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.

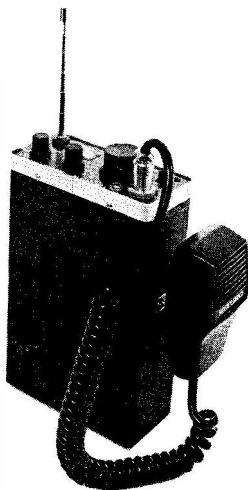
The transceiver is based on an advanced PLL system and the digital readout gives you the correct operating frequency at all times unlike many other rigs. Remember my previous comments about Trio attention to detail.

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.

We at Matlock, have all fallen in love with the TS120V and we feel sure that you will too. At it's price of £435 including VAT (and including digital readout, vox, etc.) we have no doubt that this transceiver will be another winner from Trio. See it soon.

SB2M

MIZUHO 2 METRE SSB



The SB-2M portable SSB/CW transceiver makes a welcome change from the procession of FM boxes and offers the user real DX performance in a small, easily carried package. Power output is around 1W, pep (2.5W, input) and sideband generation is by 76514 double balanced modulator and high quality 9 MHz crystal filter thus ensuring very good carrier and unwanted sideband suppression. A further 76514 is used in the heterodyne mixer to guarantee not only a clean transmission but also a receiver free from unwanted spurious responses.

Frequency control is by a wide range VXO giving 50 kHz coverage from one crystal. As supplied, the SB-2M is fitted with four crystals giving a total tuning range of 200 kHz which is adequate for most operators' needs. Alternative crystals can be fitted by the user at any time without the necessity for realignment.

The receiver performance is really outstanding and we can normally hear the Wrotham beacon in Matlock using only the telescopic whip on the rig. As a mode comparison, we can seldom if ever, hear the London repeater GB3LO even using a 10XY at 40 feet and the most sensitive FM rig available. Real DX is yours with the SB-2M and SSB.

Current consumption is low enough to make operation from dry batteries perfectly feasible. However, a Nicad battery pack and charger are also available at modest cost. The SB-2M comes complete with manual, microphone, carrying strap, etc., and is fitted with crystals to cover 144.1-144.3 MHz. Other crystals will be available shortly. Why not try sideband, you'll really enjoy it after a dose of FM repeater operation. After all, where does everyone on 2 metres vanish to when there's a lift? You guessed; they're working the real DX around 144-3 and you can join in with the SB-2M.

SB-2M £165 inc. VAT

HEAD OFFICE: 119 CAVENDISH ROAD, MATLOCK, DERBYSHIRE. Tuesday-Saturday 9 a.m.-5.30 p.m.
Telephone: 0629 2817 or 2430 9 a.m.-9 p.m. Telex 377482.

BRANCHES: Communications House, Wellington Square, Wallington, Surrey. Monday-Saturday (morning)
Telephone: 01-669 6700.
27 Cookridge Street, Leeds, Yorkshire. Monday-Saturday 9 a.m.-5.30 p.m. Telephone: 0532 452657.
Soho House, 362 Soho Road, Handsworth, Birmingham. Tuesday-Saturday 9 a.m.-5.30 p.m.
Telephone: 021-554 0708.

AGENTS:
(evenings and weekends)

M.R.S. Communications, 76 Park Road, Whitchurch, Cardiff. Telephone 0222 616936
John-G3JYG. 16 Harvard Road, Ringmer, Lewes, Sussex. Telephone: Ringmer 812071.
Sim-GM3SAN. 19 Ellismuir Road, Baillieston, Nr. Glasgow. Telephone: 041-771 0364.



South Midlands

SMC IS 21! CELEBRATE WITH US UNICOM 79. JUNE 22nd & 23rd

Unique exposition and symposium on communications.
Quite a mouthful — But a date not to be missed.
Venue:
Kempton Manor, Sunbury-on-Thames.

Friday 6 p.m. till late. Saturday 10-6.
Bar and Buffet open throughout.
Lectures — demonstrations — exhibitions.
Full details soon of THE event of '79

SMC-SUPER SAVER—BIRTHDAY OFFERS:

FT7 £265.78 + VAT
Regular £318 + VAT. Save £58.75 inc

FT202R £88 + VAT
Regular £106.50 + VAT. Save £20.81 inc

A NEW DIMENSION IN PACKAGE DEALS

BUY A FT101 ('E £515 + 'EE £503 +) AND TAKE A:-

FTV250 £100 + VAT
Regular £185 + VAT. Save £95.62 inc

YC60IB £90 + VAT
Regular £134.50 + VAT. Save £50.06 inc

YO101 £132 + VAT
Regular £169.50 + VAT. Save £40.50 inc

FV10IB £54 + VAT
Regular £85.50 + VAT. Save £35.43 inc

BUY A FT301 (T £515 S £395 D £588 SD £528) AND TAKE A:-

YO301 £134 + VAT
Regular £167 + VAT. Save £35.64 inc

FV301 £54 + VAT
Regular £86 + VAT. Save £36 inc

ALL NORMAL CONDITIONS MAINTAINED, BUT OFFERS SUBJECT TO AVAILABILITY
CONTACT SMC, OR ANY OF OUR TRADE OUTLETS FOR YOUR BIRTHDAY BONANZA

SOUTH MIDLANDS COMMUNICATIONS LIMITED

HEAD OFFICE (MAIL ORDERS)
OSBORNE ROAD, TOTTEN
SOUTHAMPTON SO4 4DN
Hours of business 9-5.30; Monday - Saturday

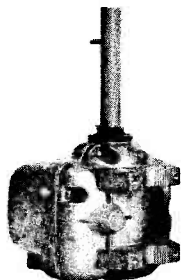
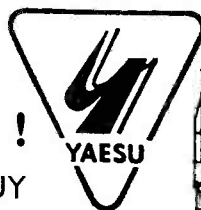


Head Office, Showrooms
Cables: Aerial Southampton
Telex: 477351 SMCMM G
Tel: Totton (04216) 7333 (3 lines)

AGENTS STOCK AND SALES

G3ZUL	Brian	Stourbridge	(03843)	5917
GM3ZBE	Alex	Aberdeen	(065183)	328
GM8GEC	Jack	Edinburgh	(031665)	2420
G13WVY	Mervyn	Tandragee	(0762)	840656
GW3TMP	Howarth	Pontyboekin	(035287)	846 Day
GW3TMP	Howarth	Pontyboekin	(035287)	324 Eve

Communications Ltd

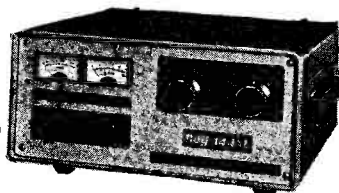


ARI0 £29 inc. VAT
SMC SCOOP BIRTHDAY BUY

A rotator for £29 inc. VAT, inc. post and packing (UK only) cannot be bad!
 If you considered a rotator an expensive luxury before, think again. If you already use one, now is the time to motorise the Hi-Fi or TV aerials.
 Remember S.M.C. stock a range of 15 larger units, call us with your requirements.

ARI0 ROTOR & CONTROL

The NAG 144XL-2000 is the finest 2m. Linear Amplifier of its type we have yet seen. Identical in size to the FT225, it produces about 250W RMS of clean stable out from a grounded grid 4CX 350F for a nominal 10W drive. The inbuilt PSU provides a 12v. 3 amp fully protected and stabilised for 12v. only excitors.
 A switchable, 10dB gain, low noise amplifier, coax change over relay, RF sensing and manual control, inbuilt SWR bridge, time delay on switch on, thermal cutout ALC output socket, are a few of the star features.
 NAG 144XL (inc. Sec. Delv. (But + VAT 12½%), £428.



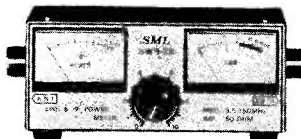
NAG 144XL

The KLM range of solid state, no tune broadband, VHF and UHF linear amplifiers, are justifiably famous. It has recently been improved by adding an extra 30% cooling area (whilst maintaining the same low 2½" profile), providing circuit breaker and reverse polarity protection, offering the choice of RF sensing or remote hand switching; proffering adjustable hang time for SSB operation and adding automatic over temperature cut out with warning leds.
 PA15 I60BL.2M 15W max. drive. 160W output £178.50 (+ VAT 12½%)

KLM PA15-I60BL



The SMC T3-170L is an indispensable aid to any station. The instrument is a twin (2" x 1", 200µA) meter, standing wave/relative power meter capable of operating between 3.5 and 170 MHz. The unit offers constant monitoring of both transmitter and antenna performance over a wide range of powers, with minimal insertion loss. The forward and reverse powers (including the VSWR) are displayed simultaneously for an instant warning of system failure. The unit is neat and compact, fitted with SO239 sockets, rubber feet, etc., it forms the perfect adjunct to any shack HF or low VHF.
 T3-170L (inc. P & P, worldwide but 8% VAT), £11.25.



SMC T3-170L

12 channel, FM, monitor receiver ideal for professional, SWL, repeater check, raynet, net and even the XYL. Tiny 2½" x 1½" x 4½" and light 8oz., yet sensitive, double superhet with 12 kHz IF bandwidth. Any 4 MHz segment between 130 and 170 MHz may be covered.
 c/w Mains charger earpiece, wire antenna, case, etc., etc
 All prices exclude VAT 12½%. But post free worldwide.
 HF12 No xtls c/w Accessories. £49.95.
 HF12A12 Amateur Band 145 MHz fitted; S(20, 21, 22, 23), R(0, 1, 2, 3, 4, 5, 6, 7), £69.95.
 HF12M9 Marine Band. 156 MHz fitted: 16, 6, 8, 10, 67, 00, M, 12, 14. £66.67.

SMC HF12



HANSEN METERS MFJ TUNERS

A full range of 14 purpose-designed, accurate SWR Wattmeters (RMS and PEP types), Auto SWR, Mobile, Fixed, HF, VHF and UHF. Call us for further info.

A full range of 7, 10 to 160m. ATU's with 12 position inductor. Optional balun; dual range wattmeter, six position switch, etc. Call for further information.

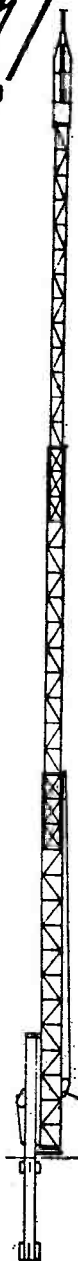
WRITE FOR FREE YAESU CATALOGUE, SMC STOCK PRICE LIST, ETC.



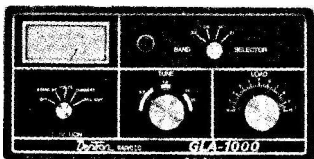
SMC (Jack Tweedy) LTD
 Roger Baines, G3YBO
 79 Chatsworth Road,
 Chesterfield, Derby
 Tel.: Chesterfield (0246) 34982
 9-5 Tuesday-Saturday

NORTHERN (Leeds) BRANCH
 Colin Thomas, G3PSM
 257 Otley Road
 Leeds 16, Yorkshire
 Tel: Leeds (0532) 782326
 9-5 Monday-Wednesday & Friday-Saturday

SMC (Jack Tweedy) LTD
 Jack Tweedy, G3ZY
 Ham Shack, Roughton Lane,
 Woodhall Spa, Lincs.
 Tel.: Woodhall Spa (0526) 52793
 9-5 Tuesday-Saturday (+ appoint.)

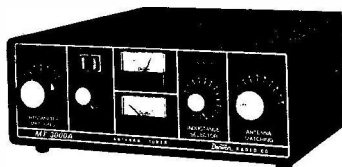


WATERS & STANTON ELECTRONICS



**Den Tron
GLA 1000**
1200 watts PEP
£289 inc. VAT
In stock now!

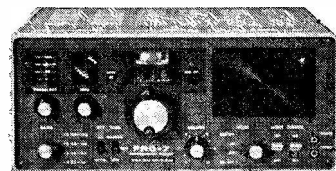
This surely is the most economical way of running the full legal limit. In true Dentron tradition, this new baby linear is a development from their higher priced military range. At last a linear below £300. This little baby is ruggedly built and incorporates full meter monitoring of PA current, DC volts and RF output. The mains power supply is built-in and a rear-mounted fan keeps things cool! Tube replacement is approx. £20 per set, so this really is the most economical of linears. Order yours today and really enjoy those DX contacts.



**Den Tron
Military
MT 3000A**
160-10m. 3kW
£275 inc. VAT
In Stock Now

- ★ Antenna selector (5)
- ★ Exciter dummy load (250W)
- ★ 3kW continuous
- ★ 3 core balun
- ★ Tuner by-pass switch

- ★ Compact 5½" x 14" x 14"
- ★ Watt meter 200W/2kW
- ★ Forward/Reverse Watts
- ★ Matches any antenna
- ★ Military construction



FRG7 RECEIVER

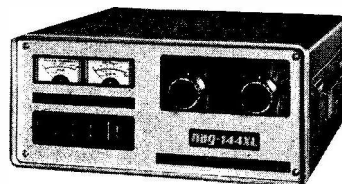
**Choose From
The Yaesu
Range:**
FRG7: £210
FRG7000: £364
FT901DM: £960
FT901DE £781

GREAT VALUE GREAT PERFORMANCE ... AND FRIENDLY SERVICE!

IN STOCK AGAIN

NAIGAI
2200 Linear
£481

(carriage £4.50)

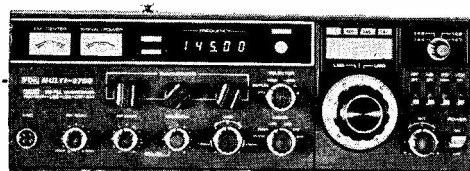


- ★ 230v. AC
- ★ 4CX-350F tube
- ★ Receiver pre-amp
- ★ 10-13 watts drive
- ★ SWR meter built-in

- ★ 500W. PEP input
- ★ 400W. FM/CW input
- ★ Fan cooled
- ★ 12v. DC output
- ★ Covers 144-146 MHz

FDK

**MULTI-
2700
£449**

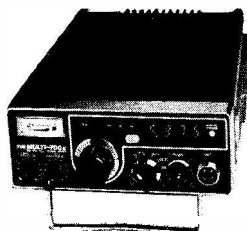


2m All mode SEND FOR 4-PAGE BROCHURE



FRG7000 RECEIVER

STOP PRESS! 12½kHz is here



MULTI-700E 25 WATT TRANSCEIVER

Similar to the 800D but with conventional rotary knob tuning. But here's the good news. It tunes 50 x 25 kHz channels so you can easily dial quickly any "S" channel with bright LED frequency readout. And another button on the front gives you 12½ kHz channels! How's that for up to the minute technology! Xtal control tone-burst is incorporated with the usual plus and minus 600 kHz frequency shifts. The price? Well at £229, including VAT, we reckon there will be a rush. Cheaper than any other model and all ready for 12½ kHz—act quickly to catch the first air shipment—next shipment due beginning of May.

THE COMPLETE HAM RADIO CENTRE
PHONE ORDERS ACCESS BARCLAYCARD MAIL ORDER RETAIL CALLERS
31 SPA ROAD, HOCKLEY, ESSEX Telephone (03704) 6835 Telex 897406

AGENTS:— G30QT (07983) 3056 G3XTX (0708) 68956 GM3GRX (0324) 24428

WATERS & STANTON ELECTRONICS

FDK MULTI 800D-25 WATTS

THE MOST ADVANCED FM RIG!

£289 inc. VAT (Remote display £19.95)



Over 25 watts of high quality FM output at your finger tips. Consider its features and learn why more people are trading up to the 800D. * Frequency control is electronic from the centre master control—no rotating dial switches to wear out. * Remote frequency control is available from the new "up/down" microphone buttons. * Bright LED readout gives true frequency display in 5 kHz steps. * True frequency counter reads both transmit and receive frequencies in use. * Instant normal or reverse repeater operation—no re-tuning! * Xtal controlled tone-burst. * Variable power control 1 watt to 25 watts (30 watts typical). * Dual non-volatile memory that lasts even with power off! * 144-148 MHz coverage for 70cms. transverting. * Additional programmable frequency shifts. * Auto-scan. * Remote digital "head-up" display for dash board mounting. * Plug-in modular construction for ease of servicing. * Solid block power module. . . . There are cheaper rigs available, but is that really what you want? . . . Send an SAE for the answer! £289 inc. VAT

MIZUHO—2M SSB/CW Portable



MIZUHO 2M SSB HANDHELD

FDK PALM II 2M FM

SIZE: 6" x 2½" x 1¼"!
WEIGHT: 1 lb. 3 oz!

COMPARE ITS VALUE
COMPARE ITS FEATURES

- ★ Smallest hand-held available
- ★ Over one watt output
- ★ AC charger included
- ★ 6 channel capability
- ★ Simplex or ± 600 kHz switch
- ★ BNC aerial socket
- ★ Flexible whip supplied
- ★ S0 /20 /22 supplied
- ★ Extra channels cost £2.90
- ★ Xtal tone-burst option
- ★ Ni-cad battery pack supplied
- ★ High quality condenser microphone

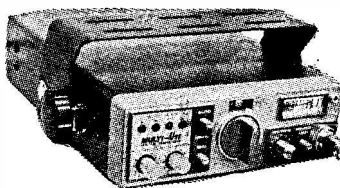
Tried UHF?

MORE REPEATERS
BETTER CONTACTS

FDK Multi-UII

10 watts 70 cms. FM
Auto scan
10 channels fitted
tone-burst — RIT
£299 inc. VAT

HP Terms:
deposit £60



MIZUHO SB2M—ONLY FROM SELECTED DEALERS

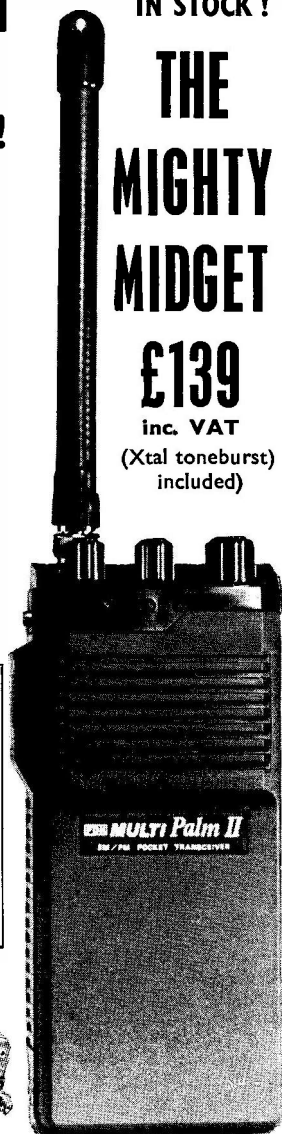
We are pleased to announce that we are stocking the dandy little MIZUHO SB2M SSB 2m. hand-held. This is a real winner and its internal construction is superior to its competitors—so much room—so neat—and its performance is quite delightful. Never heard of MIZUHO?—well until now this Japanese firm have specialised in QRP HF equipment but their first VHF product is really something. Of course, you won't find it on every dealer's shelf. MIZUHO are pretty particular who handles their products—we pride ourselves in being selected as one of their distributors. Space here is somewhat limited to give full information, but if 2m. SSB from the office, on country walks, on the top of mountains, etc., appeals to you and £165 inc. VAT is not too much for you, perhaps you had better send us an SAE. Fitted 144-20—144-40. Extra ranges. £3.00

IN STOCK!

THE MIGHTY MIDGET

£139

inc. VAT
(Xtal toneburst included)



THE COMPLETE HAM RADIO CENTRE
PHONE ORDERS ACCESS BARCLAYCARD MAIL ORDER RETAIL CALLERS

31 SPA ROAD, HOCKLEY, ESSEX Telephone (03704) 6835 Telex 897406

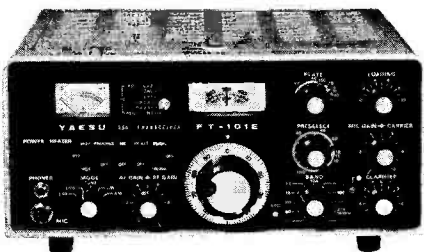
AGENTS: G3PWJ (03844) 7778 G3WRA (0432) 67864 G8NMU (0272) 669454



Western



— ? ? LOOKING FOR CHECK THESE FEATURES CHECK Western PRICES



YAESU FT-101E

£559

Yes, you'll still need to go a long way to beat the Yaesu FT-101E! The world's No. 1 HF Transceiver, with an impeccable pedigree! We've tried it alongside the newer stuff and it's hard to tell the difference. Maybe it doesn't have the fancy extras, but for sheer value for money and reliability, it takes a lot of beating.

- *Full coverage 10-160 metres, AM/CW/SSB
- *260 watts PEP input SSB, 180 watts CW
- *RF speech processor with operator control for greater talk-power
- *Base station or mobile operation with integral AC or DC (12v.) power supplies
- *Outstanding sensitivity and stability, VRO read-out to 1 kHz

YAESU FT-901DM

£949

The Amateurs Dream! Tomorrow's Transceivers here Today!
Yes! The Yaesu FT-901DM is all of this...
Superb performance and state-of-the-art features make 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 enhanced transmission efficiency
- *Built-in Curtis electronic keyer
- *All-mode operation—including FM.
- *Built-in AC and DC (12v.) power supplies



YAESU FRG-7000

£329

The New Performance Standard in Communications receivers!
A high quality general coverage receiver for the discerning SWL and a worthwhile addition as a second receiver for the transmitting amateur.
How often have you wanted a true general coverage receiver of this calibre but been put off by the price.

The FRG-7000 is a cost-effective answer to your prayers.

- *Full and continuous coverage 250 kHz to 29.999 MHz
- *Operation on SSB/AM/CW
- *Switched selectivity and fine tune control for maximum efficiency on SSB
- *Accurate digital frequency readout to kHz, using advanced CPU techniques.
- *Built-in digital clock with facilities for setting two time zones (GMT and local), selected at the flick of a switch
- *CPU controlled timing clock switches receiver on or off at preselected times; also enables control of external unit such as tape recorder
- *Wadley loop circuit for minimum drift and maximum stability
- *Simple and accurate frequency selection; easy-to-use colour coded band-switch and preselector

FREE DELIVERY and TWO-YEAR GUARANTEE

Buy with confidence from Western Electronics (UK) Ltd
We may only be 10 years old this year — BUT...

... we are proud to point out that we have ...
10 YEARS' EXPERIENCE . . . ALL IN THE SERVICE OF THE RADIO AMATEUR
ACCESS — BARCLAYCARD — DINERS CLUB — HP ARRANGED

Electronics (UK) Ltd

A NEW RIG ? ? — TRIO

You can't beat Western for value You can't beat Western for choice

TRIO TS-820S £879

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
*Rugged and proven 6146B (S-2001A) PAs with RF feedback for good linearity
*Comprehensive metering of currents, voltages and RF compression
*RF monitor enables you to check your signed quality

TRIO TL-922 £819

Want a **BIG LINEAR**? This is it!
A real powerhouse to complement your station, only needs 0 watts drive for full output.
*2000 watts PEP input SSB: 1000 watts CW/RTTY
*2x Eimac 3-500Z in AB2 grounded-grids for cool efficiency
*Blower switch-off delay and full safety interlocks

PORTABLE TR-2300

*The leading 2m. portable
*Small, rugged, easy-to-use
*25 kHz channels
*First-class receiver sensitivity
*Really—the only choice

OUR PRICE ... £189

All
Prices
include
VAT

MOBILE FT-227R

*Yaesu's up-to-date mobile rig
*800 channels 144-148 MHz
*Instant REV RPT—a WESTERN special
*Large, clear LED frequency readout
*Quick-release mobile mount

OUR PRICE ... £230

Send
for
Details

PORTABLE FT-202R

*A tiny handful of fun
*Full 1 watt output
*6-channel capability
*Fitted S20, S21, S22
*Helical antenna supplied

OUR PRICE ... £99

2 Year
Warranty

MOBILE TR-7500

*25 kHz channel spacing
*Clear LED readout of channel number
*Instant REVERSE repeater
*Good selectivity and sensitivity
*Quick-release mobile mount

OUR PRICE (limited number only) £209

CHECK OUR PRICES FOR OTHER 2M RIGS . . . FT-225R/RD, TS-700S, CPU2500R/K

MAKE IT A DATE Saturday, May 19th, 1979
WESTERN "AT HOME" DAY — See next month's ad. for full details

Western Electronics (UK) Ltd

HEAD OFFICE (All Mail/Enquiries)

FAIRFIELD ESTATE

LOUTH, LINCS, LN11 0JH

Te: Louth (0507) 4955/6

Our Agents

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

Scotland: Alan Cameron, GM3OGJ, Alloa (0259) 214653

N. Ireland: Les Lyske, G13CDF, Newtownards (0247) 812449

Opening hours:

LOUTH: 9-12; 1-5pm Mon-Fri. By appointment Sat 9-12.

LEICESTER: May's Hi-Fi, Churchgate (Tel: 0533-58662).

Mon-Sat 9-6pm; closed Thurs.

PAUL
G3VJF



THE ICOM WINNERS



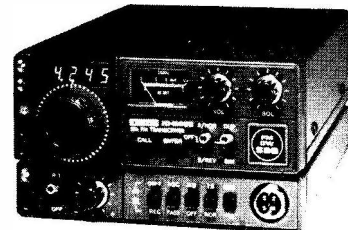
THE LEADER BASE STATION IC-211E

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

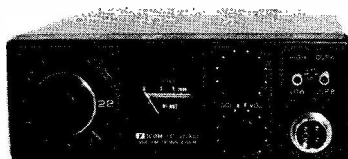
THE MOBILES

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

Less VAT = £354.67 With VAT = £399



IC-245E



IC-240

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

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

240 Alone Less VAT £168.00 with VAT £189.00

With Superscan Less VAT £230.22 with VAT £259.00

(while stocks last)



IC-280E

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

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

With the microprocessor head the IC-280E can store three frequencies of your choice, which are selected by a four position front panel switch. These frequencies are retained in the 280E's memory for as long as power is applied to the radio. Even when power is turned off at the front panel switch the programmed memories are maintained; and the 600 kHz repeater shift is always retained.

It goes without saying that the usual high quality engineering for which Icom are renowned is found in the 280E. There are no nasty shortcuts to try to keep the price down to the detriment of performance. The 280 includes the latest innovations in large signal handling FET front ends for excellent inter-modulation performance and good sensitivity at the same time. The IF filters are crystal monolithics in the first IF and ceramic in the second, providing narrow band capacity for today and tomorrow's crowded operating conditions. Modular PA construction with broad band tuning provides full rated power across the full 2 metre band.

Less VAT = £217.78 With VAT £245.00

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

Scotland — Jack GM8GEC (031-665 2420) Norfolk — Ted G3FEW (05088 632)

Wales — Tony GW3FKO (0222 702982) Burnley — (0282 38481)

North West — Gordon G3LEQ (Knuttsford (0565) 4040) Yorkshire — Peter G3PTX (022678 2517)

H.P. TERMS AVAILABLE

FOR ALL MAIL ORDERS AND SALES DURING BUSINESS HOURS

YOUR SOLE AUTHORISED UK IMPORTER FOR ICOM

THANET ELECTRONICS

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



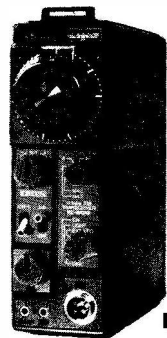

**DAVE
G4ELP**

**THE REST OF THE RANGE
ARE LEADERS IN THEIR FIELD TOO :**


IC-215

The IC-215 is getting more and more popular also as it combines the advantages of a portable, which can be operated anywhere, with the ability to double as a low power base station by virtue of its 3 Watts of output and SO239 antenna connector on the back. Of course there are facilities to operate it from an external power supply, and if it is fitted with Ni-Cads you can arrange to trickle charge these at the same time. The batteries used are of a sensible size being C type (or U11) instead of the 'penlight' batteries used by most of its competitors. This gives at least three times the operating power when you are away from home which you will appreciate if ever you have run out of battery in the middle of a QSO! It comes already crystallised up for 12 channels, S20, S22 and all the repeater channels 0 to 9. We think the extra power and larger batteries far outweigh the advantages of having the extra channels produced from a synthesizer.

Less VAT = £141.33 With VAT = £159


IC-202

ICOM's range of sideband portables has been recently expanded. The well known and tested IC-202E has now been improved in the form of the IC-2025 which has lower side band fitted also and provides sidetone on CW. The receiver has been hotted up making it even more suitable for use as a base station, either barefoot or as a prime mover. The new IC-402 is the 70cm. version of the 2025 giving the same facilities as its 2m. cousin over the range 432-435.2 MHz. Both use a very stable VXO circuit, to give fully tuneable coverage of the band in 200 kHz segments and both have extremely clean signals so that using them to drive a linear to the full legal limit presents no problems. We are very impressed with both the 2025 and the 402.

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

IC-2025

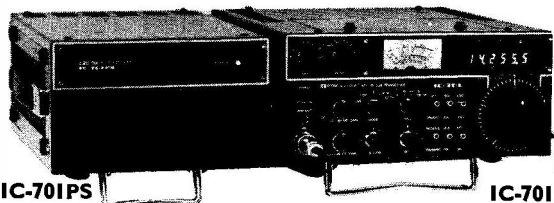
Less VAT = £176.89

With VAT = £199

IC-402

Less VAT = £256

With VAT = £288


IC-402

IC-701PS
IC-701

IC-RM3

The IC-701 with its power supply the IC-701PS and the remote, micro-processor controlled IC-RM3 make the ideal station for HF. By no means the cheapest on the market, this transceiver system, which has all the facilities normally listed as extras with other systems, is getting a very good name for itself throughout the world. The quality is typically ICOM and the sheer pleasure of driving one of these beasts has to be tried to be understood. The size is so compact too, so that mobile operation with 100 Watts of RF into the antenna is easy to achieve. The RM3 is the luxury extra for the man who wants the lot. It provides automatic remote band changing and the facility to key in any allowed frequency on any band and to store up to four. Scanning up or down the band over a range programmed in by the user is possible. The RM3 can also be used on your 2 Metre station if you have a 211E or a 245E.

The IC-SM2, which is supplied as standard with the IC701, is also available as a separate. It is a superb Electret desk microphone which is powered directly from all current ICOM equipment without modification. Details can be given for use with other makes of equipment also.

IC-701 Less VAT = £704 With VAT = £792

IC-RM3 Less VAT = £88

With VAT = £99

IC-701PS Less VAT = £88 With VAT = £99

IC-SM2 Less VAT = £23.11

With VAT = £26

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

ALSO AVAILABLE FROM OUR SHOP IN HERNE BAY

**MICROWAVE MODULES
J-BEAM**

**ANTENNA SPECIALISTS
YAESU MUSEN
FDK**

HP AND PART EXCHANGE WELCOMED

AMATEUR ELECTRONICS UK

AEUK — Your number one

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



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 (please see facing page) for full details.

FT-101ZD SERIES HIGH PERFORMANCE TRANSCEIVER

FULL COVERAGE

Full band coverage is provided on the FT-101ZD: 160 through 10 metres, plus WWV/JJY reception on 5 MHz. Teamed with the FTV901R transverter, operation can be extended to 50, 144, and 430 MHz from your desk top.

CLEAN OUTPUT SIGNAL

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

STATE OF THE ART NOISE BLANKER

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

RF SPEECH PROCESSOR

A high-performance RF speech processor is built into every FT-101ZD, providing an increase in your average talk power of approximately 6 dB. 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. As well, a DC-DC converter is an available option, for operation from your boat, car, or mobile home. 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 around airports.

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

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

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

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

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

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, such as "IF shift," 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 2.1 kHz, 1.8 kHz, 1.5 kHz, 800 Hz, 500 Hz, etc. With the FT-101ZD, you have continuously variable bandwidth—from 2.4 kHz down to 300 Hz.

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 synthesised, scanning VFO provides storage and recall of up to 40 frequencies, in addition to its 3-speed scanner and auto scan function. SAE for full information on available accessories.



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



AMATEUR ELECTRONICS UK

source for **YAESU MUSEN**

Typically, Yaesu have not overlooked that very important group of operators—the dedicated SWL's by providing the Super-Value-For-Money FRG-7 and the Ultra Sophisticated FRG-7000 General Coverage Receivers.



Here's a 10-1 winning offer if you'd like the latest Yaesu catalogue. Just send us four 9p stamps (36p) and we'll send you Yaesu's latest fully illustrated brochure together with our Credit Voucher for £3.60 against your eventual purchase. A couple of stamps will bring you the FT-1012, Atlas or Swan leaflets or our current used equipment list.

NEW! ADVANCED TECHNOLOGY from **SWAN ELECTRONICS**

100 WATTS MINIMUM OUT!

← **100MX**—The de-luxe Mobile Rig with all the extras



Solid state HF transceiver. 100 watt PEP and CW output, 80m.-10m. Broadband design featuring noise blanker, VOX, 25 kHz calibrator, CW sidetone, semi-break in CW, RIT, built-in speaker. Ultra stable PTO frequency source. Operates directly on 11 to 15v. DC, USB, LSB, CW operation. 9 MHz 8 pole crystal IF filter. 4W Audio O/P.

THIS IS THE RIG FOR THE MAN WHO INSISTS ON THE BEST



**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 a.m.—10.30 p.m.
- 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.



**508-514 ALUM ROCK ROAD
BIRMINGHAM 8**

**021-327 1497
Telex 337045 6313**

RADIO SHACK LTD for



DRAKE TR-7 solid state continuous coverage synthesized hf system

DRAKE TRANSCEIVERS & ACCESSORIES

TR-7, Transceiver with DR-7 general coverage/digital readout board fitted	£864.00
PS-7, 120/240v. Power Supply for TR-7	£135.00
RV-7, Remote VFO for TR-7	£119.00
MS-7, Matching speaker for TR-7	£24.75
NB-7, Noise Blanking for TR-7	£55.80
FA-7, Fan for TR-7	£18.00
AUX-7, Range prog. board for TR-7	£28.80
RRM-7, Range receive module for TR-7	£3.60
RTM-7, Range transceiver for TR-7	£3.60
SL-300, CW Filter for TR-7 (300 kHz)	£39.60
SL-500, CW Filter for TR-7 (500 kHz)	£39.60
SL-1800, SSB/RTTY Filter for TR-7 (1.8 kHz)	£39.60
SL-6000, AM Filter for TR-7 (6.0 kHz)	£39.60
MMK-7, Mobile mounting kit for TR-7	tba
MN-7, ATU/RF wattmeter, 160-10m, 250w.	£123.75
WH-7, HF wattmeter/VSWR bridge	£59.40
TR-4CW(RIT), Transceiver—SSB, CW, with R.I.T.	£504.00
AC-4, 115/240v. PSU for TR-4CW/T-4XC	£108.00
34-PNB, Plug-in Noise Blanking for TR-4CW	£72.00
DC-4, 12v. PSU for TR-4CW/T-4XC/R-4C	£96.75
RV-4C, Remote VFO for TR-4CW	£105.75
UV-3E, 144-432 MHz FM Transceiver	£495.00
PS-3, AC Power Supply for UV-3E	£69.75
UMK-3, Remote Trunk Kit for UV-3E	£54.00

DRAKE TRANSMITTER & ACCESSORIES

T-4XC, Transmitter—SSB	£495.00
------------------------	---------

DRAKE ADDITIONAL ACCESSORIES

TV 42 LP, Low Pass Filter 100w.	£10.13
TV 3300 LP, Low Pass Filter 2 kW	£18.00
RP-500, Receiver Protector	£63.00
7072, Hand mic. for TR-4CW/T-4XC	£13.50
7073, Hand mic. for UV-3E/TR-7	£13.50
7077, Desk mic. for UV-3E/TR-7	£24.75
DL-1000, Dummy Load	£29.70
RCS-3, Remote control Antenna switch	£83.25
B-1000, Balun 4 : 1 for use with MN-4C only	£18.00
Fixed frequency crystals	£7.88
Spare operating manuals	£3.00

The R.L. Drake Company are no longer making the following items; however, we still have a few of each—please check our stock position before ordering:

FR-1, Crystal Control for TR-4CW	£38.25
AM-10, 10 watt 2m. Amplifier	£45.00
WV-4, RF Wattmeter 20-200 MHz	£64.80

DRAKE RECEIVERS & ACCESSORIES

R-4C, Receiver—SSB, AM, SW, RTTY	£495.00
FL 250, Filter for R-4C (250 kHz)	£40.50
FL 500, Filter for R-4C (500 kHz)	£40.50
FL 1500, Filter for R-4C (1.5 kHz)	£40.50
FL 4000, Filter for R-4C (4.0 kHz)	£40.50
FL 6000, Filter for R-4C (6.0 kHz)	£40.50
4-NB, Noise Blanking for R-4C	£48.00
MS-7, Matching spkr. for R-4C/T-4XC/TR-4CW	£24.75
Crystals, Accessory crystals for R-4C	£4.50
SPR-4, Receiver—general purpose	£450.00
DC Power Cord for SPR-4	£4.05
Crystals, Accessory crystals for SPR-4	£4.50
DSR-2, Digital Receiver	£2,750.00
SSR-1, Receiver—general purpose	£175.00

WE ARE SITUATED just around the corner from WEST HAMPSTEAD UNDERGROUND STATION which is on the BAKERLOO LINE. A few minutes walk away is WEST HAMPSTEAD MIDLAND REGION STATION and WEST END LANE on the BROAD STREET LINE. We are on the following BUS ROUTES 28 : 59 : 159 : C 11.

WE ARE OPEN 9-5 MONDAY TO FRIDAY 9-12.30 SATURDAYS.

We are closed for lunch between 1-2 p.m.

HUSTLER ANTENNAS

MO 1/2, Foldover masts	£13.84
BM-1, Bumper mount	£10.35
C-32, Ball mount	£5.05
C-29, Stainless steel spring	£7.75
RM-10, 10m. Resonator	£9.34
RM-15, 15m. Resonator	£10.17
RM-20, 20m. Resonator	£11.14
RM-40, 40m. Resonator	£13.84
RM-80, 80m. Resonator	£14.73
SF-2, 2m. 5/8 whip	£9.00
DCL, Discone VHF/UHF 40-700 MHz 50' coax	£20.47
DCX, Discone VHF/UHF 40-700 MHz	£13.84
CG-144, 2m. Colinear	£25.25
CGT-144, 2m. Colinear with mount	£36.00
GG-144A, 2m. Colinear for base station use	£51.75
4 BTV, 10-40m. Vertica	£75.15
RM-80S, 80m. High power Resonator	£19.00
QD-1, Quick-disconnect	£10.23
5105, Top section only of QD-1	£7.88
HLM, Trunk-clip mount with coax	£12.57

TELEX COMMUNICATIONS INC.

Lightweight Headphones 3.2-20 ohms earpads	£8.08
HMC-2, Underchin 1.5 oz. with plastic eartips	£9.00
HT-2, 1.6 oz. Twin Receiver headphone	£14.40
Dual Muff Headphones	
C-610, 3.2-20 ohms Dual Receiver Magnetic	£6.75
SWL-610, 2000 ohms. Dual Receiver Magnetic	£7.99
C-1210, 3.2-20 ohms Dynamic foam padded	£18.45
C-1320, 3.2-20 ohms TELEX's finest Boom Microphone Headsets (headphones as above)	£25.65
CM-610, As C-610 with high Z Ceramic microphone	£29.70
CM-1210, As C-1210	£38.25
CM-1320, As C-1320	£47.25
CM-1320S, As CM-1320 with Single headphone (all the above headsets fitted ptt switch)	£36.90
Microphones (hand-held battery powered)	
ProCom I, Electret High Output	£11.70
ProCom II, Electret Variable Gain	£17.55
CB-73R, Dynamic Noise-cancelling (relay switch)	£23.40
CB-73S, As above with 6-wire universal lead	£24.75

HAL COMMUNICATIONS CORP.

