

# The SHORT WAVE Magazine

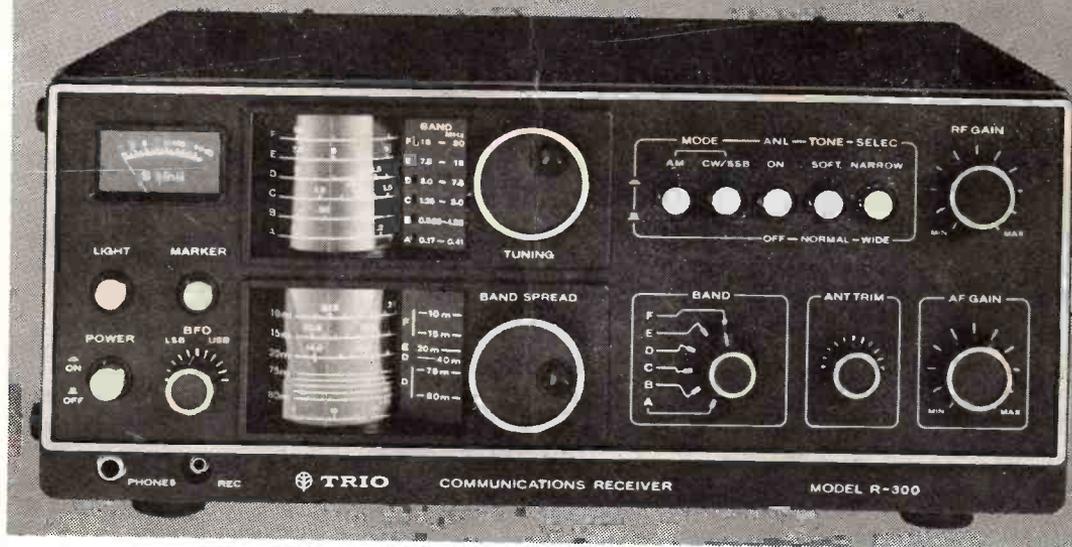
VOL. XXXIV

JANUARY, 1977

NUMBER 11

## 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 a Himalayan expedition. The R-300 is the invisible bridge to other countries and continents and the bridge to the home country for many 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 and bandspread dials.

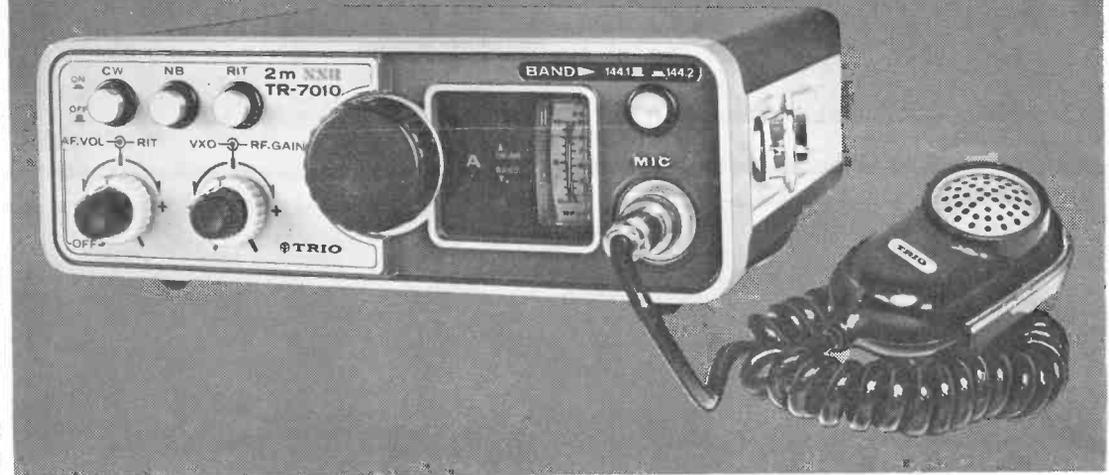
**Outstanding Input Sensitivity**—The dual-gate MOSFET front end assures excellent cross-modulation and spurious characteristics, as well as high input sensitivity. Between 18 and 30 MHz the R-300 operates as a double superhet, giving sensitivity of 1 $\mu$ V for AM and 0.5 $\mu$ V for SSB. For full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

**New. CL22 antenna coupler** for all shortwave receivers. Perk up your receiver performance the easy way

**Sole Importers: LOWE ELECTRONICS**  
Cavendish Road, Matlock, Derbyshire  
Tel.: Matlock 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 30 Watt device 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 for everyone.

### SPECIAL OFFER

Trio have agreed to maintain a special low price for the TR7010. Stocks are limited. Contact us for the current discount on this model.

Sole Importers  
**LOWE ELECTRONICS**  
 Cavendish Road  
 Matlock Derbyshire  
 Tel: Matlock 2817/2430



**NEW**

# The DXpert

An all-new big brother for the TS520  
TS820 from TRIO



The all new TS820 from Trio completes their HF transceiver range. This is the top-of-the-line transceiver which offers a significant advance in design and construction over all others. This is the "DXpert" from Trio.

- Full transceiver operation on all amateur bands from 160-10 metres (28-30MHz) on SSB, CW and RTTY; optional 2 metre transverter; optional external VFO for full split Tx/Rx operation.
- Outstanding performance on both transmitter and receiver due to fully balanced mixing combined with latest PLL techniques.
- First class frequency stability and large signal handling characteristics.
- All new precision dial drive mechanism with unambiguous readout. Optional digital frequency readout with memory facility.
- Fixed station or mobile operation with a complete line of matched system accessories for building the best possible complete station.
- RF speech processor with fully metered adjustable compression is built-in.



- IF pass band tuning allows the IF to be tuned across a signal without resetting the main dial.
- Five function metering system together with LED monitored operator control.

This brief advertisement can only touch upon the main details of the TS820. You have to handle it to appreciate its performance. See it soon at your local branch of Lowe Electronics.

**Sole Importers**  
**LOWE ELECTRONICS**  
 Cavendish Road  
 Matlock Derbyshire  
 Tel: Matlock 2817/2430

 **TRIO**

# LOWE

## NR-56 FM RECEIVER

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 is thus an excellent mobile receiver for mounting in the car, boat or caravan as well as for home use.

- ★ Double filters at 10.7 MHz and 455 kHz.
- ★ Dual conversion 10.7 MHz/455 kHz.
- ★ Narrow filter fitted for European Market.
- ★ PET RF stage for high sensitivity.
- ★ 12v. operation.
- ★ Built-in loudspeaker.
- ★ Small size 6½" x 6¼" x 2"
- ★ Mobile mount and personal ear-piece supplied.
- ★ Full coverage VFO built in.
- ★ 11 crystal positions (optional crystals ex-stock).
- ★ 22 transistors 1 integrated circuit, 16 diodes.
- ★ NR-56 £54 inc. VAT. Postage 48p. Crystals £2.40 inc. VAT.



**DAIWA** products. Possibly the most expensive but certainly the best. An all new range of antenna and station accessories from a company which is dedicated to providing only the best quality products for the radio amateur and SWL.

**CL22** An antenna coupler for the SWL. Covers 2-30 MHz in seven switched bands with separate receiver and antenna tuning controls. An enormous help in reducing image interference and perking up receiver performance at minimum cost. £13.50 inc. VAT.

**SW110** The power meter for the HF transmitting amateur. Frequency range 1-8-30 MHz. Two power ranges 0-20W. and 0-200W. with no fiddles. Three SWR ranges as in the SW410. The finish and construction are a lesson to other makers on how to do it properly. £25.92 inc. VAT.

**CL65** A coupler for the radio amateur. Rated at 500W. PEP, the CL65 covers 3.5-30 MHz in six switched bands. Finest quality components ensure top performance from this antenna tuner. £54.00 inc. VAT.

**SWX777** Top of the DAIWA power meter range, the SWX777 features in line power measurement using a cross pointer meter system which allows simultaneous readings of forward power, reverse power and SWR using the calibrations on the meter face. Two dual ranges, HIGH = 1000W, forward/200W, reverse and LOW = 200W, forward/40W, reverse. Frequency range 1-8-30 MHz. Absolutely excellent and a really good addition to any station. £110.16.

**CL666** This coupler has to be seen to be believed. This is without doubt the finest antenna tuner that we have ever seen and it provides everything that the amateur could want. Rated at 2.5 kW. PEP, the CL666 covers the range 1-8-30 MHz and provides wide range impedance matching with no power handling problems. It's no small box, measuring 370 x 150 x 285 mm. and no small price either, but it's the best. £175.50 inc. VAT.



**CSW216** A combined SWR/power meter and antenna tuner for the complete station accessory. Tuning unit covers 3.5-30 MHz and is rated at 500W. PEP. The SWR/power meter has the same specification as the SW110 and can be used as a separate instrument from the tuner. A truly magnificent instrument. £103.50 inc. VAT.

Prices are subject to alteration without notice.

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119 Cavendish Road, Matlock, Derbyshire. (0629) 2817 or 2430 9 a.m. to 9 p.m.

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Communications House, Wallington Square, Wallington, Surrey. Tel. 01-669 6700  
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Alan GW3YSA, 35 Pen-Y-Waun, Efail-lsaf, Nr. Pontypridd. Tel. Newton Llantwit 3809  
John G3JYG, 16 Harvard Road, Ringmer, Lewes, Sussex. Tel. Ringmer 812071  
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EXTRA URGE?  
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BECAUSE YOUR A.G.C. ISN'T WORKING ON THEM?  
DO YOU KNOW WHAT YOU WANT NEW YEAR?

We have pre-amplifiers for everyone. HF-VHF-UHF. Why not join the 1000s of users of what are probably the most cost effective devices advertised in this journal?

#### THE SENTINEL H.F. PRE-AMPLIFIER

A success after one month, with people ordering their second unit and many orders being received following recommendations. A wideband pre-amplifier covering 1-40 MHz, gain 15 dB, noise figure 1 dB. Input and output Z 50 Ohms, supply 12v. (9-15v.). They use the latest techniques with a UHF power transistor and voltage and current -ve feedback to ensure a high signal acceptance level, and a remarkably flat response. The box size is 2½" x 3" x 1½" and an internal c/o relay allows the unit to be inserted in a transceiver aerial lead, and is also used to switch the pre-amp out of circuit. Price: £10-12 including VAT and ex-stock.

**THE PA 10** printed circuit board version of the above—less c/o relay. Size only 1 cubic inch. Price: £5-62 including VAT, ex-stock.

#### THE SENTINEL LOW NOISE FET PRE-AMPLIFIER

The "Ultimate" in VHF pre-amplifier performance. Ex-stock, for 2 metres, 4 metres, Marine band and Satellite band. Other frequencies to order. Selected FET provides; Noise figure—1 dB, gain—18 dB. Supply 12v. (9-15v.) 5mA. Size: 2½" x 3" x 1½". Price: £8-72 including VAT, ex-stock.

#### PA3 2 METRE DUAL GATE MOSFET PRE-AMPLIFIER

Designed to fit inside your transceiver. Only 1 cubic inch in size. This is the one everybody fits. N.F. 2 dB, gain 18 dB, supply 12v. (9-15v.) 5mA. Price: £6-27 including VAT and ex-stock.

#### SM71 70cm. PRE-AMPLIFIER

A 2 stage selected J FET Pre-amplifier giving a gain of 18dB a N.F. 0.3dB. Price: £10 including VAT and ex-stock.

#### TRANSVERTERS



#### EUROPA B — THE WORLD'S BEST SELLING 2 METRE TRANSVERTER

Contrary to any rumours, the Europa B is continuing in full production.

The EUROPA B provides:

- ★ 200W input 50% efficiency with 200mW drive.
- ★ Receive converter—2 dB N.F. 18 dB gain.

★ Cleanest output spectrum—80 dB overall spurious responses.

★ Size only 9" x 4½" panel, 4½" deep.

★ Price: £109-15 including VAT, complete to plug in Yaesu equipment and ex-stock.

EUROPA COMPLETE POWER SUPPLY TYPE CPS10—Price £45-00 including VAT and ex-stock.

#### NEW EUROPA TWINS

THE EUROPA 70 SOLID STATE 70cm. TRANSVERTER. Price: £95-00 including VAT.

THE EUROPA SS SOLID STATE 2 METRE TRANSVERTER. Price £90-00 including VAT.

Both give 10 Watts using the latest SOE transistors rated to withstand infinite load mismatching.

Receive converter gain is 30 dB and N.F. for 2 metres 2 dB, for 70 cms. 3 dB, IF 28-30 MHz.

VHF CONVERTERS 2 METRES, 4 METRES, 70 cms., Satellite Band and Marine Band from stock. Other frequencies to order.

#### SENTINEL DUAL GATE MOSFET CONVERTERS

★ N.F. 2 dB, gain—30 dB.

★ No oscillator frequency multiplication to reduce spurious signals.

★ Very high tolerance crystals, 5 p.p.m. for calibration accuracy.

★ Strong signals and over voltage and reverse polarity protection built in.

★ Standard IFs are: 2 metres: 2-4 MHz, 4-6 MHz, 28-30 MHz, 4 metres: 28-28-7 MHz.

★ Size only: 2½" x 3" x 1½" long except 2-4 MHz and 4-6 MHz which are double conversion and 4" long. Price only £18-00 including VAT and ex-stock.

#### SENTINEL 2 METRE CONVERTER KIT 28-30 MHz IF ONLY

A well proven kit supplied with printed circuit board, drilled and with all coils mounted to make assembly easy. Price: £11-50 including VAT, IF it doesn't work send it back with £2-25 and we will fix it. Ex-stock.

#### SENTINEL X 2 METRE CONVERTER

A de luxe version of the Sentinel. Performance spec. is the same but it contains an external mains power supply and a front panel RF gain control.

★ Size: 5" x 1½" front panel, 4" deep.

★ Stock 2 metre I.F.s: 2-4 MHz, 4-6 MHz, 28-30 MHz. Price: £22-00 including VAT.

**SENTINEL M.F.** Another Dual Gate MOSFET 2 metre converter which converts to medium wave in 2 switched bands. Price: £20-00 ex-stock.

**SM70 70cm. CONVERTER.** This is a very high performance 70 cm. to 2 metre FET converter. Price: £18-00 including VAT.

**SENTINEL 70.** 70cm—28-30 MHz converter. Noise figure -3dB. Gain -30 dB. Price: £20-00 including VAT.

**SSM Z MATCH.** 80-10 metres matches 15-5000 ohms, 2kW. at 50c ohms, £28-00 including VAT. Size: 8½" x 4" front panel, 7" deep.

#### SSM IAMBIC MORSE KEYS

C MOS circuit for use with "squeeze" or single paddle keys, price £33-75 including VAT. Twin paddle key to complement our keyer, £11-25 including VAT.

12 months guarantee on all units. We offer same day COD (£50 limit)

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# South Midlands

TOTTON (HEAD OFFICE), LEEDS (SMC NORTHERN)



### THE MULTI U II A NEW DIMENSION IN SEVENTY CMS

The Multi U II provides a unique combination of frequency control by either 23 switchable or 4 instantly selectable auto scanning channels or an external VFO.

The main dial is channel numbered (e.g. 16 = 433.4, 20 = 433.5 etc.) and is illuminated only when a channel is crystallised up. Two R.F. stages in the receiver provide great sensitivity (0.5uV for 30dB NQ). The use of a band pass first IF (CF 45 MHz) gives high image immunity and low channel crystal drift. Further conversions to 10.7 and 455 prevent IF image whilst providing good pass and skirt selectivity. The transmitter of switchable 10/1 W output draws only 2.5 or 1.3A (0.6 or 0.3 ARx) and has a netting of new crystal facility. Both the Tx deviation and the Rx bandwidth are switchable for 50 or 25 kHz spacing. Other features include, diode RF switching, R.I.T. "on the air" lamp, PO meter, S meter, AFP, reverse polarity protection, etc., etc.

WITH 8 CHANNELS FROM 1—SU (0, 8, 12, 16, 18, 20) and RU (0, 2, 4, 6, 10, 14)

INTRODUCTORY PRICE ONLY £215 ..... VAT Ex Stock

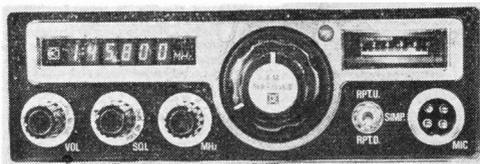
The Digital II offers complete 5 kHz step coverage across 2 metres and now with the Scanner 33, 25 kHz channels from 145 MHz upwards covered in around 10 seconds. It offers full lock and lockout on all channels. The scanner stops on a required channel for 10 seconds, then unless locked moves on. The 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 6 1/2" x 2" x 7 1/4". 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 FET's. 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 -70dB) 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 circuits block construction (for serviceability and screening). Selective calling socket (mic/LS/PTT etc.) on rear panel.

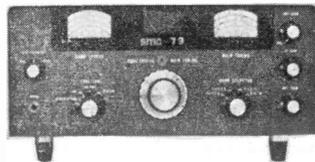
### THE SMC73 GENERAL COVERAGE RECEIVER

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 (10-80m.) 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 range (helped by adjustable RF attenuator), and marked freedom from "pulling" of both the local and beat frequency oscillators. An internal loudspeaker (but with jacks for 'phones and external speaker), illuminated signal meter, SO239 (UH) coax socket and binding posts for antenna, switchable envelope (AM) and product detectors (SSB/CW) provision on switch for possible fitting of FM demodulator, are all features of this exciting new low price receiver.

### DIGITAL II now with SCANNER



ONLY £245, CRYSTAL TB £10, SCANNER PRICE T.B.A.



SMC 73  
Ex-Stock £114.50 (+ VAT)

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



2 meter, SSB/CW/FM, RF sensing with manual override, "microstripline" 12v. D.C. 10W drive. 2" x 6.5" x 10" (11") (Over 15 different models—S.A.E. details) (VAT 12 1/2%).

PA144/160/BL 145 MHz 160W, out £155



2 or 70 superb R.F. sensing, excellent bias arrangements, c/w mounting bracket. 12v. D.C. 10W drive. 2.5" x 5.2" x 7.5" (8.5") (VAT + 12 1/2%) (57A TOS).

APB82A 145 MHz 80W output £95.00  
APB57A 433 MHz 45W output £95.00

### Microwave Modules Transverters

From Ten, Six or Two Metres (a '101 etc., a '620B or a '221R). 10W output, balanced T.X. mixers, low spurious content, high selectivity wide dynamic range (VAT + 12 1/2%) (full converter range stocked S.A.E. details).  
MMT 144/28 or 50 2 metres £79.00  
MMT432/28 or 50 70 centimetres £97.00  
MMT432/144 Double conversion £133.00



MMT 432

### Coax Relays

12v. DC 50 ohm, Silver plated Ex-Stock P. & P. 30p (VAT + 8%)  
Power crosstalk (at 500 MHz)  
CX120 50W 35dB Cable entry £8.50  
CX230 300W 40dB BNC sockets £18.25  
CX600N 600W 40dB N sockets £21.75



### Yaesu Clock

Analog clock with automatically advancing 24 hour time zone hour disc giving, at a glance, time in principal cities or time zone. Battery powered, self starting, shock resistant.

QTR24 only £13.00 (VAT + 8%)



### Coax Slide Switches



Up to 1kW, 1.5 GHz, 0.3dB loss, 1:2:1 VSWR, 50dB isolation, 50 ohm "N" or "PL" fittings. Ex-Stock P. & P. 30p (VAT + 8%)  
TWS 120 1 in 2 out Nickel SO239 £4.90  
TWS 120G 1 in 2 out Gold SO239 £5.90  
TWS 150G 1 in 5 out Gold SO239 £10.45



KP202  
KCPI2

The handheld KP202 with its 2W of RF and 1/4W of audio immunity to image and IF break-through, 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 (£5.75), leather case (£4.75), base charger KCP2s (£11.25), set of 10 ni-cads (£8.50), F to UHF adaptors (£1.45), F plugs, spare whips, spare hods, etc.  
SIX CHANNELS fitted S20 and S22 and any 4 of S0, S21, S23, S24, R3, R4, R5, R6, R7 ONLY £100.75 (+ VAT).

Send large SAE or 15p stamps for SMC Stock/Price/S.H. List



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### FT221R—£339 (+ VAT)



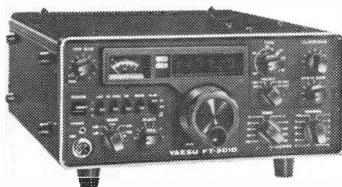
Thanks to our bulk buying policy, we have beaten inflation and the falling pound saving you £22.50 on LAST YEAR'S price ! As an added bonus all new SMC FT221Rs cover 4 MHz and are equipped with 600 kHz and 1.6 MHz shifts.

Yaesu's state of the art technology brings you a fully modular plug in board construction, multimode, 2m. transceiver that renders over the board "rats nest" wiring obsolete. The 134 MHz phase locked voltage controlled oscillator, combined with automatic varicap tuning of the transmitter and receiver gives you, without resort to preselectors, an exceedingly clean transmit signal, and a sensitive receiver without degradation of strong signal handling capabilities.

144-148 MHz INCLUSIVE COVERAGE  
MULTIMODE AM - FM - USB - LSB - CW  
234v. AC OR 12v. DC WORKING  
11 1/2" (14") x 5" x 11 1/2" AND 22 LBS.  
DUAL SPEED SMOOTH VFO DRIVE  
READOUT TO BETTER THAN 1KHZ  
44 FIX CHANNELS (4 x 11) (2 MHz)

SEMI BREAK-IN WITH SIDETONE  
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70W DISSIPATION PA DEVICE

600 kHz AND 1.6 MHz RPT. SHIFTS  
"S"/CENTRE ZERO/OUTPUT METER  
CLARIFIER (IRT WITH RT + TT)  
2-4 kHz SSB 12 kHz FM BANDWIDTH  
ADJUSTABLE SENSITIVE SQUELCH  
100 kHz CRYSTAL CALIBRATOR  
SWITCHABLE NOISE BLANKER



FT301

Top to ten, solid state, transceiver 4 models to choose from.  
10 or 100W output, digital or analogue.



FT223

2m. F.M. 23 channels. 12v. D.C.—10W. output c/w tone burst, mic, mounting bracket, smart sensitive and selective.



FR101

Solid state receivers top to ten, 234 and 12v. DC 4 models; optional B.C. bands, VHF converters digital readout, FM demodulators (transceivers with F(L) (T) (101)).



FT101E

WORLD FAMOUS transceiver, top to ten capability 3 models to choose; 234 and 12v. DC speech processor, etc. Large range of matching accessories available.

## YC500

500 MHz counters 3 models —10, 1, 0-02ppm AC and 12v. DC, overall 25mV-20v. and 50 ohm and 1M ohm inputs.

NOT ILLUSTRATED



FR7

Mains, battery and 12v. receiver, the same bandwidth from 0.5 to 30 MHz, single side-band and AM detectors. New fine tune control.

For Further Information and FREE Yaesu Catalogue Send S.A.E.

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# South Midlands Communications Ltd.

## YOUR SINGLE STOP SOURCE FOR:—

### VERSATOWERS

The telescopic, 20ft. section, with full tilt over facility permits easy antenna adjustments. The low unit weight and superior design of solid ground post allows easy and cheap installation. If you wish to purchase your own, please write for details. We advise you to contact us giving full details. With 18 years experience in the design and manufacture of commercial masts and antennas, which are used from the frozen wastes of Antarctica to the deserts of the Middle East, supplied to Nato, the U.N., the Red Cross, the British Antarctic Survey, H.M. Government and to all continents, in fact, to over 100 countries. We stock the largest range of masts and antennas in the U.K. from the Versatower (copied but not equalled) to the products of Belgium, England and Australia detailed below.

#### ALIMASTS

**TELESCOPIC LIGHTWEIGHT**  
3, 2 or 1-5m. Quick lock sections. Many versions 6 to 21 metres. Riggering extra. Carriage £2 VAT 8%  
7 x 2m. £38.75 6 x 3m. £42.50  
4 x 3m. £38.90 7 x 3m. £35.75

#### HAMTOWERS

**SELF-SUPPORTING**  
Galvanised lattice 10' sections. Freestanding with climbing steps. Carriage £3.50 Ex-Stock 8% VAT.  
30' c/w base grillage ... £164.60  
40' c/w base grillage ... P.O.A.

