

# The SHORT WAVE Magazine

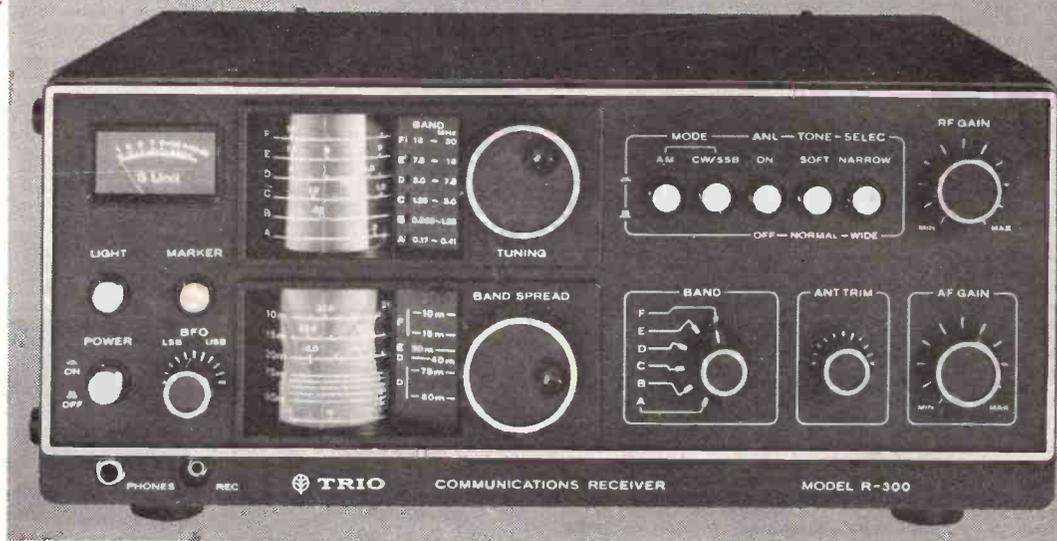
VOL. XXXV

MAY 1977

NUMBER 3

## TRIO R-300

Eavesdrop on the world



### LISTEN TO THE WORLD

Short wave radio is by far the fastest and most convenient type of communications for spreading the news about what is going on in the world. And for this reason TRIO's R300 is the right rig for those who'd like to listen to a live report of the Indianapolis Grand Prix, to Radio Peking or to follow the progress of an Himalayan expedition. The R-300 is the invisible bridge to other countries and continents and the bridge to the home country for most journalists, engineers and technical representatives working abroad. They all want a reliable and sturdy multiband receiver for home use and travel, a receiver working from mains voltage or batteries. And just such a receiver is TRIO's new R-300

Six Wavebands—LW (170-410 kHz), BC (525-1250 kHz), 4 x SW (160-10m). The four shortwave bands continuously cover the frequency range from 1.25-30 MHz with separate calibration for the commercial (75-11m.) and radio amateur bands (80-10m.) of the large drum-type main tuning bandsread dials.

Outstanding Input Sensitivity—The dual-gate MOSFET front end assures excellent cross-modulation and spurious characteristics, as well as high input sensitivity. Between 18 and 30 MHz the R-300 operates as a double superhet, giving sensitivity of 1 $\mu$ V for AM and 0.5 $\mu$ V for SSB. For full details, contact the sole importers of the TRIO range.

R300 £184.50 inc. VAT

Sole Importers; LOWE ELECTRONICS  
Cavendish Road, Matlock, Derbyshire  
Tel.: Matlock 2817 or 2430

## 5 Band SSB/CW Transceiver TS520

### The Transceiver with everything



#### The TS520 System

TRIO have now completed the first stage of the total system concept for amateur radio equipment. With the TS520 and its associated accessories, the amateur radio operator can assemble a station to suit any or all requirements for his hobby enjoyment. All modes and all bands, fixed and mobile/portable are provided by the TS520 system.

#### SSB/CW Transceiver TS-520

A real "compact"; powerful, rugged and reliable. It has everything which otherwise is available only as an accessory at extra cost; built-in power supply for fixed-station use, transistorized DC/AC power converter for mobile operation, loudspeaker, fixed-channel provisions, VOX control, etc. All these are the TS-520's special features in short format:

**Versatile Transmit- and Receive Operations**—USB, LSB and CW on all radio amateur bands from 80m. to 10m., and—with the aid of the 2m.-Transverter TV-502—also on the VHF-band from 144 to 146 MHz, as well as fixed frequency operation on four channels. The TS-520 also allows reception of WWV stations on 10 MHz for dial calibration. By adding the External VFO-520 (optional) the TS-520 demonstrates utmost versatility; independent RX- and TX operation with different frequencies transceive operation with slightly variable RX frequency by means of the built-in RT circuit (Receiver Incremental Tuning) plus fixed channel operation totaling nine different combinations.

**Advanced Circuitry**—With the exception of the transmitter driver and final stage which are equipped with blower-cooled vacuum valves of type 12BY7A and 2 x S2001 the TS-520 is fully transistorized. The semiconductor complement consists of 44 transistors, 18 FETs, 1 IC and 84 diodes. The reliability and stability of this circuit has been substantiated by numerous contests and during rugged mobile operation.

**Outstanding Receive and Transmit Performance**—The transmitter section of the TS-520 features separate driver, plate and final tuning, a 2-stage ALC circuit for local and DX operation, thus assuring undistorted clearly legible TX signals even after hours of continuous operation. Provisions for linear amplifiers, such as ALC input, antenna relay switching output, etc., are available and ready for use. Dual-gate MOSFETs are employed in all critical receiver circuits to improve the input sensitivity, cross-modulation response and spurious rejection. An 8-pole SSB crystal filter in the IF amplifier provides exceptional selectivity and stability. An optional 500Hz CW filter is available as an accessory and can be installed at any time. The switch-selectable time constant of the AGC assured perfect reception of SSB and CW signals.

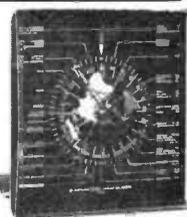
**Precision-type VFO**—a feature of all TRIO receivers, transmitters and receivers also contributes to the supreme performance of the TS-520. The VFO is fully encapsulated and is controlled by a meshgear dial drive (reduction ratio 4 : 1). Dial accuracy is better than  $\pm 1$  kHz, frequency drift will not exceed  $\pm 100$ Hz per hour. Dial calibration is accomplished by means of a built-in 25 kHz crystal marker oscillator.

**Built-in Power Supplies**—for fixed station use with 120/240v. AC 50-60Hz line voltage or for mobile operation with 12-13.8v. DC by means of the built-in DC/AC converter.

**Loaded with Extra Features:** threshold-type RF gain control; break-in CW keying with sidetone; VOX/PTT/MOX-control; RIT; TUNE switch; LED function indicators for RIT, VFO and FIX channel operation; WWV receive pushbutton; 4-position fixed channel selector switch; built-in 25kHz crystal marker oscillator; two-stage AGC; multi-function meter; terminals for optional accessories such as: 2m.-Transverter TV-502, External VFO-520, External Speaker SP-520, linear amplifier, headphone, microphone and key.

**TS520 £432 inc. VAT**

It's worth remembering that TRIO make a complete range of accessories to add to your operating pleasure and convenience. We show here the HC2 Ham Clock which gives the HF operator instant readout of the local time in any part of the world. The clock runs for about a year on one HP2 battery and the styling is most attractive. At £14 including VAT and postage, the HC2 is a worthwhile addition to any station.



If you should need the best of microphones, try the TRIO MC50 dual impedance desk microphone. Optimised frequency range for extra communications punch and cardioid response pattern to allow correct vox operation without tripping, £25.35 including VAT and postage.

For the man who likes the microphone in his fist, the TRIO MC10 is the ideal. Matching all TRIO equipment—and most other transceivers, the MC10 is rugged and reliable for long service. Optimised speech response guarantees first class quality on the air, £9.25 including VAT and postage.

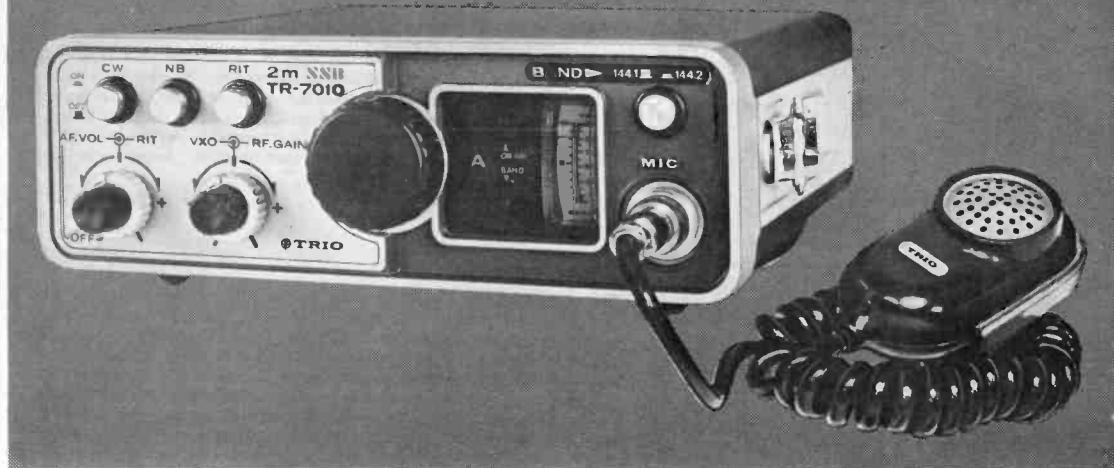
 **TRIO**

# LOWE ELECTRONICS

119 CAVENDISH RD.,  
MATLOCK,  
DERBYSHIRE.  
TEL. 0629 — 2817 or 2430

# THE 2 METRE SIDEBAND PACKAGE

## TR7010



If your station is equipped for FM only, and you wonder where other 2 metre operators have gone when conditions are good—just borrow a receiver and listen to the SSB around 144.3. Direct DX contacts with continental stations are commonplace because of the sheer distance covering ability of SSB. With the freedom from channel restrictions and the ability to have multi-station QSO's with ease, SSB capability can add a new dimension to your amateur radio 2 metre operations.

**SSB and CW operation.** Following the well deserved success of the TS700, Trio used its basic design and put together the ideal mobile/fixed station SSB/CW package—the TR7010.

Combining high receiver sensitivity and clean transmitted signal, the TR7010 gives continuous frequency coverage from 144.1—144.335 MHz to cater for CW, SSB, and beacon activity. 48 synthesised 5 kHz channels with VXO and RIT ensure crystal controlled stability with the freedom to move around the band.

**Design expertise.** Both transmitter and receiver in the TR7010 are of the single conversion type using an IF of 10.7 MHz. This gives a clean transmitter signal and a receiver that is free from unwanted image problems. Double balanced mixing is used throughout the transmitter and the carefully tailored audio system in conjunction with a first class crystal filter produces that good signal quality for which TRIO equipment is renowned. The PA stage uses a 30W. transistor which is run at only 20 Watts input to give optimum linearity and protection against misuse.

The construction of the TR7010 follows the rugged reliable package style of the TR7200G—and fits the same mobile mount so that one can fit either rig in the same mounting slide.

Fixed (using the matching PS5 supply), or mobile, the TR7010 is the DX SSB/CW rig for everyone.

### SPECIAL OFFER

Trio have agreed to maintain a special low price for the TR7010. Stocks are limited.

**TR7010 £175 inc. VAT**

If you want to check your aerial or transmitter performance, we stock a wide range of SWR and power meters suitable for general station use.

Top of the range for VHF is the Daiwa SW410 which measures in line power up to 120 watts from 140-450 MHz and also SWR in three accurate ranges. Price £48.60 inc. VAT. Lower down the price range is the super Hansen FS302 at £32.50 inc. VAT. Frequency range from 50-150 MHz and power up to 200 watts—and SWR as well.

For SWR measurements only, we have a very attractive twin meter bridge at only £10.90 inc. VAT. This is the SML-25 which has a frequency range of 3.5-150 MHz making it ideal as a general purpose station accessory.

Full details in our catalogue obtainable for only 30p in stamps.

 **TRIO**

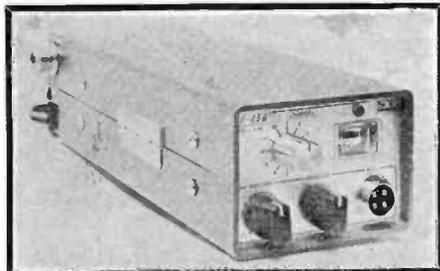
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**TD224**

This amazing little box replaces that clanking old teleprinter that was needed to copy RTTY signals. The TD224 accepts mark/space inputs from your terminal unit (normally TTL but 80-80 can be provided as an option) and converts them into a composite 625 line video signal for display on a TV monitor. A UHF modulator is available as a low cost option to enable use of any 625 line domestic TV set as a monitor. From jingle bells to displayed text—it's easy and silent with the TD224 and a terminal unit DM170.

TD224 £209.25 inc. VAT

**KF430**

Positively the best buy in 70 cm. FM mobiles. Small size (9½ x 3½ x 2½") and light weight disguise an amazing performance. Transmitter output is 10 watts and receiver sensitivity is 0.4 microvolts for 20dB quieting so it really is good. The KF430 is supplied complete with 9 channels fitted, automatic tone burst, microphone, mobile mount, etc., etc. and costs only £180 including VAT at 12½%. Super performance. Super value for money.

KF430 £180 inc. VAT

**NR56**

This remarkable little receiver gives the 2m. FM listener everything he wants at a very reasonable price. Excellent sensitivity, stability and selectivity coupled with a built-in VFO and very effective squelch make it the ideal receiver for both beginner and keen listener. Although the built-in VFO more than covers the entire 2m. band, crystal control of FM channels offers many advantages (particularly in mobile operation), so crystals, which are ex-stock, may be fitted for the popular channels and repeaters. It requires 12v. DC for operation and it thus an excellent mobile receiver for mounting in the car, boat or caravan as well as for home use.

NR56 £54.00 inc. VAT



TS700G + VOX3 £392 inc. VAT

## 2 METRE TOP QUALITY FROM TRIO



TR7200G fitted 10 Chans. £175 inc. VAT

TRIO have made dramatic reductions in the price of the TS700G, the best multi-mode 2 metre rig on the market, and the TR7200G, the mobile which beats them all. There will never be a better time to buy than right now, and we will be pleased to separate you from your wallet. If you prefer to spread out the agony, we can offer short term credit even cheaper than Access or Barclay whilst for the masochists among you, we can provide extended pain via the normal credit companies.

Make sure that the price which you see in the advert includes VAT—a purchase at £339 can become £381.37 when VAT is added so watch it. The other area in which to take care is the accessory swamp. Brave amateurs have been known to sink out of sight crying "but I thought it included the battery charger," or the microphone, or whatever. **MAKE QUITE SURE THAT YOU HAVE THE CORRECT PRICE INCLUDING ALL THE HIDDEN EXTRAS.**

### OUR AGENTS GOD BLESS 'EM

#### FULL TIME BRANCHES

Communications House, 20 Wallington Square, Wallington, Surrey. Tel. 01-669 6700.

Soho House, 362-4 Soho Road, Handsworth, Birmingham. Tel. 021-554 0708.

27 Cookridge Street, Leeds. Tel. 0532 452657.

#### EVENINGS AND WEEKENDS

Alan GW3YSA, 35 Pen-Y-Waun, Efail Isaf, Nr. Pontypridd. Tel. Newton Llantwit 3809.

John G3JYG, 16 Harvard Road, Ringmer, Lewes, Sussex. Tel. Ringmer 812071.

Sim GM3SAN, 19 Ellismuir Road, Baillieston, Nr. Glasgow. Tel. 041-771 0364.

THE BEST VALUE OF ALL IS OUR CATALOGUE, JUST SEND 30p IN STAMPS TO RECEIVE DETAILS OF ALL OUR PRODUCTS. MAKE IT 50p AND WE INCLUDE THE ANTENNA BOOKLET THAT EVERYONE IS TALKING ABOUT.

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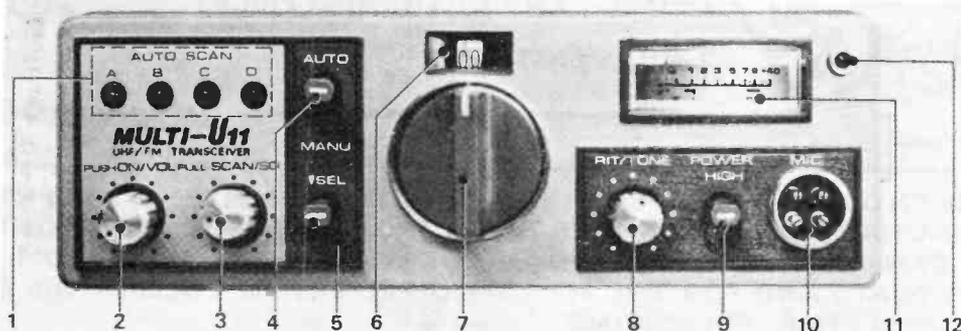
# WATERS & STANTON

TELEPHONE HOCKLEY (03 704) 6835 (2 LINES)



## 70cms MULTI-U11

### HEAD & SHOULDERS ABOVE ALL OTHERS



LATEST VERSION FOR UK MARKET NOW WITH 1750HZ T/B—ENGLISH HANDBOOK—9 CHANNELS FITTED—  
£249 inc. VAT

**KEY TO CONTROLS:** 1. Auto-scan channel indicator. 2. On-off/Volume control. 3. Scan-squelch switch. 4. Auto/Manual switch. 5. Manual scan switch. 6. Fixed channel indicator. 7. Manual channel selector. 8. Receiver incremental tuning control. 9. High/low power switch. 10. Microphone socket. 11. S-meter, centre zero, rf indicator. 12. Transmit indicator.

The FDK-U11 is a borne leader. 70cms. is a demanding band, requiring the highest standard of engineering and electronic design. The FDK-U11 is designed to meet this high specification. It is the only 70cms. transceiver to have stood the test of an independent RSGB review in *Radio Communication* (December 1976) and is now the most widely used 70cms. transceiver in use today. A look at its basic specification and design will confirm its supreme leadership in 70cms. FM.

The receiver employs a triple conversion superhet with a first IF of 45 MHz to ensure high image rejection. (Other rigs employing a first IF of 10.7 MHz at 70 cms. really do have image problems!) Triple conversion also facilitates the use of much lower frequency conversion crystals resulting in superior frequency stability. The signal from antenna passes through a 2 stage RF amplifier and mixer housed in a completely screened box. This is one of the hottest front ends we have come across and confirmed by the RSGB review -4 uv gives better than 20dB quieting. The signal then passes through a 2 stage 10.7 MHz crystal filter (a nice design point this) and on to the main 455 kHz IF chain embodying

6 stages and switchable wide and narrow filters. This ensures really hard limiting and superb adjacent channel selectivity not realised in other models. The receive channel crystals operate a back lighted dial so that only channels loaded with crystals are illuminated. And of course the now famous priority channel scan ensures continued monitoring of the main simplex channels. (Beware of rigs boasting channel scan adaptors—they simply lock onto the local repeater and stay there!) But perhaps one of its most essential features not included in any other rig is the receiver incremental tuning. On 70cms. this really is essential.

The transmitter section employs a highly stable oscillator chain and is phase modulated by a well tailored audio section for that distinctive, fully deviated signal now so familiar from the many U-11's operating through the U.K. and continental repeaters. The driver and PA stages are completely enclosed in a metal box together with a very sophisticated filter section producing a signal so free of spurious output that it meets commercial specifications! The PA is fully protected and normally gives 12-13 watts output.

#### FREE CREDIT

For a limited period you may purchase an FDK transceiver and spread your payments over 6 months without paying a penny extra. This offer applies only to UK licensed amateurs. Example: Multi-U11, deposit £49.68 and 6 payments. Multi-U11, deposit £62.50 and 6 payments. Phone or write for full details and beat inflation. For longer periods up to 30 months we can offer very competitive rates!

#### NEW!

**EL-40X** Deluxe balun-fed "Mini-Dipole." Approx. length 75ft. Supplied complete with special balun for perfect matching and tvI reduction. A complete set of hard-ware is supplied including an inverted "V" kit. The high "Q" traps are completely weatherproof yet light in weight and a unique clear vinyl covered copper element is employed to ensure that the antenna lasts for years. 1kW rating.

**COMPLETE SYSTEM £28.12.**



### for 2 metres Multi-II

Complete with Autoscan for safer driving! Fitted 7 channels plus tone burst £199.68 incl. VAT. In stock now

**SUPERB SENSITIVITY**



# ELECTRONICS FAST MAIL ORDER SERVICE

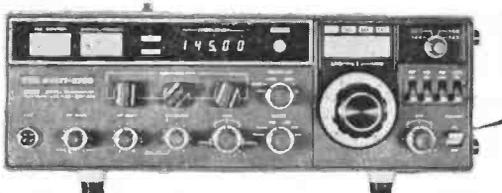


TELEX 897406



## MULTI-2700 THE FAST SELLING 2 METRE RIG MULTIMODE WITH 'OSCAR' FACILITY USB/LSB/FM<sub>N</sub>/FM<sub>W</sub>/CW/AM/'OSCAR'

- Normal/Reverse Repeat
- VOX/IRT/Calibrator
- DX Speech Clipper
- High/Low Power
- Noise Blanker



- 10W/1W Output
- 12v./230v. Supply
- Dual VFO Control
- Digital or Analogue PLL for Stability

AMAZING VALUE **£449 inc. VAT! IN STOCK NOW** Send for 4-page Brochure Today



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### JUST PART OF OUR EXTENSIVE STOCKS

**MICROWAVE MODULES**

MMC 2m. conv. IF 2-4 4-6 28-30	£20.25	(36p)
MMC 70 MHz conv. 28-30	£22.50	(36p)
MMC 70 MHz conv. 28-30 + local osc.	£22.50	(36p)
MMC 2m. conv. 28-30 + local osc.	£22.50	(36p)
MMC 70cm. conv. 28-30 or 144-146	£22.50	(36p)
MMC 1296/144 or 28-30	£28.12	(36p)
MMD 50 50 MHz counter	£66.95	(36p)
MMD 500P 50 MHz pre-scaler	£27.90	(36p)
MNT 432/28 70cm. transverter	£109.00	(36p)
MNT 432/144 2m. transverter	£149.62	(36p)
MMT 144/28 2m. transverter	£88.87	(36p)

**NIHON DENGYO**

Liner-2 Mk. II 2m. ssb tcvr. 12v. DC	£184.50	(£2.50)
Liner-430 70m. tcvr. 12v. DC	£296.25	(£2.50)
LA-106 2m. 100W. linear	£200.25	(£2.50)
R115E reg. p.s.u. for liner-2 and 430	£31.50	(£2.50)

**SOLID STATE MODULES**

2m. or 4m. Europa transverter	£109.15	(n.c.)
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70cm. converter IF 144-146	£18.00	(n.c.)
2m. boxed pre-amp	£8.72	(n.c.)
PA3 2m. miniature pre-amp board	£6.27	(n.c.)