Electronic TTY System	
DS-3000, KSR version 3.X (ASCII/Baudot/Morse)	£1,134.00
DS-3000, KSR version 2.X (ASCII/Baudot)	£855.36
ST-6000, Demodulator/Keyer with scope	£432.00
ST-5000, Demodulator/Keyer	£194.40
RVD-1005, Visual Display Unit	£285.12
DKB-2010, Dual mode keyboard with 128 key buffer memory	£345.60

Telephone 01-624 7174 with your ACCESS or BARCLAYCARD number for immediate DESPATCH

RADIO SHACK for

inc. VAT

TEN-TEC	
509. ARGONAUT 5W. SSB/CW Transceiver 3-5-30	£247.50
540. TRITON 1v. 200W. SSB/CW Transceiver 3-5-30	£495.00
544 Digital. TRITON 1v. 200W. SSB/CW Transceiver 3-5-30	£618.75
545. OMNI-A Analogue Transceiver	£652.50
546. OMNI-D Digital Transceiver	£675.00
570. CENTURY 21. 70W. CW Transceiver 3-5-29 MHz	£220.50
574 Digital. CENTURY D	£281.25
405. Linear Amp. 100W. 3-5-30 MHz	£112.50
210/E (1A). 115/230v. AC/13v. DC PSU for Argonaut	£27.00
251/E (9A). 115/230v. AC/13v. DC PSU for Argonaut 405	£67.50
262/G/E (18A). 115/230v. AC/13v. DC PSU for Tritons	£108.00
247. Tuner	£49.50
247. Tuner/SWR	£58.50
212. Crystal 29.0-29.5 MHz for Tritons	£4.50
213. Crystal 29.5-30.0 MHz for Tritons	£4.50
240. Converter 160m. for Tritons	£72.00
241. Crystal Oscillator for Tritons	£22.50
242. Remote VFO for Tritons	£119.25
245. CW filter for Tritons	£19.80
249. Noise Blanker for Tritons	£19.80
276. Crystal Calibrator for Century 21	£19.80
KR-1A. Dual paddle assembly	£27.00
KR-5A. Single-paddle keyer. 6-14v. DC	£31.50
KR-50. Ultramatic keyer dual paddle 117v. AC/6-14v. DC	£85.50

AMECO Equipment

OCMK. Code practice oscillator kit	£12.38
OCMV. Code practice oscillator kit wired	£16.20
PL-F. FET Receiver preamp.	£47.25
PT-2. FET Transceiver preamp. 10-160m.	£67.50

Morse Code Courses

101-33. Senior Code Course. 33r.p.m. Record	£5.40
101-T. Senior Code Course. Cassette	£6.48
103-33. Advanced Code Course. 33 r.p.m. Record	£2.80
103-T. Advanced Code Course. Cassette	£3.78
105-33. Gen. class supplementary course 33 r.p.m.	£2.80

Publications

3-01. Radio Electronics Made Simple	£2.00
102-01. Amateur Radio Theory Course	£2.50
23-01. Novice Class Theory Course	£2.50

PHILIPS

AAC-4000. Language-trainer, comprising Cassette Recorder and headphones with microphone attached	£129.60
--------------------------------------------------------------------------------------------------	---------

AAC. Language courses for use with the AAC-4000 trainer above. Courses are available in FRENCH/GERMAN/RUSSIAN/SPANISH/ITALIAN/PORTUGUESE and ENGLISH. There are four parts to a full course:

Parts 1, 2, 3 (each part)	£36.72
Part 4	£41.04

(Send LARGE s.a.e. for brochure please)

CDE ROTATORS

AR-20	£38.81
AR-22L	£48.38
AR-30	£46.13
AR-40	£53.44
CD-44	£106.88
HAM-3	£156.38
BIG-TALK	£89.44
TAIL-TWISTER	£81.88

HY-GAIN ANTENNAS

inc. VAT

18HT. 6-80m. Vertical Tower	£253.12
12AVW. 10-20m. Trapped Vertical	£42.18
14AVQ/WB. 10-40m. Trapped Vertical	£59.06
18AVT/WB. 10-80m. Trapped Vertical	£85.50
18V. 10-80m. Vertical	£31.28
TH3DX. 6 element beam for 10/15/20	£230.62
TH3MK3. 3 element beam for 10/15/20	£176.62
TH3JR. 3 element beam for 10/15/20	£127.68
TH2MK3. 2 element beam for 10/15/20	£123.46
HY-OQAD. 2 element quad for 10/15/20	£190.12
DB 10-15A. 10 and 15m. beam	£129.38
204BA. 4 element 20m. beam	£174.38
203BA. 3 element 20m. beam	£132.19
153BA. 3 element 15m. beam	£70.58
103BA. 3 element 10m. beam	£57.38
402BA. 2 element 40m. beam	£177.75
51. Heavy duty spring	£11.59
499. Flush body mount	£8.83
412. De Luxe spring	£4.50
497. Miniature spring	£22.84
LA-1. Lightning arrestor	£3.71
LA-2. In-line Lightning arrestor	£15.19
BN-86. Ferrite balun	

BEARCAT

Digital Programmable VHF/UHF Search & Scanning Receivers freq. coverage 32-50 MHz. 146-174, 420-512 MHz, 12v. DC 240v. AC 210, 10 channels	£199.80
250.50 ch. count and time	£249.75

ASTATIC MICROPHONES

T-UG9-D104. Golden Eagle gold-plated transistorised	£69.75
T-UPG-D104. Silver Eagle chrome-plated transistorised	£49.50
UG8-D104. The famous Crystal D104	£31.50
T-UG8-D104. Transistorised amplified D104 grip-t-t	£40.50
T-UP9-D104. Transistorised amplified p.t.t. (grey or black)	£45.00
525 DL6. Dynamic Hand Microphone. 400 Z	£12.15
400. Dynamic Hand Microphone. "Buckeye"	£5.85
565 M6. Hand Microphone FET amplified. "Mariner"	£31.50
D104-M. Hand Microphone D104 FET amp. 4-wire	£24.30
D104-M6. Hand Microphone D104 FET amp. 6-wire	£28.35
555 4-wire. Hand Mic. noise-cancelling "Trucker"	£21.60
557 6-wire. Hand Mic. noise-cancelling "Trucker"	£26.10
531. Hand Mic. mobile. High Z	£7.65
539. Hand Mic. mobile. noise-cancelling	£7.65
1104C. Desk Microphone FET amplified	£36.00

ATLAS

210X. 10-80m. SSB Transceiver	£495.00
215X. 15-160m. SSB Transceiver	£495.00
220-CS. Console & AC power supply	£129.37
DMK. De Luxe mobile mount	£40.50
DCB. DC Cable	£9.84
MBK. Mobile Bracket Kit	£4.50
MT-1. Mobile Antenna Match Transformer	£18.00
PC-120. Plug-in Noise Blanker	£42.75
10 X. Crystal Oscillator	£45.00
DD-6C. Digital Dial	£180.00
VX-5. VOX accessory	£38.25
DL-300. Dummy Load	£11.81

TRIO EQUIPMENT

inc. VAT

TS 820S. 160-10m. Transceiver. 200W PEP (with digital readout)	£899.00
TS 520S. 1-8-28 MHz SSB Tcvt. 200W. PEP	£575.00
TR 922. HF Linear. 2 kW. 160-10m.	£826.00
TS 120V. 80-10m. Transceiver. 20W. PEP	£435.00
TS 700S. 2m. all mode Transceiver digital readout	£637.00
TR 7010. 2m. SSB/CW mobile transceiver. 10W	£189.00
TR 7400A. 2m. FM mobile transceiver. 300W. 800 ch.	£365.00
TR 7500. 2m. FM mobile transceiver. 10w.	£235.00
TR 2300. 2m. FM portable transceiver	£210.00
TR 8300. 70cm. FM mobile transceiver 4 ch. fitted	£267.00
TR 3200. 70cm. FM transceiver fitted 3 ch.	£198.00
R300. General coverage Receiver	£185.00

We have listed a few Trio items—but we stock the whole range.

VHF MOBILE WHIPS

B5. BANTEX 2m. 5/8 fibreglass whip	£6.70
MAGNETIC MOUNT for above	£10.37
BD. Boot Mount	£6.48
BC. Single-hole Body Mount	£3.89
MA-41. DAIWA 2m. 1/2 wave gutter-mounting	£10.12
AS-6M. ASAH! gutter mount	£2.80
ESSE-BU. CALLETTI 2m. 5/8 whip standard mt.	£12.00
CALLETTI 2m. 5/8 whip gutter-mt.	£12.00
GP-BV. CALLETTI 2m. Ground Plane radials	£13.90
TAS. JAYBEAM 2m. 5/8 whip with 4m. coax	£13.59

JAYBEAM ANTENNAS

4Y/4M. 4 element folded dipole yagi	£14.85
C5/2M. 5dB gain fibre colinear	£35.42
5Y/2M. 5 element folded dipole yagi	£8.67
8Y/2M. 8 element folded dipole yagi	£11.25
10Y/2M. 10 element folded dipole yagi	£24.58
PBM 10/2M. 10 element Parabeam	£29.72
PBM 14/2M. 14 element Parabeam	£36.12
8XY/2M. Crossed 8 element yagi	£22.50
10XY/2M. Crossed 10 element yagi	£30.28

MICROWAVE MODULES

Transverters

MMT 432/28-S. 70cm. Transverter	£133.88
MMT 432/144-R. 70cm. Transverter	£69.88
MMT 144/28. 2m. Transverter	£88.88

Converters

MMC 144/any I.F. 2m. Converter	£20.25
MMC 144/28 LO. 2m. Converter	£22.50
MMC 70/28. 4m. Converter	£20.25
MMC 70/28 LO. 4m. Converter	£22.50
MMC 432/28 or 144. 70cm. Converter	£27.00
MMC 1296/28. 23cm. Converter	£31.50
MMC 435/51	£29.90
MMC 432/285 or 144. 70cm. Converter Frequency Counter	£29.90
MMC 050/500. 500 MHz Counter	£69.00

Various

MMA 144. 2m. Preamp	£14.63
MMD 500P. 500 MHz Prescaler	£27.00
MMV 1296. 70-23 cm. Varactor Tripler MPM 12/3. 12v. 3 amp mains power supply	£33.75

DECCA COMMUNICATIONS

KW 107. Supermatch A.T.U.	£121.50
KW 109. High power version of 107	£132.75
DC PSU. For 2000A/B/E	£106.88
E-Z Match. 10-80m. A.T.U. (mk. 2)	£45.00
Dummy Load 52 ohms	£9.00
Antenna Switch 3-way	£30.93
Balun mk. 2.	£10.12

RMS WINDOW ANTENNA MOUNTS

CBWM-50T. For windows up to 42"	£7.56
WEX-1. Additional 18" extension	£1.73
WEX-2. Additional 30" extension	£2.05

PRESTEL

MC-20. Field Strength Meter VHF/UHF	£216.00
-------------------------------------	---------

CARRIAGE EXTRA all items Brochures etc. 15p stamps

SECURICOR

DRAKE SALES SERVICE

HIRE PURCHASE

Radio Shack Ltd

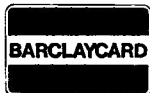
188 BROADHURST GARDENS, LONDON NW6 3AY

Just around the corner from West Hampstead Underground Station

Telephone : 01-624 7174

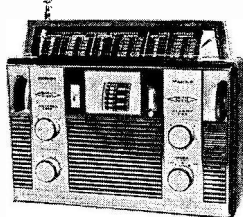
Cables : Radio Shack, London NW6. Telex : 23718 Radack G. Giro Account No. 588 7151

Open Monday-Friday 9-5, Saturday 9-12.30. Closed for lunch 1-2

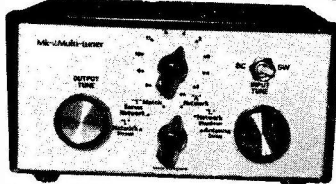


STEPHENS-JAMES LTD.

47 WARRINGTON ROAD, TELEPHONE
LEIGH, LANCS WN7 3EA (0942) 676790



Midland and North West distributors for the XCR30 unique crystal controlled receiver. This receiver is designed to provide precision frequency tuning over the full short wave spectrum up to 30 MHz with exceptional frequency stability for both AM and SSB. Separate tuned whip antenna.
£150.00 inc. VAT



The Mk. 2 Multituner was designed by us to many requests who found our Mk. 1 the finest they had ever used but required a wider frequency range. This covers 550 kHz to 30 MHz. The circuitry gives 50 switchable, tunable positions to match any antenna over 5 metres in length to practically all communication receivers. Our "Multituners" are designed and manufactured by ourselves and have been exported to over 50 countries. Many operators use them for QRP Transmitting also. See the February, edition 1977 of the "Short Wave Magazine" or send SAE for details.
£25.00 inc. VAT and postage

G3MCN



YAESU FRG-7 RECEIVER. Mains and battery operated receiver 0.5 to 30 MHz. Solid state. Advance circuitry offers excellent performance for the DX listener at a modest price. Price £210.50
Yaesu FRG7000 Receiver ... £367.00
Yaesu SP101B Speaker ... £19.68
Yaesu Desk Microphone ... £22.00

ACCESSORIES

- 2 way Antenna switch 50 ohm 200W. PEP £4.95
- 3 way Antenna switch SWL type £4.50
- 3 way Antenna switch 2KW PEP 0-500 MHz £8.50
- 3 way Antenna switch 150 watts 0-30 MHz £5.50
- 4 way Antenna switch 50 ohm 200 watts PEP ... £10.00
- 6 way Antenna switch 1 KW PEP 0-30 MHz ... £16.55
- Single Meter SWR 50 ohms Wall type £10.00
- Single Meter SWR desk type £10.50
- Twin Meter SWR desk type 3-150 MHz 50 ohm £12.50
- Twin Meter Model 500 3-500 MHz 50 or 75 ohm £45.00
- Dummy Load Watmeter DLI50 3-500 MHz £50.00
- Standard Type Morse Keys ... £3.00
- Hy Mound Morse Keys with heavy base Nye King 003 Morse Keys ... £10.25
- Twin Keying paddle. Chrome plated heavy base £26.00
- EK150 Katsumi 240v. AC or 12v. DC £70.25
- MK1024 Keyer with 1024 bit memory £140.00
- HP3A High Pass Filters ... £3.00
- FS301 Through Line Wattmeter 3-5 to 30 MHz £37.50
- FBB-9A Balun 50 ohm 1-1 1-5 to 40 MHz £12.00
- DL 120 120 Watt Dummy Load 50 ohm 0-500 MHz ... £20.00
- Daiwa MA41 2m. 1/2 wave gutter mounting whip £12.00
- Gutter Clamp for most whips ... £3.50
- Plastic Antenna Insulators ... 25p
- PL250 Plugs 50p, SO239 Sockets 45p, PL239 75p.

Cable Reducers ... 16p
ALL OUR ACCESSORY PRICES INCLUDE VAT AND POSTAGE

RECEIVERS AND TRANSCEIVERS

- (Inc. VAT and Postage)
- SR9 Tunable 144-146 MHz FM Receiver £59.00
- AMR217B Scanner Receiver. AC or DC operation ... £113.50
- SB-144 MHz SSB Portable Transceiver £157.00
- RS12 Aircraft Band Scanning Receiver £135.00
- AR240, 800 Channel Hand Held 2m. FM Transceiver ... £195.00
- HC 1400 2m Transceiver ... £255.00

SECONDHAND EQUIPMENT

Due to delay in publishing secondhand lists please send SAE for our up to date lists. We have a very quick turn over in secondhand equipment, especially in receivers. If you require a specific model please let us know and we will inform you as soon as we have one available. Our secondhand equipment carries a three month guarantee. We would be pleased to sell your equipment on a commission basis, which saves you time and money advertising. ACCESS and BARCLAYCARD facilities.

Instant HP service
Part exchanges always welcome. Spot cash paid for good clean equipment. If you have equipment surplus to your requirement we would be pleased to sell this on commission for you.
Shop Hours : 9.30 to 5.30 Monday to Friday
5 p.m. Saturday

No parking problems. Turn at the Greyhound Motel on the A580 (East Lancs.) Road. S.A.E. with all enquiries. 25p will bring you latest information and prices, credited to your first purchase over £5. Postage carriage extra.

ALL OUR PRICES INCLUDE VAT
Prices on all imported equipment subject to price increase.

TRIO

- R820 Receiver ... £841.00
- TS820 Transceiver ... £758.00
- Digital readout for TS820 £149.00
- VFO820 £131.00
- DS1A 12v. DC Inverter £446.00
- SP820 Speaker ... £41.00
- SM220 Monitorscope ... £251.00
- TL922 Linear Amplifier £826.00
- TS5205 Transceiver ... £575.00
- VFO5205 £111.00
- SP520 Speaker ... £119.00
- DGS Digital readout for TS5205 £134.00
- TS120V 80-10m. Mobile Transceiver ... £435.00
- PS-20 AC power supply for TS120V £56.00
- MB100 Mobile mounting bracket £18.00
- TS700S 2m. All mode digital transceiver £637.00
- SP70 Speaker £232.00
- TR7010 2m. SSB/CW Mobile 10 watt £189.00
- TR7400A 2m. 30 watt Mobile Transceiver ... £365.00
- TR7500 2m. FM Transceiver ... £235.00
- PS6 Power supply £63.00
- TR2300 2m. Portable Transceiver £195.00
- PB15 Battery Pack £21.00
- PS1200 Power supply £119.95
- TR8300 70cm. FM Mobile Transceiver £267.00
- TR300 70cm. Portable Transceiver £198.00
- R300 General coverage Receiver £185.00
- H55 Headphones £25.00
- H54 Headphones £12.00
- MC50 Desk Microphones £30.00
- MC305 Hand microphone 50K £14.00

ANTENNA SPECIALISTS

- ASPR332 1/2 Gutter Whip ... £8.50
- ASP201 1/2 wave Whip ... £3.26
- ASP677 2m. Whip ... £16.75
- ASP2009 Standard Whip antenna £10.20
- K220 Magnetic Mount ... £8.50
- K220A Magnetic Mount ... £8.50

DRAKE

- SSR-1 Solid State Receiver ... £175.00
- TV3300 Low Pass Filter £18.00
- TR7 Transceiver and AC PSU ... £999.00
- M57 Speaker ... £24.75
- MN7 ATU/RF Wattmeter £123.75
- R4C Receiver ... £495.00

HY-GAIN

- I2AVQ 3 Band Vertical ... £42.18
- 14AVT/WB 4 Band Vertical ... £59.06
- 18AVT/WB B Band Vertical ... £85.50
- BN86 Balun ... £15.19

MICROWAVE MODULES

- MMC70 4m. Converter ... £20.25
- MMC144/28 L0 2m. Converter £22.50
- MMC132/28 70cm. Converter £27.00
- MMC1296/28 23cm. Converter £31.50
- MMC1296/144 23cm. Converter £31.50
- MMV1296 23cm. Tripler £33.75
- MMD050 50 MHz Counter ... £66.96
- MMD300P Prescaler £27.00
- MMD500P 500 MHz Counter £85.32
- MMT432/28 70cm. Transverter £133.88
- MMT432/144 70cm. Transverter £169.88
- MMT144/28 2m. Transverter £88.87

F.D.K.

- TMS6B 2m. Monitor Receiver ... £105.00
- Pal 2 Hand Held Transceiver ... £132.90
- 700E 2m. 25 watt Transceiver ... £229.00

G-WHIP

- Tribander Helical 10-15-20m. ... £19.68
- LF Coils for Tribander ... £5.62
- LF Telescopic Whip Section ... £2.25
- Basemount standard type £3.37
- Multimobile 78, 10-15-20m. £26.08
- MM Coils ... £5.91
- MM Telescopic whip section ... £2.25
- Flexiwhip basic 10 metre section £11.24
- Basemount standard ... £3.37
- Ball type Basemount ... £5.00
- Coils for Flexiwhip £5.01
- Base thread adaptor USA/G Whip £8p
- Extendador 40" ... £9.56

N.E.C.

- CQ-7R00 General coverage Receiver £220.00

ROTATORS

- AR30 ... £46.13
- AR40 ... £53.54
- AR42 ... £106.87
- AR44 ... £48.38
- KR400 £96.00
- DR7500 ... £105.00

CABLE

- UR43 18p metre
- UR67 65p
- 300 ohm Ribbon
- 10p metre
- 75 ohm low loss 18p

JAYBEAM

- 5Y/2M 5 element yagi ... £8.67
- 8Y/2M 8 element yagi ... £11.25
- 10Y/2M 10 element ... £24.58
- PB11/4/2m. 14 element Parabeam £35.00
- 5Y/2m. 5 element crossed yagi £18.00
- 8Y/2m. 8 element crossed yagi £22.50
- 10Y/2m. 10 element crossed yagi £29.81
- Q4/2m. 4 element Quad £18.67
- O6/2m. element Quad £24.75
- D5/2m. 5 over 5 slot fed yagi £15.52
- D8/2m. 8 over 8 slot fed yagi £20.70
- UGP/2m. ground plane £7.79
- MBM48/70cms. Multibeam £24.52
- MBM88/70cms. Multibeam £32.62
- TAS 1/2 2m. Whip mobile £14.06
- 3/4 Colinear £34.87
- C8/70cm. Colinear £44.43
- D15/1296 23cm. Antenna £26.32
- SRX-30 Solid state Receiver 550 kHz-30 MHz £175.00

MINI-PRODUCTS

- C4 10-15m. Verticals (no radials) ... £44.50
- HQ1 Minibeam 10-15-20m. ... £98.50

TEK

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

BANTEX

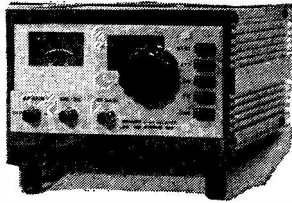
- Bantex Magnetic Base Mount ... £10.40
- 1/2 glass fibre Whip ... £8.44
- 1/2 stainless steel Whip ... £9.40
- UHF stainless steel Whip £8.63
- Standard base mount ... £2.70

S.T.E. Prices include VAT and postage

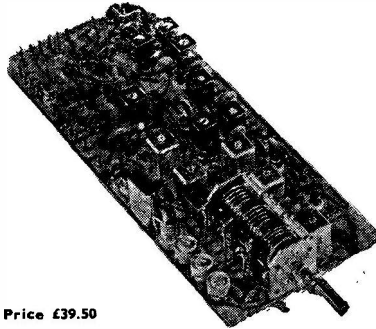
Arac 170 10m. and 70 cm. Receiver ... £127-00
 AA1 Audio Module for AR10 ... £4-10
 AD4 FM Discriminator ... £5-00

AL8 Linear Amplifier ... £27-00
 AG10 Tone Generator... £4-50
 ATAL 2m. AM-FM Tx ... £127-00

The finest value or money on the market. No price increase on these items for three years!

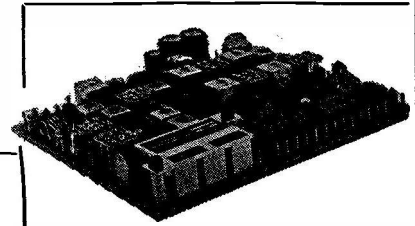


ARAC 102 receiver, 28-30 MHz. 144-146 MHz. AM-SSB-FM-CW Price £100-00

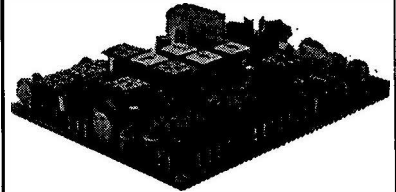


Price £39.50

AR10 Mosfet receiver. 28-30 MHz Double conversion superhet. RF and amplifiers stages are gate protected mosfets for good sensitivity and low intermodulation. Noise limiter and squelch circuit. AM, SSB and CW reception. 12v. DC.

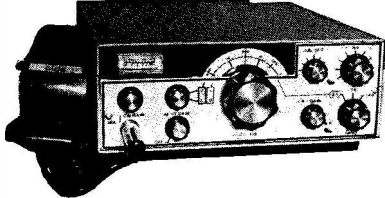


AR20. 12 channel FM receiver 144-146 MHz. Input impedance 50-75 ohm. AM-FM modes. Sensitivity 0.2uV AF output 3 watts. 12v. DC operation. Price £50.00



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

★ The latest Solid State Transceiver ★ 80-40-20 metres
 Quality engineering gives you all these convenient features
 BROAD BAND POWER AMPLIFIER ★ SSB 250 watts PEP Nomina ★ CW 250 watts DC
 Maximum ★ BUILT-IN CW MONITOR ★ 6 POLE CRYSTAL FILTER ★ SEMI BREAK-
 IN CW ★ R.I.T. DUAL SPEED VERNIER DIAL ★ MODULAR PLUG IN CIRCUIT
 BOARDS ★ BUILT-IN SPEAKER ★ 13.5 V DC input at 15 AMPS ★
 Send S.A.E. for full specifications.



We are now importing these direct from the USA and can offer them at £360 inc. VAT

TECHNICAL ASSOCIATES

Rx Band Pass Filter. 9 I.C.'s. 1 watt output*
 8 switched positions of filters* High pass
 2.5 kHz-2.00 kHz-1.5 kHz-200 Hz-110 Hz-
 80 Hz* Ideal for increased selectivity with
 FRG7, 5XR30, ETC ... Price £29-75

Printed Circuit Module. Including rotary
 switch ... Price £17-25

RX Peak and Notch Filter. Goes between
 RX and speaker* All I.C.'s* By-pass switch*
 Notch width control for optimum width of
 notch ... Price £29-75

Printed Circuit Module. Including all pots
 and switch ... Price £17-25

Pre-Selector. Coverage 1.6 MHz to 31 MHz*
 Three switched bands* Type I with antenna
 changeover relay for Transceiver op
 Price £29-75

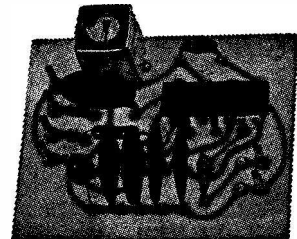
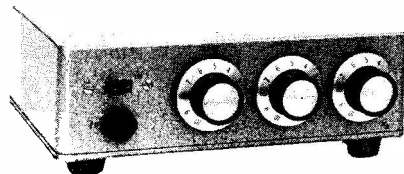
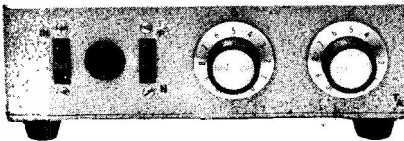
Type 2 for SWL without relay Price £26-65

Crystal Calibrator. Seven ranges down to
 1 kHz. Selected from front panel. Complete
 with antenna. ... Price £21-85

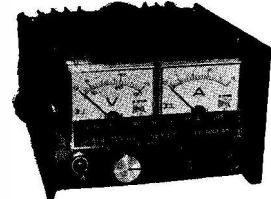
VHF Tunable Pre-amp ... Price £22-50

Some Units now in new style cabinets

These prices include VAT and postage.



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



Solid State Stabilised Power Supplies

Model 122 0-15v 2.5Amp!... £13-53
 Model 122S 12.6v 2.5Amp ... £18-00
 Model 125 12v 5Amp ... £24-00
 Model 153S Dual meter 0-20v 4Amp ... £26-73
 Model 156S Twin meter 0-15v 6Amp ... £33-35
 Model 1210S Twin meter 0-20v 10Amp £80-00

Further range of models up to 20 amp available shortly.

STEPHENS-JAMES LTD.

47 WARRINGTON ROAD, LEIGH, LANCs. WN7 3EA

telephone 0942 - 676790

**The Shop with
the Smile!**

AMATEUR RADIO EXCHANGE



PROPRIETORS: BRENDA APTAKER, BERNARD GODFREY (G4AOG)

You've read all the advertisements and you've chosen the new rig you **NEED** to buy. Before you decide **WHERE** to buy it, be sure to phone

01-579 5311

Discuss your requirements with us. Come in and try the equipment. That way you'll know that what you're investing in really is right for you. So... buying, selling or just browsing... come to the shop where they **CARE**. And have a cup of Brenda's coffee as well!

YAESU-MUSEN

Complete range always available PLUS these Spring Specials

FT-7B

The ideal HF mobile for Summer use, now improved with

1. 100w. PEP
2. Full coverage of 10m.
3. Optional remote digital readout



THE ALL-NEW FT-101Z and FT-101ZD

High-performance HF Transceivers. In stock here. Try them now.



FT-227RA

New synthesised transceiver with EXTRA features only from us:

* Scan and tune 25 or 5 kc. * Full control of scan and frequency shift from mic.
* Scan pause and restart on occupied channels. * Simplex or duplex memory facilities. * Memory available on repeater shift. * Priority channel scan on all four memories. * 5 kc. increment memorised. * Tone option on simplex for 70 cm. repeater operation through transverter. * Reverse repeater facility. * Auto toneburst on repeater operation.

EXTRA COST FOR FULLY MODIFIED TRANSCEIVER, £25.00

D-I-Y KIT AND INSTRUCTIONS, £15.00 inc. p. & p.

ALSO 1 MHZ. SCAN AND 25 KC. SHIFT KIT FOR FT.227R, £20.95 inc. p. & p



ICOM

IC-215 portable 2m. FM Transceiver

IC-202 portable SSB 2m. Transceiver

IC-402 70 cm. portable SSB Transceiver

IC-240 synthesised 2m. FM Transceiver

IC-280E synthesised 2m. FM Transceiver digital plus memories

IC-701 HF Transceiver

IC-245E FM/SSB 2m. Transceiver

IC-211E All mode 2m. synthesised Transceiver

IC-RM3 Remote control micro processor keypad

SPECIAL FOR ALL FRG-7 OWNERS

Modification kits for narrow-band SSB filter now available, complete with simple step-by-step instructions.

£15.00 inc. p. & p.

PHONE FOR DETAILS OF
CURRENT STOCKS AND PRICES
NEW AND SECONDHAND

CLOSED WEDNESDAY, BUT USE OUR 24-HOUR ANSAFONE SERVICE

Easy terms
up to 2 years



Credit sales
by telephone



Instant HP for
licensed amateurs

So easy for Overseas Visitors—just seven steps from Heathrow—
or phone your order and let us deliver it to you at the Airport.

2 NORTHFIELD ROAD, EALING, LONDON, W13 9SY

Tel. 01-579 5311

ADVERTISERS' INDEX

	Page
Aerospace and Electronics	118
Amateur Electronics UK ...	74-75
Amateur Radio Exchange	80
Amateur Radio Shop ...	120
Ambit International ...	127
J. Birkett	118
British National Radio and Electronics School ...	82
B. Brookes Electronics ...	121
Bredhurst Electronics ...	114
Cambridge Kits	127
Catronics Ltd.	119
C.B. Electronics	120
Colomor Electronics Ltd.	126
Crayford Electronics ...	127
Dart Stationery	127
Datong Electronics Ltd. ...	113
G3HSC (Rhythm Morse Courses)	126
G2DYM Aerials	126
Heathkit	82
D. P. Hobbs Ltd.	122
Johns Radio	126
K.W. Communications Ltd.	119
Lowe Electronics <i>front cover, inside front cover, 65</i>	
M.H. Electronics	127
William Munro Ltd.	122
Partridge Electronics Ltd.	123
P.M. Electronics Services...	117
Quartslab Marketing Ltd.	116, 122
Radio Shack Ltd.	76, 77
R.T. & I. Electronics Ltd.	121
SEM	115
Small Advertisements ...	123-126
South Midland Communications Ltd.	66, 67
Spacemark Ltd.	121
Stephens-James Ltd.	78, 79
S.W.M. Publications <i>Inside back cover, back cover, 124, 125, 128</i>	
T. & J. Electronic Components	127
Thanet Electronics	72, 73
T.M.P. Electronics	125
Uppington Tele-Radio (Bristol) Ltd.	127
Reg Ward & Co. Ltd.	122
Waters & Stanton Electronics	68, 69
Geoff Watts	126
Western Electronics (UK) Ltd.	70, 71
W. H. Westlake	127

SHORT WAVE MAGAZINE

(GB3SWM)
ISSN: 0037-4261

Vol. XXXVII APRIL, 1979 No. 426

CONTENTS

	<i>Page</i>
Editorial— <i>The G.P.O.</i>	83
VHF Bands, by <i>N. A. S. Fitch G3FPK</i>	84
The Datong ASP Automatic Speech Processor— <i>Review</i>	88
Home-Built SSB Transmitters: Practical or Not?	90
Beam Antennas, Rotators, Masts and Guys, <i>by Harold Bedford, A.R.I.C.S., G8MRH...</i>	95
Power FET's and RF, by <i>T. P. Ellis, G8HIO</i>	102
Clubs Roundup	105
Communication and DX News, by <i>E. P. Essery, G3KFE</i>	108
New QTH's	112

Editor: PAUL ESSERY, G3KFE/G3SWM
Advertising: Charles Forsyth

Published at 34 High Street, Welwyn, Herts., AL6 9EQ, on the last Friday of the month, dated the month following. Telephone: 04-3871 5206 & 5207

Annual Subscription: *Home: £5.50, 12 issues, post paid*
Overseas: £5.50 (\$10.00 U.S.), post free surface mail

Editorial Address: Short Wave Magazine, 34 High Street, Welwyn Herts. AL6 9EQ, England.

Prices shown in advertising in this issue do not necessarily constitute a contract and may be subject to change.

AUTHORS' MSS

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.

You'll make a first-class rig with Heathkit.



HR-1680 SSB/CW RECEIVER

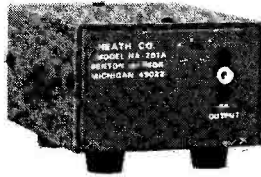
- ★ High performance.
- ★ Built-in AC power supply or external battery operation.
- ★ Excellent sensitivity.
- ★ Complete 80-10M coverage.

This is just a small selection from the big range of Heathkit radio equipment kits. Each one has an excellent specification and an advanced design, so you can build a top-quality rig for yourself.

The step-by-step instructions make it easy for you, and your success is guaranteed.



Full details are in the Heathkit catalogue. Send for your copy now.



HA-201A 10W 2M AMPLIFIER

- ★ Operates from car battery.
- ★ Ideal for portable or hand held rigs.
- ★ Up to 10W for 1.5W input (8W for 1.0W input).
- ★ 40W amplifier also available (HA-202A).



SW-717 4-BAND SHORT WAVE RECEIVER

- ★ Ideal novice kit, assembled in a few hours.
- ★ Full 550kHz to 30MHz coverage.
- ★ Slide rule tuning.
- ★ Signal strength meter.
- ★ Built-in AM rod antenna and connection for external antenna.

To Heath (Gloucester) Limited, Dept XXXXX, Bristol Road, Gloucester, GL2 6EE.
Please send a copy of the Heathkit Catalogue. I enclose 20p in stamps.

Name _____

Address _____

SWM/4/79

If you are already on the Heathkit mailing list then you'll automatically receive a copy of the latest catalogue without having to use this coupon.
Registered in England, number 606177.



There are Heathkit Electronics Centres at 233 Tottenham Court Road, London (01-636 7349) and at Bristol Road, Gloucester (Gloucester 29451).



We'll put you on the air.

Learn how to become a radio-amateur in contact with the whole world. We give skilled preparation for the G.P.O. licence.

Free!

Brochure without obligation to:

British National Radio & Electronic School

P.O. Box 156, Jersey, Channel Islands.

NAME _____
ADDRESS _____

SW E79

Block caps please

The
SHORT WAVE
Magazine

EDITORIAL

The G.P.O.

We must apologise to readers for the long delay they experienced in receiving their copies of the March issue of *Short Wave Magazine*. As many will be aware, the *Magazine* is printed in Tunbridge Wells, which means that the first point in the distribution system (for the vast majority of copies) is Tunbridge Wells G.P.O. Sorting Office. Now Murphy (or perhaps someone far more menacing) had it that at the crucial time there was an unofficial overtime ban and work-to-rule at this particular sorting office, virtually shutting it down—the effect being that the subscriber copies, and newsagents parcels, were left untouched for *ten days*.

Added to this, the difficulties at the G.P.O's main London sorting office (Mount Pleasant), through which many copies pass, and the Post Office's complete inability to handle second-class mail in anything like the time they promise, resulted in a total delay of between two and three weeks.

The current postal situation is one which is just as frustrating for us as it is for readers and we do hope that readers understand that, to *our* immense annoyance, there is *nothing* we can do about it.

While on the subject of the posts, we suggest that readers who like to contribute to our regular feature articles should always mail first-class and allow at least three days for delivery, in order to meet the deadlines.

All the foregoing indicates a disgraceful situation in a monopoly "service," and one which we trust will not be of long duration.

Equally, the foregoing is not meant to cover-up our own difficulties of late—merely to show that the fault is not always with us, and that the G.P.O. is not helping us one little bit.

[Handwritten signature]
[Handwritten initials]

VHF BANDS

NORMAN FITCH, G3FPK

VHF Convention

THIS year's RSGB VHF Convention at The Winning Post Hotel on March 10 attracted an estimated 800 visitors according to Geoff Stone, G3FZL, compared with 676 in 1978. Weatherwise, it was a dismal day and your scribe left Riddlesdown in a snow storm. Nevertheless, this did not deter VHF enthusiasts and the exhibition area in the hotel was packed from the beginning.

Twenty-four traders and groups comprised the exhibition, plus the RSGB and the Bring-and-Buy stalls. To accommodate all the exhibitors, there were some stands at the Whitton School where the afternoon lectures were given. The exhibitors were limited to components and accessories, in theory, although the proverbial "black boxes" were available, under the counter. The ceiling in the hotel was dominated by the big, 16-ele. *Tonna* aerial. These become very popular since *Randam Electronics* began importing and marketing much of the *Tonna* range last summer. Precision power dividers for groups of beams are now available.

Cambrian Electronics had a range of *Eimac* valves, socket hardware and data on show. It is refreshing to find a firm so keen to give free technical advice to *bona fide* inquirers before a sale, as well as after-sales assistance. A surprising amount of very useful *Eimac* literature is available. Graham Packer of *Packer Communications* reported satisfying sales of the little VHF/UHF pre-amplifier based on the popular DJ7VY design. The bandwidth is 70-570 MHz, so it covers three amateur bands and FM broadcast as well. The gain is about 19 dB and the very large dynamic range, coupled with very low *noise figure*

make this one of the best pre-amplifiers on the market.

Events like this always attract the home constructor so naturally those exhibitors offering components did a brisk trade in new and surplus items. With the very high cost of postage these days, considerable savings can be effected by buying from several different firms at such events, particularly in the heavier goods, such as cable, which W. H. Westlake were offering in the school part of the trade show.

The afternoon lectures were very well attended. Your scribe poked his nose into Streams A—General—and C—Microwaves, but opted for the B Stream, devoted to propagation. As always, Charlie Newton, G2FKZ, gave a very informative, entertaining and well illustrated talk on the current *Aurora* theories. He mentioned the unique "Spy Network" that thousands of radio amateurs, world wide, provide when they send in reports of *Ar* events. He now gets weekly information from The National Bureau of Standards' Radio Propagation Laboratory in Boulder, Colorado, thanks to Dick Grubb, W0QM, who is a Research Director at the N.B.S. Dick is G3FNL and an old college friend of Angus McKenzie, G3OSS, through whom this contact was established. One result of this cooperation is that the forecasting of *Ar* events is more accurate.

Martin Harrison, G3USF, gave a most interesting talk on *Sporadic E* propagation, illustrated with tape recordings of FM broadcast and amateur *E's* signals. These revealed to the uninitiated now exasperatingly fleeting some of the reflexions can be. Martin stressed that, unlike *Ar* events, there is no way to even begin to warn operators that *E's* propagation is expected in a day or week; it is, after all, *sporadic*, in the true meaning of the word. There are "seasons" though, and various indicators that such propagation is imminent for those with the necessary time to listen.

An important point mentioned was that when you hear broadcast FM on Band 2, it is almost certain that *somewhere* in Europe, *E's* QSO's are taking place on 2m. When such stations are heard, it is a sound idea to put out CQ calls for, if everyone is only listening, nobody

will know if there is *E's* propagation!

The lecture was devoted to temperate zone *E's*, *auroral E* having been dealt with by Charlie Newton, earlier. However Prof. Harrison did play a tape from Roland Whiting, 5B4WR, of his record-breaking 2m. QSO last year with Ray Cracknell, ZE2JV, *via* transequatorial propagation. It was fascinating to hear the "auroral" sound of these multipath signals from over 6,000 kms. away. These propagation lectures were chaired by fellow columnist Ron Ham, in a very efficient manner.

The day was rounded off with a social evening and buffet supper, attended by 125 guests. The 1980 event will be on March 8, possibly using the Whitton School for the whole event and the Winning Post for meals, drinks and the evening social. Congratulations to the RSGB VHF Committee for organising the affair and it was a pleasure to meet so many readers.

Awards News

The new Magazine QTH Squares Century Club award has been welcomed, it seems, particularly since it is "back-dated" so that it is not necessary to start collecting QSL cards all over again. The full rules and an application form are available on receipt of a self-addressed envelope at the Welwyn office.

The first "His and Hers" VHF Century Club certificates have been awarded to Sheila and Dave Williams, for 2m. operation from Cumbria. No. 308 goes to Sheila who, after a couple of years as a short wave listener, got her G8KPL call in 1975. Dave was also a listener for several years before getting his G8JAG call in 1974. He started with mobile operation using AM. After initial AM operation, a *Trio* TS-700G was purchased but, due to a poor home QTH, much portable operation was done.

In early 1977, they moved to the present Dalton-in-Furness home and later that year bought a TS-700S. Last year, Dave built a 4CX250B amplifier which runs 250 watts PEP output to the 10-ele. *Parabeam* at 45ft. Recent acquisitions are a 70 cm. transverter and 88-ele. *Multibeam* and they are now active on 2m. and 70 cm. SSB. There are plans for an amplifier for 70 cm.

and to get going on 23 cm. later this year. Dave's certificate is No. 309.

Contests

Results: The Single-Operator, all-mode section of the 144 MHz Fixed Contest of Dec. 3 was won by G8KMW with 2,450 points. Second was John Heys, G3BDQ, with 1,771 pts. The Multi-Op. all-mode part was won by G3ZIG with 2,823 pts. with the University of Nottingham Station, G3UNU, runners up with 2,659 pts. The FM Only section was won by G8LHW with 82 pts.

Coming Events: The 1,296 MHz Open contest is scheduled for April 7 from 1600-2400 GMT, followed the next day by the 432 MHz Open and SWL event from 0900-1700 GMT. On April 22, the 144 MHz CW event will take place from 0900-1700 GMT and on the following Sunday, April 29, the 70 MHz Open contest, from 0900-1500 GMT. The first big event in May is the 432/1296/2304 MHz affair on May 5/6 from 1600-1600 GMT.

Beacon Notes

At the VHF Convention on March 10 Brian Bower, G3COJ, told us that the new microprocessor keyer had been installed in GB3VHF and that the beacon had been under a "soak test" on dummy load for a couple of weeks. Brian brought the Tx to the Convention. So before this appears, the Wrotham beacon should be on its new frequency of 144-925 MHz.

During this severe winter, the 70 cm. Emley Moor beacon lost a director from one aerial due to ice. The 23 cm. Dunstable Downs beacon is now back on the air with its new call, GB3DUN. During a recent QSO with FICRP, Alain told your scribe that the Lannion 2m. beacon FX3THF (YI13d) may be silent for a long time—may be a year or more. Its keeper, Henri Roger, F5ZA, reckons it is not worth repairing so a new one will have to be made. Unfortunately, Henri has no time to build a new, modern Tx. However, this would seem to be an ideal project for a local club to build.

Chris Bartram, G4DGU, mentioned that the frequency of GB3WHA, nominally 432-81 MHz, tends to wander. He makes the

THREE BAND ANNUAL VHF TABLE

January to December 1979

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	
G4DEZ	—	—	56	16	—	—	72
G2AXI	13	1	35	6	13	2	70
G3FIJ	13	1	35	8	11	1	69
G3FPK	—	—	56	10	—	—	66
G8LHT	—	—	35	4	17	2	58
G4ERG	—	—	43	9	—	—	52
GM4CXP	2	1	31	11	1	1	47
G4GXT	—	—	38	7	—	—	45
G4HAO	—	—	36	6	—	—	42
GD2HDZ	2	2	9	2	20	2	37
G18EWM	—	—	22	6	—	—	28

valid point that, with present day technology, beacon QRG's and outputs should be very accurate. Chris wonders whether the correct type of crystal was used.

The Satellite Scene

The telemetry from the Russian satellite *RS-1* indicates trouble in batteries nos. 1 and 4 which have been indicating very low voltages. Throughout February, the transponder was not switched on. It may be that they will recover now that the spacecraft is seeing more of the sun. On a recent AMSAT net, a reference orbit was quoted for Feb. 17 as follows: No. 1362 at 01h. 26m. 43s. at 66-8°W. based on a visual sighting from a South African observatory by ZS1DI. Pat Gowen, G3IOR, has learned from UA3CR that there are three control stations in the Soviet Union, RS3A in Moscow, RS0A in Vladivostok, and RS3B, which appears to be a mobile station.