#### TELOMASTS

**TELESCOPIC GALVANISED**  
10' steel sections c/w guy rings, etc. Carriage £2 Ex-Stock VAT 8%.  
30' £22.85 or £41.75 c/w rigging  
40' £29.75 or £53.75 " "  
50' £37.95 or £69.95 " "

#### TELETOWERS

Telescopic Galvanised Lattice and 10' steel sections. Carriage + 8% extra  
42' £121.00 (Rigging Kit £28)  
57' £174.00 (Rigging Kit £28)  
73' £234.00 (Rigging Kit £48)  
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#### CUSHCRAFT VHF OMNI (Carriage 95p) VAT 12½%

**RINGO RANGER ARX** 6dB gain (over ½) ultra low angle radiation, excellent 50 ohm match uses 3 x ½ in phase and ½ stub. 145 MHz version approx. 9' 6" (& 1 ½ lbs.) 432 MHz approx. 3' 6" (illustrated).  
ARX2 Ringo Ranger ARX450 Ringo Ranger  
145 MHz ... £21.50 432 MHz ... £21.50  
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AR25 QRO AR2 ... £15.00 ABW125 ABW harness £7.30  
CX1000 29 MHz Ringo ... £25.75 ASQ1 2m. Squalo ... £11.75

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

D5/2M 5 over 5 slot feed	£9.90	PMB14/2M ele. Para	£21.00
D9/2M over 8 slot feed	£13.40	D9/70 8 over 8 slot feed	£11.30
EXY/2M 5 ele. crossed	£10.30	PBM18/70 18 ele. Para	£13.75
BXY/2M 8 ele. crossed	£12.90	MBM48/70 48 ele. Multi	£15.20
10X/2M 10 ele. crossed	£17.75	MBM88/70 88 ele. Multi	£20.25
5Y/2M 5 ele. yagi	£5.40	12X Y/70 12 ele. crossed	£20.90
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#### SMC TRAPPED DIPOLES (Post 45p) VAT 12½%

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

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AR33 (De-luxe control AR40) ...	£57.60
CD44 (C.B. illus. left) m.d. duty ...	£95.00
Ham II (C.B. illus. left) hy.duty ...	£129.00
2010/220 Stolle through Rotator	
2030/220 Stolle de-luxe type ...	£45.50
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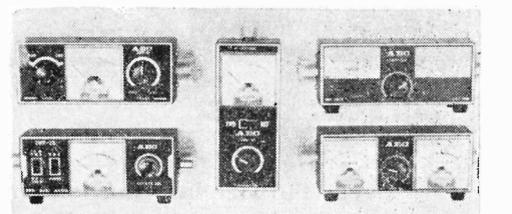
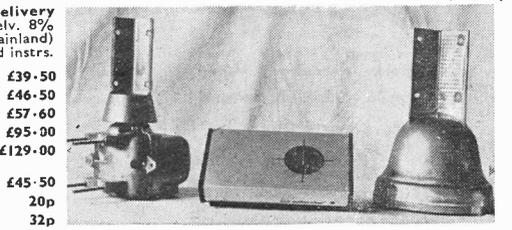
2½ Polyprop ribbed ... 14p SMCPI8" carbon polyprop 85p  
NTI 4½" polyprop ribbed 45p 3" porcelain ribbed 33p

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RG8/U 50 ohm heavy ... yd. 35p UR39 75 ohm medium ... yd. 24p  
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75 ohm flat twin ... yd. TOS UR43 50 ohm solid cent. yd. 15p  
300 ohm ribbon ... yd. 9p UR76 50 ohm strand cent yd. 14p



# RELIABLE RADIO FROM YAESU



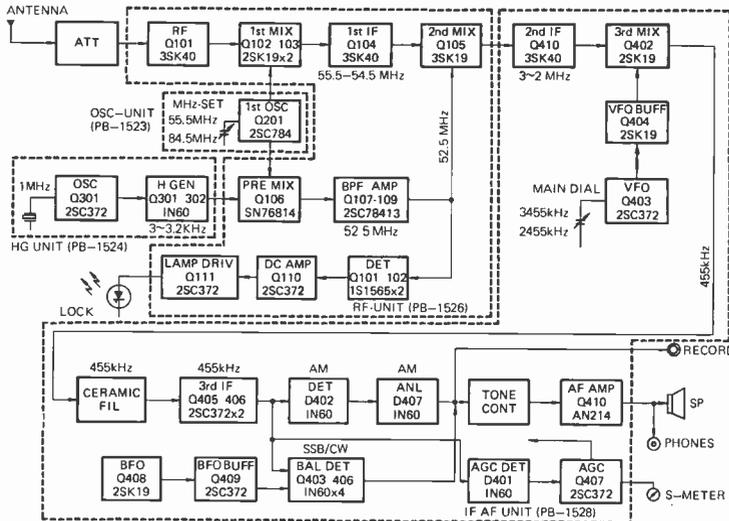
The FRG7 is a solid state mains and 12v. receiver offering continuous coverage 0.5-30 MHz with specifications unparalled in its price range.

Its advanced circuitry provides superb performance either as a standby receiver or for SWL's (BC and Amateur Bands alike)

The use of a Wadley loop (using the same VHF oscillator to mix up, then after pre-mixing with a stable crystal source down again (this cancelling all drift from the variable oscillator)) it provides equivalent performance to 30 crystal controlled converters feeding a low IF, but without the image problems of such an arrangement.

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 0.25vV (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 (fc = 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 ± 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 fined 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 (234 VAC), 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 when battery operation is employed.



## FRG7 WORLD WIDE WIRELESS

### OUR AGENTS

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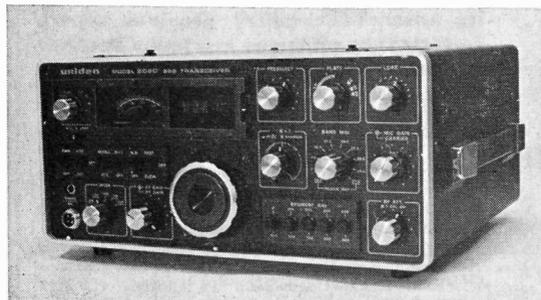
# G3MCN

## STEPHENS-JAMES LTD.

### 47 WARRINGTON ROAD, LEIGH, LANCs. WN7 3EA

TEL. 052-35 76790

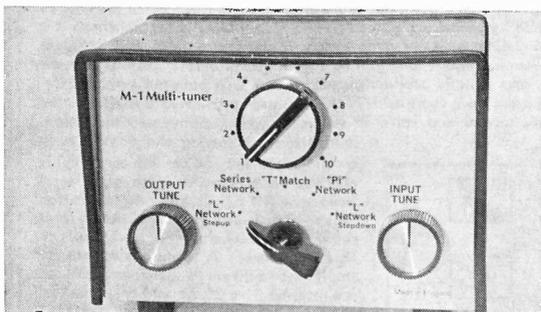
The North West's leading supplier for all your requirements. EASY ACCESS FROM THE M61-62.63—we're 5m. from M6, turn at the Greyhound Motel on the A580 (East Lancs. Road). OPEN 9.30 to 5.30, MONDAY TO SATURDAY.



**UNIDEN 2020.** AC/DC power supplies. CW filter. Noise blander. Blower. Digital and analogue display give direct readout. 2-6146B in PA 80-10 metres. Receiver is pre-mixed single conversion using phase lock loop oscillator circuit. Separate filters for USB/LSB. Price £495.00



**UNIDEN 2030.** 144-146 MHz FM Transceiver. 12 channels. 12v. DC operation. 10 watt or 1 watt output. Antenna impedance 50 ohm. Complete with microphone and mounting bracket. Price £178.74



**Mk. 1 MULTI TUNER.** Designed and manufactured by us. 50 tunable switched positions for antenna lengths over 5 metres in the 2-30 MHz range. Five different circuits to give an excellent match between your receiver and antenna. Now in use in over 35 countries. Price £17.00. MK2 Multi-Tuner covering 550 KHz to 30 MHz. £23.00

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WE ARE PLEASED TO ANNOUNCE WE HAVE BEEN APPOINTED SOLE DISTRIBUTORS FOR THE BARLOW WADLEY RECEIVERS FOR THE MIDLANDS AND NORTH WEST. BADLOW WADLEY XCR-30 EX-STOCK AT £145 INC. VAT.

Complete with FM range ... £170.00

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KW202 Receiver	...	...	£185.00
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FV400S VFO	...	...	£40.00
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We can supply most items from stock. All equipment is sold from the above premises. We do not supply any agents or agents of agents who work from home in their spare time. All equipment is air tested and carries normal guarantee.

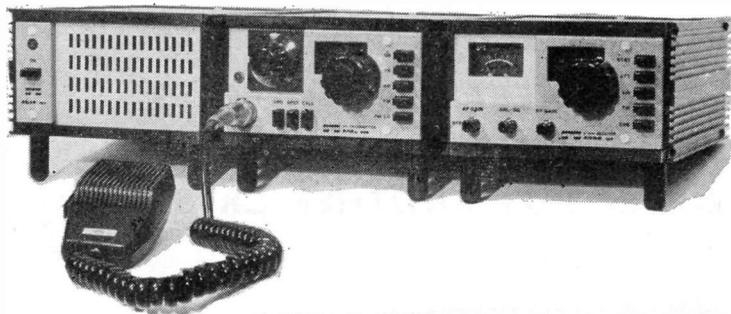
# S.T.E. MILAN VHF EQUIPMENT

We enter our third year as sole distributors for the S.T.E. range in the U.K. The popularity of this equipment is growing all the time. With the kind help of the Directors of S.T.E. we have managed to keep the prices stable for the past three years. This equipment sell for about 20% in some of the ECC countries and to keep cost to the customer down we have not sold to the trade and therefore you get the benefit of lower prices. The quality of these P.C.B's are the finest we have ever seen. Following on from the ARAC 102 receiver for 28-30 MHz and 144-146 MHz fully tunable we now have the ARAC 107 28-30 and 430-440 MHz with AM FM and SSB Facilities. The base station AK20 transceiver will be soon supplied with mobile mount and also available in kit form. We also look forward to many new models from S.T.E. in the next year.

ASP 154

ATAL 228

ARAC 102



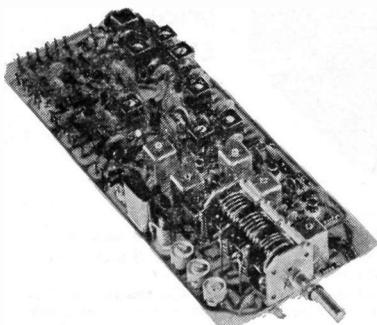
**SPEAKER  
AC POWER SUPPLY UNIT**

**144 - 146 MHz  
AM FM TRANSMITTER  
with Microphone**

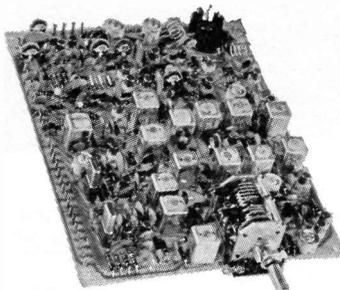
**28-30 MHz 144-146 MHz  
AM-FM-SSB RECEIVER**

**Price List (including postage)**

ARAC 102 Receiver	... ..	£100-00
Atal 228 Transmitter	... ..	£126-00
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AR10 Receiver Module	... ..	£37-50
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AR20 C.C. Receiver	... ..	£50-00
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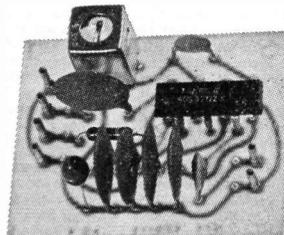
**AR10** Mosfet receiver. 28-30 MHz Double conversion superhet. RF and amplifiers stages are gate protected mosfets for good sensitivity and low intermodulation. Noise limiter and squelch circuit. AM, SSB and CW reception. 12v. DC.



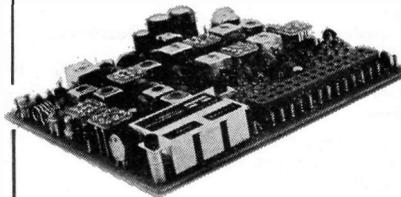
**AT 222.** A complete transmitter exciter unit for 144-146 MHz on AM or FM. VFO controlled or fixed channel operation. Complete with microphone pre-amp., speech processor including active audio filter. 1 watt output. FM. .25 watt AM. Output impedance 50-75 ohm adjustable. Frequency deviation 3-10 kHz adjustable.



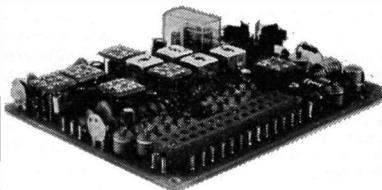
**AK20, STE.** Latest model from the famous STE Milan range of equipment. 12 channel operation in the 144-146 MHz range. 11-15v. DC operation. 3 watt output. Sensitivity 0.2 uv R.I.T. tone burst. Complete with microphone. Price £174-00



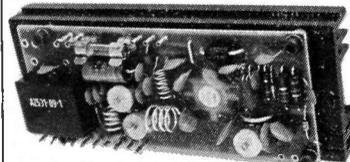
**455 kHz FM Discriminator Amplifier.** Limiting threshold 100uV. Amplitude modulation rejection 40dB. Audio output voltage at 1 kHz 200-300mV frequency deviation + or - 3 kHz.



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



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



**Linear Amplifier.** Frequency 144-146 MHz output 10 watts FM, 8 watt PEP SSB, 8 watt AM. Input power 1 watt FM, .25 watt AM-SSB. Input impedance 50 ohm output impedance 50-75 ohm. 12v. DC.

## STEPHENS-JAMES LTD.

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052 - 35 76790



**INTRODUCE THE LATEST IN FM MOBILES  
10 WATTS 22 CHANNELS (15 ALREADY WIRED)  
AND YOU NEED NEVER BUY ANOTHER CRYSTAL!!**



introductory  
price  
**£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.
- \* A sensitive, temperature compensated, adjustable squelch circuit with front panel indicator to show when the squelch is open should the gain control be turned back to please the XYL.
- \* 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 FA 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



**FOR UK ENQUIRIES  
THANET ELECTRONICS  
HERNE BAY**



# ICOM

## IC215 HANDY FM PORTABLE 15 channels 3 watts

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.

**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	Earpiece
Power supply plug	9 x Dry cells type C (U11)
Comprehensive English handbook	

### OPTIONAL EXTRAS :

C-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.	

### HIRE PURCHASE TERMS AVAILABLE

See ICOM at your nearest agents by telephoned appointments :-

LONDON—Terry, G8BAF  
01 556 9366

WALES—Tony, GW3FKO  
0222 702982

NORTH—Peter, G3TPX  
022678 2517

SCOTLAND—Ian, GM3DOX  
079683 3223

MIDLANDS—Tony, G8AVH  
021 329 2305

CHESHIRE—Gordon, G3LEQ  
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DEVON—Bob, G3 PQH qthr.

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# THE COMPLETE RANGE . . . .

Keep it to yourself, won't you, but did YOU know that we have the widest range of VHF and UHF equipment available to meet the most stringent requirements of the discerning amateur radio enthusiast, who is continuously endeavouring to keep his shack up to date without upsetting his bank manager.

It's no secret, though, that we have recently expanded our entire production capacity, enabling us not just to manufacture our standard range of first class VHF/UHF converters and varactor triplers, which have gained world wide acclaim over several years, but to arouse new interest by launching on to the market certain new products such as our 50 MHz and 500 MHz frequency counters,  $\pm$  10 500 MHz prescaler and our latest range of all-mode linear transverters for 144 MHz and 432 MHz.

This month we are briefly reviewing this wide range, but please do not hesitate to contact us either by post or telephone for any technical details, or to request detailed data sheets for any of the products mentioned below.

## 144 MHz

**MMT144/28 :** 144 MHz linear all-mode transverter.  
Features: 10 watts RMS output power.  
30dB receive gain.  
2.5 dB noise figure.  
Aerial changeover achieved by a pin diode switch.

**IF :** 28-30 MHz.  
**Price :** £79 + VAT.

**MMCI44/28 :** Single conversion 144 MHz receive converter with protected dual gate MOSFETS.  
Typical gain: 30dB. Noise figure: 2.5 dB.  
12-14, 14-16, 18-20, 24-26, 28-30 MHz.  
£18 + VAT.

**Other IF's :** As above unit but has an extra buffer amplifier at 116 MHz for use in transverters.  
Provides 5mV at 116 MHz.  
£20 + VAT.

**Price :** £20 + VAT.

**MMCI44/2 :** Double conversion 144 MHz receive converter which achieves good image rejection at low intermediate frequencies.  
2-4, 4-6 MHz.  
£18 + VAT.

**Other IF's :** Low noise preamplifier with two independent outputs.  
Typical gain: 18dB. Noise figure: 2.5dB.  
ALSO AVAILABLE FOR 70 and 136 MHz.  
£13 + VAT.

**Price :**

## 1296 MHz

**MMCI296/28 :** 1296 MHz receive converter utilising a hybrid ring mixer, with a matched pair of schottky diodes driving a MOSFET IF amplifier.  
Typical gain: 25 dB.  
28-30, 144-146 MHz.  
£25 + VAT.

**Other IF's :** 1296 MHz varactor tripler.  
Will accept up to 30 watts of 432 MHz drive and achieves 60% efficiency.

**Price :** £30 + VAT.

## 70 MHz

**MMC70/28LO :** Similar to MMCI44/28LO.  
Features buffered local oscillator facility at 42 MHz for transverter use.  
£20 + VAT.

**Price :**

## 432 MHz

**MMT432/28 :** 432 MHz all-mode linear transverter.  
Features: 10 watts RMS output power.  
30 dB receive gain.  
3.0 dB noise figure.  
Aerial changeover achieved by a pin diode switch.

**IF :** 28-30 MHz.  
**Price :** £97 + VAT.

**MMT432/144 :** 432 MHz DOUBLE CONVERSION all-mode linear transverter.  
Features: 10 watts RMS output power for 10 watts 144 MHz input.  
10dB receive gain.  
3.0 dB noise figure.  
Aerial changeover achieved by a pin diode switch.

**IF :** 144-146 MHz.  
**Price :** £133 + VAT.

**MMC432/28 :** 432 MHz receive converter featuring 2 RF amplifiers and a MOSFET mixer.  
Typical gain: 30 dB. Noise figure: 3.8 dB.  
14-16, 18-20, 28-30, 144-146 MHz.  
£22 + VAT.

**Other IF's :**

**Price :**

## DIGITAL PRODUCTS

**MMD050 :** Six digit 50 MHz frequency counter.  
Frequency range: 0.45-50 MHz.  
Input sensitivity: Better than 50mV RMS.  
£62 + VAT.

**Price :**

**MMD050/500 :** Six digit 500 MHz frequency counter.  
Two ranges: 0.45-50 MHz.  
50-500 MHz.  
Combined version of MMD050 and MMD500P  
£79 + VAT.

**Price :**

**MMD500P :** Divide by 10 prescaler to give 500 MHz capability when used with MMD050.  
Fully TTL compatible.  
Output level is 2.5 volts p.p.  
Input sensitivity: Better than 200mV.  
Frequency range: 50-500 MHz.  
£25 + VAT.

**Price :**

## MHz

**MMC70/28 :** Receive converter for 70 MHz.  
Similar to MMCI44/28.  
4-4.7, 14-14.7, 18-18.7 28-28.7 MHz.  
£18 + VAT.

**Other IF's :**

**Price :**

### PLEASE NOTE :-

At the time of writing, the VAT rates applicable to the above products were likely to be changed. However, the VAT rates applicable at the time of writing were 12½% on all the above products, with the exception of the DIGITAL PRODUCTS, which are 8%.

Just a phone call will put you in touch with our experienced sales and technical staff, who will be pleased to assist you with any queries you may have.

Incidentally, ALL of our products are FULLY GUARANTEED FOR 12 MONTHS.

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**BROOKFIELD DRIVE, AINTREE, LIVERPOOL**  
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Can now be extended from 1.5 to 30MHz with  
FS-4 Frequency Synthesizer. S.A.E. for details please.

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SEND FOR A COPY OF OUR JANUARY 1977 PRICE LIST (Stamps please)

We are situated just around the corner from West Hampstead Underground Station (Bakerloo line). A few minutes walk away is West Hampstead Midland Region station and West End Lane on the Broad Street Line. We are on the following Bus Routes : 28, 59, 159. Hours of opening are 9-5 Monday to Friday. Closed for Lunch 1-2. Saturday we are open 9-12.30 only.

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# WATERS &

Telephone : HOCKLEY (03704) 6835 2 lines



## MOVE TO 432MHz !

**MULTI-U11  
LATEST MODEL  
NOW WITH  
AUTOMATIC  
TONE-BURST  
FITTED**

+  
**9 CHANNELS  
FITTED!**

+  
**NEW FDM-10 MIC. IN STOCK  
FOR EVEN GREATER PUNCH NOW!**



The transceiver with a specification far in excess of its competitors at a price you can afford ! Fitted every U.K. repeater channel plus 4 simplex, £249, including VAT.

*REMEMBER—auto scan means safer driving*

## 70cms—A COMPLETELY NEW CHALLENGE. . . FOR YOU AND "FDK"

Anybody monitoring 70 cms. since the new repeater band plan was agreed cannot have failed to notice the new 70 cms. repeaters now appearing on the band. There are now as many repeaters on 70 cms. as there are on 2 metres and there are more to come! The new FDK Multi-U11 is packed with features to allow you to explore the UHF spectrum. Already voted the best 70 cm. transceiver in Japan, the powerful 10 watts transmitter matched by the extremely sensitive receiver ensures peak performance. Its smart appearance and compact size make it ideal as either base station or mobile rig. For those not familiar with 70 cms. it is worth remembering that 100 Hz error at 12 MHz produces 3.6 kHz error at 70 cms.! All FDK Multi-U11 are carefully adjusted and maintain a very high stability but other rigs may not be quite so stable, that is why **INCREMENTAL RECEIVER TUNING IS ESSENTIAL** if QSO's are not to be lost and ignition noise kept to a low level—don't consider any transceiver not fitted with this control. For full specification details send S.A.E. today.

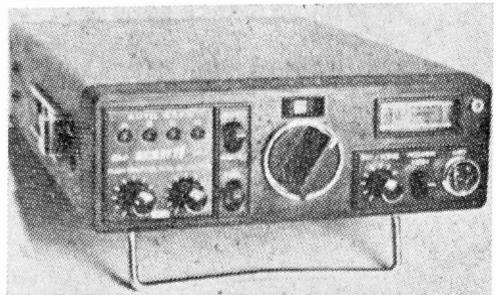
## So you thought that all 2 metre FM Transceivers were much the same ! . . .

Please don't judge the Multi-11 transceiver by others. If you thought that all FM transceivers were very similar then you were wrong. If you want the cheapest then you won't be interested in the Multi-11 but if you want the best value for money it won't cost you an awful lot more ! Take for example the typical "black box" utility rig just about 10 watts output, a mediocre receiver and a transmitter that is not completely free of spurious outputs—not bad for the price ?

Perhaps not, but for a few extra pounds see what extras the Multi-11 has to offer. Typically 12-14 watts output ; a fully screened transmitter section that is completely free of spurious outputs ; a receiver that has a built in pre-amp for really sensitive flutter free reception, a really high performance modulator for superb audio quality and built in safety too ! In addition to the 23 fixed channels you have 4 autoscans channels—fit these with the popular calling channels and while your hands are on the wheel and your eyes on the road, the Multi-11 hunts out the signals. There are a host of other features too—incremental receiver tuning, tx monitor switch, automatic toneburst, European tone access, centre zero/s-meter, remote VFO socket, wide/narrow deviation etc. So before buying the cheapest how about considering the best—send today for the FDK catalogue.



## MULTI-II 2M FM IN STOCK NOW



THE NEW TOP PERFORMER FOR 2M FM MOBILE  
Fitted all U.K. Repeaters + 50 and 520 **£199-68**

## HERE'S SOME NEW EXCITING FDK MODELS

SEND 10p TODAY FOR LATEST FDK CATALOGUE



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IN STOCK**

**MULTI-2700.** All mode 230v./12v. D.C. Digital 2m. transceiver including "OSCAR" facility. £449 inc. VAT.



**NEW MODEL  
IN STOCK**

**AC PSU FOR FM MOBILES.** Comprehensive psu to match Multi-11/U11 plus switched voltage outputs for laboratory use. £63-50 inc. VAT.