**WATERS**

Stable tone-burst modules		
1750Hz	£3.93	(25p)

**POLAR ELECTRONIC DEVELOPMENTS**

Magnum 2m. transverter	£151.90	(£1.50)
Wavemeter 65-230 MHz	£19.00	(50p)
432 MHz linear 230v. AC	£151.90	(£1.00)
Magnum 2m. linear 230v. AC	£151.90	(£1.50)

**QM70 PRODUCTS**

2 & 4 converters 28-30	£18.00	(36p)
70cm. converters 28-30 IF	£19.50	(36p)
1296 MHz converters	£14.00	(36p)
Cobra 70cm. transverter	£86.00	(75p)
Solid state amplifier	£49.50	(50p)

**VHF ANTENNAS BY JAYBEAM**

4Y/4M 4 element yagi	£11.45	(£1.75)
5Y/2M element yagi	£6.96	(£1.00)
8Y/2M 8 element yagi	£9.10	(£1.00)
10Y/2M 10 element yagi	£19.35	(£1.50)
PBM14/2M 14 ele. parabeam	£23.00	(£1.50)
PBM14/2M 14 ele. parabeam	£28.35	(£1.75)
5XY/2M 5 ele. crossed yagi	£14.50	(£1.25)
8XY/2M 8 ele. crossed yagi	£18.10	(£1.50)
10XY/2M 10 ele. crossed yagi	£23.95	(£1.75)
Q4/2M 4 ele. quad	£14.85	(£1.50)
Q6/2M 6 ele. quad	£19.80	(£1.75)
D5/2M 5 ele. slot fed	£12.35	(£1.25)
D8/2M 8 ele. slot fed	£16.55	(£1.50)
XD/2M crossed dipoles	£6.40	(£1.00)
UGP/2M ground plane vertical	£6.95	(£1.00)
HO/2M Mobile halo head only	£3.55	(50p)
HM/2M Mobile halo with mast	£3.09	(£2.75)

**PMH/2C 2 way phasing harness**

circular polarisation £4.60 (75p)

**PMH2/2M 2 way phasing harness for 2 or 2 metre antennas**

£6.15 (75p)

**PMH4/2M 4 way phasing harness**

£14.85 (£1.00)

**5VMK/2M mounting kit for vertical pot. for 2 slot feds.**

£3.45 (75p)

**UHF ANTENNAS BY JAYBEAM**

DB/70cm. 8 ele. slot fed	£14.05	(£1.25)
PBM18/70cm. 18 ele. parabeam	£16.95	(£1.50)
MBM48/70cm. 48 ele. multi-beam	£19.65	(£1.50)
MBM88/70cm. 88 ele. multi-beam	£26.30	(£1.75)
12XY/70cm. 12 ele. crossed yagi	£27.00	(£1.50)
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**MOBILE ANTENNAS BY JAYBEAM**

TAS 2m. 5/8th glass fibre whip with 4m. of cable	£11.80	(£1.00)
US 70cm. colinear 5-6dB gain and 4m. of cable	£18.90	(£1.00)

**LF ANTENNA SYSTEMS**

EL40X compact 80/40 dipole de luxe with balun, hard-ware, inv. "V" brackets, special protected copper wire, etc.	£27.00	(£1.00)
Q-Trap compact 80/40 dipole kit 79ft.	£14.62	(£1.00)
Q-Trap coils only	£7.98	(50p)

**MINI-PRODUCTS**

HQ-1 10-20m. compact 1-2W. yagi

£84.37 (£2.00)

C4 10-20m. compact 1-2kW vertical

£38.25 (£1.50)

**ROTATORS**

AR30 antenna rotator	£44.40	(£1.50)
AR40 antenna rotator	£51.70	(£1.50)
CD44 antenna rotator	£106.85	(£1.75)
Ham II antenna rotator	£145.00	(£2.00)
CD bearing	£4.21	(50p)
Stolle 2010 antenna rotator	£46.50	(£1.50)
Stolle 2030 antenna rotator	£51.05	(£1.50)
Stolle alignment bearing	£11.25	(50p)

**HY-GAIN ANTENNAS**

12AVQ 10-20m. vertical 2kW	£37.60	(£1.50)
14AVQ 10-40m. vertical 2kW	£53.40	(£1.50)
18AVT/WB 10-80m. vertical 2kW	£72.45	(£2.00)
TH3 JNR 10-20m. yagi 600W	£108.00	(£2.00)
TH3 Mk3 10-20m. yagi 2mW	£154.12	(£2.50)
BN86 balun 2kW	£13.50	(50p)

**STATION ACCESSORIES**

MFJ audio filter boards 80/110/180 Hz	£14.62	(50p)
Shure 444 table microphone	£21.95	(£1.00)
Shure 201 hand microphone	£9.95	(50p)
SWR single meter	£9.85	(50p)
SWR dual meter	£12.63	(50p)
Telegraph key	£9.75	(50p)
Drake low pass filter	£18.00	(75p)
Ferrite rings 1 1/2" for a.f.i.	30p	(8p)
HP3A high pass tv filters	£2.53	(15p)
Set of 10 HP7 ni-cads	£9.72	(75p)
2 way coax switch	£2.63	(50p)
Balun insulator 50 ohm (beams or dipole)	£8.43	(50p)

MAIL ORDER & HEAD OFFICE: Hockley Audio, 31 Spa Road, Hockley, Essex. Tel.: 03-704 6835 (2 lines)

ALL PRICES INCLUDE VAT

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AGENTS: G3XTX J.R. Electronics, 198 Collier Row Lane, Romford, Essex.

Tel.: Romford (0708) 68956

G3OQT Bredhurst Electronics, Willowbrook, School Lane, Bunbury,

Cheshire. Tel.: (Bunbury) 0829 260708

GM3GRX Eric Simpson, 6 Drossie Road, Falkirk, Stirlingshire. Tel.: 0324 24428

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# South Midlands Communications Ltd.

## TOTTON SOUTHAMPTON

### YAESU MUSEN 2 YEAR GUARANTEE '24 HOUR' SECURICOR SERVICE



FTV250  
FTV650B



DIGITAL II  
+ Scanner



MMT 144/28  
MMT 432/28  
MMT 432/144



PA 160/10/BL

KP202  
KCP 2



Whether you are a listener, a newly-licensed GB, an old hand at the HF bands, or Mr. V.H.F., an array of equipment currently available for VHF is most bewildering. On these pages we make a few suggestions from our large stocks that may help guide you through the maze.

If you already have a HF transceiver, or feel one day you may wish to use the DX bands, then, you can do far worse than use a transverter. Perhaps the Yaesu FTV250 for two, and the FTV650B, suitably modified by us, for four metres. Both offer complete flexibility of station design and requires no plugging or unplugging of any leads, whatsoever, then changing from VHF to HF. As an alternative we offer the range from Microwave Modules. Their 70cm. unit is exceedingly popular, coming in three forms with a 144MHz, 28MHz or 50MHz IF. For this latter item we offer the FT620B 6m. transverter, which by virtue of its high output frequency can substantially improve image problems (even permitting single conversion to 23cm.). The MMT432/144, when used in conjunction with the Yaesu Musen FT21R, from us, will allow full repeater working on 70cm. with the in-built 1.6MHz shift and full 4MHz coverage.

Should your interest be purely in listening, and you have a communications receiver, we offer a range of external converters and amplifiers from 4m. through to 23cm., or you may prefer a self-contained unit such as the FR101D. This covers all UK amateur bands, from 1.8 through to 144MHz with detectors and filters for AM, FM, SSB, CW, etc.

For mobile use, the range is very wide and the choice difficult. For 70cm., rapidly growing in popularity, a Multi U11 for FM, or for SSB a Liner 430, which with its Oscar VII capability offers interesting possibilities of mobile satellites QSOs. In this vein satellite translation from 2 to 10, or the enjoyable full duplex 70-2 crossband should not be neglected. Crystal controlled FM transceivers, such as the FT223, are very popular. We would recommend that you seek one with at least, a 20-channel capability, even if you may not intend to use them all at first. The more advanced synthesised equipments, whether this employs digital or crystal mixed techniques, are surprisingly good value when looked at in the long term, with no crystals to buy for band plan changes or to update with activity. We could suggest either a Yaesu Sigmasser 80R which covers all of 2m. in 25kHz steps and has repeater up and down shifts in the necessary parts of the band, or, perhaps, the Kyokuto Digital 11. This is a digitally synthesised transceiver, covering in 5kHz steps the entire band (and a receive facility to 149). Repeater up and down shifts of 600kHz are fitted (but we can modify the transceiver to provide a 1.6MHz transmitter shift). An automatic crystal controlled tone burst is available, as is a scanner. This unique device allows you trouble-free searching of the band in a hitherto unavailable form. All important normal functions of the transceiver are maintained, but in addition, when scanner is switched on the unit tunes automatically from 145 to 145.87MHz in 25kHz steps. As soon as the squelch opens, scanning stops and for seven seconds you hear what is on the channel. If you flick the small toggle switch on the microphone over, the equipment will lock on the frequency. Conversely, should you not wish to use that channel (say lock out the local repeater input or output frequency) you can momentarily squeeze the push to talk and next time round, the scanner will skip this frequency. Any or all of the frequency scanned may be locked out in this manner, if so desired.

As the next step to your mobile installation we would suggest a linear amplifier for 2, the KLM 160W output device is strongly recommended. Other units are available providing 80W out on 2 or 45 or 80W. on 70cm.

If you seek hand held equipment (or an all-purpose transceiver with your main interest being elsewhere), the KP202 has a fine reputation. It is a two watt true walkie-talkie that works well into its own or an outside antenna, produces at least 2W output and has an exceedingly sensitive receiver.

For home station use, any of the mobile equipments with suitable power supply are quite satisfactory, but special mention should be made of the multimode equipments, such as the FT21R. This operates on: selectable SSB (remember LSB for Oscar 7), FM (with full repeater facilities including inverse and 70cm. shift), CW (with sidetone and semi-break-in) and on AM. Powered from mains or from 12v., its sophisticated circuitry is equally at home working SSB DX or local rag chewing on FM.

**IF ANY ITEM HERE OR PREVIOUSLY ADVERTISED HAS WHETTED YOUR APPETITE, PLEASE DO NOT HESITATE TO CONTACT US, AT TOTTON, LEEDS CHESTERFIELD, LINCS. or BIRMINGHAM.**



FT101E 160-10m. (all 2 MHz)  
100W. P.E.P. with low power output skt.



FR101D 160-10m., 2 and 4m.,  
BC bands, FM, SSB, AM, CW



SIG80R 2m. FM 12v. 10W.  
80 x 25 kHz channels, 600 kHz shift



FT620B 50-52 or 50-54  
SSB, AM, CW. Ideal transverter source



FT221R 144/8 MHz. -6 + 1.6 MHz shift  
10W. (plus) SSB, CW, FM, AM, 230/12v.

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# South Midlands Communications Ltd. THE LEEDS BRANCH

## HOW TO FIND US

If in Leeds city centre, follow signs to "Headingley" or "University" past University on left, over tree lined Woodhouse Moor, into Headingley. Turn left at third set of traffic lights. (Well spaced, some pedestrian operated). Into North Lane. See map.

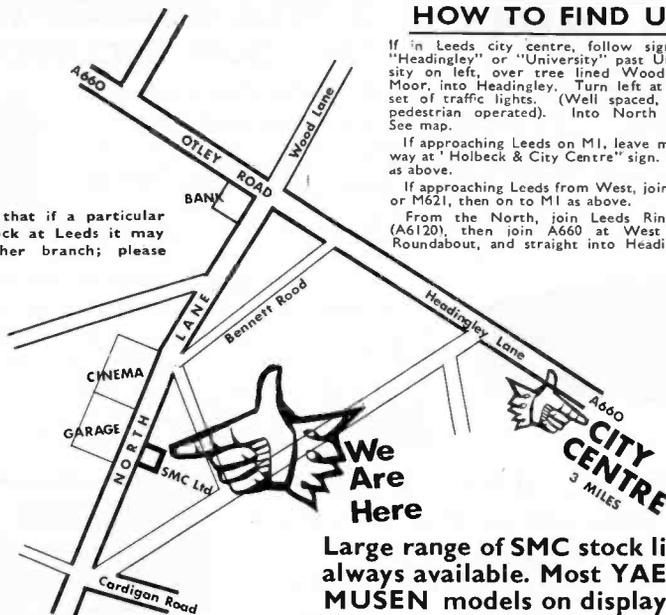
If approaching Leeds on M1, leave motorway at "Holbeck & City Centre" sign. Then as above.

If approaching Leeds from West, join M62 or M621, then on to M1 as above.

From the North, join Leeds Ringroad (A6120), then join A660 at West Park Roundabout, and straight into Headingley.

Please remember that if a particular item is not in stock at Leeds it may well be in another branch; please enquire.

Equipment demonstrated at clubs; Secretaries are invited to apply.



Large range of SMC stock lines always available. Most YAESU MUSEN models on display.

**NEW LEEDS REPAIR SERVICE** ★ For any amateur equipment. Come and have a chat with our service engineer, Richard Ginn, B.Sc.

### JAYBEAM 40(4m), 144 (2m), 432 (70) (Carr. about £1) VAT 12½%

For general work, with the emphasis on distant mobiles. Oscar etc., crossed yagis are increasingly popular. However, for maximum gain needed to push your signal over the horizon we would suggest long yagis, on 2, such as the 14Y/2M (offered exclusively by SMC or the MBM88 for 70).

D5/2m 5 over 5 slot feed ... £11-00	PBM10/2m 10 ele. Para ... £20-50
D8/2m over 8 slot feed ... £14-75	PBM14/2m 14 ele. Para ... £25-20
5XY/2m 5 ele. crossed ... £12-90	D9/70 8 over 8 slot feed ... £12-57
10XY/2m 10 ele. crossed £16-10	PBM18/70 18 ele. Para ... £15-00
5Y/2m 5 ele. yagi ... £6-20	MBM48/70 46 ele. Multi ... £17-50
8Y/2m 8 ele. yagi ... £8-10	MBM88/70 88 ele. Multi ... £23-40
10Y/2m 10 ele. long yagi £17-20	12XY/70 12 ele. crossed ... £24-00
14Y/2m 14 ele. long yagi £22-00	4Y/4m element yagi ... £10-20
O4/2m 4 ele. yagi ... £13-20	PMH2/70 2 way harness ... £4-75
O6/2m 6 ele. quad ... £17-60	PMH2/C Circ. phasing ... £4-10
	PMH2/2m 2 way harness... £5-50

### CUSHCRAFT VHF OMNI (Carriage 90p) VAT 12½%

Top the tower or mount on your chimney stack a 2m. gain vertical. The Ringo Ranger (ARX2) offers over the conventional ground plane elimination of unsightly radials and 6dB gain from only 9" 6" (weighs less than 1½lb!).

If you prefer horizontal omnis are available for net control, RAEN, SSB mobile, etc., etc.

ARX2 Ringo Ranger 145 MHz ... £21-50	ARX450 Ringo Ranger 432 MHz ... £21-50
AR2 3dB Ringo Vert ... £12-75	ABW144 2m Big Wheel ... £14-50
AR25 QRO AR2 ... £15-00	ABW125 ABW harness ... £7-30
CX1000 29 MHz Ringo ... £25-75	ASQ1 2m Squal ... £11-75

### BANTEX VHF WHIPS (Carriage 90p) VAT 12½%

The mobile season is with us again. For 2m. ssb a Cushcraft, for FM a ½ or ¾ Bantex roof mounted (on the standard or magnetic base). If the mounting is to be lower down use a longer 3dB antenna only.

B5 ½ 145 MHz ... £6-35	70½ ¾ 70 MHz ... £4-00
BGA f.g. ½ 2m. fibreglass... £8-75	Trunk Lip Mount ... £5-25
BGA s.s. ½ 2m. stainless steel ... £8-50	Magnetic Base Mount ... £8-50
B5U ¾ 432 MHz ... £5-00	Standard base unwanted deduct ... 50p

SEND A LARGE (10 x 12) S.A.E. OR 15p STAMPS FOR YAESU CATALOGUE, STOCK/PRICE/S-H LISTS, Etc.  
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Telephone : Leeds (0532) 782326. Open : 9-5 Tuesday-Saturday, 9-8 Thursday



### COAX PLUGS (post and packing extra) VAT 8%

Whilst it is undoubtedly true that the UHF, PL259 range leave much to be desired over 200 MHz, their mechanical performance is excellent. We offer plugs in standard or P.T.F.E. insulation for ¾", with reducers for smaller cables, adaptors and converters. For the discerning BNC, N and C types are stocked. For accessory connections we hold from stock phonoplugs, plastic or metal barrelled, jack plugs ¼" stereo or mono, mic. plugs, power plugs (for the Yaesu range), and a wide collection of similar ancillaries.

PL259 Standard UHF plug	48p	UR43 or 70	
UHF fixed reducer	50p	258 Back to back (female)	80p
"Solderless" UHF RG8U	51p	"T" adaptor (2F + 1M)	£1-20
"Solderless" UHF UR43	51p	Right angle (1M + 1F)	90p
UG** Reducers state		Phono/car to SO239	55p
		SO239 2-hole socket	37p

### LIGHTNING ARRESTORS (p & p 30p) VAT 8%

By bleeding static lightning arrestors reduce the chance of a strike. They may be of either the simple adjustable spark gap or of the precision gas discharge type, constructed for straight in line or bulk-head mountings.

SM566 Spark PL/50	£2-25	NSK Gas 50/50	£7-50
LA2 Spark PL/50	£1-50	LAI Gas 50/50	£17-50

### CABLES RF FEEDERS (Carriage extra) VAT 8%

Feeders are the point where amateurs often falsely economise. For mobile use a cable with a stranded centre (UR76 etc.), for fixed a long unsupported run without a catenary, or allowing the cable to slap against the mast are taboo, breakages of the centre conductor will arise with disastrous results.

If you are using a ¾ cable changing to ½ can be the most cost effective improvement.

UR67 50 ohm Heavy	36p yd.	UR39 75 ohm Medium	24p yd.
UR57 75 ohm Heavy	42p yd.	UR28 75 ohm Distribution	20p yd.
75 ohm Flat Twin	10p yd.	UR43 50 ohm Solid Cent.	16p yd.
300 ohm ribbon	12p yd.	UR76 50 ohm Strand Cent.	16p yd.



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### THE FRG7, GENERAL COVERAGE RECEIVER Ex-Stock UNPARALLELED IN ITS CLASS AND ONLY £145 (VAT 12½%)

The FRG7 is a general coverage solid state receiver with specifications unparalleled in its price range. It uses a Barlow Wadley Triple-mix, drift cancelling loop for continuous, spin-tuned inclusive coverage of 0.5 to 30 MHz with calibration accuracy better than 5 kHz. Frequency selection is accomplished by setting the RF (pre-selector and range switch), dialling up the required number of megahertz, then tuning the VFO knob as normal.

The receiver is sensitive (0.5µV for 10dB S + N/N (SSB) and stable (within 500Hz for any 30 minutes after warm up) with A.M., SSB and CW modes catered for A 3 position audio filter, RF attenuator, dial lamp conservation switch, recorder and phone sockets are fitted. It is mains powered, but should the supply fail, or portable operation be required, 8 dry cells are automatically switch in.



### FT223 THE NEW 2M-FM TRANSCEIVER

£139.50, 3 crystal pairs ; £152.50, 8 crystal pairs (+ VAT 12½%)

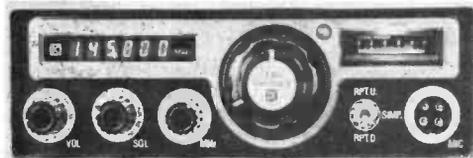
The FT223 is an FM transceiver operating on 23 crystal controlled channels (or by external VFO) across 144 to 148 MHz. For mobile use it is safe, illuminated; meter (Rx "S" and TX out) and main dial (when crystal up). LED's indicate: squelch open, high 10w. or low 1w operation, or air, or if the special frequency is selected. Housed in heavy metal case and supplied complete with mounting bracket cables, connectors, microphone, etc., it is equally at home as a compact (7" x 2½" (3") x 8½" (10")) base station with a 12v. PSU, (0.45A RX, 1.2A LTX, 2.3A HTX). The dual conversion receiver is sensitive (mosfet RF and mixer), and selective, (12 kHz at 6 dB) delivering 2w. to the internal 3" or an external 4Ω speaker. A switchable repeater access tone burst and a tone squelch option (sub audible selective calling tone T/RX) are all features of this new high quality, low price, transceiver.



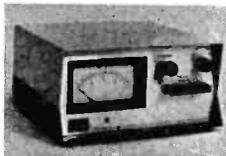
### DIGITAL II from KYOKUTO SCANNER AND CRYSTAL T.B. OPTIONS

The Digital II offers complete 5 kHz step coverage across 2 metres and now with the Scanner 33, 25 kHz channels from 145 MHz upwards covered in around 10 seconds. It offers full lock and lockout on all channels. The scanner stops on a required channel for 7 seconds, then unless locked moves on. The bright digital readout comes from 6 seven segment LEDs. Selectable 10 or 1 watt output for simplex or duplex (up and down shifts), across 144-146 (rx to 149 MHz) from a tiny 6½" x 2" x 7½". Easily underdash mounted with the supplied mounting bracket, or slipped in place of the broadcast wireless.

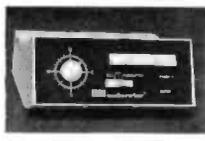
For strong handling, and low noise the R.F. mixer, first IF (16.9 MHz) second mixer (and LO) are all PETS. The front end is tuned by varicaps by the DC output of the P.L.L. with superb selectivity provided by a 15 pole (± 8 kHz at -6dB ± 15 kHz at -70 dB) Ceramic filter. LED lamps indicate if the P.L.L. is unlocked or the squelch open. The V.C.O. is directly modulated (for exceedingly linear deviation) Unitary 6 circuit block construction (for serviceability and screening). Selective calling socket.



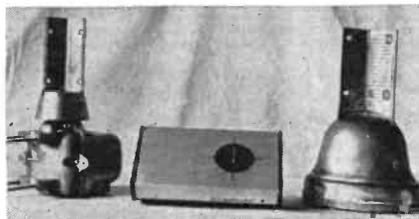
DIGITAL II £235; CRYSTAL T.B. £10.00; SCANNER £49.50  
All prices exclude VAT at 12½%



CD44/HAN



AR33



AR30

AR30/40

AR40/33

### ROTATORS

Ex-Stock for fast delivery

VAT—Rotators 12½% Cable and delivery 8%  
Carriage (BRS or post) FREE. Securicor delivery £1 extra (mainland). All rotators supplied complete with appropriate control box and instrs.

#### CDE ROTORS

AR30 Light VHF/UHF...	£39.50
AR40 VHF and Light HF	£46.00
AR33 De luxe control AR40	£57.50
CD44 Medium duty	£95.00
Ham II Heavy duty	£129.00

#### STOLLE ROTORS

2010/220 Automatic	£41.25
2030 M. matic	£45.50

#### BEARINGS

CD562 CDE	£4.50
RZ100 Stolle (ballrace)...	£10.00

#### MOUNTING KIT

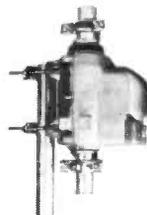
AK121 CDE to Versatower ...

#### CABLE

5 core AR30/40/33/2010 pr. yd.	22p
8 core CD44/Ham II per yd.	35p



STOLLE



RZ100

2010/220  
and Cont. Box  
CDE

### G WHIP HF MOBILE (Carriage 90p) VAT 12½%

Tribander 10-20m. (+LF)	£16.10	LF 40,80 or 160	£4.87
Multimobile 10/20 (+MM)	£19.00	MM 40, 80 or 160	£4.87
Flexiwhip 10m. (+FF)	£12.42	FF 15, 20, 40, 80 or 160	£5.04
Basemount ½" hole mount	£2.20	Telescopic whip for coils	£1.85

### TAVASU HF MOBILE (Carriage 90p) VAT 12½%

Whip Chrome 2 sect. 60"	£3.88	Base heavy duty	£5.18
Base section chrome 16"	£1.94	Complete monobander	£14.95
Resonators 160-15m.	£3.88	Complete 5 bander	£25.92
Adaptor 24 to 20 thread	55p		

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**FT221R**—NOW costs less, we have beaten inflation and can offer at lower prices than last year. As an added bonus all new SMC supplied FT221Rs cover 4 MHz and are equipped with 600 kHz and 1.6 MHz shifts. YAESU's state of the art, fully modular plug in board, multimode, 2m. transceiver renders over the boards "rats nest" wiring obsolete. A 134 MHz VCO automatic varicap tuning of transmitter and receiver, gives you an exceedingly clean signal sensitive receiver combined with good strong signal handling.



## The SMC73 General Coverage Receiver

The SMC73 is an all Solid State, Mains and 12v., communications receiver covering 550 kHz to 30 MHz in four overlapping ranges. Frequency readout is by two illuminated dials tuned by coaxial spun aluminium knobs, the larger for general coverage, the inner for amateur band (40-80m.) band spread (set by use of internal 3.5 MHz crystal calibrator). FET's are employed in the R.F. Amplifier, mixer, VFO and BFO (these latter two stages being fed from independent stabilised supplies) ensuring good sensitivity, stability (electrical and mechanical) dynamic mixers, low spurious content, high sensitivity with dynamic range. Full converter range stocked S.A.E. details (VAT + 12%).

FET's are employed in the R.F. Amplifier, mixer, VFO and BFO (these latter two stages being fed from independent stabilised supplies) ensuring good sensitivity, stability (electrical and mechanical) dynamic mixers, low spurious content, high sensitivity with dynamic range. Full converter range stocked S.A.E. details (VAT + 12%).

illuminated signal meter, SO239 (UHF) coax, socket and binding posts for antenna switchable envelope (A.M.) and product detectors (SSB/CW) (provision on switch for possible fitting of FM demodulator) are all features of this exciting new low price receiver.



SMC 73 Ex-Stock £114.50 (+VAT)

## Microwave Modules Transverters

From Ten, Six or Two Metres (a '101, etc., a '620B or a '221R). 10W output, balanced Tx mixers, low spurious content, high sensitivity with dynamic range. Full converter range stocked S.A.E. details (VAT + 12%).

MMT 144/2B or 50 2 metres **£79.00**  
 MMT432/2B or 50 70 centimetres **£97.00**  
 MMT432/144 Double conversion **£133.00**



## Yaesu Clock

Analog clock with automatic advancing 24 hour time zone hour disc giving, at a glance, time in principal cities or time zone. Battery powered, self starting, shock resistant. Approx. 5 1/2" dia.

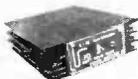
**QTR24** only **£13.00** (VAT + 8%) p. & p. 30p



## SOLID STATE MOBILE LINEARS (VHF & UHF) FROM KLM & AMPERE

2 metre, SSB/CW/FM, RF sensible with manual override. "Microstripline" 12v. DC 10W drive. 2" x 6.5" x 10" (11") (VAT + 12%) (Over 15 different models—SAE details).

**PA144/150/BL** 145 MHz 160W output **£155.**



2 or 70 Superb R.F. sensing, excellent bias arrangements, c/w mounting bracket. 12v. DC 10W drive. 2.5" x 5.2" x 7.5" (8.5") (VAT + 12%)

**APB82A** 145 MHz 80W, output ... **£95.00**  
**APB57A** 433 MHz 45W output ... **£95.00**

## SMC TRAPPED DIPOLES (Post 45p) VAT 12 1/2%

For those with limited space, or restricted interests the SMC trap dipole offers coverage of 10-80 (160M) in 10Bt, Suspended as a "V" from the tower excellent results on 80 and 40m. are obtained.

S 500 P.I.P. 14 SWG ... **£19.60** P500W. P.I.P. Cu/Terrylene  
 HF 1K P.I.P. 14 SWG ... **£21.75** braid c/w 75' feeder, etc. **£21.75**

## MOSLEY TRI-BAND BEAMS (Carriage £2.50) VAT 12 1/2%

Ever popular for HF bands are Triband (10-15-20M) beams such as the TA33 (or for higher powers the Mustang) providing DX potential from the typical urban environment.

TA33 3 ele. 200W R.M.S. **£70.00**  
 MUSTANG 3 ele. ... **£90.00**

TA32 2 ele. 300W. A.M. **£49.00**  
 MUSTANG 2 ele. 1Kw T.B.A.