The Stanford Research Institute has an orbiting satellite which has beacons in the 70 cm. and 23 cm. bands. These are 200 mW. continuous carrier (A0) signals on 435-9702 MHz and 1239-073 MHz. The orbital parameters are: period 105-729 mins.; longitude increment per revolution 26-432°W; inclination 99-655°; apogee 1025-968 kms.; eccentricity 0-045. A reference orbit given on the AMSAT net on March 11 was for Feb. 26 at 0h. 04m. 44s. at 188-8°W.

Latest news on AMSAT's first *Phase 3* satellite is that the uplink band will be 435-14-435-29 MHz and the downlink 145-99-145-84 MHz with a beacon on 435-97 MHz. The launch date is early March, 1980.

Repeater Notes

The Humber side VHF repeater GB3HS on R2 was scheduled to come into service on March 4. Further information from G3KDC. Another UHF repeater GB3NN, serving northeast Norfolk on RB2 was due on from Bacton on Mar. 9. Barrie Stevens, G8KKA, is the secretary of the Mendip Repeater Group which was formed on Oct. 4 last. Their immediate goal is to establish a VHF repeater, possibly on R0, to fill a gap in the coverage of GB3BC, GB3SN and GB3NC. Coverage tests from the likely site have proved very encouraging. Anyone interested in joining the group should contact Barrie at 25 Hazel Terrace, Midsomer Norton, Bath, BA3 4BG.

Two Metre TEP

George Vernardakis, SV1AB, from Athens, has sent an account of the World record-breaking 2m. QSO's between Greece and South Africa, which were the culmination of many hours of patient listening. Throughout almost every evening in February, the ZE2JV beacon was received. On the 11th, the ZS6DN beacon was heard from 1803 to 1815 GMT but no QSO resulted as the operator was not at home.

On Feb. 13, ZS6DN was again heard at 1815 GMT and this time a QSO took place between Costas Firmerellis, SV1DH, in Athens and Dave Larsen, ZS6DN, in Pretoria, a distance of 7,117 km. Unfortunately, SV1AV was not at home. On Feb. 16, ZS6DN's signals were again heard so George put out a call on the 10m. TEP net and later completed a tape-recorded QSO with Dave at 1820 GMT, thus creating a new World record of 7,127 km. on 2m.

One interesting point is that SV1AB has received the South African signals both with horizontal and vertical polarisation, in the latter case best reception being with a 20° elevation! George confesses to having no theories about that at the moment. The signals were typical TE sounding with T6 notes at best. However, during February, the ZE2JV signals were received for up to two hours at a time, occasionally of T9 quality.

The gear at ZS6ND comprises a 100 watts Tx to a 4 x 10-ele. group. At SV1AB, 200 watts to 16-ele., and at SV1DH, 300 watts to a *Parabeam*. George concludes, "I am glad to report that we do have some more stations taking part in the tests; like YU1EU from Belgrade; LZ1AB in Sofia; 9H1BT in Malta and EA3XS and EA3ADN from Barcelona."

Six Metres

Although we do not yet have an amateur band around 50 MHz, nevertheless, a number of British and European stations have been taking part in crossband 6/10m. tests with U.S.A. stations. Brian Bower, G3COJ (Bucks.), reports the band having been open briefly to North America and Africa but that so far, propagation has not been a patch on that in the 1956/7 winter. On Feb. 8 and 9, he heard WB2RLK/VEI around 1330 and worked him on the 10th at 1314. The following day, Brian worked W2IDZ at 1324 and heard various others up to 1440, including W4WD and WB8IWI/4. On the 17th, the WB2/VEI was worked again at 1346; he was S9 but faded out in 2-3 mins. The beacon VE1SIX on 50-088 MHz was first heard at 1332 but faded three minutes later. The band then died till 1710 when AD1C, who is 15 years old, and W1JR were worked, with W1MX heard. No trans-

Atlantic signals were heard after Feb. 17.

Graham Taylor, G8HVY (Dorset), found 6m. wide open between 1405 and 1445 on Feb. 15. WB2RLK/VEI was a colossal signal—he runs 1 kW. to an 11-ele. *Yagi*—and other signals heard were, W3XO, W2UTH, W2AXU, N2ASC, WB2VWI, W3VTH, K1IKN, W2EIF and WB2RYV, plus VE1SIX, which was S9. Graham uses a *Yaesu* FT-620B with 3N211 preamp. and a 5-ele. *Yagi*. Others who have been hearing and/or working the W's crossband include Al Slater, G3FXB (Sussex) and Brian Meaden, G3BHT (W. Midlands). Inquests are held on 28-885 MHz on Sundays around 1700 GMT with WA5CEB in New Mexico in the chair, but your scribe has heard this net during the week, too.

On March 4, G3COJ (Staffs.) heard ZS6LN working crossband with Henry Souchet, 9H1CD at 1415. At 1428, G3COJ heard the ZS6PW beacon on 50-03 MHz and 7 mins. later worked ZS6LN crossband. By 1440, 6m. ZS signals had disappeared in the U.K. but were still being heard strongly by 9H1CD. The "TE chat frequency" of 28-33 MHz was used for inquest purposes by Brian, Henry, ZS6LN and ZS6PW. From Athens, SV1AB reports receiving Rhodesian TV on Ch. 2 daily, both video and sound, in the evening. George has made crossband QSO's with ZS6PW and ZS6LN, too, and has copied the ZS6VHF beacon on 50-04 MHz.

From Leeds, welcome to new correspondent Kevin Jackson who sent a very detailed account of DX TV reception at VHF. The F2 layer stuff started on Feb. 6 with TV pictures from stations 6,000 miles away plus U.S.A. police and paging systems, and Middle East military traffic. At some times, "snow-free" pictures were received on a 3ft. piece of wire. Russian TV pictures on R1—49-75 MHz—have been received from Baku, Dushanbe and Frunze. On Feb. 13, Kevin writes: "... two programmes seen at 0933 and 1013 GMT; a Chinese announcer in the standard issue boiler suit followed by progs. consisting of paddy fields and people in sanpan hats." A clock in one picture indicated 9 hours ahead of GMT so the station received was

probably Kirin. From Feb. 17, no F2 signals have been observed, but in a "P.S.," Kevin mentions TSS (Russia) TV on Ch. R1 at 1019 GMT, on Feb. 26.

Two Metres

Congratulations to Fausto Minardi, I4EAT, who worked his 50th country on 2m. on Feb. 24. This was F0UITU in Geneva, operated by FØBJT, and it was a tropo. contact. Fausto wonders if this is the first "half-DXCC" on VHF? We would imagine that Dave Price, GW4CQT, and Clive Penna, G3POI, cannot be far short of that goal now.

By Feb. 25, the barometric pressure in Southeast England was 1044 mb. The centre of the anti-cyclone wandered off Eastwards and declined but did not bring any sign of the lift many had been expecting. Syd Harden, G2AXI (Hants.) found G DX conditions up around Feb. 20/21 for Midlands QSO's, while on the 22nd, they were good towards the South coast and East Anglia. On the 25/26th, he had, "... a good run along both sides of the Channel."

Bob Mackean, G4HAO (Liverpool) reckons February was quite a fair month, notable dates being the 4th, 5th and 25th. However, school work had meant limited time on the air. Arthur Breese, GD2HDZ, reports very poor conditions and minimal activity as observed from the island. Up to Feb. 20, Geoff Brown, GJ8ORH, who was due to take his morse test in mid-March, had 10 countries *confirmed* on the band this year and 60 QTH squares worked.

From Borders, Derrick Dance, GM4XCP, reports little to get excited about on the band although he says he hears lots of weak CW DX around 144-05 MHz. His best DX in Feb. was Colin Wooff, G3SPJ (London), who is heard regularly over the border in and out of the QSB. He is glad to hear more folk using the key these days. During an *Aurora* on the 26th, he worked LA7KK (FU62j) for square no. 132 on 2m.

For some weeks now, when beaming at 345° from G3FPK, there has been a nasty sheet of noise centred around 144-065 MHz which would mask any DX signals. It appears to be a London phenomenon so more accurate QTF's are sought

so that the source of this nuisance can be pin-pointed.

During the 144/432 MHz Contest on March 3/4, the weather conditions on the Saturday night in S.E. England were appalling. The Harrow R.S. lads operating G3EFX/P near Lewes in E. Sussex, endured a howling gale but thick fog. They managed 505 QSO's, 170 of them with continentals. Best DX was 617 km. with a GM.

QTH LOCATOR SQUARES TABLE

Station	23 cm.	70 cm.	2 m.	Total
G3POI	—	—	265	265
I4EAT	—	25	217	242
G8HVY	—	71	119	190
G8LEF	22	61	101	184
G3JXN	26	66	88	180
G8GML	11	63	106	180
G3SEK	—	—	179	179
G3IMV	—	—	172	172
G4CMV	—	30	140	170
G3COJ	23	66	80	169
G3CHN	—	—	167	167
GM4CXP	—	25	132	157
G3FPK	—	—	154	154
G4DEZ	—	—	150	150
G4BWG	—	29	118	147
G2AXI	2	52	91	145
9H1CD	—	13	127	140
G8BKR	1	30	108	139
G3OHC	4	33	101	138
9H1BT	—	—	138	138
G3XCS	—	21	111	132
G8HHI	—	30	101	131
GJ8ORH	—	30	99	129
G4BAH	—	32	92	124
G8IWA	—	40	83	123
G3BW	3	25	91	119
G8LHT	3	34	80	117
G8ATK	—	29	88	117
GM4COK	—	9	106	115
GD2HDZ	11	34	67	112
G4FCD	—	22	89	111
GJ8KNV	—	26	82	108
G3KPU	—	20	84	104
G4DKX	5	30	68	103
G4ERX	1	29	67	97
GM8NCM	—	12	84	96

G4FBK	—	5	90	95
G4AWU	—	—	94	94
G8KSS	—	—	93	93
G4AEZ	3	28	61	92
GJ8AAZ	1	24	67	92
G3FIJ	—	27	65	92
G3SPJ	5	21	63	89
G8GII	—	22	63	85
G8KGF	—	5	80	85
G6UW	—	—	85	85
G4GEE	—	27	56	83
9H1C	—	—	83	83
G8EOP	8	36	38	82
G8KPL	—	7	74	81
G8JAG	—	7	73	80
G8JHX	—	—	80	80
GI8EWM	—	18	61	79
G8JJR	—	—	79	79
G8LGL	—	1	74	75
G8IFT	7	18	49	74
G8KSP	—	2	72	74
G8ITS	—	16	56	72
G4GET	—	—	70	70
GD3YEO	—	8	59	67
G8KUC	—	7	60	67
G8KLN	—	1	62	63
G4CIK	—	—	62	62
G4GCQ	—	—	61	61
G8JEF	—	—	58	58
G8MFJ	—	9	48	57
GW4FJK	—	—	57	57
OZ9IY	—	—	53	53
G4GSA	—	1	48	49
G4GXT	—	—	43	43
G4EYL	—	—	41	41
G8JGK	—	—	41	41
G8PRG	—	—	15	15

Starting Date January 1, 1975. No satellite or repeater QSO's.

Operating from Harwell, the G3PIA team notched up 557 contacts including 16 DL's, 17 F's, 17 GM's, 21 ON's and 26 PA's. John Quarmby, G3XDY (Ipswich), found conditions very poor to the N.W. and only heard one weak Welsh portable.

Your scribe was too busy to take part seriously in the event but found conditions pretty rotten to the North and Northwest. Best DX was

DL0WU (DL66b) on CW at 505 km. Steve March, G4BWG (London), did quite well to the East with 11 ON's, 16 DL's and 35 PA's. Ray Elliott, G4ERX (Essex), also found conditions abysmal and managed 69 QSO's on 2m.

Seventy Centimetres

A dearth of reports this month. During the March 3/4 Contest, G3XDY summed up conditions as, "grim." G4ERX had 80 QSO's, Ray's best DX being DC4QW (DM66h) at 460 km. The Harrow R.S. lads remarked on the lack of Welsh portables but made 77 contacts from ZK10d.

Twenty-three Centimetres

Claus Neie, DL7QY, is now fully operational from the new QTH in FJ61j. He now has the 23 cm. dish up and had already worked FL, GM, EK and CJ squares. Claus can be raised by telephone any time of the day, the number being 07951 7418 which probably means dialling from the U.K., 010 49 7951 7418. He is QRV on 70, 13, 9, 6 and 3 cm. On 3 cm. he has 5 watts RF of SSB/CW on 10-368 GHz to a 0.5m. dish.

Brian Harber, G8DKK (Beds.), now has 30-40 watts of SSB, derived from 1½ watts of 2m. drive to 3 watts of local oscillator at 1,152 MHz in a high level mixer. The aerial is a home-built 34-ele. *Parabeam* type.

DX-Pedition

Clive Penna, G3POI, passes along the news that PA3AHD plans a 24 hours-a-day operation from 4U1TU in Geneva on June 3-16, so some *Scorpiids* MS skeds should be rewarding for those out of tropo.

Wishful Thinking

When Malcolm Andrew, G8NRP, was on holiday in France last summer, operating as F0EFE/P from CE square, he caught an *E's* opening. He has since received five QSL's from UB5DAA who claims a QSO at S9-plus-plus. But Malcolm did not hear the Ukrainian station. So it would seem that the art of the one-way QSO is being developed outside England, too! It's all in the mind, you know.

Deadlines

All your news, views and claims for the May issue by April 5 and for the June edition, by May 10, to: "VHF Bands," SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts., AL6 9EQ. 73 de G3FPK.

REVIEW

THE DATONG ASP AUTOMATIC SPEECH PROCESSOR

MANY radio amateurs enjoy chasing DX and participating in contests, the ultimate goal being to win something. Inevitably this means both working very weak stations down in the noise and making yourself heard through the QRM by the fellow at the other end. One obvious way to be heard above the majority is to boost the peak power of the Tx by using additional RF amplification. This can be an expensive solution.

Speech Processing

Speech waveform is very irregular and considerable energy is contained in the explosive consonants and sibilants, neither of which convey much intelligence. But if distortion and over-modulation are to be avoided, the system must be set up for these peaks. Consequently, the average level of the speech conveying intelligence can be quite low. To overcome this, speech processing can be used to boost the average audio level. This can be achieved by clipping or compression or a combination of both techniques.

Unfortunately, clipping the peaks of any complex waveform cannot fail to generate harmonic distortion. This fact is put to good use by severely clipping the output waveform from a low frequency crystal calibrator so that scores, or even hundreds, of harmonics can be identified for frequency spotting throughout a wide RF spectrum.

RF Speech Processing

If an audio sine wave of 700 Hz is clipped, for example, harmonically related signals at 1400, 2100, 2800 Hz, etc., will be generated. As these harmonics fall in the audio passband, they cannot be filtered out. A neat way out of this dilemma is to convert the audio signal to an RF one and do the clipping at this frequency. Harmonic distortion is thus removed an octave higher and can be easily filtered out. If this signal is then reconverted to the original audio passband, a clipped, but distortion-free signal results.

The *Datong ASP Automatic Speech Processor* uses this technique where the processing is carried out at 60 kHz. This part of the device is really a closed circuit SSB Tx and Rx, using a common local oscillator.

Audio Compression

Earlier, audio compression was mentioned. This is a system analogous to automatic gain control in receivers wherein very large changes in RF input due to fading are "ironed out" to produce very little change in the final audio level. All *a.g.c.* circuits work by reducing the overall gain progressively as the input signal increases.

The *Datong ASP* incorporates an audio derived *a.g.c.* circuit which caters for wide variations in voice input so that the RF processor always receives a constant peak amplitude signal. It works on both positive and negative peaks and has a long time constant of five seconds. A long time constant is an important feature which ensures that the background noises do not come up

quickly when one stops talking between words. Additionally, loud transients, like dropping the microphone, do not cause an instantaneous gain reduction which would cut down the desired speech input.

Connections

The *Datong ASP* is simply connected between the microphone and the Tx. A four-pin socket is provided on the front panel to suit popular Japanese equipment, with a push button to select high or low input impedance. On the rear panel there are two phono-type sockets for PTT and audio output. A one metre length of twin screened lead is supplied with the matching phono plugs on one end and a Trio/Yaesu type four-pin plug on the other, wired to customers' choice.

As can be seen from the photograph, there is space for eight HP7 size batteries. Alternatively, the *ASP* can be powered from an external 6-16 volts DC source, such as a car battery, the current drain being a mere 15 mA. A 3.5 mm. socket and jack plug are supplied for this purpose.

Setting Up

A most useful feature of the *Datong ASP* is the inclusion of a 700 Hz tone oscillator. To set up the processor, the Tx microphone gain control is set to the usual level, then the tone button on the *ASP* is pressed and the pre-set control on the rear panel adjusted to give the recommended peak plate or collector current.

With no speech a LED labelled "LO" will light up. After a second or two of close talking into the microphone this should go out and another LED, labelled "OK" should come on and stay on throughout the over. A third LED marked "SPEECH" winks in sympathy with the modulation. The required amount of processing from nothing to 30 dB in 6 dB steps is selected by six push buttons on the front panel.

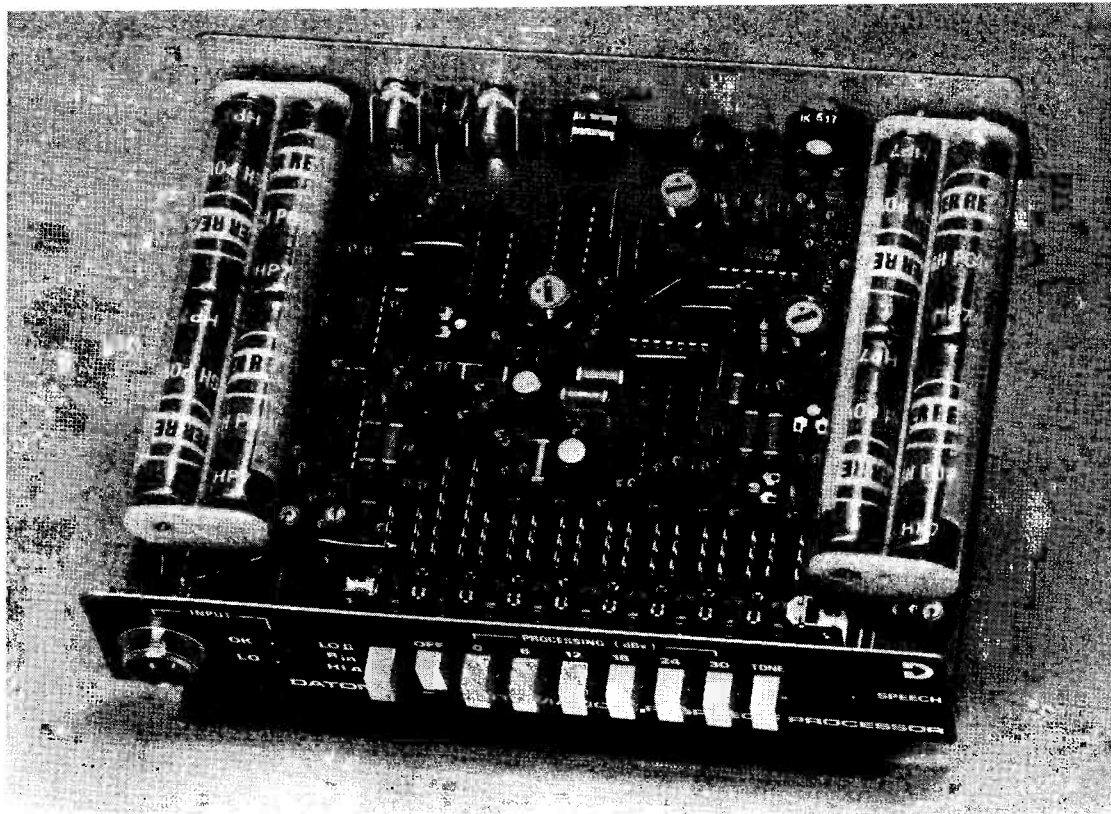
Taped Results

Before testing with the G3FPK station, the *Datong ASP* was used with a *Ferrograph* tape recorder so that comparisons could be made with the normal speech quality from the *Shure 444* microphone used on its own and then through the processor. The complete tape was then replayed and the waveforms monitored on an oscilloscope.

The immediate impression was that when the *ASP* was switched into circuit with no processing, the quality sounded a little deader. The specified frequency response of the *ASP* is 400-3400 Hz ± 3 dB and it probably drops off quite rapidly outside these limits. The response of the *Shure 444* is only 3 dB down on the 1000 Hz level at 5000 Hz and this would account for the greater "presence" when by-passing the processor.

It is recommended that the technique of close talking across the microphone be used to avoid picking up extraneous noises. Unfortunately this means that, when using higher levels of processing, breath intake noises become a nuisance and somewhat fatiguing to listen to. Users of any speech processing system must bear this in mind and should try to evolve a better microphone technique.

The 6 dB of processing sounded quite acceptable with a worthwhile increase in audio content. At 12 dB the



The Datong Model "ASP" Automatic Speech Processor. An inside view showing the neat layout on the single-sided, glass fibre, printed circuit board. On the rear panel from left to right are the sockets for p-t output, audio output and external DC supply. The pot on the right next to the batteries is the preset output level.

effect was enhanced even more. To this reviewer, any processing over 12 dB was somewhat fatiguing to listen to for any length of time. However, in fairness it must be confessed that the writer is used to listening to very high quality sound reproduction so has developed a dislike of artificial alteration of the original sound.

The most convincing proof of the effect of the step-by-step increase, then decrease of the amount of processing was accidentally discovered when winding the tape back at high speed with the replay amplifier on. The increase in audio content, or average talk power, was dramatically demonstrated in a few seconds.

Examination of the speech waveform on the oscilloscope revealed a constant peak level with more audio as the amount of processing was increased. A further series of tests was carried out feeding a pure sine wave into the microphone from an audio oscillator. No distortion could be detected at maximum processing of 30 dB, thus bearing out the manufacturer's claim of 0.5% total harmonic distortion at 1000 Hz with 30 dB of processing.

On Air Results

Most readers of this review will use a speech processor with an amateur transmitting station so it is essential that opinions of those at the receiving end be included. However, one must realise that such opinions are entirely subjective and not be swayed by

either a flattering report or a very critical one. The writer never ceases to be amazed when listening to tests being carried out between other stations. Sometimes a quite badly distorted signal of wide bandwidth is given the "thumbs up" by a listener. Very often it transpires that the listener's receiver has a tiny "Mickey Mouse" speaker in the bottom of the case. How any assessment of quality can be made under these circumstances is very debatable.

When this review was undertaken, conditions on the VHF bands were mediocre thus affording opportunities to test the usefulness of the ASP under weak signal conditions. All stations noted a worthwhile increase in audio and intelligibility with 6 dB of processing and no adverse comments were received from local stations. During a QSO with G3BHT in Sutton Coldfield, when deep fading was experienced, the use of 12 dB of processing made all the difference between marginal copy and a QSA 5 report, keeping the Tx output to a peak power of about 40 watts. During this contact, 24 dB of processing was tried but, although the audio content was increased, intelligibility was degraded. Tests with other stations confirmed that 18 dB was about the maximum amount of processing that would produce a more intelligible result under weak signal conditions using the microphone and Tx described.

Construction and Appearance

The *Datong ASP* is very neatly built, all components being accommodated on one single-sided glass fibre printed circuit board. A stout 14 gauge wrap around case in anodised aluminium, measuring 184 x 44 x 153 millimetres deep, gives this device a smart appearance. The weight, excluding batteries, is 725 grammes.

Conclusions

The *Datong ASP* currently costs £65 plus VAT, a total of £73.13 in the U.K., including postage. It is a cost-effective way to boost transmitter performance, particularly when one realises that, unlike an RF amplifier restricted to use on certain frequencies, this is an audio device which can be used with public address systems, etc.

Of course, when using the *ASP* with a Tx, the output stage will be working harder, the more the processing used. Some of the popular TV sweep tubes in many LF/HF band gear may not last so long unless efficient cooling is provided. This is a fact of life whenever the average output power is increased.

As far as the writer is aware, there is no directly similar processor with which to compare the *ASP*. There is a variety of clippers and compressors from British, U.S. and Japanese sources but this *Datong* design appears to be the first one to dispense with the need for manual level control once the device has been set up for a particular station. It should be particularly advantageous in a multi-operator contest station and to increase the effectiveness of low power stations.

Datong Electronics Limited are to be congratulated once again on designing and marketing a novel amateur radio accessory with obvious export potential.

N.A.S.F.

Post Script

Since the main tests were carried out, Dr. David Tong, designer of the *ASP*, has suggested that a microphone with a flatter response than the *Shure 444* would be more suitable for use with the processor. So a flat response crystal microphone and a professional, low impedance, noise cancelling boom type were tried. However, the overall results were much the same so one concludes that the *ASP* can be used successfully with any decent microphone.

Finally, an observation concerning plate current meters. Many years of experience with HF and VHF transmitters has convinced the reviewer that the *only* way to be certain that one's SSB signal is linear is to monitor it on an oscilloscope. For example, if a Tx is tuned up on a carrier or single tone to a plate current at resonance of, say, 200 mA, then it will be found that the peak current due to the peaks of unprocessed speech should not exceed about 120 mA if "flat topping" is to be avoided. Using 18 dB of processing with the *ASP*, plate currents of 150 mA were indicated and this figure would increase a little with more processing.

A very important feature of the *ASP* is that, once set up with the tone for maximum linear output, it becomes impossible to exceed the peak plate current so one ends up with a loud-sounding signal which is narrow.

HOME-BUILT SSB TRANSMITTERS: PRACTICAL OR NOT

WAYS OF GETTING YOUR OWN
SSB RIG ON THE AIR

LOOKING back through old volumes of *Short Wave Magazine* for information, one is very conscious that there have been very few SSB transmitter designs published; in the early years many articles discussed the complexities of SSB and its wonderful advantages as a phone technique on the amateur hands. If one looks at these, one is struck by the fact that, on the one hand, there is great stress on the new, stricter, requirements in terms of stability, spurious outputs, and more formal design than was the case with the older AM rig, which most people home-brewed; and on the other hand, of the few designs written up, the vast majority were decidedly complex tasks which would probably take up about a year of one's limited spare time, allowing a small amount of operating when in the shack! Furthermore, in many cases an array of test gear was deployed which would be enough to deter anyone not so well equipped.

Now, it is to some extent true that an SSB Tx is more complex than an AM box, and that it needs to be more stable than was tolerable with the old Top Band AM rig. Equally, it is also true that an SSB rig is only a superhet receiver turned 'base-over-apex,' and many people will happily build the receiver and yet shy from trying a transmitter design.

Now, the writer was for many years involved with the exciter used by the Royal Navy (now obsolescent), and he can say without fear of contradiction that the sort of labour used to build and test was progressively of lower and lower skill grading, as the bright lads progressively demanded first a shift into transistorised stuff, and then towards integrated circuitry. With possibly one exception, the test-gear used to test and set up this equipment (which was far more complex than anything an amateur would want to run, with good enough sideband suppression to enable operation in the ISB—Independent Sideband—mode), was very simple. One doubts if any amateur rig run at normal power inputs could cope with that requirement.

So, how come the average chap makes such a meal of a sideband rig, that he gives up and goes out to buy without even picking up the soldering-iron? Defeatism, pure and simple! Let's look and see what we are trying to build: break it down to modules—see Fig. 1 for the block diagram of a single-band SSB rig. Audio first, and that's not really a problem after looking at a few op-amp data sheets, or building a hi-fi for the junior op's pop noises. A VFO; just like we've always had. A *Sideband Generator* which will accept the audio, and the output of a crystal oscillator, and by either phasing or filtering will give us a baby SSB signal (forget Weaver's Third Method for the moment, let's keep it simple!). One, or maybe two, mixers to get our baby SSB signal on to the right frequency; if two mixers, then there'll be another crystal oscillator. Nothing complicated so far, save the sideband generator, and that is very largely

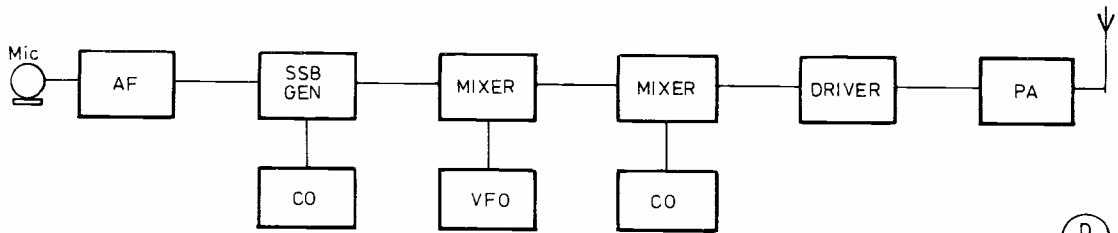


Fig. 1 BLOCK SCHEMATIC

D
315

Block diagram of SSB Tx: this is shown as a 'double-conversion' for use with a 455 kHz SSB generator on the HF bands. For 160 and 80 metres, or with a 9 MHz SSB generator, single-conversion could be used by deleting the mixer and CO nearest the driver stage.

mistakeable for an IF strip! All we have left to do is to build up the signal to the power level we want; there've been quite a few designs for linears written up, so obviously nobody is too fussed about *that*.

So—where's the hassle? We'll let you into a secret—there isn't any!

How to do it

We've talked about the SSB transmitter in terms of a block diagram, so as to make it easier to visualise; and by building in the same fashion and getting each bit to go first before tackling the next block of the diagram is the whole simple secret, except for a few little details which we propose to look through now.

We have a couple of crystal oscillators to build (or maybe only one) and get going: one is the RF input to the sideband generator, and the other will be used with a mixer stage if required, to get you on to the desired band. Let's start with them; one of the things we can achieve is 'sideband inversion' depending on which way the mixer sees its signals. Thus, if we brew up lower sideband in the sideband generator, we can turn it into upper sideband at will in the mixers. Keep a hold of this, because it's important when you recall that convention says upper sideband on bands above 10 MHz, and lower on bands below 10 MHz. The crystal oscillator associated with the sideband generator will have a frequency set out in the bump about your filter if you are going to do it that way, and you must be able to tweak its frequency to just the right place. If you are phasing—a much more elegant system all round, and much nicer to listen to—than your crystal oscillator will be on some frequency you've decided for yourself after a bit of head-scratching or calculation to avoid any "birdies" in the bands; at a pinch you could just take the frequency as being right—but it's better to get the frequency to be what is on the can, as you may as well give it a trimmer. The point about this is that a crystal's frequency is specified in a circuit in which the total shunt capacity of the crystal plus stray capacitances plus trimmer is given; so you twiddle the trimmer to get the right total and you are on the right frequency.

Make your crystal oscillator (CO) on a scrap of PCB offcut or *Veroboard*, with the crystal left out. Measure the current down the transistor, plug the crystal in and the current reading should show a change; if it doesn't, sort out your wiring or crystal or transistor! Once it seems to be perking, one can look at the output on a scope, or a receiver, or an RF probe and transistor, or

valve voltmeter. None of these aids? Does a *harmonic* come onto an amateur band, or even an image frequency? If you are talking Top Band or Eighty, you might even turn to the RDF set in a boat, or the junior op's transistor portable with the short wave band; or have you a Class-D or BC-221, or even a counter?

So, now you've got your CO or CO's going, each on their own bit of PCB. Next, after putting these aside in a suitable box, we can start with the VFO. We know the coverage desired, which when mixed with our crystal oscillator(s), will bring us out 'on the band.' So, again to our humble scrap of PCB off-cut; but if you want good performance, send your variable capacitor to whoever you know who can ultrasonically clean it—it is quite surprising how a variable capacitor can be improved! (While we are on this subject, be quite sure whenever you are squirting contact cleaner of the *Lectrolube* type about that you don't let it reach the variable capacitors, or you'll find you have moved frequency somewhat!) The circuit doesn't much matter if it's put together right. For instance, double-sided PCB should not be used for the VFO, even though we like it elsewhere, as will be shown soon. The point is that with one side acting as a ground-plane, it has capacity to the other side, and so to various components in the frequency-determining parts of the VFO, both the ones that are drawn on the circuit *and* the other ones! This "capacitor" is very temperature sensitive. If possible,

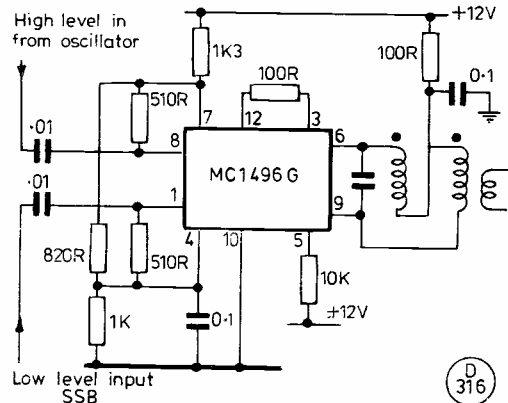


Fig. 2 IC DOUBLE BALANCED MIXER

IC double-balanced mixer; see text for definition of 'high level' and 'low level'.

D
316

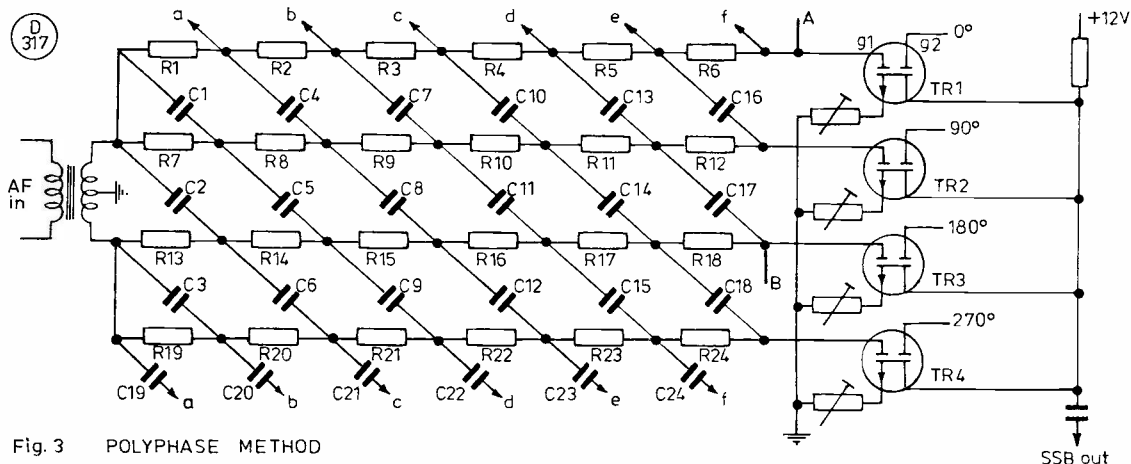


Fig. 3 POLYPHASE METHOD

Polyphase SSB generator. Note that the CO driving the TTL 7473 IC must run at *four times* the SSB generator nominal frequency, i.e. for an SSB generator output frequency of 2.5 MHz the CO input to the 7473 must be 10 MHz. Gate 2 of each dual-gate Mosfet goes to the 7473 output indicated. Adjust source pots for best sideband suppression; to change sideband, switch A and B points.

one should use an inductor with no core, and certainly not a toroidal core; if you must have a core, adjust the turns ratio and capacitances so that you are where you want to be, with the slug barely seeing the coil. Fixed capacitance could well use polystyrene types, but the writer has been luckier than others with silver-mica types. Of course the transistor should have a good high F_T and be a gainy type so that the feedback to sustain oscillation can be kept down to a minimum; the value for F_T can be, for a rule of thumb, about 30 times the VFO frequency. Similar requirements govern the selection of an FET for a VFO. With single-sided PCB off-cut, one can mount all the components except the variable, and then stick the PCB to the capacitor so that the whole shooting-match is solid and 'moves as one.' It all goes in its own box, preferably one of the die-cast ones.

As we have already indicated, the VFO and the CO when mixed will come out on the desired band, so if you have an amateur bands only receiver you can mix them and listen for the result on the band, tweaking until you get the frequency and bandspread right for the dial drive you happen to be using. Any old mixer will do for the

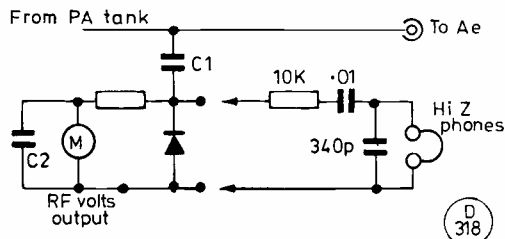


Fig. 4 Alignment gadget by 2L2AMJ

Alignment: the RF output meter and diode should be a part of the transmitter PA output, and the alignment gadget is connected as shown. With single AF tone into the mic., socket of the Tx, loading into dummy load, align/tune for a peak on the meter and minimum AF response in the 'phones.

Table of Values

Fig. 3

C1, C2,	C16, C17,
C3, C19 = 0.047 μ F, 5%	C18, C24 = 6800 pF, 2%
C4, C5,	
C6, C20 = 0.033 μ F, 5%	All resistors = 5.6K, Electrofil
C7, C8,	TR4, 2%.
C9, C21 = 0.022 μ F, 5%	
C10, C11,	X1, X2, $\bar{X}1$, $\bar{X}2$ output from
C12, C22 = 0.015 μ F, 5%	TTL 7473, phase as shown.
C13, C14,	Four dual-gate Mosfet's modula-
C15, C23 = 0.01 μ F, 5%	tor.

moment, and why not a simple diode? Or, of course, we may just prove it is running by one of the methods we applied to the CO, and let the accurate trimming of it wait till later.

Mixers

This is where the problems show up, and we offer two very fundamental rules which will keep you out of trouble. One is to be quite clear as to the sizes of the signal voltages to be applied to the ports of the mixer, and their relative amplitudes, and to stick at it until you get them right; the other is simply to *always* use a doubly-balanced mixer circuit if possible, to regard a singly-balanced mixer as a poor substitute, and to look down your nose at any 'normal' mixer. *Don't* look down your nose at a double-balanced mixer using four diodes as not very modern—not only is it as modern now as when it first appeared, but it also can give very fine results.

On the other hand, one could do a lot worse than go to a *Motorola* MC1496G; the high level signal into Pin 8 of the order of 300 mV, and the low-level signal into Pin 1 with no more than 10 mV maximum of modulation or modulated RF. Look at Fig. 2, and bear in mind that the IC in question when used at the front-end of a direct-conversion receiver is capable of hearing a signal

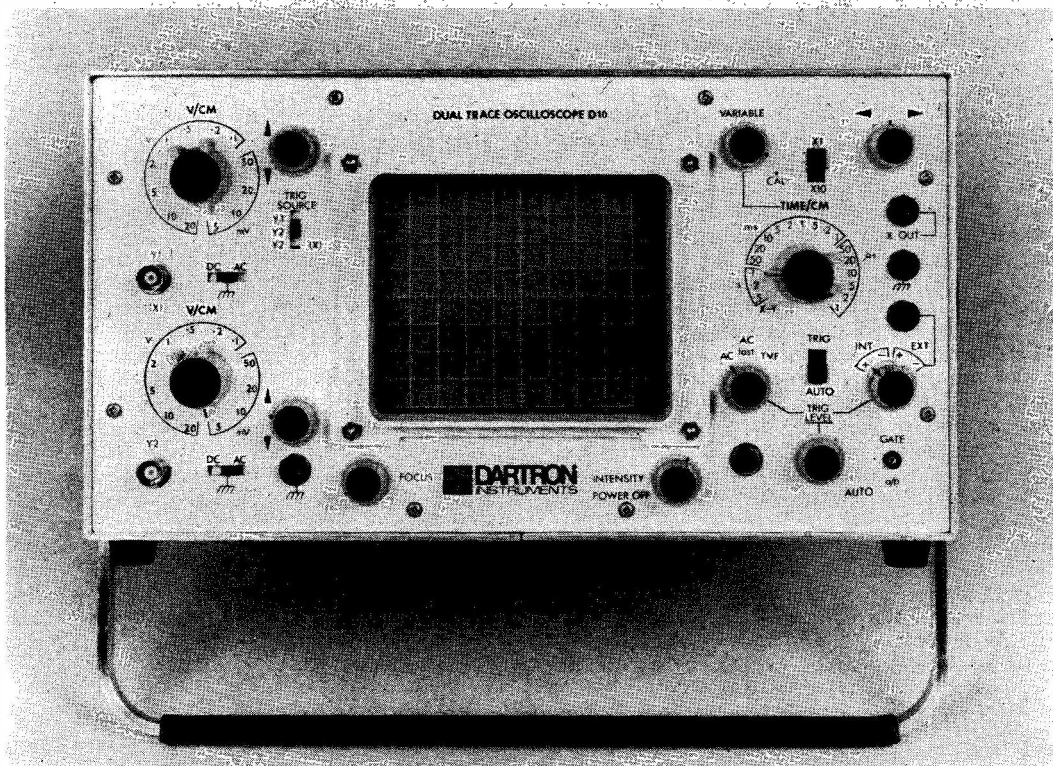
of 0.1 microvolt; the IC double-balanced mixer is preferred to the all-diode one simply because it doesn't need such hard driving from the local oscillator. Incidentally, if you are working a double-conversion arrangement and one of your mixers is going to have CW into both Pins 1 and 8, then while the high-level signal continues at 300 mV, one can get away with 100 mV. into Pin 1. But, as we have said, if you are putting a modulated signal into Pin 1, *keep it low*. Build the circuit up, and feed it with the frequencies required, taken from the oscillators already built, and see it play.

Sideband Generation

Here we have, as already noted, two choices: phasing or filtering. Phasing can be done by using the classic phasing network at audio, as has been shown in the handbooks for about thirty years; perhaps the best known are due to Dome, and the one originally popularised in the "SSB Jr." exciter by W2KUJ, published in the American *GE Ham News*, November and December 1951. At RF, one can use the low-Q phasing network, also of 30 years ago! What about a more modern

approach? The polyphase method, originally written up by M. Gingell in 1973, and later written-up and discussed by G3VA and G3PLX seems to offer a good sideband suppression characteristic; one can build the circuit as shown (Fig. 3), and feed into the four polyphase modulators the output from a 7473 dual JK flip-flop, which in its turn is driven from the CO which feeds the sideband generator. The only difference is that now the CO is not at the nominal frequency of the generator but is four times higher, so that the gate outputs at Pins X1, X2, XI, X2, pins can go successively down the modulator FETS. The writer has tried the system and it works; two per cent components were used, which is rather better in tolerance than the drawing shows.