**NEW MODEL  
IN STOCK**

**REMOTE VFO FOR MULTI-II.** Complete coverage 144-146 MHz plus 600 kHz repeater shift. £89-00 inc. VAT.

# STANTON ELECTRONICS

Telex : 897406



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**BY POST** State clearly your requirements enclosing cheque or postal order.  
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**NEW THIS MONTH—**

**ELECTRONIC DEVELOPMENTS**  
 144 Linear 230v. AV ... £112.50  
 28/144 transverter ... £112.50  
 VHF wavemeter ... £16.00

**Q-TRAP.** Economy version of the above dipole without balun, inverted "V" kit and fitted standard copper wire ... £14.62 (£1.00)

**MICROWAVE MODULES**  
 New transverters for 2 metres and 70 cms.  
 28 MHz in 144 MHz out ... £85.50  
 28 MHz in 432 MHz out ... £94.50  
 144 MHz in 432 MHz out all modes ... £126.00

**TESTED TRADE-INS**  
 Liner 430 ... £247.00  
 ARAC 2m./10m. AM/FM/SSB Rcv. ... £80.00  
 KP202 plus all extras inc. charge and 8 channels ... £129.00  
 Liner-11 2m. ssb ... £130.00  
 Trio JR310 ... £95.00  
 Icom IC21A ... £159.00  
 Icom IC30A ... £130.00

**2M FM HANDHELD TRANSCIEVERS**  
 KP202 fitted 6 channels plus 1/b KCP2 charger ... £12.65  
 Flexible antenna ... £6.46  
 10 Ni-cads ... £9.00  
 Leatherette case ... £5.34

**MICROWAVE MODULES**  
 MMC 2m. conv. IF 2-4, 4-6, 28-30 ... £18.00 (36p)  
 MMC 70 MHz conv. 28-30 ... £18.00 (36p)  
 MMC 70 MHz conv. 28-30 + local osc. ... £19.80 (36p)  
 MMC 2m. conv. 28-30 + local osc. ... £19.80 (36p)  
 MMC 70 cm. conv. 28-30 or 144-146 ... £19.80 (36p)  
 MMC 1296/144 or 28-30 ... £24.30 (36p)  
 MMD 50 50 MHz counter ... £66.00 (36p)  
 MMD 500P 500 MHz pre-scaler ... £27.00 (36p)  
 MMT 432/28 70 cm. transverter ... £94.50 (36p)

**LF ANTENNA SYSTEMS**  
 EL40X compact 80/40 dipole de luxe with balun, hardware, inv. "V" brackets special protected copper wire, etc. ... £27.00 (n.c.)  
 Q-Trap compact 80/40 dipole kit 79ft. ... £14.62 (£1.00)  
 Q-Trap coils only ... £7.98 (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)

Drake low-pass 1kW filter 80dB ... £14.75 (75p)  
 5WR single meter ... £9.85 (50p)  
 5WR dual meter ... £12.65 (50p)  
 Telegraph key ... £9.75 (50p)  
 Drake low pass filter ... £14.65 (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)  
 Set of 9 HP11 ni-cads ... £16.20 (£1.00)  
 Balun insulator 50 ohm (beams or dipole) ... £8.43 (50p)

**YAESU MUSEN EQUIPMENT**  
 FT101E transceiver. 160-10m. 230/12v. ... £482.62 (n.c.)  
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 FV101B matching remote vfo ... £61.31 (£1.25)  
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 FP200B matching AC p.s.u. ... £60.75 (n.c.)  
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 FR1015 receiver standard 160-10m. ... £336.37 (n.c.)  
 FR101D receiver de-luxe 160-2m. plus short wave broadcast ... £438.75 (n.c.)  
 FR101DD as above with digital counter ... £540.00 (n.c.)  
 FL2100B linear 1200w. input ... £279.00 (n.c.)  
 YP150 dummy load/wattmeter ... £47.52 (£1.00)  
 Yo100 monitor scope ... £127.44 (£1.50)  
 YC355D 200 MHz counter ... £150.12 (n.c.)  
 FT221 2m. ssb/cw/fm/am transceiver ... £403.87 (n.c.)  
 YD844 table microphone ... £20.25 (75p)  
 YD846 hand microphone ... £8.43 (75p)

**SOLID STATE MODULES**  
 2m, or 4m, Europa transverter 200w. pip ... £109.15 (n.c.)  
 2 or 4m. converters IF 2-4/4-6/28-30 ... £18.00 (n.c.)  
 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 1750 Hz ... £3.93 (25p)

**YHF ANTENNAS BY JAYBEAM**  
 4Y/H4 4 element yagi ... £9.56 (£1.75)  
 5Y2M 5 element yagi ... £6.07 (£1.00)  
 8Y/2M 8 element yagi ... £7.87 (£1.00)  
 10Y/2M 10 element yagi ... £15.52 (£1.50)  
 PB110/2M 10 ele. parabeam ... £18.45 (£1.50)  
 PB114/2M 14 ele. parabeam ... £23.62 (£1.75)  
 8X/Y/2M 5 ele. crossed yagi ... £11.58 (£1.25)  
 8X/Y/2M 8 ele. crossed yagi ... £14.83 (£1.50)  
 10X/Y/2M 10 ele. crossed yagi ... £19.96 (£1.75)  
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Q6/2M 6 ele. quad ... £15.75 (£1.75)  
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 D8/2M 8 ele. slot fed ... £15.07 (£1.50)  
 XD/2M crossed dipoles ... £8.15 (£1.00)  
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 HO/2M Mobile halo head only ... £2.58 (50p)  
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 PMH/2C 2 way phasing harness for circular polarisation ... £4.05 (75p)  
 PMH/2M 2 way phasing harness for 2 of 2 metre antennas ... £5.56 (75p)  
 PMH4/2M 4 way phasing harness ... £12.94 (£1.00)  
 5VMK/2M mounting kit for vertical pol. for 2 slot feds. ... £3.09 (75p)

**NIHON DENGYO**  
 Liner-2 Mk. 11 2m. ssb tcvr. 12v. DC ... £184.50 (£2.50)  
 Liner-430 70cm. ssb tcvr. 12v. DC ... £296.25 (£2.50)  
 LA-106 2m. 100W. linear ... £200.25 (£2.50)  
 RL5E reg. p.s.u. for liner-2 & #30 ... £31.50 (£2.50)

**TRIO**  
 HC2 ham clock ... £13.50 (48p)  
 New R.300 General coverage receiver in stock ... £184.50 (£2.50)

**UHF ANTENNAS BY JAYBEAM**  
 D8/70cm. 8 ele. slot fed ... £12.71 (£1.25)  
 PB118/70cm. 18 ele. parabeam ... £15.46 (£1.50)  
 MBM48/70cm. 48 ele. multibeam ... £17.10 (£1.50)  
 MBM88/70cm. 88 ele. multibeam ... £22.89 (£1.75)  
 12X/Y/70cm. 12 ele. crossed yagi ... £23.51 (£1.50)  
 PMH/70cm. 2 way phasing harness ... £4.66 (75p)  
 PMH4/70cm. 4 way phasing harness ... £9.67 (£1.00)

**MOBILE ANTENNAS BY JAYBEAM**  
 TAS 2m. 5/8th glass fibre whip with 4m. of cable ... £9.45 (£1.00)  
 U5 70 cm. colinear 5-6dB gain and 4m. of cable ... £15.19 (£1.00)

**MINI-PRODUCTS**  
 HQ-10-20m. compact 1-2kW yagi ... £79.50 (£2.00)  
 C4 10-20m. compact 1-2kW vertical ... £38.25 (£1.50)

**ROTATORS**  
 AR30 antenna rotator ... £42.18 (£1.50)  
 AR40 antenna rotator ... £48.93 (£1.50)  
 CD44 antenna rotator ... £100.00 (£1.75)  
 Ham 11 antenna rotator ... £133.00 (£2.00)  
 CD bearing ... £4.21 (50p)  
 Stolle 2010 antenna rotator ... £46.50 (£1.50)  
 Stolle 2030 antenna rotator ... £51.50 (£1.50)  
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**HY-GAIN ANTENNAS**  
 12AVO 10-20m. vertical 2kW. ... £36.62 (£1.50)  
 14AVO 10-40m. vertical 2kW. ... £51.97 (£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 2kW ... £154.12 (£2.50)  
 BN86 balun 2kW. ... £13.50 (50p)

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ALL PRICES INCLUDE VAT at 12 1/2% CARRIAGE CHARGE IN BRACKETS  
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 GM3GRX Eric Simpson, 6 Drossie Road, Falkirk, Stirlingshire. Tel.: 0324 24428  
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## ELECTRONIC DEVELOPMENTS — NEW LOCATION

Our new factory is now operational and from here we will be able to supply you with our current range of high quality equipment. Please give us a ring or write to the address below with any queries you may have relating to your own particular application.

### THE MAGNUM TRANSVERTER EDT 144/28 : EDT 70/28 : EDT 50/28



Our Transverter is fully YAESU compatible and may be operated with most other HF transceivers. Drive required at 28 MHz up to 500mW. Power input up to 200 watts (50% efficient). Each Transverter is aligned using our SPECTRUM ANALYSER to obtain an extremely clean output spectrum. Microwave Modules receive converters are fitted to all our transverters.

PRICE : £112.50 (Inc. VAT)

### WAVEMETER 65 – 230 MHz



General coverage VHF Absorption Wavemeter. Its high sensitivity makes it ideal for checking spurious outputs as well as the transmitted frequency.

PRICE : £16.00 (Inc. VAT)

### THE MAGNUM LINEAR/PREAMP EDL 144



This Linear Amplifier has been developed by us to fill the need for a high power add-on unit for use with low power transceivers. The unit also contains a low-noise receive preamplifier which is equipped with an RF gain control. Mains operated. Drive requirement : 5-20 watts. CW and SSB, 5 watts maximum AM & FM. P.A. 50% efficient. R.F. switched so no modification to transceiver is necessary.

PRICE : £112.50 (Inc. VAT)

### 70CM LINEAR EDL 432



This 432 MHz Linear is operated in grounded grid configuration and exhibits a gain of typically 10dB. With a drive input of 5 watts its output power is in the order of 50 watts which is more than adequate for OSCAR 7. Power requirements are 6.3v. AC and H.T. 400-1000v. DC. Fitted with BNC connectors.

PRICE : £50.50 (Inc. VAT)

Your orders, enquiries and technical queries will be dealt with both personally and quickly.

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**AND THE LATEST**  
SSB/FM/CW/AM

**FT-221R**

2 METRE  
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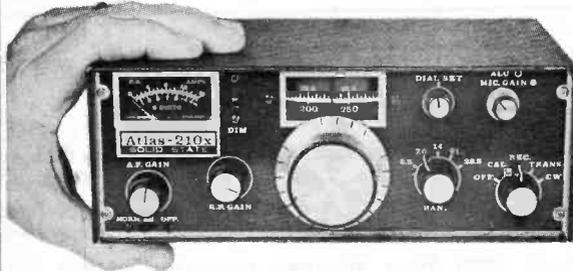


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## COMMUNICATION and DX NEWS

*E. P. Essery, G3KFE*

ALL the Top Band enthusiasts of long standing will be saddened to hear of the death of Bob Palmer, G5PP; back in the days when SSB was just another rare variety of Phone signal, G5PP used to go on his summer trips around the rarer Scottish counties, and all the county-chasers would be happy, knowing that they all would have a chance with G5PP at the DX end. Bob's first licence was issued in the Twenties, and he had been active on most bands at one time or another. Certainly he will be greatly missed in the amateur radio world, not just for his operating record, but, maybe more, for his kindness and readiness to help; who but Bob would have thought of making a small production-run of bug-keys, to save everyone having to get used to the one on the NFD operating table or remembering to bring their own—and G3KFE has treasured for years the one allocated to him which first made him realise that CW as a mode has its own fascination just as Phone.

Looking at the bands this past month, things have been about par for the course for those who could tolerate conditions in their shacks; but there will be many who have not been on the air simply because the weather has made the shack unhabitable. In addition, it is noticeable that there has been little of the "expedition" type of activity; the expeditioners doubtless feeling that it is better to wait for a few more sunspots to make conditions all round more conducive to worldwide coverage from the DX spot. On the other hand, it is also true to say that there is no shortage of the more run-of-the-mill DX about; all you have to do is to be "on" at the right time and with the right conditions, and (more or less!) there you are. Of course "conditions" as we think of them are really a function of both station and propagation, as for example the chap with full power into a beam at sixty feet will have an opening that starts before and lasts after the time during which it is apparent to the fellow with the "bit of wire" and low power—indeed in the worst case this chap

may not even be aware of the existence of *any* opening until he reads this piece and notes that the other chaps can both hear and work DX. At that stage, he does one of two things, namely—1. Become convinced that the "other chap" has ten kilowatts of power, thus forgetting that QRO outgoing signals don't help the incoming ones; or 2. He gets off his butt-end and settles down to the task of getting the best aerial possible into his plot and with his local planners in mind. That just leaves 3. The chap who buys his first receiver after he gets his R.A.E. pass, and then spends his life sitting on a repeater or a simplex channel, disregarding even the DX on the bottom end of that band, let alone coming down on the HF's, simply because he's never, ever, heard amateurs chasing and working DX without the aid of a black box, and a repeater.

So, you may well be saying, what's this got to do with DX? Just this, that one is sure that many a new licensee spends hard cash he can ill afford on a commercial rig because he doesn't know how to get on the air without it. Isn't it about time we in the hobby got around to trying to make people realise that, in the economy class, one can still use a BC348, or an AR88, or an HRO, along with a home-brew rig made of bits bought at the club junk sale, and *get on the air for a tanner*. Whether you or I like SSB only is quite irrelevant; the point is that by seeing the cheap bit of gear, and the cards it has obtained, our newcomer will have already exposed himself to more facets of the hobby, and so he will be much more likely to stay in the hobby, and to get more fun out of it; and, of course, the special-event station and its display should *always* show, alongside the costly transceiver, the poor mans home-brew version which gets just as many countries. The public then at least see two extremes of the hobby, and so you have twice as many chances of recruiting a new DX-er.

### Top Band

Your conductor has not visited this band in earnest for some months; but the Editor said we must

have a listen to MCC. A fine time to discover the grandchild—or maybe the writer!—had left the MFJ filter switched on and flattened the battery. Hurried changing of plugs and sockets retrieved the station 888 receiver from the two-metre rig and plugged it in to Top Band, just in time to hear an interesting BBC talk on Stonehenge around 1816 kHz. Press on regardless, using the LC filter built into the 888, and note how Top Band contesters often send their CW considerably faster than would be considered good practice in say, the ARRL CW contest. Smack in the middle of the rumpus one heard G3YMC calling CQ DX on the Saturday evening and similarly on the Sunday evening G4AEH calling CQ VK; in each case a quick QSY indicated the bait was being taken before we returned to the main business of the evening, listening to the Clubs battling it out.

G2HKU (Sheppey) complains that there was not much DX around when *he* was around. We know the feeling! However, Ted's SSB talked to PA9AQG, PA0INA and PA0PN, while CW dealt with DJ3CY, EI9J, GM3CFS, and PA0HIP.

Oddly enough it is GM3CFS (Caithness) who is next on the pile. Jim has a  $\frac{3}{4}$ -wave Marconi, but he finds it so annoying that there should only be the run-of-the-mill countries for so much of the time; not to mention Wick being on  $1\frac{1}{2}$  kHz away from 1827 kHz which is Jim's transmitting frequency. All this is not to say GM3CFS isn't getting out—far from it, he has PY, LU, and W in the log, but he just doesn't seem to be able to hit the Caribbean islands at all, even though they are known to be available on Top Band.

From G3JFF, the Hon. Sec. of the Royal Navy A.R.S. wrote to let us know that ZC410 is around on both Top Band and Eighty. Take a peek for him between 2000 and 2030z, his preferred frequency being 1825 kHz. It is noticed that at the time of writing, ZC410 had already worked several G stations on Top Band.

Don't forget the CQ WW 160

Contest over the weekend at the end of January; start is at 2200 GMT on 28th, through to 1600 GMT on Sunday, January 30. For the DX (that's us' fellers!) one scores two points for a QSO in ones own country, five points for other countries, and ten points for a W/VE/VO contact. For the multiplier, take one for each US State, VE province, and DX country (remember VE1 covers three provinces, New Brunswick, Nova Scotia and Prince Edward). Final score, QSO points times multiplier points. Exchange RST plus a three-digit number starting at 001. Mailing deadline is February 28 to: CQ 160 Contest, 14 Vanderventer Avenue, Port Washington, L.I., N.Y. 11050, U.S.A.

### Eighty Metres

There are really three bands here, all rolled into one; down low where CW and QRP reign supreme, save for the odd gormless AM operator who can't measure frequency; the middle bit, where one can find, side by side idiot theories and real erudition, first class operating and the exact reverse; and the upper five kHz where the DX contacts are made despite the activities of those who would have it otherwise. Like they say up North, "There's nowt so queer as fowk!"

G3RJV (Calverton) is top of the clip; George is the QRP Club merchant, and a mighty fine group he has made of it too, even though one suspects it to have lost him quite a bit of time when he could have been operating. Thus, his 3.5 MHz activity was, as he puts it "just dodging the QRM!"

G4EVO (Broadstairs) has an almost identical set-up to the one at G3CED, who sends the logs on—but G3CED complains bitterly that G4EVO gets consistently better incoming reports! That is the way the cooky crumbles—just as you think things are panning out, along comes a banana-skin to be trodden on! G4EVO in fact covered pretty well all of Europe with his couple of watts on Eighty to a Joystick.

G2NJ (Peterborough) and others mentioned G5PP's passing; in addition, Nick managed to work nine QSO's, all separate, with OT's, G2, G5, G6, G8 types, all on CW, and one of them he knows to have

been in the Royal Navy as long ago as 1914; all nine contacts made on November 22.

G2BJY (Walsall) misses the Geoff Watts DX News Sheet each week, with all its compressed news items, and hopes to hear that Geoff is on the mend—we'll second that motion. Geoff runs reasonable power on Eighty, and this, on CW, means K1RQE, K1GMW, K1CZM, VO1KE, VE3AKG, ISØYDD, HBØAZD and DL7ON/LX/P, which takes Geoff to 227/181 in the DLD-200 for which he is chasing.

G4CCQ (Lamberhurst) obviously feels that it's an illwind that blows nobody any good; he used the day off to go to the dentist and have a couple of teeth out and put some new countries in the log as well! Around 2300z, CW gave UK9AAN, UAOABZ, TF30F and OY2H, midnight W2 and W3, and a 0100 there was DL7ON/LX/P to be worked. GM3CFS (East Mey) has a big centre-fed vee at 70 feet, which operates on Eighty as two half-waves in phase; that and CW results in HK4AOY, KP4DKX, OX3RA, PJ8CM, PJ1AA, PJ9MM, UA9, UAO, UH8, UI8, UM8, VE1ZZ, VE3DU, VP2M, VP9DX, W1-9, XE1FR, 9D5A, 9K2EW, and 9Y4A.

If you want ZC410 on Eighty, try looking for him around 3501 kHz CW, where he will be in residence from 1945-2000z when he turns, as already mentioned, to Top Band.

### Forty

At this time of year and sunspot cycle, 7 MHz is probably the best all-round band we have for DX operating, were it not for the intruders on the one hand, and the first impression you get on the other, as you spin over the dial with the gain right up! If you are put off by this you are missing quite a lot; wind back the RF gain, or, better, put in attenuation until the noise level drops suddenly and the signals pop up, and then have another tune; a different kettle of fish altogether, isn't it? Then, you have to work 'em—and there seems to be a knack in this too, as GM3JDR and GM3JZK used to demonstrate in their own separate ways. CW is preferred for this band, but there are plenty of QSO's there for the taking on SSB too, if that is your scene.

GW4BLE (Newport, Gwent) got up at 0300 for a sked with HC5EE, to give the latter CW towards his 5BDXCC award; HC5EE failed to surface, but GW4BLE snapped up FG7AS towards his own 5BDXCC score, in which he has now worked around the 120 countries mark on 7 MHz. HK4DHR and YV5MM/YV3 were also booked in before a return to bed.

G2HKU (Sheppey) seems to be back in the groove again on all bands; 7 MHz only got a passing mention, though, with a CW QSO with VP2VDJ in the British Virgin Is.

G4CCQ seems to have spent his late evening hours on Forty, and his CW collection is quite impressive with around tea-time UA9CAL, UA9CFV and UA9WBV; midnight arrived and Mervyn had knocked off KV4FZ a couple of hours earlier as an appetiser, ready for K7VPF/VP2A, UAOABB, KP4AST, HI8JEI/8, and most W call areas saving the sixes and sevens, while 0100 was about right for FGØCXV/FS7, 0200 for FG7AS; and then it was time for a bit of sleep to dream of Gotaways 9K2EP and VU2GW.

That Pestilence from Poltava was noted on Forty by GM3CFS; it was S9 plus on the morning of December 3 and wiping everything out. However, that didn't stop Jim from using other times, and he made two way contact with C5ZA, CM7FM, CX3AL, EL2EN, KP4DJE, lots of JA's, OX3RA, PY1NEW, PJ8CM, VK3MR, VK6HD, VP9BK, VP9WI, UK9CCJ, ZE5JJ, ZS6QU/3, 4X4UF, 9D5B, for as fine a collection as the writer has come across for many a moon.

### Here & There

Nice to hear again from W4WFL; Morgan is back in New York, with his nose well down to the grindstone and nowhere from which to operate; however, at the last count he had found a flat and had hopes of getting the year from Farmington before the New Year. As a consolation, although his favourite Taunton Blackthorn Dry Cider is not available in U.S.A., he has located a fair substitute by way of a source of supply of Bulmer's Dry cider to keep him going till next he reaches U.K.!

Another friend from the States used to be known as WB2OZW; Paul writes to let us know he is now

K2OZ; the application took nine weeks to be processed and sent out, which is what is to be expected when a computer is put in to "speed things up." It has to be admitted that your scribe cannot recall a single occasion where a "business" computer has been installed which has either reduced the staff requirement or improved the service to the customer—rather has it been a Godsend to those departments looking for a scapegoat that can't answer back! Indeed, one could well hold the opinion that the business—as against scientific—computer is the biggest con-trick since Hitler's War! But back to K2OZ; he sent in a picture of his shack with a fine array of gear, some commercial and some home-brewed.

Many people will have been wondering about Geoff Watts and his DXNS. The situation is that Geoff managed to get out two issues, numbers 746 and 747, before the Doctor stopped him again. This means Geoff is out of action until the end of 1976 at least, and maybe for longer. However, it is important that all his U.K. readership, and indeed *anyone* who can, passes on any gen they may come across, if DXNS is again to be a force in the hobby. Meantime, don't forget the Amateur-Radio Prefix-Country-Zone Listings which Geoff had prepared before his illness. 35p is a cheap price to pay for such a useful DX tool. Orders can go to Geoff Watts at 62 Belmore Road, Norwich, Norfolk, NR7 0PU.

### Twenty

Up and Down about sums it up; apart from conditions there has been that Pestilential Thing from Poltava on occasion to contend with. However, the feeling is growing that we may possibly be through the bottom of sunspot cycle 20, and beginning to see the rise of cycle 21; albeit it should be noticed that we will not be able to be sure about it until some six months or more after the turn, when the averages start to perk up a bit.

Your scribe will admit to having spent very little time on the band, his interest being focussed elsewhere; but over the next few days from the time of writing the predictions look d—if only the shack were mer . . .

G4EAN (Nottingham) is still in the toils with work—he hasn't even had the time to crank the tower up and switch on this month. On the other hand, Ian has, as a result of all this work, some of that useful "time off in lieu" routine stowed away for the future, and, in addition, he has obtained a piece of UR67 coax cable so he can put the 18AVT back up again and make comparisons of the beam and the vertical at HF, and also of course chase some LF DX.

From G3RJV comes a note of the activity by GM3OXX (Edinburgh) who uses a DL6HA transceiver at ten milliwatts driving into an outboard PA stage at two watts and a dipole. This gear yielded contacts with JA8ZO around lunchtime at 579 incoming report, JA1PIG/PZ and EA6CL, plus in the contest HK4AOY who gave him a typical contest 599 report, and W7RM. That's DX at any power, and better still with two watts.

G4EVO's log demonstrates how conditions have fallen away from the autumn peak and into the winter doldrums; the Argonaut and Joystick have still covered all Europe, but nothing much more, and at that reports slightly down on average from the previous month.

G4CCQ, having had his teeth out, took away the pain by going into the shack and knocking off CW contacts with VP2MT PY8AKL, and W7NW within a couple of hours. Mervyn's rig, by the way, for CW, is the FT200 with dipoles at thirty feet plus a vertical on 40.

G2HKU mentions receiving his QSL card for a contact with the raft "The Last Generation" which went from Morocco to Trinidad in 1974, he apparently being the only G contact they had. One reckons that after the two reed-boat voyages by LI2B, commanded by Thor Heyerdahl, they would have had a pretty fair idea as to where their landfall would be; and in reading about the "Ra" they would have been surprised, as your conductor most surely was, to realise that the ancient Peruvian civilisation had a calendar more accurate than we ourselves can boast. So much for the "progress" of Western civilisation. But back to the bands and G2HKU, who worked SSB with ZL1AAE, ZL1VN, ZL3RS, and ZL3SE, and

used his key to bring to book AJ3AA, K6DC, and YV5EWN.

Some of the operation from GW4BLE was, relatively, QRP at 240 watts, as the Linear was *hors de combat* for a week or so. That didn't stop Steve getting among the SSB DX, such as C5AZ, CX2DH, KØWIQ/DU2, WB6UAG/FMØ, FP8HL, HC2SO, HI5ØRCD, HK4ABY, KP4BDL, LU9HAG, OY2EL, PJ3DO, PZ5AA, TD76GI, VK's by the bucketful, along with ZL's, long path, in the mornings, VQ9RB, who was G3LQP operating from the QTH of VQ9R, VS6BB, YN1CCA, and 6Y5HJ.

### Fifteen

Is about as far HF as we are likely to get this time, to judge by the reports so far to hand, although it is known there is another lot still in transit.

21 MHz has always been a favoured hunting-ground for GW4BLE, who managed to take in such goodies as A9XBC, A9XBD, DK5EC/ET3, FL8NR, FR7BE, FYØBHI, HC5EE, HP7XJS, KG4TS, KZ5AS, PYØZAE (Trinidad), TI2DT, TR8SM, ZB2DN/VP9, YN1RWG, ZE2JS, ZS4VF, 3B8CV, 5N2ESH, 6W8AAD, WBØHQI/6Y5, and 9J2PH.