## KP202

The handheld KP202 with its 2W of RF and 1/2W of audio, immunity to image and IF breakthrough, offers performance to rival all walkie-talkies and many mobile 10W sets. The KP202 is supplied with telescopic whip, leather handle/whip case and F type plug. Accessories include automatic (R channels only) crystal tone burst (£10.00), flexi stubby antenna, leather case, base charger KCP2, SIX CHANNELS FITTED S20 and S22 and any 4 of: 50, S21, S23, S24, R3, R5, R6, R7, only **£109.50 (+ VAT)**

## TOWERS IN TOTTON—CALL, WRITE OR PHONE ANY BRANCH FOR DATA SHEET

**TELOMAST TELESCOPIC GALVANISED**  
 10' sections without or c/w rigging, Carriage £2-75, ex-stock VAT 8%.

30' **£25.00** or **£43.85** c/w rigging  
 40' **£32.50** or **£56.85** c/w rigging  
 50' **£42.00** or **£74.50** c/w rigging

**HAMTOWER SELF SUPPORTING**  
 Galvanised lattice 10' sections. Free-standing with climbing steps. Carriage £8-50 ex-stock 8% VAT.

30' c/w base grillage ... **£192.35**  
 40' c/w base grillage ... P.O.A.

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 Carriage and rigging (RX) extra.

42' ... **£121.00** (RK £28)  
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**VERSATOWER TILTING TELESCOPIC**  
 Galvanised lattice, 20' sections. Post, wall, plate, socket mounts.

P25 ... **£156.50** W40 **£157.50**  
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 MULTI-STORY CAR PARK AT REAR OF SHOP NOW OPEN





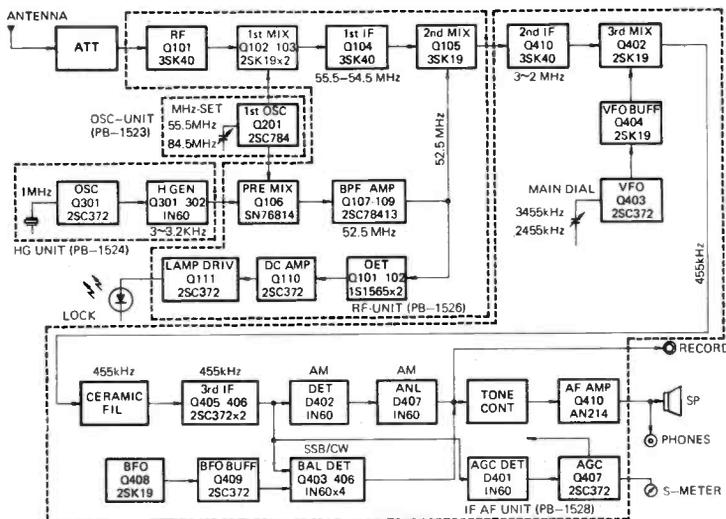
# YAESU MUSEN

## FRG7 Synthesised General Coverage Communications Receiver.



The signal path starts with the choice of 3 antenna connectors: for 1-6-30 MHz, a 50/75 ohm feed (to a SO239 (UHF) coax socket and a binding post) and for 0.5-1.6 MHz (medium wave) a separate high impedance binding post. A 3 position 0-40dB switchable attenuator aids reception of very strong signals and reduces adjacent channel interference. The low noise MOSFET RF amplifier provides a SSB sensitivity of 0.25µV (for 10dB N+ S/N at 10.5 MHz) and is sharply tuned by a well calibrated "pre-selector" capacitor with 4 band switched coils. Its output is low pass filtered ( $f_c = 35$  MHz) removing VHF image problems from the following mixer. This comprises a pair of JFETs, driven by the "MHz set" 55.5-84.5 MHz oscillator, which upconverts the signal to the band pass first IF to 55 MHz  $\pm$  500 kHz where it is MOSFET amplified. The second IF of 2-3 MHz is produced by a FET mixer by heterodyning with the synthesiser derived 52.5 MHz signal. A 1 MHz crystal oscillator and diode harmonic generator produces a 3-32 MHz comb spectrum. This, with the first heterodyne oscillator (MHz set) is fed to a dual balanced i.c. pre-mixer. The output is expurgated by a multiple stage selective amplifier producing the 52.5 MHz second oscillator. A small fraction of this is rectified, DC amplified and lights the "lock" LED (saving power) when the MHz oscillator is malset. The 2-3 MHz signal is MOSFET amplified and fed to the third mixer (a JFET whose input and output are tuned by capacitors ganged to the main tuning control) where it is heterodyned to the final IF by the main VFO which covers a 1 MHz range (2.455-3.455), is clearly calibrated, to 5 kHz (or better), well buffered, and highly stable. The third (455 kHz) IF starts with the ceramic selectivity element and is followed by two stages of bipolar (the first in the

signal path) amplification before the choice of detectors; twin diodes for AM, or a 4 diode product detector, with well buffered switched frequency (for selectable sidebands) B.F.O. A diode rectifies, a fraction of the output from the final IFT, this is boosted to drive the illuminated "S" meter and automatically gain control the MOSFET amplifier in the RF, second and third IF stages, reducing fading and distortion. Immediately following the demodulator is an automatic noise limiter, highly effective in suppressing pulse type interference on AM signals, and a three position "tone" switch a (high, low or band pass) audio filter, reducing the bandwidth to that required. A transformerless AF amplifier; delivers a generous 2W to the internal 5" x 3", or external speaker, drives a phone jack, and a "volume" independent output for tape recorder. The receiver is, mains (234VAC), external (12v. DC) or internal dry cell powered, the most economic source being automatically chosen. This is reduced to a stable regulated 10v. (or 9v. for oscillator and the harmonic generator). A dial lamp switch is provided to conserve power on battery operation.



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FT301S 10W analogue      FT301SD 10W Digital  
FT301 100W analogue      FT301D 100W Digital



FT301D

### FT301 FEATURES (with options installed).

160-10 metre inclusive coverage  
Multi mode USB-LSB-CW-AM-FSK  
12v. DC (234v. with FP301 and FP301D)  
11 1/2" (14") x 5" x 11 1/4", 22 lb. weight  
Silky smooth precision VFO drive  
Readout to 100 Hz (digital version)  
11 fix channels per band Segment

Semi break in with sidetone  
4 models—10/100 Dig/analogue  
RX on M.S.F. (5 MHz) and CB  
Front panel microphone gain  
R.F. derived feedback circuit  
Rejection tuning (I.F. passband)  
RF speech processor (in. I.F.)

Adjustable carrier level  
Fully switchable 3 position A.G.C.  
Clarifier (IRT with RT and TT)  
600Hz, 2.4 kHz, 6 kHz bandwidths  
Triple PA protection circuit  
100 kHz crystal calibrator + MSF  
Switchable fixed noise blanker

### FT301 SPECIFICATIONS

**Frequency range**  
160-10 metres transceive  
M.S.F. and CB receive

**Modes**  
USB, LSB, CW, AM, FSK

**Frequency stability**  
> 100Hz/1/2H (A.W.U.)  
< 100Hz for 10% line change

**Backlash**  
50Hz or better

**Antenna impedance**  
50 ohms, nominal

**Power requirements**  
234v. AC with FP301  
13.5v. DC 1-1A RX 21A TX

**Sensitivity**  
1/2µV for 10dB N + S/N at 14 MHz

**Selectivity**  
SSB 2.4 kHz at 6 dB (1:67 : 1SF)  
AM\* 6 kHz at 6dB (2:1 SF)  
CW\* 600Hz at 6 dB (2:1 SF)  
FSK as SSB

**Spurious responses**  
Images > -50dB  
Internal spurious < 1µV

**Audio output**  
3W (int. and ext. speaker)

**Audio distortion**  
< 10% at 3W output

**Input power**  
> 200W PIP A3;  
> 200W DC A1 (50% duty)  
> 50W A3 and F1

**Audio response**  
0.3-2.7 kHz ±3dB

**Carrier suppression**  
> -40dB

**Sidband suppression**  
> -50dB

**Spurious radiation**  
> -40dB

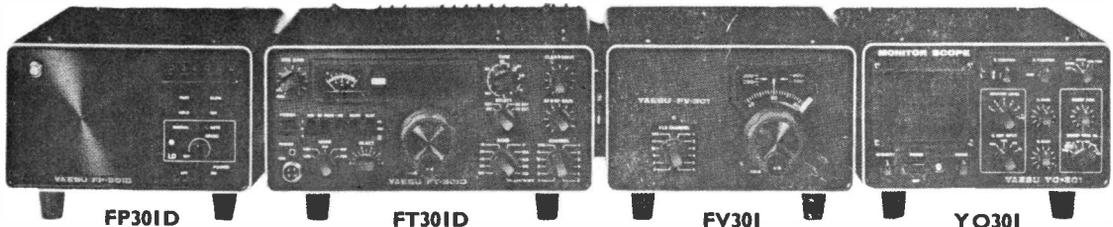
**Dimensions**  
11 1/2" (14") x 5" x 11 1/4", 22lb.

### THE FT301D AND ACCESSORIES ALL YOU NEED FOR A COMPLETE HOME STATION

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FT75B	£269.00	£33.62	£302.62	Sigma-80R	£199.00	£24.87	£233.87
FP75B				£65.00	£8.12	£73.12	
DC75B				£139.00	£17.37	£156.37	
FR101 S.Dig.				£359.00	£44.87	£403.87	
FR101D	£319.00	£39.87	£358.87	FT301D	£539.00	£67.37	£606.37
FL101	£315.00	£39.37	£354.37	FL2100B	£234.00	£29.25	£263.25
				FRG7	£144.00	£18.00	£162.00

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introductory  
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**£198 inc. VAT.**

The IC-240 is the start of a revolution in 2 metre transceivers. It has all the advantages of the highly popular IC-22A, with its easily selected 22 Channel capability, but does it all with a phase locked synthesised system. Hence you can programme it for all 22 channels **WITHOUT HAVING TO BUY ANY CRYSTALS**. Channels are hand wired using diodes according to clearly described instructions. We supply the UK version with 15 channels already wired in, these being 10 simplex and 5 repeater. Thus there are 7 more frequencies for you to programme at your own whim—ideal for RAYNET and local net use. You can programme for any of the 80 channels at 25 kHz spacing between 144 and 146 MHz.

Duplex (for repeater use) operates by shifting the RECEIVE frequency. This means that by switching to SIMPLEX when using repeater channel you will automatically be listening on the INPUT channel of the repeater without having to wire in special "Reverse Repeater" channels.

The main advantage over other more expensive synthesised rigs is that by not having some 400 selectable channels, at 5 kHz spacing (most of which are redundant as they don't fit into the UK 25 kHz channel spacing system), you are relieved of multiple knob twiddling to change from one popular channel to another. 22 channels are ample for UK national simplex, repeater and local net channels and these are selected by one knob which is easier, quicker and safer than "trying to open a combination safe while driving."

As an optional extra, a built-in scanning system will be available which will scan all 22 channels.

The IC-240 has the same excellent FM performance as the well known and highly popular IC-22A. Consider these points which all contribute to providing optimum communication either direct or through the ever-growing number of repeaters in the UK :

- \* Low noise dual-gate mosfet in the front end of the receiver.
- \* 5-section helical filter after the front end to provide high rejection of unwanted out-of-hand signals.
- \* Dual conversion with IFs of 10.7 MHz and 455 kHz for excellent image rejection and selectivity, with filters at each IF frequency.
- \* Narrow filter giving high rejection of adjacent channel signals 25 kHz away.
- \* Hard IF limiting using an IC.
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- \* 1.5 Watts of audio from its built-in speaker giving ample volume for copy on the move.
- \* Line voltages are filtered and regulated for reduction of interference from the dynamo or alternator.
- \* A full 10W output from a sturdy PA transistor.
- \* Built-in 1750Hz tune burst for repeater use.
- \* Automatic PA protection.

The channels already programmed are :  
 SIMPLEX S0, S16, S17, S18, S19, S20, S21, S22, S23, S24  
 REPEATER R3, R4, R5, R6, R7.

Accessories supplied with the rig :

Microphone  
 Quick release mobile mounting bracket  
 Fixing screws  
 Spare Fuse  
 DC power cord



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 the evening for more details  
 of ICOM equipment.



# ICOM

## IC215 HANDY FM PORTABLE

### 15 channels 3 watts

Fitted with 7 channels (S20, S22, R3, R4, R5, R6, R7,)  
£162.00 INC. VAT

(There are still a few left with the special introductory offer of 12 channels fitted for the same price)

ICOM are pleased to introduce their first FM portable and a careful look at the features will soon show how popular it's going to be. You can use it ANYWHERE. Change vehicles, use it in the shack or take it for a walk to the local high spot and you have the high quality FM communication, for which ICOM are so famous available all the time. The batteries are larger than those of its competitors, thus giving considerably longer life. The 3 watt output and high sensitivity receiver makes it a useful main station set, where it can be operated from an external power supply and a good antenna system. Thus the IC-215 can be a good starting point for the man who has just obtained his licence and wants to get on the air without having to spend too much money.

#### LOOK AT THE MAIN FEATURES :

**Aluminium Die-cast Frame** The IC-215 chassis and main frame are integrated into an aluminium die-casting rendering it light but resistant to vibration or shock when carried.

**15 Channels** The unit incorporates 15 channels to select from : 12 by the main channel selector and a further 3 by the function switch. All crystals are plug-in-type HC-25/U and are the same as the crystals used in the popular IC-22A. Being fundamental crystals, they are tunable over a reasonably wide range and a separate trimmer is supplied for each crystal making accurate frequency adjustment possible. This is very important for optimum results with minimum interference.

**Dual Power Mode** The output power can be switched to 3W on HI for long distance work or 0.5W on LOW for short distance contacts or working a nearby repeater. Battery consumption is minimised in the LOW power mode.

**Dial Illumination** The dial can be illuminated to facilitate night operation. This is controlled by a selector switch on the front panel.

**Power Pilot Lamp** If the power voltage falls below the required value a red LED power indicator goes out as an indication that the batteries are almost exhausted or the external power is inadequate.

**External Power and Antenna Sockets** Sockets for external power and antenna are provided on the rear. The antenna socket takes a standard PL259 plug.

**Whip Antenna** A fully collapsible antenna is built into the top of the rig. This can be unscrewed and removed to provide a screw socket for a flexible helical antenna. We have had an Antenna Specialist flexible antenna specially made and tuned to suit the IC-215.

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**Meter** The meter indicates receive signal strength during reception and relative output level during transmission.

**Squelch** A sensitive squelch control is fitted rendering the set silent when no signal is being received.

**External Speaker Jack** An external jack is fitted to the front panel for a larger speaker or an earpiece. The internal speaker is muted when this is used.

**Discriminator Meter Jack** By removing a rubber grommet on the side of the transceiver a jack socket is available for connection of a 50 microamp centre-zero meter. This is very useful when tuning extra receive crystals.

**Tone Burst** A 1750Hz tone burst is fitted for opening UK repeaters.

**Shoulder Belt** A shoulder belt is supplied and is fixed to clips on the top of the rig. There is also a microphone hook. The side panels of the set itself are covered in leather simulated vinyl.

**Excellent FM Audio Tailoring and Clipping** This feature, already well known from the excellent quality produced by the IC-22A, ensures clear optimum talk power without over deviation. This makes the IC-215 a far better rig for use with repeaters and gives an optimum range, for the power used, on simplex contacts.

#### ACCESSORIES INCLUDED :

Dynamic microphone	External Speaker plug
Microphone Case	Discriminator socket plug
Shoulder strap	Earphone
Power supply plug	9 x Dry cells type C (U11)
Comprehensive English handbook	

#### OPTIONAL EXTRAS :

IC-3PS Power supply which doubles as a holder for the IC-20L linear and supplies power for both the 215 and the linear.  
IC-20L 10 watt linear amplifier  
IC-SM2 Desk type condenser microphone with built-in amplifier.  
Ni-Cad Batteries.  
Charger for charging the Ni-Cads in situ.  
Helical stub antenna.

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- All Solid State    ● Built-in AC Power Supply
- Selectable Sidebands    Excellent Performance

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## Models W-4 and WV4

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20-200 MHz  
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ADVERTISERS' INDEX

# SHORT WAVE MAGAZINE

(GB3SWM)

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Page

Amateur Electronics UK ...	131
Amateur Radio Exchange	179
Amateur Radio Shop, G4MH	186
Amcomm Services ...	186
Ashley Dukes ...	191
Baginton Electronics ...	191
B. Bamber Electronics <i>back cover</i>	
J. Birkett ...	180
C. & C. Electronics ...	187
Cambridge Kits ...	189
Catronics Ltd. ...	181
C.B. Electronics ...	178
C.E.C. ...	175
Colomor Electronics Ltd.	190
Com-Tek (Mids.) Ltd. ...	182
Crayford Electronics ...	183
Datong Electronics Ltd. ...	176
G3HSC (Rhythm Morse Courses) ...	190
G2DYM Aerials ...	190
G.W.M. Radio Ltd. ...	187
Hamgear Electronics ...	191
Ham-Spares ...	183
D. P. Hobbs Ltd. ...	189
J. Yu ...	178
K.W. Communications Ltd.	176
Lee Electronics Ltd. ...	177
Lowe Electronics <i>Front cover, inside front cover,</i>	<i>129, 130</i>
S. May Ltd. ...	191
M.H. Electronics ...	189
Microwave Modules Ltd.	174
Mosley Electronics Ltd. ...	183
Partridge Electronics Ltd.	181
P.M. Electronic Services ...	182
Radio Shack Ltd. ...	144, 146
R.T. & I. Electronics Ltd.	179
Small Advertisements ...	184-190
South Midland Communications Ltd. ...	134, 135, 136, 137
Spacemark Ltd. ...	188
S.S.B. Products ...	190
Stephens-James ...	172, 173
S.W.M. Publications <i>Inside back cover,</i>	<i>185, 190, 192</i>
Tape Talk ...	191
Technical Associates ...	184
Thanet Electronics ...	142, 143
Reg Ward & Co. Ltd. ...	188
Waters & Stanton Electronics ...	132, 133
Geoff Watts ...	191
Western Electronics (UK) Ltd. ...	140, 141
W. H. Westlake ...	191
Yaesu-Musen Co. Ltd. ...	138, 139

---

Vol. XXXV	MAY, 1977	No. 403
-----------	-----------	---------

---

CONTENTS

	<i>Page</i>
<b>Editorial—Thanks</b> ... ..	147
<b>Communication and DX News</b> , by E. P. Essery, G3KFE ... ..	148
<b>Socket Panel for the KW-2000B</b> , by R. G. Marden, G3MWF ... ..	152
<b>Aspects of Radio Communications Receivers, Part I</b> by N. H. Sedgwick, G8WV ... ..	154
<b>No Test Gear? Use your Receiver!</b> , by A. D. Taylor, G8PG/GW8PG ... ..	156
<b>Satellite Telecommand Centre at the University of Surrey</b> , by N.A.S. Fitch, G3FPK ... ..	157
<b>Mini-ZL Special for Twenty Metres</b> , by F. C. Smith, GW2DDX ... ..	158
<b>The Month with the Clubs—From Reports</b> ... ..	160
<b>VHF Bands</b> , by N. A. S. Fitch, G3FPK ... ..	164
<b>“SWL”—Listener Feature</b> ... ..	168

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Editor: PAUL ESSERY, G3KFE/G3SWM

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While operating CW you may receive with either the 2.1 KHz or the 500Hz Crystal Filter—They are front panel selectable!

The Drake TR-4CW is a product of years of transceiver experience and design improvements. The resulting performance makes it one of the finest transceivers available. Its operating handiness is not only evident in circuit design, but also in packaging. Compact and lightweight, it is ideal for mobile use, portable excursions, and vacations. USB, LSB, CW or AM operation is at your finger tips with 300 watts P.E.P. of communications power.

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*The*  
**SHORT WAVE**  
*Magazine*

EDITORIAL

***Thanks***

Since our first editorial appeared last month, we have received many letters of congratulation, plus of course the odd one requiring us to instruct the maternal grandparent in the art of sucking eggs.

In addition there appears to be an upsurge of useful articles in the pipeline: some of a higher standard, technically, for the more advanced readers and some of a more basic sort for the newcomers to the hobby. For all these things, our thanks—essentially we can only produce from what you, the readers, are game to contribute.

On an entirely different angle, it would seem likely that the deadline arrangements which have prevailed for many years will have to be modified in order that we can give the printers enough time for them to be able to guarantee that production output will be on time every month, as it has for so many years past; like so many others among us, they have to run faster just to stand still by way of ever more intensive use of their presses, if they are to stay in business. On our side we intend that SHORT WAVE MAGAZINE will, as for so many years up until our recent events overtook us, will be out on time, every time, come hell or high water.

*Ed. [unclear]*  
*W3KFE.*

# COMMUNICATION and DX NEWS

*E. P. Essery, G3KFE*

WE were, last time out, remarking on the loss of the lead-in to that old long-wire of invisible nature; we should have added that the home end of the span sits on a stub mast above the house, to which access is gained by way of the bathroom roof, which in its turn requires fishing the ladder out of the garage. Just after we posted the copy for last month, came an ominous-looking damp patch, leading to a call to the local builder to come and remove some bad timbers and re-felt the flat roof; it most certainly was not safe for climbing on until the building work was completed—but who cares, we've got a continuous loop halyard, and we can rig another long-wire complete from ground level, can't we? We could—until this time, when the halyard chose to break, and jam itself at the top of the mast! And, we could remark, it is very annoying to be told by the junior op. all about the DX he has been hearing on the LF bands on his Joystick, and gloating about the absence of QRM from the OM!

## The Bands

Up and down, but something of interest usually to be found provided one has the enthusiasm to scratch about a bit or change from a favourite band to another; and, at that, the odd CQ on an apparently "dead" band may well have proved productive. So, let's take a wander round, starting with:

## Top Band

Ten years ago, at this time of the year, we would have had to do some very severe filtering to reduce the volume of Top Band correspondence; but such is the falling-off in the activity that we have only a few mentions of the band—we would have been on ourselves but for that infernal halyard breakage . . .

The Old Firm, GM3YOR and GM3OLK will be out on business over the holiday period July 9 to July 31, of which the area July 12-29 will be, if all goes well, from Shetland Is.; gear will cover all bands from Top Band up to Seventycems, both CW and SSB, though no firm operating schedule is planned. How-

ever, they will no doubt draw the coverts adequately on all bands.

W1WY is the chap who writes the Contest Calendar for CQ Magazine, and sends us copies each month; Frank doesn't just write about contests, he plays in 'em when the chance occurs, and one of his favourites is the CQ WW 160 affair. Over there, the Saturday evening was excellent, 34 DX stations being raised in 21 countries, the best for Frank being VR3AH, with F8EX and EA8CR the other new ones. W1WY comments that he was sure many more G's could have been worked and they only followed the proper and accepted procedures in listening for calls, as W1WY had no difficulty in raising the savvy operators with a very brief call—they were in many cases S9 signals at peak. One would have thought by now, after all these years of split-frequency working on the band, that the gang would have realised the need to give an indication as to their listening frequency if they are to work DX in a contest on Top Band.

GM3CFS (East Mey, Caithness) has suffered somewhat with gales turning into storm force, throwing down the aerials and wrapping them round telephone poles. Radio-wise conditions have been up and down, but Jim did manage to latch on to ELØN/MM, off Cuba, PT2CW, VE1CD, and W2LW. The ARRL contest was a dead duck, thanks to the high noise levels.

G2HKU (Sheppey) commiserates with us on the problems of getting the direct-mail copies to readers on time, and says he doubts if anyone gets their copy before the week-end; Ted got his on Monday, but he knows of Kentish readers who didn't see theirs until a couple of days later still—as Ted says, we have got a problem, with the cost of mail getting higher and higher for less and less service. Our problem, essentially, is that once it lands in the posts, our control over it goes, and the printer of course has his certificate of posting on the due date. That is one end of the squeeze, and the reader deadline is the other—this must be as late as possible if the

news is still to be news. However, to get back to the matter of Top Band, the G2HKU SSB was heard in the speakers of PAØPN, PAØHIP, PAØSE, HBØLL, DK3BJ, HB9AUS, DJ5PN, YU2HDE/3, DL7SU and DJØYL, the latter being husband and wife. CW accounted for 4UIITU, OL8CFB, OK2BQL, OL8CGB, GM3AWF, GM3PFQ, F6DBA, OK1AVG, YU2HDE/3 and DL6SS.

## Eighty

Reminds one a little of that old saying "From ghoulies and ghosties, and long-leggitty beasties, and things that go bump in the night, good Lord defend us!"

However, there are those who like it; for example, WA2LTQ, who is now FØCGP with Trans-world and there indefinitely. David only operates Eighty and a bit of Top Band, and on Eighty after one month of operation the tally was 103 countries up on SSB, the gear being an FT101B, Alpha 77, HRO-500, and a G3LLL clipper, which last David reckons helps a lot. On the aerial side the prime radiator is a Cubical Quad, but there is also a Beverage for reception and a full-wave sloper for the USA. Jusk think about that—a Cubical Quad for Eighty!

On to G4EDG (Newton Abbot) who mentions that the last batch in from the Bureau included the last few needed for the hundred countries confirmed. Eighty showed contacts with CO2BB, DL7FH/OY, FY7AS, JTØICB, ZL1BPU, ZL4GU, 6W8FOC, all at the CW end, plus 6Y5DA and 7X2DG on SSB.