If, instead, you insist on filtering, go out and buy the filter and then design your generator around it. One can get the 9 MHz filter type from *KVG*, or lower-frequency ones from *Collins*, *Kokusai* (much used by *K.W. Electronics Ltd.* over the years), and the more recent *Toko* devices from *Ambit International* in Brentwood. These last types of filter all come around the 455 kHz mark, which is one reason for double-conversion



Costing under £200, the Model D10 dual-trace oscilloscope is the latest product of Dartron Instruments Ltd., Crown House, 280-282 Wood Street, London E17—from whom full details may be obtained.

at any band higher than 3.5 MHz. Check the blurb with the filter, looking down the side by 20 dB; that is the frequency you have to get your crystal oscillator on to. Feed audio into one port of a balanced modulator (call it a double-balanced mixer!) and RF in t'other; when balanced you get double sideband *minus* carrier and audio. Push it into the filter, taking great care that nothing leaks round it; that means metal screens between input and output, correct terminations and all the rest. One sideband will struggle through the filter, but the other one will not; so now you have SSB. Whether its USB or LSB depends on which side of the filter you put your CO; you can have two carrier crystals, switched, for this CO, and put one on either side, so you can switch sidebands, or you can go simple and sensible and so arrange your oscillators and mixing for the band that you come out on the sideband you prefer anyway. Take your choice.

So . . . you have got a whiff of SSB on the desired spot. What you need now is a straight Class-A amplifier stage to bring it up a bit, and then go to a valve in Class-A, followed by a 6146 or a pair in the PA. Alternatively, the valve Class-A stage may drive a transverter and take you into another band. Either way, it must be set up. For this you need a receiver which has a CW filter in it, and a 1 kHz oscillator of *good* waveform. If you only have SSB selectivity in the receiver then you can alter the oscillator to give 2 kHz of audio of good shape. Best of all—you'll see why in a moment—is to have both, even though you have a CW-selectivity receiver, *see* Fig. 4. One just runs the beast into a dummy load, and tweaks for maximum meter indication, at the same time putting on the alignment-gimmick and tweaking the sideband pots in the balanced modulator for minimal tone. If you have a 1 kHz tone into the mic. socket of the rig, and no carrier, then you will hear a 2 kHz tone, as upper and lower sidebands beat against each other; get rid of the tone by tweaking. Change to the 2 kHz oscillator, so now you hear a 4 kHz beat, and again you tweak for minimum tone and maximum meter reading.

There are two reasons for the choice of tone frequencies: the 1 kHz oscillator will have a second harmonic of 2 kHz, so there is only so far you can go in tweaking the 2 kHz away, and when you change to the 2 kHz audio tone the second harmonic is outside the audio passband. If you are phasing with a W2KUJ-type network you should repeatedly switch sidebands too, in order to get the best suppression of both tones when used on either sideband. Now, the point about the higher-frequency audio input, apart from telling us whether the tone second harmonic is significant by taking it outside the AF passband, is that if we switch from lower-frequency tone to higher, and the 4 kHz is equal to or greater than the 2 kHz signal, then the problem is less in the filtering or phasing networks than in the balance of the various double-balanced mixers (or modulators if you insist!); these therefore, be

looked at with care and removed from the argument one by one. However, if you used the IC we suggested, you out not to have significant problems.

Summary

So, what have we done? We have presented you with a way of getting a home-brew SSB rig into being, some bits of circuitry, and the concept that each bit is to be *tested and got working before the next step is taken*. We say clearly and unequivocally that that last phrase is the only new idea we have presented to you (apart from maybe suggesting you try a few semiconductors instead of valves!). And, for the record, we have indicated that we don't think a transistor SSB PA is practical with simple test gear, or a load comprising an aerial which falls down or changes impedance with a puff of wind. Now, a VMOS FET would do the trick, and soon *Siliconix* will be selling 'em cheap. . . .

Oh, yes, and we called for a receiver with which to set-up—and then proceed to use a gimmick device instead: because when the gimmick device runs out of steam you'll have the receiver, and you'll need it if you intend to have a QSO with your new rig. You can't work 'em if you can't hear 'em.

NOVICE LICENCE PROPOSAL

A. D. Taylor, G8PG, writes to tell us (in his capacity as an Executive Committee Member of the recently formed European CW Association) that the E.C.W.A. is examining the possibility of Western European nations introducing a CW-only Novice Amateur Radio Licence. This licence would be a stepping-stone for beginners who wish to qualify eventually for a full amateur licence; the proposed licence conditions are:

1. A simple examination covering regulations and radio theory.
2. A 5 w.p.m. Morse test (administered by any amateur who has held a full licence for at least 3 years).
3. Crystal control only, in defined segments of amateur bands (HF and VHF).
4. Maximum power input 10 watts.
5. Holders of an R.A.E. pass certificate need only pass the Morse test.
6. A Novice licence could only be held for 2 years in any 5 year period.

To try and establish the volume of support for such a proposal, G8PG asks that those in favour of the idea (whether licensed or not) should send their names and addresses to him—on a post card—at 37 Pickerill Road, Greasby, Merseyside L49 3ND.

The European CW Association consists currently of the Scandinavian CW Activity Group, The West German CW Activity Group, the TOPS CW Club (UK), and the G-QRP Club.

BEAM ANTENNAS, ROTATORS, MASTS AND GUYS

AN INSIGHT INTO SOME DESIGN PROBLEMS

HAROLD BEDFORD, A.R.I.C.S., G8MRH

This Paper was presented for discussion to members of the Reigate Amateur Transmitting Society and appeared in their monthly Newsletter. As it was thought worthy of wider circulation, it is reproduced here.

WHEN considering the design of beam antennas, the use of rotators, the erection of masts or towers together with the strain on guy wires, a knowledge of simple mathematics is required in order to apply some fundamental formulae, so that a safe and satisfactory design will result. The formulae are not involved, provided that the steps are taken in a logical sequence and the worked examples should make this clear and easily understood. In using the formulae be very careful to keep the "units" used the same and watch carefully the "powers" when cancelling out.

Guesswork coupled with luck may see you through but it usually means that the system is overdesigned. If the system fails, due allowance has not been made for some vital factor. Apart from the frustration caused—it always happens at a most inconvenient time—it could be costly especially if there is damage to life or property and insurers may quibble if they consider the design of a system to be unsafe. The objective is too match the strength of the materials used (aluminium or steel) with the maximum anticipated loads. Throughout we shall be dealing with 'moments.' A moment is a term used to denote the effect of a load or force applied at a distance from a point under consideration.

Symbols and Formulae

The following symbols and formulae will be used in the calculations: M_B = Bending Moment in ft/lbs. or lbs/ft.

Fig. 1a illustrates a beam cantilevered out from a wall, but obviously it would be a mast held at the base and extending vertically (W is weight in lbs. and L is in feet). In Fig. 1b the weight (W) would be replaced by a wind force (F) in lbs., and as the load is distributed it is

the same as that applied at the mid-point of the beam as a point load. It is obvious that the bending moment (M_B) must be equal to the moment of resistance (M_R) at the point of anchorage (f is the tensile strength of the material in lbs. per sq. inch). For identical sections under load aluminium will have about three times the deflection of steel. This "low stiffness" or elasticity enables aluminium better to withstand shock or impact loads.

I is the second moment of area of cross section in ins.⁴;
 C is the distance from the neutral axis to the extreme fibres; Z is the section modulus in ins.³ and equals $\frac{I}{C}$

The formulae and their relationships between I , Z and C for the two main types of sections most commonly used are shown in Fig. 2, and the strength of materials is shown in Table 1.

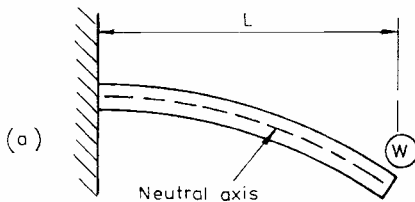
Allowable Design Stress is the ultimate in safety and is used by structural engineers to ensure safety in the most stringent cases of loading. It is covered by B.S.Spec. CP/118.

Proof Stress is the standard derived from a stress/strain curve which departs from a straight line by 0.2 per cent of its gauge length. In other words, if a load is applied the deformation will be proportional to the stress, and when the load is removed the tube will return to its original shape.

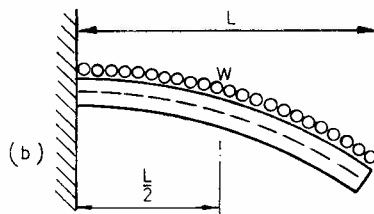
Ultimate Stress is the maximum stress the tube will withstand before rupture; i.e. the tube will bend and remain permanently bent. In the design of Beam Antennae a compromise is called for: to design to the standards of "allowable design stress" will result in too heavy an array which will overload most rotators. Taking a reasoned judgement "proof stress," i.e. a tensile stress of 39500 lbs/ins.², has been used in the calculations (but see also the remarks under Para. 2 on the effects of wind). For tubing up to $\frac{1}{4}$ in. wall thickness, some of the hard calculation work can be eliminated by using Table 2.

Effect of Wind

The formula is: $F = A \times P$, where F is the wind load force in lbs., A is the effect area in sq. ft. on which the wind is acting, and P is the wind pressure in lbs/ft.². It is usual to quote wind velocity in m.p.h. and the pressures (P) for the velocities normally encountered are shown in Table 3.



Point load $M_B = WL$



Distributed load $M_B = \frac{WL^2}{2}$

(a) Single load on Cantilever Beam

(b) Distributed load on Cantilever Beam

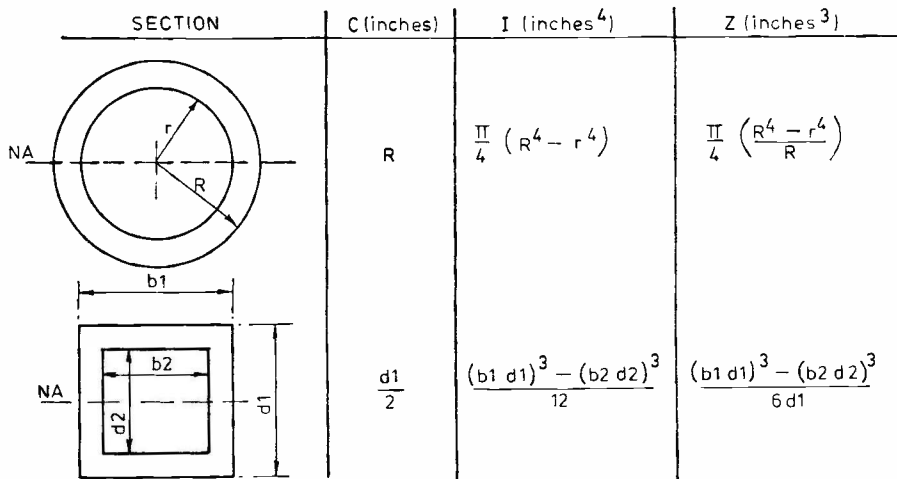


Fig. 2 TYPICAL SECTIONS OF MATERIALS USED AND RELATED FORMULAE

D 268

Table 1. Spec. types 6061, 6063 and 6082 are generally available. Types 2024 and 7178 are aircraft-quality alloys not generally available, also very costly and needing anti-corrosive treatment to withstand the effects of weather.

Materials	Tensile Strength (f) in lbs/in. ²				
Pine or Bamboo	4000				
Steel	40000				
Aluminium	Extruded tube up to 1/4 in. wall thickness				
International Spec.	B.S. Spec.	Use	Allowable Design Stress	Proof Stress	Ultimate Stress
7178	—	Aircraft	—	—	76000
6082TF	HE-30	Commercial	23500	39500	44800
6061	HE-20	Commercial	21267	34720	40550
2024	—	Aircraft	—	—	40000
6063TF	HE-9	Commercial	14112	23520	26880

It is good design practice to allow a wind load of 30 lbs/ft.² of area on flat surfaces and two-thirds of this, i.e. 20 lbs/ft.² on round cross-sections—e.g. masts or beam tube elements. This holds good for average conditions but obviously in exposed positions subject to abnormal winds, for instance the West Coast of Scotland, a higher loading should be used. Similarly in such places

as Sheffield and Glasgow, which seem to suffer freak winds in each 10 year cycle.

Turbulence is always present when wind acts upon a round tube thus creating a vortex; overcoming this is a highly technical study and discussion in detail is well outside the confines of this paper. Briefly what happens is that the wind sets up oscillations of the tube, which

TABLE 2

Tube diam. (inches)	Wall Thickness (inches)	Weight, Aluminium	Weight, lbs./ft. Steel	I (Ins. ⁴)	Z (Ins. ³)	C (Ins.)		
1	0.031	0.054	0.157	0.001	0.005	0.250		
	0.062	0.101	0.293	0.002	0.008	0.250		
	0.125	0.173	0.502	0.003	0.012	0.250		
	0.062	0.159	0.461	0.008	0.021	0.375		
	0.125	0.288	0.835	0.012	0.033	0.375		
	0.080	0.170	0.493	0.016	0.037	0.438		
	0.062	0.216	0.626	0.020	0.041	0.500		
	0.125	0.405	1.174	0.034	0.067	0.500		
	0.078	0.300	0.870	0.036	0.064	0.562		
	0.062	0.274	0.795	0.041	0.071	0.625		
	0.125	0.520	1.508	0.071	0.113	0.625		
	0.062	0.332	0.963	0.073	0.097	0.750		
2	0.125	0.635	1.840	0.129	0.172	0.750		
	0.062	0.447	1.296	0.179	0.179	1.000		
	0.125	0.865	2.508	0.325	0.325	1.000		
	0.250	1.616	4.686	0.537	0.537	1.000		
	3	0.125	1.328	3.851	1.169	0.779	1.500	
		0.250	2.540	7.366	2.059	1.373	1.500	
		4	0.125	1.790	5.191	2.859	1.429	2.000
			0.250	3.463	10.043	5.200	2.600	2.000

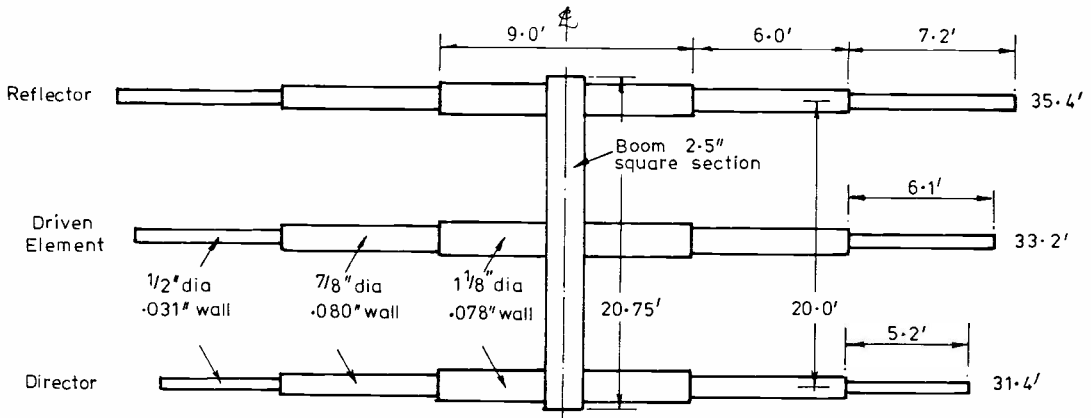


Fig. 3 THREE ELEMENT 20m BEAM WITH ELEMENTS CUT TO 14.15 Mc FOR GENERAL COVERAGE OPERATION WITH A SWR OF LESS THAN 1.5 : 1. GAIN APPROX 8.5dB

D 269

if not damped will cause it to fail. Methods to minimise this could, in vertical masts, be to fill the tube with sand and in the case of elements to stretch a nylon rope tightly from end to end. 'Vortex shedding' on guyed cylindrical metal chimneys of factories is achieved by arranging around the outside of the chimney a helix of strip metal. Wind velocity increases with height above ground and the figures in Table 3 hold good up to a height of 50 feet. Between 50 and 150 feet above ground increase the wind loading by 50 per cent.

Enough information is now available to commence design.

TABLE 3

Wind Velocity M.P.H.	Wind pressure on a flat surface lbs/ft ²
50	10.5
60	15.1
70	20.6
80	26.8
90	34.0
100	42.0

Example 1. Consider a 3-element 20 metre beam, Fig. 3. As the beam is symmetrical about its centre-line only one half-section need be considered for mathematical check. The driven element is chosen for example but both the reflector and director have to be analysed. All the elements are assumed to be to Spec. 6082TF aluminium. See Fig. 4.

Consider Section 3. 1/2 in. Ø tube, 6.1ft. long, 0.031in. wall thickness:

$$M_{\max.} = Z \times f = \frac{0.005 \text{ ins.}^3 \times 39500}{\text{in.}^2} = \frac{197.5}{12} = 16.46 \text{ ft./lbs. max. permissible.}$$

$$\text{Wind load per foot} = 0.5 \times \frac{1}{12} \times 20 = 0.83 \text{ lbs.}$$

$$\text{Tube weight per foot} = 0.05 \text{ lbs.}$$

$$\text{Total load per foot} = 0.88 \text{ lbs.}$$

$$\text{Total load on Section 3} = (F_3) = 6.1 \times 0.88 = 5.37 \text{ lbs.}$$

$$\text{Bending Moment } M_3 = 3.05 \times 5.37 = 16.4 \text{ ft./lbs.}$$

(As the load is distributed it acts at half the length, L/2

i.e. —). The design is sound as the Bending Moment

2 (M_{actual}) is within the "max. permissible" (M_{max.}), i.e. 16.46ft/lbs.

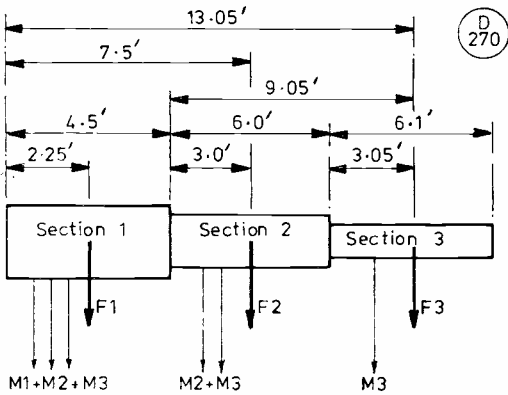


Fig. 4 ONE HALF SECTION OF DRIVEN ELEMENT USED FOR MATHEMATICAL ANALYSIS

Designing the Beam Antenna

First determine the frequency for which the beam is to operate. Formulae for calculating element lengths, spacing, F/B ratios, SWR, power gain and bandwidth for desired frequencies are contained in the many handbooks. The array can now be sketched out with an approximation of tube sizes and lengths for each element. By using the formulae and tables, it can be ascertained if the assumptions made are viable.

Consider Section 2. $\frac{7}{8}$ in. \varnothing tube, 6ft. long, 0.080in. wall thickness:

$$M_{\max.} = Z \times f = 0.037 \text{ins.}^3 \times 39500 \frac{\text{lb.}}{\text{ins.}^2}$$

$$= \frac{1461}{12} = 121.8 \text{ft./lbs. max. permissible.}$$

$$\text{Wind load per foot} = 0.875 \times \frac{1}{12} \times 20 = 1.46 \text{ lbs.}$$

$$\text{Tube weight per foot} = 0.17 \text{ lbs.}$$

$$\text{Total load per foot} = 1.63 \text{ lbs.}$$

$$\text{Total load on Section 2 (F}_2\text{)} = 6.0 \times 1.63 = 9.78 \text{ lbs.}$$

$$\text{Bending Moment } M_2 = 3.0 \times 9.78 = 29.34 \text{ ft./lbs.}$$

$$\text{Bending Moment } M_3 = (6.0 + 3.05) \times 5.37 = 48.60 \text{ ft./lbs.}$$

$$\text{Total Bending Moment } M_2 + M_3 = 77.94 \text{ ft./lbs.}$$

This is within the "max. permissible" i.e. 121.8ft./lbs.

Consider Section 1. $1\frac{1}{8}$ in. \varnothing tube, 9ft. long, 0.078in. wall thickness:

$$M_{\max.} = Z \times f = 0.064 \text{ins.}^3 \times 39500 \frac{\text{lb.}}{\text{ins.}^2}$$

$$= \frac{2528}{12} = 210.6 \text{ft./lbs. max. permissible.}$$

$$\text{Wind load per foot} = 1\frac{1}{8} \times \frac{1}{12} \times 20 = 1.88 \text{ lbs.}$$

$$\text{Tube weight per foot} = 0.30 \text{ lbs.}$$

$$\text{Total load per foot} = 2.18 \text{ lbs.}$$

In this case it is only necessary to consider half the length of Section 1, i.e. about the centre-line of the boom.

$$\text{Total load on Section 1 (F}_1\text{)} = 4.5 \times 2.18 = 9.81 \text{ lbs.}$$

$$\text{Bending Moment (M}_1\text{)} = \frac{4.5}{2} \times 9.81 = 22.07 \text{ ft./lbs.}$$

$$\text{Bending Moment (M}_2\text{)} = 7.5 \times 9.78 = 73.35 \text{ ft./lbs.}$$

$$\text{Bending Moment (M}_3\text{)} = 13.05 \times 5.37 = 70.08 \text{ ft./lbs.}$$

$$\text{Total Bending Moment } M_1 + M_2 + M_3 = 163.43 \text{ ft./lbs.}$$

The design is sound as the Bending Moment (actual) 163.43ft./lbs. is within the max. permissible i.e. 210.6ft./lbs. It is obvious that the shorter length of the director element may necessitate differing tube sizes or lengths. These should be calculated in a similar manner to that of the driven element.

It is noticeable, especially with 20-metre beams of aluminium tube construction, that there is considerable sag in the end elements; this is due to the elastic properties of aluminium—possessing about three times the elasticity of steel—and is the same for all grades of aluminium and is a function of tube diameter and wall thickness. As the array is evenly balanced about its centre point, i.e. at the attachment of the drive tube, it will not in itself produce a Bending Moment—only a compressive load equal to its weight. This can be calculated from the data given. The compressive stress of aluminium is taken as being equal to the tensile stress and provided a suitable rotator is chosen compressive

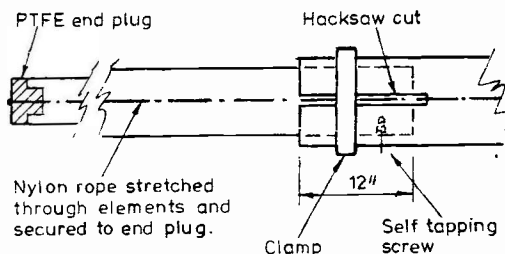


Fig.5 DETAIL OF ELEMENT JOINTS AND VORTEX SUPPRESSION ROPE

D 271

sive stress will not be a problem. However, if desired a thrust bearing can be used to minimise the load on the rotator.

Having completed the design of the array consideration must be given to its attachment to the rotator. But first it is necessary to know the wind load that is likely to be experienced. This is calculated as follows:

Example 2. Referring to the design of the array the wind loads are:

(i) Area of the three centre-sections,

$$3 \times 9.0 \times 1\frac{1}{8} \times \frac{1}{12} = 2.53 \text{ sq. ft.}$$

(ii) Area of the three mid-sections,

$$6 \times 6.0 \times \frac{7}{8} \times \frac{1}{12} = 2.63 \text{ sq. ft.}$$

(iii) Area of end sections of the reflector elements,

$$2 \times 7.2 \times \frac{1}{2} \times \frac{1}{12} = 0.60 \text{ sq. ft.}$$

(iv) Area of end sections of the driven elements,

$$2 \times 6.1 \times \frac{1}{2} \times \frac{1}{12} = 0.51 \text{ sq. ft.}$$

(v) Area of end sections of the director elements,

$$2 \times 5.2 \times \frac{1}{2} \times \frac{1}{12} = 0.43 \text{ sq. ft.}$$

$$\text{Total wind area of elements} = 6.70 \text{ sq. ft.}$$

As the elements are round, a wind load of 20lbs/ft.² is used. The wind load on the elements is $6.7 \times 20 = 134.0$ lbs. Now consider the boom: this is $2\frac{1}{2}$ in. square section it is usual practice to use for calculation purposes the length of the diagonal cross-section, i.e. the side dimension $\times 1.4$, and this is 3.5ins. As this surface is flat, a wind load of 30lbs/ft.² is used.

$$\text{Wind load on boom} = 20.75 \times 3.5 \times \frac{1}{12} \times 30 = 181.6 \text{ lbs.}$$

The most critical wind load is the one to be used in calculating the connecting tube to the rotator. In the example this is the boom wind load. Most manufacturers of commercially-made beams give the wind loading on the array and this obviates a lot of calculation. However, the beam has to be carried on a length of tube to connect to the rotator. Differing makes of rotators accept drive

tubes of varying diameters and it is good practice to adopt maximum tube diameter acceptable. The bending moment produced by the beam on the tube and the moment of resistance at the rotator are critical.

Connecting the Beam to the Rotator

A commercially-made antenna for 2-metres together with a readily available rotator will form the basis of calculation for the next example. Judging by the number of bent television masts one sees, plus the fact that the drive tube will have little load effect on the rotator it will be prudent to use the "allowable design stress" *i.e.* 23500lb/ins.².

Example 3. Using a J-Beam 6-element quad Type Q6/2M and a Stolle automatic rotator, is it required to know the maximum length of connecting tube between beam and rotator. The Stolle rotator will accept a tube of 1½in. maximum diameter; J-Beam give a wind load of 72·6lbs. at a wind velocity of 100 m.p.h. Aluminium tube 1½in. Ø with 0·125in. wall thickness, to spec. 6082TF will be used. Let L be the length of the mast in feet.

Using the bending moment formula:

$$M_{max.} = Z \times f = 23500 \times 0.172 \times \frac{1}{12} = 336.8 \text{ ft/lbs.}$$

Wind load of antenna = 72·60lbs.

$$\text{Mast wind load} = L \times 1.5 \times \frac{1}{12} \times 20 = 2.50L \text{ lbs.}$$

$$\text{Bending Moment, } M_{actual} = (72.6 \times L) + \left[(2.5L) \times \frac{L}{2} \right] \text{ ft/lbs.}$$

(L / 2 is used as this is a distributed load)

Equating the Bending Moment (M_{actual}) with the maximum Bending Moment ($M_{max.}$), L can be solved.

$$72.6L + 1.25L^2 = 336.8$$

Re-arranging the equation $1.25L^2 + 72.6L - 336.8 = 0$. Using the formula for solving a quadratic equation:

$$L = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Where $a=1.25$, $b=72.6$ and $c=-336.8$, we have:

$$L = \frac{-72.6 \pm \sqrt{72.6^2 - 4(1.25 \times -336.8)}}{2 \times 1.25}$$

$$\frac{-72.6 \pm \sqrt{5270 + 1684}}{2.5} = \frac{-72.6 + 83.4}{2.5} = 4.32$$

= 4ft. 4ins.

This is the maximum length of tube allowable between the beam antenna and the rotator.

The use of the Stolle alignment bearing Type RZ-100 (which is in effect a thrust bearing) will increase the Bending Moment ($M_{max.}$) if installed as directed by

22lbs/M. If it is desired to arrange more than one antenna on the drive tube (or create a "Christmas tree") the wind loading on each antenna must be ascertained and the sum of these used for calculation. It will be readily appreciated why manufacturers of rotators state that the drive tube should be "kept as short as possible"!

Unsupported Masts

These can take the form of (a) pole type or (b) a lattice tower.

(a): It is possible to design a self-supporting pole mast up to a height of 50-60 feet by the same principle employed for beam elements to carry at the top a small rotator and a simple 2-metre array. However, to obtain "nesting" tube sections from about 2ins. diam. at the top to 4ins. diam. at the base, calculations show that it has to be over-designed by two or three times, which makes it uneconomic. The mast (or gin pole if it is to be made a tilt-over type) will need to be sunk into the ground for at least 10 per cent of the mast length and embedded in a concrete foundation. As mentioned previously, aluminium has about three times the elasticity of steel and in a strong wind such a mast carrying a top wind loaded array, plus rotator of about 50lbs. load, could sway in a circle about 5-7 feet radius. Having satisfied yourself and the local authority building regulations, the YL might nevertheless be somewhat anxious and it may unwittingly create a tourist attraction! Not really a practical proposition.

(b): A lattice type mast of triangular section which could be made by the home constructor is shown in Fig. 6. It consists of 10ft. lengths of 1in. diameter steel tube, with ½ins. dia. steel rod bent as shown to form continuous braces on each of the three sides. The braces are welded at each point to the 1in. tube. A top and bottom plate are welded at the ends of each 10ft. length; solid rods extending 6-9 inches long to form a sliding fit with the next section are rivetted 6-9 inches into the ends of each length of tube. The next 10ft.

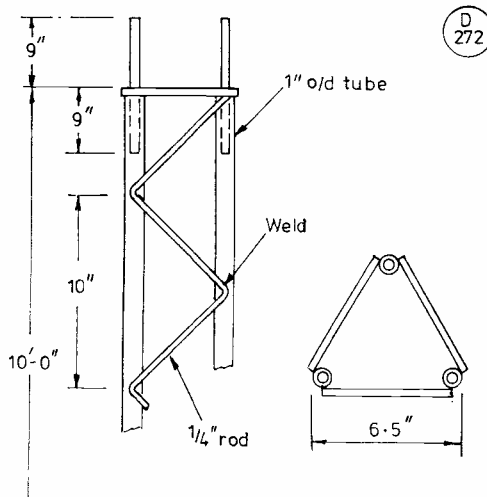


Fig 6 DETAIL OF LATTICE MAST CONSTRUCTION

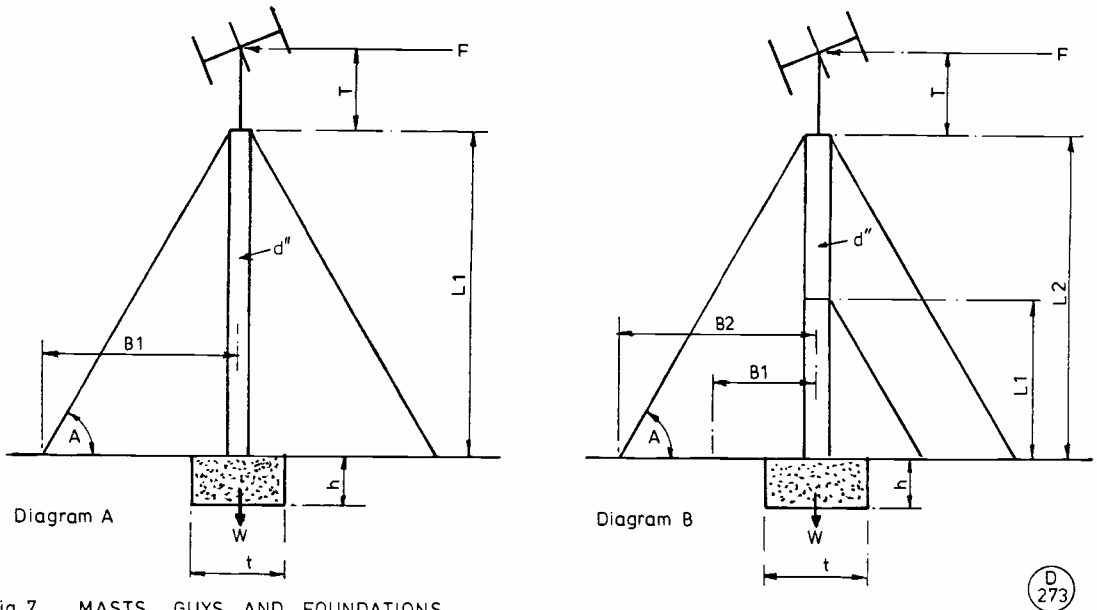


Fig. 7. MASTS, GUYS AND FOUNDATIONS

D
273

section will slip over these rods and be secured by a set screw. (A simple jig could be made to achieve a neat bending job of the 1/4 in. rod). Apart from the cost of materials the only "outside" cost would be for the welding which could be undertaken reasonably by the local garage. Do not attempt to construct this in aluminium as welding by any method materially reduces its strength. It will be necessary to rub down to free from surface rust the pipe sections and rod and then apply a weak solution of phosphoric acid (e.g. Jenolite); this creates a chemical action changing iron oxide (rust) into iron phosphate—a rust preventer. The mast can now be painted. Suitably guyed this type of mast could quite safely be extended to a height of 70 feet.

Guying and Guying

The formulae shown in Table 4 are used to determine the guy loads for diagrams 'A' and 'B', Fig. 7.

The top set of guys in diagram 'B' will have to take all the wind force on 'T' plus the antenna load and in addition about half the force between the top and lower

set of guys. Each guy wire should have a *breaking strength* of about four times the load as calculated. Guys (angle 'A') should never exceed 60° to the horizontal.

The value of 'K' in the formula for various angles at 'A' is shown in Table 5.

In Fig. 7, if the mast is round, then 'd' will be the tube diameter. If it is of lattice construction the 'actual' unit area of one face will have to be calculated. For the triangular mast given as example, the 'actual' face area is $(2 \times 10\text{ins.}) + (10\text{ins.} \times \frac{1}{2}\text{in.}) = 22.5\text{ins.}^2$ or $\frac{22.5}{10} = 2.25$ ins. per foot length.

This must be multiplied by 1.75 as a safety factor. The value of 'd' in the formula then becomes $27 \times 1.75 \times \frac{1}{12} = 3.9375$ ins. = 0.33ft. = 4ins.

The value of 'M' in the formula is dependent upon the number of guys in the set.

TABLE 4 — Guy Loads

Round Section Masts	Triangular Section Masts
Diagram 'A' $KM \left[\left(\frac{20 \times L_1}{2} \right) + F \left(1 + \frac{T}{L_1} \right) \right]$	Diagram 'A' $KM \left[\left(\frac{30 \times L_1}{2} \right) + F \left(1 + \frac{T}{L_1} \right) \right]$
Diagram 'B' Upper Set $KM \left[20d \left(\frac{L_2 - L_1}{2} \right) + F \left(1 + \frac{T}{L_2 - L_1} \right) \right]$	Diagram 'B' Upper Set $KM \left[30d \left(\frac{L_2 - L_1}{2} \right) + \left(1 + \frac{T}{L_2 - L_1} \right) \right]$
Lower Set $KM \left(\frac{20L_2 \times d}{2} - \frac{FT}{L_2 - L_1} \right)$	Lower Set $KM \left(\frac{30L_2 \times d}{2} - \frac{FT}{L_2 - L_1} \right)$

TABLE 5

Angle 'A'	K Factor	Ratio		Guys in set	'M' Value
		$\frac{B_1}{L_1}$	$\frac{B_2}{L_2}$		
59°	1.94	0.6		3	1.150
51°	1.60	0.8		4	1.000
45°	1.41	1.0		5	0.649
40°	1.30	1.2		6	0.578
36°	1.23	1.4		7	0.457
				8	0.415

Foundations for the Mast

First calculate the total combined weight (W) of the tower, beam, rotator and concrete base in lbs. (Concrete weights approx. 150lbs/ft.³). This will enable us to calculate 't' and 'h' in the diagrams 'A' and 'B', Fig. 7.

$$t \text{ (ft.)} = \sqrt{\frac{W}{100}}$$

and to calculate 'h':

(i) for single set of guys (Diagram 'A') with round mast,

$$h = 1 + \left[\frac{10L_1d - \frac{FT}{L_1}}{200t} \right] \frac{1}{200t}$$

for single set of guys (Diagram 'A') with triangular

$$\text{mast, } h = 1 + \left[\frac{15L_1d - \frac{FT}{L_1}}{200t} \right] \frac{1}{200t}$$

(ii) for double set of guys (Diagram 'B') with round

$$\text{mast, } h = 1 + \left[\frac{15L_1d}{200t} \right] \frac{1}{200t}$$

for double set of guys (Diagram 'B') with triangular

$$\text{mast, } h = 1 + \left[\frac{20L_1d}{200t} \right] \frac{1}{200t}$$

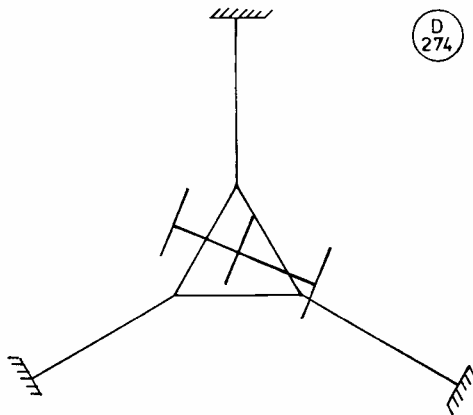


Fig. 8 PLAN VIEW OF MAST AND GUYS

Rotators

Most manufacturers of rotators supply a technical specification (some only on request) but unfortunately this information—whilst valid—only provides a part of the answer required. With large arrays the braking moment is important as is the starting torque; the brake action determines the ability of the rotator to hold the array and prevent it "hunting" in high winds. The starting torque has to overcome the weight of the array in order to turn it.

The compressive stresses (vertical loads) are relatively insignificant when compared with the Bending Moments, torque and braking moments. The most important criteria for a rotator is the bending moment, which coupled with torque, is the most damaging factor. (Refer to the relatively short length of tube from the rotator to the modest 2m. beam discussed earlier).

Some commercial masts use a long sleeve tube as an alignment bearing in which the drive tube rotates, thus

D 275

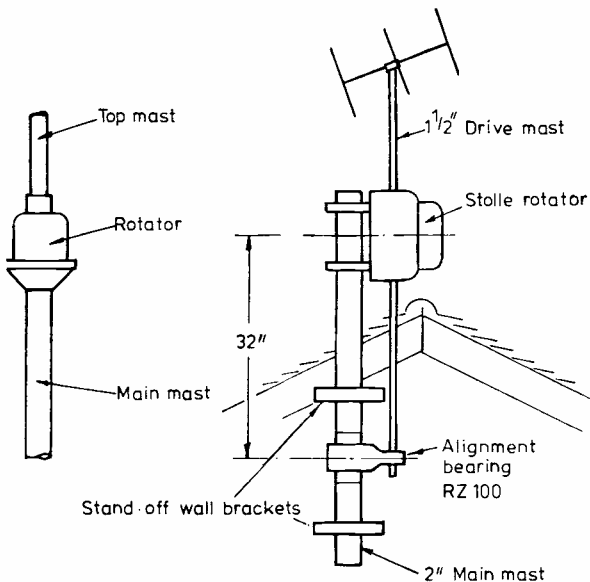
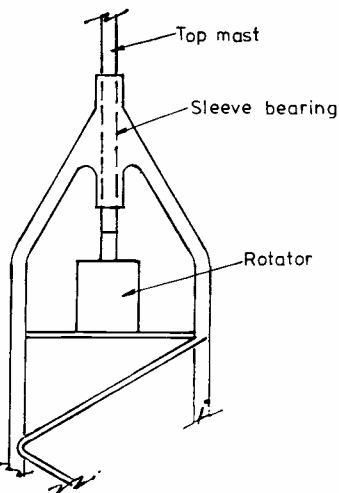


Fig. 9 TYPICAL ROTATOR INSTALLATIONS

removing the Bending Moment from the rotator to the sleeve tube; this could present problems for the home constructor. The Bending Moment ($M_{max.}$) can be increased by use of alignment or thrust bearings and this is sound practice. Some commercial masts use a long sleeve tube in which the connecting tube rotates, but this again presents problems for the home constructor.

At the end of World War II it was possible to acquire propeller-pitch motors which made admirable rotators after some modification; they were sturdy beasts and could handle the job comfortably but they needed low volts at high currents and coupling up to magslips (selsyns) and waterproofing. The amateur rotator took over from the propeller-pitch motor with all its attendant problems but the modern article, especially those of light-weight, suffered from a loss of robustness and this we must take into account. For the longer beams the more robust rotators will, if properly installed and treated, give years of trouble free service, but they will soon fail if misused or overloaded. Some typical rotator installations are shown in Fig. 9.

Corrosion

It has been stated that the greater the tensile strength of aluminium the more it suffers from the effects of corrosion from the atmosphere: to enhance the life of aluminium in the open, protective painting is necessary. First an etch-primer is applied after ensuring the metal is clean and free from grease or oxydisation; a finishing coat of cellulose paint can now be applied either by brush or spray. The materials used for clamps, screws and fittings should be preferably of aluminium or stainless steel (to Spec. 18/8). Brass especially, and mild steel, should be avoided like the plague as they will set up corrosion by electrolytic action which will cause the aluminium to disintegrate. It is good practice to run all joints and screws in a paste mixture of anhydrous lanolin and pure turpentine. Smear also all screws and joints after fixing with anhydrous lanolin cream.

Imperial v. Metric Units

In the examples and formulae Imperial units have been used: these are still in use and quite valid.

Conclusion

Perhaps the least known subject, and yet a vitally important part of amateur radio, concerns the antenna. The days when a length of wire strung between two trees coupled to the transmitter with a length of 600-ohm open-wire feeder have long since gone. Nowadays we have exotic beam antennas held up by masts and remotely tuned by rotators, the varieties and types of which are quite bewildering unless the underlying principles of design are understood. Both the design parameters and choice of rotators are quite wide, and without resorting to complicated mathematics the calculations are straightforward (albeit perhaps a little tedious). This should pose no deterrent to the keen amateur.

It is hoped this paper (whilst not claiming to be an exhaustive treatise) will to some extent shed a little light on this dark subject.

POWER FET'S AND RF

T. P. ELLIS, G8HIO

THE development of power FET devices has been talked about for many years, but the hardware has been notable by its absence. Recently, however, development has been concentrated on the fabrication of Vertical FET's as a means of achieving higher channel current density. Fig. 1 shows the typical cross-section through a conventional JFET and Fig. 2, by contrast, shows the cross-section of a vertical power JFET. Devices of the latter construction are available, such as the Sony 2SK60 (N-channel, 63W) and 2SJ18 (P-channel, 63W), and the Yamaha 2SK77 (N-channel, 200W) which are utilised in the respective Companies' audio products. The devices however, retain the disadvantages of conventional JFET construction and also exhibit high input capacitances, and thus their use above 1 MHz is severely restricted.

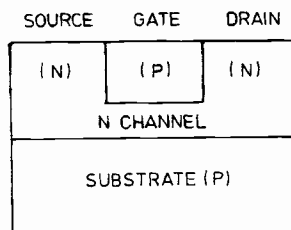


Fig.1 CONVENTIONAL N-CHANNEL JFET

VMOS

More recently much development has been concentrated on the fabrication of Vertical MOS (VMOS) FET devices.¹ The construction of a VMOS FET device is shown in Fig. 3.