Ex-G2XC (Horndean) noted that he has been SWL-ing for just a year since he returned to the scene; and in that time, without any excessive effort, Ted has booked in "at least" 177 countries on 21 MHz—we like that "at least" which smacks of the Trade Description Act! But, to be serious for a moment, this was done using an indoor aerial, and the 21 MHz listening was not by any means the only activity, there being plenty of spells on 14 and 3.5 MHz for example, not to mention the time spent playing with the aeriols. And, of course there is the small matter of dits-and-dahs, not considered useful by many SWL's, which accounted for lots of the loggings.

Also, and it is perhaps germane to our theme at this moment, there is the matter of those indoor aeriols; a couple of W8JK types at right angles to each other. Last time Ted wrote, it will be recalled, he had been checking the quarter-wave-transformers and the half-wave of

cable in the balun with a GDO. Everything *seemed* to be "on the nose" but there was the worrying thought that band noise appeared to be at a different level between the two arrays; and there was also the feeling that the N/S was a better performer to some areas where the E/W one ought to have been best. The element lengths for both arrays had been cut "to the book" for 21.3 MHz. Out with the trusty old GDO again, and check the resonant length of the E/W aerial elements with the centres shorted—they came out at 19.5 MHz! Thus, a couple of feet had to be cut off to bring them to 21.3 MHz; and on checking the N/S array in a similar way, lo! the elements of this one were—the same original "book" length—20.8 MHz, so six inches had to come off these as well. This done, Ted now finds the ATU setting for both aerials the same, band noise is the same, and they seem to be working rather better, albeit it is a little early to tell for sure. As to why these aerials should be so far off their "book" frequencies, ex-G2XC has a theory that the dielectric constant of the plastic coastings of the elements have some connection, one aerial being made of 28/0076 stranded, and the other being 7/22 swg stranded, with different coloured plastic coating. So, when the weather abates, Ted proposes to lay out equal lengths of various types of wire in the garden, and GDO them for resonant frequency away from all the clutter that upsets things in the loft.

GM3CFS stuck mainly to the LF bands, but that didn't stop Jim from working the odd one or two on CW, like KP4DRX, VK6SA, ZP5NW, 5Z4JE, and 9Q5SW. Another refugee from the LF bands was G3RJV, who took his QRP down to Fifteen and, after a bit of a battle, landed a 4X4.

### Snippets

Till now, the operating hours of PY0ZAE have been dictated by the availability of electric mains, the operating hours for which are 0930-1120z, 1500-1700z, and 1900-0050z, but it is understood that around mid-December things should change with the arrival of battery power, so that it may be possible to get in more operating time should Hal so wish

it—and we guess lots of people would like him to operate round-the-clock until his vacation ends in the beginning of February! The QSL route for this one, by the way, is to PY1CK, although we believe the intention is to hold all the logs until departure.

The 1976 and 1977 Call Book listings for Easter Island are all NBG with the exception of CE0AA and CE0AB, says Father Reddy, CE0AE. Father Reddy's correct address is: Father David L. Reddy, OFM, CE0AE, Parroquia, Isla de Pascua, Chile, although his QSL route is to WA3HUP. It is understood that CE0AE has plans for a new beam, and for Top Band working, once he gets things organised, but meantime there is a major problem to be overcome in that there is a very high noise level, emanating from the refrigerator in the hospital on the island—anyone with good ideas on this one could do worse than drop a line to CE0AE.

FR7AI is currently on Europa Is. for a couple of months; so what, you may ask? So, Europa counts for Juan da Nova, that's what!

That SEA-net convention in Djakarta back in November seems to have been quite a party; the next one will be held in Thailand, and should be quite a show, with HS1WR doing the organising. Incidentally, it has been confirmed that the shutdown of HS stations is largely voluntary and self-imposed until things settle down a bit.

Lloyd and Iris Colvin closed down in the British Virgin Is. after the CQ WW CW Test, and at the moment of writing have not yet surfaced; however, the plans called for various stops in the Antilles, so an ear kept on their previously-notified frequencies might be worth while.

XT2RV in Upper Volta is Louis Varney, G5RV at home, rock-bound on 14025 kHz; and there are hopes of a TU4AJ operation while he is around the area, which we understand to be until the end of February.

Lesotho is represented by 7P8BC, who is W9JER; Jerry has the Drake line and hopes to get a beam up soon—cards for QSO's with him should go to WA9SMM, with the usual SAE or IRC's. Look for him around 14283 kHz at 1800z or at other times

he might be noted up at 14330 kHz.

5Z4NI is in fact SM0KV, due to remain in 5Z4-land until May. EP20D now signs 9D5B, while the 9D5A heard in the contest was K6KM, and his QSL address is WA6AHF. Another QSL route is that for FR7BE, Box 137, Tampon, Reunion Island. If you came across C5AZ (and lots of people did!) during the contest, you worked OH2MM operating from The Gambia and trying to beat the record score turned-in in past years from the same spot by OH2BH as ZD3X. QSL's for this recent action go to OH2NB.

Finally, of course, by the time this comes to print there will be a new G prefix—GU for Guernsey from January 1.

### Sign-off

Which is where we pull the Big Switch for another month; and if anyone doesn't seem to have received his mention, then it should be noted that there is a packet of mail from Buckingham full of CDXN letters which has not at the time of writing shown up at this end; and your scribe must post before the next mail delivery if he is to meet his own deadline. Anything of interest from that lot will be duly reported next time round.

Now, the deadline. January 11 it is, to arrive first post; the address is CDXN, SHORT WAVE MAGAZINE, BUCKINGHAM MK18 1RQ.

*For this month's*

*Readers' Small Ads.*

*see pp.697 to 702*

## DIGITAL ELECTRONIC KEYS

USING IC's — CIRCUIT  
ACTION FULLY DESCRIBED

P. R. CRAGG (G3UGK)

WITH the increasing availability of reasonably priced integrated circuits, more and more complex circuit designs become feasible to the amateur constructor. The Mk. II keyer described here, while fairly sophisticated in operation, should present little difficulty even to the inexperienced, and should satisfy the demands of the most critical CW operator.

Why Mk. II? Well, the Mk. I was a hybrid version of the G3KPT design, published on the March 1971 issue of *SHORT WAVE MAGAZINE*, with a number of additions, but retaining the transistor pulse generator. In an effort to improve upon this rather basic, albeit effective, circuit, it was decided to retain the best features, and add the necessary components to produce an "unbeatable" keyer. It was to be all integrated circuit, if possible, using standard SN-series IC's, and it had to be foolproof in the sense that dot/dash processing was totally controlled by the electronics and timing. Above all, it had to be impossible for normal paddle operations to corrupt characters. Builders of the G3KPT original will have noticed that, in spite of the modification to the pulse generator (described by G3FCW in the September 1973 issue of the *Magazine*) it is still possible for a very short contact of the *dash* side of the paddle to produce *dots*.

Looking at the block diagram, Fig. 1, we can see an outline of the theory of operation. Movement of the paddle in either direction will enter the dot or dash into its appropriate store. It will stay there regardless of further paddle movements until the completion of the character. (In this description, the word "character"

refers to a dot or a dash, not a complete Morse code letter).

The next box, "Gate", selects the character set up first, starts the pulse generator going, informs the dot-dash generator which character to expect, and in the case of a dash, prevents the dot store from being reset one third of the way along a dash.

The output of the dot-dash generator drives the one transistor in the circuit to operate the relay, and resets the relevant input store. Not until this reset pulse arrives can another character be started.

Note that both input stores can be set up to hold a character simultaneously, but the first one selected will be processed first, and when this is complete, the gate will automatically process the other one, with the correct spacing between characters. The only exception to this is a "key-down" condition whereby the character will be repeated until the paddle is returned to its central position.

The external speed control, by a variable resistor, regulates the pulse repetition rate and hence the speed of the characters. A thorough understanding of the principles outlined above will be of great benefit in following the logic and timing description.

### Theory of Operation

Before going into the detailed circuit explanation, we must examine the integrated circuits used, and see how they can be connected to produce different effects.

Looking at Fig. 2, we see that the SN7400 consists of four separate NAND gates. These conform to the following rules: Any '0' in, gives a '1' out, and two '1's in, give a '0' out. To elucidate: '0' refers to GND, and '1' to plus 5v. Thus, if pins 1 and 2 are both a logical '1', pin 3 will be a logical zero. (Note that we refer to *logical* '1' and *logical* '0', as these are not necessarily exactly 0v. and plus 5v.) In accordance with the rule above, therefore, if either pin 1 or pin 2 is at logical '0', then pin 3 must be a logical '1'.

The SN7475 is a Quad Latch. Note that although

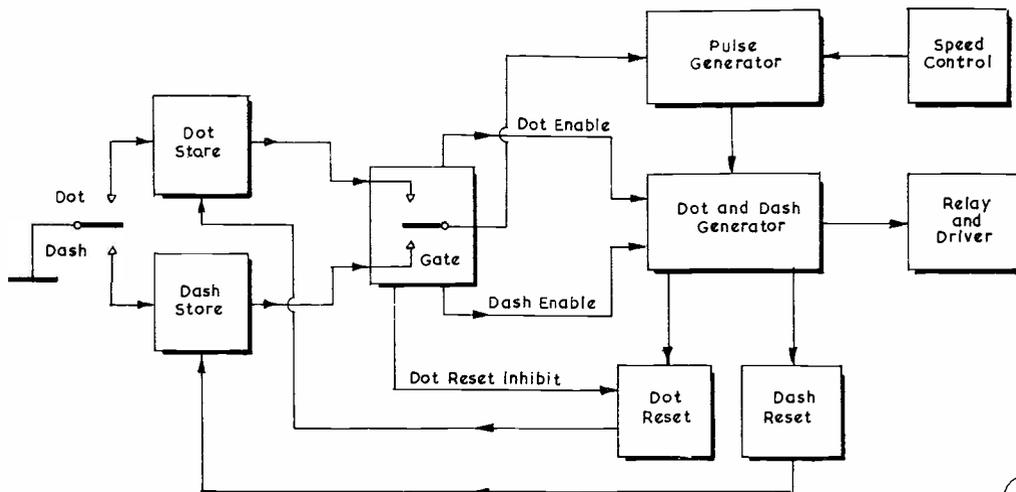


Fig.1 BLOCK DIAGRAM

there are four circuits, they are paired up as far as the enable-lines, marked 'CL', are concerned. The rule for this device is that any information present on the 'D' input will be fed through to the 'Q' output whenever the 'CL' line is a logical '1', and will remain there when the 'CL' line goes to a logical '0'. With the 'CL' line '0', the 'D' input will have no effect on the 'Q' output. The 'Q' output is always opposite to the 'Q' output.

Next we have the qN 74107, which is a Dual J-K Flipflop. This is one of the most useful devices ever invented for digital electronics, and can be used in a number of ways. It is only necessary to describe the particular configuration used in this circuit, which has both the 'J' and 'K' inputs wired up to a logical '1'. When the 'CL' input goes from '1' to '0', the 'Q' output will change its state. So for every transition from '1' to '0' at the 'CL' input, the 'Q' output will change from '1' to '0' or from '0' to '1'. It is important to understand that it is the *change* from '1' to '0' at the 'CL' input which alters the state, and not a permanent '0' or a change from '0' to '1'. The other input, marked 'CLR', overrides the 'CL' input, and when '0', forces the 'Q' output to '0'. When the 'CLR' input is '1', the 'Q' output will obey the rule above. The 'Q' output is always opposite to the 'Q' output.

Finally, the SN74123, which is a dual Monostable. This device consists of two separate circuits, each of which will produce a pulse, the duration of which is determined by external R and C components. The rule is that a logical '0' on pin 1 (or 9), and a logical '1' on pin 2 (or 10), will give a positive-going pulse at pin 13 (or 5). There will be only one pulse initially, and in order to produce another one, either of the inputs has to change twice. For example, if pin 1 is at '0', as soon as pin 2 goes to '1', we will get an output pulse, and to get another one, pin 2 must change from '1' to '0' and back to '1'. Alternatively, pin 1 must change from '0' to '1' to '0'.

**Logic Circuit**

Fig. 3 is the logic diagram, and there are two special logic circuits which merit further attention. The first is the input store. This uses two NAND gates interconnected as a "set-reset" latch. Looking at IC1A and IB1B, the dot store, we have pin 1 as the "set" input, and pin 5 as the "reset" input. When the paddle is moved to the dot side, GND, i.e. logical '0', is applied to pin 1. In accordance with the operating rule, any '0' in gives a '1' out. So pin 3 goes to '1'. With pin 5 at '1', that is the Q output of IC5, and pin 4 at '1', pin 6, and hence pin 2, will be at '0'. With pin 2 at '0', pin 3, which was initially set to '1' by the paddle, remains at '1', until a reset pulse arrives.

When pin 4 of IC5 goes to '0', IC1B pin 6 goes to '1'. Provided the paddle is not connected to the dot side at this time, pin 1 is at '1'. Now we have both pins 1 and 2 at '1', so pin 3 goes to '0'. Remember that the presence of a dot in the store is indicated by a logical '1' at pin 3. Of course, exactly the same principle applies to the dash store, IC1C and IC1D.

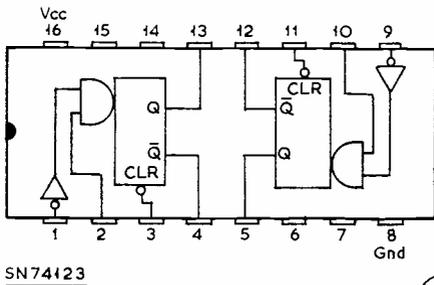
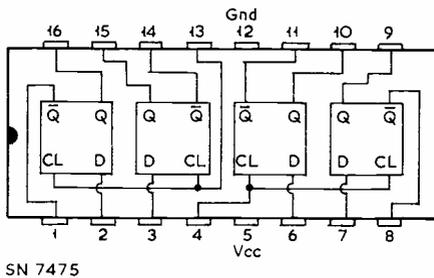
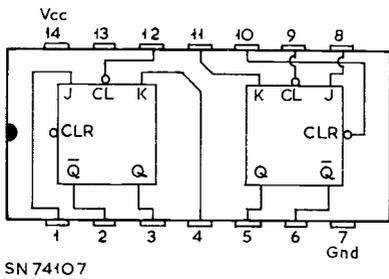
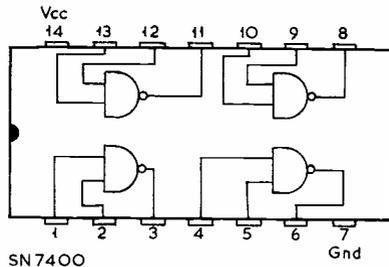


Fig.2 INTEGRATED CIRCUITS (Top view)



**Pulse Generator**

The second circuit to understand is the pulse generator, IC3. The Q output of IC3B is connected back to the inverted output of IC3A. In its rest condition, this line is at '0'. When pin 2, which is normally '0', goes to '1', a negative-going pulse will appear at pin 4. At the end of this pulse, when pin 4 goes from '0' to '1', and with pin 9 connected to '0', IC3B will trigger.

As soon as pin 5 goes to '1', pin 12 goes to '0', giving the first clock pulse to IC4 pin 12. At the end of the

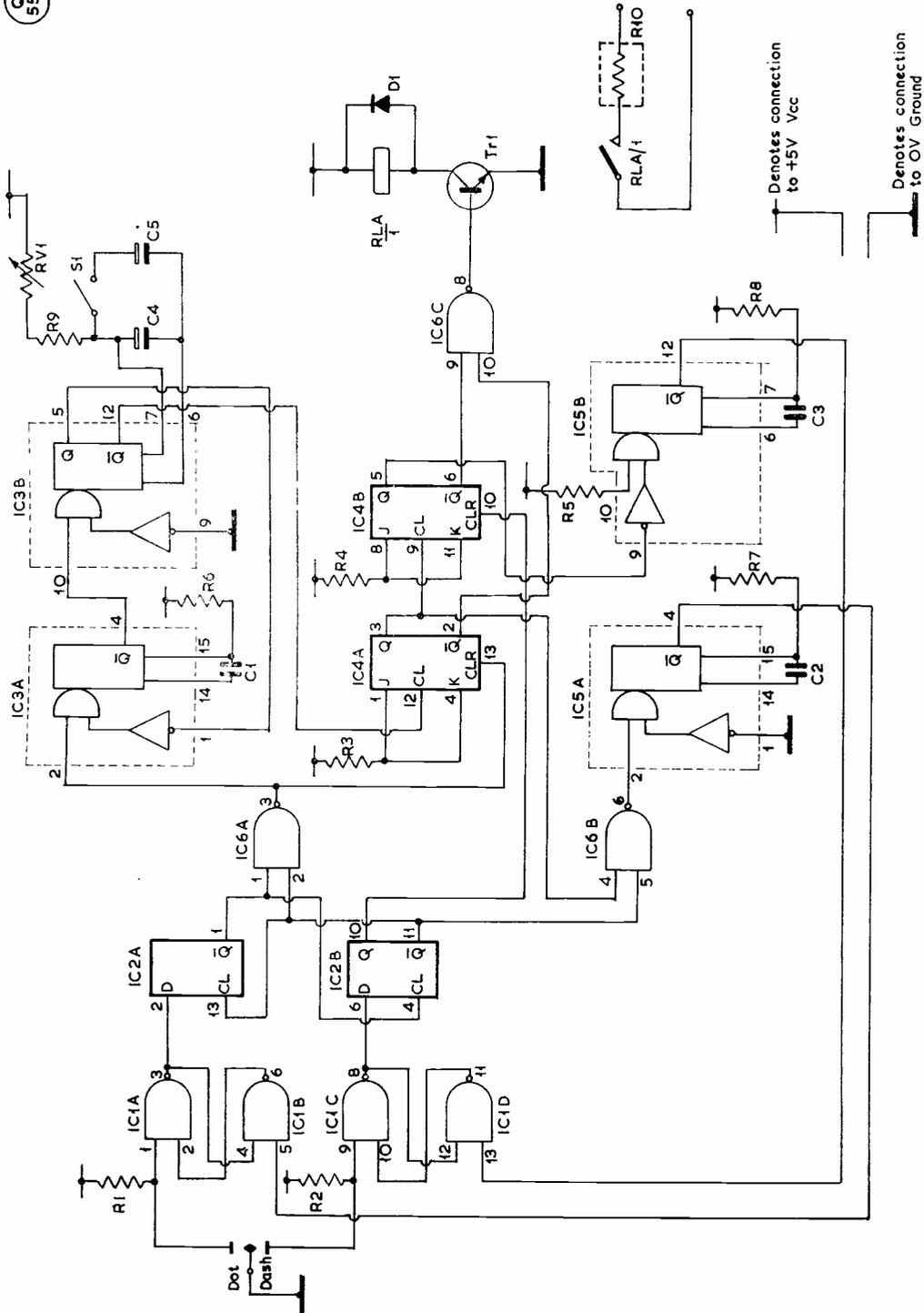


Fig. 3 LOGIC DIAGRAM OF Mk.II DIGITAL ELECTRONIC KEYS

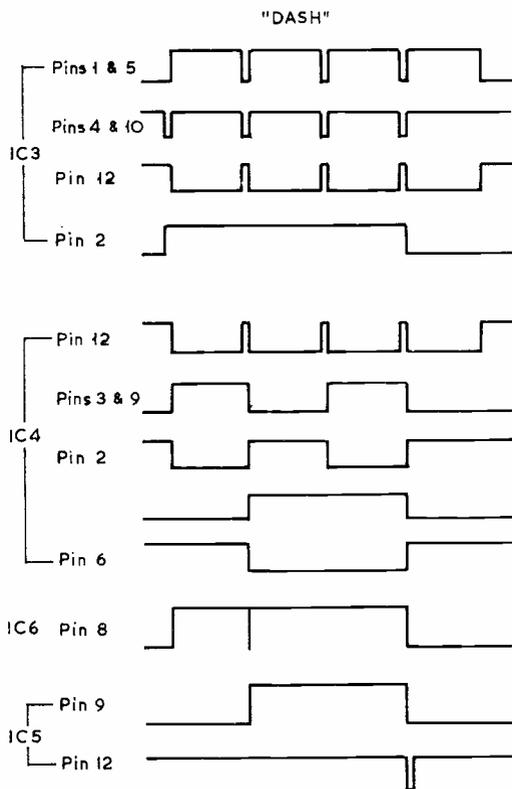


Fig. 4 DASH TIMING DIAGRAM



pulse, the duration of which is determined by the setting of the speed control, pin 5 goes to '0', causing IC3A to trigger again *via* pin 1, providing pin 2 is still at '1' at this instant. All the time pin 2 remains at '1', the two monostables will re-trigger continuously, giving a series of negative-going pulses at pin 12.

At the end of the character, pin 2 will go to '0', preventing IC3A from triggering from pin 1. The output pulses from pin 4 are very short, some  $6\frac{1}{2}$  micro-seconds long enough to trigger the second half of the pulse generator, but not to long to introduce any undesirable delay between operating the paddle and starting the character.

If the above description is read in conjunction with the timing diagram, Fig. 4, it will be easier to understand.

We can now correlate all the fore-going information, and see how the keyer works. First, a complete 'dot' sequence will be described. When the paddle is moved to the dot position (and released), a '1' appears at IC1A, pin 3. At the same time, IC2A pin 1, goes to '0', causing the enable-line of IC2B pin 4 to go to '0'. This prevents the output of the dash store from going any further than IC2B pin 6.

The '0' at IC6A pin 1, produces a '1' at IC3A pin 2,

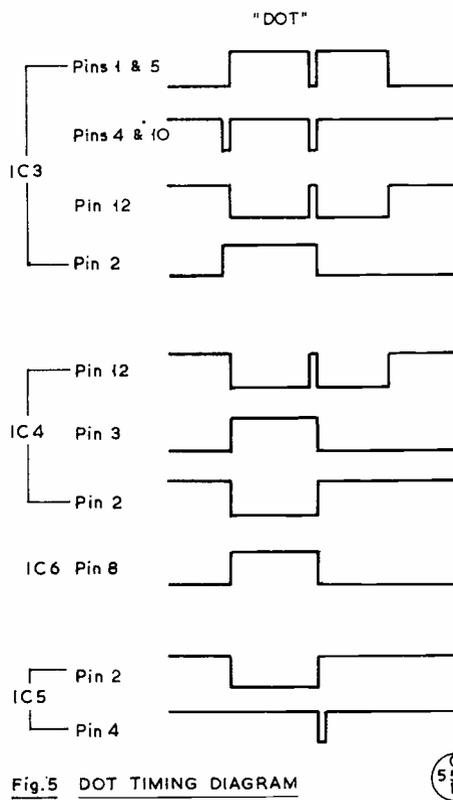


Fig. 5 DOT TIMING DIAGRAM



and IC4A pin 13. The pulse generator is started up, and the CLR input to IC4A will allow the flip-flop to change over at the first negative-going pulse from IC3B pin 12. As the  $\bar{Q}$  output of IC4A pin 2 goes to '0', a '1' appears at IC6C pin 8, turning on the transistor, and calling the relay. Also, the Q output of IC4A pin 3 goes to '1'. As the dash gate, IC2B, has not been enabled, a '1' is present at IC6B pin 5. With a '1' also on pin 4, IC6B pin 6 goes to '0'. However, IC5A pin 2 must go to '1' to trigger the monostable, so nothing more happens at this point.

At the second clock pulse to IC4A pin 12, the flip-flop once again changes over. Pin 3 goes to '0', giving a '1' at IC5A pin 2, and a negative-going pulse at pin 4. At the same time, IC4A pin 2 goes to '1', IC6C pin 10 goes to '0', switching off the transistor, and dropping out the relay. The negative pulse from IC5A pin 4, connected to IC1B pin 5, sets IC1A pin 2 to '1'. With the paddle in its centre position, IC1A pin 3 goes to '0', and IC2A pin 1 goes to '1'. This turns off the pulse generator *via* IC6A pin 3, and everything is reset ready for the next character.

If the paddle was still connected to a dot, the reset pulse onto IC1B pin 5 would still produce a '1' at IC1A pin 2, but with IC1A pin 1 held to '0', this would have no effect on pin 3, and continuous dots would ensue until the paddle was released.

The sequence for a dash is very similar, inasmuch the dash store, IC1C and D, is set up in the same way, and the dash gate, IC2B, allows the dash through to start the pulse generator and inhibit the dot gate. However, as well as doing these things, the dash gate has two further functions. First, while a dash is being processed, the  $\bar{Q}$  output, pin 11 of IC2B, is at '0', holding IC5A pin 2 at '1'. This prevents the changing levels of IC6B pin 4 from triggering the dot reset monostable, IC5A. Also, the CLR line to IC4B is set to a '1', allowing this flip-flop to change over with clock pulses in pin 9.