An interesting one for G2NJ (Peterborough) was DK4BP/5N/MM in La Spezia Roads—the more one looks at that call and location, the more one is surprised, a German with a 5N call, maritime mobile and sitting on the North-West coast of Italy; the mind boggles! On a different tack, a QSO with G3KLX in Eastbourne had to be terminated so that Doug could go and have his weekly chat with a blind and deaf old lady of 87. Winnie Powley had an eye operation some five years ago which went wrong somewhere along the line and left her blind; then shortly

afterwards she became suddenly totally deaf. However, she was, and is, a fine telegraphist, and she has a buzzer, the vibrations of which she copies through the sense of touch; G3KLX tapes a couple of stories for her each week, and she puts them through her recorder when she wants to read. She must be our oldest YL Tel.—and good luck to her from us all; to start taking it in a new manner, and to store it instead of writing it down like that, when one is in the eighties is a *real* achievement.

Usually for him, G3CED/G3VFA made the odd contact on SSB; however, they were not on Eighty, and so will be mentioned elsewhere. Meantime, we simply note that Eighty seems to have upset George in some way, as he has only used it occasionally for tests and contacts with G4EVO.

G4EVO, like G3CED is a Broadstairs man; and like G3CED, G4EVO seems to have felt the attractions of the HF bands with improved conditions. On Eighty, there were quite a few contacts, mainly with G's, but a few into Europe.

G3PKS (Wells) found conditions on the band good early on March 20; around 0700 clock Jack was calling a pal in London, and despite signing KN was called by a horde of W's in the contest. While waiting, he worked K2TQC and W1RR—but, had he known his London contact had forgotten to put his clock on, he might have had some fun.

GM3CFS stuck to CW on the lower bands, and on Eighty his RF penetrated to W6OFR, WA0UCU (Minnesota), and WA7WXY (Idaho).

On a different tack, it is interesting to notice how one writer will often answer another's question—in this case it was G3VFA, doubting his SSB contact with 7P8BE, and F0CGP who provided the verification by working him on another band.

### Forty

Not always good, but usually usable at civilised hours for the odd interesting contact; and of course you can have the pleasure (?) of listening to Radio Tirana blethering on in English in between bouts of weakening up the transmitter to give

maximum output at mid-band, right on top of him; the writer is firmly convinced that if *everyone* made a practice of *always* doing their tuning-up on intruders, some of them at least would get tired and go away! Incidentally, while G3KFE was indulging in the re-organisation of the station which provoked that last comment, he divided his time listening to Tirana between the KW77 receiver and the receive side of the TS-520, which made an interesting comparison of a valve and a solid-state receiver under similar band conditions, flipping from one receiver to t'other and back again.

G2HKU always seems to have a look at the band, and this time his CW seems to have penetrated to UI8CQ, and VP2MAQ.

In a similar way, GM3CFS seems to have ripped off a couple of CW contacts in passing from below to above, his selection being CX3AL, PY1NEW and UA9SEC.

G2HLU on the BERU trail—his only operating 'in anger' as he describes it—saw a visit to Forty where he collected a few VK and ZL contacts but not a lot elsewhere.

Although he, like most reporters, didn't do a lot on the band, G3PKS notes a propagational oddity around 1115 GMT on March 20; he had called CQ and been answered by a W1; Jack was still pondering this, wondering whether he had a pirate, when HB9BIO at S9 plus umpteen popped up on the frequency, together with K4, a W8ZCQ, K0CMF, and others of like ilk. After two minutes there was a silence, and then a reversion to the usual Europeans and stuff for the time of day. Most odd—especially the moment of silence.

Not only did G4EVO make a few contacts on Forty, he made some on Phone too! The run-of-the-mill stuff was largely European, but the Phone working seems largely to have been a net activity, with the call EI2CC prominent, and the Argonaut pumping some five watts input peak, or about a couple of watts of output, say, into the Joystick; and the advantages of a salt-water take-off were to be noted here too, the signals going out less well to the west than Eastwards.

Now to G4EDG, who found the conditions better than he would

have expected, and his log reflects this; however, Steve has not yet completed his "proper" 7 MHz vertical, and thus has to rely on the present device which he describes as a "bit of a bodge." Be that as it may, the log shows—presumably CW—with KZ5FR, JA1PIG/PZ, K9KDI/6Y5, VP2DD, VP2MAQ, VP8ON, WB5QXI in Oklahoma, WB5NMA in New Mexico, W6PT, W6BAC, W7DAZ, W7IGE in Idaho, W7LR in Montana, W7AO in Arizona, W7DNU, WA7VOS, VE7IG, VE7TT, VU2GW, VP9HO, YS1ESH, YV3AGT, XE1ZV, ZD8TM, ZL3PT, 6W8FOC, 8R1J, and 9D5A.

### Here and There

Perhaps our first stop should be with G3CED/G3VFA, of Joystick fame—it seems that the February issue of his usual advertisement in the pages of this journal managed to turn his 0.5 to 30 MHz claim into 0.5 to 30,000 MHz!—had that claim been true then we are quite sure G3CED would be sitting right on top of the world, with his pile made years ago! But seriously, even though such an error can happen and occasionally gets through the screening of any printed page, it seems that there are always the characters about who will write rude letters about it to the advertiser concerned, or—we hope jocularly—bring the subject up in conversation or on the air in a QSO. One would have felt that the prime thought would have been to be thankful they hadn't had it happen to themselves, rather than spend time plastering egg all over the face of the unlucky one!

That 9D5A call was to mark the 50th year of the Pahlavi Dynasty in Iran, and made some 12,000 contacts before they closed down—the QSL address is to WA6AHF, says W1WY.

This year the SEANET Convention is being held in Bangkok, and the Thai national society is doing the organising of the SEANET contest which is run to publicise the Convention each year. The CW leg comes up on the weekend of July 9-10, 48 hours midnight to midnight GMT, while the Phone session will be on August 20 and 21 similarly. All bands from 1.8 to 30 MHz, and the classes are single-band, single-operator, multi-band single opera-

or, and the multi-multi for the clubs and contest groups. The call will be, on CW, CQ SEA, and for the Phone end, CQ SEATEST; and the exchange is to be the usual five or six-digit effort with the serial number beginning at 001. Scores are a bit complex, and perhaps the best way of making sure you get the correct information would be to drop a line to the SEANET Contest Committee, c/o Ismail Razak, "Eshee," 9M2FK, 281-C Jan Pekeliling, Bukit Glugor, Penang, Malaysia for the Rules—an SAE or IRC's would be courteous. This is also the address for the logs, which should arrive by October 31.

On the question of DX-peditions, we notice in the letter from F0CGP that, apart from his normal activity, David has his eyes on various rare spots; he already holds licences for C31 and 3A0, and is on the trail for a licence to operate from 3V8, although this one is not going to be an easy nut to crack at all.

At the time of writing it would rather seem as though the Manihiki expedition came unstuck, largely for want of those valuable man-hours on the spot; however, it is also understood that another try is possible in July, of which more anon.

That S8AAA is still around, and the story we hear is that he and S8AAF would be the second active Trankei station, all the rest being phoneys.

All the bad news, that's what we have this month! At the time of writing it was on the cards that the Cocos Is. DX-pedition should have been in full cry has so far only been heard on one day; and, were that not enough, we also have it that the St. Brandon show has slipped a bit, although even then it may have come and gone by the time this hits your doormat.

### Twenty

Quite a formidable crop of letters on 14 MHz doings. GM3CFS used CW to contact JA8BVT, WA6WXB/KL7, P29MO, VK2FT, VK20Z, UA0OS, UA0AAA, UA0RA and ZL4NH. The SSB log showed JA0AE, JH3FCR, K9PNT/DU2, UAOSAU, VK3AH, YV2AAM, 7XOBI, and UJ8JGJ.

Next G2HKU, who shows SSB with ZL1VN, ZL3SE, UF6VAG, ZL3RS, ISOIGV (Ischia, Bay of Naples), IK0ISD, JR1KRC and

7X4MD; the CW yielded VE4OY and ZL1VN.

We have two letters from G3RCA (Wigan); in the earlier letter Tom mentions that his friend 5N2ESH is not having his licence renewed, this apparently being a hang-over from the Civil War powers. We have since heard it from other quarters that the 5N2's are off the air—yet another African country with so little stability that it is afraid of an amateur radio station. On the question of the G3RCA score, we see from the first letter SSB to FK8AH, FK8CD, HM0U, KG6JBE, W7's, VP8HZ, 4S7SW, 5B4DJ, TU2FO, FL8BF. 9J2PH, 9G1PL, 5T5DY, FC6EFJ, KG6RI, AP5HQ, EP2GJ, VU2JB, FR7ZL/T, W6QL/VP2A, C5AR, C5AU, P29KE, D2ASW, FL8FF, 3B8AR, FR7AD, CN8MB, 3B8DA, CX's, 9J2GF, 7X2's, FL8NR, FR7AO/M, FR7ZK, FC2CV, FK8CO, EA9FL, 5N2WBF, WA3PCC in Delaware, OD5IM, C31BT, KH6OR, KL7IIP, KL7GEY, 7X0BI, EA9EA (Melilla), FY7AN, FY7AS, KG6RT, VP8JC, CE3IU, 9L1NP, HM1IJ, ZL's, VK's and JA's assorted. Over the second month, there were even more, including such as FM7AV, OZ3DX/SU, TR8CM, VE3FXT/S8, VE3FXT/3D6, KC4AAA, C6ADY, HK0BMO, PJ8CO, VS6FN, XE1OL, HK0BKX, DU1NRS, 8R1J, FK8BY, 9G1KP, UG6GAS, VP2MAQ, FG7AR/FS7, JT1KAA, VR4DH, KZ5CA, FR7BI, FL8PF, D6AC, OA4US, TG8NE, HK0TU, VP2LCT, VP2AYL, VP2KT, 3B8DA, OX3RA, KL7's a plenty, D4CBC, 8R1X, VK4AAU/LH on Lord Howe Is., HM1KC, VS5MS, P29JS, KM6FC, KX6BU, FR7BM, 9K2BE, CR3AGD, JY9HQ, FG7AE, 7X2SA, HP1SI, YS1AJE, AP2AL, CE1BMH, TI2VVR, ZP0TE, KP4EAS, OA4AO, JW2CF, JA's, A4XGX, FP8ZZ, UH8HAI, ZF1MA, VK, ZL, 3A0FY/M, 5B4EC, VP9IL, HI8CRP, TF3IM, TU2BB, PJ2FR, 7X4MD and 6W8BR.

It rather seems as though the previous month's letter from GW4BLE (Newport) must have gone astray; however, for the current month he reports reduced activity thanks to the chore of writing-up his log for the ARRL DX Phone Contest in which Stephen made nearly 3000 contacts—more than

double the total for the 1976 contest. On Twenty, then, the little time has been spent on chats over the Pond, a few VE4 and VE5 contacts, CR3AGD, and, while he was waiting for TI9AEL to pop up from Cocos, writing his letter to us.

Twenty for G3CED/G3VFA was not, on the face of it, as DX-effective as Fifteen, of which more anon; apart from the Europeans, the only penetration on this band was to UA9CES on CW around 1300z. Another user of QRP and a Joystick is G4EVO, who had a mite more success on Twenty, with UK9ADY and the odd W to show for a couple of watts of RF input.

G3PKS is most definitely not enamoured of 14 MHz, and reports just three European QSO's; but he promises one day to dig down and see what really lies beneath those layers of Europeans!

### 21 MHz

For many people the favourite, combining the best features of 14 and 28 MHz. Ex-G2XC found several ten-metre openings, of which more anon. On 21 MHz it followed that things should be pretty fair, and so it turned out to be. FG7AM, FR7ZL/T, HK0BKX, KA6YL, KC4AAC, KG4SC, PJ3IDP, VE3FXT/S8, VP8PL (South Orkneys), VS5MC, all noted until the morning of March 30, when things were well down; 9M2DQ on his regular morning sked was all but inaudible, and VU2BK, 4Z4DX, FG7AM, and OD5AP were all better on the North-South array than on the East-West one, and almost as strong on the long-wire. Conditions remained pretty average flat through the early evening until around 2130z when a few CW W4's were noted.

G4BHE (Basingstoke) has a HW100, into a two-element Yagi on Twenty and three-element on 21 and 28 MHz. On a philosophical note, G4BHE comments that he can't do gardening in the dark, which is one of the advantages of winter—don't be so sure, the writer once had a neighbour who, if the mood took him, would hang up a long lead and a 100-watt bulb and work merrily until long past midnight! On 21 MHz, Barry had SSB contacts with JA's, WA00NL for S. Dakota, WA0LLQ in Nebraska,

ZS6BNH, and 7P8BE; on the other hand two Gotaways were rather annoying, in VU2DK and 9N1MM. Everyone wants 9N1MM, but in four years of trying Barry has never made it to VU even though he is up to nearly 200 countries.

GM3CFS says he prefers CW contesting to the SSB sort, as the hours of sideband splatter in the ears can't be filtered out and are so tiring, whereas on CW one can cut away almost all the mess, leaving just the wanted signal—if he is stable enough! Be all this as it may, Jim used SSB to work A6XT, FR7ZL/T, LU1BR, LU4ECO, PY5EG, UF6DZ, VK2XT, and 5B4ES.

It is quite unusual for G2HKU to appear on 21 MHz, but this last month was an exception, Ted being able to make SSB contacts to VK8NDK, and 5B4ES.

Most of the interesting stuff for GW4BLE was on Fifteen, and it included CR3AGD, FG7AS, FR7BI, FR7ZL/T, KP4CI, KZ5FR, TU2GG, VP2MAQ, VP5EE, OA4AX, PY1RO, 3B8BJ, 4J6A, 7P8BC, ZS2, ZS3, ZS4, ZS6 and all the W call areas.

We have already remarked that the G3CED prizes were largely on 21 MHz; he worked CW to 7P8BE, W8GZX, and UO50WS, plus the usual crop of Europeans, using an input of two watts and his Joystick. Nearby is G4EVO, who found UK6AAE, W4IFE, WB8DLL, was called by WB8BYW, and raised W3TV and WA3NNA all in about eight log entries, W1BFA some days later; and a rather nice idea in his log in which he notes the days when there was no operating, and the reason for the non-operation. Just think, when the XYL starts the run-up to the old paint-pots routine, in which she says you are never away from the rig blah, blah, you can open the log and point out all the entries when she nagged you into this that or the other task which has been conveniently "forgotten"! There can be no doubt about it, G4EVO deserves a medal from the League of Hen-pecked husbands for this scheme!

The 21 MHz pickings for G4EDG included such nice ones as PJ8CO, W7's JA's, VE7DAC, P29JS, VE8NDK who was on 30 watts, KZ5FR, UJ8, UM8, S79DF(?),

A9XBC, 9J2BO, FG7XA, VP2MAQ, 8R1VC, HM2IR, CP6EL, and DU1DL.

G3PKS used the band for most of his activity this time, but comments that there is nothing extraordinary in the list. On the Saturday afternoon of March 19 there were some forty assorted W/K (and N) stations worked in a couple of hours—all but W5 or W6 areas. The band appeared to be in quite good shape and stayed that way on into the evening to some extent, although the noise level was up somewhat and it took another 55 minutes to bring the tally of contest QSO's up from forty to fifty. Otherwise, there have been several openings to be caught, which gave G3PKS LZ1CY/MM twice when the MM was near ZS3, ZC4IO, EP2CR, A9XBC, PT7WA, YV5SJ twice, 4Z4NUT, PY3CGJ, ZP5NW, A9XS, assorted W's, PY4BFR, VU2GO, 4Z4UW and a Gotaway in the shape of VP8PL heard weakly working lots of W's and believed to be asking for QSL's by way of G3LIK.

G2HLU played in the ARRL CW test both weekends and made lots of contacts, but found it not quite so good for the second weekend although he did manage to raise W7JYW for Montana. The second phone test weekend was also good on this band, with WA7WXY and K7NN, respectively Idaho and Arizona.

#### Oddments

Many will already know of the fire that destroyed most of the village at Het Dorp near Arnhem, centre for the handicapped and also the Central Bureau for VERON; the latter have lost their printing gear and some of their subscription records, but PAØTO and PAØBN are trying to get things back upright again. Meantime, if you are not receiving DXpress or VHF Bulletin, now you know why.

#### Ten Metres

Showed signs of life at various odd times through the weeks. G2ADZ wrote a long letter which somehow didn't quite reach your scribe in time; so he wrote early this time to make sure all the information reached here in good time. He picked out eleven openings of significance in February and fifteen more in March. The February

activity was largely concentrated into eight days, February 12-20, and likewise March 12-20. Looking at it in more detail, we notice that there were several occasions when DX was about but no beacon signals, and also *vice-versa*; Looking at it closely, we see Europeans, Africans, Asians, Oceania, South America, and a hint of the North Americans—G2ADZ trying to raise EL2T who was busily peeling off the W's who were inaudible to G2ADZ!

On April 3, GW4BLE picked out a rather nice opening, with ZS2OM, ZS6ACW, ZS6CS and ZS6FU all booked in between 1400 and 1430z.

Ex-G2XC also looked at Ten, and found some events of interest. Leaving out of account the beacon signals, 9K2DR and 9J2BO both seem to have been about, the former being heard to say he had managed a WAC in a couple of hours on March 27. March 19 showed VP8AI, EA8BK and several LU's, while on 26th CX1BB1 was heard.

G4BHE reckons his tally of countries for this year is only six on 28 MHz, as compared with a total of 75 worked on the band in 1976; as he is aiming at the 100 countries in 1977, we reckon Barry'll have to stir his stumps a bit!

A final thought comes from G4EDG on his activities for the month, by way of a look at Ten, where his two QSO's were with VK9XN and OD5LX!

It does seem as though our continuous campaign to get more use of the 28 MHz band is bearing fruit, as quite a number of local nets have moved there; one of these is the Wessex group, who are on from 0930 to 1100z around 28-575 MHz, and G4EMN assures us they would be pleased to let in *anyone* who is able to work them, this of course includes any DX. One seems to recall a Hertfordshire group several years ago who regularly were joined on their local net by stations on the other side of the Atlantic.

#### Finale

For next month, it looks like May 6, latest, addressed to your scribe, CDXN, SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts., AL6 9EQ. After the June issue, we may have to modify our routines somewhat, of which more anon. Meantime, Good Hunting.

# SOCKET PANEL FOR THE KW-2000B

R. G. MARDEN, G3MWF

ONE minor disadvantage of the KW-2000B transceiver is the fact that the extension speaker output, control of external equipment, external T/R switch and keying input are all connected to the transceiver via an international octal (I.O.) plug. This means that all the leads for these accessories have always to be "tied" together and so therefore do the accessories. It would of course be possible to fit the appropriate sockets to a small box with the four leads terminated at an I.O. plug but in the writer's opinion little boxes attached to leads are difficult to keep tidy.

At G3MWF the inconvenience has been overcome by making up a socket panel and this is fixed under the KW remote VFO, Type 4B. If the VFO is not available then the arrangements to be discussed could be incorporated under the power pack.

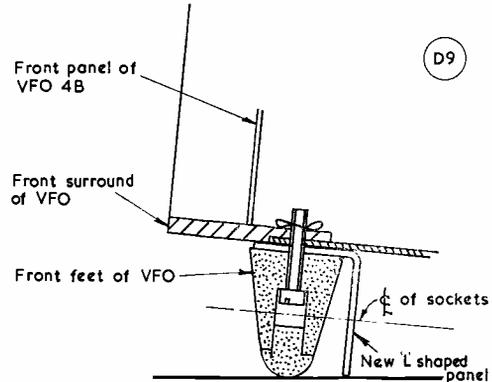


Fig. 2 METHOD OF FIXING TO VFO

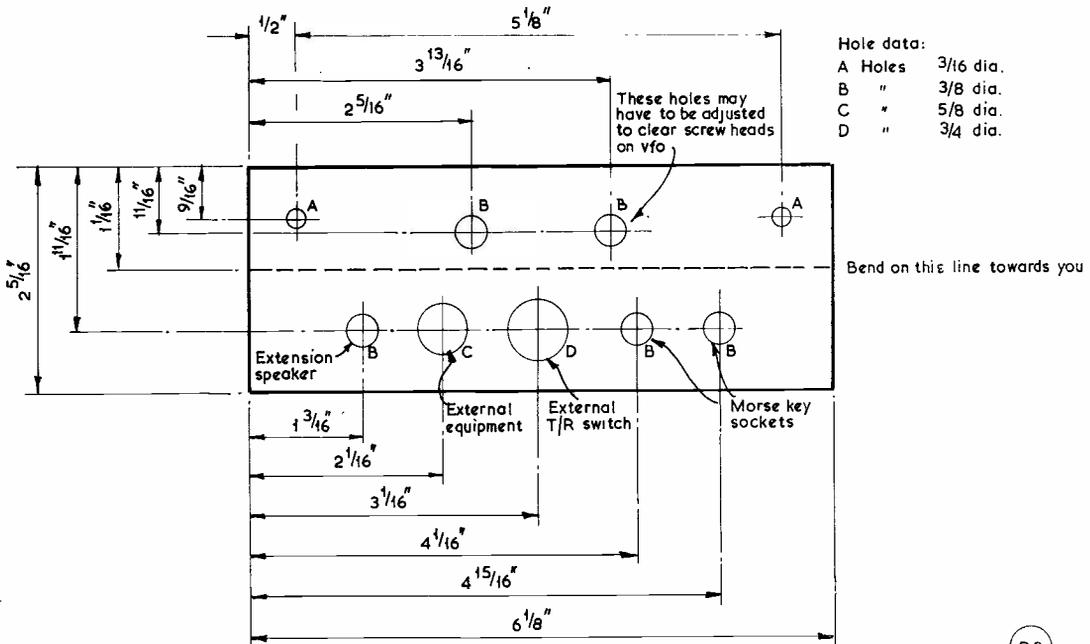


Fig. 1 PUNCHING AND BENDING DETAILS

D8

All that is necessary is to punch, drill and bend a piece of duralumin in the manner illustrated in Fig. 1. Fit all the sockets and wire them up, terminating the other ends of the leads to an I.O. plug. With the VFO right next to the 2000B, 24in. leads are ample. The sockets, from left to right, are an 0.25in. diameter jack for speaker, a pin and spade audio socket for external equipment, a Bulgin miniature three pin socket for external T/R and the remaining two 0.25in. diameter jacks (wired in parallel) are for different Morse keys, one a squeeze keyer and the other straight. Naturally if other sockets are used to suit individual taste the holes and spacing may have to be changed.

The front feet should now be removed from the VFO and the "L" shaped panel complete with its sockets should be fitted to the underside of the VFO, using the VFO feet and their screws to hold it in place. Fig. 2 should make the method of fixing clear. The circuit diagrams, Fig. 3, indicated the I.O. numbering employed on the KW-2000B.

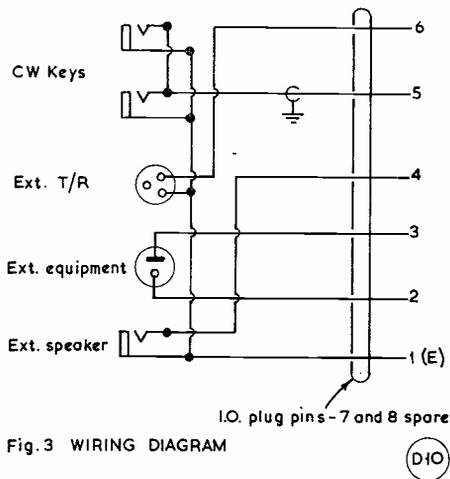
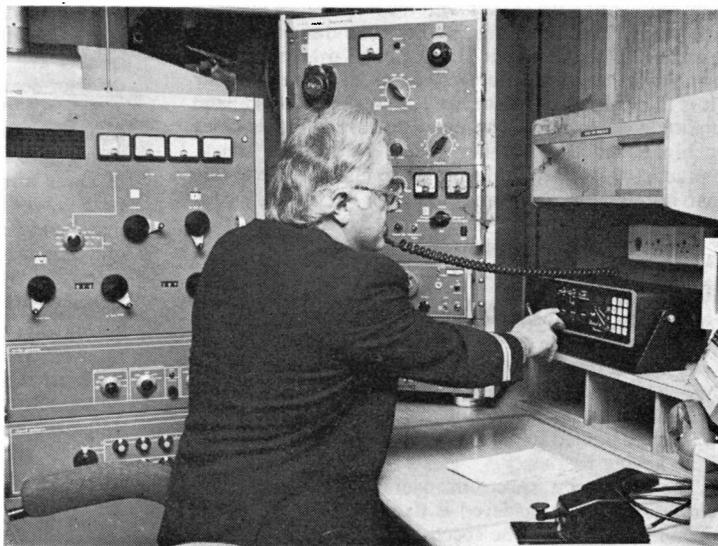


Fig.3 WIRING DIAGRAM

The radio station of one of the two largest salvage tugs in the world: the equipment in these tugs (S.A. Wolraad Woltemade and S.A. John Ross of the South African Marine Corporation Ltd.) is provided by Redifon Telecommunications Ltd. and consists of an RMT-1500S marine synthesised SSB transmitter covering all MF, IF and HF marine bands between 400 kHz and 26 MHz; reserve Tx is the G474. Main receivers are the R551 and R554 SSB/DSB gear, with unbroken coverage from 15 kHz to 30 MHz. Also fitted is an Omega Navigator receiver which gives continuous indications of position world-wide to within 1-2 nautical miles; radiotelephones are the Sealand 30, Sealand 66, and GR477 IF/HF with 400 watts p.e.p. on SSB.