A key advantage of the V-channel fabrication technology is that the upper frequency determining element, the gate length, is fixed by a diffusion process, permitting easy realisation of micrometre and even shorter gate lengths, with the added advantage of high attainable transconductance values.

The non-planar electrode arrangement, in contrast to the horizontal structure of Fig. 1, allows the interconnection of large area devices with less parasitic capacitance, thus making possible devices for high frequency power applications. Bipolar power transistors do not require special vertical structures, since their natural mode of current flow is vertical.

The V-channel fabrication yields further advantages in operation.

1. Both walls of the 'V' serve as channels, so that a single gate metal stripe controls two channels. The resulting short channel provides high current per unit of channel width.

2. No secondary breakdown due to the ON resistance having a positive temperature coefficient. A localised hot spot in a VMOS device causes the current through that area to decrease, thus lowering the dissipation. VMOS devices may therefore be paralleled without the

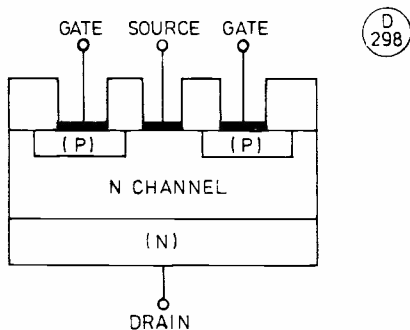


Fig. 2 VERTICAL CHANNEL JFET

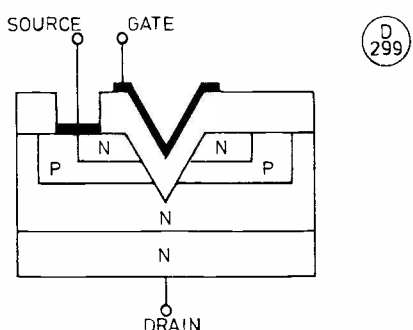


Fig. 3 VERTICAL MOSFET CONSTRUCTION (Siliconix)

Table 1a	Breakdown Vds Volts	Max. cont. Id Amps.	Typ. forward gfs. mU	Typ. Cin pF	Typ. Cout pF	Package
Siliconix						
VN33AJ	35	2.0	250	33	38	TO-3
VN84GA	80	12.5	2000	640	38	TO-3
VN33AK	35	2.0	250	33	38	TO-39
VN86HF	80	2.0	240	87	35	TO-202
VMP4	60	2.0	240	34	35	380-SOE Flange
C.T.C.						
BF25-35	65	3.5	700	—	37	—
BF50-35	65	5.0	1500	—	77	—
BF100-35	65	10.0	2200	—	170	—

use of equalising resistors, as the current sharing tends to be self equalising.

4. Excellent linearity; VMOS devices are capable of lower high-order intermodulation distortion, with products typically 5 to 10dB lower than bipolar transistors.

4. Because they draw virtually no DC input power, and have no thermal runaway problems, biasing networks can be very simple.

VMOS devices do, however, have some disadvantages.

1. About 10 volts is required at the gate for maximum drain currents; this drive requirement maybe reduced with further device development, but will not reach the low levels needed by bipolars, which only require the base-emitter junction to be forward biased.

2. High drain source voltages required for linear operation, about 24 volts, as compared to present bipolar devices.

3. VMOS is of an MOS structure, and therefore requires the same handling requirements. Devices are produced with a Zener of approximately 15 volts breakdown connected between the gate and source, but this forms a voltage-dependent capacitance. Devices with no static protection are therefore used for RF applications.

VN33AJ VN66AJ VN98AJ	VN35AJ VN67AJ VN99AJ	VDS VDS	Max. = 60 Max. = 90
VN33AK VN66AK VN98AK	VN35AK VN67AK VN99AK	VDS VDS	Max. = 60 Max. = 90

Table 1b. Equivalent devices. Note: The equivalents shown in the first column have a lower specified ON resistance than those in the second.

Available VMOS

At present there are only two manufacturers producing VMOS devices for RF applications with a product range available in Britain. These companies are Siliconix and C.T.C., of which only Siliconix devices are freely available at present.^{2 3}

The main device parameters are outlined in Tables 1a and 1b, but it should be remembered that as VMOS is in its infancy, the devices and their type codes are constantly changing. Further parameters for devices specifically for RF purposes are shown in Table 2.

Prices for the devices are difficult to quote at present, but an idea of costs to be expected are as follows: VMP4, £14.00; VN33AJ, £9.00; VN35AK and VN67AK, £4.00; and approximately £1.00 to £1.50 per watt for the C.T.C. devices, all excluding VAT.

Applying VMOS Devices

Fig. 4 shows the area in which VMOS will probably be applied in relation to currently available devices.

It has been advocated that use is made of the common source and common gate configurations, the common drain connection is not only more susceptible to unstable operation, but requires special drive circuitry since its voltage gain is less than unity. The common source configuration exhibits a large input impedance variation,

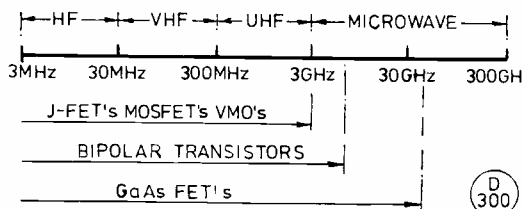


Fig. 4 VMOS in relation to established technologies

		Min. power gain, dB	Max. power in, watts	Max. power out, watts	Small signal noise figure, dB
VMP4	(1)	10	—	20	2.5
BF25-35	(2)	—	2.5	25	—
BF50-35	(2)	—	5	50	—
BF100-35	(2)	—	10	100	—

Table 2. (1) Results at $V_{DS} = 24v., I_D = 0.2A, f = 175 \text{ MHz}$; (2) Results at $V_{DS} = 35v., f = 175 \text{ MHz}$.

the reactive component changing by almost three orders of magnitude from 1 to 1000 MHz. In contrast, the common gate configuration results in an input impedance which is fairly flat with frequency. The characteristics therefore suggest that below 1000 MHz the common gate configuration is the more stable, whereas the reverse is true at higher frequencies.⁴

Applications

VMOS has been established for use in RF amplifiers operating in Classes A, B, C and their derivatives. A 2-metre transverter has been constructed utilising a VN66AJ VMOS as the 5 watt *p.e.p.* power amplifier. The stage has a measured performance of 12dB gain and two-tone 3rd order intermodulation distortion of -30dB relative to the carrier.⁵

VMOS, however, is not subject to minority carrier storage, and therefore is suitable for high-efficiency switching-type RF amplifiers of Classes D, E and F. Theoretically, amplifier efficiency cannot extend beyond 50 per cent for Class A, 78.5 per cent for Class B, and typically 85 per cent for Class C. In contrast, a theoretical efficiency of 100 per cent is attainable in a switching amplifier, but in practice is unattainable with VMOS

owing to the relatively high ON resistance. In practice however, a 5-watt Class E amplifier has been built with an efficiency of 90 per cent.

A further advantage of VMOS is their excellent small signal noise figure: the VMOS PA of the previously mentioned transverter has been measured as having a gain of 11dB and a noise figure of 2.4dB at 146 MHz when used as receive amplifier with no circuit changes. This implies that a highly linear PA can be constructed which, with suitable input and output switching, can be used as a receiver pre-amplifier with a high dynamic range.

Probably the most impressive application is the use of the VMP4 as a broadband amplifier, shown in Fig. 5. The amplifier is claimed to have a gain response within $\pm 0.5\text{dB}$ from 40 MHz to 265 MHz. The only special component is the 0.15 μH feedback inductor—a moulded choke is not suitable as it has too low a resonance. The amplifier may be used as a medium power amplifier of 1-2 watts *p.e.p.* output or, with changes in the input transformer to optimise the small signal noise figure, an untuned 'front-end' for a VHF receiver with a 3rd order intercept point of 47dB.⁶

The configuration used for a 200 MHz amplifier with a variable bias network has been outlined⁷. The amplifier, with its neutralisation network was measured as having a gain of 18dB, a noise figure of 2.5dB, and a reverse attenuation of over 50dB.

VMOS has also been shown to have advantages over bipolar counterparts for AM power amplifiers. A power amplifier has been constructed utilising a VMOS device⁸; low level modulation was utilised, the gate being modulated instead of the usual drain modulation method. The high gate impedance allows the use of low power modulation circuitry, the gate bias V_{GS} being varied; modulation in the practical stage is supplied directly by a 741 op-amp. The power amplifier was measured as having an efficiency of 52 per cent as compared to 62 per cent for the stage when used as an unmodulated Class-C amplifier. Modulation performance has been shown to be excellent even at levels as high as 93 per cent.

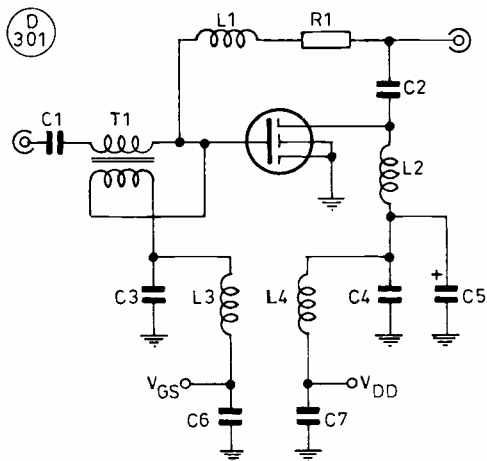


Fig.5 Broadband amplifier using the VMP4 device

Table of Values

Fig. 5

R1 = 180R	L1 = 6 to 8 turns, 32 s.w.g., on 1/2-watt 1M resistor, to produce 0.15 μH
C1 = 200 pF	
C2 = 470 pF	
C3, C4 = 1000 pF	
C5 = 1 μF , 50v.	L2 = 0.18 μH
C6, C7 = 500 pF	L3, L4 = 0.22 μH
T1 = 4 turns, 28 s.w.g., as twisted pair on ferrite toroidal core	

References

- "VMOS—A Breakthrough In Power MOSFET Technology", Siliconix Application Note AN76-3.
- "VMOS Power FETs Design Catalog", Siliconix Ltd., May 1978. (Available from Siliconix Ltd. UK).
- "C.T.C. Provisional Data", Communications Transistor Corporation. (Available from Walmore Electronics Ltd.).
- "Vertical Geometry Is Boosting FETs Into Power Uses At Radio Frequencies", by S. Ludvick (C.T.C.), *International Electronics*, 2/03/1978, pp. 105-108.
- "Two-Meter Transverter Using Power FETs", by L. Leighton *Ham Radio*, Sept. 1976, pp. 10-15.
- "VMOS Power FETs In Your Next Broadband Driver", Siliconix Technical Article TA76-1.
- "A New Technology: Application Of VMOS Power FETs For High Frequency Communications", Siliconix Technical Article TA76-2.
- "VHF/AM Transmitter Using VMOS Technology", by V. Petrovic and W. Gosling (Bath University), *Electronic Engineering*, June 1978, pp. 65-67.

CLUBS ROUNDUP

BY 'Club Secretary'

THE response to our attempt to operate a scheme which will avoid the need for club scribes to write each month has been overwhelming. However, it hasn't yet overwhelmed us: nonetheless it is vital that someone in the club looks at the information each month and makes *sure* any alteration is notified before it can be an embarrassment to us or the group.

New Club Proposed

G800W is quite definitely very keen to form a club in his district, and we are equally definitely surprised at the implication that there isn't one there already! Roger is thinking in terms of **Louth**, Lincolnshire, and the surrounding area. Anyone interested please get in touch as follows: R. D. Wilson, G800W, 112 Upgate, Louth, Lincs., or telephone him on Louth 2220.

The Mail

Addiscombe are primarily a contest club, but that doesn't stop them doing other things . . . like getting together at the Spread Eagle, Portland Road, S. Norwood on Tuesdays at about 9.15 p.m.

AMSAT-UK provides facilities for all those interested in space satellites (*Oscar* or *RS*) to keep up with the goings-on in this area, and indeed to make an active contribution. Details from the Hon. Sec. at the address in the Panel.

On to the mobile chaps, and their club, **A.R.M.S.**; anyone, listener or transmitting amateur, with an interest in /M would be well advised to join the group.

Ashford next—the one in Kent, that is—and the gang foregather at their Hq. on the top of Hart Hill, near Charing, on Tuesday evenings.

There seems to have been a bit of a change at **Barking**; they now only mention meetings on Thursdays, with a Morse class on Tuesdays. However, they are still at the same Hq., Westbury Recreation Centre, Westbury School, Ripple Road, Barking Essex.

Have you a teleprinter? If you have and intend to get it going on the air, then you should join **B.A.R.T.G.**; details from the Hon. Sec. at the address in the Panel.

Another special interest is amateur television, and here the club to join is **B.A.T.C.** A sub. is worthwhile just for the *CQ-TV* magazine they put out, which is full of useful and sensible circuits and data. Details from the Hon. Sec.—see Panel.

At **Bishops Stortford** they have a place at the British Legion Club, which is situated at the top of Windhill. They can be found here on the third Monday in the month, and since the last AGM things appear to be moving along nicely and attendances rising.

Down South to **Bournemouth** who have April 6 and 20 at the Dolphin Hotel, Holdenhurst Road. The former date is for an Auction Sale of Equipment and Gear, while the latter is reserved for G2KV to discuss the basic principles of Radar.

The name of **British Rail** indicates clearly enough the chaps the group want to recruit—details from the

Hon. Sec., see Panel.

On to **Bury** now, and we note their Hq. address is at Mosses Community Centre, Cecil Street, Bury; the booking is for the second Tuesday in each month.

Quite a lot of clubs have got a little out of sync. with our deadlines—sorry, chaps!—and one of these is **Cheltenham**, where we also note for the Panel a new Hon. Sec. The group get together at the Old Bakery, Chester Walk, which is at the rear of the Public Library, on the first Thursday and the third Friday in each month.

Moving on again, we come to **Cheshunt**; Church Road, Church Lane, Wormley, Herts., every Wednesday is the routine here.

Chichester have quite a large catchment area and a nice central Hq. at Room 34A, Lancastrian Wing, Chichester High School for Boys, Basin Road, Chichester; the clan gathers on the first Tuesday and the third Thursday each month.

According to our records, **Chiltern** are at the canteen of John Hawkins Ltd., Victoria Street, off Oxford Road, High Wycombe on the last Wednesday of the month. However, we have a small element of doubt and recommend a call to the Hon. Sec. before setting off if you are on a first visit.

Deadlines for "Clubs" for the next three months—

(May issue—March 30th)

June issue—April 27th

July issue—May 25th

August issue—June 29th

Please be sure to note these dates!

Chippenham on a Tuesday evening means a visit to the Liberal Club, 20 Gladstone Road, where the group are to be found between 7.30 and 10.0 p.m.

Cornish have their AGM on April 5, at SWEB Clubroom, Pool, Camborne, and on May 5 a talk by the Station Officer of St. Just Coastguard Station—this one should be an interesting variation from the amateur radio themes, the more so because the group has, to a very large degree, to be self-supporting in the matter of lectures and talks at meetings.

Crawley foregather at Trinity Church Hall, Ifield, and at members' homes alternately, the dates being the second and fourth Wednesday evenings—check with the Hon. Sec. for details.

The chuckle of the month is from **Cray Valley**, where the *Newsletter* editor made the mistake of asking the troops to authorise an increase in the size of this issue; a warranted certain way of drying up the supply of any material! Christchurch Centre, High Street, Eltham, is the Hq. address for a lecture on the first Thursday and Natter on the third one.

Crystal Palace will be found on March 17, listening to G5XB discussing the invaluable work of the Intruder Watch; the third Saturday, at Emmanuel Church Hall, Barry Road, London S.E.22. In addition, there is an informal on the first Tuesday in each month at various members' homes—to attend one of these it would be a courtesy to ask the Hon. Sec., at least for the first visit. His address is in the Panel.

The venue for **Derby** is 119 Green Lane, where they have a room of their own every Wednesday. April 4 is a

Junk Sale, and on 11th G3SZJ will talk about Simple Photography. April 18 is down for G3RKL to talk about the GB3HH and GB3SF repeaters, and on 25th there is a Film Show.

Dartford Heath D/F is, so far as we know, the only club in the country with a prime interest in amateur radio D/F activity. They foregather at the Scout Hut in Broomhill Road, Dartford on the first and third Friday evenings—but in summer-time check with the Hon. Sec. to make sure they aren't taking advantage of a long evening to organise an evening hunt!

We are in some doubt about the details for **Exeter**, and would appreciate being put straight by a member. However, we can say that we believe the Hq. address is the Community Centre, St. Davids Hill, and the date the second Monday. The contact is as shown in the Panel.

Now we must mention the **G-QRP Club**; as the name implies, it is for the low-power operator with an upper limit of around five watts, and boasts some 500 members. We could add that the *Newsletter* is one of the most

interesting we see, and always full of worthwhile construction or modification projects.

It's the second and fourth Thursdays at Watling Community Centre, 145 Orange Hill Road, Burnt Oak, if you want to join the **Edgware** gang.

Next we turn to **Guildford**, where the dates are April 13 and 27; the former is the NFD preamble, and the latter is the AGM. The only snag is that the Hq. is not quoted, and for that we must refer you to the Hon. Sec.—see Panel.

April 6 at **Hereford** is a visit to Barton Road Telephone Exchange, while the 20th date is still open at the time of writing; however trot along to the Civil Defence Hq., Gaol Street, Hereford, and there will most certainly be some entertainment organised.

Over the water this time, to **IRTS Region 1**; the *Newsletter* contains an interesting comparison with the newsletter of mid 1949—thirty years ago there were lots of inputs to the newsletter, mostly about the latest home-brew projects, and EI3CP concludes that some of

Names and Addresses of Club Secretaries reporting in this issue:

- ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, Acton, London W3 8LB.
 ADDISCOMBE: P. J. Hart, G3SIX, 42 Gravel Hill, Croydon, Surrey CR0 5BD. (01-656 9054.)
 AMSAT-UK: R. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ.
 A.R.M.S.: N. A. S. Fitch, G3FPK, 40 Eskdale Gardens, Purley, Surrey CR2 1EZ.
 ASHFORD (Kent): J. A. Clarke, G3TIS, Yeomans Cottage, The Street, Brook, Ashford, Kent. (Wye 812888.)
 BARKING: A. Sammons, G8IZN, 80 Lyndhurst Gardens, Barking, Essex IG11 5BZ.
 B.A.R.T.G.: J. P. G. Jones, GW3IGG, Heywood, 40 Lower Quay Road, Hook, Haverfordwest, Dyfed.
 B.A.T.C.: M. Cox, G8HUA, 13 Dane Close, Broughton, Brigg, South Humberside.
 BISHOP'S STORTFORD: T. E. White, G8LXB, 79 Elmbridge, Old Harlow, Essex.
 BOURNEMOUTH: G. D. Cole, G4EMN, 3A Cavendish Road, Bournemouth BH1 1QX. (Bournemouth (0202) 20027.)
 BRITISH RAIL: R. V. New, 29 Little Dock Lane, Plymouth, Devon PL2 2LZ.
 BURY: E. R. Thirkell, G4FOE, 59 Oulder Hill Drive, Bamford, Rochdale. (Rochdale 32730.)
 CHELTENHAM: G. Cratchley, G8MZV, 47 Golden Miller Road, Prestbury, Cheltenham. (Cheltenham 43891.)
 CHESHUNT: R. E. Chastell, G8LNM, 4 Fairley Way, Cheshunt, Herts. EN7 6LG. (Waltham Cross 35393.)
 CHICHESTER: T. M. Allen, G4ETU, 2 Hillside, West Stoke, Chichester PO18 9BL.
 CHILTERN: N. C. Ambridge, G4FRL, 53 The Avenue, Chinnor, Oxon. OX9 4PE.
 CHIPPENHAM: P. J. Tuck, 178 St. Edith's Marsh, Bromham, Chippenham, Wilts. SN15 2DJ.
 CORNISH: T. S. Evans, G3VGO, "Glengormley," Carnon Downs, Truro, Cornwall. (Devoran 864255.)
 CRAWLEY: A. V. H. Davis, G3MGL, 41 Gainsborough Road, Crawley, West Sussex RH10 5LD. (Crawley 20986.)
 CRAY VALLEY: P. J. Clark, G4FUG, 42 Shooters Hill Road, London SE3.
 CRYSTAL PALACE: G. M. C. Stone, G3FZL, 11 Liphook Crescent, London SE23 3BN. (01-699 6940.)
 DARTFORD HEATH D/F: A. R. Burchmore, G4BWV, 49 School Lane, Horton Kirby, Dartford, Kent DA4 9DQ.
 DERBY: Mrs. J. Shardlow, G4EYM, 19 Portreath Drive, Darley Abbey, Derby DE3 2BJ. (Derby (0332) 56875.)
 EDGWARE: D. L. Lisney, G3MNO, 119 Draycott Avenue, Kenton, Harrow HA3 0DA. (01-907 1237.)
 EXETER: Mrs. M. Jefford, 29 Dukes Road, Budleigh Salterton, Devon EX9 6QL.
 G-QRP CLUB: Rev. G. C. Dobbs, G3RJV, "Willowdene," Central Avenue, Stapleford, Nottingham.
 GUILDFORD: L. Bright, G4BHQ, 4 Dagley Farm, Shalford, Guildford, Surrey.
 HEREFORD: S. Jesson, G4CNY, 181 Kings Acre Road, Hereford. (Hereford 3237.)
 IRTS Region 1: J. Ryan, EI6DG, 23 Dollymount Grove, Clontarf, Dublin 3.
 LOUGHOR: T. Griffin-Thomas, "Riverside Manor," 77 Castle Street, Loughor, Nr. Swansea, W. Glamorgan. (Swansea (0792) 893392.)
 LOUTH (Lincs.): R. Wilson, G8OOW, 112 Ugate, Louth, Lincs. (Louth 2220.)
 MELTON MOWBRAY: R. Winters, G3NVK, 32 Redwood Avenue, Melton Mowbray, Leics. LE13 1TZ. (Melton Mowbray 3369.)
 NORTHERN HEIGHTS: L. Cobb, G3UI, 27 Moorlands Crescent, Cousin Lane, Halifax, West Yorks. (Halifax 60574.)
 ORMSKIRK: P. J. Kay, G4GCB, 24 Laurel Avenue, Bursbough, Ormskirk, Lancs. (Burscough 892416.)
 PETERBOROUGH: L. Critchley, G3EEL, 36 Waterloo Road, Peterborough, Cambs.
 R.A.I.B.C.: Mrs. F. Woolley, G3LWY, 9 Rannoch Court, Adelaide Road, Surbiton KT6 4TE.
 REIGATE: F. H. Mundy, G3XSW, Westview, rear of Manor Farm, off Reigate Road, Hookwood, Surrey. (Horley 73878.)
 ROYAL NAVY: M. Puttick, G3LIK, 21 Sandyfield Crescent, Cowplain, Portsmouth, Hants. PO8 8SQ.
 SALTASH: C. Squires, G3XCS, 5 Frith Road, Saltash, Cornwall.
 SILVERTHORN: C. J. Hoare, G4AJA, 41 Lynton Road, South Chingford, London E4 9EA. (01-529 2282.)
 SOLIHULL: R. A. Hancock, G4BBT, 80 Ulteries Road, Solihull, West Midlands B92 8EE.
 SOUTHDOWN: B. Chuter, G8CVV, 15 Coopers Hill, Willingdon, Eastbourne, East Sussex BN20 9JG.
 SOUTHGATE: J. Fitch, G8FEW, 16 Kent Drive, Cockfosters EN4 0AP. (01-440 7353.)
 STEVENAGE: T. J. Tugwell, G8KMV, 11 The Dell, Stevenage, Herts. SG1 1PH.
 STOURBRIDGE: S. Shacklock, G4IP, 12 St. Peter's Road, Stourbridge, West Midlands DY9 0TY.
 SURREY: R. Howells, G4FFY, 7 Betchworth Close, Sutton, Surrey SM1 4NR. (01-642 9871.)
 SUTTON & CHEAM: J. Korndorffer, G2DMR, 19 Park Road, Banstead, Surrey. (01-255 8729.)
 SWANSEA: P. Jones, GW4GRI, 27 Gorwydd Road, Gowerdon, West Glamorgan. (Swansea 873986.)
 THAMES VALLEY: R. J. Blasdel, G3ZNV, 92 Bridge Road, Chessington, Surrey KT19 2ET.
 VERULAM: A. Clarke, G8MAE, 24 Kiln Ground, Hemel Hempstead, Herts. HP3 8EZ.
 W.A.C.R.A.L.: L. Colley, G3AGX, Micasa, 13 Ferry Road, Wavne, Nr. Hull, HU7 5XU.
 WEST KENT: B. P. Castle, G4DYF, 6 Pinewood Avenue, Sevenoaks, Kent TN14 5AF.
 WIRRAL (West Kirby): M. McIntosh, G8NMG, 8 Brancote Gardens, Bromborough, Wirral, Merseyside.
 WOLVERHAMPTON: J. Cook, G8EDG, 75 Windmill Lane, Castlecroft, Wolverhampton WV3 8HN.
 WORCESTER: M. Tittensor, G4EKG, 16 Durocott Road, Evesham, Worcs. WR11 5EQ. (Evesham (0386) 41105.)
 YEOVIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil, Somerset.
 YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

the magic has been lost. However, IRTS is in good shape, as a contact with the Hon. Sec. will demonstrate.

Loughor is a place near Swansea, where there is a local group based on Loughor Boating Club as their Hq. We understand they get together on alternate Mondays, and any more details may be obtained from the Hon. Sec. at the address in the Panel.

For **Melton Mowbray** the place is the St. John Ambulance Hall, Asfordby Hill, Melton Mowbray, and the day the third Friday. More details if required from the Hon. Sec. at the address in the Panel.

The British Sub-Aqua Club, Mountain, Queensbury, is home to the **Northern Heights**; April 10 is the AGM and you can 'Meet the Committee' on 24th.

If you want to join **Ormskirk** you will have to get in contact with the Hon. Sec. first, because they rotate between members' homes every Wednesday. His address is in the appropriate line of the Panel.

Peterborough next, and here the venue is the Scout Hut, Occupation Road on the third Friday each month.

R.A.I.B.C. are next on the pile, and every regular reader will know them; however, for the benefit of the newcomer, the 'I' and 'B' in the name stand for Invalid and Bedfast—people to whom, in many cases, amateur radio is an only link with the outside world. If you know of someone who ought to be a member, pass the word to the Hon. Sec.—likewise pass the word if you can *help* in any way.

Now we come to **Reigate**, who have the third Tuesday every month at the Constitutional Centre, Warwick Road, Redhill; we believe there is also an informal, though we have no details.

Anyone who has had a connection with the Royal Navy, can become a corporate member of the **Royal Navy A.R.S.**, with an Associate membership available to MN and foreign navy types. Details from the Hon. Sec.—see Panel.

On to **Saltash** and here we understand the contact is G3CXS—see Panel for details.

At **Silverthorn** the Hq. is at Friday Hill House, Simmons Lane, Chingford, London E.4 and this gives a fair idea of the coverage achieved. They foregather in their quarters at this stately home every Friday.

Manor House, High Street, is the home of the **Solihull** group, where they can be found on the third Tuesday each month.

Southdown have the first Monday in each month unless that clashes with a Bank Holiday in which case they postpone things a week; the venue is Chaseley Home, South Cliff, Eastbourne.

Another 'Scout Hut' Hq. comes up next, namely that of **Southgate**; it is located in Wilson Street, Winchmore Hill, and the gang are there on the second Thursday of each month.

What is now known as British Aerospace Plant 'B' in **Stevenage** is home to the local group; but no doubt the older residents will recall it better as Hawker Siddeley Dynamics, or even de Havilland. The actual place to aim for is the staff canteen, on the first and third Thursdays.

Stourbridge are based on the library in Longlands School, Brook Street, Stourbridge, where they can be found on the first and third Mondays; try 1930 for 2000, and everyone has time to have a natter before the meeting proper commences.

It is April 4 for the AGM, and April 18 for the R.A.E. revision session, at *T.S. Terra Nova*, 34 The Waldrons, South Croydon, if you are thinking of the **Surrey** club.

On to **Sutton & Cheam** where they have two Hq. places; Sutton College of Liberal Arts (SCOLA), and Rays Social Club, London Road, N. Cheam. The general form is to have meetings on the third Friday and the last Wednesday, with the former at SCOLA and the latter at Rays—but the current newsletter doesn't give the details so we have to refer you to the Hon. Sec., see Panel.

We have already mentioned one group near Swansea, and now we come to the **Swansea** club itself; they meet on alternate Tuesdays at Sketty Park Sports and Social Club, Aneurin Way, Sketty Park, Swansea.

Library Hqs. seem popular south of the Thames—now we have **Thames Valley** who have their base at Giggs Hill Green Library in Thames Ditton, on the first Tuesday in each month.

Its April 26 for **Verulam**, when they will be receiving a talk by Vero Electronics, Ltd. at their venue of the Civil Defence Hall in Chequer Street Car Park, St. Albans. In addition, there is an informal at the RAFA Hq. in Victoria Street, St. Albans.

WACRAL is the new name of the group we used to know as WAMRAC, having dropped its reference to Methodism in favour of the word Christian, as its membership is now so inter-denominational. Details, from the Hon. Sec.—see Panel.

Details for **West Kent** now; April 3 and 17 are informals with Morse practice sessions and chat at the Drill Hall in Victoria Road. As for the formal sessions, these are at the Adult Education Centre, Monson Road, Tunbridge Wells—April 27 being down for the AGM.

We have a letter from a club calling itself "Wirral" which is not, so far as we know, connected with the Wirral club we have known for many years. To avoid confusion we will call this one **Wirral (West Kirby)**, who are based on the Sports Concourse, West Kirby on the 2nd and 4th Wednesdays. Various talks and activities are planned for the coming months.

No mistaking **Wolverhampton** though; they are at Neachells Cottage, Stockwell End, Tettenhall, every Monday evening.

It is just the first Monday in the month for **Worcester**, they having a place at the Old Pheasant, New Street, Worcester.

The weekly routine is favourite at **Yeovil** where the Hq. is in Hut 101, Houndstone Camp, Yeovil, every Thursday evening.

York also gather weekly, on Fridays *except* the third one in each month, and always they seem to have something going on in the way of "showing the flag"—the latest is a meeting to decide their participation in the 1980 York Festival. Find them at the United Services Club, 61 Micklegate, York.

Finale

That's the pile for this time; next month and future deadlines are in the 'box' in the body of the piece, and your information should be addressed to "Club Secretary," **SHORT WAVE MAGAZINE**, 34 High Street, Welwyn, Herts. AL6 9EQ, to *arrive* by the deadline given. This usually will mean that a letter travelling through London to reach us should be allowed a day or two extra.

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

AS we commence our offering this month the first warming spell of weather since this hard winter began has arrived; the result was that over the weekend while the CQ WW WPX Contest was being fought out your scribe was unable to operate as outdoor tasks of greater import were outstanding. And, we must admit, *had* there been a few hours available it would have been a toss-up between the contest and the peace to be found in sailing a dinghy down the river in the sun!

However, there is much for us to discuss, so we must turn to the mail. Readers will have noted a certain shortage of correspondents last time, though just as soon as the copy had gone far enough to be out of reach a flood descended on us.

Conditions

Anyone trying to argue that these are not the Good Days as compared with 1976 will have his work cut out: the flux holding up above 200 for a week at a go, and 14 MHz becoming quite noticeably a night rather than a day band, not to mention DX opening on Ten just about every time you have a lunch-time listen-round.

Ten Metres

It really is quite amazing what can be found and worked from the most unpromising locations; from the car parked amid a mass of others and surrounded by steel-framed buildings, yet with Ws piling in on top of more interesting DX beneath them. An alternate is the ten-metre dipole cut and hung out of the shack window, about a half-wave above ground as to the centre and one leg, but with the other leg falling away to one side to avoid the TV set feeder (as TV and rig mutually upset each other); a listen on this monstrosity at the right time has shown VK and ZL, and lots of interesting places between there and here.

G3CED and his fleapower gave Ten a whirl, and as so often noted over the years, found it the best

band for real DX with minimal gear. Lots of Ws, a first UJ8 with QRP, Europeans of course, and even a cheeky CQ—it takes a nerve to run a CQ call at that sort of power level, and expect anyone to come back!

G2HKU (Sheppey) mentions K4FW, 9J2BO, VE2AH, N5TP, K5VT, ZC4BI W4DZH, EA8QO (LA7Y), PY1ZAE and AF9C.

At Yeovil, G3NOF found things were quite good to the U.S. from noon to around 2000 most days, with the odd morning activity from JA and VK. AP2KS, N7RK (Arizona), W7RKE (Utah), 9K2DR, and all W call areas were worked on SSB.

G2BJY (Walsall) stuck to CW, and this mode yielded QSOs with ISØFIC, ISØNZA, JA1DNZ, LU6DYR, UAØSAR, VE7CXD, VE1, VE2, VE3 and VP9L.

Another CW man is G2DHW (Sidcup) who has commissioned an R.216 for the band, and reports QSOs with W1-2-3-4-5-8-9, UT5, W7TC1/5, RQ2, RB5, WB6VVH/9, KA7AWH, WA7SHP, YV1AD, 5B4CY, ZP8BH, W7TC, K6DC, VP2SZ, ZP5 and W6BRT.

G5BVU (Bottisham) is AI2A at home, and oddly enough has the same surname and christian name as G5BIU—and both have discovered QRP. David writes to comment that he believes it when he sees it; and he doesn't have ideal conditions for the "seeing" with something like 100 metres of cable between the rig and the trap vertical aerial. An optimistic estimate indicates that maybe one watt of RF was actually put into the aerial, and while the G and EU stuff was fairly easy, it took a while before W9AWD (Florida) obliged with a first two-way to the U.S.A.

G2HLU (Reading) has a long and interesting letter covering all sorts of things; Ten has been the big draw for Harold, in particular CW, having noted the quite alarming amount of QRM on the SSB end, even though there is so much room. He leaves out the Ws—save for a

comment that there were plenty of W6, W7 and VE7; the best were JAs, KH6, VR3AH (a jolly one that—the first VR3 *heard* let alone worked!) and XE2MX. On a slightly different tack, G2HLU treated himself to a Junker key to replace the old Type D used for many years. This had an interesting effect, in that before the purchase the straight key was used for about 10 per cent of the time and the el-bug for the rest, it has now become more like fifty-fifty as the Junker is that much less tiring to drive; with the old key, it was just a matter of keeping in practice or reverting to it when the brain refused to control the el-bug once in a while. The writer has believed for years that one can "lose" the el-bug on occasion no matter how much one uses the thing, and it's nice to know that someone else has a similar problem!

At G4DMN (Wirral), the cold weather gave incentive to stay in the shack, albeit one outdoor foray was made for the purpose of aerial-erection. Ten was noted as "excellent" with FR7BE, HROQL, RM8MBN, RAOJBP, VE1-7, VS6GY, W1-7, ZF1SV, ZL4BO, YS9RVE and WA1SQB/HC8 entered in the log.

Not much activity is reported on the air by G3PPR (Sherborne) from the school station, although they do have a ground-plane for Ten which yielded a few Ws; the time is being spent on the design and erection of a Quad for 21/28 MHz, for which the 'civil engineering' had been completed at the time of writing, as well as the actual beast, which was due to go up in the air on the day after the letter was posted. A few weeks earlier they had an R.A.E. pass, and Rod was hoping for another G4 call in the club just as soon as the Morse is passed. Fingers crossed!

SSB on Ten is an unusual activity for G3RJV (Nottingham) even though it is still QRP. Five watts into a dipole at 15 feet gave him YN1H, 8P6CC, 6Y5MB, SV4GP,

5B4EP, a long QSO with WOMWO/MM2, W1-2-3-4-5-7-8-9, VE1-2-3, UK9HAR, UA9CMS, UA9HHI, RA9FMI, UI8ZAC, and a two-way QRP QSO with UA3ACQ running four watts from Moscow for an RS57 both ways.

21 MHz

G4DMN comes in to bat first; Richard seems to have spent most of his time on the LF Bands, but he does mention SSB contacts on 21 MHz with STØHF, TI2KT, VP1MW, VP2MCX, XT2AT and YBØADW.

Another one who spent lots of time elsewhere is G2HLU who worked 7X4AN and missed out on CP1AC.

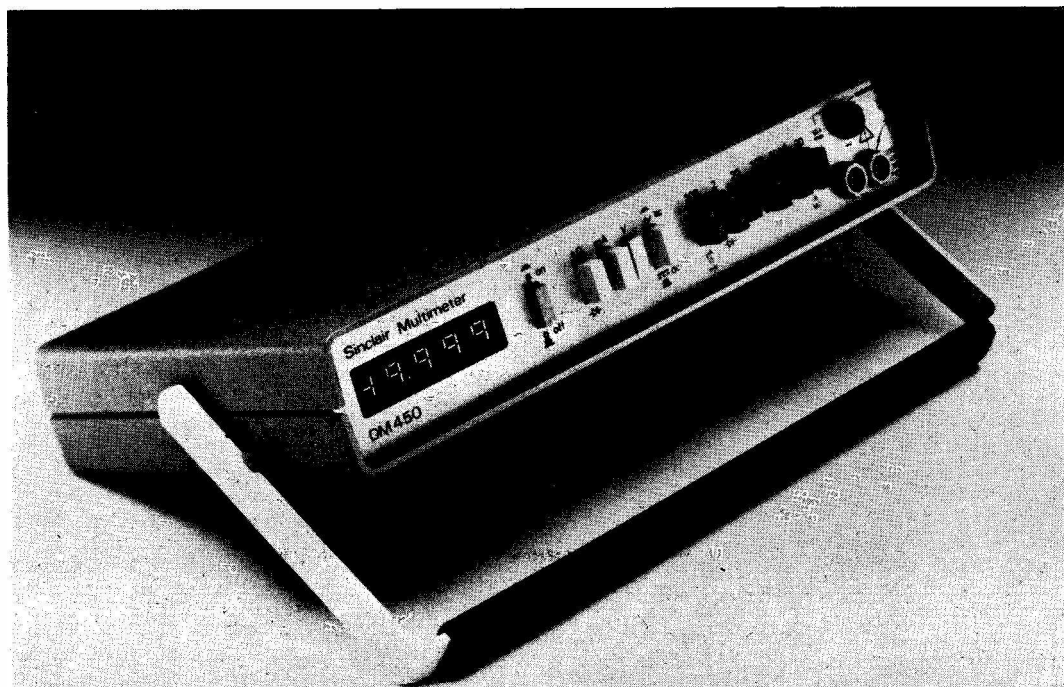
G2DHV seems to have been pretty active on the band, and his CW signals accounted for all W call

areas, VE1-4, KP-4, 4Z4, K7HDK, JG3EKS, WB6ADT (University of California), VK3NNH, VK3NRK, VK5NNF, VK5NDY, KA6, VK6NCD, JA2PIW, VE4HW, OY9K, WB6ETQ, WB7UBN, WA6QVB, SM5HIH/MM, W0AAA/5, KB9AB, K7BBD—a fine crop indeed.

G3NOF found conditions on 21 MHz to be good to most areas; long-path VK, ZL, JA, from 0730, followed by the short path opening at about 1000. Little was heard from Africa, but in the depths of winter Ws have been around from noon until 2300, while a week or two later they remained in evidence until the small hours. SSB QSO's were made with JA6PJ, JF3SGI, JR6RVG, KG4FW, N7RA (Arizona), S8FXT, VE6MP, VE6TY, VE7AKL,

VE7DGI, VK2NCL, W7XA (Arizona), WA7LCP (Oregon), WB7PTZ, ZL3QA, ZL4BX and all U.S. call areas. The second letter added EA8TE, VP2DXF, 7X5KSF.

G2BJY (Walsall) has chosen 21 MHz for his present activity; after brewing-up for this activity he also gave a going-over to the ten-metre machinery (plus a few mods, of course!) so that output is up from 50 to 80 watts. CW it is, and EA9URE, YV5BLT/2, FP8HL, many Js, PYs, UA0YT, SU1MI, VK4XA, TF3LJN, some oddball Italian prefixes, JA0AXV, JA0CUV/1, JA2AT, JA2FUA, JA3CXL, JA3LXN, JA4OQH, JA4OUZ, JE2HIW, JE2NZE, JH1EDD, JI1VLV, JI1EXH, JL1BDI, JR1EBL, TF3HNN, KL7MF, KV4AA, LU9EY,



The new Sinclair DM-450 is a 4½ digit, 5-function multimeter with a basic accuracy of 0.05 per cent of reading; the instrument weighs 1½ lbs. and is powered by four C size cells. Price £99 plus VAT. Further information is available from the Instrument Division, Sinclair Radionics Ltd., London Road, St. Ives, Huntingdon, Cambs. PE17 4HJ.

UK6GAB, YV5BLT/2, ZL1AMM, ZL1AXN and ZL2TX.

G2VF (Southampton) runs 30 watts to a triangular aerial which he can energise on all bands. On 21 MHz this aerial yielded CW contacts as far afield as W6, WO, W1-4, EUs assorted, N5JB, and of course the inevitable I and U stations.

G3CED (Broadstairs) scorns all this high-power stuff, using just two watts of CW to a Joystick; this made noises to several East Coast and middle-west Ws, PY, SM5KAS/QRP who had 1 watt to a dipole for a two-way in QRP, and a sked with WB3BDQ which was fairly solid despite the fading and generally poor conditions.

Another QRP man is G2HKU who used his HW-8 just once for a CW QSO with HA8CH/P; but then along came the second letter which mentions SM5KAS, YU4VIB, YU4VOY, SMØFY, N2LK, SM3BCS and YU4EXA, plus QRO contacts with PY2SO and N4GG.

Twenty

While it still carries a lot of traffic, there can be no doubt that the rise in conditions from the bottom of the sunspot cycle to the position we see now has siphoned off much activity, while the pestilential Thing which pops up regularly is an even bigger drawback. However, there are some hardy ones; their reports follow.

G4DMN took the odd peek at the band, and came up with SSB to JT1AO, JT1BF, VP8SU in S. Georgia, ZD9GH, 5U7AG, 8Q7AF and 8Q7AG.