This time, the second pulse onto IC4A pin 12, puts the Q output, pin 3, back to '0', which in turn causes IC4B pin 6 to go to '0'. So, although the transistor might have been turned off when IC4A pin 2 went to '1', it is held on via IC6C pin 9. The third clock pulse changes IC4A pin 3 back to '1', and the fourth one finally resets it to

'0', and thus changes back IC4B. At this point, IC4B pin 6 goes to '1', dropping out the relay, and pin 5 goes to '0'.

This change to '0' at pin 5 triggers the dash reset monostable, IC5B, giving a negative-going pulse to IC1D pin 13. Thus the dash store is reset, pin 10 of the

**Table of Values**

C1, C2,	= .002 $\mu$ F	VR1 =	100K linear, speed control
C3, C5 =	1 $\mu$ F	RL =	Relay, G.W.M. Radio, see text
R1, R2,		D1 =	On relay
R3, R4,		Tr1 =	BC107
R5 =	1,000 ohms	IC1,	
R6, R7,		IC6 =	SN7400
R8 =	10,000 ohms	IC2 =	SN7475
R9 =	68,000 ohms	IC3,	
R10 =	100 ohms (see text)	IC5 =	SN74123
		IC4 =	SN74107

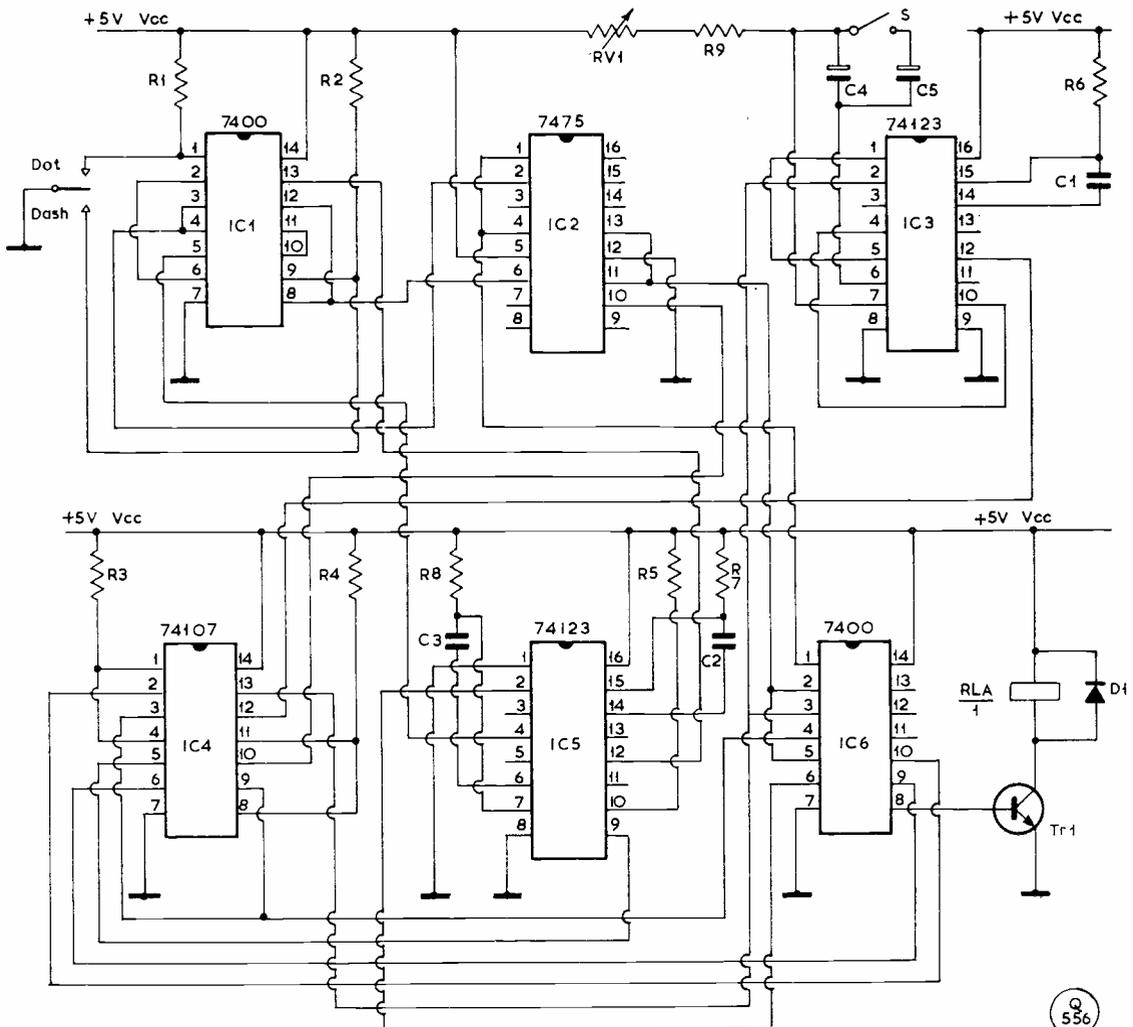


Fig. 6 WIRING DIAGRAM

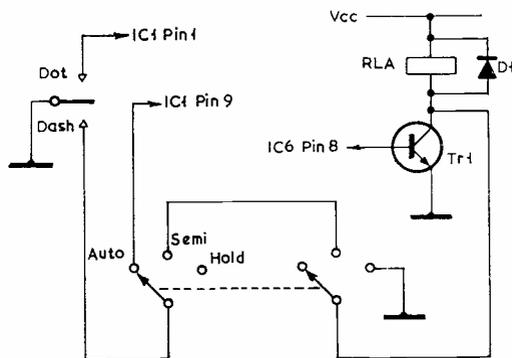


Fig. 7 Optional Switching arrangement

dash gate, IC2B, goes back to '0', pin 11 goes to '1', and the pulse generator is stopped. The dot gate enable-line IC2A pin 13 goes to '1', and the CLR input to IC4B pin 10 goes to '0'.

### Operation

Assume both dot and dash stores had been set up, as is quite likely to happen during QRQ operation when the operator might transfer the paddle from one side to the other very quickly, *i.e.* before the completion of the first character. If he were sending a letter "N", the dash would be still in process while the dot was set up. In this case, the output of the dot store would be a '1' at IC1A pin 3, but the enable-line, pin 13, would be '0'.

So all the while the dash is in process, the  $\bar{Q}$  output of the dash gate would hold off this '1' from the dot store. At the end of the dash, the dash store would be reset, IC2B pin 11 would go to a '1', enabling the dot to be processed via IC2A pin 1, and the dash gate enable-line, IC2B pin 4, would prevent further dashes.

This feature has the effect of smoothing out the operator's paddle movements, especially at high speeds, but does assume fairly sensible manipulation of the paddle. Any keyer will corrupt characters if the paddle is operated much too fast for the speed at which the CW is supposed to be running. This circuit merely allows for a greater leeway before corruption occurs, and the paddle would have to be operated at some 50 w.p.m., with the speed set at 10 w.p.m. to enable the operator to beat it, on a dot-dash or dash-dot sequence.

### Construction

Construction of the keyer should present no problems if the wiring diagram, Fig. 6, is followed. Care should be taken when counting the pin numbers, as IC's 2, 3 and 5 have 16 pins each, while the others have only 14. The relay used was as specified for the G3FCW keyer (obtainable from G.W.M. Radio of Worthing, Sussex) and comes complete with a surge suppressing diode. The 100-ohm resistor R10 may not be necessary, but was added after an attempt to key an FT-200 nearly welded together the relay contacts. (It is not necessary in the writer's HW-101).

It is very important to prevent stray RF from getting into the keyer, and decoupling of connecting leads will most likely be necessary, but the requirements will vary with each installation. Again, no decoupling was found necessary with the HW-101.

Useful additions may be a monitor and mains power supply, as well as some extra switching to enable semi-automatic keying, and a "hold" position for tuning up. The monitor can be that described by G3FCW, but the power supply will require a larger output transistor. In the writer's case, a spare 2N3055 is more than adequate.

For those who wish to add the extra switching, Fig. 7 is included.

Finally, a word to those who may be unwilling to risk their hard-earned cash on "little black boxes". IC's are more reliable and rugged than transistors, and *much* easier to deal with.

## THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for February issue: January 11)

**B**Y the time this comes to be read, the MCC entry will have been made, the log posted off, the holiday season taken, and one may well be wondering just what to do at the next meeting.

One solution might be to have a debate (always provided the gang can be relied on to accept the rulings of the Chair when the argument gets warm!), which then leaves the programme-arranger only the small matter of thinking up a suitable subject, and wording it nicely into the form of a proposition to be debated. Subjects there are a-plenty, within and without our purely hobby angle. For instance, bearing in mind that the majority will be licensed and will therefore be of a mind to recall the struggles of learning R.A.E., how about debating the question of the continually falling status of the engineering professions? One could raise a few eyebrows in professional circles by pointing out how the CEI is obsessed with paper qualifications to the point where practising engineers are not able to be members, and yet there are members who never progress past the status of detail draughtsman! If you have a fair sprinkling of "professional" amateurs, *that* proposition should stir them to eloquence!

However, to return to the matter in hand, namely the Club reports; and so that we may be sure of getting the last comers a mention without contortions in the script—your conductor has, for his sins, another piece running in parallel with this one—we will run straight down the clip.

### The Reports

**Bishops Stortford** top the pile, and here it is a question of AGM-time on January 17; but, prior to the AGM, there is to be an extra-ordinary meeting to consider the possibility of a close-down; support has been falling off badly of recent months, so all those who are or have been members and still live in the district are urged to attend and indicate their views. If this proposition to close down falls, then they will go straight on to the AGM. The venue, as always, is the British Legion club, Windhill, Bishops Stortford.

**Echford** are to be found at St. Martins Court, Kingston Crescent, Ashford, Middx., on January 10; the routine is to get together on the second Monday and the last Thursday in each month, although this was disrupted during December by problems beyond their

control. No details of the programme for the January meetings is to hand.

We have a bit of a problem over the **Milton Keynes** entry; it is stated that the talk will be about the Communications side of the Civil Aviation Authority, by G3IAB, and we know the venue to be the Loyal Hall, Silver Street, Newport Pagnell—but we have no *dates!* So—for the date of the January meeting mentioned above, or of the informal at the Rose and Crown on the following Monday evening, we have to refer you to the Hon. Sec. at the address in the Secretaries' Panel.

Our next stop is at **Coulsdon**, where they are in the habit of foregathering on the first Thursday in each month at the 10th Purley Scouts Hq., Chipstead Valley Road, Coulsdon; but on the third Monday in each month, they are booked in at the 1st Purley Scouts Hq., Purley Park Road, Purley—yes, we've checked it to make sure we got it right! For more details on this group, contact the Hon. Sec. at the address in the Panel.

The AGM of the **Chiltern** group will be on January 26, at 42 Castle Street, High Wycombe, the meeting proper to start at 8.15 sharp. By the time this comes to be read, the Agenda and other details will be in the hands of members; anyone intending to make a first visit would of course be courteous to contact the Hon. Sec. in advance—see Panel—as this is the AGM, even though we know visitors to be welcome.

**Guildford** mention with sorrow the passing of their President and founder-member, Eric Rawlings, G5RS. They seem to have things arranged on the basis of the second and fourth Fridays in each month, although we do not have details of either programme or venue this time; but no doubt the Hon. Sec.—see Panel—would be only too pleased to update you.

**Hereford** also use Fridays, but in their case it is the first and third ones, at the County Control, Civil Defence Headquarters, Gaol Street, Hereford. We have no details as to the programme, although we do know they usually have something fixed up; but if you want to know the details before you visit, then the Hon. Sec. is your man, at the address given in the Panel.

Next we come to **R.A.I.B.C.**, the Radio Amateur Invalid and Bedfast Club; the name defines pretty clearly the position of the "full" members, and it also implies the existence of others, known as representatives and supporters, who help, in one way or another, in the work of getting and keeping the full members on the air. Just for this once, let your scribe step out of his role as a mere recorder and say that the club to which he belongs (and he knows of several others who do the same) always contrives to send a small donation to the funds at the time of the AGM. This, as much as anything, is because we locally can see the value of R.A.I.B.C. and assess what it means to the full members.

Just a brief note this time from **Torbay**, where they have just chalked up the 100 members—they obviously have the formula for success. Hq. address is at Bath Lane, rear of 94 Belgrave Road, and for the rest we refer you to the Hon. Sec.—the Panel gives his address.

The first and third Thursdays are the ones for **Mid-Sussex**, at their Hq. in Marle Place, Burgess Hill; and if the picture of Marle Place and the aerials is anything to go by, they have a very nice Hq. indeed.

We took quite a while reading through the **Stourbridge**

Newsletter before we managed to extract from it the meat we wanted. The January 4 date is an informal, at the "Shrubbery Cottage" Heath Lane, Oldswinford, at 9 p.m. while the main session is on January 17, for the Annual Constructors contest.

Nice to see the letter-head of **Maidstone YMCA** again; they foregather every Friday evening at the "Y" Sports-centre, Melrose Close, Maidstone, with the first and third being devoted to beginners by way of R.A.E. and Morse tuition. On the other Fridays more general activities take place, talks, film shows, and so on. For example, on January 14 and 28 respectively, Mr. Bell will be talking about CCTV and Videotape.

The **Thames Valley** is a big place, but the club of that name restricts its activities to the area around Thames Ditton, the Hq. being at Giggs Hill Green Library, Giggs Hill Road, Thames Ditton; the date is January 4 for the AGM.

Up in **Nottingham** the group is based on Sherwood Community Centre, Woodthorpe House, Mansfield Road, Nottingham, where they are to be found on Thursday evenings. A Forum is down for 6th, and a talk on Semi-conductors on 13th. Activity Night is down for January 20, and on 27th G3LOV will be talking about Amateur Radio in U.S.A. On a rather different tack, this group managed to arrange a window display in one of the main shopping centres in Nottingham, and to gain several mentions in the local papers—perhaps that is why the membership is at an all-time high level.

Further North yet, this time to **York**, and their Hq. at the British Legion Club, 61 Micklegate, York. They kick off with a New Year Party on January 7, then there is January 14, the *third* Friday as always is missed, and on 28th there is the AGM. Visitors, we are told, are very welcome, and a report from elsewhere tells us that this is indeed very true—good for them.

**South-East Kent YMCA** are the next for consideration, and we find them in session every Wednesday evening at 7.30, the Hq. being Dover YMCA, where they have their own rig and shack. Looking at the programme, we see on January 5 a Film evening, the "Aurora Borealis" with G4EQJ; on 12th G3LCK has his turn on the subject of Aerials and Propagation. January 19 appears to be set first for a visit to see a Hi-Fix set-up, followed by an HF evening. Finally, on January 26 there is a debate on "CB radio in U.K.", the leaders being G3XVY and G4DCV for, and G4EQJ and G8KSD against the motion, under the chairmanship of G8KEN.

**Newport** next; although there are about six Newports around the country, the one of interest is the one in Gwent; they get together at Brynglas House, Brynglas Hill, Newport, on January 17 for their AGM, but the routine of meetings is for every Monday.

**Silverthorn** continue their merry way at Friday Hill House, Simmons Lane, Chingford, where they appear to be on each Friday; they have a shack and a lecture room, and refreshments are available in the building.

Mobile operators are catered for by **A.R.M.S.** which has become more of an international than a mere national group, with representatives and members in most of the continents. The society has much to offer the regular, or even occasional, operator of a /M station.

January 27 is the big day for **Verulam**, when the gathering at the Market Hall, St. Albans will be listening

to G3GJX talking about Electronic Keyers. On the second Thursday in each month there is also an informal, which is booked in the R.A.F. Association Hq., Victoria Street, St. Albans.

Down West, **Cornish** are based on the SWEB Club-room, Pool, Camborne; on January 6, G3UCQ will be giving a talk entitled "Visiting the States." One could add that the Cornish Link is one of the most consistently good Newsletters to come our way, and there is usually a stop work for several minutes while we absorb it from cover to cover.

Still, one supposes, in a general westerly direction, we go on to **Wirral**, where the Editor of the Newsletter has some philosophising to do about the AGM attendance and its relationship to membership attitudes; we suspect his remarks to be connected with the fact that he has been an unwilling editor almost as long as we have been writing this column, but no one will nominate another at AGM-time! Anyway, he does a good sound job with little help, and from his work we can see that the gang meet at the Sports Centre, Grange Road West, Birkenhead on the first and third Wednesdays in each month; January 5 sees G3WSD talking about an IC CW sender which can send complete "overs" at the touch of a button, while on January 19 G3YGL will be discussing Ceefax and Oracle.

**Cheltenham (RSGB)** have a bumper holiday number for December/January with so much "gen" in it that they have not put in an indication of where-and-when. However, our spies tell us it is the Old Bakery, behind the Library in Clarence Street, on the first Thursday in the month.

A very brief last-minute note from **Peterborough** indicates a last-minute reshuffle of the programme so that they now have a New Year's party on January 21, at the Fitzwilliam Arms, Marholm, Near Peterborough—potential visitors note that this is *not* the usual venue.

**Surrey** have a revamped magazine from which we find the Hq. address as T.S. "Terra Nova", 34 The Waldrons, Croydon. However, although we can say that the normal rule is the first and third Wednesday, we don't have any details of what goes on; this information being left out in favour—rightly so—of an obituary for G8DWM, Dan, who had been a popular member for many years having been first licensed as G3JYV. A sad loss indeed.

On to **Acton, Brentford & Chiswick**, where that familiar handwriting advises that their AGM is on January 18, at the Chiswick Trades and Social Club, 66 High Road, Acton. Start 7.30 sharp, and when the business is completed, there will be a general discussion.

January for **South Manchester** is, as usual, a matter of every Friday at Sale Moor Community Centre, while the VHF lads also foregather at the club shack, Greeba, Shady Lane, Baguley on Mondays, at least for the present. The Friday doings are: January 7, G3SMT on "Recent development at UHF," and January 14, G3HZM on Aerials. Logically, on January 21, G3FNM follows up with a talk on Aerial Support Systems, leaving, on January 28, G3YRQ to round off the month by talking about Logic Circuits.

A lecture on Radio Astronomy is to be given to the **Southdown** chaps on January 3, the speaker being G3JIX; this is as usual at Club Hq., Victoria Hotel,

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

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 CORNISH: S. Halfyard, G4EIS, Studio 12, Rosewall Terrace, St. Ives (5576), Cornwall.  
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 ECHELFORD: R. S. Hewes, G3TDR, 24 Brightside Avenue, Laleham, Staines, Middx.  
 GUILDFORD: L. Bright, G4BHQ, 4 Dagley Farm, Shalford, Guildford, Surrey.  
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 S. E. KENT YMCA: A. D. Hewlett, G8KSD, 170 Cheriton High Street, Folkestone (76661), Kent.  
 SOUTH MANCHESTER: W. L. Seddon, G3YIW, 12 Barwell Road, Sale, Cheshire. (061-973 3355.)  
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 TORBAY: M. Yates, G3UIQ, Top Flat, 23 Waverley Road, Newton Abbot, Devon.  
 VERULAM: B. H. Pickford, G4DUS, 130 The Drive, Rickmansworth, Herts.  
 WIRRAL: H. I. Crofts, G3DLF, 3 Barmouth Road, Wallasey. (051-638 2515.)  
 WORKSOP: D. L. Rush, G4CRE, 87 Rydal Drive, Worksop.  
 YEOVIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil, Somerset.  
 YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

Latimer Road, Eastbourne; and on January 22, the Annual Dinner is at the Esmeralda Restaurant in Eastbourne.

**Basingstoke** have recently had an AGM with some injection of new blood into the committee. The present meeting routine is a formal on the third Wednesday in each month, and an informal on the first Saturday; but we have to refer you to the Hon. Sec. for the Hq. address.

A brand-new formation—the first for some while to be notified—is mentioned for the **Poole** area. They centre on Poole Technical College, North Road, Poole, where they have a booking for the last Friday in each month. More details, contact the Hon. Sec. at the address in the Panel.

Hq. for the **Cray Valley** folk is Eltham United Reformed Church Hall, 1 Court Road, London, S.E.9, and they have the first Thursday booked for the formal, and the third Thursday for an informal ragchew; however the programme does not go that far ahead in our Newsletter copy. That means we have to refer you to the Hon. Sec.—see Panel—for the latest information.

Although **Yeovil** have a firm programme for each Thursday in the month, it is nonetheless important to get in touch with the Hon. Sec. before you set off, the reason being simply that a change of Hq. address is possible, from the present one.

**Bournemouth/Poole (Wessex A.R.G.)** had already been written into the copy but we have had to erase that because they now have a new Hq.—the first time it will be used is Friday, January 7, at the Dolphin Hotel, Holdenhurst Road for the formal, the talk being by G3OBD, on the subject of Oscar—how to equip and how to use it, not to mention what it can do. This group, and the new Poole one already mentioned, are combining forces for the Marconi 75th Anniversary effort at the Haven Hotel, where a station will be set up in the very room Marconi used to work over to Volland; the show goes on over the weekend this piece is being written, and sounds to be a very fine example of teamwork between various organisations.

It's not very often we hear from **B.A.T.C.**, they seeming to prefer keeping their light under a bushel. The group, of course, is the one devoted to the amateur TV interest, both in terms of broadband TV at UHF, and the Slow-Scan variety practised on the HF and VHF bands, and they put out a very good little magazine called CQ-TV which has now reached its 96th issue.

### Deadlines

For next month, your letters should contain your February details—venue, dates, Hon. Sec.'s. name and address, and any other details of interest; and it should be posted to arrive by January 11—sorry it's a bit tight but we also have the MCC report to cope with in the time! Address, as ever, to CLUB SECRETARY, SHORT WAVE MAGAZINE, BUCKINGHAM, MK18 1RQ.

## TRANSCEIVER FOR EIGHTY METRES

COMPACT, QRP—  
DIRECT CONVERSION ON THE  
RECEIVER SIDE

R. GOULDSTONE (G3TAG)

**T**HE recent surge of interest in QRP working prompted the construction of the small transceiver described here. The operating band was chosen for two reasons: First, because an 80-metre VFO had been constructed some time ago and was available and, secondly, because most operating is done in the evenings when the HF bands tend to dry up a little.

Although it is doubtful if a direct conversion receiver can attain the same high standards as a modern conventional design, nevertheless results are pretty good. The only way an order of improvement can be obtained is to violate the basic simplicity of the system by using phasing techniques.

Results on the air were far better than had been expected. It is doubtful if, by using any other system, a transceiver giving similar results could be built for less than four times the cost.

### The Receiver

In the interest of simplicity a direct conversion circuit is used. There are no RF or IF amplifiers to worry about, all the amplification and selectivity being provided at *audio* frequencies. The sensitivity has not been measured but seems to be more than adequate, the gain control never being more than about "half-cock" at any time. Selectivity given by the bandpass filter is very good, enabling signals to be singled out of the crowd quite effectively. On "receive" the IRT allows the VFO to be shifted above or below the signal frequency by about 1 kHz, enabling the side with the least QRM to be selected. With the filter switched out of circuit good SSB reception is possible despite the lack of AGC. No doubt those interested could rig up an audio-derived system round the AF amplifier to provide this facility if the need arose.

### RF Stage

During experimental work an RF amplifier was tried at the front end of the receiver. It was found during tests that this was very rarely used to anywhere near full advantage, a 25 dB aerial attenuator being switched in most of the time. The amplifier was therefore scrapped. Radio frequency selectivity at RF is provided by L1 and L2 and their associated capacitors. The coils are separated by a screen and top coupled by C4, consisting of two pieces of insulated wire twisted together for an inch or so.

### Mixer

Almost any kind of balanced mixer can be used in a direct-conversion receiver of this type. The conventional arrangement is a diode-ring bridge or one of its derivatives. These give first-class results but do require the winding of balanced transformers and also call for a good

deal of carrier power. The mixer used here is a *Plessey* SL641 integrated circuit. This is a low-noise double balanced modulator designed to replace the diode ring. It can be employed at frequencies up to 75 MHz and its carrier and power requirements are a modest 100 mV into 1K and 6-9 volts at 10 mA respectively. The only precautions to be taken when using this unit are:

(1) The decoupling capacitors C9 and C10 should be mounted as close to the pins as possible, and (2) The power supply must not exceed +9 volts.

### Pre-Amplifier

Since there is no gain in the RF or mixer stages all the amplification must be done at audio frequencies. It will be realised from this that the noise-performance of the receiver will depend mainly on the first stage of the AF amplifier. The circuit shown is about the best that can be achieved using bi-polar transistors. Some of the more recent FET's could give a slightly better noise-figure but are at present rather expensive. Transistor Tr1 is a 2N3391A low-noise type; its collector current is set to about 350 micro-amps to achieve optimum results; this transistor could be substituted by a BC109 if desired. The output of the amplifier Tr1 and Tr2 is DC-coupled to an emitter follower Tr3. Emitter resistor VR1 forms the AF gain control. It will be noticed that a moulded-track component has been specified in this position and also for the IRT control. An ordinary carbon-track potentiometer can become noisy in operation in these positions owing to the DC current flowing through it.