### 1977 MOBILE RALLY SEASON—Update

This list is in addition to the information published in the March issue. **May 21**, BARTG Convention, Village Hall, Meopham, Kent, lectures by G3PLX and G5BX, trade stands, bring-and-buy stall, members and non-members all welcome. **May 22**, Northern Mobile Rally, The Victoria Park Hall, Keighley, talks-in on 2m. SSB 144.25, 2m. FM S22, 70 cm. FM 433.20, trade stands etc. **May 29**, East Suffolk Wireless Revival, Civil Service Sports Ground, Bucklesham, Ipswich (near Suffolk Show Ground), VHF/UHF antenna gain measurement competition and beam test facility, static 2m. DF hunt, SSTV and RTTY demonstrations, 2m. talk-in using GB3PO (R3), S22, SU8, 144.28 SSB, 70.26 AM, trade stands etc. **June 5**, Maidstone YMCA ARS, "Y" Sportscentre, talks-in on 160m. (G3TRF), 80m.

(G4DUT), 2m. (G3YSC). **June 12**, Elvaston Castle Rally, near Derby, information from G4CTZ, QTHR. **June 12**, Longleat Radio Rally, Longleat House, Longleat, Warminster, Wilts. **June 19**, Royal Naval ARS, HMS *Mercury* (situated between Clanfield and East Meon, Hants.). **August 14**, Derby Mobile Rally, Lower Bemrose School, Derby. **September 18**, Peterborough Mobile Rally, Walton Secondary School, Mountsteven Avenue, Peterborough, talk-in station G3DQW on 2m. **June 25**, Exhibition Station G3NQX/A, Kendal Grammar School Fete, Kendal, Cumbria, 10-160m. SSB.

### CORRECTION

In the article on "Lecher Lines" in the April issue, the formula at the top of the second column on page 96 should be 15,000/cm. = MHz.

# ASPECTS OF RADIO COMMUNICATIONS RECEIVERS

## Part I

N. H. SEDGWICK, G8WV

**M**OST readers will know the block diagram of the simple superheterodyne receiver and will be able to explain the elementary function of each stage. This information is available in so many books that it is not proposed to deal with it in this article, but this elementary knowledge is necessary to the understanding of what follows, and readers should be confident of possessing such knowledge before reading further.

### Concept of Selectivity

A receiver must be capable of detecting and amplifying power received on the aerial over the bandwidth of the wanted signal. It is axiomatic that any radio transmission used to convey message intelligence in any form will do so by modulating the carrier with the intelligence by some method or other, and this implies that there will be a spreading of the resultant signal power over a band of frequencies, to which the receiver must respond evenly if it is to introduce no distortion. Using double-sideband amplitude modulation, the bandwidth required is twice the highest audio frequency of the modulation signal. In practice this generally has to be modified to accepting what is tolerable, *i.e.* some of the power in the upper audio frequency range is lost or reduced but the reduction of intelligibility is negligible.

Radio telegraphy signals are generally modulated with square-wave marks and spaces. Theoretically a square-wave contains frequencies up to infinity, but in practice a bandwidth that will pass up to the fifth harmonic of the keying frequency is easily adequate to maintain the wave-shape good enough for the purpose of conveying the intelligence, and it is not uncommon for the bandwidth to be limited to pass only up to the third harmonic of the keying frequency.

The frequency spectrum over which radio communication can be achieved is fixed by God or nature. Different portions of the spectrum behave differently in propagation characteristics. From the above it will be seen that the bandwidth required by a station for conveying intelligence is fixed by the nature of the intelligence, and has nothing to do with the radio frequency used. The MF band used for broadcasting stretches from 525 to 1605 kHz, a spectrum of 1070 kHz. The HF band commonly used for communications runs from about 2000 kHz to 27,000 kHz, a spectrum of 25,000 kHz, but seasonally and by night the upper frequency which will propagate is greatly reduced and all the stations on the air crowd into the lower part of the spectrum, which is considerably less than half of the total in terms of kHz.

We are thus faced with the fact that the frequency spectrum available is fixed by God or nature, but the number of stations trying to use it is fixed by man, and the international disciplines which seek to control his behaviour in this respect seem to be fairly unsuccessful. The individual communicator may lodge his protests

at the way he is treated by his competitors, but in the long term his success in communications will depend on the equipment he uses and how he sets it up to meet the conditions prevailing. He must set a good example by ensuring that his transmitters radiate power only in the minimum bandwidth required for his purpose, and he must reject power radiated by other transmitters by adjusting his receiver bandwidth to the minimum required for the signal he is receiving. If he uses a selectivity setting of 3 kHz bandwidth to receive a signal requiring only 0.5 kHz in which to convey its intelligence, he is putting up the risk of message mutilation by interference (QRM) by five to one. In the early days of motoring it was a fairly safe bet to take a blind bend on the wrong side of the road. One was indeed unlucky if one met another car coming. Nowadays such an action is almost certain death, and so with HF communications. Thirty years ago one could use quite a wide channel bandwidth with reasonable hope of immunity from interference. Nowadays, if there is a hole in the spectrum which will propagate somebody is sure to get into it!

Another reason for limiting receiver bandwidth to a minimum is often made much of. Noise from all sorts of sources is distributed right across the spectrum. The smaller the aperture in the spectrum that the receiver detector sees, the smaller the amount of noise power it will detect. Whilst this is quite true, we know by experience that when the signal drops so low that it is competing with wide-band noise, it has in the great majority of cases already been mutilated by QRM. However, both noise and QRM problems come to the same answer that bandwidth should be limited to the minimum required to receive the intelligence, and so the emphasis placed on one or other aspect is rather academic as far as selectivity is concerned.

Having decided we must have selectivity in our receivers accurately adjusted to the bandwidth required, we must next consider the shape of the selectivity response. Selectivity is generally specified in terms of Hz difference between the half-power points. If one couples a signal generator into a tuned circuit and tunes the generator across the circuit bandwidth whilst measuring the voltage across the circuit, a peak amplitude will be found at exact resonance. If the generator is then detuned either side of resonance and the frequencies  $f_1$  and  $f_2$  at which the voltage falls to 0.707 of its peak noted, then the difference in Hz between  $f_1$  and  $f_2$  represents the selectivity figure of the circuit, since half power is 0.707 of the voltage, or 3dB down. The same will apply to a number of tuned circuits in cascade, and thus to a complete receiver.

Consider Figure 1. This shows a typical selectivity response curve for a given Q. The first thing one notes is that the selectivity figure for the circuit tuned to 100 kHz is 4 kHz, but if the circuit is tuned to 200 kHz the figure becomes 8 kHz, and at 2000 kHz it becomes 80 kHz, provided Q remains constant. Thus, whilst the shape remains proportionately identical, the selectivity in terms of bandwidth (which is what we are interested in) is degraded in exact proportion to the increase in  $f_0$ .

This brings us to the major objection to the "Straight" or TRF receiver, which is simply a receiver where all circuits are tuned to the incoming signal frequency. As

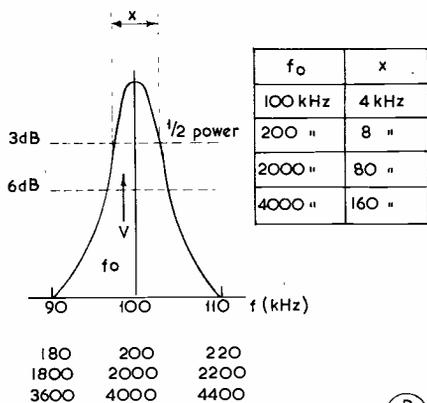


Fig. 1

D 43

one tunes the receiver up in frequency the selectivity becomes worse and we cannot control it to the minimum bandwidth required for the signal. A receiver designed to receive only one frequency in the MF or LF bands could well be a "straight" set, but if we wish to tune over a band of frequencies we are in trouble. There is therefore a case for changing all signal frequencies received to one specific frequency which we can deal with properly, and this leads to the superheterodyne principle.

Look at Figure 2. This represents the ideal selectivity response shape for receiving a signal having a bandwidth requirement of 4 kHz. All frequencies within the bandwidth pass through the receiver without attenuation, because the response shape top is flat. All frequencies outside the bandwidth are attenuated to nothing because the response shape sides are completely vertical. We can do no better. Compare this with Figure 1. Any modulation frequency component 2 kHz removed from  $f_0$  will be attenuated by 3 dB. In fact, any frequency not exactly  $f_0$  will be attenuated in some degree, and a receiver using such selectivity shape will inevitably introduce amplitude distortion of the signal at its output. Consider also an

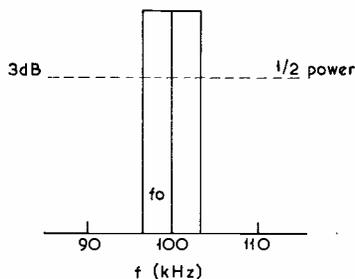


Fig. 2

D 44

adjacent signal 3 kHz removed from  $f_0$  and thus out of band. If this signal strength is the same as our wanted signal it will pass through to the receiver output with only 6 dB attenuation, and thus cause interference. Note that both tuned circuits have the same selectivity figure, and it becomes apparent that this figure is not, in itself, adequate to judge a receiver performance in respect of both linearity of frequency response and protection against adjacent signal interference.

It is not possible to produce a selectivity shape as shown in Figure 2 because of practical limitations, but a good approximation can be made by use of band-pass couplings, producing a shape on the style of Figure 3. This is a big improvement on Figure 1 in both respects. A band-pass coupling in its simplest form consists of two tuned circuits critically coupled together to produce the shape shown. This is fairly simple to achieve for one frequency  $f_0$ , but if one attempted to tune it over a wide frequency range it would be impossible to hold the critical coupling correct over the range. It would also require two variable capacitors per circuit instead of the usual one. This is another reason for the superheterodyne principle of changing all signal frequencies to one intermediate frequency. We can for special purposes insert a very high quality crystal band-pass filter having excellent shape characteristics in the IF chain, and so improve things still further.

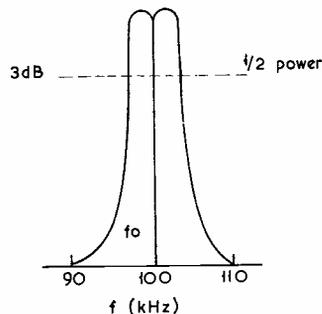


Fig. 3

D 45

Another advantage of the superhet., often given prior place by examination candidates, is that in a cascaded amplifier such as a receiver, it is easier to prevent self oscillation if the input and output frequencies are different. This is quite true, but it is a "by-product" advantage at best. Amplifiers can be made stable by proper design and layout, and the superhet would not have developed into practically the only possible type of communications receiver if it had not been for the two reasons previously stated.

(to be continued)

## NO TEST GEAR? USE YOUR RECEIVER!

A. D. TAYLOR, G8PG/GW8PG

THE grid dip oscillator (GDO) and L-C bridge are useful and versatile instruments, but not all amateurs have access to them. Also, those of us who do have access to these instruments have had the experience of operating from a remote site and finding that just when we needed it most our test equipment was sitting in the shack miles away. This article shows how by applying first principles the writer overcame such a crisis with the aid of a general coverage receiver.

### Finding The Resonant Frequency

Fig. 1 shows our old friend the absorption wavemeter. If the coil L is coupled to an RF source and tuned to the source frequency by means of capacitor C, the rectified current flowing through the meter produces a reading when the frequency the wavemeter is tuned to is the same as the source frequency. The wavemeter can thus be calibrated to provide an approximate indication of frequency (in the order of  $\pm 100$  kHz if loosely coupled). As the deflection on the meter increases with the amount of RF induced into the coil, the device can also be used as a radiation meter by placing the coil close to the aerial and tuning up for maximum indication on the meter. Before using the device, particularly in the absorption wavemeter role, it must be calibrated, however. The conventional way of doing this is with a GDO, but how does one go about it if no GDO is available? Provided that one has a calibrated general coverage receiver available, the answer is surprisingly easy. The coil and capacitor in the wavemeter form a parallel tuned circuit, which is of course a rejector circuit. If such a circuit is connected in series with the receiver aerial (Fig. 2a) it will reject signals at the frequency to which it is tuned, thus providing a means of calibration. Suppose that we wish to calibrate the wavemeter at 7 MHz. Tune in a steady 7 MHz signal on the receiver, then disconnect the aerial. Temporarily connect the aerial to point X on Fig. 1, then connect point Y to the aerial terminal *via* a few inches of wire. Adjust C1 until a point is found where the signal strength decreases sharply, then tune carefully for minimum signal. The wavemeter is now tuned to the same frequency as the incoming signal. The procedure is then repeated at other frequencies until adequate calibration has been obtained. The same procedure can be used to check parallel tuned circuits destined for use in transmitter tank circuits and aerial tuning units. In these instances it must be remembered that additional stray capacitance will be introduced when the components are installed in the equipment, so if necessary the number of turns on the coil should be adjusted until the circuit resonates with the capacitor vanes in their mid position. The same method may also be used for adjusting series tuned circuits such as harmonic traps. In this instance the circuit under test is connected between the aerial and earth terminals of the receiver as shown in Fig. 2b. Other than the difference in the connections the procedure is the same as for the parallel tuned circuit.

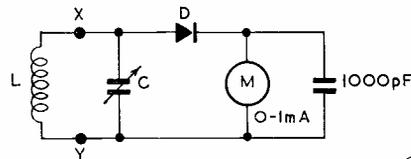


Fig. 1 Wavemeter

(D 39)

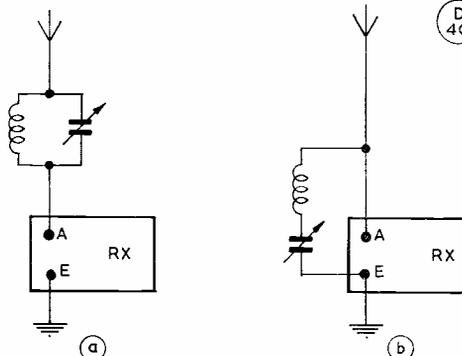


Fig. 2 Connections to Receiver

(D 40)

So far we have seen how a general coverage receiver can be used to perform several useful functions normally achieved with the aid of a GDO. Surprisingly, for one never sees it mentioned in text books, the receiver can also perform some of the functions of an L-C bridge.

### Capacitance Measurement

Apart from the receiver, the main tool here is a 10 turn coil wound on a  $1\frac{1}{4}$  inch former (wire size not critical) and some fixed capacitors. The coil is connected in series with the receiver aerial as in Fig. 2a, and a range of fixed capacitors with values from 15 pF to 1000 pF are connected in parallel with it in turn. In each instance the resonant frequency of the combination is determined with the aid of the receiver, and this frequency and the value of the capacitor in use are noted. A graph of frequency against capacitance is then constructed (similar to a frequency/tuning dial reading calibration graph). Once the graph is available the capacitance of unmarked capacitors in the 15-1000 pF range can be measured by connecting them in parallel with the coil, determining the resonant frequency and reading off the capacitance required to resonate at this frequency from the graph. A rather similar method can be used for finding the inductance of coils which will tune within the frequency range of the receiver. If the unknown coil is connected in series with the aerial with a 100 pF capacitor in parallel with it, the resonant frequency can be found. The inductance of the coil in milli-Henrys can then be calculated by means of the formula

$$25,330$$

$$F^2 \times 100$$

where F is expressed in MHz and the 100 represents the 100 pF capacitor. This method may not be as accurate as a good bridge, but it will serve for most amateur purposes.

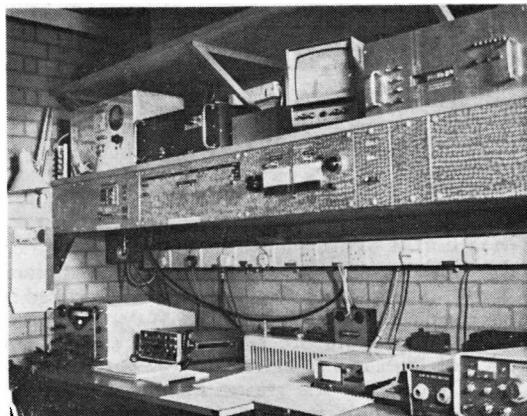
## SATELLITE TELECOMMAND CENTRE AT THE UNIVERSITY OF SURREY

N. A. S. FITCH, G3FPK

READERS who attended the series of lectures given by the AMSAT-UK team at last year's VHF Convention at Brunel University may recall seeing the partially completed command transmitter. This was shown during a lecture by G8IEF describing the British Telecommand Station situated in the University of Surrey at Guildford.

In its present form the station commenced operating last summer and has been used primarily to command *Oscar 6* whenever the satellite is in range of the U.K. The command transmitter operates in the two metre band around 144.78 MHz and was the subject of much speculation when it first appeared last September. Since then, the bandwidth has been reduced considerably and command is very positive.

Figure 1 shows part of the Telecommand Centre. From left to right, the items comprise—on the top shelf; the command PA unit, the closed circuit TV monitor looking at the dish aerial, the Autocommand tape input from the main computer and the full, back-up autocommand unit. On the middle shelf there is the command selection keyboard and autocommand control and override, the autocommand computer which takes information from the University's main "1905" computer and operates the entire station automatically, then the manual aerial and control panel with Manual/Auto track/computer track on-line/Radio control selection and position indicators. On the bottom level is the *Racal* RA-17 receiver for the downlink, the *Trio* TS-700 for



University of Surrey AMSAT-UK Telecommand Centre. The station runs entirely automatically, being computer programmed for a week at a time. (Fig. 1)

up and down link, a *Ham-M* rotator for the terrestrial array (not shown) and a *KW-2000B* transceiver. Off the picture is RTTY equipment for *Oscar 7* telemetry.

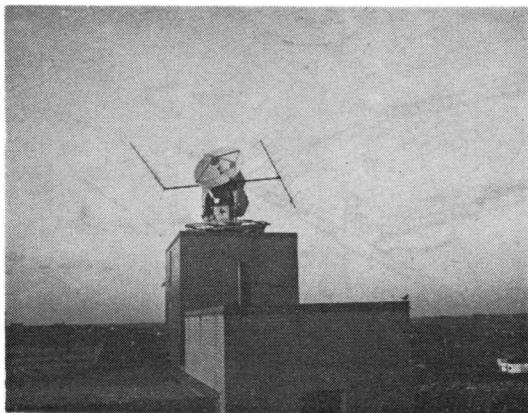
Figure 2 shows the dish aerial and tracking mount weighing  $3\frac{1}{2}$  tons. The system is steerable in elevation and azimuth and powered by two 30 volts, 30 Amps. DC motors. The serve system was designed and built by the UOS Department of Electronic Engineering and incorporates two 900 watts solid state servo amplifiers. The aerial has a pointing resolution of  $0.05^\circ$  and a pointing accuracy of  $0.25^\circ$  and may be steered either manually, by on-line computer, by an automatic tracking system or by radio control.

The 70 cms. and 2m. crossed *Yagis* are used for communicating with *Oscar 6* and *Oscar 7* and for telecommand transmission. The dish itself, has a 10 GHz feed and is used at present in terrestrial 10 GHz colour television experiments on 3 cms. The aerial is on a tower, 110 feet high.

The station runs entirely automatically. Data is fed into the main 1905 computer at the beginning of each week and the week's orbits are then calculated. The output is then processed by a "MINIC" computer and then fed into the Autocommand computer. The station is then operated for one week, switching on the transmitters and PA to warm up for five minutes, appropriate command selection, aerial azimuth and elevation, etc. The system tracks and commands *Oscar 6* for the orbit, then shuts everything off till the next one.

Martin Sweeting, G3YJO, the AMSAT-UK Telemetry Coordinator, who kindly provided the notes for this short article, says that the UOS hopes soon to install a microprocessor system capable of doing all the necessary orbit calculations itself and running the station.

If A-O-D is successfully launched into orbit later this year to become *Oscar 8*, the UOS station will assume command of that also.



University of Surrey. The dish aerial and  $3\frac{1}{2}$ -ton tracking mount; the crossed polarised Yagis for 70 cm. and 2m. are on the left and right respectively. The dish is presently used on 10 GHz for colour TV experiments, and the whole array is on a 110ft. high tower. (Fig. 2)

## MINI-ZL SPECIAL FOR TWENTY METRES

### DESIGN AND CONSTRUCTION — STEP-WINDING

F. C. SMITH, GW2DDX

THERE must be many amateurs who, like the writer, have little space in which to put up a full sized beam. As far as 21 MHz goes, the "Easy Quad" described in the September 1976 issue of *SHORT WAVE MAGAZINE* solved the requirement for a reliable and suitable DX aerial; but to extend it to Twenty was not felt to be practical because of the greater span of the support canes which would be required. Hence a mini-beam for 14 MHz was given some thought.

A "compressed beam" is one in which the elements are considerably shorter than normal, inductance being incorporated to bring the assembly back to resonance. Unfortunately there is a limit to the amount of shortening beyond which the trade-off between length on the one hand and gain and bandwidth on the other becomes less than one wishes to suffer. Bearing this in mind, a study of quarter-wave whips using the continuous, step-wound technique was made, and a bandwidth of 250 kHz at 14 MHz noted. The current distribution is sinusoidal rather than linear, and thus there is a higher centre impedance; a beam made in this manner is easier to tune and exhibits a greater efficiency than a conventional compressed beam. The total width of the elements is twelve feet, which makes this a useful aerial for portable or Field-day activities.

Initially, a dipole was constructed along these lines and erected at thirty-three feet; as it showed promise

as a DX aerial, the technique was extended to make a Mini-ZL Special.

### Materials

Four canes, each seventy-five inches long are needed, tapering from three-quarters of an inch to three-eighths; check that they have no splits and are straight. Treat them for weather with a coat of paint. The wire is 20 SWG enamelled, wound on in accordance with Fig. 2. Take care that the windings are all tight so as to maintain their spacing; when the winding is finished, a wrapping of adhesive tape and varnishing completes the cane. Treat each cane similarly. The step winding may be found a little tedious but once started presents no difficulty. An eight-foot boom is also required, say, of 1 inch diameter, and the two coils are eight turns of 12 SWG wound into a length of  $1\frac{1}{4}$  inch. (Winding coils of this thick wire is most easily achieved if you possess, or know someone else who has, a lathe.—*Editor*). The final mounting of the canes may be left to the reader's own ideas.

Fig. 1 shows the method used by the writer for the mounting of the beam, which enables the beam to be pulled up or down the mast as required. The coils used in the centre of each element of the array are *not* there to compensate for the shorter elements; the coil and link method is favoured at GW2DDX as being the best way to get a near-perfect match to the feeder.

The velocity-factor of the phasing line is 0.75, and it should be remembered that to get the desired 135 degrees of phase shift the line needs to be transposed. The elements are grid-dipped with the coils *in situ*, and the phasing line is connected  $3\frac{1}{2}$  turns in on each coil. If the elements, when grid-dipped, show resonance to be not quite where required, a few turns may be removed from the top of the canes, equally on each side. A six-

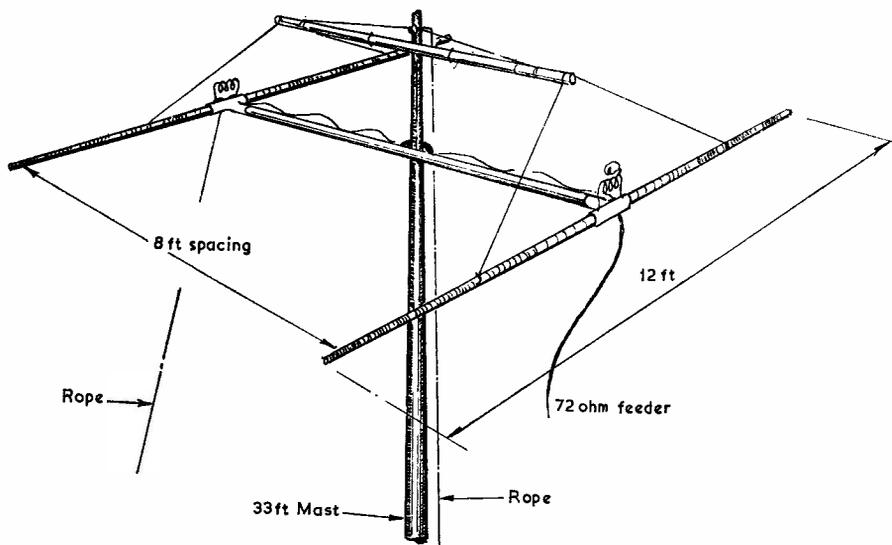
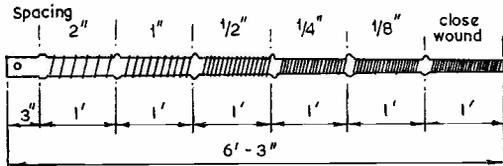
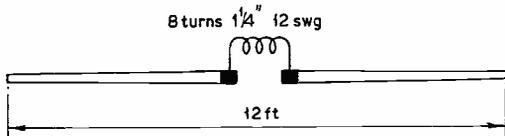


Fig. 1. Method of mounting MINI-ZL



Cane diameter  $3/4"$  tapering to  $3/8"$   
Wind with 20swg enam. wire

A  
620

Fig. 2 Winding details for canes

turn link of thin flex is inserted at the centre of the driven element to which the 72 ohm feedline is connected.

### General

A beam in which the phase relationship is 0 or 180 degrees presents no problems; but the requirement for unidirectional radiation means that the phase angle should be between about 90 and 135 degrees. In the GW2DDX version as originally made, the forward lobe seemed rather wide, and although the beam performed normally it was assumed that the phase relationship was nearer 90 than 135 degrees. It was decided to try a  $3/8$ -wavelength phasing line. A length of coaxial cable having a velocity factor of 0.75 was therefore cut to a length of 21 feet three inches and connected in place of the existing  $1/8$ -wave phasing line which had been eight feet six inches; the surplus was coiled up and tied to the boom. Either length works well, but it does seem that with the longer phasing line the forward lobe is narrowed down to a more acceptable figure.