G2HLU says his logs are very uninteresting for the most part, because he has so many hobbies, not to mention keeping the house upright and earning a crust! One DX QSO was FY7BH, and another activity was that of taking on some of the newly-licensed Ws: a small number at a time because it sometimes takes a half-hour to make a basic exchange of not very much at not many w.p.m., and they then want to QSL direct. It gives the chap at the other end a big thrill to work his first G or first EU, but nobody seems to have told him about the simplifications that get the message (sorry!) through without spelling out fully, for example, "so back to you old man." G2HLU

is so right, and one wonders whether the licence requirements should not require some knowledge of the essential abbreviations.

G2DHV (Sidcup) has now got an R.209 on the band again after a lapse of some twenty years; it listened to the CW from a UO5, UH8, UI8, UA9, UX9, VK2, JA2AA, VE7IW, JA1SXH, CN2 and UF6.

G3NOF found activity on the bands sometimes right through the 24 hours, and doing some unusual things at times. That does not include the bombs, which did not, fortunately, affect any members of the Yeovil club or their families, although it was very close to G3NOF's office. The VK/ZL/JA chaps have been in on long-path at 0800, then on short-path, following this by reappearing in the evening around 1930; and on top there has been much short-skip stuff about. One morning saw a WAC heard within two minutes; if one had worked them all it would have constituted something of a record we think! CPIGN, DU1MEL, EA9URE, EP2LI, EP2MT, FG7TD, FK8AC at 1812z, FK8CR at 0855z FWOTT at 0914z, JA5BSQ, KA2MI one morning, KL7BRD, KL7D, KL7HFQ, KL7JDR, KV4AA, OD5JP, P29JS, TI2VVR, VKs, VP2LDZ, VP8SU, VP9CP, VR1AE (1913z), VU2HI, WA4YPJ/AM over the Atlantic, ZD7SD, ZD8RG, ZD9GH, ZLs, ZSs, 5H3BP, 6W8DY, 8P6JA, 9G1JV, 9X5PM, CT2BB, JY5ZM, KL7DP, KL7ENY, KL7HCC, KL7MF, several VKs, VP2VBK, VP9IR, W6NE/KH6 and 7X2DG.

G2VF's triangle aerial radiates, even though your scribe has some difficulty in reading the log copy! We noticed a lot of European signals and 4N1Z, plus some which look to be DX but could not be deciphered. Which, we might remark, is nothing new—G3KFE often can't read his own writing!

G3CED's fleapower CW managed to find itself in various European logs, and also made it across the Pond to get a 559 report from N2KW.

G2HKU made SSB contacts with KL7IYH, KL7JAR (a YL), ZL1QQ, ZL1VN, ZL2NF, ZL3FV, ZL3RS and ZL3SE; CW was used to work PY1APS, ZL1AXM, JH2UUVL,

9J2BO, ELØAN/MM, W6RZ and VK2QL.

Here and There

The Isle of Man Millennium celebration is due in the first week of July, and from 0001 clock on June 30 till 2359 clock on July 8, the GD stations may use the prefix GT. Naturally, there is an award to go with it, and the award requires one to work four GD's and on GT call if one is in Europe; stations outside Europe need three GD callsigns (in 1979 but with the proviso that no GD QSOs can be counted during the period when the optional GT prefix is about). Claims should go to GD4FWQ, Isle of Man Amateur Radio Society, 20 Terence Avenue, Douglas, I.o.M., together with 12 IRCs or four U.S. dollars (or the equivalent), to arrive before March 31, 1980. The same address will get you any more details you may need.

Guildford club have been in existence now for 60 years and to celebrate their Diamond Jubilee they are having an award; the requirement is to work not less than five members of the club between March 1 and August 31, 1979; the QSOs are to be on two bands or more (*i.e.* if four of the QSOs are on one band, then for the fifth contact a different band must be used). Claims to be from a range of at least 50 Km from Guildford *except* on 23cm. where this restriction does not apply. For lists of the frequencies where the gang congregate for award purposes, and other details, write to Brian Grist, G3GJX, QTHR; applications containing log info. (no QSLs) to G3KMO, who is also QTHR.

The G-QRP Club, are making the next step along the line, which is to try and promote QRP-to-QRP contacts, and to that end they are going to run "Activity Week-ends" on June 23/24, August 4/5, September 4/5 and October 6/7. The daily times will be 0900-1100z for 14060 MHz, 1100-1300z on 21060 or 28060 kHz, 1400-1500z on 3560 kHz for inter-G working, 1600-1900z 21060 or 28060 kHz, 1900-2200z on 14060 kHz. There will also be 2030-2130z on 3560 kHz for some inter-G working. It should be noted that the preferred spot on Eighty for the QRP chaps has been moved to 3560 kHz, and one will

quite often find QRP club members around that neck of the woods. There is also a similar Activity Period over the Christmas holidays—details of this, and of the club itself, from G4BUE, "Alamosa," The Paddocks, Upper Beeding, Steyning, West Sussex BN4 3JW.

The word is passed round that the SPs are on Top Band with a licence which gives them 1750 kHz to 2 MHz—it would be nice if we got that bottom bit back again, come to think of it!

On a different tack, the Thing on 3720 kHz was a geological survey in ZL, believe it or not! No wonder it was louder there than here. The users were quite unaware of the havoc they were causing until they were located and put right.

Looking forward a little, we hear that OZ1CRH has received permission for YA, and has the call YA2MI; if this is correct it will be the first operation from Afghanistan in several years. Prior to the YA operation, Masood will be in AP, signing AP2LJ. If the YA effort comes off it will probably beat the end of April or the beginning of May. QSLs to WA8AJG.

West Coast DX Bulletin has some interesting things on the Poltava Pestilence, The Caviar Grinder, or the Woodpecker, depending on which part of the world you come from. People have tried calling it as H5HHH, and some have noted it changing from around the 25 w.p.m. to twice that; this apparently implies it is looking out to 7500 Km and hence painting the target twice as often to get a good response. A rasp on the signal is caused when they use noise modulated FM signals to better distinguish between replies and QRM; a spread of several signals punching out dots over some 10 kHz, preferably at a close match to the speed sent by Poltava, sometimes shuts it up for a while. If there is a flat spectrum over some 10 kHz or so, this is an indication of FM too, this time to enhance range resolution. Again several stations sending dots within a few kHz of it seem to check it. Sudden changes of signal strength indicate the thing is beaming in a different direction and it often appears that if your own beam is swung onto the long path you pick it up again. In fact, plays like this can be effective

in telling much about long-haul propagation, and indeed about the clever tricks the radar designers can get up to.

We understand that the new chap to arrive on Marion Is. in May will not be an operator but a technician, who is taking his own gear and aiming to be very active.

You may recall a mention of Redonda in this piece a while back: the latest we hear is that stamps are now being issued—Antiguan stamps overprinted 'Redonda'. It just *has* to be a new country looking for someone to operate from there! It is an offshore spot from Antigua, and the stamps appear to be OK with Antigua and acceptable for international mail.

If you are looking for a Comoros contact—don't; we have it that the authorities have cancelled the tickets, and that D68AD is QRT and looking for a move to a new work location.

One hears that the odd BY signal is being heard—which must mean that Phoney Phred reads at least one DX column.

The Aves Is. operation mooted by the Radio Club Venezolano, YVOAA, will begin around noon on April 28 for three days, working all bands Eighty-Ten plus hope of a bit of Top Band and *Oscar*. QSLs to the club at Box 2285, Caracas DF, Venezuela.

Low Bands

With all the troops going HF, there hasn't been all that much doing lower down. However, Top Band is seeing lots of signals that haven't been heard in a long time, possibly after hearing over the grapevine about the new countries which are about; and of course 3560 kHz is the favourite of the QRP chaps. As space becomes short we must just note the highlights.

G2HKU reports on Top Band; SSB contacts with PA0PN, PA0KJF, PA0PAU/A, and PA0INA, and CW ones with GW3KOR, F9KP, DJ8WL, DF9FM, GW3JI, OK1HAS, SP2BMX, G13JEX, I2XOG, OK2SOD, DJ5GW, OK3LL, OK1DFF/P, OK1DKW, GM3LWS, GU5CIA, OH2BNP, SP3DOI, F6CNI, YU3EF, YU3ZV, GU3HFN, GM5PJ, EI9J, W4DZH, DL1RK, HB9AJU, GM3ZSP,

G13IVJ, GM4ALK/A, PA0LOU and PA0QRP. Eighty CW worked a couple of Ws and a UA9, not to mention a QRP contact with OK1DKW. 7 MHz saw CW to CM2HB and a brace of Ws.

An interesting one for G2NJ was the Top Band CW QSO with DJ3CY; when Nick said he was using a wartime B2 set, the DJ came back to add that he was using a German wartime transmitter. QRP stations noted on Top Band were OK1DKW, OL5AUU, and HB7BE. As to Eighty, G2NJ has been spreading the word about the QRP Club change of frequency to 3560 kHz; and G2NJ mentions that among the many QRP stations he worked, the most interesting was G3LGX in Fareham who had 800 milliwatts, with which he had made a two-way contact with GM3OXX. At the time of writing G2NJ says that G2CAS has been stopped from his customary /P work by the vile winter weather, but no doubt as the snow goes away we may hear him out and about again.

'CDXN' deadlines for the next three months—

May issue—April 5th

June issue—May 3rd

July issue—June 7th

August issue—July 5th

Please be sure to note these dates.

G2HLU says he only used the band for the odd CW rag-chew contact—Harold reckons they'll still be there to be used after the sunspots have made Ten and then broken it!

G4DMN found 3.5 MHz SSB quite good until he started to have aerial troubles at a time when the West Coast Ws were quite good. Richard mentions QSOs with AF5K, HC1NEK, K5MK, N5RQ, OA4AKP, W1XK/PJ7, W6KG/TI5, VP2DAY, VP2LFZ, VP2MCX, VP9JT and YS9RVE.

Having been out into the snow to put up an aerial for 7 MHz, G4DMN thought he had better use it, so he put SSB signals out to CE7BIY, CO2JA, CO2FH, CX3AN, FK8CC, HC1FM, TU2FH, VE7DFW, VP2LGB, VP2DAY, YN5JAR, YS9RVE, YV, ZF, 5T5s,

9Y4ND, and a crop of Ws nicely covering the central and western reaches.

G2VK and his triangle aerial, plus 30 watts, seems to have managed quite nice contacts around Europe on 3.5 and 7 MHz, taking advantage of the directional effects noted on these bands, and carrying out tests.

G3CED completely ignored Eighty, and only made a handful on Forty, doubtless due to the attractions of the HF bands.

Nasty

G4EAN (Nottingham) recently

received a chain letter, which appears to have emanated from the States, and to have seen European amateurs and VKs. We cannot stress too much that these things are a deception, and finding one circulating among licensed amateurs is a very unpleasant surprise. G4EAN broke the chain, and we hope that anyone else getting one will do likewise. It appears to have originated from a firm called Imperial Sales Co., Tennessee, and we can make a shrewd guess that they have just picked out some names with a pin and hoped the recipients would

be gullible. Be warned!

Finale

That seems to be about it for another month, deadline dates are in the 'box,' and your report should be posted to reach us by these dates; and please don't expect a first-class letter to reach us in 24 hours—that was good enough a couple of years ago, but now . . . Address, as always, to your scribe, "CDXN," SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts. AL6 9EQ.

NEW QTH'S

This space is for the publication of the addresses of holders of new call signs, or changes of address, in EI, G, GC, GD, GI, GM and GW of stations not already listed. All addresses published here will appear in the U.K. section of the American "CALL BOOK" in preparation. Please write clearly and address on a separate slip to QTH Section. Be sure to give correct County designation and post-code. In the case of direct subscribers needing Change of Address, please state for card index adjustment. Address items for this space to: "New QTH Page," SHORT WAVE MAGAZINE, 34 HIGH STREET, WELWYN, HERTS., AL6 9EQ.

EI6DI, R. Northridge, "Rathlin," Carysfort Avenue, Blackrock, Co. Dublin. (Tel: Dublin 881187.)
 EI7DF, R. Walsh, Bay View House, Strand Road, Sutton, Dublin 13.
 EI8DH, B. Walsh, Athboy, Co. Meath.
 EI8DJ, D. Kelly, "Olivette," Camden Road, Crosshaven, Co. Cork.
 GB2RN, R.N.A.R.S. H.M.S. Belfast, c/o 78 Lansdowne Drive, Hackney, London E.8.
 G4GTP, D. M. Austin, 105 Coombe, Sherborne, Dorset DT9 4DF. (Tel: Sherborne 2631.)
 G4GUX, J. H. D. Kuipers, 2-A Heronsdale Road, Woodingdean, Brighton, E. Sussex BN2 6QG (name and address appearing in August 1978 issue was that of G4GXU).
 G4GXU, G. W. Grieseson, 6 Spinney Bank, Kings Sutton, Banbury, Oxon. OX17 3RL (appeared in error under G4GUX in August 1978 issue).
 G4HKE, L. R. Woodings, 19 Lambourne Avenue, Huntley, Glos. GL19 3HW. (Tel: Longhope 830762.)
 G4HLN, L. C. Bennett (ex-G8OAZ), 7 Maple Avenue, Fishponds, Bristol, Avon. BS16 4HJ. (Tel: Bristol (0272) 651841.)
 G4HLT, M. E. Eckhoff, 45 Malthouse Square, Beaconsfield, Bucks. HP9 2LE. (Tel: Beaconsfield 6094.)
 G4HME, L. W. Bailey (ex-G8NQU), 47 Millers Park, Wellingborough, Northants.
 G4HMS, R.N.A.R.S. H.M.S. Belfast, Symons Wharf, Vine Lane, Tooley Street, London SE1 2JH.
 G4HOH, W. V. Thursfield, 9 Aynsley Close, Green Park, Cheadle, Staffs. (Tel: Cheadle 3036.)
 G4HRV, D. A. Ashton (ex-G8RCT), 12 Juniper Close, Swindon, Wilts. SN3 4DZ.

G8OAO, B. A. Austin, 105 Coombe, Sherborne, Dorset, DT9 4DF. (Tel: Sherborne 2631.)
 GM8PCJ, E. I. Fraser, 3 Rimbleton Avenue, Glenrothes, Fife KY6 2AS. (Tel: 0592-752762.)
 G8PCV, Trent Polytechnic Amateur Radio Society, Trent Polytechnic Students Union, Shakespeare Street, Nottingham.
 G8PEW, J. G. Finley, 70 Edinburgh Avenue, Gorleston, Great Yarmouth, Norfolk NR31 7HA. (Tel: Great Yarmouth 67980) (house No. is incorrect in 1979 RSGB Call-Book.)
 G8PIT, H. G. D. Glasson, 76 Anthonys Avenue, Lilliput, Poole, Dorset BH14 8JJ. (Tel: Canford Cliffs 707013.)
 G8PJY, G. L. Southwell, 5 Southgate, Hornsea, N. Humberside HU18 1AQ.
 G8PQP, A. C. Langford, 2 Southview Drive, Leicester, Leics. LE5 5SG. (Tel: Leicester (0533) 738988.)
 GM8PSM, A. McGugan, 29 Langmuir Avenue, Kirkintilloch, Glasgow, Strathclyde G66 2JQ. (Tel: 041-776 6266.)
 G8PTU, P. T. Reeves, 82 Potton Road, Eynesbury, St. Neots, Huntingdon, Cambs. PE19 2NN.
 G8PYZ, A. J. Jolly, 20 Crawford Avenue, Chorley, Lancs. PR7 2QT.
 G8RBO, H. A. Collier, 12 Coronation Drive, Higher Fold, Leigh, Lancs. WN7 2UU.
 G8REI, R. I. Houghton, 50 Severn Way, North Brickhill, Bedford MK41 7BH. (Tel: Bedford 43348.)
 G8RGQ, T. L. Scrimshaw, 10 Somerdale Road, Northfield, Birmingham, W. Midlands B31 2EG.
 G8RMA, F. J.-C. Raen (OZ1EVA), 19 Gore Park Road, Eastbourne BN21 1TG.

CHANGE OF ADDRESS

EI9CN, L. Mc. Griskin, 42 Woodland Drive, Ard Easmuinn, Dundalk.
 EI0DH, P. J. Dunne, 25 Riversfield Estate, Middleton, Co. Cork.
 G2BZQ, R. Q. Marris, P.O. Box 972, Somerville, New Jersey 08876, U.S.A.
 GW2FZG, K. R. Boot, 12 Frondeg, Llandefan, Menai Bridge, Gwynedd LL59 5TN. (Tel: Menai Bridge 713010.)
 G3LSJ, C. S. Gerrard, 80 Eastfield Avenue, Hollytree Meadows, Haxby, York.
 G3LZM, M. A. Bush, 52 Barrs Court Road, Hereford HR1 1EQ. (Tel: Hereford (0432) 6144.)
 G3OAK, C. J. Dempster, 48 Western Avenue, Woodley, Reading, Berks. RG5 3BH.
 GW3OIN, J. G. Nicholas, 36 Coast Road, Rhyll, Clwyd.
 G3OMC, A. E. Jenkinson, 40 Walker Road, Chadderton, Oldham, Lancs. OL9 8DB. (Tel: 681-1926.)
 G3OXH, K. W. Brooker, The Warden's Bungalow, "Bredhurst Shelter," Matts Hill Road, Hartlip, Sittingbourne, Kent ME9 7XA.
 G3R1R, N. Ackerley, 24 Macaulay Road, Lutterworth, Leics. LE17 4XB.
 G3WTV, K. J. Baker, 16 Woodfield Road, Radlett, Herts.
 G3XBE, A. F. Walton, 40 Rooley Crescent, Bradford, W. Yorkshire BD6 1BX.
 G4AGM, R. H. G. Williams (ex-VP8JR/DA2XW/DJ0HY), Flat 47, "Tarranbrae," 176 Willesden Lane, London N.W.6.
 G4ASH, I. Roberts, 2 The Quadrant, Marshalswick, St. Albans, Herts. AL4 9RA.
 G4BPG, R. Brown, 10 Crossgates, Meadow Rise, Wadworth, Doncaster, S. Yorkshire.
 G4DCS, H. J. Paice, 100 New Street, Grantham, Lincs. NG31 8BB.
 G4EHS, J. L. Dowsett, "Cornerways," Cox Park, Gunnislake, Cornwall.
 GM4E1W, J. Dunnington, 20 Maple Road, Abonhill, Cumberland, Glasgow.
 G4EMN, G. D. Cole, 3-A Cavendish Road, Bournemouth BH1 1QX. (Tel: 0202-20027.)
 G6TZ, R. Bottomley, 54 Delius Street, Coventry, W. Midlands CV4 9NE. (Tel: Coventry 467857.)
 G8CID, D. A. L. Austin, 85 Hoblands, Haywards Heath, W. Sussex RH16 3S. (Tel: Haywards Heath 56812.)
 G8OLJ, A. J. Picard, "Holm-Dene," 38 North Lane, East Preston, Sussex BN16 1HW. (Tel: Rustington 5713.)



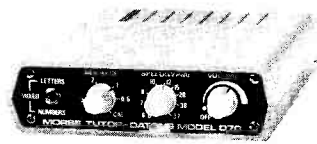
DATONG ELECTRONICS LIMITED

NEW PRODUCT

MORSE TUTOR

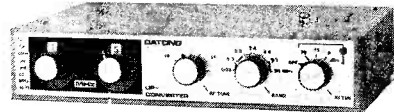
The revolutionary new way to practice morse code reception. The DATONG Morse Tutor gives you an unlimited supply of precision morse at the turn of a switch, PLUS built-in oscillator for sending practice. Now, you can practice receiving morse whenever, and wherever, you like. The DATONG MORSE TUTOR sends a continuous stream of precision morse in five character groups which never repeat. For optimum learning efficiency it has a calibrated variable speed control plus a separately variable delay facility between characters. It delivers letters only, numbers only, or mixed letters and numbers. It comes with a built-in tone oscillator for sending practice (key required), built-in loudspeaker, and also a separate earpiece for private listening. Learn morse, the easy, convenient and self-pacing way with the DATONG D70 Morse Tutor. Supplied complete with battery for only £37.00 plus VAT giving a total of £41.62. Now available from stock.

MODEL D.70



Model ASP Automatic R.F. Speech Processor

Model UC/1 Up Converter

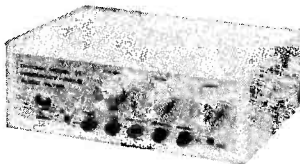


Our R.F. Speech Processors, using the advanced technique of R.F. clipping, greatly increase your talk power and help your voice punch through the QRM.

They work on any rig, with any speech mode, at any power level, and on any band. Simply connect in series with your microphone to get a really punchy speech signal. MODEL ASP, our latest model, offers for the first time the ultimate convenience of instant push-button selection of the desired amount of clipping and elimination of manual level setting.

Prices : ASP £65.00 plus VAT (£73.13 total) ; RFC £40.00 plus VAT (£45.00 total) ; RFC/M £21.50 plus VAT (£24.19 total).

Model FL1 Frequency Agile Audio Filter



A versatile add-on unit for communications receivers which helps to extract wanted signals from background interference. It connects in series with the loudspeaker or headphones. The effect is similar to "I.F. passband tuning" for SSB/or RTTY reception, and bandwidth down to 20Hz (with limited a.f.c.) gives an amazing capability for pulling weak CW stations out of the QRM. MODEL FL1 is unique in being able to tune itself when notching out unwanted whistles. Price : £53.00 plus VAT £59.63 total).

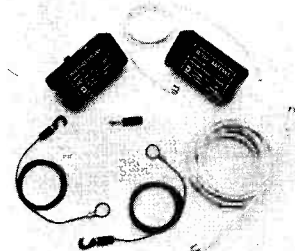
If you already own a good quality ten-metre or two-metre receiver or transceiver you are only £118 away from a really high performance general coverage receiver. Just add the magic ingredient, MODEL UC/1 from DATONG !

You get full coverage in thirty synthesised 1 MHz segments from 60 kHz (Rugby MSF) to 30 MHz, at high sensitivity and with all the facilities and high performance of your existing rig !

For good measure UC/1 also adds two-metre coverage to ten-metre receivers.

Price : £105.00 plus VAT £118.13 total).

Model AD170 Active Antenna



For sensitive reception right through from MSF at 60 kHz to Band I TV DX around 50 MHz, without the need for an antenna farm, MODEL AD170 is ideal. Designed for loft mounting, MODEL AD170 has no adjustments and needs no external tuning units.

Although only three metres long, MODEL AD170 has the same directional properties as a full size dipole, even at 60 kHz.

Price : £29.50 plus VAT (£33.19 total) ; Special price complete with mains power unit : £33.00 plus VAT (£37.13 total).

DATONG ELECTRONICS LIMITED

Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE, England. Telephone: (0532) 552461

BREDHURST ELECTRONICS

FULL TIME RETAIL PREMISES NOW OPEN

FDK					
Multi 700E 2M FM synthesised	...	£229.00			
Multi 800D FM with memory	...	£289.00			
DD800 Remote display for above	...	£19.95			
Multi U11 70cm. FM with 10 channels	...	£299.00			
Multi 2700 All mode 2m. with Oscar	...	£499.00			
Palm 2 2M Hand Held with nicads	...	£149.00			
TM56B 2M Scanning monitor RX	...	£105.00			
ICOM					
IC215E Hand Held 2M FM	...	£159.00			
IC240 Mobile synthesised FM	...	£189.00			
IC280E Mobile 2M HP controlled	...	£245.00			
IC245E Mobile/fixd 2M all mode	...	£399.00			
IC202S Hand Held 2M SSB	...	£199.00			
IC211E Fixed 2M all mode	...	£559.00			
IC402 Hand Held 70cm. SSB	...	£288.00			
IC701 HF all mode	...	£855.00			
IC701S Power supply for above	...	£144.00			
YAESU MUSEN					
FT227R Synthesised 2M FM	...	£239.00			
FT202R Hand Held 2M FM	...	£299.00			
FT7 HF mobile SSB 10w. out	...	£299.00			
FT7B HF mobile SSB 50W. out	...	£421.00			
FP4 12v. DC PSU	...	£19.50			
FT200B HF fixed station	...	£395.00			
FT301 HF fixed all solid state	...	£579.00			
FR91DM The ultimate HF transceiver	...	£960.00			
FRG7 HF general coverage RX	...	£210.00			
FRG700 HF gen. cov. digital readout	...	£367.00			
FX	...	£647.00			
FT101ZD all mode transceiver	...	£647.00			
Other models too numerous to list	...	POA			
DENTRON					
MLA250 HF 2KW linear	...	£650.00			
MT3000 2KW HF ATU	...	£275.00			
MT2000 2KW HF ATU	...	£175.00			
160AT 1KW HF ATU	...	£99.50			
JR Monitor 300W. HF ATU	...	£59.95			
W2 Direct reading 2KW Wattmeter	...	£69.00			
MIZUHO					
SB2M Hand Held 2M SSB	...	£165.00			
Nicads	...	£10.00			
AOR					
AR240 800 channel synthesised 2M	...	£195.00			
Hand Held	...	(£1)			
SHURE					
201 Hand mic.	...	(50p)	£11.25		
444 Desk mic.	...	(50p)	£25.50		
NAIGAI					
NAG 144 2M Linear 500W. PEP in	...	£481.00			
MINI PRODUCTS					
HQ1 Minibeam 10/15/20M	...	(£3)	£98.50		
C4 Vertical 10/5/20M no radials	...	(£3)	£44.50		
SAGANT					
EL40X De luxe 80/40M dipole	(£1)	£29.95			
HY-GAIN					
12AVQ 10/15/20M vertical	...	(£2)	£42.18		
14AVQ 10/15/20/40M vertical	...	(£2)	£59.06		
18AVQ 10/15/20/40/80M vertical	...	(£2.50)	£85.50		
SOTA					
EDL 1445 2M Linear 100W. out	...	(£3)	£144.00		
EDL 432P 70cm. 50W. Linear	...	(£3)	£152.00		
JAYBEAM					
C5/2M 5dB glass fibre collinear	...	(£2)	£35.00		
5Y/2M 5 ele. Yagi	...	(£1)	£8.66		
8Y/2M 8 ele. yagi	...	(£1)	£12.50		
10Y/2M 10 ele. yagi	...	(£1.50)	£24.18		
PBM 14/2M 14 ele. parabeam	...	(£2)	£35.55		
5XY/2M 5 ele. crossed yagi	...	(£1.50)	£18.00		
8XY/2M 8 ele. crossed yagi	...	(£2)	£22.50		
10XY/2M 10 ele. crossed yagi	...	(£2)	£29.81		
Q4/2M 4 ele. cubical quad	...	(£1.50)	£18.68		
Q6/2M 6 ele. cubical quad	...	(£2)	£24.75		
UGP/2M Ground Plane	...	(£1)	£7.98		
MM/2M Halo with 2ft. mast	...	(75p)	£4.39		
C8/70cm. 8dB glass fibre collinear	...	(£2)	£44.43		
MBM 48/70cm. 48 ele. yagi	...	(£2)	£24.53		
MBM 88/70cm. 88 ele. yagi	...	(£2)	£32.62		
8XY/70cm. 8 ele. crossed yagi	...	(£2)	£27.11		
W21 21" stand off wall bracket	...	(£2)	£11.48		
DL Double chimney lashing kit	...	(£1)	£9.23		
LOWE ELECTRONICS					
SRX 30 General coverage receiver	(£2)	£175.00			
DAIWA					
SR9 VHF FM Monitor receiver	(£1)	£59.00			
MICROWAVE MODULES					
MMC 70 4M conv.	...	£20.25			
MMC 144/28LQ 2M conv. local OSC	...	£22.50			
MMC 144/2M conv. any IF	...	£20.25			
MMC 432/28 70cm. conv.	...	£29.90			
MMC 432/144 70cm. conv. 144 out	...	£29.90			
MMC 1296/28 23cm. conv.	...	£31.40			
MMT 432/28 70cm. transverter to 10m.	...	£133.00			
MMT 43L/144R 70cm. transverter to 2m.	...	£170.00			
MMT 144/28 2M transverter to 10m.	...	£89.00			
MMA 144 2M pre amp	...	£14.63			
MML 432/100 100W. 70cm. linear	...	£247.00			
MML 144/100 100W. 2M linear	...	£139.50			
MMD 050/500 500 MHz counter	...	£69.00			
MMC 28/144 10M to 2m. conv.	...	£20.25			
MMA 28 10M pre amp	...	£15.00			
WATERS & STANTON					
HP3A TVI High pass filter	(20p)	£2.50			
WESTERN ELECTRONICS					
PM 2000 PEP reading wattmeter	(£1)	£50.63			
ASW1 3-way coax switch	(75p)	£10.12			
DX5V All band HF vertical ant.	...	£59.00			
ROTATORS					
AR30 Light VHF beams	...	(£2)	£46.13		
AR40 Large VHF beams	...	(£2)	£53.54		
CD44 Medium HF beams	...	(£2)	£106.87		
HAM 11 HF beams	...	(£2)	£145.13		
9502 Large VHF 3 wire control	(£2)	£50.62			
KR400 Medium HF 3 wire control	(£2)	£95.63			
ADONIS					
AM202G Mobile mic. with pre amp.	(75p)	£19.95			
AM502 Desk mic. with compressor	(£2)	£39.95			
AM802 De luxe desk mic. with compressor	...	(75p)	£95.95		
ANTENNA SPECIALISTS					
ASP 201 2M ± A	...	(75p)	£2.95		
ASP 2009 Economy 2M ± A	...	(75p)	£7.95		
ASP 677 2M 3dB ± A	...	(75p)	£14.95		
ASPE667 70cm. 6dB collinear	...	(75p)	£19.02		
ASPE 462 3dB collinear	...	(75p)	£7.50		
Magnetic Mounts for all above	(75p)	£8.50			
BELL SONIC					
13-Bv. 3A DC Power Supply fully protected	...	(80p)	£17.30		

Carriage free except where shown in brackets. All prices include VAT. Send SAE for literature on any of the above. Same day mail order despatch—or just phone your credit card number.

PART EXCHANGE WELCOME

NEW ADDRESS—300 yards from the sea—500 yards from the A27.

**REGAL HOUSE
PENHILL ROAD
LANCING
WEST SUSSEX
Tel.: LANCING (09063) 63119**

G3OQT

BARCLAYCARD — ACCESS — HP

G3VXJ

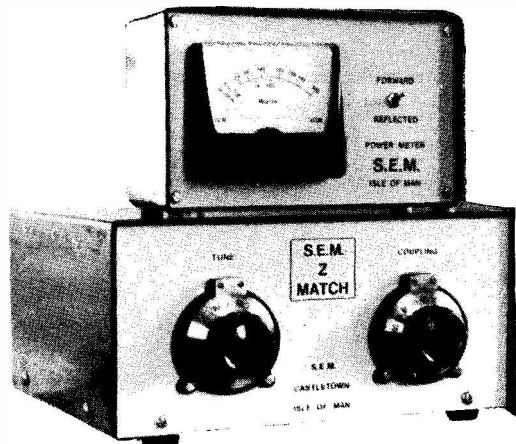
Call for details on second-hand equipment. All items normally in stock.

Full demonstration facilities. Callers and browsers welcome.

24 hour answering service. Open: Monday to Saturday 9-5.

SEM

P.O. BOX 6, CASTLETOWN, ISLE OF MAN Tel. (0624) 851277



NEW! S.E.M. FORWARD/REVERSE POWER METER

At last a forward/reflected power meter designed for the British amateur. FSD 500w, $\frac{1}{2}$ scale 100w. 1-30 MHz. The pick-up unit which connects in the aerial lead is separate from the readout for very convenient use. Price: **£28.50.**

S.E.M. Z MATCH

The necessity to terminate modern equipment with the correct NON-REACTIVE impedance is solved with our Z Match. 15-5,000 ohms. BALANCED OR UNBALANCED with inductively coupled BALUN. SO239s and 4 mm. terminals for co-ax or wire. Rated up to 1 kW. Calibrated slow motion dials make adjustment and re-setting easy. Price: **£39.44 IN STOCK.**

2 METRE AND 70 CM. PRE-AMPLIFIERS TO IMPROVE RECEPTION

These are also stocked on Marine and Satellite Band. Other frequencies to order. All require 12v. supply (9-15v. spread).

SENTINEL AUTO 2 METRE PRE-AMPLIFIER

The pre-amplifier contains an r.f.-operated switch for direct connection in the transceiver aerial lead, or for "mast head" use. The transistors are selected for a 1 dB noise figure and gain is 18 dB. The r.f. switch has a delay for use on all modes. A much commended unit with many thousands in use. Price: **£17.35* IN STOCK.** 70 cm. version **£20.25* IN STOCK.**

SENTINEL STANDARD PRE-AMPLIFIERS

Same circuits and performance as above but without the relay switching. 2 metres **£10.85***. 70 cm. version **£13.50***. Both **IN STOCK.**

PA3

This must be the most copied pre-amplifier, but all the

competitors seem to have faded away. Only about one cubic inch, to fit inside your transceiver. N.F. 2 dB Gain 18 dB. Price: **£6.80 IN STOCK.**

PA3/70 for 70 cm. Size: $1\frac{3}{8}$ " x $1\frac{3}{8}$ " x $\frac{1}{2}$ ". Price: **£9.00 IN STOCK.**

H.F. WIDEBAND PRE-AMPLIFIER 1-40 MHz

Ideal for pepping up your receiver on 15 and 10 metres. For use with OSCAR or with a short aerial they make an effective ACTIVE AERIAL. Gain 15 dB, supply 12v.

SENTINEL STANDARD H.F. PRE-AMPLIFIER £9.00* IN STOCK.

THE SENTINEL AUTO H.F. PRE-AMPLIFIER

SAME circuit as above with an aerial change over relay for operation with your transceiver relay, for direct connection in your aerial. Price: **£12.94* IN STOCK.**

SENTINEL 2 METRE POWER AMPLIFIER/PRE-AMPLIFIER

Another unit which is being copied, I'm sorry to say. We are now fitting the very latest types of power transistor available with a dissipation of 135w., and power gain of 4. E.g. 12w. IN, 48w. OUT. The circuit is linear for use on all modes.

The receive pre-amplifier uses a J FET selected for a 1 dB noise figure and 18 dB gain. The r.f. relay switches between the two with a time delay for use on any mode. The relay can also be operated by the transceiver. Size is only 6" x 2" front panel, 4 $\frac{1}{2}$ " deep. SO239s are used. **£59.62 IN STOCK.** Or less the pre-amplifier **£49.50.** Yes, they do work fine with the FT221 and TS700 series.

SEM EUROPA C 2 METRE TRANSVERTER

200w. input, 2 dB N.F. Plugs straight into YAESU equipment and you are on 2 metres, any mode.

£112.50 EX STOCK. 600 kHz repeater shift, **£12.50.**

CPS10 Power Supply for Europe to use with other equipment. Price: **£56.25 EX STOCK.**

SENTINEL DUAL GATE MOSFET 2 METRE CONVERTERS—I.F.'s: 2-4 MHz, 4-6 MHz, 28-30 MHz. N.F. 2 dB. Gain 30 dB. Price: **£20.25 IN STOCK.**

SENTINEL X—Same as above with an A.C. power supply. Price: **£24.75 IN STOCK.**

SEM 70. 70 cm. to 2 metre converter. Price: **£20.25 IN STOCK.**

SENTINEL 70. 70 cm. to 10 metre converters. Price: **£22.50 IN STOCK.**

SENTINEL TOP BAND CONVERTERS—21.8-2.3 MHz to 14-14.5 MHz. Price: **£20.25 IN STOCK.**

* SO239 sockets available on these units at an extra cost of £1.69.

Circuits and instructions provided with equipment. For more details of any of our equipment, please ring or write. Prices include VAT and delivery.

12 months guarantee. To order: C.W.O. or credit card. Just phone your credit card number for same day service.

BELLE VUE—All our products will be stocked by The Amateur Radio Shop—G4MH.



FOR QUALITY CRYSTALS—AT COMPETITIVE PRICES POPULAR FREQUENCIES IN STOCK MADE TO ORDER 10kHz to 225MHz

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 £1.85 for one crystal. £17.5/crystal when two or more purchased.

	HC6/U 30pF TX	HC6/U 30pF TX	HC25/U 40pF TX	HC25/U 20pF and 30pF RX	HC25/U 25pF and 20pF TX	HC6 & 25/U SR RX
RZ	4-0277	8-0555	12-0833	14-9888	18-1250	44-9666
R1	4-0284	8-0569	12-0854	14-9916	18-1281	44-9750
R2	4-0291	8-0583	12-0875	14-9944	18-1312	44-9833
R3	4-0298	8-0597	12-0895	14-9972	18-1343	44-9916
R4	4-0305	8-0611	12-0916	15-0000	18-1375	45-0000
R5	4-0312	8-0625	12-0937	15-0027	18-1406	45-0083
R6	4-0319	8-0638	12-0958	15-0055	18-1437	45-0166
R7	4-0326	8-0652	12-0979	15-0083	18-1468	45-0250
S20	4-0416	8-0833	12-1250	14-9777	18-1875	44-9333
S21	4-0423	8-0847	12-1270	14-9805	18-1906	44-9416
S22	4-0430	8-0861	12-1291	14-9833	18-1937	44-9500
S23	4-0437	8-0875	12-1312	14-9861	18-1968	44-9583

All Repeater Channels for FT221 in stock plus Yaesu FT2FB FT2 Auto, FT224, Trio 2200 and Icom IC22A, 215 series crystals for R0 to R7, S20 to S23. Also in stock 4 and 8 MHz TX in HC6/U for 145.8 MHz. Icom crystals TX and RX for 145.25 MHz (S10) and TX for 145.25 MHz (S10) and TX for 145.6 MHz (RR0). 44 MHz RX crystals in HC6 and HC25 for 145.8 and 145 (RR0) and HC6 only for 145.475 MHz (S19). Other crystals in stock—send sac for details.

2 METRE MADE TO ORDER CRYSTALS at £2.50 (No discounts) This service is designed specifically for those customers who require an odd S channel or Raeten crystal and covers most ex-commercial and Japanese equipments. TX 4 to 4.06 MHz, 6 to 6.084 MHz, 8 to 8.12 MHz, 12 to 12.17 MHz and 18 to 18.25 MHz. RX 10.25 to 10.4 MHz, 11.1 to 11.28 MHz, 14.81 to 15.04 MHz, 44.43 to 45.1 MHz and 51.56 MHz to 52.24 MHz. Delivery 6 to 8 weeks. Holders HC6, HC18 or HC25/U. When ordering please give crystals load capacity and holder. Specify equipment in which crystals are to be used.

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.

70 Cm CRYSTALS. Crystals held in stock for Pye Pocketfone PFI for SUB (433.2 MHz) and all UK repeater channels RB0, 2, 4, 6, 10 and 14 at £4.50 a pair or TX only £2.25, RX only £2.50. Also 8-0222 and 12-0333 in HC6/U for SUB at £1.85. We can supply crystals in 6 to 8 weeks for any frequency within the 70cm. amateur band for Pye, WISU, UIOB, U450L and FDK Multi U11 at £2.50 per crystal.

CONVERTER CRYSTALS in HC18/U at £2.85. In stock. 38-666, 42-000, 70-000, 96-000, 101-000, 105-666 and 116-000 MHz in stock.

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 (8% VAT) in stock. 455 kHz, 1 MHz, 5 MHz, 10 MHz in HC6/U. Price £2.75, 10-7 MHz in HC18/U. Price £2.75, 100 kHz in HC13/U Price £2.50 (special offer).

PRICES ARE EX VAT. PLEASE ADD 12½% UNLESS OTHERWISE STATED.

FORMERLY C&C ELECTRONICS

QuartSLab
MARKETING LTD
P.O. Box 73
Summit House
London SE18 3LR

Telephone: 01-690 4889 24Hr Ansafone: Erith (03224) 30830
Telex: 912881 CWUKTX-G (Attention QUARTSLAB)
Cables: QUARTSLAB London SE18

MADE TO ORDER CRYSTALS SINGLE UNIT PRICING

	Price Group	Adjustment Tolerance ppm	Frequency Ranges	Price and Delivery
				A B
Fundamentals	1	200 (total)	10 to 19-999 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	£5.90
	6	10	1.50 to 1.999 MHz	£3.90
	7	10	2.00 to 2.599 MHz	£3.50
	8	10	2.60 to 3.999 MHz	£3.40
	9	10	4.00 to 20-999 MHz	£3.35
	10	10	21.00 to 24-000 MHz	£3.70
3rd OVT	11	10	21-00 to 59-999 MHz	£3.35
5th OVT	12	10	60-00 to 104-999 MHz	£3.35
	13	10	105-00 to 119-999 MHz	£5.00
5th, 7th & 9th OVT	14	20	120-00 to 149-999 MHz	— £6.00
	15	20	150-00 to 225-000 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, Column B 6 to 8 weeks.

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

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

CRYSTAL SOCKETS HC6/U and HC25/U 16p

MINIMUM ORDER CHARGE £1.50.

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

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

OVERSEAS DISTRIBUTORS

West Germany, Austria and Benelux countries—SSB Electronic, Karl Arnold Str 23,5860 Iserlohn, West Germany.
Denmark—Asbjorn Jorgensen, Aabrinken 1, Tapdrup, DK800, Denmark.
Portugal—Sorubal SARL, Rua General Pimenta de Castro, 15-81, Lisboa 5.

(Enquiries invited from companies in other countries).