### Filter Amplifier

The final stage of the receiver performs two functions, that of a bandpass filter and output amplifier. An integrated-circuit operational amplifier is used in this position. Bandpass characteristics are obtained by switching a bridged-T network into the feedback line by means of S1. With the components shown (R11, R12, R14 and C16, C17, C18) the pass-band is centred around 800 Hz. If desired R10 could be made a pre-set

component of about 10K. The selectivity of the filter can then be adjusted to suit the user. Output from the 741 amplifier is sufficient to drive headphones of between 100 ohms and 1K.

### The VFO

The field-effect transistor VFO is similar to the one used by the author in a 160-metre TTx (described in the April 1972 issue of *SHORT WAVE MAGAZINE*) and found to be very reliable. Apart from the frequency the only change is the inclusion of a by-passed 1K resistor in the FET source to obtain certain starting. Following the two-stage buffer amplifier is a potentiometer R31, R32 to provide approximately 100 mV r.m.s. via C33 to the receiver mixer. The output from the VFO is very clean and free from harmonics, an important factor in avoiding interference from out-of-band signals. Independent receiver tuning (IRT) is provided by VR2 and variable capacity diode D1.

With VR2 in its mid-position the oscillator is on the same frequency for "transmit" and "receive". In this position the calling station is netted zero-beat with the main tuning control. VR2 is then shifted either side of centre to achieve the required beat note. This facility also enables a drifting signal to be tracked without shifting the transmitting frequency.

### Tx Driver

This is a simple Class-A amplifier using a wideband output transformer. Almost any ½ in. ferrite ring core will do for L4. The centre tap on the secondary of this transformer is taken to ground via R37 and C37 to give Class-C bias for the output stage. Keying is achieved by switching the +12 volt line to this stage.

### RF Power Amplifier

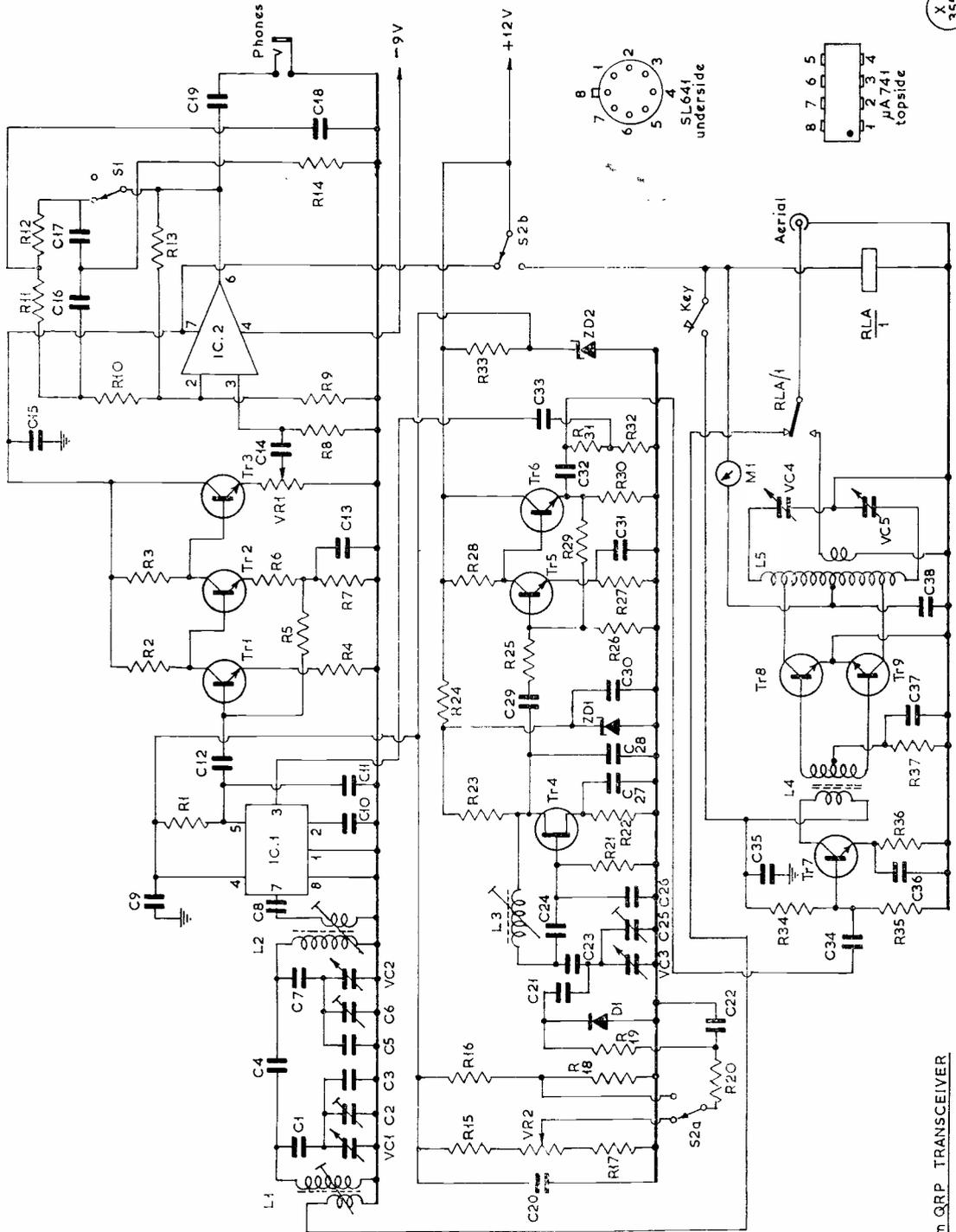
A push-pull Class-C amplifier has been adopted for this stage. Some thought was given to using a *pi* tank circuit but this was rejected on the grounds of complexity and the fact that these circuits can be a little temperamental. The forfeit to be paid for simplicity is increased harmonic output but it was found that this

## Table of Values

Circuit of The 80m. Transceiver	
C1, C7	= 220 $\mu$ F, s/m
C2, C6	= 300,000 ohms, high-stab.
C25	= 82 ohms
C3, C5	= 30 $\mu$ F Philips trimmer
C4	= 70 $\mu$ F, s/m
C8, C31, C33, C35, C36, C38	= see text
C38	= -01 $\mu$ F, disc
C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C21, C22, C27, C30, C32, C34	= 1,000 ohms
C15	= 56,000 ohms
C16	= 4,700 ohms
C17	= 2,000 ohms
C18	= 910,000 ohms
C21	= 12,000 ohms, 1%
C22	= 15,000 ohms, 1%
C27	= 100,000 ohms
C30	= 47,000 ohms
C32	= 330 ohms
C34	= 15,000 ohms
C35	= 270 ohms
C36	= 22,000 ohms
C38	= 820 ohms
C23	= 22 $\mu$ F, s/m
C24	= 20 $\mu$ F, s/m
C26	= 20 $\mu$ F, s/m
C28	= 470 $\mu$ F, s/m
C29	= 100 $\mu$ F, s/m
VC1, VC2, VC3, VC4	= 50 $\mu$ F, 3-gang
VC5	= 500 $\mu$ F, 2-gang
R1	= 2,200 ohms, high-stab.
R2	= 30,000 ohms, high-stab.
R3	= 6,200 ohms, high-stab.
R4	= 47 ohms
R5	= 300,000 ohms, high-stab.
R6, R36, R37	= 82 ohms
R7, R13, R22, R23	= 1,000 ohms
R8, R9	= 56,000 ohms
R10, R25	= 4,700 ohms
R11, R12	= 2,000 ohms
R13	= 910,000 ohms
R15, R17	= 12,000 ohms, 1%
R16, R18	= 15,000 ohms, 1%
R19, R20	= 100,000 ohms
R21	= 47,000 ohms
R24, R33	= 330 ohms
R25	= 15,000 ohms
R26	= 270 ohms
R29	= 22,000 ohms
R30	= 820 ohms
R31	= 22 $\mu$ F, s/m
R32	= 20 $\mu$ F, s/m
R33	= 470 $\mu$ F, s/m
Tr1	= 2N3391A (BC107)
Tr2, Tr3, Tr5	= BC108
Tr4	= BC109
Tr6	= 2N3819
Tr7, Tr8, Tr9	= BFY50 or 2N2219
IC1	= <i>Plessey</i> SL641
IC2	= 41 Op-Amp.
D1	= BA111
ZD1	= 5.6v. 400 mW zener
ZD2	= 7.5v. 400 mW

## TABLE OF COIL DATA

L1	= 50 turns 34g. enam. on ½ in. dia. former, input winding 5 turns over earthy end.
L2	= As L1, but with mixer input winding 8 turns at earthy end.
L3	= 55 turns of 34g. enam. or ½ in. dia. former.
L4	= <i>Primary</i> , 15 turns 34g. <i>Secondary</i> , 9 turns with centre tap, all on former consisting of ½ in. ferrite ring.
L5	= 33 turns of 30g. enam. on ½ in. dia. former, centre-tapped with collector taps 2½ turns each side of centre. Output winding six turns of insulated wire over centre of L5.



80m QRP TRANSCEIVER

Circuit of The Transceiver

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could be overcome by using an ATU or simple low-pass filter. Power input is around 3 and 4 watts and efficiency between 55% and 65%. It must be remembered that as the transistors used are not specifically intended or selected by the manufacturers as RF amplifiers, performance will vary a little with transistors from different manufacturers or batches. The circuit seems to be free from the usual suicidal tendencies of most transistor PA's, being quite stable with or without a load. A simple change-over circuit is employed, RL1 operating with the PA supply is energised via S2B. The other section of this switch S2A selects the appropriate bias to D1.

#### Construction

Layout of most of the transceiver is not very critical. In the prototype the various stages were built on both P.C. board and *Veroboard*. These modules were then connected up in a logical sequence using screened cable for all the RF and AF signal routes. One point is however very important: The PA and driver must not be able to "see" the VFO, or a nasty chirp will result. (This careful isolation is even more necessary in this sort of circuit, where the VFO runs at the radiating frequency). The PA is in a separate compartment at the rear of the chassis and power supply and keying leads are decoupled where they enter this compartment.

#### Alignment

After checking the wiring for obvious faults connect the output to a 75-ohm load, put S2 to Rx and connect a supply of +12 and -9 volts. (The -9 volt line only takes about 1 mA so a small battery would last almost as long as its shelf life). Next, set VR2 to its mid-position and adjust the VFO by means of C25 and L3 to give coverage of the 80-metre band using a receiver or wavemeter. Now switch S2 to Tx and check that the VFO remains within a few cycles of the Rx position. If wildly out check the voltages at the slider of VR2 and junction of R16, R18—they should be equal at about 3.7 volts. Once the VFO is satisfactory, switch to Tx and key the PA. Tune the tank for a dip in collector current; this should be between 250 and 250 mA. Measure the output power in the load and ascertain that the efficiency is reasonable. Also listen to the note on a receiver—if worse than T9 suspect instability. If chirpy, examine screening and decoupling, add more if necessary. Remove the 75-ohm load and connect an antenna through at A.T.U. With S2 at Rx signals should be heard in the 80-metre band. Peak up the receiver input stage, L1 and L2 at the LF end, C2 and C6 at the HF end. All being well you are now ready to join the milliwatts-per-mile Club.

#### Results

Using a half-wave end-fed aerial at about 15 feet some 50 stations were worked in the first few evenings of operating. Reports vary, some being rather surprising considering the distances and power involved. The most pleasing so far came from UR2JIO, 579 and UP2PBY, 569 and the most depressing from DM2DHN/A, 359. The usual rule seems to apply even at these low powers: "If you can hear them you can invariably work them".

Other prefixes worked on this 3-watt rig include SM, SP, various DM, DK, DJ, PAØ, ON and F—all at between 569 and 579. It remains only to say that the exercise has been most enjoyable and satisfying.

## TRANSMITTING ANTENNAE FOR SMALL GARDENS

### INTERESTING HELICAL SYSTEM ON TOP BAND

J. S. CUSHING (G3HKC)

ONE of the problems many amateurs have to solve is how to radiate a reasonable signal from a small garden. The QTH where the aerial systems described here are installed has a garden just over 40 feet long, so elaborate layouts are impossible. A major handicap is the difficulties involved if masts of any height are installed. Obviously, siting and guying even one mast of more than 25 feet is not easy, while if a taller mast is somehow contrived there is always a risk of damage to a neighbour's property. On the principle that good neighbourly relations are more important than an extra S-point with a W2, only one mast about 20 feet high is used. This is near the end of the garden and by using the rear of the house in place of a second mast, a maximum top length of just over 30 feet is possible.

Aerials made by folding about 70 feet of wire into the space available radiate a good enough signal on 160 and 80 metres to allow plenty of contacts, though mostly only local ones result. A very much folded 140 feet has also been tried but this maze of wire gave only slightly better results.

On 20 metres with either of these aerials results were very poor even though all indications suggested they were taking power. But as soon as a simple dipole was put up contacts with European countries became easy. Such an aerial at 20 feet will not open the door to DX working, but on the other hand contacts up to 1500 miles are regularly and easily made with reports up to 5-and-9, and sometimes W's are worked with no great effort—this with an *input* of less than 50 watts p.e.p. The reason for these results is easy to understand if azimuthal radiation pattern diagrams for simple aerials are studied. For a height of about 20 feet—with a 20-metre aerial—radiation will be mostly at high angles, hence the ease in working Continentals.

Practical advice seems to be: Get the aerial up to about 20 feet and plenty of QSO's should result. DX contacts will be very few, but recalling how fierce competition can be, it may be argued very little is being missed.

Having made some progress with 20 metres attention was returned to 160 and 80m. Operation on these bands was possible by the common expedient of strapping inner and outer of the coax feeder to the dipole.

#### Another Approach

At this point it seemed no further progress could easily be made when brief mention of a helically wound aerial suitable for Top Band was noticed in the '69 *ARRL Handbook*. Briefly, the idea is to wind 250 feet of wire on a wooden pole 15 to 20 feet high. This is fed with 70-ohm coax which may be taken straight to the Tx

as no ATU is needed. For a vertical radiator less than 20 feet high, which can be placed in any convenient spot, results are very good and lively interest was shown by some stations contacted. If Fig. 1 is referred to the general idea should easily be visualised. The mast is about 20 feet high and one or two inches in diameter. It must of course be non-metallic so a short wooden scaffold pole a couple of stout 10 foot bamboos (suitably joined) or thick dowelling are suggested. Uniformly wound over the length of the mast, except for a couple of feet at the bottom, is 250 feet of wire. This should resonate at 2.0 MHz or a little above and to bring the system to resonance in Top Band a tapped inductance is connected between the inner of the coax feeder and the bottom of the helix. The outer of the coax is earthed below the mast.

Turning to constructional aspects the point to keep in mind is there seems to be nothing very critical about dimensions. The *Handbook* does not lay down any rigid data and, as will be seen later, data for this aerial departs a good deal from recommendations in the *Handbook*.

**Construction**

A mast was made by joining two 9-foot lengths of one-inch diameter wooden poles, these being joined as shown in Fig. 2 with a halving joint. This joint is not the strongest possible, but should be no problem to anyone with a modicum of skill in woodwork and needs no special tools other than a small handsaw. Three 2BA screws and nuts secure the joint and the small amount of

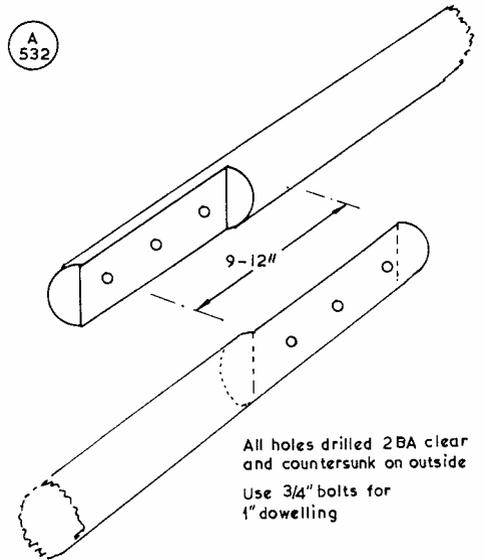


Fig. 2

metal seems to have no ill effect. Having joined the two sections a couple of coats of varnish are applied as weather proofing. Winding 250 feet of wire on to the mast comes next. This should be done carefully so the winding is reasonably regular. Making this winding is rather tedious and takes some time so is best started when time is available to work steadily and get the job done in one go. If a thicker mast or a different length of winding is used, frustration will be avoided if a little figuring is done first mainly to determine the number of turns per inch. Any join in the mast may be covered with a layer of black insulating tape to provide a smooth surface for the winding.

When complete, the winding should be liberally doped with more varnish to fix the turns in place. Once the helix is finished the remainder of the job is easy enough. A fence post or something similar is sunk two or three feet in the ground with the mast fixed to it with home made clamps of thick sheet aluminium. The tapped coil is housed in a plastic box and waterproofed with black *Bostik*.

There remains an earth system. Buried radials are recommended, but several earth rods will do instead. For initial trials one earth rod will suffice.

**Testing**

To check resonance of the system, feed "full" output from a signal generator into the coax feeder and place a field-strength meter close to the mast. The meter (which should be of the aperiodic type) will peak as the generator is tuned through the resonant frequency. If different taps are selected optimum taps for various part of 160m. can be found. (No doubt a GDO should be used instead, though this was not tried.)

When it came to on-the-air testing, a pleasant surprise resulted. It had been assumed in view of the low height and small size that only very local contacts would

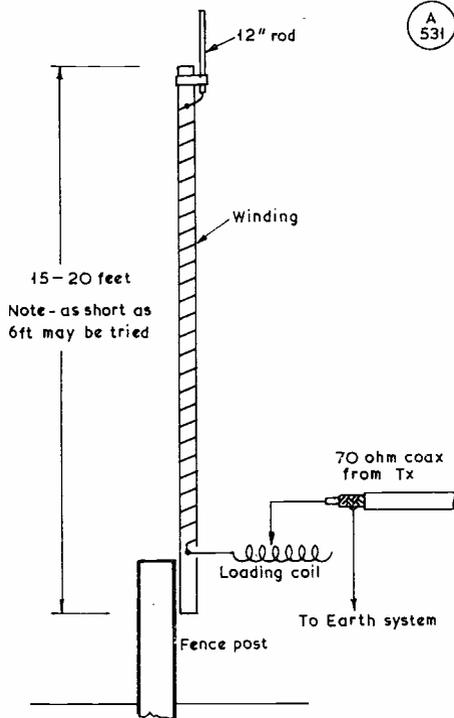


Fig. 1

be possible—but early contacts proved, it was radiating very well and several stations commented on the strength of the signal, and were much interested when told of the nature of the aerial.

### Results

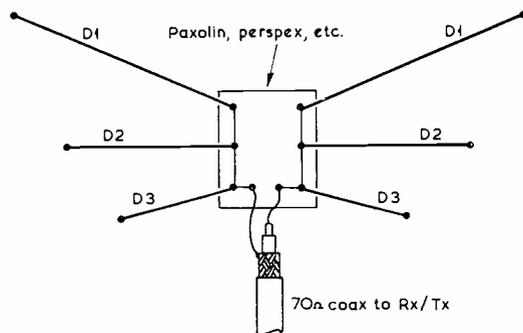
Sufficient QSO's have now been made to establish its performance with some certainty. There seems little doubt that a strong ground-wave goes out with a maximum range of 25 to 30 miles. Nearby contacts are S9+, at 10 miles generally S9 and at 20 miles usually S8. Beyond 20 miles the signal weakens rapidly and ground-wave contacts in excess of 30 miles have not been possible. These figures are across open country. Contacts across heavily built-up areas are not so good—but compared with a folded 70 feet of wire, results are considered very good.

At greater distances performance has been less easily determined, but the following serves as a guide: Up to about 200 miles reports are poor, but beyond this they improve—R5/S5 has been given at 250 miles and R4/S5 at 500 miles. Again, other aerials tried have never produced even these results.

It is, of course, a Top Band-only system and will not work on other bands. If an ATU was placed at the bottom of the helix other bands might perhaps be used. This has not been tried so no comment can be offered.

Reception of Top Band signals is also very satisfactory. In the S.E. of England, GW, GI and GM stations are often heard. Harmonics from TV time-bases, which are so often troublesome, are considerably attenuated—the effect is quite noticeable and this system could be recommended on these grounds alone.

The manner in which this aerial works is not very clear. It does not function as a half-wave (250 feet is approximately a half-wave on 160 metres). It rather acts as a vertical quarter-wave and the *ARRL Handbook* does mention this. This is borne out indirectly by remembering the feed impedance of a vertical quarter-wave is 50 or 60 ohms and that the ordinary 60/70 ohm coax used makes a good feeder. Low readings on a SWR Bridge tend to confirm the above.



- D1 : 20 metre aerial, total length about 33 feet  
 D2 : For 15 metres, 22 feet  
 D3 : 10 metres 16½ feet approx.

Fig. 3

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These two aerials then, erected in a small garden, have given superior results if compared with a short wire aerial and have produced many enjoyable QSO's. The chance to work DX only occurs rarely but when worked is perhaps more satisfying for that reason. There is, by the way, no need to keep to 160 and 20 metres. The helical can be wound for 80 or 40m. instead and a 15 or 10-metre dipole used in place of a 20-metre one—or perhaps the idea in Fig. 3 could be tried, if all HF bands are to be used. Construction data for the 160 metre aerial is given herewith. If it is checked against that in the *Handbook*, several differences will be noticed, suggesting there is nothing critical about the design. Probably the only important factor is the length of wire used. This was in fact measured fairly carefully and must have been within a foot or two of the required length of 250 feet.

### Aerial

Length of mast 17ft. 3in.; diameter of mast one inch; length of wire 250ft.; length of winding 13ft. 6in.; pitch of winding 6 t.p.i.; gauge of wire 28g., or heavier.

### Tapped Inductance

100 turns close wound, 18g. on 1½n. former, taps every 5-10 turns.

## VEHICLE NOISE SUPPRESSION FOR MOBILE OPERATION

DEALING WITH A MORRIS 1000

D. G. ARIGHO (G3NVM)

*Based on material appearing originally in the July 1971 issue of "Mobile News," the approach and methods suggested by G3NVM would obviously be applicable to almost any make of car requiring rigorous noise suppression treatment.—*  
 Editor.

HAVING recently installed 160/80 metre transmitting and receiving equipment in my Morris 1000 for mobile operation, I found various interference problems had to be overcome before satisfactory mobile operation was possible. Whilst I do not claim that the following notes are original, they are an accumulation of various hints and articles which were perused in the efforts to find a cure for my own particular interference problem.

### Mobile Installation

The equipment being used consists of a home-built Tx and a Codar T.28 Receiver. The transmitter is located directly over the transmission shaft and below the heater outlet. The receiver is just under the driver's glove compartment. The antenna is a 9ft. centre-loaded whip with an adjustable capacity hat on the high end of the coil and resonates in the 160-metre band. The aerial mounting is on the rear bumper (driver's side) and a coaxial lead taken through the luggage boot under carpets to the front of the vehicle to the transmitter.

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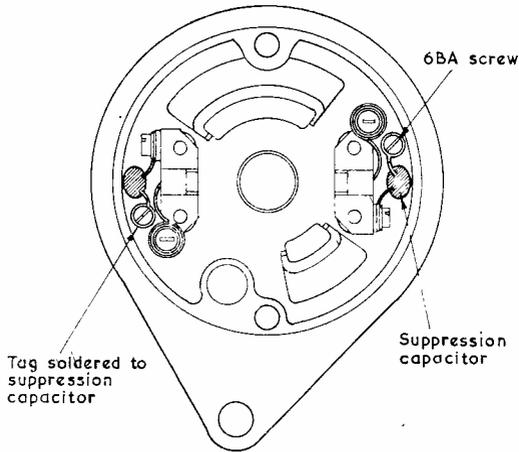


Fig.1 Dynamo End Plate

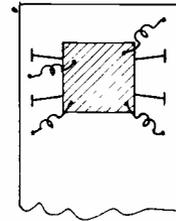


Fig.4 Engine mounting grounding points

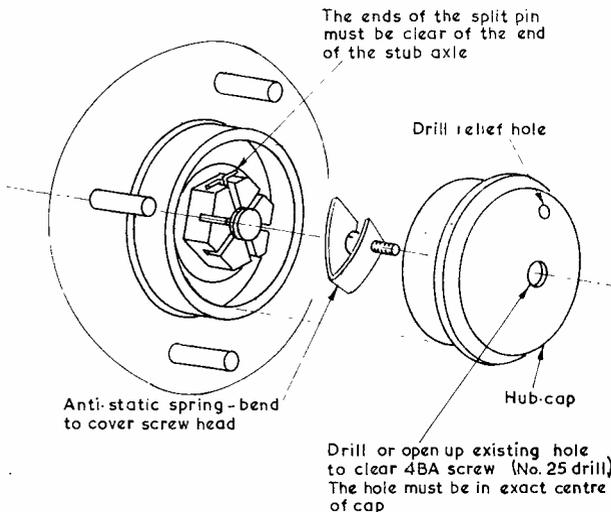


Fig.2. Fitting Anti-static Spring to Hub cap.