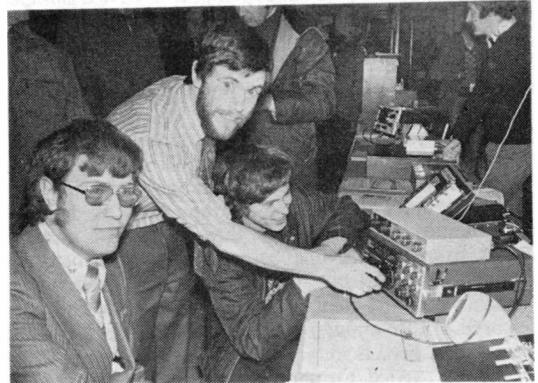
### Results

Attenuation off the sides of this beam is a little down compared with a full-sized array, which is to be expected. However the Mini gives a good account of itself on 14 MHz when the band has not been at its best. All around Europe have been around S8 to S9, and on into the far lands at reasonable strength; VK and ZL have heard at workable strength but the pile-up has been too much to be worth battling through with the writers KW Viceroy run at 150 watts.

## THE WHITE ROSE RALLY

Lawnswood School, Leeds,

April 3rd



Ian Forse G4DHA (front) and Ken Turner GM8JPT look on as David Tong G8ENN (a White Rose member himself) of Datong Electronics Ltd, demonstrates one of his Up-Converters.



Ian Sneap G3ZYC of Lowe Electronics tends to potential customers Cliff Kilvington G8EPH and, on the right, Alan Cherrett G3BEJ.



General view in the West Hall of the school around noon.

## THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for June issue: May 4)

ONCE again your scribe reaches for his typewriter; this month in the clear knowledge that, with some main still to come in, we already appear to have a Bumper Bundle. So, perhaps it would be a good time for us to mention the question of the chaps who wish to send in all the dates for several months at one go, with the very laudable idea of saving the club postages and at the same time saving themselves some work. Much as we would like to do so, it is impossible to devise a scheme of things which will enable us to do this without serious risk of errors creeping in. Essentially, the problem revolves around the number of reports to be handled each month. The result is that, to accept multiple entries from a club, one has to have a photographic memory, which is one thing this writer has *not* got! Normally, all the mail is kept for a month and then disposed of (not enough room in the shack as it is!) and the essential need is to remember to separate those which should be carried through to next month—a memory which must be relied on just at the moment in the month when the pressure is at its greatest. And, of course, if the memory errs, no one says "poor old soul, he must be forgiven mistakes made in his dotage," but rather do they say "You are discriminating against my club, dammit!" Again, to be fair, that was precisely how this old conductor felt when he missed the 'bus (before he became "Club Secretary") is sending his report in, and got a rocket from the gang at the next club meeting.

So . . . PLEASE, send in your reports on a month-by-month basis, despite the costs; you can save 2p by posting a week earlier, which is some help, provided you always remember that the deadline is **23 days ahead of publication day** which is the last Friday of the month.

### Reports

Regional this time, to celebrate our having a wee bit more time to process them; and the upper clip seems to be the Southerns, so that is where we'll start.

*Verulam* are always in session on the fourth Thursday in each month, at the Market Hall in St. Albans. This gives us May 26, on which evening there will be a talk on Operating Techniques—the speaker is not named. In addition, from May to September, the gang have informal gatherings on the second Thursday of the month, at Salisbury Hall, London Colney.

We make a couple of rude noises in the direction of *Southgate*, there being absolutely no information on their Hq. address or the meeting dates. However, it so happens that we recall their QTH is at the Scout Hut, Wilson Street, Winchmore Hill, just off the village green. Also we believe they usually foregather on the second Thursday. Another place you might find them is around the talk-in station at the Alexandra Palace "do" over May 6-8.

On the other hand we have a nice long list and all the required details in the *Sutton & Cheam* Newsletter. By the time this comes to print, they will have had their AGM; and for May 19 they have a booking at Sutton College of Liberal Arts for S.M.C. Ltd. to talk about and

show their range of commercial gear. A couple of days later they will have a demonstration station running at Cheam Junior Girls School (May 21). In addition to all this there are informals held at Ray's Social Club, London Road, Cheam on certain Wednesdays.

*Acton, Brentford & Chiswick* have their base very firmly fixed, at Chiswick Trades and Social Club, 66 High Road, Chiswick. May 17 sees them dealing with a very important subject, namely IARU and the WARC 1979.

Although they don't tell us what is going on—the new committee hadn't really had time between being elected and the date of our deadline! but they do say that Hq. is Emmanuel Church Hall, Barry Road, London SE22, on the evening of the third Saturday in the month. Which club? *Crystal Palace*, of course.

Now on to *Harrow* where on May 6 there is some R.A.E. revision, May 13 a Practical evening, May 20 G3MLS to talk about Modulation, and May 27 for a talk by G8EIM on SS/TV. However, for the current volume, we must refer you to the Hon. Sec.—see Panel.

At *Silverthorn*, the Hq. is Friday Hill House, Simmons Lane, Chingford, London E4, and the arrangements are easy enough to recall, since they get together every Friday evening.

A funny thing happened to *Edgware* recently—their attendances have shot up although the membership seems to be relatively not much changed. I don't think I'd be worried by it—but it would be nice to know just what did the trick! Find them on the second and fourth Thursdays in each month at 145 Orange Hill Road, Burnt Oak, Edgware.

It looks like the first Thursday in each month for *Cray Valley*, the venue being the Eltham United Reformed Church Hall, 1 Court Road, Eltham, London SE9. However we don't know what is down for the May meeting, as the new committee will hardly have had a chance to sort it out by the time they wrote to us; but we don't ever recall them failing to put something interesting on.

At *Chiltern* a new Hon. Sec. is noted—see Panel—and he writes in to let us know that they are making a big effort to keep up the standards; the venue is now 42 Castle Street, High Wycombe, and the regular routine is to get together on the fourth Wednesday in each month.

At *Echelford* we were a little saddened to read that they were suffering a shortage of nominations for the various offices, to let some of the existing committee people have a rest after several years of work. We hope that by AGM time, all this will have been sorted out. The group get together at the Hall, St. Martins Court, Kingston Crescent, Ashford, Middlesex, on the second Monday and the last Thursday of each month.

Tuesday, May 3, is in the normal routine at *Thames Valley*, but we notice that the June date is 8th—a Wednesday—so make a note in the diary if you are going to attend in June at Giggs Hill Green Library, Giggs Hill Road, Thames Ditton. As for the real current news, on May 3, there will be a quick discussion on NFD, to be followed immediately by a mammoth Junk Sale.

Quite a change for *Shefford* on May 5, when G4ARL will talk about "Under the sign of the Spread Eagle"—the history and development of Barclays Bank. On 12th,

G3RWL will be talking about OSCAR, and on 19th they will all be visiting Bedford club. Finally, May 26 sees a talk on "Plastic Embedding" by guest speaker, Mrs. Culpán.

Not only the usual date of May 2, but also May 23 appear on the *Southdown* fact-sheet. The first is a Junk Sale, while the second is down for a discussion of NFD and contesting. Both are at the new Hq., Chaseley Home, South Cliff, Eastbourne.

It's a mighty long time since last we heard from *Stowmarket*; now they write to say that from this month they will change Hq. to the Red Cross building near the Station; normally they assemble on the first Monday in the month unless it happens to be a Bank Holiday. For more details we suggest you get in touch with the Hon. Sec. at the address in the Panel.

*Milton Keynes* are booked in to the Loyal Hall, Silver Street, Newport Pagnell, on May 9, on which evening they will be hearing a talk from G8FMG, Steve Felts, on the Bedford repeater.

At *Wessex* they have a treat on May 6; their natter session has been replaced by a talk with slides to be given by YJ8DS; for the non-DX types YJ8 is New Hebrides. This one is at Hq., The Dolphin Hotel, Holdenhurst Road, Bournemouth; but on 20th the show

is moved to Bournemouth School, East Way, Bournemouth, where the talk will be by G2DX, who was first licensed in 1912; he will be followed by G6CJ, Dud Charman and his topic of "Aerials and Propagation."

*Reigate* have their monthly Natter Night on May 3, at the Marquis of Granby, Hooley Lane, followed 14 days later on May 17 by the "Sale of Surplus Equipment" at the Constitutional Centre, Warwick Road, Redhill; the footnote makes it quite clear there is *no* junk in Reigate! On a different note, this entry was G3NKS's last one before taking up a new job in Cheltenham—17 years of Newsletter writing for the club, and almost as many as an executive of the club.

Over to *Maidenhead* now, still at their Hq. at the Ambulance Hall, The Crescent—it has been variously reported as being St. John and Red Cross, but let it be clarified a little by your scribe who says there is only one of 'em in the Crescent anyway! The dates are May 5, when G3ZHY will be talking about "Magic Boxes" which are training aids for would-be CW operators which are designed around a PROM. Tuesday, May 17 is a bit nearer the date set aside for NFD, and so the lads will be fully occupied getting ready for the battle.

Over to *Mid-Sussex*, and the tale of their planning application for the Tower at the Marle Place Hq. in Burgess Hill; were it not so funny as they tell it, one

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

- ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, Acton, London W3 8LB.  
 B.A.R.T.G.: J. P. G. Jones, GW3JGG, Heywood, 40 Lower Quay Road, Haverfordwest, Dyfed SA62 4LR.  
 BOURNEMOUTH (Wessex A.R.G.): G. D. Cole, G4EMN, 6 St. Anthony's Road, Bournemouth (20027) BH2 6PD.  
 BRISTOL CITY (RSGB): B. L. Goddard, G4FRG, 2 Greenfield Park, Portishead, BS20 8NQ. (*Bristol 848140.*)  
 BROMSGROVE: R. Blacker, G8JTK, 23 Leasowe Road, Rubery, Birmingham B45 9TB.  
 CHELTENHAM (RSGB): G. D. Lively, G3KII, 26 Priors Road, Cheltenham (34785), Glos.  
 CHILTERN: N. C. Ambridge, G4FRL, 53 The Avenue, Chinnor, Oxon OX9 4PE.  
 CORNISH: S. Halfyard, G4EIS, Studio 12, Rosewall Terrace, St. Ives (3576), Cornwall.  
 CRAY VALLEY: J. M. B. Tripp, G3YWO, 57 Cathcart Drive, Orpington (38199), Kent.  
 CRYSTAL PALACE: G. Cluer, G4AVV, 24 Patterson Road, Upper Norwood, London SE19 2LD. (*01-653 4340.*)  
 DURHAM (University): M. Warrington, G4EMW, Van Mildert College, Durham.  
 EAST LANCs.: E. A. Lomax, G4DGR/SN2ABG, West End Post Office, Accrington (34012) BB5 4NQ.  
 ECHELFORD: R. S. Hewes, G3TDR, 24 Brightside Avenue, Laleham, Staines, Middx.  
 EDGWARE: P. D. Ling, G4BZY, 42 Greencourt Avenue, Edgware, Middx. (*01-952 2495.*)  
 HARROW: M. A. Kipp, G4FBK, 43 Southdown Crescent, South Harrow, Middx. HA2 0QT. (*01-864 1412.*)  
 HEREFORD: S. Jesson, G4CNY, 181 Kings Acre Road, Hereford (3237).  
 LANCASTER (University): R. J. Scott, G4EGE, c/o Physics Dept., University of Lancaster, Lancaster LA1 4YB.  
 LEICESTER (VHF Group): B. Povoa, G8GVA, 43 Hilders Road, Leicester LE3 6HE.  
 LIMERICK: P. B. Maher, EI3AV, Knockearl, Cloughjordan, Co. Tipperary, Eire.  
 LOTHIANS: P. Bates, GM4BYF, 2 Swan Spring Avenue, Edinburgh EH10 6NJ.  
 MAIDENHEAD: M. Adams, G3ZLQ, 76 Blind Lane, Bourne End, SL8 5LA.  
 MID-SUSSEX: R. Bellerby, G3ZYE, 104 High Street, Lindfield (3187), Haywards Heath, West Sussex.  
 MILTON KEYNES: D. Stimson, G3THC, 108 Cambridge Street, Wolverton, Milton Keynes (316730) MK12 5AH.  
 NORTH BRISTOL: K. Osborne, G8KSS, 10 Mortimer Road, Filton, Bristol BS12 7LF.  
 NORTHERN HEIGHTS: A. Robinson, G3MDW, Candy Cabin, Ogdén, Halifax (44329).  
 PERTH: R. Grant, GM4DQJ, 31 Stormont Park, Scone, Perth PH2 5SD.  
 REIGATE: F. H. Mundy, G3XSZ, 2 Conifer Close, Reigate (43130), Surrey.  
 SALTASH: J. K. Reynolds, G8LLR, 47 Lulworth Drive, Roborough, Plymouth (771135).  
 SCARBOROUGH: C. H. Whitaker, 1 Ryefield Close, Eastfield, Scarborough YO11 3DN.  
 SHEFFORD: M. J. Strange, 19 Wilsheres Road, Biggleswade, Bed. SG18 0BU. (*0762 315075.*)  
 SILVERTHORN: C. J. Hoare, G4AJA, 41 Lynton Road, South Chingford, London E4 9EA. (*01-529 2282.*)  
 SOUTHGATE: B. Oughton, G4AEZ, 48 Morley Hill, Enfield. (*01-366 7166.*)  
 SOUTH MANCHESTER: W. L. Seddon, G3VIW, 12 Barwell Road, Sale, Cheshire M33 5FF. (*061-973 3355.*)  
 STOURBRIDGE: A. Dewsbury, G4CLX, 10 Rectory Road, Oldswinford, Stourbridge (3530), West Midlands.  
 STOWMARKET: P. J. Keeble, G4ETC, "Meadowbrook," 37 Combs Lane, Stowmarket, Suffolk.  
 SOUTHDOWN: B. Chuter, G8CVV, 15 Coopers Hill, Willingdon, Eastbourne, East Sussex BN20 9JG.  
 SURREY: S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon, CR2 8PB. (*01-657 3258.*)  
 SUTTON & CHEAM: A. Keech, G4BOX, 26 St. Albans Road, Cheam, Sutton, Surrey. (*01-644 4157.*)  
 SWINDON: A. D. Bettley, G8KWC, 17 Centurion Way, Stratton-St.-Margaret (2860), Swindon Wilts SN3 4BT.  
 THAMES VALLEY: R. J. Bladdell, G3ZNW, 92 Bridge Road, Chessington, Surrey KT9 2ET.  
 TORBAY: M. Yates, G3UIQ, Top Flat, 23 Waverley Road, Newton Abbot (3025), Devon.  
 UK FM GROUP (London): R. G. Street, G3TJA, 3 White Lodges, St. Stephens Road, London W13.  
 VERULAM: B. H. Pickford, G4DUS, 130 The Drive, Rickmansworth, Herts.  
 WHITE ROSE: R. R. Hughes, G4DZI, 3 Primley Park Crescent, Leeds LS17 7HY.  
 WIRRAL: H. I. Crofts, G3DLF, 3 Barmouth Road, Wallasey. (*051-638 2515.*)  
 WOLVERHAMPTON: J. Cook, G8EDG, 75 Windmill Lane, Castlecroft, Wolverhampton WV3 8HN.  
 WORLD SCOUT BUREAU: L. Jarrett, HB9AMS, Case Postale 78, 1211 Geneva 4, Switzerland.  
 YEOVIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil, Somerset.  
 YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

would be foaming at the mouth over the idiocies of bureaucracy, but they kept their sense of humour with the result that in the end they got their beam, which at least makes it far easier for a visitor to flush them out. Look for it on May 5, when G3WNS will be showing films "In the Steps of Lawrence of Arabia," and again on May 19 when the Wanderer Reminisces, the roamer of the title being their President G5RV of course. Finally, please, everyone, note that the Hon. Sec. is not G3JMB any longer, he having been given the hard word by the doctor; G3ZYE is filling the hole.

The TS "Terra Nova" at 34 The Waldrons, Croydon, is "home" for the Surrey lads, and it looks as if the first and third Wednesdays are the ones to keep open. By now, of course, after the AGM, they will be just getting the new programme sorted through so if you must have the very latest, a call to the Hon. Sec. seems indicated—see Panel.

### Midlands

Quite a big place, this, and yet, as with Scotland, one never ceases to be amazed at the apparent rarity of the genus Radio Club, and the way they hide their lights under a bushel. However, Bromsgrove are taking the wraps off their latest publicity scheme, which is to be an Award. They say that as U.K. amateurs will be allowed to use the prefix GE during the period June 4-10, the Club station, GEVGG will have an award for which you must work the Club station, GE3VGG and one other Bromsgrove Club station (we wonder whether that means what it says or is it that you are to work one club member?) plus 23 other stations using the GE prefix for a total of 25 contacts; any band or mode, saving that no repeater or satellite contacts are acceptable. The award is to be known as the Bromsgrove Silver Jubilee Award. Meetings are not mentioned, but the designer of the note-paper heading had forethought when he put "the second Friday in each month at Avoncraft Art Centre" up in the top left-hand corner.

Not far away is Stourbridge where they have Royal approval to their plans for a Silver Jubilee station; and with that sort of support let us hope the authorities relent and permit them the GB4SJ call they want, instead of the ER60I which would be the conversion of the club call, G6OI. The formals are held at Longlands School, Brook Street, Stourbridge, and we believe the date is usually set to be the third Monday of the month; there is also an informal get-together during the month at the "Shrubbery Cottage" pub in Oldswinford. More details can be obtained by listening to Beacon Radio on the day of the formal and the day before, when the latest local news is passed out; and if even that isn't enough, then it is the Hon. Sec. for you—see Panel.

Cheltenham RSGB group have their place at the Old Bakery, Chester Walk, and at this moment it rather looks as though the topic will be Civil Aviation Communications, and G3HCB the speaker.

May 6 and May 20 are the dates for Hereford in the County Control, Civil Defence Hq., Goal Street; the former for a talk on Emergency Services by Sqn. Ldr. Pengilly from Worcester, and the later date for a "Junk and Goodies" Sale—the names these events get never ceases to amaze this scribe!

A familiar signature sits on the bottom of the next

note, which is from G5UM, and points out that in Leicester there are no less than six clubs, four of whom have call-signs, namely G3LRS, G3SDC, G4CKC, and G4DAG; plus the VHF group and the Repeater group. G5UM writes for the VHF group, and points out that the Hon. Sec. is G8GVA—his address is in the Panel—and that he would dearly love to tell people all about the VHF gang and their doings. Good for him!

Wolverhampton are open for business on every Monday evening, at Neachells Cottage, Stockwell End; May 2 is down for a Home-construction competition, while 9th is a Natter evening, sandwiched neatly between the homebrew contest already mentioned and the Sale of second-Hand Equipment on 16th. May 23 is a committee meeting and the final May 30 date is given over to more nattering.

The South Manchester scribe it was who sparked off the preamble to this piece; but if he (and indeed every scribe) were just to remember the requirement for the material to arrive 21 days before the last Friday in the month, they would be able to generate their own deadlines for posting, either first or second class. They only exception to this rule occurs in January, when the reports are battling their way through the Christmas mail rush and all deadlines are altered to take account of this; but even this one can be coped with if you get in to the habit of mailing early. However, to turn to the matter of the South Manchester doings, they have a Mini-D/F contest on May 6 followed on 13th by the AGM; G2FOS will be talking to them about Electronic Organs on May 20 and on 27th they are going to visit the Post Office Tower. In addition, the informal VHF-cum-D/F sessions at the club shack, "Greeba," Shady Lane, Baguley on Monday evenings continue.

Over the water to Wirral, where May 4 will be devoted to "Amateur Communications Methods"—a consortium directed by the Chairman who will thrash out the fundamentals for the benefit of all. This is followed on May 18th by an evening with G3LEQ, who will be bringing all the goodies of the firms he is agent for, not to mention his own VHF expertise, from Knutsford. Quite a jaunt this, so we hope he gets a good turn-out of the lads at the Sports Centre, Grange Road West, Birkenhead.

### Westward

Firstly, we head down into Cornwall, where we find the SWEB Club room, Pool, Camborne on May 5 to meet Cornish; as usual they will no doubt be packed out for G3OCB's talk on Counters.

Nice to hear again from Saltash after quite a break; they are still based at Burraton Toc H Hall, at the junction of Warraton Road and Oaklands Drive, Saltash. May 6 sees a talk on BCI and TVI by G3VWK, while on May 20 there is a surplus-equipment Sale, the Auctioneer to be G3UBY.

Swindon are in session on May 11 and 25; the former date is down for G3SEK to talk about M/S and other two-metre DX, while the second date is given over to a Test Equipment demonstration by G3LTZ. Both dates are in the Coldharbour public house, which is in Blunsdon, five miles north of Swindon on the A419.

Bristol RSGB have a trip out for May 30th. They are going to HTV studios, where they will be entertained by

the Entertaining Electron, and Oracle, all under the control of Jim Slater of IBA—anyone outside Bristol who is interested can get in touch with the Hon. Sec.—see Panel. On a different tack, the gang will be at Long-leat as usual, on June 12, with a separate rendezvous tent and a large refreshments tent; the whole rally site has been moved to the Anglers Pond nearer to the House.

Another Mobile Rally to be mentioned is the *Torbay* one; this is down for August 28 at Haldon Race Course near Exeter, on the A38 heading towards Newton Abbot. For other details of the club, it is suggested you contact the Hon. Sec.—see Panel. May 28 is down for NFD work.

Over the water now, to *Limerick*, where the local club continues to thrive; for all the details, get in touch with the Hon. Sec.—see Panel.

*Yeovil* Hon. Sec. G4EVI says that although they are continuing to foregather each Thursday at the usual spot, there are possibilities of a move in the offing; so any would-be visitors should get in touch with the Hon. Sec. at the address in the Panel before they finalise any plans. One special date for the gang to recall is May 19, when G3XFW will be talking about "Breaking Down RF Amplifier Circuits."

#### New Club

*North Bristol* are a new group based on Lockleaze Community Centre, near Gainsborough Square, Bristol, where they can be found every Friday evening. They are recruiting as hard as they can, and would particularly welcome SWLs—they already have an R.A.E. class running, and hope to fix up lots of talks in the coming weeks.

#### North

1977s *North-West Convention* is being organised by the *University of Lancaster*, and will be held there on September 17-18. Trade stands, competitions, a dinner, and a coach tour. On a different tack, the *University* club is not a "closed" one; anyone, whether SWL or licensed is welcome, the meetings being on Wednesday evenings in Furness College Bar, at 8, followed up by some operating from the club Shack.

The May meeting of the *East Lancs* group is transferred to May 3 which is a Tuesday instead of a Thursday, at Canterbury Street, Blackburn—we would like to tell you the topic and the starting time, but they are, thanks to Murphy's Law, the only bits of the print to be smudged; but it is quite clear that there is a bar which will be open from 2130!

*Northern Heights* get together at the Peat Pitts Inn, Ogden, Halifax, on alternate Wednesdays; May 4 is a Surplus Equipment Sale, while on May 14 there is a Social at Sutcliffe Farm, Golden Heptonstall organised by Mrs. G4EFX.

Up at *Scarborough*, things are going quite nicely, with membership rising rapidly, and a mention each week in the local paper. They are to be found on Friday evenings at the Technical College, Scalby Road.

Everything the *White Rose* group touches seems to be a success; as at the beginning of March they had already accepted 87 applications for their White Rose award, and their Wednesday evening meetings get more and more attendances, Hq. is at 83 Town Street, Armley, Leeds.

We are pleased to hear that the radio group based

on *Durham University* has been revived; alternate Wednesdays during term time in the Physics Building, Science Site, South Road, Durham, sees them in session and very keen to welcome members from outside the University. More details can be obtained from the Hon. Sec.—see Panel.

If you go to *York*, you have to remember that they miss the third one in each month, but get together on all the other Fridays; on May 30 they have a trip to Hull Technical College which is already at the time of their letter over-subscribed! All sorts of interesting activities seem to go on with this group.

Over the Border now, and our first port of call is to *Lothians*; May 12 is a Junk Sale, while May 26 is not yet settled, while for June there is the AGM on the ninth and a Forward Planning session on June 23, after which they will be in recess until September. All the details from GM4BYF, or turn up at the Adult Education Centre, Riddles Court, Lawnmarket, Edinburgh.

#### Another New One in GM

This one is at *Perth*; in the absence, as yet, of somewhere to meet, they are getting together in each other's homes on a rota basis. This being the case, if you wish to get to know them, we suggest it would be a courtesy to get in touch with the Hon. Sec. first—see Panel for his address.

#### General

A place in which to fit all the groups that are not on a purely local basis; and our first one is the *World Scout Bureau*, who have sent a copy of their report on the 1976 radio activities; and it seems likely that in JOTA 1976 there were probably in excess of 7000 stations on, some 1277 being over in the States.

The *UK FM Group* Newsletter for the London group is quite interesting, and one can understand the views of the member who found getting to the Grove Park Hotel Hq. at the junction of Bolton Road and Spencer Road, Chiswick. This venue is adjacent to Chiswick station, and is more "get-atable" than many of the other proposed places—but it has to be accepted that any Hq. address will be awkward to get at from some part of London, which is getting to be a rather large village!

*BARTG* will have their main event of the year on May 21, at Meopham Village Hall, with all the usual attractions, Bring and Buy stall, lectures by G3PLX and G5XB, a picture tape factory and a fine selection of Trade Stands. On a different tack, their Spring Contest on the weekend March 26/27 was notable for DX on all continents, and an increased UK participation for G8CDW to plough through to get to the results. One popular station, on RTTY for the first time was JY1.

#### Finale

That brings us to the bottom of the pile for another month; for next time, we want your programme gen for June, together with the Hq. address, the address of the Hon. Sec. (and his name of course!) and any other data that would be of interest to a prospective member. Address it all, to arrive by May 4 latest (23 days before the last Friday of the month), addressed to Club Secretary, SHORT WAVE MAGAZINE, 34 High Street, Welwyn AL6 9EQ.