P.M. ELECTRONIC SERVICES

PROFESSIONAL COMPLETE CRYSTAL SERVICE AMATEUR

VAT—PRICES EXCLUDE VAT, FOR YOUR CONVENIENCE THE VAT INCLUSIVE PRICE IS SHOWN IN BRACKETS—OVERSEAS ORDERS (Inc. Eire and Channel isles) NO VAT CHARGEABLE

2M TX & RX CRYSTAL AVAILABILITY AND PRICE CHART

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-HC25/U	12 MHz-TX-HC25/U	14 MHz-RX-HC25/U	18 MHz-TX-HC6 & 25/U	44 MHz-RX-HC6/U	44 MHz-RX-HC25/U	48 MHz-TX-HC6 & 25/U	52 MHz-RX-HC25/U	72 MHz-TX-HC25/U
OUTPUT FREQUENCY													
144-4 (433.2) ...	a	b	c	d	e	f	g	h	i	j	k	l	m
144-480 ...	a	b	c	d	e	f	g	h	i	j	k	l	m
144-900 ...	a	b	c	d	e	f	g	h	i	j	k	l	m
144-850 ...	a	b	c	d	e	f	g	h	i	j	k	l	m
145-000/ROT	a	b	c	d	e	f	g	h	i	j	k	l	m
145-025/RIT	a	b	c	d	e	f	g	h	i	j	k	l	m
145-050/RJT	a	b	c	d	e	f	g	h	i	j	k	l	m
145-075/RJT	a	b	c	d	e	f	g	h	i	j	k	l	m
145-100/RAT	a	b	c	d	e	f	g	h	i	j	k	l	m
145-125/RST	a	b	c	d	e	f	g	h	i	j	k	l	m
145-150/R6T	a	b	c	d	e	f	g	h	i	j	k	l	m
145-175/R7T	a	b	c	d	e	f	g	h	i	j	k	l	m
145-200/R8T	a	b	c	d	e	f	g	h	i	j	k	l	m
145-300/S12	a	b	c	d	e	f	g	h	i	j	k	l	m
145-350/S14	a	b	c	d	e	f	g	h	i	j	k	l	m
145-400/S16	a	b	c	d	e	f	g	h	i	j	k	l	m
145-425/S17	a	b	c	d	e	f	g	h	i	j	k	l	m
145-450/S18	a	b	c	d	e	f	g	h	i	j	k	l	m
145-475/S19	a	b	c	d	e	f	g	h	i	j	k	l	m
145-500/S20	a	b	c	d	e	f	g	h	i	j	k	l	m
145-525/S21	a	b	c	d	e	f	g	h	i	j	k	l	m
145-550/S22	a	b	c	d	e	f	g	h	i	j	k	l	m
145-575/S23	a	b	c	d	e	f	g	h	i	j	k	l	m
145-600/ROR	a	b	c	d	e	f	g	h	i	j	k	l	m
145-625/R1R	a	b	c	d	e	f	g	h	i	j	k	l	m
145-650/R2R	a	b	c	d	e	f	g	h	i	j	k	l	m
145-675/R3R	a	b	c	d	e	f	g	h	i	j	k	l	m
145-700/R4R	a	b	c	d	e	f	g	h	i	j	k	l	m
145-725/R5R	a	b	c	d	e	f	g	h	i	j	k	l	m
145-750/R6R	a	b	c	d	e	f	g	h	i	j	k	l	m
145-775/R7R	a	b	c	d	e	f	g	h	i	j	k	l	m
145-800/R8R	a	b	c	d	e	f	g	h	i	j	k	l	m
145-950/S38	a	b	c	d	e	f	g	h	i	j	k	l	m

PRICES : (a) £1.95 (£2.19); (b) £2.32 (£2.61); (c) £2.80 (£3.15); (d) and (e) £3.92 (£4.41).

AVAILABILITY : (a), (b), (c) and (d) stock items, normally available by return (we have over 5000 items in stock). (e) four 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.

YAESU FT221 CRYSTALS NOW IN STOCK, ALL AT £2.80 (£3.15). All popular channels—For repeater use advise xtal frequency required as earlier models have different shift xtal to later FT221R. We can also supply the crystal to give NORMAL "tune to RX" working (as FT221R).

MODULAR COMMUNICATIONS SYSTEMS

For the RTTY enthusiast we can recommend and supply the "MCS" range of products. This includes terminal units, AFS keys, magnet drivers for TTL interface, telegraph distortion measuring adaptor, RTTY audio processor, power units, etc., etc. For the CW man we have the "MCS" CW filter which give three stages of active filtering. Please send S.A.E. for full details of the "MCS" range.

MICROCOMPUTER DIVISION

We are now suppliers of popular Z80 based microcomputer systems including "DYNABYTE" and "North Star HORIZON" together with a full range of VDUs and line printers. We can supply either as basic units or as complete working systems with software for the small business user.

CRYSTALS FOR NEW BRITISH 70CM CHANNELS

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

We are stocking the following channels R80 (434-60/432-00), R82 (434-66/433-05), R84 (434-70/433-10), R86 (434-75/433-15), SUB (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 (PF1) and STORNO COL/CQM 662 all at £2.32 (£2.61). 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 £3.92 (£4.41) to Amateur Spec. or £4.64 (£5.22) to same spec. as stock items. Delivery approx. 4/5 weeks.

4M. CRYSTALS FOR 70.26 MHz—HC6/U

TX 8-7825 MHz and RX 6-7466 MHz or 29-780 MHz £2.32 (£2.61).

10.245 MHz "ALTERNATIVE" IF CRYSTALS £2.32 (£2.61). For use in Pye and other equipment with 10.7 MHz and 455 kHz IF's to get rid of the "birdy" just above 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 (£3.37), 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).

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. ± 50 ppm. Temp. tol. ± 100 ppm 0 to +70°C.
6.0 to 19.999 kHz £28.12 (£31.63) 80 to 99.999 kHz £7.30 (£8.21)
20 to 29.999 kHz £17.75 (£19.97) 100 to 149.99 kHz £6.68 (£7.51)
30 to 59.999 kHz £15.51 (£17.45) 150 to 499.99 kHz £6.20 (£6.97)
60 to 79.999 kHz £12.41 (£13.19) 500 to 799.99 kHz £7.30 (£8.21)

B Mid frequency fundamentals in HC6/u, HC18/u or HC25/u
Adj. tol. ± 20 ppm. Temp. tol. ± 30 ppm, -10 to +70°C.
(800 to 999.9 kHz £9.50 (£10.64) *4.0 to 5.999 MHz £4.24 (£4.77)
*0.1-0 to 1.499 MHz £8.40 (£9.45) *6.0 to 20.99 MHz £3.92 (£4.41)
*0.1-5 to 2.599 MHz £4.24 (£4.77) *21 to 24.99 MHz £6.48 (£7.29)
*0.2-6 to 5.999 MHz £3.92 (£4.41) 25 to 27.99 MHz £8.88 (£9.99)
*3.4 to 3.999 MHz £4.96 (£5.58) 28 to 30 MHz £9.68 (£10.89)

C High frequency overtones in HC6/u, HC18/u or HC25/u
Adj. tol. ± 20 ppm. Temp. tol. ± 30 ppm, -10 to +70°C.
*15-20.99 MHz (30/T) £4.24 (£4.77) *105-125 MHz (50/T) £5.84 (£6.57)
*21-63 MHz (30/T) £3.92 (£4.41) 125-180 MHz £6.48 (£7.29)
*60-62.99 MHz (50/T) £4.88 (£5.49) 180-250 MHz £10.64 (£11.86)
*63-105 MHz (50/T) £4.48 (£5.04)

Delivery * Normally 4/6 weeks (express available), all other frequencies 6/8 weeks. Holders : Low frequencies HC13/u or HC6/u dependent on frequency. Mid and High frequencies are available in HC6/u, HC18/u or HC25/u unless marked \emptyset only available in HC6/u or \ddagger 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 (28p) extra on HC6/u price. Unless otherwise specified, fundamentals will be supplied to 30pf circuit conditions and overtones to series resonance.

TEST EQUIPMENT FREQUENCY STANDARD CRYSTALS
100 kHz in HC13/u and 455 kHz in HC6/u, £2.95 (£3.19).
1.1 MHz and 5 MHz in HC6/u and 10 MHz and 10.7 MHz in HC6/u and HC25/u, £2.80 (£3.02).

BURNS ELECTRONICS

We are the Northern Appointed Agents for BURNS KITS etc. and can supply many of their products from stock.

ANZAC MD-108 DOUBLE BALANCED MIXER

5-500 MHz supplied with full details for only £5.95 (£6.43).

CRYSTALS FOR PROFESSIONAL USE

We can supply crystals to most commercial and MIL specifications, with an express service for that urgent order. Please send S.A.E. for details or telephone between 4.30-7 p.m. and ask for Mr. Norcliffe.

CRYSTALS FOR LARGE QUANTITY COMMERCIAL USERS
We can supply crystals for commercial use, e.g. TV or computer crystals, etc., at very competitive prices. Please let us know your requirements.

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.

2 ALEXANDER DRIVE, HESWALL, WIRRAL, MERSEYSIDE L61 6XT
Tel : 051-342 4443. Cables : CRYSTAL BIRKENHEAD. Telex : 627371

J. BIRKETT *Radio Component Suppliers*

25 THE STRAIT . LINCOLN . LN2 1JF

Telephone: 20767

VHF POWER TRANSISTORS PT4544. 12.5 volt 175 MHz 10 watt at £3.

SPECIAL VHF SOLDER-IN TUBULAR TRIMMERS. 6pf at 10p each.

MINIATURE 25 + 25 + 25 pf VARIABLE CAPACITORS. Direct Drive at 75p.

FERRITE BEADS FX 1115. 15p doz.

TOKO CERAMIC FILTERS. CFS 10.7 MHz BW \pm 30 kHz at 30p.

MURATA CERAMIC FILTERS. 10.7 MHz at 27p, 5.5 MHz at 27p, 3/16" COIL FORMERS with core at 6 for 25p.

VHF TETTER TRIMMERS. 10pf at 18p.

COMMUNICATION SERIES OF I.C.'s. Untested with data, consisting of 3 x R.F., 1 x I.F., 2 x VOGAD, 2 x AGC, 1 x Mike Amp, 2 x Double Balanced Modulator, 1 x Mixer, The 12 I.C.'s for £3. Separate I.C.'s, 27p each.

2 GHz STRIPLINE NPN TRANSISTORS at £1 each.

VERNITRON FM 4 10.7 MHz FILTERS at 50p each.

HC 6U CRYSTALS. 2002, 2044, 2100, 2111 kHz, 19.06, 20.006, 27.1765, 27.178, 27.181, 27.184, 27.187, 27.1885, 27.193, 32.2222, 33.3333, 36.2222, 36.6666, 38.3333, 39.7407, 40.075, 40.2222, 40.3333, 44.3, 45.7, 45.9, 46.3, 48.3, 50.1 MHz. All at 50p each. 3 for £1.30.

HC18U CRYSTALS. 10.230 MHz at £1.25, 26.583, 53.675, 66.986 MHz at 50p each.

TWO METRE 10X CRYSTALS. 8010 kHz at 40p.

LARGE 0.2" RED LEDs at 10 for £1.

2 GHz STRIPLINE NPN TRANSISTORS at £1 each.

MYLAR CAPACITORS. 50v.w., 0.1uf or 0.1uf. Both 20p doz.

50 VARI-CAP DIODES LIKE BA 102. Untested for 57p.

10.7 MHz CRYSTAL FILTERS. B.W. \pm 7.5 kHz at £5; 10.7 MHz B.W. \pm 6 kHz at £6; 11.4 MHz at £3; 21 MHz at £3.

AF 239 PNP R.F. TRANSISTORS at 50p, BFY 90 RCA TYPE at 50p.

RCA WIDE BAND RF/I.F. I.C. AMPLIFIER. CA 3011 at 50p.

DUAL GATE MOS FETS LIKE 40673 at 33p, 4 for £1.10.

MULLARD SEMI-AIRSPACED TRIMMERS. 1 to 3.5 pf at 15p; 1.8 to 10 pf at 15p; 2 to 18 pf at 18p.

PLASTIC TRANSISTORS SIMILAR TO BC 108 at 10 for 50p.

X BAND GUNN DIODES with data at £1.65.

X BAND GUNN DIODES CYX11A at £3.

X BAND DETECTOR DIODES LIKE SIM 2 at 15p; IN 23 at 25p.

50 ASSORTED 2 WATT ZENER DIODES. Untested at 57p.

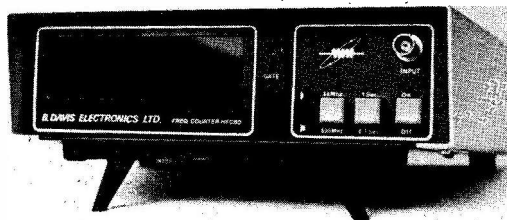
50 PIV 2 1/2 AMP DIODES WIRE ENDED. 7p, 6 for 25p.

DIVIDE BY 2 300 MHz COUNTERS with data at 65p.

DIVIDE BY 4 150 MHz COUNTERS with data at 65p.

30 ASSORTED 10XAJ CRYSTALS at £1.10; 20 ASSORTED FT 241A CRYSTALS at £1.10; 20 ASSORTED FT 243 CRYSTALS at £1.10; 25 ASSORTED CRYSTALS at £1.10.

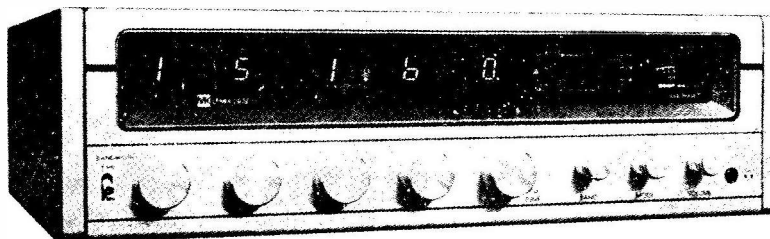
HIGH FREQUENCY COUNTER TYPE HFC 600. Range 1 Hz to 600 MHz, 240 volt AC input. Price £115 VAT paid.



Please add 20p for post and packing on U.K. orders under £2. Overseas postage at cost.

AEROSPACE & ELECTRONICS LTD.

PRESENT: THE DR22 SPACE AGE DIGITAL READOUT RECEIVER



DR22

FULLY SYNTHESISED GENERAL COVERAGE RECEIVER

SPECIFICATIONS

FREQUENCY COVERAGE

TUNING

MODES

SENSITIVITY FOR 10dB S + N/N

IMAGE REJECTION

BANDWIDTHS

DIMENSIONS AND WEIGHT

50 kHz to 29.7 MHz continuous. LED display.

5 kHz steps, digital readout, \pm 5 kHz fine tune.

AM, USB, LSB, CW.

1 μ V typical.

70dB.

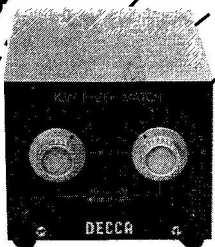
4 kHz-3dB, 10 kHz-60dB and 8 kHz-3dB, 14 kHz-60dB.

(WxDxH) 17.5 x 14.5 x 5.1in. Shpg. weight 19 lb.

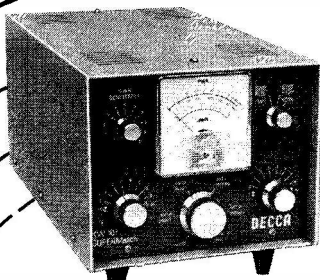
OTHER SYNTHESISED RECEIVERS: DR33, DR44, DR55.

DETAILS FROM: AEROSPACE & ELECTRONICS LTD., 4 AUBURN AVENUE,
DUNLAOGHAIRE, CO. DUBLIN, IRELAND. Phone: 855487

Optimum Performance with KW Ancillaries

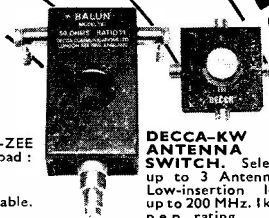


DECCA-KW E-ZEE MATCH
Antenna Tuner 10-80 metres, matches 50/75 ohm input to co-ax fed antenna's, also twin feeder and single wire systems.



DECCA-KW107 SUPERMATCH
Antenna Tuning System Incorporates E-ZEE Match, SWR/RF power meter; Dummy Load; Antenna switch.

DECCA-KW109 SUPERMATCH
A high power version of the KW107 is available.



DECCA-KW ANTENNA SWITCH. Selects up to 3 Antennas. Low-insertion loss up to 200 MHz. 1kW p.e.p. rating.

DECCA-KW BALUN Mk. II
The Decca-KW Balun is broadband-3 to 30 MHz. rated up to 2 KW p.e.p. 1:1 Ratio 50 ohms "unbalanced" feed to "balanced" output. Water-proof moulded case. Suitable for Dipole and Beam Antenna.



Other KW Favourites—Decca KW Dummy Load, KW Traps (original and the best); KW Trap Dipoles; Stockist for HY-Gain beams and Verticals; CDR Rotators; Shure Microphones, etc. Write or phone for catalogue..

Amateur Radio Products,
DECCA COMMUNICATIONS LTD.
Cramptons Rd., Otford, Sevenoaks, Kent TN14 5EA
Tel.: Sevenoaks (0732) 50911

SERVING RADIO AMATEURS WORLD-WIDE



COMPLETE RANGE of
VERO CABINETS at
DISCOUNT PRICES from

Catronics

A few examples:

All-Plastic Range		Metal Fronted Range	
Code No	Size (mm.)	Code No	Size (mm.)
65-2514 F	100 x 50 x 25	75-1237 J	85 x 40 x 154
65-2516 G	100 x 50 x 40	75-1238 D	85 x 60 x 154
65-2518 H	120 x 65 x 40	75-1239 K	85 x 80 x 154
65-2520 J	150 x 80 x 50	75-1411 D	205 x 140 x 75
65-2522 K	188 x 110 x 60	75-1412 K	205 x 140 x 110
		75-1410 J	205 x 140 x 40
Aluminium top panel—65-3851 A (120x65x40 mm.)		£3-31	
Sloping front — 75-1798 K (171x121x75/37.5 mm.)		£4-82	
Sloping front — 65-2623 E (220x174x100/52 mm.)		£6-90	
19" CARD FRAME / CASE SYSTEM			
Card Frame / case	...	71-3841-L	£24-50
			£1-25 p+p
Pair end plates	...	71-3842-F	£1-01
8" Module	...	71-3843-A	£5-00
4" Module	...	71-3844-G	£3-80
Veroboard	...	09-3979-K	£1-35
2" Front panel	...	71-3845-B	£2-37
1" Front panel	...	71-3846-H	£2-06
Veroboards (less connector)	...	09-1034-F	£1-42
Plain board (less connector)	...	09-1040-J	94p
DIP board (less connector)	...	10-1041-J	£2-66
Connector, plug, 31 way	...	17-0267-H	£1-09
Connector, socket, 31 way	...	17-0268-C	£1-20
VQ DIP board	...	01-0044-C	£1-17

All prices include VAT at current rates
Add min. 30p post & packing on cabinets and panels

COMMUNICATIONS HOUSE (Dept. 914)
20 WALLINGTON SQUARE,
WALLINGTON, SURREY, SM6 8RG
Telephone : 01-669 6700



VHF COMMUNICATIONS

NOW AVAILABLE!

The WINTER 1978 edition

which includes articles on:

- 2m Synthesized Transceiver
- 2m DF Receiver
- Receive Converter
- Meteosat Reception
- 10 GHZ Technology
- etc., etc.

Send £1-30 for a copy of this new Winter Edition
or £4-80 for COMPLETE 1978 VOLUME.
1979 Subscription £5-30

VHF COMMUNICATIONS is the English language edition of the German publication UKW-BERICHTE, a quarterly amateur radio magazine especially catering for vhf/uhf/ishf technology. It is published in spring, summer, autumn and winter.

All special components required for the construction of the described equipment, such as printed circuit boards, coil formers, semiconductors and crystals, as well as complete kits, are available for despatch direct from Germany. Many of the printed circuit boards, in addition to a few selected kits, are stocked in the U.K. A price list of kits and materials is available—send sae for your copy.

Orders and enquiries should be sent to either

VHF COMMUNICATIONS, Dept. 914, 20, Wallington Square, Wallington, Surrey SM6 8RG

OR

SOTA COMMUNICATION SYSTEMS LTD., 26 Childwall Lane, Bowring Park, Liverpool L14.

C.B. ELECTRONICS

UNIT 3, 771 ORMSKIRK ROAD, PEMBERTON, WIGAN, WN5 8AT

Telephone : Wigan (0942) 216567

THE BEST IN THE NORTH-WEST

HOW TO FIND US :—From M6 junction 26 follow signs for Wigan A577 at first traffic lights (T junction) turn right towards Wigan. At next traffic lights you are there, **BUT** turn left and 10 yards further turn right by telephone kiosk. Premises are slightly to your right. Plenty of parking space. Mileage from motorway $\frac{1}{2}$ mile. **From Wigan** follow the A577 Skelmersdale to traffic lights at Fleet Street, Pemberton (Ye Olde White Swan on your left). Turn right then 10 yards right again. By Co-op. Mileage from Wigan $2\frac{1}{2}$ miles.

YAESU		FR101's	... .. £444.37	Multi 2700	... .. £489.00	PTT mics.	... .. £4.50
FT90IDM	... .. £959.62	FT225R	... .. £548.33	TM56	... .. £104.00	WESTERN	
FT101E	... .. £579.37	FT225RD	... .. £601.87	Rotators		ANT SW. 5w	... .. £10.50
FT101Z	... .. £562.50	FT227R	... .. £239.62	CDE AR30	... .. £46.00	Power meter HF	... .. £48.62
FT101ZD	... .. £646.87	FT202R	... .. £99.00	CDE AR40	... .. £53.00	Power meter VHF	... .. £48.62
FL2100B	... .. £349.87	CPU250R	... .. £328.50	CDE CD44	... .. £107.00	ASP Antennas	
FT200	... .. £394.87	CPU2500RK	... .. £346.50	EMOTATOR		2009 5/8 wave	... .. £9.72
FP200	... .. £77.62	CPU2500RS	... .. £318.37	103LBX	... .. £95.62	201 1/4 wave	... .. £3.13
FT301	... .. £579.37	CPU2500RKS	... .. £335.25	502CX	... .. £145.12	677 5/8 wave	... .. £14.95
FP301	... .. £110.25	FL110 Linear	... .. £146.25	1102	... .. £208.00	462 5/8 wave	... .. £7.56
FT7B	... .. £421.87	F.D.K.		Morse Key	... .. £2.95	Magnetic Base	... .. £8.50
FC301	... .. £121.50	Multi 800	... .. £289.80	Morse Key Ny King	... .. £9.75	Boat mount	... .. £3.50
FRG7	... .. £210.37	700E	... .. £229.00	High Pass Filter	... .. £2.95	SWR Bridges	
FR101D	... .. £590.62	Multi U11	... .. £249.00	Headphones	... .. £4.50	Single meter	... .. £11.50
FL101	... .. £489.32					Twin meters	... .. £14.50

DUE TO FLUCTUATING EXCHANGE RATES, PLEASE CHECK FOR CURRENT PRICES.

WANTED : RECEIVERS & TRANSCEIVERS HF or VHF

PART EXCHANGES WELCOME

S.A.E. ALL ENQUIRIES

H.P. AND CREDIT TERMS

We are moving on the 1st March NEW ADDRESS

THE AMATEUR RADIO SHOP

4, CROSS CHURCH STREET,
HUDDERSFIELD. TEL. 0484 20774.

Agents for YAESU ; J BEAMS ; ASP ; AES ; SEM ; G WHIPS, etc.

COMPONENTS : WE HAVE VAST SUPPLIES OF TRANSISTORS ; IC's ; PLUGS ; SOCKETS ; CAP's and RESISTORS. UHF PLUGS, etc.

SECONDHAND : USUALLY A GOOD STOCK, S.A.E. FOR LIST.

XTALS : 3000 MIXED STOCK, S.A.E. FOR LIST.

SWR IND. :	Single Meter	... .. £9.75	Twin Meter	... .. £14.00
	Low Pass Filter	... .. £4.75	Antenna Switch, 150w. handling	£6.25
	Morse Keys : Standard key	... .. £1.25	Power Supply Units 2.75 amp. 12v.	£16.50
	High Speed	... .. £3.00	Portable Masts 16ft. 4 sections	£6.00
	Coax R.G.8U low loss metre	40p	Yaesu 4 pin Mic plus and socket pr.	£1.00
	Mics. Hand held P.T.T. 50k.	... .. £3.75	Headphones. 2k. imp. mono	£3.75

WANTED ! WANTED ! — SECONDHAND GEAR

NEW HOURS : 9 a.m. to 5.30 p.m. MONDAY TO SATURDAY. LATE NIGHT THURSDAY UNTIL 8 p.m.

R. T. & I. ELECTRONICS LTD.

where equipment is fully overhauled

EDDYSTONE EB35 Receiver	£100.00 (£3.00)
EDDYSTONE EC10 Mk. 2 Receiver	£140.00 (£3.00)
EDDYSTONE 830/7 G.C. Receiver	P.O.A.
HAMMARLUND HQ110 B.S. Receiver	£100.00 (£3.50)
HAMMARLUND HQ145X G.C. Receiver	£150.00 (£4.00)
TRIO 9R-59DS G.C. Receiver	£65.00 (£4.00)
TRIO TS-510 Transceiver, PSU & Ext. V.F.O.	£250.00 (£5.00)
EDDYSTONE 770R. VHF Receiver 19-165 MHz AM/FM	£180.00 (£5.00)
EDDYSTONE 990S. UHF Receiver 230-970 MHz AM/FM	P.O.A.
COLLINS 51J4 G.C. Receiver	P.O.A.
G.E.C. RC410R G.C. Receiver 2-31 MHz	P.O.A.
G.E.C. RC411R G.C. Receiver 15-30 MHz	P.O.A.
CODAR AT5 + AC PSU	£50.00 (£2.00)

We are MAIN DISTRIBUTORS for AVO, MEGGER, TAYLORS and SULLIVAN INSTRUMENTS

All types of AVOMETERS and MEGGERS, normally in stock also accessories and spares

NEW DIGITAL AVOMETER TYPE DA116 in stock — £99.00 Send for details.

We also repair all types of instruments Trade and Educational enquiries invited

S. G. BROWN'S HEADPHONES. Type "P" 120 ohm, 2000 ohm, 4000 ohm, £14.50 (£1.00); Rubber Earpads for same, £1.32 per pr. (40p); Standard Jack plugs, £24p (12p).

SINCLAIR DIGITAL MULTIMETERS	
DM2	£55.00 (£1.20)
DM35	£29.95 (65p)
Mains adaptor for either model	£3.00 (70p)
Carrying case for DM2	£5.00 (70p)

YAESU MUSEN FRG-7 Receiver in stock	£187.00 (£3.00)
YAESU MUSEN FRG-7 Digital in stock	£228.00 (£3.00)
YAESU MUSEN FRG-7000 Receiver	£324.00 (£4.00)

In present conditions we regret that all prices are subject to alteration without notice.

NOTE: 12½% VAT must be added to all prices, new and secondhand, except Test Equipment which is 8% inc. carr. and packing.

Carriage for England, Scotland and Wales shown in brackets. Terms: C.W.O., Approved Monthly Accounts, Hire Purchase and Part Exchange. Special facilities for export.

HOURS—9.30 a.m.—5.30 p.m. MON.—FRI. CLOSED SATURDAYS

At R.T. & I.

- ★ We have full H.P. facilities.
- ★ Part exchanges are a pleasure.
- ★ We purchase for cash.
- ★ We offer a first-class overhaul service for your electronic equipment, whether you are an amateur or professional user.
- ★ We have EASY Packing facilities.
- ★ We welcome your enquiries for specific items which although not advertised, may very well be in stock.

PARTRIDGE "STOCKSTICK" New improved VFA, £21.95. JOYMATCH 111B, £21.95. LO-Z500, £28.00. JOYMATCH A.T.U. Kit, £9.50. A.T.U. Kit assembled, £11.25. Artificial earth and bandswitch, £9.50. Note—Partridge prices include postage, packing and VAT.

TRIO EQUIPMENT. New Trio R-300 Receiver, in stock, £164.00 (£3.00). All Bands with xtal calibrator.

SHURE MICROPHONES, 526.T £30.80 (£1.00); 444, £25.40 (£1.00); 401A, £13.00 (£1.00); 202, £12.00 (£1.00); 201, £11.40 (£1.00); 414A, £19.50 (£1.00); 4148, £19.50 (£1.00). Full details on request.

KEYNOTES, piano key mains connector units, £4.25 (40p). Trade enquiries welcome.

VALVES. Please state your requirements.

ADVANCE TEST EQUIPMENT—we are agents—your enquiries please.

TMK METERS: TP-10S, £14.95 (£1.00). 500TUB, £27.30 (£1.00). TM500, £23.75 (£1.00). TW20CB, £28.50 (£1.00). TP55N, £17.50 (£1.00). Model 700, £56.35 (£1.00), also cases for same.

We also supply PHILLIPS & LABGEAR COLOUR TV TEST EQUIPMENT, including Colour Bar Generators, Cross Hatch Generators. Degaussing Coils, Oscilloscopes, CRT Testers, Transistor Testers, etc., etc.

KW EQUIPMENT: KW103, £23.00 (£1.50); K W107, £108.00 (£1.50); KWE-Z MATCH, £40.00 (£1.50); KW109, £118.00 (£1.50); KW Balun, £8.50 (£1.00); KW Antenna Switch, £10.50 (£1.00); KW Dummy Load, £28.00 (£1.20), etc.

R. T. & I. ELECTRONICS LTD.

Ashville Old Hall, Ashville Road, London E11 4DX Tel. 01-539 4986

NEAREST STATION: LEYTONSTONE (Central line)

MON.—FRI. CLOSED SATURDAYS

SAMSON ETM-3C C-MOS KEYS

1 µA battery drain—Why switch off?

- Self-completing dots/dashes/spaces. ● Can be used either as normal electronic keyer or as an iambic mode squeeze keyer.
- 8-50 wpm. ● Constant 3:1 dash-dot ratio. ● 6 C-MOS ICs and 4 transistors. ● Plug-in PCB. ● Long battery life—typically 1 µA drain when idling—Built-in battery holder for 4 x 1.5v batteries (but will work over 3-10v. range). ● PCB has both a reed relay (250v., 0.5 amp., 25w. max.) and a switching transistor (300v., 30 mA max.)—either keying method can be used. ● Has the well-known fully-adjustable Samson precision twin keying lever assembly. ● Operate/Tune button. ● Sidetone oscillator.
- Grey case 4" x 2" x 6". ETM-3C, £63.88.

ETM-4C MEMORY KEYS: Has ETM-3C features plus 4 memories of 22 characters each (or 2 of 44). Erase/Rewrite memories as needed—Send CQ's etc. by pressing a button.

BUILT FOR DEPENDABLE MARINE AND COMMERCIAL SERVICE

JUNKER PRECISION HAND KEY

A superbly engineered straight key used for many years by professionals afloat and ashore. With this key you can't help but send good Morse. Free-standing—no screwing down. Front and back contacts—fully-adjustable gaps/tension. Key-click filter. Hinged grey cover, £36.54

BAUER KEYING PADDLE

Single-paddle unit on 1½" x 2" base for home-built EI-bugs. Adjustable gaps/tensions, £11.66.

88 mH TOROIDS

For CW, RTTY, SSTV and other filters, 99p each.

All prices post paid UK and include 12½% VAT.

Please send stamp with enquiries.

SPACEMARK LTD.

THORNFIELD HOUSE, DELAMER ROAD

ALTRINCHAM, CHESHIRE

(Tel: 061-928 8458)

ANNOUNCING

THE BROOKES MB6/R/RT R.T.T.Y. CONVERTER, THESE UNITS SUPERSEDE THE HB5 SERIES, AND ARE OF ACTIVE FILTER DESIGN.

AUDIO INPUT FROM RECEIVER, WITH T.T.L. AND C-MOS LEVELS FOR VDU'S (SINGLE OR DOUBLE CURRENT) TO PRINTER MAGNETS, AND OSCILLOSCOPE OUTPUTS ARE AVAILABLE. RECEIVING SHIFTS ARE 170, 250, 425, 625 AND 850, TRANSMITTING SHIFT 170 NEW TONES.

BUILT IN AN ULTRA MODERN CASE, FRONT AND BACK PANELS BEING BLACK WITH WHITE LETTERING. DIMENSIONS 84 x 304 x 210.

Just a Reminder

OF OUR POPULAR FDU7's FREQUENCY DISPLAY UNIT FOR THE FRG7, WHICH FITS IN PLACE OF THE kHz DIAL. ALSO THE FDU3 FOR THE SSRI AND SRX30 WHICH IS NOW SUPPLIED IN AN ALUMINIUM CASE, FOR TOP OF THE RECEIVER USE.

ALL SUPPLIED WITH FULL FITTING INSTRUCTIONS C.W.O. CHEQUE OR ACCESS ACCEPTED

	PRICE	
MB6/R (RECEIVE ONLY)	£77.96	Inclusive of
MB6/RT (AFSK/FSK)	£83.25	Postage
FDU7 (DISPLAY UNIT FOR FRG7)	£44.77	and VAT
FDU3 (FOR SSRI & SRX 30)	£44.77	

B. BROOKES ELECTRONICS

69 LEICESTER STREET, NORWICH NR2 2DZ ENGLAND Tel.: 0603 24573

U.K. DISTRIBUTORS TO BE ANNOUNCED

INTERNATIONAL DISTRIBUTORS "INTERMEDIARY" (INTERNATIONAL TRADE)

P.O. BOX 5599

1007, AN. AMSTERDAM, HOLLAND

C&C electronics

10 WEST PARK, LONDON SE9 4RQ

Telephone: 01-852 9397



Please note that all business interests previously handled by C. & C. ELECTRONICS will from the 1st April 1979 be dealt with by QUARTSLAB MARKETING LIMITED.

Quartslab Marketing Limited will be providing all the services previously offered by C. & C. Electronics and will be continuing to process orders placed with C. & C. prior to April. However all future orders after this date must be placed with Quartslab Marketing Limited who will deal with any guarantees or queries on previous transactions.

Please see the advertisement elsewhere in this magazine for full details of prices. You will note that where possible reductions from the C. & C. Electronics price have been made. Also Quartslab Marketing Limited carry a larger range of stock frequencies to give an improved service.

C. & C. Electronics would like to thank the customers who have supported them over the last 5 years and hope that they will now give the same support to QUARTSLAB MARKETING LIMITED.

FORMERLY C&C ELECTRONICS

QuartSlab

MARKETING LTD

P.O. Box 73

Summit House
London SE18 3LR



Telephone: 01-690 4889 24hr Ansafone: Erith(03224)30830
Telex: 912881 CWUKTX-G (Attention QUARTSLAB)
Cables: QUARTSLAB London SE18

REG. WARD & CO. LTD.

(G8CA)
(G2BSW)

YAESU

FT901D	£737-50	FT225R	£487-50
FT301D	£585-00	CPU2500RK	£308-00
FP301	£98-00	FT227RA	£229-00
FT101E	£515-00	FT227R	£213-00
FT200B/FP200	£420-00		
FT7B	£375-00	FT202R	£88-00

FT7	£265-78		
FL2100B	£311-00	FP12	£67-50
FL110	£130-00	FP4	£35-00
FR101DD	£615-00	YC601	£113-00
FR101D	£525-00	SP101B	£19-00
FR101S	£395-00	YD148	£18-50
FRG7000	£327-00	YD844	£18-00
FRG7D	£240-00	YD846	£7-50
FRG7	£187-00		
YO100	*£145-00		
YC500J	*£168-50		
YP150	*£58-50		
FC301	£108-00		

SHURE

444	£28-20
201	£12-60

* Add 8% to these—others 12½% VAT.

VALVES. Most types kept. All valves for Yaesu in stock, valves for K.W. also.

S.E.M. Equipment. Most items held.

K.W. Ancillary equipment.

Agents for G2DYM antennas.

J Beam. 2m. antennas. Ascot antennas.

Aerial wire, insulators, co-ax cable, twin feeder, WIGHTRAPS. CO-AX SWITCHES.

H.P. available.

Carriage extra.

Please check prices and availability before ordering.

ACCESS / BARCLAYCARD

GEORGE STREET, AXMINSTER, DEVON

Telephone Axminster 33163

WILLIAM MUNRO (INVERGORDON) LIMITED

Telephone: 0349-852351

100, High Street,
INVERGORDON
Ross-shire IV18 0DN

Telex: 75265

NEC

NEC

CQ-P-2200E 2M FM Portable Transceiver. 3 Channels
£179 inc. VAT and Delivery.

Additional Channels from our Xtal
Stock £3 each.

CQ-R-700 6-Band General Coverage Receiver
170 MH to 30 MHz. AM-SSB-CW-RTTY
£220 inc. VAT and Delivery.

CQ LINE CQ 110E HF Bands Digital Readout
Transceiver.

CQ 301 Matching Linear.

CQ 201 Matching External VFO.

SP110 Matching External Speaker Unit/
Digital Clock.

M110 Matching Table Microphone.

Full Spec. for the above and prices available on request.
We always have several used items in stock, e.g.
IC 202, EUROPA-MEL 202-25P.

G4DSG D. P. HOBBS Ltd. G3HEO

The Component Specialists

YAESU FT202R 2 metre hand portable. Limited offer ...	£99-00
YAESU FT223 2 metre mobile tcvr. fitted 3 chan....	£155-94
YAESU FRG7 receiver P.L.L. -5-30 MHz	£210-38
SMC HF12A122 2 metre monitor rec. fitted 12 chan. Rech. batt. and charger	£78-69
SR9 2 metre monitor rec. V.F.O.	£58-50
FDK Multi 700E 2 metre tcvr. dig. readout. T.B....	£229-00
QM70 144PA10/40 linear amp. £54 or £59 fitted Rx preamp.	
QM70 Cougar 2m.-70cm. FM transverter. 2 only....	£45-00
STOLLE 2010 rotator	£48-94
CM9502 rotator	£50-62
CM9523 alignment bearing	£10-68
HANSEN DL20 10 watt dummy loads, 150 MHz	£6-90
TOKO CFU 050D 455 kHz ceramic filters (inc. P. & P.) ea.	40p
2N697 transistors	(inc. P. & P.) ...5 for 50p
5K Ω 3w. & 25K Ω 4w. W.W. pots (inc. P. & P.) ea.	30p
3300μF 63v. 2-25a. screw term electrolytics (inc. P. & P.) ea.	60p
3300μF 63v. 10a. screw term electrolytics (inc. P. & P.) ea.	80p

MICROWAVE MODULES CONVERTERS AND TRANSVERTERS
—GOOD RANGE IN STOCK. BANTEX WHIPS, JAYBEAM
AERIALS, R5GB AND BERNARDS BOOKS

Send SAE for surplus valve and component list

PRICES INCLUDE VAT ACCESS AND BARCLAYCARD

11 KING STREET, LUTON, BEDS. Tel. 20907

Open 9 a.m. - 5.30 p.m., Mon. - Sat. Closed all day Wed.

ALSO VISIT—**D. P. HOBBS (NORWICH) LTD.**

13 St. Benedict's Street, Norwich, Norfolk. Tel: 615786

Open 9 a.m. - 5.30 p.m., Mon. - Sat. Closed all day Thurs.

("SITUATIONS" AND "TRADE")

15p per word, minimum charge £1.80. No series discount. All charges payable with order. Insertions of radio interest only accepted. Add 50 per cent for Bold Face (Heavy Type). Box Numbers 35p extra. No responsibility accepted for transcription errors. Replies to Box Numbers should be addressed to the Short Wave Magazine, Ltd., 34 High Street, Welwyn, Herts., AL6 9EQ.

TRADE

Components! 2N3055, 40p; SO239 sockets, 30p. Hundreds of others. S.a.e. for full list.—G3KTF, QTHR.

Good second-hand equipment always wanted. Come to AMATEUR RADIO EXCHANGE for the best deal.—2 Northfield Road, Ealing, London W13 9SY. (Tel: 01-579 5311.)

Coax cables at trade prices: UR43, UR67, UR76, UR57 and UR70. Also mains and multicores. S.a.e. for lists.—W. H. Westlake, Clawton, Holsworthy, Devon.

Why and FT-101? 1.5 times competitions power output, RF speech clipping (G3LLL or Yaesu), plus-in 2m. transverters with repeater shift, NBFM attachments, modification data and our service. Also try us for G-Whip, FT-7, FRG-7, SRX-30, etc. S.E.M. Europa and Converters, SWR bridges, mics., co-ax., RSGB Books, and super CW filters for FT-101, FT-301, TS-520 and TS-820. Telephone your Access/Barclay Card number.—Holdings of Blackburn Ltd., 39/41 Mincing Lane, Blackburn. (Tel: 0254-59595/6.)

Dart Stationery presents Reception Report Letters for the Dx-er. Professionally styled letters, printed in two colours, on high-quality paper, and made into pads of 100 letters for tidy storage: 1 pad, £2.10; 2-plus pads, £1.80 per pad. All prices include post/packing. Every order received carries a 10-day return of money guarantee if not completely satisfied. Mail orders only, please. Please send cheque or P.O. payable to Dart Stationery, 20 Bromley Road, London E17 4PS.

Valves, new and boxed: 6146B, 6JM6, 6HF5, 6JS6/C, 6JB6/A, 6KD6, 6LQ6, 66ES, 8950 and many other types. S.a.e. for list.—Wilson, 20 Croft Gate, Harwood, Bolton, Lancs. (Tel: Bolton 54165.)

QSL cards. Sample pack and price list forwarded on receipt of 20p stamp.—Derwent Press, 69 Langstone Drive, Exmouth, Devon EX8 4HZ.

Wanted: Surplus crystals, in quantity if possible. Please state details of quantity, and sizes.—Box No. 5682, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

Radio Amateur Examination City & Guilds. Pass this important Examination and obtain your G8 Licence with an RRC Home-Study Course. For details of this and other Courses (GCE, professional examinations, etc.) write or phone: The Rapid Results College, Dept. JV/1, Tuition House, London SW19 4DS. Careers Advisory Service, 01-947 7272 or ring 01-946 1102 for Prospectus. (24-hr. Recordacall).

READERS' ADVERTISEMENTS

8p per word, minimum charge £1.20, payable with order. Add 25 per cent for Bold Face (Heavy Type). Please write clearly, using full punctuation and recognised abbreviations. No responsibility accepted for transcription errors. Box Numbers 35p extra. Replies to Box Numbers should be addressed to the Short Wave Magazine, Ltd., 34 High Street, Welwyn, Herts., AL6 9EQ.

READERS

Wanted: Valves, types ESA-1500, AH238, BR1126, RG3/1250 and GXU4.—Eaton, G3SMK, QTHR. (Tel: Earlswood 3423 after 7 p.m.).

The best things come in little packages?

Are you shopping for Antennas & Receivers?

The JOYSTICK VFA gives you a six amateur band or continuous tuning (0.5-30 MHz) effective ground plane, efficient, substantially harmonic free, space saving antenna. Proven performance, testimonials world-wide bulge in our files!

IN USE BY AMATEUR TRANSMITTING AND SWL STATIONS WORLD-WIDE AND IN GOVERNMENT COMMUNICATION

JOYSTICK ANTENNAS

SYSTEM 'A'	200w. p.e.p. OR for the SWL	£41.00
SYSTEM 'J'	500w. p.e.p. Improved 'Q' on receive	£47.95

"PACKAGE DEALS"

COMPLETE RADIO STATIONS FOR ANY LOCATION

All packages include the JOYSTICK VFA (System 'A') 8ft feeder, all necessary cables, matching communication headphones. Delivery Securior our risk. ASSEMBLED IN SECONDS. You SAVE £14.15 on each PACKAGE DEAL!