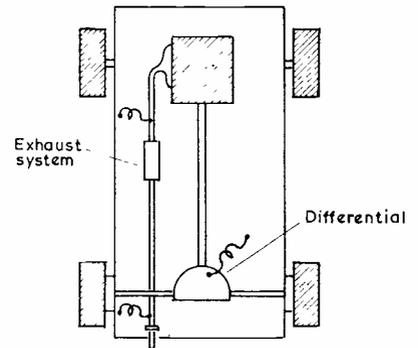


Fig.5 Additional grounding points

Commercial type anti-static spring

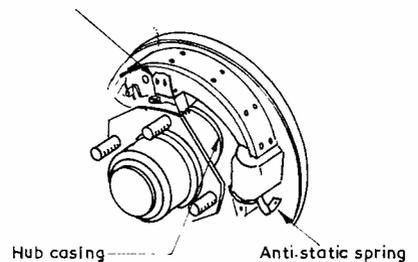


Fig.6 Fitting of Anti-static Bracket to Brake Shoe

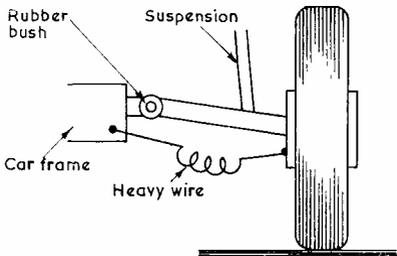


Fig.3 Grounding Front Suspension

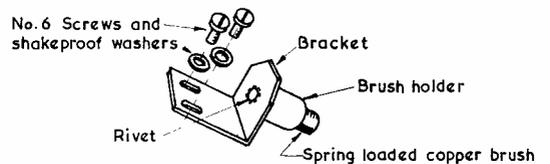


Fig.7 Commercial anti-static spring

### The Dynamo

The first mobile trials were not very encouraging as the interference whine from the dynamo was equivalent to an S8/9 signal on the receiver so it was virtually impossible for contacts to be made when the vehicle was moving.

This was tackled first; a standard car suppressor (0.1  $\mu$ F) was fitted between the dynamo output and the casing and this improved reception as the dynamo noise level was considerably reduced. The next step was to remove the dynamo and examine the state of the commutator and brushes. The commutator was found to be very dirty and the brush wear was uneven. The commutator was well cleaned up and a new set of brushes bedded in. The possibility of physically mounting the dynamo suppressor capacitors directly on the brushes and inside the dynamo case was investigated and eventually a 0.1  $\mu$ F and a 1,000 pF were wired in parallel across the brush holders.

The first test proved that there was not a trace of dynamo interference at various engine speeds and reception was possible on 160/80 metres. However, now that the dynamo trouble was cleared up, I was permitted to hear interference from the distributor (ignition interference), this was bearable but it was decided to try and eliminate it. The first thing was to fit standard plug suppressors to all the plugs leads (these can be purchased through most Lucas agents) and a cut lead suppressor to the HT lead to the coil. This modification was tried with a noticeable improvement. The next step was to fit a 0.1  $\mu$ F capacitor to the LT side of the coil (SW)—and again there was an improvement.

### Wheels and Tyres

Then it was discovered that now either wheel or brake static was evident and at S9-plus, making it virtually impossible to copy anything at all. Back to the square one. A quick jab at the brakes confirmed that it was not brake static as it did not disappear when the brake was applied, so it must be a combination of wheel and tyre static.

A rethink and a reread of various manuals dealing with interference disclosed a number of solutions. The first one was to inject anti-static powder into the tyres? Great! But have you ever tried getting any anti-static powder? . . . every tyre distributor I inquired at said "Never heard of it."

The BMC people in Cambridge said there had been a kit of anti-static brushes for a Morris 1000 but they were no longer being manufactured. I had an idea of what would be necessary for these brushes, so I decided to make and fit my own interpretation of them.

Make sure that all the grease is removed from the contact area before refitting the hub cap otherwise you will be wasting effort. The rear wheels not having the removable hub caps required a rethink, and eventually it was decided to drill the rear brake drum and mount a phosphor bronze spring in each rear wheel, so that when the brake drums were refitted they would make contact against the springs and "ground" the wheel to the axle.

### Final Triumph

When the modifications were complete and the mobile equipment tested on the road on 160/80 metres a marked reduction was evident. The ignition interference was well below the noise level and the tyre/wheel static had virtually

disappeared. As a last refinement a tin of tyre wall paint (obtainable from Halfords) was bought and a mixture of 25% powdered graphite and the tyre wall paint was made up. This was then painted on to the outside walls of the tyres; a retest was arranged and *presto*, no sign of any tyre or wheel static was evident at all.

### Bonding

It should be mentioned that after this exercise was complete about two days were spent underneath the car taking resistance measurements between various parts of the framework. The results were surprising, as much as 20 ohms appearing between some panels and the overall chassis. Thick, heavy wire was used to bond most of the chassis items to the various panels where these large resistances were encountered. I cannot say that this has at all helped with the *interference* suppression but the signal strength on both transmit and receive has improved remarkably!

One other point worth mentioning which might interest Morris 1000 owners is that the front and rear wheel suspensions are connected to the chassis through rubber bushes, so theoretically the front wheels are insulated from the chassis by these rubber suspension bushes. Both front wheels were grounded to the chassis with a short length of heavy flexible cable, the grounding points being from the rear of the front-wheel brake drums direct to the chassis; enough slack grounding cable must be left to allow for the steering linkage, otherwise every time you turn a corner the grounding cable will snap. The rear suspension and exhaust system were grounded from the differential casing to the chassis, also with a short length of heavy lead.

### Conclusion

Perhaps one final comment: During the past few months or so attending various Mobile Rallies and talking with a multitude of Morris 1000 owners everyone had the same comment—in their opinion the Morris 1000 was the worst car they had experienced for ignition and wheel static interference! So, if you're seriously thinking of going mobile, unless you are prepared to do a lot of painstaking work buy another car, one which has a good reputation for interference-free reception from the outset.

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# • • • SWL • • •

## SHORT WAVE LISTENER FEATURE

By Justin Cooper

IT will be recalled that last time round we started talking about the receiver, this being of course, the most important part of the station; and we had arrived at the post-war scene and mentioned the advent of SSB. The second important event came at around the same time, and was, of course, the development of the semiconductor amplifying device—the *transistor*. Now, in any receiver up till then, around half the power input was used in valve heating alone, so the transistor was seen immediately as a means of reducing power consumption—indeed, its first significant commercial manifestation was probably the truly pocket-portable receiver running from the PP3 battery size, which compared very favourably with the valve “portable” which contained two batteries and took about a foot cube of volume most of which was full of battery! However, the much lower power consumption of the transistor receiver blinded many people to its vital shortcoming in amateur service which was its serious inability to cope with big signals, even when the VHF transistor was well into service. Allied with the common amateur obsession with gain for its own sake, this resulted in the sad state that the earlier transistor receivers on the amateur bands overloaded far more easily than their valve brothers, thus backing the average amateur in his view that the transistor had little or no place in his station, a view that persisted for years. Indeed, it is only within the past few years that it has become accepted that it is possible to build a semiconductor receiver which will outperform a valve job on the HF bands where the big-signal problem is usually at its worst—let alone build one at an “amateur” price! Even now, there is no receiver aimed at the amateur market which has much better than marginally-adequate performance at HF, and, indeed, such a receiver as the old 888 from Eddystone will respond better on Forty than a 1976-vintage transistor receiver in terms of large-signal rejection, although it is possible at a price to do better than either of these beasts.

It should also be noticed that the receiver for the purely SWL station and the receiver for the transmitting amateur may have rather different design goals; after all the sensible amateur uses the same aerial for both send and receive, which aerial will be the very best he can devise in that he requires to radiate a signal to anywhere from whence he may at any time hear an amateur signal, and one dB of extra aerial gain may do a lot to bring him up the queue in a pile-up. On the other hand, the purely-SWL receiver may well have poorer big-signal rejection in that the SWL will more often be satisfied with the proverbial piece-of-damp-string aerial, in which case sensitivity is a little more important; and a high-Q aerial and ATU such as the “Joystick” or a short wire will activity discriminate against the big signals to the advantage of the receiver. This sort of receiver, hung on the end of a four-element Quad at a hundred feet on 7 MHz may show up fewer signals on the band than it did on the small aerial, unless it is driven with a lot of care and an attenuator is used in the feeder to

the receiver. The point here is that, essentially, the normal receiver gain controls at RF operate by shifting the working-point of the device on its characteristic, which is set at the centre of its linear response when the RF or IF gain control is at maximum; thus gain control tends to reduce the ability to cope with strong out-of-band signals just when we want them to be at their best. An attenuator *ahead* of the receiver can be adjusted to insert just enough attenuation to cause the receiver to operate linearly with the gains set normally, and at that point, noise will suddenly reduce markedly and lots of signals which were not previously audible will surface; they were there before but buried under the noise which the receiver was generating through overloading, caused by signals which generally were *outside* the passband of the receiver IF.

Image responses of course, *should* be around 100 dB down, and hence for all practical purposes non-existent, but they never are in a commercially-available receiver. However, they may always be identified, providing the receiver has essentially CW or SSB shape-factor in the IF strip, through crystal or mechanical filtering, in that these receivers will only pass one sideband of an AM signal; thus the beat note on one side of zero-beat is much louder than the other side, so as you tune the band all the real signals appear as, say, beat notes rising in frequency, in which case the image will quickly be noted as its beat note is falling instead of rising. If you tune t'other way, each real beat will be falling in pitch and the image will rise in pitch as you pass over it—so it sticks out like a boil on a bald head, either way. But this test is only possible on a receiver using a crystal filter or its mechanical counterpart.

### HPX LADDER

(All-Time Post War)

SWL	PREFIXES	SWL	PREFIXES
<i>PHONY ONLY</i>		<i>PHONY ONLY</i>	
K. Kyezor (Archester)	1648	G. F. Gullis (Ogbourne St. George)	847
W. Bingham (Carrickfergus)	1621	W. H. Smyth (Hartlepool)	840
S. Foster (Lincoln)	1546	B. T. Mackness (Dagenham)	810
R. Shilvoek (Kingswinford)	1500	M. Rodgers (Harwood)	800
J. Fitzgerald (Gt. Missenden)	1412	C. K. Verstage (Old Basing)	800
R. Carter (Blackburn)	1405	L. Gibson (Barrow-in-Furness)	732
B. Hughes (Worcester)	1365	P. Rooney (Liverpool)	725
M. J. Quintin (Wotton-u-Edge)	1314	S. Budd (Worthing)	714
P. C. Jane (East Looe)	1313	D. Taylor (Harborne)	702
K. A. Whiteley (Castleford)	1280	J. Aspinall (Leeds)	641
A. W. Nielson (Glasgow)	1217	M. Gibson (Barrow-in-Furness)	621
M. Cuckoo (Herne Bay)	1209	M. Law (Chesterfield)	605
H. A. Londesborough (Swanland)	1145	S. T. Bowen (Kippax)	545
J. H. Sparkes (Trowbridge)	1073	<i>CW ONLY</i>	
F. W. Robinson (Bury St. Edmunds)	1052	A. Glass (Plymouth)	1240
Mrs. J. B. Jane (East Looe)	1028	N. A. Phelps (Devizes)	1235
M. C. P. Bennett (Datchet)	1024	H. A. Londesborough (Swanland)	940
H. M. Graham (Harefield)	937	A. F. Roberts (Kidderminster)	465
P. Barker (Sunderland)	902	F. Grimbleby (Hull)	400

Starting Score 500 for Phone, 200 for CW. Listings in accordance with HPX Rules and include only recent claims.

### The Mail

Three newcomers first; *R. Gilmour (Droylsden)* has a BC 348 receiver, and cannot use it with mains or a speaker. Probably the best way to organise this is to build a separate, outboard, PSU-plus-AF-Amplifier and Speaker, to give around 200 volts of HT, twelve volts for heaters at about three amps, an integrated circuit audio amplifier, and about a five-inch speaker, all in one box, with a cable and connector to carry the HT and LT over to the BC348; the easiest way of getting the audio out is to take a screened lead to a suitable jack-plug to plug into the audio output of the BC-348. One can remove the rotary generator from the middle if one so desires, and build the PSU and AF Amp in the space so left; but this merely substitutes one source of heat for another! Just take away the rotary, and extend the leads from the rotary out to the new power pack. Make sure you don't mix up the HT and LT leads though—a couple of hundred volts is bad for valve heaters!

*T. Wilson (Longside)* is a canny Scot when it comes to the QSL card business, sending a card to those stations he hears giving their address, which method has earned a reasonable return; but Box 88 is a rather different kettle of fish, as no replies have been received from there. Essentially this will be because the Russians are great believers in the Bureau system, and any replies to Terry's cards will be sent from Box 88 on the return journey to one or other of the U.K. QSL Bureaux; thus, to receive cards from Russians one needs to be a member of one or another Bureaux, and, usually, to keep envelopes on file with the Bureau as well.

Despite having bothers with his AR88D, *P. Ramsay (Stevenson)* has a first entry in the HPX ladder. Prefix queries noted include XJO, XL2, XL3, 4J3A, NU1 and N8M. The X calls are almost certainly MARS and hence don't count in HPX, 4J3A was a Russian special in the contests, and the two N prefixes could just be genuine amateur calls from U.S.A. as it is understood that at least some N's have been issued.

The promised up-date from *J. Fitzgerald (Gt. Missenden)* duly arrived, to bring his score on the ladder a bit further up. On a different tack, John looked at the up-dated JR599 receiver and was glad he has the earlier version, as the attenuator seems to have been replaced by an RF Gain control, although the new version shows slightly better sensitivity and selectivity on paper. Of course, the attenuator can always be built up outboard in a die-cast box using the miniature toggle switches to bring in the desired amounts of attenuation. As to the sensitivity, it is usually in practice an academic figure at HF anyway, if only because the noise pick-up of the aerial is greater by far, for most if not all one's listening below 28 MHz.

Looking at the latest list from *L. Gibson (Barrow-in-Furness)* one notes that just about all of them are in the real DX category—quite unusual, this, even for the leading stations, as there are always some more of the relatively local prefixes to be logged. Indeed, the writer knows of several stations who have got to quite high positions in DXCC, and have then "had a purge" on all the previously-neglected semi-local countries which were not considered worth working in the early stages when the DX scent was strong.

### ANNUAL HPX LADDER

(Starting date January 1, 1976)

SWL	PREFIXES	SWL	PREFIXES
G. Ridgway (Ardleigh)	499	P. Wells (Colne)	403
D. W. Waddell		P. Ramsay (Stevenson)	312
	(Herne Bay)	P. Polanyk (Coventry)	300
L. West (Langley)	414	R. G. Williams	
		(Borehamwood)	255

Starting Score 200, in accordance with HPX Rules. Table closes on December 31, 1977. Table starts January 1, 1977.

Added to this Yaesu FRG7 receiver, says *D. W. Waddell (Herne Bay)*, he now has a Hamgear preselector and some earth radials, between which his signals have been considerably improved, not to mention the useful bonus of the long-wave BC Band, which is handy for checking calibrators, the long-wave 200 kHz transmission being a frequency standard in its own right.

Another FRG7 receiver user is *B. F. Hughes (Worcester)* who changed to this model from an FR50SDX so far the new receiver has been tried successfully on 40, 20 and 15—but the acid test of a trial on Eighty will come soon. If a receiver can cope with the QRM on Eighty, it can cope with anything the aerial cares to throw at it!

*W. H. Smyth (Hartlepool)* has some more prefixes to add to the list, and this time has a separate section covering AM stations! All, of course are grist to the mill, although we cannot accept such things at AM-only entries *as such*. If someone for a private whim wanted to collect AM signals only, and still make an entry in the Table, he would just go in the Phone section like any other entry, but progress rather less quickly!

*K. A. Whiteley (Castleford)* compares his FRDX500, against the back-up RF50B, and the FR50B against the QR666 general-coverage receiver, greatly to the detriment of the latter, largely in the matter of images, the "feel" of liveliness, and a sluggish S-meter. Images are inevitable with the general-coverage receiver in this price range, and usually the general-coverage box is a mite less sensitive across the bands than the amateur-bands-only receiver; the "liveliness" or otherwise of a receiver is largely subjective; and the S-meter readings are always a moot point. However, one could check the Handbook and see whether all these receivers specify the same signal input for S9 on the meter. If so, it should be easy enough to check each against the other, and see whether the QR666 reads like the others. If it doesn't one tries the correct adjustment using the handbook setting, and if that fails, you start looking for the fault! But, in any case, the S-meter is only useful in a *relative* sense, to tell a station he is increasing in strength after a modification or reducing. On a final point, Ken sent in a picture of his SWL station, all nice and tidy—a pity it isn't contrasty enough for publication.

Continuing to go up the Ladder is *K. Kyezor (Irchester)*, who reckons to get a couple of sessions at the receiver each day. A bright note on the QSL front was an incoming card from Kerguelen Is.

*R. Carter (Blackburn)* has been waiting for his aerial to fall down, and wasn't disappointed! However, it gave him the opportunity to re-erect it in a slightly different configuration, the dipole having been replaced by an inverted-vee. On the receiver side, the repair to the cord

drive seemed to have knocked things a bit out of line, but a careful tuning of main and bandspread dials made things seem better than they were before—and since the aerial modification also seems to have been profitable, Ben is well satisfied.

A. W. Nielson (*Glasgow*) seems to have regained his enthusiasm for the hobby of late, but he is beginning to have second thoughts about his earlier Windom idea; on comparing his 1965 results in the CQ Contest with the 1976 ones, the former including two days of good conditions, the latter but one—but the shorter listening time in 1976 was vastly more profitable, 76 countries in 15 hours against 82 countries in 23½ hours in 1965 when the old Windom was intact. But, of course, the operator has learned a lot in ten years, and maybe the present relatively poor aerial is avoiding receiver overload with the consequent noise.

Looking at Arthur's prefixes, we note he queries CT9AT—CT3AT with a contest callsign. On the other hand there was a dearth of Bi-Centennial prefixes in the Contest, during which Arthur would have thought such facilities would be used in the hope of gaining some rarity value and hence extra attracting-power under battle conditions.

Over in GI, W. Bingham (*Carrickfergus*) finds that work is the curse of the Listening classes—don't we all! Thus, a nil report this time, but on the other hand the work is electrical in nature and could show some worth in a future R.A.E. attempt; and anyway, the local club is back in operation and Billy doesn't mean to miss the meetings.

D. Taylor (*Harborne*) raises the question of ELØSP—one doesn't really see why, as ELØ are not unknown.

We have already mentioned L. Gibson—now it is the turn of M. Gibson, who is also in Barrow-in-Furness; he has a rather shorter list and lower score, but just the same very high percentage of, relatively speaking, rarities.

Yet another list-only merchant is M. J. Quintin (*Wotton-under-Edge*), and we guess from it that he may well be listening on VHF, insofar as he has a GI8 among his souvenirs.

"When is the last date for Prefixes for the 1976 Table?"—thus enquires P. Polanyk (*Coventry*), to which the reply of course is December 31 at midnight, after which we start a new 1977 Ladder. But again, once you get to 500, you go, willy-nilly, into the All-Time Table. The reasoning behind this is quite simple, that the 200 starter is quite simple to find—one good weekend of a Phone contest should do the trick—while by the time 500 have been heard, it is a reasonable idea to consider the operator as being equal in skill to the leaders, equal in equipment, and equal in aeriels. On a different line, Pete is a bit mixed up in equating the Noise Limiter in his AR88 to an external attenuator on Forty. No, any receiver's Noise Limiter is intended to lop the tops off "spikes" of noise such as ignition interference or Loran, while the RF Gain control is used (or an attenuator) by turning it back gently until noise drops faster than signal so that signals pop up "from nowhere" without touching the tuning, "noise" in this case meaning just that; "hash" or "sharsh" which may or may not bounce up and down a bit as the worst station causing the problem modulates. The two types of noise are radically different; one man-made and external to the receiver, dealt with by a noise-

limiter, clipper, or noise blanker, while the other is generated within the receiver due to its being hit by unwanted signals which usually aren't even in the band, and results in a type of noise that no noise limiter or blanker or whatever can shift.

Still creeping-up the CW List is N. A. Phelps (*Devizes*), heading for the Top Spot, while Bert Glass is missing this time; one gets the feeling reader Phelps has been concentrating on the higher frequencies, not even neglecting Ten, a band which many Phone SWL's leave until they hear that someone else has heard something, which, at this stage of the sunspot cycle, is too late.

P. Barket (*Sunderland*) writes his first letter from the new place. First impressions are that the move is to a better QTH, radio-wise, by far, than the old one, with a range of DX heard, both Phone and SS/TV, using only a forty-inch whip section. It sounds as though it may be a very good site, once proper aeriels are in use.

Pressing on, we come to S. Budd (*Worthing*) who wants to know whether, since he is in the All-Time, he can add to his total with those prefixes gleaned before January 1, 1976. Certainly, and it usually means there are a few to help the total along when the transition is made.

A smash-hit for E. W. Robinson (*Bury St. Edmunds*) was YJ8DE for an all-time new country. On a different tack, reader Robinson went down memory-lane as a result of our preamble last time, recalling those old TRF one-valve jobs with reaction which was controlled by moving the reaction coil relative to the grid tuning coil. Those receivers were the Utter End, as movement of the reaction coil altered the tuning, and hand-capacity effects altered both tuning and reaction, so they were hard to drive on the BC bands, let alone on our bands; this particular difficulty was general with all the reacting-detector receivers, until someone found a way to adjust reaction without moving coils about; and the hand-capacity effect disappeared once we had earthed metal panels to replace those ebonite horrors—half the art of home-brew in those days comprised in being a skilled French Polisher! Again shifting tack, back to those who have problems of water in aerial traps or in coaxial connections at the middle of dipoles—SWL Robinson recommends plumber's seal, under the trade name of Saniseal, slathered all over the trap or dipole centre—a coat of paint can go over the seal to finish a first-class job of waterproofing.

An interesting one is offered for inspection by J. H. Sparkes (*Trowbridge*) who came across a WT1AAA, telling all and sundry that this was a "temporary call issued pending allocation of a permanent call." That was a W1 Slim, we reckon—a slim chance of him being a good 'un! This old scribe reckons Slim "issued" that call to himself, maybe while he was waiting for a proper one, as it is known that there are delays over there in licence issuing at the moment. But Slim he still is; and come to think of it, Slim gets around—Tirana Slim was a favourite pose, a few years ago, usually on Forty CW, with a note like a buzz-saw and a King-size chirp, until a legitimate DX-pedition—well it got the OK from the DXCC people, anyway!—mopped up most of the demand. At the moment, there seems to be a trade in Peking Slim, with commercial gear and a punk beam-heading; but often Slim pops up in the most unexpected

Places. The only thing to do is to work him, or log him, send a card, and wait for a reply, the while scanning the DX columns for any reference to your particular problem. No QSL or a bounced one is taken as being for definite as Slim—he never QSL's!

*M. C. P. Bennett (Datchet)* reckons conditions have been "patchy" of late, but during the good periods all the bands have been open, with even Ten showing willing, usually North-South, but occasionally even into North America. But, of course, we have to allow for the Sun and the antics of its Spots—we have varied over the Autumn from daily counts as high as the low Forties right the way back to zero.

*M. Cuckoo (Herne Bay)* carries on in his usual serene manner towards the upper reaches of the Ladder, with a bias in favour of Europeans and special-event calls this time, along with a sprinkling of the Real McCoy.

*B. T. Mackness (Dagenham)* complains bitterly that the CQ WW DX Contest, Phone leg, was a bit of a disappointment, with only three new prefixes collected; and the *thing* from Poltava about which so many countries are protesting, added to his cup of bitterness—still, he can always go back to the other hobby of Hi-Fi—once he has got around to mending the tape-deck! Yes we know the feeling—your scribe has, when he should have been listening, or indeed writing this piece, been in mortal combat with a gear-box from a Horseless Carriage which had somehow metamorphosed itself into a milling-machine, with an accompaniment of suitable noises (or unsuitable, depending on which way you look at it!). But, press on, all well be sorted out In the End.

*S. Bowen (Kippax)* is upset because we have turned him loose on the All-Time Table just because he has scored 510—but that is part of the Rules of the Game, Stephen!

*H. M. Graham (Harefield)* was a bit of an optimist when he wrote in his letter that the Pestilential Menace from Poltava seemed to have gone to sleep—it seems, by all reckoning to have wakened up again just as soon as Maurice dropped his letter in the box! Fifteen seems to have been better at the beginning of the period, tailing off at the end, which caused a return to Eighty, but not at DX'y times—maybe after retirement next March, Maurice will be ready for some more interesting hours of listening. As to the question of a Set Listening Period, Maurice says—"Don't have one on Forty!"

*G. Ridgeway (Ardleigh)* comes back with just five more, to bring his total claim up to 499—he doesn't want to go on the All-Time, we reckon!