# VHF BANDS

NORMAN FITCH, G3FPK

## Awards and Tables

THERE have been no VHFCC Certificates awarded this month though several claims are in the pipeline. The rules are few and simple. The certificates are available for 4m., 2m. and 70 cm. activity, for individual bands only. Applicants should have at least 100 confirmations from stations operating from different locations. That means you can submit cards from a station or group operating successively from different counties, for example. To claim, just send a list of the confirmations with a potted history of your amateur radio activities and a description of the equipment used, past and present, to the address at the end of this feature. You will then be asked to send six cards chosen at random for verification after which, if all is in order, your certificate will be issued. Your contacts must have been made from the one, fixed location, but it does not matter if you change your call part way through due to licence up-grading. Satellite and repeater QSO's are not permissible.

To enter the Three Band Annual and "Squares" tables, it is stations worked, not necessarily confirmed, that are counted. All modes count, only repeater and satellite QSO's being excluded. The counties are the latest ones, of course, such as Merseyside, Gwent and Highlands, rather than Rutland, Middlesex, Merioneth, Angus and so on. You can count the Irish Republic counties of which there are 26.

## Repeaters

As readers within range of GB3LO will know, the Crystal Palace device has been off the air for some time. It was closed down at the request of the Home Office and there is no indication when service will be

resumed. The licensee, the RSGB, is at pains to point out that the closedown was not due to the persistent interference. It seems a pity that those who have used the repeater properly and who contribute to its upkeep have been rather left in the dark concerning the closedown. As it is, there are many rumours around as to why it was necessary. Normally such matters are solely the business of the individual amateur and the Home Office but in this case, *all* Society members have helped pay for the repeater programme. It does seem rather unnecessary to treat infringements of licence conditions as state secrets!

G3CHN (Devon) mentioned a French repeater in Department 9, Ariège, on channel R1. All "F" repeaters will be in the "FZ" series, the number indicating the REF region, as with the beacons. This repeater would be FZ5THF and runs 10 watts to eight dipoles, 1205m. a.s.l. The "Ile de France" repeater, FZ1THF, (B112F) is located at Clamart, Dept. 92. It is on R6 experimentally, running 10 watts *e.r.p.* from an omni-directional aerial at 205m. height. The repeaters might be useful as beacons for those with vertically polarised aerials.

On the 70 cm. scene, Jack Hum, G5UM, reports that G3PVG has succeeded him as Chairman of the Leicester Repeater Group. To counter the idea that only a handful of local operators would use 70 cm. repeaters, a show of hands at the group's AGM revealed over a score ready to use GB3LE on RB4.

## Intruders

Following the paragraphs on unidentified intruders in the 2m. band, Joost Berden, G3RND, says that he does not think the buzzing noise complained of by G8HUY originates from Russian satellites. The only USSR QRG anywhere near the band is 143.625 MHz and that is used only when a *Soyuz* link up with the orbiting space station is planned. It is purely a beacon signal to locate the orbiter. During such operations, 121.27 MHz is used on FM for voice communication. Other general USSR satellite QRG's are: 137.15; 137.20; 137.30; 137.40; 150.0; 180.0 and 400.0 MHz.

Joost suggests that the noise described sounds like that he used to

hear when he was in Yorkshire and which came from certain aircraft radio altimeters. Similar noises in the 70 cm. band appeared to be coming from the BMEWS installation at Fylingdale. G3RND advises that detailed records of this kind of interference be sent to the Home Office.

Most UHF operators around our coasts will have experienced the racket generated by the radar probes from Soviet "trawlers" and Joost reports that their activities are ruined by high power SSB fired at them. Since they operate just below the 70 cm. band, he suggests those suitably equipped can quite easily cause them to close down.

## DX Notes

Via G3POI comes news that from mid-July to mid-August, OE4XMS will be operating on 2m. from IH12j using 400 watts to a 20-ele. array, 1000m. a.s.l. During the last three weeks of July, ON61D will be in HB9, operating from DG75 square. From the Faroe Islands, OY2A in Torshavn has joined OY5NS on the 2m. band. For many U.K. operators, Irish Republic counties are not too easy to come by. G3CHN passed along the news that EI5DA (Co. Louth) is ready to start on 2m. as soon as his "black box" arrives.

Those who have not worked Cornwall, and/or XJ square, will be pleased to read that David Butler, G4ASR, will be on again from May 9 to June 1 from the Lizard Peninsula. He will be on 2m., 70 cm. and 23 cm., both fixed and portable as follows:— May 9-12 from G4ASR/A (Ruan Minor) on 144.26 MHz: May 14 from G4ASR/P on 23 cm. and on the 15th, 70 cm., these being contest days: May 16-26, G4ASR/A on 144.26 and 432.26 MHz: May 28/29, 2m. portable contest as G4ASR/P and May 30 to June 1, G4ASR/A on 144.26 MHz. Times of the -/A operation will be 1900-2230 GMT on weekdays and 1000-1900 GMT at weekends. David is *QTHR* on 01-360 9470 evenings or Epping 74351 during working hours for those wanting to arrange skeds. The Cornish number is Helston 4141, daytime. On 2m., G4ASR runs 100 watts SSB/CW to two 6-ele. *Quads*; 50 watts SSB/CW to an 88-ele. *Multibeam* on 70 cm. and 14 watts CW on 23 cm. with a *Quad Loop*

*Yagi*. The "prime mover" is a *Yaesu* FTDX560 with a *Datong* clipper, power being generated when operating portable from a *Honda* E300.

### Mediterranean News

Henry Souchet, 9H1CD, writes that he is glad he got started on 70 cm. He now has five QTH squares worked but so far he has not worked Malta! During February, he had a first QSO with 18CVS on CW in HA13c, exchanging reports of RST 509, and has daily skeds with IT9ZDA in Messina. 17EMG in Taranto has also been worked on CW.

On Feb. 23, there was a fine tropo. opening into Israel with the Haifa repeater on R3 completely readable, even with the beam north. Six 4X/4Z stations were worked via the Haifa relay by Henry, 9H1BT and 9H1FI. The latter, Tony, is a newcomer to the band and they each worked 4X4MR in Natania, direct. 9H1CD and 9H1BT also worked 5B4AP in Limassol via Haifa but could not make it direct. Once again, Henry found vertical polarisation useless and all the repeater contacts were with his bay of horizontal *Yagis*.

### The Gigahertz Bands

Although QRV in one form or another from 4m. to 23 cm., Ned Cartwright, G4DKX (Ipswich) is now constructing 13 cm. gear for tests with G3LQR and G3ZEZ. Brian Bower, G3COJ, (Bucks.) is continuing his 23 cm. SSB project and Brian Oughten, G4AEZ (London) should be on 23 cm. with SSB by now. G4AEZ's gear comprises a *Microwave Modules* converter into an *FT-101B* for reception. For transmission, a 2C39A mixer, solid state LO chain and a valved 2m. SSB transverter is used. The aerial is a dipole fed, 3ft. dish at 45ft. but Brian says feeder losses are the main bugbear at present.

### Seventy Centimetres

Syd Harden, G2AXI (Hants.) now has a 3CX100A5 amplifier going with 40 watts output, "... made, of course, from a lot of junk!" A reconstituted axial blower sends a gale down the half-wave stripline keeping the bottle at about 0°C. G2AXI is putting a lot of effort into

"solid stating" all the VHF/UHF gear up to the finals. Even so, Syd took time off to work G4ASR/P in Cornwall, for a new QTH square, XJ as did G3COJ.

During the Open Contest on March 20, Dr. John Tindle, G3JXN (London) made 76 complete contacts in poor conditions, for 252 points. He missed G4ASR/P but did work a Welsh portable and three PA's. The most exciting event appears to have been a lightning strike which did not seem to do any damage. Angus McKenzie, G3OSS (London) summed up the event as "... a bitter disappointment." He made 46 contacts in a 3½ hour session. Alan Scott, G4BYP (Liverpool), took time off from the 2m. Open affair on March 5/6 to work a couple

of ON's for a new country on 70 cm., with his 10 watts of SSB. The evenings of March 29/30 also produced good paths between Merseyside and Avon. Unfortunately, gale force winds on April 1 bent Alan's aerial pole so much that only overhead *Oscar* passes enter the field of view!

At the home station, Alan Evans, G8GII (London) has some TVI. For the "Open" he was out on the Hogs Back in Surrey and also found poor activity to the north and to Wales. Using 8 watts output to a 46-cle. *Multibeam* he worked into Devon, N. Staffs. and Suffolk making 59 QSO's worth about 200 points. However, when a thunderstorm looked imminent, he beat a hasty retreat! During the 2m. Open, Alau

### THREE BAND ANNUAL VHF TABLE

January to December 1977

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	
G8HQJ	—	—	56	14	21	8	99
G3FIJ	26	2	44	9	15	2	98
G3OHC	23	3	39	8	16	3	92
G2AXI	18	2	37	9	20	2	88
G8GML	—	—	52	8	14	4	78
G4FOR	—	—	57	11	7	2	77
G4CMV	—	—	62	12	—	—	74
G3FPK	—	—	59	12	—	—	71
G4BYP	—	—	43	9	13	6	71
G4DKX	7	1	37	9	13	4	71
G8GII	—	—	31	5	28	6	70
G8BKR	—	—	47	9	10	2	68
G4ECQ	8	1	47	10	—	—	66
G4FCD	—	—	55	8	2	1	66
GD2HDZ	1	1	28	8	21	6	65
G8JHX	—	—	51	10	—	—	61
G8LHT	—	—	48	9	—	—	57
GM4CXP	6	2	34	6	1	1	50
G8KSS	—	—	42	8	—	—	50
G4DEZ	—	—	43	6	—	—	49
G8ITS	—	—	35	5	8	1	49
G8HAF	—	—	40	7	—	—	47
G4AEZ	2	1	24	6	12	1	46
G8KKX	—	—	36	6	—	—	42
G4ERX	—	—	26	6	—	—	32
G4FKI	—	—	8	1	4	1	14

put out a "CQ" call at 0530 after a contact with ON6AT/A, which resulted in a pile-up of over 30 Germans.

Arthur Breese, GD2HDZ (Laxey), took a little time off the 2m. Open to work ON6AT/A on the band at RS59 both ways. By contrast, conditions for the 70 cm. Open, "... were back to what we are accustomed to for a contest—awful!" From Jersey, Lawrence Woolf, GJ8AAZ, forsook the 2m. Open and worked down to the south of France. He is another TV enthusiast currently experimenting with a pattern and call sign generator. Lawrence is appalled at the idea of the Jubilee "GE" prefix. Having waited so long for the GJ/GU system he feels it rather senseless to use a common prefix for all British stations. He suggests, "Presumably the next step is to allow all European stations to use 'EU' irrespective of location!" Never mind, OM, it is only optional.

### Two Metres

Following the hasty notes about the 2m. Open Contest in last month's column, it now transpires that OK, OZ, LA and SM stations were worked adding up to 21 countries worked. Did any group contact them all? Using an indoor dipole, listener Glen Sweeney (Nottingham) heard G, GD, GU, 7 GW's, 2 F's, 2 ON's and DKØKN/P, all on SSB. He now has a 5-ele. *Yagi* aerial.

Using 10 watts of AM, Ken Osborne, G8KSS, worked GI4BAC/P, ON6AT/A, DLØWU (DL66b), DKØMR/P (DK46d) and a couple of F's in YI square. After the contest another ON, F and two PA's were worked. Best DX heard in the contest was AD and EK squares. G8LLG is Pete Milsom who operates from Dorset using an FT-221 plus 4CX250B stripline amplifier. The 8-ele. *Yagi* has been superseded by a 14-ele. *Parabeam* and this combination yielded some more squares in the contest. During the contest, Bob Nash, G8MDI (Coventry) broke his continental duck by working DLØEE/P (E142h), F6CTT/P (ZJ76d) and others, plus GD3FLH/P (XO67e). The rig is an Icom IC-202 and *Modular Electronics*, 25 watt amplifier feeding a loft mounted *Jaybeam* 4-ele. Quad.

A rather different story from Len Dixon, G3XXQ, who, together with

G3YUV and G3ZEM, operated GM3XXQ/P from Borders Region. It was their first contest attempt on 2m. but they found conditions very poor for most all the event. They heard the southern stations working the continentals which were inaudible there. In the early hours of the Sunday morning, they made it with GU4EON/A and GU8IRF, the first continental being FIDIU/P at 0312 GMT. Then magically, at 1318, the Wrotham beacon came up to S9 and, in the following 2½ hours, they contacted 78 stations, out of their total of 205. Best DX was DKØVL at 1075 km.

From Wales, Phil Edwards, GW4BXE (Pontypool) worked

### QTH LOCATOR SQUARES TABLE

Station	23 cm.	70 cm.	2 m.	Total
G8FUF	1	79	172	252
G3JXN	18	53	69	140
G3COJ	15	50	64	129
G2AXI	1	36	59	96
G8EOP	8	36	38	82
G8GML	1	34	75	110
G8HVY	—	33	93	126
G4BAH	—	32	92	124
G3OHC	—	27	94	121
G4DKX	3	25	68	96
G3FLJ	—	25	57	82
GD2HDZ	9	24	50	83
G4BWG	—	23	110	133
G4FCD	—	22	67	89
G8GII	—	22	63	85
GM4CXP	—	21	107	128
G3BW	—	21	47	68
G8IWA	—	17	74	91
G8IFT	5	16	35	56
GJ8AAZ	—	15	55	177
G4AEZ	—	15	44	59
G3XCS	—	14	82	96
G8BKR	1	8	81	90
G8HHI	—	7	71	78
9H1CD	—	5	110	115
G8ITS	—	2	44	46
G8KLN	—	1	62	63
G8LLG	—	1	38	39
G8JAH	—	1	35	36
G4CIK/A	—	1	23	24
G3POI	—	—	173	173

G3CHN	—	—	131	131
G3FPK	—	—	125	125
G4CDF	—	—	109	109
G6UW	—	—	85	85
G8HAF	—	—	69	69
G4DEZ	—	—	66	66
G8JJR	—	—	63	63
G4CIK	—	—	62	62
G3KPU	—	—	60	60
G8KSP	—	—	60	60
G8JHX	—	—	59	59
G8KKX	—	—	59	59
GW4FJK	—	—	57	57
G8LHT	—	—	55	55
OZ9IY	—	—	53	53
GD3YEO	—	—	52	52
G8JEF	—	—	44	44
G4EYL	—	—	41	41
G8KSS	—	—	31	31
G8JAJ	—	—	24	24
G8JKA	—	—	21	21

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

HB9BIR/P in EG square and OE2CAL/P2. Second hand, it seems that GW3UCB/P team made 858 contacts, some 350 being continentals. Russ Stewart, G8BHH, has written to account for his team's effort from Beacon Hill, Powys, 1740ft. a.s.l. They made 801 QSO's but lost an hour due to breakdowns. For the first couple of hours conditions were "ordinary" after which the DX never let up till late on. The opening started to central and north Germany gradually moving southwards early on the Sunday morning to take in HB, OE, south Germany and France. The points claimed from 785 scoring QSO's was 14,764. No less than 416 contacts were continentals made up of 210 DL's, 130 PA's, 40 ON's, 29 F's, 3 HB's and 3 OE's, but no I's or DM's heard. The station comprised two *Trio* TS-700's to a pair of 4CX250B's running 350 watts with a 14-ele. *Parabeam*. The receivers were modified to deal with strong signals. The team comprised G3WCS, G3WOH, G4FJK, G8GMC, G8IZS and Russ.

### Four Metres

Most reports concern the Open

Contest of April 3. Graham Badger, G3OHC (Sutton Coldfield), was on for 4 hours during which he made 35 QSO's. Conditions were below average with slow and deep QSB. No GM's were heard and the best DX was GD3FLH/P. G3OSS also found conditions poor generally, but with momentary "lifts." Angus started late and made about 50 contacts, mostly SSB but resorting to CW for the more difficult exchanges. He found more SSB than last year but very little AM. There seemed to be few London stations on and no Norfolk, Suffolk, GM or GI stations were heard. G3UUT/P in N. Yorks. was consistently good and there was a good deal of Midlands participation. Angus complained that some stations do not seem to understand the CW request, "QRS" as several did not slow down for him.

Peter Gamble, G4ECQ (Hereford and Worcs.) is now QRV on 4m. with a home built valve transverter and home made 3-ele. Yagi. He is always willing to QSY to 4m. from 2m. Richard Girling, G4FCD (Hertford) should have 25 watts of SSB by now with a 2-ele. Quad in the loft.

### A Real Aurora

The first decent *Aurora* this year, as far as more southerly stations were concerned, occurred on April 6/7, just too late for written accounts. G3FPK was alerted by a phone call from GM8FFX at about 2120 GMT. First signal heard—as usual—was GM3JFG in Fortrose (XR40c). Most of the stations heard had been worked in previous such events except LA8UU in CT80j, which would have been a new square. Chris Bartram, G4DGU (Oxon), has a receiver tuned to Meldrum which proved a good indicator of the event. He worked most of what he heard, including GM, LA, SM5 and SMØ. All the QTF's were between 000° and 020° true.

ON6AT/A mentioned working SM4DLT in GT square and GM8FFX and from the *Dubus* net, it seems that SM5EJN worked F9FT, so it went quite far south for some. It was obvious that many London operators were quite oblivious of this *Aurora* which lasted till about 0330 GMT, at least in GM. Observations at G3FPK were that it

"came and went" with GM8FFX on SSB and GM3JFG up to S9 at times. May we have your detailed accounts for the June issue please, with QTH locator and QTF and QTF/A information?

### Contests

*Results:* The 1976 Verulam Contest results indicate that 21 stations took part in the 2m. leg on Nov. 28. Winning station was G3VRE/P with 5062 pts. from 114 contacts, runner-up being G4DDP/P whose 95 QSO's totalled 3209 pts.

*Forthcoming:* May 7/8 is an IARU Region 1, 144/432/1296 MHz affair from 1600-1600 GMT. May 14 is the 1-3 GHz Open from 1700-2400 GMT, followed nine hours later by the 432 MHz Open and Listeners' Contest from 0900 to 1700 GMT. May 22 sees the first leg of the 10 GHz Cumulatives. The 144 MHz Portable event is the weekend May 28/29. That lot should keep you all going!

### Satellite News

A third cell of the battery has gone down in *Oscar 6* but the transponder is still relaying 2m./10m. signals satisfactorily. It is switched off when the telemetry on channel 3A falls to 332 (18 volts). To preserve the life of 0-6 it is essential to use as little power as possible.

The 435.1 MHz beacon on *Oscar 7* has been switched on again and will be on each first Mode "A" day of the week. (A week starts on Sunday) Please send reports of the TLM to AMSAT at PO Box 27, Washington DC, 20044, U.S.A.

Every Monday is now a *QRP Day* on 0-6 and on 0-7, either mode: 10 watts e.r.p. maximum.

For those who want to work out orbital data for *A-O-D*, due for launch in November, the parameters are: period 102.79 minutes; apogee/perigee 561.59/545.47 statute miles respectively; inclination 98.99° retrograde. If the launch is successful, *A-O-D* will become *Oscar 8* and the longest overhead pass will be 15½ minutes. As with 0-6 and 0-7 night time orbits will be ascending ones.

### Three Thousand Up

Seeing last month's note about G8HUY prompted Jack Hum, G5UM, to tell us that John of Ripon was his 3000th station worked

on 2m. from his present site near Leicester, these past ten years. The 3000 were "different stations," i.e. fixed, mobile portable and -/A. In the case of -/A care is necessary, adds G5UM, to ensure that the same site is not counted more than once. For example, several -/A calls are heard from Nottingham and Loughborough Universities. For the purpose of counting different stations, the form is, "If you have worked one, you have worked the lot," and this is the computation used at G5UM. For the record, "Uncle Mike" adds that the totals on the only other two bands worked were 695 on 70 cm. and 572 on 4m. up to the end of March, which is some sort of conspectus of different stations who have equipment for these bands.

### Band Plans

Some who read last month's comments by G8KSS concerning adherence to the 2m. band plan have called G3FPK to agree with the view that it should be respected. Chris Baker, G8JGK (Essex), wrote to say he wholeheartedly agreed with your conductor's comments. He continued, "When the conditions improve, I am looking forward and hoping to work DX, so would be rather upset if, after calling 'CQ DX' any DX was flattened by an S9 carrier." Chris says he has worked DX on AM and FM over the past two summers, ". . . so surely G8KSS can QSY to 144.50-145.0?"

G8KSS, in a further letter, maintains that he is not against band plans in general, only your scribe's ". . . very rigid view of them." He says, "I shall be calling on and around 144.52 MHz when *Aurora* and Sporadic E is around, looking for any contacts and would like to hear from anybody interested here and abroad. QTHR." Perhaps operators interested in AM or cross mode contacts would monitor 144.52 MHz for G8KSS. Why not establish it as an all mode calling frequency?

### Deadlines

That about wraps it up for another month. Please send all your notes and claims for the June issue by May 5 and for the July edition, by June 2 to:—"VHF Bands," SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts., AL6 9EQ. 73 de G3FPK.

# • • • SWL • • •

## SHORT WAVE LISTENER FEATURE

By *Justin Cooper*

OVER the last couple of pieces we have nattered on somewhat about receivers, and the usefulness of a listener to CW as a self-training process in trying to become competent SWLs on Phone. One topic we have not touched—ever—in this column concerns the “after life” when the licence has become an accomplished fact rather than a dream. Most of us, when this moment comes, have to build up the station within the constraints of a budget and what we know so far about our likely interests. Right from the start it is as well to accept that in the vast majority of cases there will be marked changes in the pattern of the interest; the DX SWL is deflected to listening to repeaters, or the avid home-constructor becomes a pure operator who only builds when he needs a bit of gear unobtainable in any other way, and so on. Thus, when you get the first ticket it is a good thing not to spend too much but to keep back some for later. This being the case perhaps it is as well to briefly comment on transmitters. The first thing to be aware of is that the arrival of SSB made a vast difference to our ideas in all the other modes of transmission too. Perhaps the most important of these changes has been the widespread improvement in *stability*. The old-time Top Band net on AM for example, would not notice a warm-up drift of the odd kilohertz or so, would often not be netted within a kilohertz either, and were all possessed of receivers which drifted in varying degree (The CR100 for example, said in its handbook that the maximum selectivity was not to be used much above a megahertz or so; a tacit admission of the receiver’s shortcomings). Thus it is fair to say that equipment performance which would not be acceptable to the extent that both the owner of the rig *and* the receiver of its signals would be nigh to foaming at the mouth in 1977, would have been quite acceptable in 1947. In those far-off days we expected things to drift, and to go over after a transmission almost always involved tuning round to find the other chap, not to mention following him about once he was found. Thus the use of the transceiver was *out* and we all had “separates,” even on mobile or portable rigs.

Our receiver was almost invariably a surplus one, and the transmitter home-brewed; to get a six-band rig we started with a VFO or a crystal at Top Band and followed up with a string of doublers, each one of which, in its operation also doubled the effect of VFO drift on the final frequency so that the Top Band VFO with a warm up drift of, say, 1 kHz would drift 16 kHz at Ten! The mixer-VFO scheme, where you make a low-frequency VFO and mix it with a stable crystal oscillator so that you end up with only small drift on the final frequency, was known but considered to be “way out” for the ordinary chap. And of course, all the AM phone meant that the heterodyne QRM was out of this world, and only the very dedicated phone operator ever worked out of his own continent, which meant that the only effective way to work real DX, or for that matter to hear it to any extent, was to learn the Morse Code, both to get away from the QRM but also because the low-power

signals could be copied—weak-signal performance was everything to the amateur receiver and one would trade anything in the performance line in favour of sensitivity. Under such conditions to work DX (and, pre-war, four out of five G stations would be operating on 14 MHz some time or other in any given week-end) needed good *operating* to even think of overcoming the shortcomings of the gear.

### The Mail

And for a start, the newcomers, of whom we have a bumper crop this time. *P. Elstob (BFPO 40)* wants to know something about RAEN; and also Great Circles and distances. RAEN groups naturally use chosen frequencies, the choice depending very largely on the local gear and terrain over which the groups operate. On the other question, the Great circle map gives true directions and distances at the cost of distortion of shapes; and the practical Great Circle path is the true shortest distance between two points on the Earth’s surface. A calculation of distance and bearing between two points on the earth is a basic navigational question; the essential formulae may be obtained from the ARRL Antenna Book given that you know the latitude and longitude of the two points. The sums can be worked through with a book of logs, a scientific calculator, or through the Tables given in a nautical almanac such as *Reed’s*.

On a different tack altogether, *I. P. Ruddock (Hertford)* wonders why it is necessary at all to go through an R.A.E. and Morse test for an amateur licence—he has had six tries so far and no joy as yet. In the last analysis, the test is there to meet the requirements of international law; and in the process to make sure that a candidate for a ticket is capable of keeping his rig in trim, or at least in knowing when it is playing up; of ensuring he has knowledge of the existence of TVI, shared bands and all the rest of it. If there were no exam., we could say for sure that the cost of active policing of our bands alone would put the cost out of most people’s reach, and the cost of type-approval of all our equipment to ensure it met the requirements of the licence would mean that every amateur would have to spend around a thousand pounds for the test gear to tell him his rig is “up the creek” and needs repairing, if he intended ever to use any home-brew gear; and of course every amateur would have to be crystal-controlled to avoid his going out of the band. And, SWL Ruddock says later in his letter that he would like to see Citizens Band here after a paragraph in which he complains about the goings-on over the GB3LO repeater—CB in the States makes the goings-on on GB3LO sound like the vicar’s tea-party!