PACKAGE No. 1	£222.00
Features R.300 Rx.	
PACKAGE No. 2	£237.45
Features FRG7 Rx.	
PACKAGE No. 3	£212.45
Features SRX 30 Rx.	
PACKAGE No. 4	£402.00
Our "Rolls" — Rx. FRG 7000	

RECEIVERS ONLY

R.300	£184.50	FRG7	£199.95
SRX30	£174.95	FRG700	£364.50



Just telephone your card number



Phone 0843 62535 (ext. 4) or 62839 (after office hours) or write for details—send 9p stamp

NOTE: All prices are those current at the time of closing for press inclusive of current VAT at 12½% and carriage.

4, PARTRIDGE HOUSE, PROSPECT ROAD, BROADSTAIRS, CT10 1LD. (Callers by appointment).



CALL BOOKS

INTERNATIONAL :

RADIO AMATEUR CALL BOOKS (1979)	
"DX Listings"	£9-10
"U.S. Listings"	£9-70
U.K. Call Book, 1979 Edn. (RSGB)	£3-20

MAPS

"SHORT WAVE MAGAZINE"	
DX ZONE MAP (GREAT CIRCLE)	
In colour. New 8th Edition.	£2-25

AMATEUR RADIO MAP OF WORLD	
Mercator Projection — Much DX	
Information — in colour. Second	
Edition	£1-05

RADIO AMATEUR MAP OF THE	
U.S.A. AND NORTH AMERICA	
State boundaries and prefixes, size	
24" by 30", paper	90p

RADIO AMATEUR'S WORLD	
ATLAS	
In booklet form, Mercator projec-	
tion, for desk use. Gives Zones	
and Prefixes (New 9th Edition)	£1-60

LOG BOOKS

Amateur Radio Logbook	£1-63
Receiving Station Log	£1-50
Minilog (New style)	£1-05

(The above prices include postage and packing).

Available from

SHORT WAVE MAGAZINE

Publications Dept., 34 High Street, Welwyn, Herts. AL6 9EQ-Tel. Welwyn (043871) 5206/7

(Counter Service, 9.30-5.15, Mon. to Fri.)

(GIRO A/C No. 547 6151)

S.W.M. "DX ZONE MAP"

8th EDITION !!

In four colours, on durable paper for wall mounting, 33½ in. wide by 24½ in. deep. Giving essential DX information—bearing and distance of all parts of the world relative to the U.K., the Zone areas into which the world is divided for Amateur Radio purposes, with major prefixes listed separately. Distance scale in miles and kilometres. Time scale in GMT. Marking of Lat./Long. close enough for accurate plotting. Hundreds of place names, mainly the unusual ones, and most of the rare islands.

Price £2-25

including postage and special packing in postal tube to avoid damage in transit.

Publications Dept.

Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ. Tel: Welwyn (043871) 5206/7

Sale: Eddystone 830/7 general coverage receiver with base speaker, excellent condition, recently checked over, £350 or near offer. Buyer collects.—Macdonald, 9 Lochview Avenue, Gourrock (32384), Scotland.

For sale: KW-2000 with interconnected Scorpion 50w. 2m. SSB transverter, £180. Buyer collects. Replies acknowledged by telephone. (Nottingham).—Box No. 5683, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

For sale: Barlow-Wadley XCR-30 Mk. II with FM (bought Dec. '78), fully de-bugged and realigned by Barlow, as new, no longer required as owner returned to UK, £130 or near offer.—Ring Kaznowski, Norwich 60534.

Selling: Termination wattmeter, 7 ranges, 0-3-300 watts, 50-ohm lead, for use on AC mains or internal nicads, £35. BC-221 with charts and power-pack, £20. BC-221, no charts or case but checked working, £6. Pye Vanguard mobile, high-band, with control box/cables, £28. Paging transmitter, 5 watts output, would make QRP rig, with manual, £20. R.220, £6. Monitor 'scope unit, £10.—Ring Barnes, G4DVH, Ulverston 54466.

Shack clearance: Fully crystallised 2200G 2m. transceiver, with nicads and charger etc., £110 cash (buyer collects). Two-metre 5-over-5 slot-fed antenna, £5. Marconi VFO unit, transistorised, 2-3-5-3 MHz, ten 300 kHz ranges, compact, needs 250v. DC stabilised supply, £8. Constant voltage transformer, 190-260v. input, 230v. r.m.s. output, 60w., £4. 15 Mullard Type NIC50 nixies with drivers, £5 the lot. Two 5m. rolls of black PVC heatshrink (4-5mm. shrinks 50% at 120°C). Old Avo R/C bridge, working, £5.—Ring Mash, Malvern (068-45) 63270 evenings.

Selling: Bench oscillator, £60. Transistor/diode tester £25. Type 51 waveform generator, £10. Hudson VHF amplifier, £10. UHF radio/transmitter tester, £10. Type VCR-139 cathode ray tube, £5. Marine band crystals: 9-13750 MHz, 9-10625 MHz, 9-12500 MHz, £2 each. Carriage extra, s.a.e. with enquiries.—Hayward, Sunnyfields, Lighthouse Road, St. Margaret's Bay, Dover, Kent.

For sale: FT-DX500, reasonable condition, £250.—Russell, 70 Belmont Road, Portswood, Southampton. (Tel: 0703-35611, daytime.)

Selling: Trio 2200GX, as new, with extras and in original packing, £130. EC-10 Mk. II with mains PSU, £95. **Wanted:** FT-101, approx. £360 offered.—Ring Gaunt, 0609-2068 office hours.

Sale: Collins TCS transmitter, £50. Jason FM tuner unit, £10. Type 715 Racal/BCC VHF receiver, £25. Carriage extra, s.a.e. with enquiries.—Hayward, Sunnyfields, Lighthouse Road, St. Margaret's Bay, Dover, Kent.

For sale: Dentron MT-3000A tuner, £220. FDK-2700 Mk. II, multi-mode, £390. Solid-state linear, 80 watts, £75. Daiwa remote masthead antenna switch and 2-metre pre-amp., £25. Vibroplex 'de luxe' key and case, £25. Hansen VHF SWR/Power bridge, £20. Two 10-ehz quads, £10 each. Shure 526T desk mic. plus pre-amp., £25. IC-215 transceiver, 15 channels plus RR6, all accessories, £145. YO-100 monitor 'scope, £95. Yaesu SP-101B speaker, £10. All items carriage extra.—Smyth, GM3XNE, 4 Afton Place, Ardrossan, Ayrshire. (Tel: 0294-67326.)

Sale: DX-160 Rx, 150 kHz to 30 MHz, all modes, 5 bands, with matching speaker and manual, mint condition (new £130), bargain £70 or near offer.—House, 10 Leagh Close, Kenilworth, Warks. (Tel: Kenilworth 54556, 6-8 p.m.)

Sale: Yaesu FR-101D, 2-160m., with matching speaker and front cover, excellent condition, £400. Yaesu headphones, new and boxed, £6. Hy-Gain 18AVT, 10-80m., weather proofed and boxed, £45. Jaybeam 5Y/2M antenna, new and boxed, £6. One 3-way antenna switch, £3. Buyers collects.—Ring Hitchcock, 01-359 7064.

VE3TR, located approx. 75 miles East of Toronto, Ontario, is seeking a UK ham who would be interested in exchanging his house/flat/static-caravan, car and station, for any period mutually agreeable between two and six months, beginning preferably next October. Full details of my house and location etc. in first letter.—J. Pollard, VE3TR, RR.1 Baltimore, Ontario, Canada, Kokico.

For sale: Jaybeam D8/2M antenna, new, still in box, genuine reason for sale, £14. Buyer collects.—Ring Norton, Dewsbury (0924) 452303.

Sale: Racal RA-17, good condition, £230 or near offer. Callers after 6 p.m.—Zagorski, 7 Reid Road, Invergordon, Ross-shire.

For sale: B.62 receiver, excellent condition, with SSB converter, £50. AR88, fair with manual, BFO needs attention, £35.—Ring Barnes, Hele 420 (Devon).

Wanted: Control box for Storno 'Viscount'; also 30-way plug, and microphone. Details and price please.—McGhie, Boyach Crescent, Isle of Whithorn, Wigtown-shire.

Selling: TR-7010 2m. SSB Tx/Rx, as new, one owner, with $\frac{3}{4}$ -whip, £135. "G3ZVC" 9 MHz SSB Tx/Rx, with KVG XF9B filter, kit constructed on commercial PCB, £40 or near offer.—Parker, G3OLX, QTHR. (Tel: Burgh Heath 55271.)

Selling: Racal RA-17 Mk. II, very good condition, £230 or near offer. Marconi TF-801D/1 signal generator, very good condition, £150 or near offer.—Ring Betts, Watford 28566 ext. 298 daytime.

For sale: Drake DSR-1, superb Rx, solid-state, 10 kHz to 30 MHz continuous, synthesised, digital readout to 100 Hz, AM/SSB/CW/RTTY/ISB, bandwidths 6-0.4 kHz, 2 watts output, as new, with manual, boxed (current price over £2000), £695.—Ring East, G8PKD, 01-486 8286. **Sale:** AR88LF, good condition, with case and manual, £60 or near offer. Prefer buyer collects.—Ring Johnson, Wakefield 78538.

Wanted: Valve/transistor testers, in good condition and with manual. Full details and price (inc. carriage) please.—Box No. 5684, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

Sell or exchange: FT-221R, as new, fitted pre-amp., with accessories and manual, £290 or exchange for Icom IC-202/215 with cash adjustment. Technical Associates speech processor, £15. Type 6S6 tape reader, new, £10.—Clark, G8NPM, QTHR. (Tel: Wickford 4317 evenings and weekends.)

Wanted: 'Suitcase' sets, Marks 119, 122, 128/128A, 217; a Mk. III, Type 3 Mk. II (B.2), BP5/T5, AR11, A3. Incomplete or damaged items considered.—Ring Taylor, G3UCT, Fleet (02514) 6998.

Selling: Eddystone 1001 general purpose communication receiver, excellent condition, with ten-position crystal facility 550 kHz to 30 MHz, variable mains 100-260v. and 12v. internal/external battery operation, (today's price £770), £300.—Ring Wevell, 041-779 2137.

Wanted: Ham returning to hobby requires reasonably priced HF transmitter, QRP or otherwise. W-H-Y?—Hardy, 71 Scalpliffe Road, Burton-on-Trent, Staffs.

For sale: KW-2000B with AC/PSU, immaculate, complete service by K.W. two months ago, £250. KW-1000, 1200w. linear amplifier, perfect, £150. KW-110 Q-multiplier, £20. K.W. LPF, £20. Or offers for the Lot? **Wanted:** VHF gear, e.g. FT-200 plus Europa. W-H-Y?—Ring Morse, G4FRB, Cirencester 5409.

T.M.P.

ELECTRONIC SUPPLIES

YAESU MUSEN EQUIPMENT AVAILABLE OFF THE SHELF WITH SMC 2 YEAR GUARANTEE AND FREE SECURICOR CARRIAGE, PLUS ALL THE OTHER WELL KNOWN NAMES, HY-GAIN, CDE, JAY-BEAM, LEADER, SHURE, CUSH CRAFT, BANTEX, ETC. ALL SALES HAVE THE PERSONAL ATTENTION OF GW3TMP.

AMIDON TOROIDAL CORES AVAILABLE FROM STOCK, SEND SAE FOR PRICES
SECONDHAND EQUIPMENT ALWAYS AVAILABLE, ENQUIRE FOR PRESENT STOCKS

W2AU QUAD SPIDERS	...	£26.81
W2AU BALUNS 1:1 and 4:1 with built-in Lightning Arrester	...	£14.06
HANSEN SWR/POWER METERS. Switched 20, 200 and 1KW	...	£36.72
SIGMA KRF-2000 SWR/POWER METERS. 0-200w. and 0-2KW	...	£20.52
NYE-VIKING MORSE KEYS. 114-312-004	...	£9.25
114-322-003	...	£9.75
MOUNTING BASES FOR ABOVE KEYS	...	£1.12
NYE-VIKING LOW PASS FILTERS. 2-30 MHz .5dB less, 2KW rating	...	£18.00
HI-MOUND MORSE KEYS HK-708	...	£9.45
EXTENSION SPEAKERS 10 $\frac{1}{2}$ x 7 $\frac{1}{2}$ x 3 $\frac{1}{2}$ IN TEAK CABINETS	...	£12.00
4 OHMS	...	£15.75
CL-22 SWL ATU	...	£38.88
FC-5M DIGITAL FREQUENCY COUNTER, 455 kHz offset, 50 MHz	...	£4.02
BALUN KITS, TOROIDAL TYPE LF	...	£5.15
HF	...	

ALL PRICES INCLUDE VAT AND POSTAGE
Coax, Plugs, Sockets, Reducers, Insulators, H/D Copper in stock.

BRITANNIA STORES, LEESWOOD, MOLD, CLWYD
CH7 4SD, N. WALES

Open Daily 9.30-5 p.m. Early Closing Tuesday and Saturday 1 p.m.

TEL.: PONTYBODKIN 846 (035 287)

BETTER SHORT WAVE RECEPTION

by William I. Orr W6SAL and Stuart D. Cowan W2LX
New 4th Edition

In the latest edition of this excellent work for all those who own (or intend to own) a radio receiver, these two well-known and respected writers have produced chapters covering: the radio spectrum and what you can actually hear world-wide; the tuning of a shortwave receiver; the business of buying a receiver, both new and secondhand; a description of the SW Rx in non-technical terms, together with receiver adjustment and alignment; DX-ing above 30 MHz; a description of the VHF receiver; building and adjusting efficient aerials; reception techniques.

Thoroughly readable and "digestible," this book is without doubt a very valuable addition to the bookshelf of any SWL.

160 pages

£3.15 inc. post

Order from:

Publications Dept.,

SHORT WAVE MAGAZINE LTD.,

34 High Street, Welwyn, Herts., AL6 9EQ

RADIO AMATEUR PREFIX-COUNTRY-ZONE LIST

published by GEOFF WATTS

Editor of "DX News-Sheet" since 1962

The List you have always needed, the list that gives you everything, and all on one line!

- For each country —
- its DXCC "status"
 - the normal prefix
 - the special prefixes
 - the ITU call sign block allocation
 - the continent
 - the "CQ" Zone No.
 - the ITU Zone No.

Full information on Antarctic stations, USSR Klub-stations, obsolete prefixes used during the past 5 years, and much more, and the List can be kept always up-to-date because ample space has been provided for adding every new prefix, each new ITU allocation, etc. Everything arranged alphabetically and numerically in order of prefix. Ideal for Contest operators and SWL's.

Tell your Club-members about it. Order a gift copy for that overseas friend 15 pages. Price 45p (UK) or sent overseas (air-mail) for \$1 or 5 IRCs (55p)

GEOFF WATTS

62 BELMORE ROAD, NORWICH, NR7 0PU, ENGLAND

WHAT ARE THE WILD WAVES SAYING?**G2DYM ANTI-TVI TRAP DIPOLES**

S.W.L.-ing or Tx-ing at 250 watt P.E.P. ...	£41-00
500 watt Tx-ing or "Hi-Q" for S.W.L.-ing ...	£47-95 (all prices
2 Kilowatt "THE BIG ONE" ...	£56-25 include VAT
10-160 metres Aerial Matching Unit 500 ...	and P & P)
watt & S.W.L.-ing ...	£18-25
2 K.W. model ...	£24-50

"MARBELL" MAYDAY S.O.S. SUCCESS

Full story, copy photographs, etc., as shown on BBC Nationwide, aerial article, full details of the G2DYM "Mayday Cracker" anti-TVI aerial used: 10" x 8", 16p SAE and 3 x 9p stamps.

G2DYM Design, Custom built by:

H.F. TELECOMMUNICATIONS (UK) LTD.

UPLOWMAN, TIVERTON, DEVON

RACAL EQUIPMENT ALL WITH FULL MANUALS

RECEIVERS RA17 FULLY CHECKED AND TESTED. RACK MOUNTING WITH DUST COVERS, £225-00. NEW LOUVRED METAL CASE, £25-00. RA98A, NEW AND BOXED S.S.B. AND I.S.B. CONVERTER, £100-00. MA.197B (A.T.U.) SELECTOR PROTECTOR, £35-00. MATCHING NEW LOUVRED CASE, £15-00. TAPE READERS TYPE 6S/5 AND 6S/6 NEW OR USED, £5-00 TO £15-00. REPERFORATOR 7TR/3 NEW WITH SPARES, £15-00. USED £10-00. REDIFON TELEPRINTER TERMINAL UNIT. TYPE T711 FULLY TRANSISTORISED 600 OHMS AUDIO INPUT. POWER INPUT 100-125 VOLTS OR 200-250 VOLTS A.C. CONTAINS INTERNAL POWER SUPPLY FOR TELEPRINTER MAGNET COILS. SPEED 0-100 BAUDS + UNIT MADE TO OPERATE CREED 75 TELEPRINTER. CIRCUIT INCLUDED, £25-00. TESTED. ALL ITEMS EX. WORKS. CARRIAGE EXTRA. S.A.E. ALL ENQUIRIES. PHONE FOR APPOINTMENT FOR DEMONSTRATION OF ANY ITEM.

JOHNS RADIO

424 BRADFORD ROAD, BATLEY, YORKS.

Tel: 0924 478159 (9.30 a.m. to 1 p.m.)

ALL VALVES & TRANSISTORS

Call or phone our
Mr. Stephan for a quotation
01-749 3934

We are one of the largest stockists of
valves etc. in the U.K.

COLOMOR ELECTRONICS LTD 170 GOLDHAWK ROAD
LONDON W12

MORSE MADE EASY BY THE RHYTHM METHOD!

FACT NOT FICTION NO, TAPE WON'T WORK AS WELL if you start RIGHT you will be reading amateur and commercial Morse within a month. (Most students take about three weeks). That's why after 25 YEARS we still use three scientifically prepared 3-speed records with which you cannot fail to learn the MORSE RHYTHM automatically, it's as easy as learning a tune. 18 w.p.m. in 4 weeks guaranteed. Complete course comprising 2 x 12" + 1 x 7" 3-speed records + books. £5-50 inc.p.p. (overseas + £1). Dtls. only s.a.s. or ring Stan Bennett (G3HSC) 01-660 2896. Ex RAF keys £2.70. (Box 14) 45 GREEN LANE, PURLEY, SURREY

For sale: Trio TR-2300 with nicads, £150. Microwave Modules 500 MHz counter, £49. Datong RF clipper, £35. QM-70 2m. converter, 28-30 MHz, £10. VHF SWR/Power meter, £15. HF SWR/Power meter, £6. All in mint condition, unused and boxed.—Ludkin, G4BKM, QTHR. (Tel: Denham 4358.)

Sale: Robot SSTV Type 80A camera and 70B monitor. Two CCTV cameras. 70cm. parabeam. 70cm. colinear. 2m. 8-ele. crossed Yagi. Stolle rotator. AR22R rotator. 70cm. converter, 28 MHz IF. 70cm. varactor tripler. Heath OS-2 scope.—Ring Le Sueur, Downland 55908 evenings. (Surrey).

Wanted: Concerning Eddystone 770R Series 1 receiver: any reader able to help with advice or work. The Rx is in good condition and values/voltages OK, but VHF sensitivity is pathetic—what is likely fault? In payment, complete MCR-1 Rx, or radio magazines, or cash.—Fleetwood, The Red House, Spetchley, Worcs.

For sale: Emigrating, must sell: Yaesu FR-101DD Rx with all optional extras and Landliner SP-101P speaker/patch-unit, £445. FL-101 Tx, 1-8 to 30 MHz (with free SWR meter and trap dipole), £280. All equipment in good condition, complete with leads, manuals and original packing. Yaesu YD-844 bench mic., new and boxed, £15. Marconi precision hand key, with filter, £25. S. G. Brown headphones with detachable earpads, £5. Ceramic aerial insulators, 3in. ribbed (pack of 8), £2.—Sirignano, G4FZG, QTHR. (Tel: Bedford 56144.)

Wanted: Beginner requires general coverage or amateur bands receiver.—Ring Cash, Sedgley 2333.

Sale: TS-700, as new, and to 700G standard, £290. E.M.I. CCTV camera Type 8A, vidicon marked but worth it for lens, £25. Microwave Modules 28-432 MHz transverter, £60. Prefer buyers collect.—Ring Gorrill, GM8BOV, 031-331 2755.

For sale: FRG-7 receiver, £140. Microwave Modules 144/28LO converter, £16. Both mint condition.—Ring Shillock, Brierley Hill 79209.

Shack Clearance: Send large s.a.e. for lists of valves, xtals, wavemeters, transmitters; also Heathkit RA-1 Rx and digital frequency meter. (Berks.).—Box No. 5685, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

Sell or exchange: FRG-7, £175 or exchange for Eddystone EA-12 which must be in mint condition. Microwave Modules 144/28 converter, £15. Buyers collect or pay carriage.—Ring Norton, Dewsbury (0924) 452303.

Sale: Good used valves: five 5B254/M's, £1 ea; hundred E180F's, £1 ea; hundred EL85's, 50p ea; twenty-five OA2's, 20p ea.—Thomas, GW4BCD, 13 Northways, Porthcawl, Mid. Glam. (Tel: Porthcawl 8963 after 6 p.m.) May issue: Due to appear May 18th. Single copies at 50p post paid will be sent by first-class mail for orders received by Wednesday, May 16th, as available—Circulation Dept., Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

Sale: Clover-leaf antenna for two-metres, £5 or near offer. Eight metres of RG214U low-loss cable, 50-ohm, £3 or near offer.—Hadley, G8LJW, 021-773 6488.

Wanted: FL-200 transmitter, or similar, to match FR-50B. Also prop. pitch or Cowl Gill motor.—Ring Barber, Street 45763 (Somerset).

Wanted: Collins 30-L1 linear amplifier and 312B-5 VFO unit. Details and price please.—Ring French, G3LGL, Kinver 2461 (West Midlands).

Sell or exchange: Professional VDU, ASC11 coded, 21 lines of 80 characters, RS232C V24 interface, full edit mode, auto Tx. Exchange for Tx/Rx, motor-cycle etc. (Beds.).—Box No. 5686, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

For sale: HW-32A with AC and DC PSU's, full band coverage, £75. 12XY for 70cm., £15. Stabilised PSU, 4-15v. 10A, £25.—Ring Cragg, Dunstable (0582) 600358.

LOSING DX?

ANTENNA FAULTY? Check resonance and radiation resistance FAST with an Antenna Noise Bridge, 2-1,000 ohms 1-30 MHz (20-200 ohms 30-150 MHz), £9-80.

RARE DX UNDER QRM? Dig it OUT with a Tunable Audio Notch Filter, speaker amplifier, MORE DX, £8-90.

MISSING RARE DX? Get on their frequency with a Crystal Calibrator, 1 MHz, 100, 25 kHz markers to VHF, £13-80.

V.L.F.? 10-150 kHz Receiver only £10-70.
Each easy assembly kit includes all parts, printed circuit, case, postage etc., money back assurance so SEND off NOW.

CAMBRIDGE KITS 45 (SR) Old School Lane, Milton, Cambridge

MORSE CODE RECEIVING AND SENDING

Receiving:
CASSETTE A For Amateur Radio examination preparation. Speed slowly increasing from 1-12 w.p.m.
CASSETTE B For Professional examination preparation. Computer produced morse from 12-24 w.p.m. including international procedure signs and symbols and their incorporation into messages.

Sending:
Morse Key and Buzzer Unit for sending practice and own Tape preparation. Phone output.
Prices: each cassette, including booklets, £4-50
Morse key and buzzer unit, £4-50

Prices include postage, etc.

M H ELECTRONICS
12 LONGSHORE WAY, MILTON,
PORTSMOUTH, PO4 8LS

G8MWW OFFERS.

UR43 Coax. 50 ohms ... 14p per m., post 2p per m.
UR67 Coax. 50 ohms, low loss ... 41p per m., post 4p per m.
UR75 Coax. 75 ohms, standard ... 35p per m., post 4p per m.
UR70 Coax. 75 ohms, standard ... 16p per m., post 4p per m.
UR95 Coax. 50 ohms, miniature nylon ... 5p per m., post 2p per m.
300 ohm twin Ribbon Feeder ... 9p per m., post 1p per m.
Low Loss UHF TV Coax. 75 ohms ... 16p per m., post 2p per m.
Heavy Duty Twin Screened Microphone Cable ... 18p per m., post 2p per m.

Flexible PCB. Sheets 9 1/2" x 12" ... 40p per sheet, post 15p any qty.
HC25U Crystal Holders at ... 12p each, post 7p any qty.
New 1 SRB Soldering Irons. 12 volt, 18 Watt with interchangeable bits. Fitted No. 20 standard bit ... £4, post 35p
120 mixed Carbon Film Resistors ... 40 values for £1-20, post 35p
100 mixed Erie Ceramic Capacitors. 1-5-43 pf. 20 values £1, post 15p
PL259 Plugs at ... 60p each ... Reducers ... 16p
Chassis mtd SO 239 Sockets ... 45p each, post 7p any of the above

Lots More Offers on our Lists. Send SAE for full lists of Xtals/Cables/Revco Aerials and other special offers. Collect your Cable, etc. at N.R.S. Rally Manchester/Tamworth Rally, Barry Rally, etc.

W. H. WESTLAKE, CLAWTON, HOLSWORTHY, DEVON

G8AYN CRAYFORD ELECTRONICS G81WX

Available Ex-Stock

QM70 144PA 10/40 2m. linear amp. 10w. in 40w. out £54 (or £59 with Rx preamp.)
MICROWAVE MODULES. 10m. to 2m. converter £20-25, 10m. preamp. £14-63, new 2m. 100w. linear £139-50
BURNS TC101 Wavemeter 0.8-500 MHz ... £39-91
HONEST FC5M 50 MHz frequency counter with switchable 455 kHz IF offset for Rx dig. R.O. ... £39-16

ACCESS Prices inc. VAT & carriage BARCLAYCARD

6 LOVELACE CLOSE, WEST KINGSDOWN SEVENOAKS, KENT TN15 6DJ 047485 2577

DART STATIONERY

Presents For the Amateur

Large variety of personalised **QSL CARDS**—see catalogue or prices. **LOG BOOKS** ... £2-00 each

For the DX'er

Personalised **QSL CARDS**.
RECEPTION REPORT LETTERS. Professionally styled letters printed in two colours and supplied in pads of 100 letters.
1 Pad £1-80 2 + Pads £1-60 each
Loose Leaf **LOG BOOKS** with 100 sheets ... £2-50

For the CB'er

Personalised **QSL CARDS**
CATALOGUES available containing complete range of radio stationery Price 45p.
EVERY ORDER CARRIES A MONEY BACK ASSURANCE IF NOT COMPLETELY SATISFIED
MAIL ORDERS ONLY PLEASE

Please send cheques or P.O. payable to:—

DART STATIONERY

20 Bromley Road, London E17 4PS, ENGLAND. Tel.: 01-539 5412

SPECIAL OFFERS

DIODE PACK. Unmarked, untested, mostly silicon types, some germanium. Pack of 200 (approx.). 65p, including p and p.

TTL IC PACK. Unmarked, untested, mostly ttl (7400 series). Ideal for learning about i.c.s. Pack of 50. 65p, including p and p.

Components: Resistors: 1W E12, 4-7 ohms to 1 Meg 2p each; Potentiometers; less switch; log or lin: 4-7k, 10k, 100k, 220k, 470k, 1 Meg 28p; Insulating kits: TC2 5p, TC2 6 5p, TC2 20 5p; standard crocodile clips 7p; Semiconductor: BC107, 8, 9 12p, BSX20 17p, 7400 12p, 741 8 pin 25p, 1N4002 6p. Coil formers and screening cans—many types available—details in list. Many other components and accessories in stock, send 15p in stamps for full list.

T & J ELECTRONIC COMPONENTS

9B Burrow Road, Chigwell, Essex IG7 4HB

Mail order only. Please add 30p to total for postage. Prices include VAT at the current rates. SAE with all enquiries please.

Have you got it?

It may not be the BIGGEST in the world, and it may not be the LONGEST in the world, but it's certainly likely to be the most informative catalogue you will see this year if your interests include anything to do with radio technology. I can't list it all, but it includes: 2 Graham Road, Brentwood, Essex. AMBIT's catalogue (part two) has at last been set loose on an unsuspecting world, and includes such wonders from the world of wireless as:

the 100W MOSFET complementary power transistors, 120v 7amp, either P or N channel types for the hitherto unheard-of price of 19.95p per pair in one of quantities.
Micrometals/amidon dust on cores for resonant circuits and filters - Toroids from 0.1" to 2.0" dia. Push button switches: TWO ranges, the Diablot system and the die ALPS SLB series, in DIY form for switch arrays of up to 30 ways per bracket. SLB types are replacements for S Chadow, ABY etc. Various new communication ICs for AM FM SSB from TOKO, Philips and Motorola, together with more Murata ceramic ladder filters, linear phase FM IF filters, crystal filters for 10 MHz.
The incomparable OKI LSI for digital frequency display of received frequency devices for LW MW and FM or LW MW SW and FM, various off-sets readily programmed, UFD, LCD or Fluorescent displays. Some of the most interesting developments in modern radio design, described for the first time in the UK.

The Mark Three FM tuner system, taking DIY HF off the "kitchen table" and putting it in the living room. Not only a spectacular appearance and performance now - but since the modular plug-in construction has been designed from the outset with updates in mind, we will be keeping it up with the times for years ahead. And also adding power MOSFET amplifiers, and IR controlled preamplifiers in matching styles later this year.

So, if you own any of the above AMBIT catalogues (part two) and part one if you don't already, buy one - for 45p (pt 1) 50p (pt 2) - both for 85p. We are already even taking orders for part three from customers who have been kind enough to express their appreciation of our efforts.

HAM BAND AERIALS GALORE

2 METRE ELEMENTS TUBING. Comprising new 3/8" Butt Edge tube 42" long, metal boom clamp, 1" to 3/4", nut bolt and washer, end stops. In lots of 5 elements ... (P.P. 50p) £2-00
2 METRE TURNSTILE. Star insulator, 1/2" diameter elements. Head complete ... (P.P. 50p) £2-75
6 METRE AMERICAN BAND. Yagi 3 element folded dipole, whip calms and large Universal bracket ... £8-75
70 MHZ BRITISH BAND. 4 element Yagi as above ... £9-35
VERTICAL 1/2 WAVE ELEMENTS. 3 sections of telescopic tubing 1" to 3/8" to make 10 metre vertical ... £3-35
4 sections of same 1" to 3/8" to make 15 metre 1/2 wave vertical £4-30
SLIM LINE. 10 metre half wave Yagi elements only, telescopic tube. 3/8" to 3/4" with stainless steel bolts and Jubilee clamps, full size £4-40
15 metre as above ... £4-80
THE SUPER GALORE range of 10 and 15 Yagi half wave elements with telescopic tubing (available in sizes 1 1/4" to 1/2" diameter) at cost per element ... £6-00 and £7-00

Aerial elements—Please include £1 each unit for Roadline delivery, add VAT at 12 1/2% to all above.
UPPINGTON TELE-RADIO (Bristol) LTD.
12-14 PENNYWELL ROAD, BRISTOL BS5 0TJ
Telephone (0272) 557732

CREATE YOUR OWN REFERENCE LIBRARY

The "EASIBINDER" is designed to bind 12 copies of the Magazine as you receive them month by month, eventually providing a handsomely bound volume for the bookshelf.

No need to wait until twelve copies are assembled. As each copy is received, it is quickly and simply inserted into the binder. Whether partially or completely filled, the binder is equally effective, giving the appearance of a book, with each page opening flat.

Strongly made with stiff covers and attractively bound in maroon Rexalon and Milskin, the binders have only the title gold-blocked on the spine and the date frame.

Price £2.35 (incl. P & P)

PUBLICATIONS DEPARTMENT
SHORT WAVE MAGAZINE
34 HIGH STREET,
WELWYN,
HERTS. AL6 9EQ

WORLD RADIO/TV HANDBOOK 1979

The World's only complete reference guide to International Radio & Television Broadcasting Stations. It includes: Frequencies, time schedules, announcements, personnel, slogans, interval signals and much more besides of value to the listener.

Lists all International short-wave stations, including frequencies, for each country; foreign broadcasts, long and medium wave stations (AM broadcast Band), TV stations and domestic programmes. Long recognised as the established authority by broadcasters and listeners. It is the only publication that enables you to identify BC stations quickly and easily. Enables you to fill more pages in your log book on the SW BC bands and helps you add more BC-station QSL cards to your collection.

£9.15

(The above price includes postage and packing).

from:

SHORT WAVE MAGAZINE
34 High Street, Welwyn, Herts. AL6 9EQ.

RADIO AMATEUR HANDBOOK (ARRL 1979)

56th Edition

This HANDBOOK, the most widely used manual of communications theory, design, and construction, contains descriptions of the latest devices and their application. Written in a clear and readable style, the HANDBOOK appeals to beginners and advanced amateurs alike. The new, larger format of this year's edition contains many extensively revised sections, and runs to well over 500 pages with the usual excellent index. Priced at £7.35 (soft cover), £10.20 (hard cover); prices include postage and packing. Order from:

Publications Dept.
SHORT WAVE MAGAZINE LTD.
34 HIGH STREET, WELWYN,
HERTS. AL6 9EQ

Subscription rate to Short Wave Magazine is £5.50 for a year of twelve issues, post paid.

a selection of specially recommended titles

* LEARNING TO WORK WITH INTEGRATED CIRCUITS (ARRL)	£1.65
* SIMPLE, LOW-COST WIRE ANTENNAS, by W. Orr W6SAI	£3.15
* A GUIDE TO AMATEUR RADIO, 17th Edition (RSGB)	£1.70
* TEST EQUIPMENT FOR THE RADIO AMATEUR (RSGB)... ..	£4.40
* WORLD RADIO TV HANDBOOK 1979	£9.15
* WORLD DX GUIDE	£5.35
* WORKING WITH THE OSCILLOSCOPE	£1.90
* AMATEUR RADIO TECHNIQUES, 6th Edition (RSGB)	£3.95
* TOWERS' INTERNATIONAL TRANSISTOR SELECTOR (New Revised Edition)	£5.15
* VHF/UHF MANUAL, 3rd Edition (RSGB)	£6.70
* VHF HANDBOOK, by W. I. Orr W6SAI	£3.95
* RADIO VALVE AND SEMICONDUCTOR DATA, 10th Edition	£2.40
* RADIO COMMUNICATION HANDBOOK, VOL. I (5th Ed.) RSGB	£9.30
* RADIO COMMUNICATION HANDBOOK, VOL. II (5th Ed.) RSGB	£8.05
* SOLID STATE BASICS FOR THE RADIO AMATEUR (ARRL)... ..	£3.30

(all prices include post/packing)

Available from **SHORT WAVE MAGAZINE**

Publications Dept.,

34 HIGH STREET, WELWYN, HERTS., AL6 9EQ Telephone: Welwyn 5206/7

1979 CALL BOOK— U.S. LISTINGS

In this issue . . .

- *374,487 U.S. licensed radio amateurs
- *Repeater Stations
- *SSTV Directory
- *Zip codes and licence class on all listings
- *Stop press—late QTH's
- *ARRL Countries list
- *International postal information
- *Census of Amateur Radio licences of the World
- *Plus many other features

1,069 pages **£9.70** inc. postage

Order from:

Publications Dept.,
SHORT WAVE MAGAZINE LTD.,
34 High Street, Welwyn,
Herts, AL6 9EQ

1979 CALL BOOK— DX LISTINGS

(i.e. all amateur call-signs outside the U.S.A.)

In this issue . . .

- * 295,398 licensed radio amateurs
- * 84,822 changes in listings
- * QSL Managers around the world
- * Radio Amateur Prefixes of the World, with Map
- * ARRL Countries list
- * Great Circle bearings
- * Standard Time charts
- * World-wide QSL Bureaux
- * Plus much, much more!

900 pages **£9.10** inc. postage

Order from:

Publications Dept.,
SHORT WAVE MAGAZINE LTD.,
34 High Street, Welwyn,
Herts., AL6 9EQ

Technical Books and Manuals

(ENGLISH AND AMERICAN)

AERIAL INFORMATION

- Antenna Handbook (Orr and Cowan) . . . £4-15
- Practical Aerial Handbook, 2nd Edition (King) . . . £6-20
- Beam Antenna Handbook . . . £3-10
- Cubical Quad Antennae, 2nd Edition . . . £3-10
- Simple Low Cost Wire Antennas, by Orr . . . £3-15
- 73 Vertical Beam and Triangle Antennas (E. M. Noll) . . . £3-75
- 73 Dipole and Long-Wire Antennas (E. M. Noll) . . . £3-75
- Antenna Book (ARRL) 13th Edition . . . £3-60

BOOKS FOR THE BEGINNER

- "Short Wave Magazine" R.A.E. Questions and Answers, 1972-1976 . . . £1-50
- Solid State Short Wave Receivers for Beginners (R. A. Penfold) . . . £1-10
- Beginners Guide to Radio (8th Edition) . . . £3-05
- Beginners Guide to Electronics . . . £2-60
- Course in Radio Fundamentals, ARRL . . . £2-80
- Guide to Amateur Radio (17th Edition) (RSGB) . . . £1-70
- Ham Radio (A Beginners Guide) by R. H. Warring . . . £3-33
- Morse Code for the Radio Amateur (RSGB) . . . 50p
- Radio Amateur Examination Manual (RSGB) . . . O/S
- Simple Short Wave Receivers (Data) . . . £1-05
- Understanding Amateur Radio (ARRL) . . . £3-65

GENERAL

- Radio Circuits Using IC's . . . £1-50
- Projects in Radio and Electronics (Newnes) . . . £2-55
- How to Make Walkie-Talkies (Rayer) . . . O/P
- 50 (FET) Field Effect Transistor Projects, by F. G. Rayer . . . £1-40
- Amateur Radio Awards (RSGB) . . . O/S
- How to Build Advanced Short Wave Receivers (P. nold) . . . £1-35
- Better Short Wave Reception, New 4th Edition . . . £3-15
- FM & Repeaters for the Radio Amateur (ARRL) . . . £2-90
- Easlbinder (to hold 12 copies of "Short Wave Magazine" together) . . . £2-35
- Oscar—Amateur Radio Satellites . . . £4-20
- Test Equipment for the Radio Amateur (RSGB) . . . £4-40
- World Radio & T.V. Handbook 1979 Edition . . . £9-15
- World DX Guide . . . £5-35
- Radio Stations Guide . . . £1-70
- Long Distance Television Reception (TV-DX) for the Enthusiast . . . £1-70
- Solid State Basics for the Radio Amateur (ARRL) . . . £3-30

HANDBOOKS AND MANUALS

- Radio Communication Handbook Vol.1 (5th Edition) RSGB . . . £9-30
- Radio Communication Handbook Vol. II (5th Edition) RSGB . . . £8-05

- TVI Manual (2nd Edn.), RSGB . . . £1-55
- Surplus Conversion Handbook . . . O/S
- Teleprinter Handbook (RSGB) . . . £8-83
- Radio and Electronic Laboratory Handbook, 8th Edition (Scroggie) . . . £8-75
- Amateur Radio DX Handbook . . . O/S
- RTTY Handbook (73 Magazine) . . . £3-65
- Radio Amateur Operators Handbook . . . O/P
- Slow Scan Television Handbook . . . O/S
- Specialized Communications Techniques for the Radio Amateur (ARRL) . . . £2-85
- Working with the Oscilloscope . . . £1-90
- Radio Amateur Handbook 1979 (ARRL), soft cover . . . £7-35
- Radio Amateur Handbook 1979 (ARRL), hard cover . . . £10-20
- Shortwave Listener's Handbook . . . £3-25
- Learning to Work with Integrated Circuits (ARRL) . . . £1-65
- Weather Satellite Handbook . . . £3-15
- Single Sideband for the Radio Amateur (ARRL) . . . £2-95

USEFUL REFERENCE BOOKS

- Solid State Design for the Radio Amateur (ARRL) . . . £5-00
- Foundations of Wireless and Electronics, 9th Edition (Scroggie) . . . £4-50
- Amateur Radio Techniques, 6th Edition (RSGB) . . . £3-95
- U.K. Call Book 1979 (RSGB) . . . £3-20
- Hints and Kinks (ARRL) . . . £2-85
- Radio Data Reference Book RSGB . . . £3-60
- NBFM Manual (RSGB) . . . O/S
- Electronics Data Book (ARRL) . . . £3-25
- Getting to Know OSCAR from the Ground Up (ARRL) . . . £2-30
- ARRL Ham Radio Operating Guide . . . £2-75
- Radio Frequency Interference (ARRL) . . . £2-15

VALVE AND TRANSISTOR MANUALS

- Digital IC Equivalents & Pin Connections . . . £2-82
- Towers' International Transistor Selector, (New Revised Edition) . . . £5-15
- Service Valve and Semiconductor Equivalents . . . 55p
- Radio Valve and Semiconductor Data (10th Ed.) . . . £2-86

VHF PUBLICATIONS

- VHF Handbook, Wm. 1 Orr . . . £3-95
- VHF Manual (ARRL) . . . £3-20
- VHF/UHF Manual (RSGB), 3rd Ed. . . £6-70

O/P (Out of print)
O/S (Out of stock)

THE ABOVE PRICES INCLUDE POSTAGE AND PACKING

Many of these titles are American in origin

(terms C.W.O.)

(prices are subject to alteration without notice)

Available from **SHORT WAVE MAGAZINE**

Publications Dept.

34 High Street, Welwyn, Herts. AL6 9EQ - Welwyn (043871) 5206/7

(Counter Service. 9.30-5.00. Mon. to Fri.)

(GIRO A/C. No. 547 6151)

Printed by The Courier Printing Co. Ltd., Tunbridge Wells for the Proprietors and Publishers, The Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts., AL6 9EQ. The Short Wave Magazine is obtainable abroad through the following: Continental Publishers & Distributors, Ltd., William Dawson & Son Ltd.; AUSTRALIA AND NEW ZEALAND — Gordon & Gotch, Ltd.; AMERICA—International News Company, 131 Varick Street, NEW YORK. Registered for transmission to Canada by Magazine Post. April 1979