*C. Chilton (Bulwell)* is a newcomer who uses an FR-50B receiver with a sixty-foot endfed aerial. Colin wants to know the HPX Rules—we will reprint them in full in a forthcoming issue, but essentially, it involves the collection of amateur radio prefixes (G3 is one prefix, GW3 a second, G4 a third, a GW4 fourth, and so on)

rather than of stations as such. The thing to do is to log all you hear properly, and then when the Rules are printed again, have a comb-through and total them up. In addition some sort of index system is required to make sure you don't accidentally claim a prefix twice or for that matter fail to claim one at all. One supposes the easiest index uses a few packets of index-cards from the local stationers, contained in some sort of box.

Another one who isn't quite sure of the Rules for HPX is *P. Sharpe (London W2)*, even though he has sent in a quite acceptable starting score in the meantime. Phil originally started his interest back in 1962, and at that time was a member of Cheltenham club until examinations claimed him in 1964. Thirteen years later, the bug bit again, with the purchase of a Drake SSR-1; and the aerial is about 35 feet draped round his room which is itself about fifty feet above ground level.

*P. L. Shakespeare (Foulness)* and his interest aroused when a technician at his work was tossing out some radio magazines—said technician happened to be G3SCY, and seems to have gone out of his way to help along our reporter; reader Shakespeare had an old National Panasonic T-100D portable, partly *u/s*, and G3SCY mended it and also, maybe more important, showed him how to use another receiver to give front-end carrier injection for CW and SSB reception.

## HPX LADDER

(All-Time Post War)

SWL	PREFIXES	SWL	PREFIXES
PHONE ONLY		PHONE ONLY	
K. Kyezor (Irchester)	1708	H. M. Graham (Harefield)	963
W. Bingham		P. Barker (Sunderland)	926
(Carrickfergus)	1621	W. H. Symth (Hartlepool)	861
S. Foster (Lincoln)	1596	M. Rodgers (Harwood)	847
R. Shilvock (Kingswinford)	1552	B. T. Mackness (Dagenham)	816
R. Carter (Blackburn)	1470	L. Gibson	
B. Hughes (Worcester)	1416	(Barrow-in-Furness)	765
J. Fitzgerald		J. Aspinall (Leeds)	753
(Gt. Missenden)	1412	D. Taylor (Harborne)	731
M. Quintin		P. Rooney (Liverpool)	725
(Wotton-u-Edge)	1337	S. Budd (Worthing)	714
P. C. Jane (E. Loce)	1331	M. Gibson	
K. A. Whiteley (Castleford)	1311	(Barrow-in-Furness)	640
A. W. Nielson (Glasgow)	1236	S. T. Bowen (Kippax)	594
M. Cuckoo (Herne Bay)	1214	P. Rooney	
H. A. Londesborough		(CW ONLY)	
(Swanland)	1188	A. Glass (Plymouth)	1266
J. H. Sparkes (Trowbridge)	1097	N. A. Phelps (Devizes)	1258
E. W. Robinson		H. A. Londesborough	
(Bury St. Edmunds)	1091	(Swanland)	995
M. C. P. Bennett (Datchet)	1063	A. F. Roberts	
Mrs. J. B. Jane (E. Loce)	1053	(Kidderminster)	465

Minimum starting score 500 for Phone, 200 for CW. Listings in accordance with HPX Rules, and only include recent claims.

Although he has passed R.A.E., *J. G. Ollis (Solihull)* says he can't afford to take out a ticket yet. He has a home-brewed double-superhet, which has a severe attack of fallen sensitivity above about 21 MHz, leading to thoughts of pre-selectors. Watch for this one—a test with a good standard signal generator and an oscilloscope looking at the output could well show you that the sensitivity of the receiver is not down so much, but that the level of incoming noise has fallen and so given that impression! On a different tack comes the question of the advantages of the product detector over the use of a diode detector and BFO. Essentially, the BFO of a

diode-detector set-up is of a low voltage injection, to keep it from upsetting the AGC line (unsuccessfully, as some manufacturers accept tacitly) and also, more important, to avoid the pulling of the BFO by the big signal coming down the IF. Fitting of a product detector enables much larger injection voltage from the BFO, and this is accepted in that the BFO is now called a CIO! In addition, the isolation between the CIO and the AGC can be improved to the point where AGC is practical, although many receivers opt for audio derived AGC. That being said, J.C. has been using diode-detector gear for years on SSB, and, properly adjusted, there is not a lot in it.

A very brief first entry comes in from *A. R. Darby (Rotherhithe)*; he has an FR101S receiver and a Joystick aerial mounted thirty-five feet up in the air above the roof of a block of flats, to give him a first claim of 341.

On now to *G. Parker (Guildford)* who has an end-fed wire into a Heath HR10B; further studies of an interesting subject like R.A.E. are awaiting clearance of the O-level examinations. Guy has a pet hate in amateurs who do not repeat their call signs clearly enough, which is fair enough as far as it goes, but it must also be borne in mind that the stations concerned may be in a QSO of perfect copy at each end, in which case the unnecessary repetition or phonetically spelling-out of all the QSO data is, as far as the two stations are concerned, pure liddery! It also spins-out the rubber-stamp contact, so causing an overall increase in QRM by increased occupancy of the band. Practically, though, it would be no bad thing were call signs to be spelt out phonetically on the final signing, just for the benefit of the SWL.

Our last newcomer is *Mrs. S. A. Waterfall (Truro)*, who has an AR88D with a PR30 preselector; one wonders if she has yet joined up with the Cornish Club gang YL's yet. If she hasn't, we bet she will after R.A.E. night, when your conductor happens to know of another one, at least, YL who will be taking the examination in that area! On a more serious tack for a moment, a query is 6B2SST, heard on January 25 on 14 MHz. A look at the prefix list says that this would be an SU if it were genuine, and we feel it is a fair bet that it was a phoney. A pity—it would have been interesting were it genuine!

## The Others

*P. Ramsay (Steventon)* says he suffers with static between 1.9 and 2.0 MHz—it is hardly likely that the noise from an electricity-pylon line could be so narrow banded, as one would normally find it gently tailing off as the receiver is tuned higher in frequency. Thus the question has to be "What the blazes is it?" and the most likely answer we can think of says Loran-A, the European chain of which is centred on 1950 kHz.

That WT1AAA whom we wrote off as a Slim has turned out to be real—several folk wrote in about this one, among them being G3BHK and G3KFE's old buddy, W4WFL. It seems the computer broke down—the most regular failing of computers, although not as comprehensively as seems to have happened here. Anyway that means WT is a "good" prefix, though it will disappear when the box of tricks is mended and "proper" calls allocated.

*T. W. Morgan (Swansea)* recently bought a used

CR70A receiver and is finding his way about the bands for the first time: one of his earlier listening sessions came out to be the same time as the CQ WW Contest. The numbers heard in such contests usually consist of the report, followed by a three-digit number which goes up one for each contact made—usually beginning at 001, but for some contests, to avoid the backmarkers giving up, it is permissible to start the serial-number at any point, continuing upwards as before. Thus the contests will on phone swap a five digit number of which the first two digits will be the R and S of the report, while the CW contester will send RST plus serial, to give a form like, for example 599001, 579002, and so on.

Nice to hear again from *K. Kyezor (Irchester)*, who remarks on hearing the W's from the Western Reaches over here as early as noon, which is highly unusual for W6, W7, and W0.

*B. F. Hughes (Worcester)* remarked last time how he was pleased with his FRG-7; and this time he analyses his results since it was installed as compared with the All-Time; and it certainly is an impressive analysis when due allowance is made for Bernard having been listening for long enough to have seen the bands change their characteristics as the sunspot cycle continued.

On the other hand, *J. Aspinall (Leeds)* is not so happy with the comparison between his R-300 and the pre-war Hallicrafters SX17 he is restoring; the objection being largely due to the difference in the amount of bandspread available. However, what your J.C. suspects Joe hasn't taken into account is the difference in the performance of the two receivers as far as weak-signal reception on the one hand and weak-signal response in the presence of strong out-of-the-passband stations on the other. The point here is that the valves on the SX 17 receiver front-end have lots of gain ahead of the mixer, to overcome mixer noise, and at the same time the performance of these high-gain RF stages falls off pretty quickly with time, the noise figure deteriorating from the "book" value of a new valve to something much higher very quickly, after which it stabilises at the lower figure; and the gain built into these two RF stages is quite enough to upset the operation of the mixer in the presence of the strong signals present today. In addition, of course, although there is a bit less band-spread on the R-300, it is probably more accurate in the frequency read-out, and the semiconductor devices are not subject to the same tendency to fall off as they have no cathode to be "poisoned" and wear out.

*P. Wells* hails from *Colne* and has been listening to DX on all bands; but he has now made the decision to sell all the gear in the shack to raise the wherewithal for a two-metre all-in-one receiver—one would think that the combination of his present receiver; possibly endowed with an FM detector if one is not already fitted (there are IC's that are useful in this context) and his existing converter, would serve equally well.

*A. Glass (Plymouth)* writes to catch up with the scoring, having not been able to contribute last time round; and Bert notes that *N. A. Phelps* should have been above him on the CW Ladder. Yes, indeed, but this time there seems to be no score in from *SWL Phelps* so Bert goes back to the top.

SS/TV is the main interest at *P. Barker (Sunderland)* where the home-brew gear has been displaced by *Robot*

## ANNUAL HPX LADDER

Starting January 1, 1976

SWL	PREFIXES	SWL	PREFIXES
G. Ridgeway (Ardleigh)	499		(Borehamwood) 350
D. W. Waddell (Herne Bay)	477	P. Ramsay (Stevenston)	312
P. Wells (Colne)	427	P. Polanyk (Coventry)	300
L. West (Langley)	414	A. Dimmick (Glasgow)	220
R. G. Williams			

This is the final appearance of the 1976 Table. Entrants must now either go on to the All-Time list, if they have enough earlier material to make up the starting total, or alternatively put their 1976 lists by, and make a new start on the 1977 Table. Once they reach the All-Time start level, any of the 1976 total which are not shown elsewhere in their lists may be taken in then.

stuff which has had the effect of bringing up the scoring, both in terms of countries and prefixes in this mode.

*K. A. Whiteley (Castleford)* wants to know about the Delta Loop aerial. This one can best be regarded as a Cubical Quad pulled out of shape, the rectangle being replaced by a "triangle standing on its head" which is probably an easier shape to manufacture in the "plumbers delight" all-metal technique, and there are claims that a Delta Loop can be more gainy than the equivalent Quad, although this writer has his doubts as to whether the difference is significant. The great advantage of a Quad or Delta Loop aerial is its tendency to improve in performance as compared with an equivalent Yagi, when it is mounted "close" to ground in terms of wavelength at the design frequency; and the lower the aerial is, the more the comparison favours the Quad.

Talking of aerials, *M. C. P. Bennett (Slough)* has been well occupied in the exercise of handing up a TA32 two-element triband beam; the improvement is most marked and the local council are said to have been very helpful all along the line.

*R. Carter (Blackburn)* has been spending a lot of his time on the bands listening-out for WAMRAC members overseas, without success, but of course in the process along came a few more scoring prefixes. Two doubtful ones included CH1J heard on Forty, which might—just might!—have originated in VE-land, and VQ1ZM which just has to be a phoney—VQ1 was the prefix for Zanzibar, 'way back before it was "liberated" to become part of a dictatorship.

*W. Bache (Kingswinford)* is home-bound after an accident, and in three months of listening has amassed 230 countries; we were highly amused at his tailpiece, in which he mentions UZ6CL in the "village" of Sverdlovsk; some village with over a million souls of population! A glance at the useful Penguin Encyclopedia of Places also indicates it is the main cultural centre for the Urals, as well as being well-known for heavy engineering and as the western terminus of the Trans-Siberian Railway. As for UZ6CL sounding somewhat American, this is not at all unusual.

A long letter from *E. W. Robinson (Bury St. Edmunds)* is full of comments and queries. To deal with the queries, the HI10 prefix heard was quite genuine, and the D4CBS was to the best of the writer's knowledge, from Cape Verde Is.

*K. M. Rogers (Lutterworth)* disappeared from our lists some four years ago, in favour of other forms of radio activity. Ken now makes his return with new gear in the form of an R-300 and an NR-56 for two metres,

although his aerials are the same as they were four years ago. His HPX query is about the Americans using "N" call signs—quite above board.

How do you work out the exact frequency you are on with a Trio JR-310, asks *G. A. Passmore (Pembroke)*. Quite easy; on most of the Trio receivers the main tuning knob has a skirt with engraved marking on it. "O" on the knob, "O" on the dial, represents the bottom end of whatever band you are switched to, and when you switch the calibrator on, both these "O's" can be set where they should be and a control used to bring the calibrator harmonic to zero-beat; the modern TS-520 simply moves the "skirt" of the knob relative to the knob itself, and your scribe seems to recall this also was the case on the JR-310, although it is many years since he ran the rule over one; the alternative ways of "zeroing" include a varicap diode with a front panel "twiddle" to set zero, and physical movement of the fiducial to be over zero when the rig is at zero. In the Trio rigs the dial skirt then reads off linearly the intermediate frequencies between two calibration points; it is usual to calibrate at the nearest calibration point before reading off the frequency.

*W. H. Smyth (Hartlepool)* was a bit startled at our refusal to accept any "AM Only" entries in the Ladder: he has for years broken down his lists by mode, and we have not commented because this was also a help to us; but for years, in fact ever since SSB become the predominant mode, we have made it a rule to classify all the "Phone" entries as the sum of all the prefixes heard on any form of telephony; partly because to do otherwise would involve an enormous amount of checking at this end (have you ever worked a chap on "SSB" and received a QSL saying he was on AM?) and partly because of the risk that enough people would run special-mode entries for AM, FM, SS/TV, or whatever, that we would have to expand the Ladder into several parts. This also covers prefixes heard *via* Oscar, although it has to be admitted your scribe had some soul-searching thought over this last.

Having managed 325 in the 1976 Ladder, *S. Hammond (Solihull)* has now managed a Trio 9R59DS receiver plus ninety feet of wire fed at one end, with which he has started with 211 for the 1977 list.

*H. M. Graham (Harefield)* missed the bus last time but in so doing has managed to pile even more news into the present letter. Nothing much on Ten, Fifteen opening well, but not every day, and, as ever, the meat of the DX on Twenty. W7JZU was in Wyoming to complete the set of States, but one has grave doubts as to C7UBP, heard in mid-afternoon back in early December; as the C7 series are allocated to the World Meteorological Organisation it is fairly safe to assume this one was a phoney. Another odd one, which Maurice himself reckons to have been misheard was an "NM3SI" around 2000z on March 3.

*T. Scrimshaw (Birmingham 31)* is still struggling along, and only has a BFO facility on one band, namely Eighty; with this he attacked the ARRL Contest and got more prefixes logged in a weekend than he had done in a year before! In fact, if Tim were to make a "calibration chart" of his front-end injection, he could probably use it on Twenty also—your scribe has on occasion done the "two portables" trick like this, using the second

harmonic of the oscillator frequency as a successful "bodge."

A difficulty for *D. W. Waddell (Herne Bay)* is that his FRG7 receiver works well on the HF bands but is very difficult to handle on Eighty—quite the reverse of the normal situation, in fact. Two things spring to mind immediately: one, that 1.8, 3.5, and 7.0 MHz use lower sideband while the HF's use upper, and secondly that signal strengths tend to be higher (and noise!) on Eighty, which means that often the limiting factor is the amount of CIO injection available to cope with a big signal at the product detector. One could try to cut back on the RF/IF gain, regardless of whether the AGC is on or off, and see if this cleans a big signal up; if it does you have the answer, and only wind up the gain for the weak signals, or, better fit an attenuator. If, on the other hand, the problem arises on both big and small signals, then there must be some investigating to be done.

## ANNUAL HPX LADDER

(Starting date January 1, 1977)

SWL	PREFIXES	SWL	PREFIXES
G. Ridgeway (Ardleigh)	496	G. A. Passmore (Pembroke)	217
D. W. Waddell (Herne Bay)	423	S. Hammond (Solihull)	211
P. L. Shakespeare (Foulness)	410	S. W. Allsopp (Banbury)	211
A. R. Darby (London SE16)	341	P. Sharpe (London W2)	203
P. Ramsay (Stevenston)	270	Mrs. S. Waterfall	
K. Rogers (Lutterworth)	254	(Chacewater)	200
J. G. Ollis (Solihull)	228		

Starting score 200, in accordance with HPX Rules. All Prefixes to have been heard in 1977.

### The Rest

That's about our lot from the space point of view; so here we can just acknowledge Table entries from: D. Taylor, Harborne; A. W. Nielson, Glasgow; L. Gibson, Barrow-in-Furness; Mrs. J. B. and Mr. P. C. Jane, E. Looe; M. Gibson, Barrow-in-Furness; J. H. Sparkes, Trowbridge; G. Ridgeway, Ardleigh; J. B. McDowell, Bristol; M. J. Quintin, Wotton-Under-Edge; S. Bowen, Kippax; H. A. Londesborough, Swanland.

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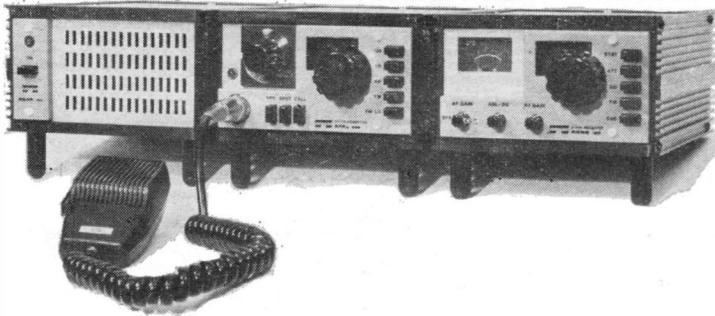
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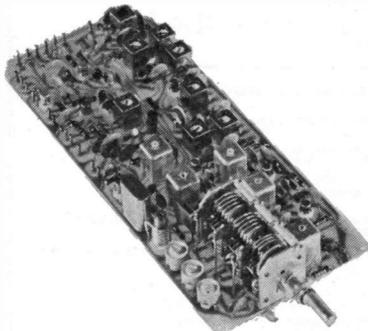
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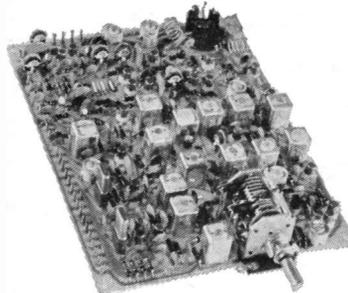
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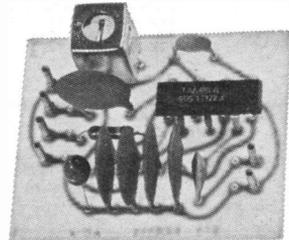
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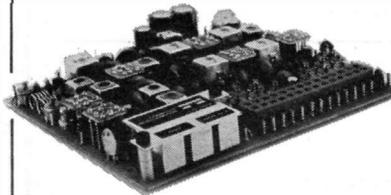
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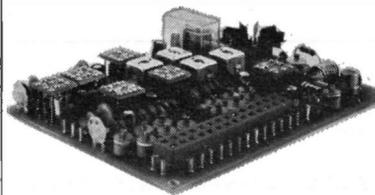
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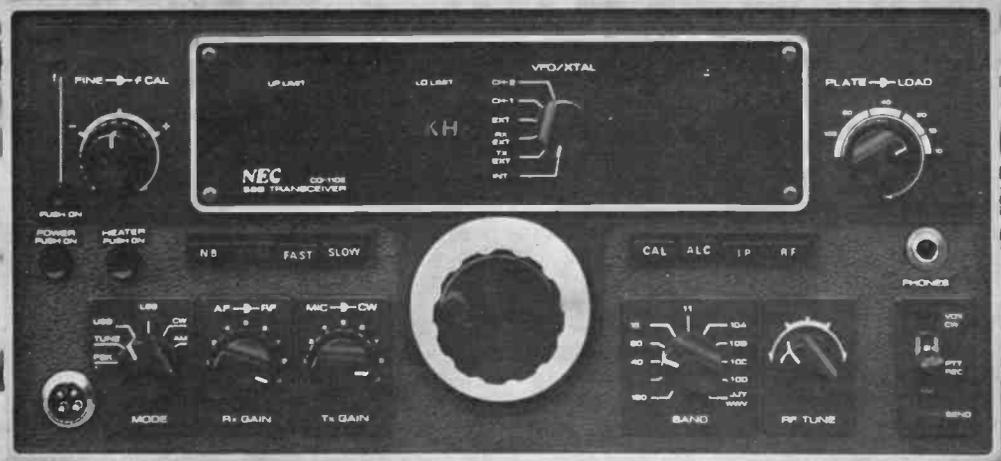
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# NEW PRODUCT UP-CONVERTER MODEL UC/1

SYNTHESISER CONTROLLED GENERAL COVERAGE RECEIVING ADAPTOR PLUS TWO-METRE CONVERTER FOR RECEIVERS COVERING 28-29 MHz AND/OR 144-145 MHz



Model UC/1 converts any existing amateur-bands-only receiver which has coverage of 28-29 MHz or 144-145 MHz (e.g. HF bands receivers or transceivers and 2-metre "all-mode" transceivers) into a general coverage receiver with equivalent high performance. Compared with the alternative of purchasing a separate receiver for general coverage, Model UC/1 avoids wasteful duplication and gives better performance for less outlay.

### FEATURES :

- Gives complete no-gap coverage from 90 kHz to 30 MHz, in thirty switched 1 MHz bands.
- Also operates as a 2-metre converter with receivers covering 28-30 MHz.
- Two separate outputs are provided, one for 144-145 MHz and the other for 28-29 MHz receivers.
- No receiver modifications are required. Model UC/1 simply connects in series with the aerial feeder.

- Overall performance is limited primarily by that of the main receiver.
- Straightforward digital switch selection of the desired 1 MHz band segment eliminates critical adjustments such as "tuning for lock."
- Built-in aerial attenuator.
- Frequency synthesiser locked to 1 MHz crystal.

PRICE £97.50 plus 12½% VAT, Total £109.69 (including delivery in UK)

Data Sheet for UC/1 available free on request. Also available: Frequency-Agile Audio Filter Model FL1 ; Universal RF Speech Clipper, details on request, or refer to our advertisement in December's issue.

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FT301, FT221, FT220, FT620, £3.00 each inc. VAT. Carriage 45p.

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Ident .... £125-00	YC500S 500 MHz counter 1. P.P.M. .... £225-00	QRT24 World time clock .... £13-00	FT101E "EE" with RF Clipr. .... £429-00
FT200B T/Rx 3-5-30 .... £249-00	YC500J 500 MHz counter 10 PPM/1 .... £155-00	YD846 Hand mic. .... £7-50	FT101EX "EE" less DC PSU etc. .... £369-00
FP200B AC PSU/Speaker .... £54-00	YV355D 220 MHz counter AC/DC .... £139-00	FR101S Rx 1-8-30. 12/240v. .... £299-00	FV101B External VFO .... £62-75
FRG7 Rx 1-5-30 Cont. AC/DC .... £145-00	YC355 35 MHz counter AC/DC .... £105-00	FR101D De luxe "S" BC, FM .... £390-00	
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OUTPUT FREQUENCY	a	b	c	d	e	f	g	h	i	j	k	l	m	n
144-030 ...	a	b	b	b	b	b	b	b	b	b	b	b	b	b
144-4/433-2 ...	a	b	b	b	b	b	b	b	b	b	b	b	b	b
144-480 ...	a	b	b	b	b	b	b	b	b	b	b	b	b	b
144-80 ...	a	b	b	b	b	b	b	b	b	b	b	b	b	b
144-85 ...	a	b	b	b	b	b	b	b	b	b	b	b	b	b
145-000/SO ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-050/R2T ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-075/R3T ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-100/R4T ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-125/R5T ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-150/R6T ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-175/R7T ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-200/R8T ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-300/S12 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-350/S14 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-400/S16 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-500/S20 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-525/S21 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-550/S22 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-575/S23 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-600/S24 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-650/R2R ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-675/R3R ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-700/R4R ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-725/R5R ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-750/R6R ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-775/R7R ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-800/R8R ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-950/S38 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a

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A5-12

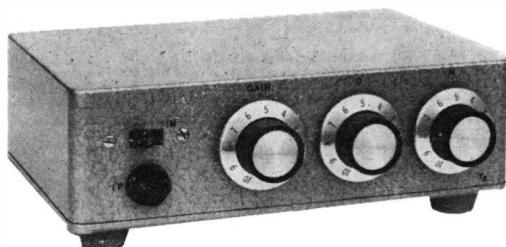
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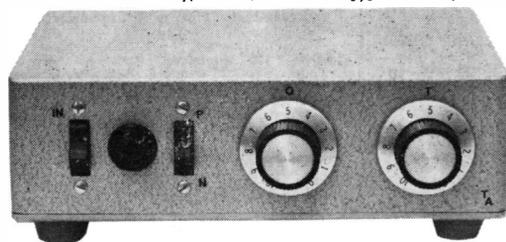
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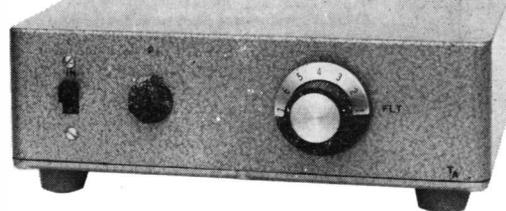
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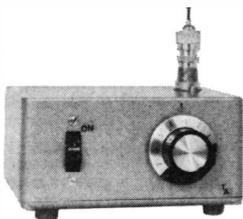
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