We have to mention J. MacIntosh (Inverness), who, as VS1AA invented the aerial known as the VS1AA, a variation of the theme of the Windom, and still uses one in his GM3IAA activities. Jim points out that the Windom type of aerial is essentially fed against earth, and thus that earthing must be good; he himself has a bit over 1000 feet of wire in the ground, not to mention a couple of water-tanks buried and coupled in to the earth system. A half-wave running N-S, with the feeder at the Northern end, has rather a long, 110-foot wire feeder attached, which is coupled to the rig by an aerial coupler for each band, which gets rid of the problem of 21 MHz in a way—load it up as it will, and radiate power where it will is

the motto here, and it has been quite successful. On Top Band, Jim recalls hearing and working a couple of Russians back in 1961, *who QSL'ed*, and as he has also worked the UW3 and UB5 who have been around on the band this year, he is now wondering whether they in their turn will also come across with a card—that's something a lot of people would like to know! Another one worked this year was VP5LZ, worked just after hearing the UW3, even when the band seemed very poor.

*T. Hunt (Coventry)* has just started with an HE30, and wants to know just how much can be done in the way of modifications and extras for it. Perhaps the best thing at this stage is to *join the Local Club*, and get to know the locals; then take it from there. Old J.C. has no personal knowledge of the HE 30, save for the comments of one or two of his R.A.E. class who owned 'em; but there are no doubt ways and means of moulding them nearer the heart's desire.

Apart from his own receiver using the Tandy BFO, *T. Scrimshaw (Birmingham)* has obtained a TCS-12 receiver, which looks as though it *might* work, given faith and patience. Perhaps the best thing to do is, once again, to join the local club, where, among the Old-Timers, there will surely be someone who recalls the TCS-12 and how to hook it together; the power connector, one recalls had twelve volts going in and also HT, but there were lots of connections to the mating transmitter.

Another of the licensed types comes back at us over that Windom of last time. G3OHK (Workington) has the idea of using a *capacitive* connection to the top from the feeder, using a sleeve which can be slid up and down the aerial until best match is located on each band. Sounds workable, but somewhat complex!

Despite his BFO being completely u/s, and having no S-meter, *J. Aspinall (Leeds)* soldiers on, with another six added to the total, some on Twenty and one on Eighty.

Eighty is a band about which *H. Sqaunce (Bangor, Co. Down)* has a beef—and a fair one at that. He finds the local nets have a tendency to gabble their callsigns, or to omit them altogether, and so SWL's are not able to log them. A good point this; after all, if an SWL can't log your call, a Home Office monitor might also have difficulty, and he might take umbrage enough to start searching. One Eighty-metre net your scribe knows of, where he has himself sat in the shack of one of the gang, where he couldn't understand the call-sign of the guy before his words hit the mike—Heaven-only knows what it sounded like at a distance. But, to be fair to the operators on Eighty, they are very often talking to the same station daily, and they can identify the members of the net without ever hearing a callsign, even from a distance.

### Deadline

That's about it for another time round. For next time, the deadline is January 20, 1977, and for those who are on the Annual list, your final total, plus, if you so wish, your 1977 starting claim if you can rake up the 200. If so, *don't* lose your 1976 lists, as they can be used again when once you reach the All-Time. Meantime, all the best and a Happy New Year.

# VHF BANDS

NORMAN FITCH, G3FPK

## Awards

ART Smyth, GM3XNE, from Ardrossan in Ayrshire is only the seventh Scottish member of the VHF Century Club and has been awarded No. 273 for 2m. He began on VHF in February, 1975 using a Telford TC5/TC6 combination running 2 watts to a 4-over-4 aerial, later followed by a *Liner 2* and 10-ele. *Skybeam* for SSB use. By this time, a modified *Pye* Cambridge and *Lowe* Monitor receiver were used for AM and FM. The latest addition at GM3XNE is the *Yaesu* FT-221 all mode transceiver. By all accounts, Art's site at 100ft. a.s.l. is not very good.

VHFCC Certificate No. 9 for 4m. goes to Graham Badger, G3OHC, from Sutton Coldfield. From 1969-1974, his station comprised a home built, QQV03-10, 10 watt TX with 6CW4 into *Eddystone* EC-10 RX and a loft mounted 4-ele. Yagi. The next stage was the use of a *KW-2000* transceiver with a home built transverter running 100 watts p.e.p. input, the aerial being erected at 30ft. outdoors. The gear currently in use at G3OHC is the *Yaesu* FT-101B and *Europa* transverter capable of 150 watts p.e.p. input.

Frank Howe, G3FIJ, from Colchester, Essex, has been a very regular contributor since the A. J. Devon days. His 2m. certificate was issued in October, 1973, and the comments in the November feature prompted him to dig out cards for 70 cm. QSO's, which were all in order. Accordingly VHFCC Certificate No. 22 has been awarded. G3FIJ is equipped for all bands from 160m. to 23 cm. but main activity is on 4m. 2m. and 70 cm. at present. On 70 cm., Frank's station comprises and 18-ele. Yagi at 35ft. with CW and AM operation from valve/*varactor* gear but with

low power SSB being introduced.

To complete his "hat trick," Frank has won VHFCC Certificate No. 10 for 4m. operation thus becoming the first reader to have accomplished this feat. Congratulations, OM.

It is worth pointing out that it is not necessary to possess QSL's from 100 different *licensees*, as cards from the same chap operating portable from different locations, over a period, are acceptable. However, applicants are requested to use their discretion since in the limit, one could envisage a claim comprising QSL's from one station operating from 100 different locations! A sensible compromise is to list cards from one licensee operating in different counties.

On a somewhat sour note, your conductor has reached the conclusion that the *Kennermerland VHF/UHF Activity Award*, referred to in the May, 1976 column, is fiction rather than fact. A number of excuses have been offered concerning the non-appearance of the certificate including—their club house burned down; club official concerned went to Canada for six months so nobody could get the records; another club official very ill in hospital. All of which adds up to the advice—“*Dont waste your IRC's!*” Up to the time of editing this piece, a final letter to the last known chairman of this club, PA0JY, has been ignored.

## Technical Stuff

Mention was made last month about obtaining reliable local oscillator power at 1152 MHz for transverting a 2m. signal to the 23 cm. band using a modified DJ1EE design. John Quarmby, G3XDY, writes that he uses this approach but warns about pitfalls. He says, “I scaled up the length of all the tuned lines by a factor of  $1\frac{1}{2}$  to achieve resonance on 384 MHz rather than 432 MHz, and used trimmers with a 3-20 pF swing. The problem comes if you try to align the strip without a spectrum analyzer. Using just a reflectometer, my first attempt at tuning up *seemed* to generate a lot of power, but on checking it at work, this power was found to be fairly evenly distributed over the range 50-500 MHz. On returning with the analyzer in circuit, I could obtain 7 watts of RF on 384 MHz

from the R2206 PA I used, but tuning was critical to prevent parasitic oscillation. It is also essential to use a pure 384 MHz drive source since the amplifier has lots of gain at 192 MHz and this can lead to trouble if the oscillator strip is not well filtered.”

John's transistor complement in his version of the DJ1EE design is 2N5914/2N5914/R2206, these devices being obtained fairly cheaply on the surplus market. His *varactor* tripler is based on the G8ADP design but using a BXY27 device. Careful adjustment has produced 4 watts of RF at 1152 MHz with 7 watts of drive and the spurious output at 384 MHz is 50 dB. down, all others greater than 70 dB down. The 4 watts is more than adequate to drive the 2C39A mixer to 7 watts output on 1296 MHz with a plate voltage of 600.

## Any Answers?

A number of readers completed QSO's with Sardinia in last summer's E's openings. Dave Price, GWCQT, would like to know if anyone achieved this prior to his QSO with IS0PUD on June 23rd at 1804 GMT.

And now to a “funny noise” puzzle. On November 22, G3HCK (Hurst Green, E. Sussex), G8HAF (Rotherham) and G8GGK (Croydon) were in a three-way on 144-315 MHz. Around 2135 GMT, all three heard a noise like the sound made by a petrol engine model aircraft, which gradually faded away. G8GGK wonders if any readers can suggest the origin of this signal. G8HUY (N. Yorks.) has heard a similar noise on and off for some time both here and in Germany. John is convinced it comes from a satellite with a two-hour period and asks that readers send their reports on reception to him at the QTH in the December “New QTH's” list. Please give times audible with aerial bearings. John will then pass all the collated information to the appropriate people.

## Beacon Update

Brian Bower, G3COJ, has kindly supplied the following news. GB3CTC on 144-128 MHz was withdrawn from service finally on Nov. 29 now that the new Redruth beacon on 144-915 MHz is operating satisfactorily. It is likely that the

70 cm. beacon from Redruth will precede the 4m. one due to windage problems with the 4m. "clover leaf" aerial. Following the death of GM4AEL, GM3ZBE is now dealing with the Lerwick beacon, GB3LER. The crystal for 144.965 MHz is to hand and it is hoped to have it on the air this year.

Immediately after last month's column was prepared, the Durham beacon, GB3NEE, appeared on 144.935 MHz. As the PA stage did not work, the driver stage was connected to the aerial. Until the proper keyer is modified to generate the new callsign, the 70 cm. keyer is being used. Unfortunately this results in "backwards" keying. An opto-isolator is to be installed to overcome the problem caused by this keyer's providing an earth on "mark." As anticipated, the beacon causes problems for the GB3TW repeater receiver and GB3NEE is off the air at the time of writing. The RSGB VHF Committee has agreed to move the beacon down to 144.130 MHz in what many readers may agree to be a somewhat retrograde step.

On the 23 cm. band, G3COJ reports that GB3AND on 1296.87 MHz is fully operational at 5 watts e.r.p. from a single slot aerial. By the time this appears, the final, four slot aerial should be in use. Permission is being sought for another Emley Moor beacon, GB3MLE, on 1296.93 MHz. Finally, G3COJ mentioned a proposal to set up a 2m. beacon in Malta, 9H3ML, the suggested QRG being 144.120 MHz with an e.r.p. of 50 watts. Such a beacon would be of great use in the E's season being in a part of the band monitored by the DX fraternity. Contact man is G3VLX.

### The Irish Scene

Mike Higgins, EI0CL, has sent some interesting notes concerning VHF/UHF activity in the Irish Republic. His station is at Kilcolgan, Co. Galway (VN66) about a mile from the Atlantic Ocean and 9 miles SE from Galway City. His nearest VHF neighbour is EI9BG (Co. Clare) to the south over the 1307 ft. Maghera mountain. Tom is a very active VHF man and runs 200 watts to a 14-ele. *Parabeam* SSB and CW, on the low end of 2m. To the east lies the 1200ft. Caherdrum-

lahan over which Mike fires his signals to Dublin, G, GD and GW. Take-off to the NE is "a clear shot" and the first EI on VHF in this direction is Nial, EI4CF who runs high e.r.p. from Co. Galway. Beyond Nial, is Paul, EI5BH, in Athlone, Co. Westmeath, a well-known RTTY and MS experimenter on the VHF's. Also in Athlone is Mike, EI4AL, who is inactive at present but has some outstanding DX to his credit including a QSL on 2m. from Moscow! EI4AL runs all home brew gear with a pair of 4CX250B's feeding a pair of log periodics, in phase, at 60ft. South from Athlone is Bobby, EI7AF, in Birr (Co. Offaly) who is not very active apart from Sunday mornings.

The station at EI0CL operates all bands, 160m. to 70 cm. On 2m. Mike runs an *FT-221* to a *Jaybeam* Quad, 100ft. up on a home made, triangular tower. Naturally, this installation has to take the full brunt of the Atlantic gales and the tower is guyed at six points, each stay being anchored in three tons of concrete, six feet in the ground. So far it has survived a 130 m.p.h. gale. A 2m. amplifier using a pair of 4CX350A's is nearly complete and, as soon as the weather permits a climb, the aerial is to be replaced by two, 6-ele. Quads. Next summer Mike plans to monitor the band towards CT2 and VP9 with automatic receiving and recording at regular periods. At present, Mike is getting set up for 432 MHz using a dish aerial at 70ft. and 10 watts. EI0CL calls "CQ" daily at 2000 and 2100 GMT on 144.300 MHz CW, replying in the same mode as anyone answering.

### Contests

In the 144 MHz Open contest of Sept. 4/5, the winners of the portable section were the March & District Radio Amateur Society, G3PMH/P, with 4706 points. Second place went to the Isle of Man Amateur Radio Society, GD3FLH/P with 4519 points. In the fixed section, first place went to G8BBC, the Ariel Radio Group at The Langham in London, with 2005 points, another Londoner, G3OSS, coming second with 1943 points.

DK1AQ was the clear winner of the 8th BARTG VHF RTTY Contest last September, with 238

points from 34 contacts. G3PLX came second with 92 points from 19 QSO's. There were 32 entrants from 7 countries but the G entries were 20 compared with 10 last year. Thanks to G8CDW for this information.

Conditions during the 144 MHz Fixed station contest were very disappointing. From the south of England, a few F, PA and GM stations were worked. So far the best performance seems to have been GW8JHL/A operating from GW8CFQ with 1626 points from 246 contacts. GM4CXP (Borders) was on for 5 hours and only managed 32 QSO's. From Weybridge (Surrey) G8HCL's 230 contacts were worth 1146 points, whilst G3POI, Downe (Kent) made 1044 points from 200 exchanges. The majority of the signals heard in very limited operation from G3FPK were quite good but there were one or two "stinkers" on SSB. On Nov. 28, the four hour Verulam ARC Contest stirred up a lot of 2m. activity in rather flat conditions.

*Contest Calendar:* The first contest of this year is the 70 MHz CW on Jan. 23, followed by the 144 MHz Open the weekend of March 5/6.

### Twenty-Three Centimetres

G2AXI (Hants.) worked another three counties during the UHF/SHF Contest on Oct. 2/3 but Syd has not heard GB3AND yet, probably due to hills rising 400ft. above his QTH in that direction. During the better conditions on Nov. 21, G4BYV in Dereham gave G3HCW in W. Yorks. his first Norfolk QSO.

### Seventy Centimetres

The *Cumulatives* provided a good deal of activity recently and G2AXI participated in all seven sessions, finding nos. 2, 6 and 7 the best. G3OHC enjoyed the lift on Nov. 19 and 20, working G3MTG (Somerset), G8FUO (Berks.), G4CMT (Humber-side), G8GXP and G8HBQ (W. Yorks.), G3RND and G8AHF (I.O.W.), GW3UCB/P (Gwynedd) and G8IXN (Cornwall) from Sutton Coldfield. However, Graham reckons the Midlands were not favoured in that lift, conditions being, "... over our heads." He heard nothing of the GI, GM and SM stations being worked by G3VPK (Essex) and G8IXN, for example. G3BW (Cumbria) found

QTH LOCATOR SQUARES TABLE

Station	23 cm.	70 m.	2 m.	Total
G3JXN	16	50	66	132
G3COJ	15	49	63	127
G8EOP	8	36	38	82
GD2HDZ	8	24	45	77
G8IFT	5	15	34	54
G4DKX	2	16	66	84
G8FUF	1	76	163	240
G8GML	1	33	74	108
G2AXI	1	34	59	94
G8BKR	1	6	79	86
G3POI	—	—	163	163
G4BWG	—	23	110	133
G3CHN	—	—	130	130
GM4CXP	—	21	106	127
G3FPK	—	—	124	124
G4BAH	—	32	92	124
G3OHC	—	26	91	117
9H1CD	—	2	110	112
G4CDF	—	—	109	109
G8HVV	—	10	91	101
G3XCS	—	14	82	96
G8IWA	—	17	74	91
G6UW	—	—	85	85
G8HHI	—	7	71	78
G3FLJ	—	24	53	77
G8GII	—	11	62	73
G3BW	—	21	47	68
GC8AAZ	—	11	54	65
G8KLN	—	1	62	63
G8JJR	—	—	63	63
G4CIK	—	—	62	62
G8HAF	—	—	61	61
G3KPU	—	—	60	60
G8KPS	—	—	60	60
G4AEZ	—	15	44	59
G8KKX	—	—	59	59
OZ9IY	—	—	53	53
GD3YEO	—	—	52	52
G8LHT	—	—	48	48
GW8HVP	—	—	48	48
G8ITS	—	1	43	44
G4EYL	—	—	41	41
G8JEF	—	—	41	41
G8JEF/A	—	—	38	38
G8JAH	—	1	35	36

G8LLG	—	1	24	25
G4CIK/A	—	1	23	24
G8JAJ	—	—	24	24
G8JKA	—	—	21	21

Starting Date January 1, 1975. No satellite or repeater QSO's. "Band of the Month" is 23 cm.

conditions dreadful during November, apart from the evening of the 19th, when GB3SC was S8 in Whitehaven and a 100% QSO was made with G3AUS (Devon).

"After three months in the doldrums, November saw an upturn in the fortunes of south western 'VHF/UHF types'," is how G3XCS (Saltash) starts his summary of the Kernow scene. (N.B. Kernow is Cornwall in the Cornish language.) A relative newcomer to the band, Colin heard GB3EM at S5, for the first time, on the 20th and managed a "shaky" QSO with GM8BDX. In the 6th leg of the *Cumulatives*, Gtr. Manchester, Merseyside and Humberside stations were worked. G4BYV had a QSO with G8AGU/P on the 20th and learned that Paul had worked GM and SM on 70 cm. from near Exeter.

G8HBQ (Leeds) found the *Cumulatives* to have hit the worst conditions for some time. Paul confirms a good deal of ducting over Leeds but did work EI9D (Wicklow), G8IXN, G3VPK and G8AUS. G8HHI (Yateley, Hants.) is using the 28 MHz SSB from his *Liner 2* to drive a *Modular Electronics* transverter, the aerial being an 18-ele. *Parabeam*. Nov. 19 brought QSO's with GD2HDZ and G8HXY, whilst on the 23rd G3AUS and G8EPG (ZN54b) were worked. In the last period of the *Cumulatives*, 13 stations were contacted.

For GD2HDZ (Laxey) the Nov. 19/20 lift was a small consolation although Arthur's results were nothing spectacular—just a few new counties. GM4CXP worked G8AGU/P on the 20th for a new county and QTH square on the band. There is ample evidence of considerable ducting during the Nov. 19/21 period and this was largely due to a temperature inversion of up to 15°C. at 3000-5000 ft. altitude. The barometric pressure was extremely high. For instance at Manchester, it reached 1043 mB.

(30.9 inches), the highest value for nine years.

Two Metres

G2AXI enjoyed the lift around Nov. 20 which brought Syd his first GI of the year, GI3ZTL in WO17j. On the 20th. G3CHN worked LA6HL (CS09e) who was the only Scandanavian audible at Bolberry Down, Devon. That same evening, Roger reports that GM8FFX was a tremendous signal. On the 21st, EIØCL gave G3CHN a new QTH square. At G3FPK, it was indeed a pleasure to hear some DX during the 19-21st. On the 19th, GM8DOX in Bridge of Allan, GM8BJJ on the Isle of Cumbrae, GM8FFX, and GM3WFJ in Perth were worked, the last on CW. Just into the 20th, GW8IVJ in Anglesey, and GM8BDX in Duns were contacted. On the 20th, the best DX was LA6HL in CS09e on SSB. Johannes was a very good signal most of the afternoon using just an FT-22I to a 10-ele. Yagi. He mentioned the 2m. Scandanavian Activity periods the *first Tuesday* each month from 1800-2400 GMT. EIØCL was a most welcome new square and county, and another new county, Armagh, was provided by G13WFA and G13WWY during the evening. Conditions had returned to normal by the afternoon of the 21st by which time the EI and GI stations were quite weak.

G3OHC found GI3ZTL (Londonderry) to be the most consistently strong signal in the aforementioned lift and Graham also worked EIØCL and a number of GM's. G3XCS was not one of the lucky few who worked EI9V/P when he was in UL square and operating for a few hours from a 1700ft. a.s.l. site near Black Ball Head (Co. Cork) on Nov. 6. Colin very kindly phoned your scribe concerning Con's unexpected trip but absolutely nothing was heard at Riddlesdown in the poor conditions. As some consolation, G3XCS did contact LA6HL and many EI, GI and GM stations during the lift, best DX being GM3ZBE in YR58j.

David Butler's operation from the rare XJ square on Nov. 14 was confined to 2m. operation after all, following damage to the 23cm. and 70 cm. aerials. G4ASR/P made 54 contacts in 5 countries and 14

counties between 1000 and 1600 GMT on Nov. 14. He will be down there again from Jan. 3-28 and plans to be QRV for the 4m. CW event on the 23rd. G8BKR (Bristol) was in on the lift, John's best DX being GM8FFX on Nov. 19. Graham copied his *six watts* of AM at Q5.

GD3YEO (Douglas) was in a local, 3-way with GD8CFA and GD8LFA on the 20th and they were able to give many I.O.M. seekers three for the price of one. Best DX for Richard was SM but a hastily arranged sked with SM7AED, who has yet to work GD on 2m., failed to come off. Richard was, in fact, up all night and worked OZ1ABE (GP12g) at 0640 GMT on CW. GM3XNE (Ardrossan) worked your conductor on CW on the 20th using just 10 watts output to a horizontal, five-eighths whip in the loft! Art heard the Kent and Cornish beacons, many repeaters and worked lots of GI's on FM. GM4CXP added XI and YI squares and EI9Q in Waterford for a new British Isles county. GM8FFX says there was an *aurora* on Nov. 7 and that G8LRN (Sunderland) worked some stations in it from 1500-1600 GMT. However, this has G3USF very puzzled since the *gamma* count was perfectly normal. Graham reports a visual *aurora* on the 11th but no radio one. After eight years off the band, G3MMW (Hants.) has returned to the fold and remarks upon the tremendous change in activity. Using a *Standard C146A* he made over 100 contacts in three weeks. He suggests that whatever one thinks of repeaters, they make users adjust their transmissions properly to gain and hold access.

#### Four Metres

G3OHC was the only correspondent to mention this band in any detail. Graham reports it quiet, especially on weekdays. G4DZL and G3YZU in Leics. and G4DFG in Shropshire are regular, weekday "CQ Callers" with little success. He suggests "CQ" calls at 2000, 2100 and 2200 on 70.2 MHz for SSB and 70.26 MHz for AM. New stations contacted include G3UUT (Cambridge), G4ALG (Reading), G4ENA (Luton) whilst G3DAH (Herne Bay) and G3CO (Colchester) are very consistent. GB3SX is always audible now at Sutton

### THREE BAND ANNUAL VHF TABLE

January to December 1976

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	
G3BW	62	7	65	14	44	6	198
GD2HDZ	52	6	62	12	50	7	189
G2AXI	50	7	63	16	42	8	186
G3OHC	40	5	63	14	49	9	180
G3FJ	51	7	58	14	34	10	174
G4BWG	46	6	65	21	25	6	169
G3XCS	43	7	64	18	26	6	164
G5DF	43	5	63	13	30	9	163
G4BYP	41	7	58	9	25	7	147
G8HBQ	—	—	72	13	52	10	147
GM4CXP	16	4	71	19	21	9	140
G3BOC	52	7	60	13	—	—	132
G8GML	—	—	61	13	38	10	122
G4AEZ	32	6	46	12	13	3	112
G8GII	—	—	54	16	25	6	101
G3FPK	—	—	77	21	—	—	98
G8BKR	—	—	75	13	6	2	96
G8HHI	—	—	58	14	15	3	90
G3ILO	—	—	61	18	6	2	87
G4DKX	14	2	45	13	4	7	85
GD3YEO	9	6	54	16	—	—	85
G8EOP	—	—	28	8	35	9	80
G8KLN	—	—	53	16	1	1	71
G8KKX	—	—	48	14	—	—	62
G8ITS	—	—	48	13	—	—	61
G8KSP	—	—	47	11	—	—	58
G8HAF	—	—	48	10	—	—	58
GC8AAZ	—	—	26	10	10	5	51
G8IFT	—	—	20	5	12	4	41
G8JAJ	—	—	31	6	—	—	37
G8GLS	—	—	18	4	—	—	22
G8LGZ	—	—	9	3	2	1	15

This Table closed on December 31, 1976. Final placings for the year will appear in the February issue. The Table re-opened w.e.f. January 1, 1977, and new scores should be sent in as they accrue.

Coldfield and GD2HDZ and G3JYP (Appleby) are reliable signals to the north.

#### Satellite News

Due to the continued "clobbering" of *Oscar 7* by very QRO stations in I, F and DL, when in Mode "B", the satellite has been switching itself to Mode "A." So, if you hear

nothing when it is supposed to be on "B," check "A" for a bonus! In special QRPP tests, SP9ADU has had his CW signals relayed when using just 100 *milliwatts e.r.p.* Newcomers to 0-6 and 0-7A include 5B4KP on SSB and 5Z4IR. 5T5CJ is expected on imminently and ZS1BI has contacted the Japanese Antarctic base station, 8J1RC, for

VHF CENTURY CLUB MEMBERS

70 Centimetres

Cert. No.	Station	Date Issued
1 G3DAH	Herne Bay, Kent	15/4/68
2 G8AAZ	London SW19	16/8/68
3 G8AEJ	London SW20	8/11/68
4 G8AWO	Welwyn Garden City	14/1/69
5 G8AUE	Ambergate, Derby	14/1/69
6 G8ARM	London SE3	17/4/69
7 G8AYN	Dartford, Kent	1/10/69
8 G3MCS	Aylesbury, Bucks.	13/10/69
9 G8ART	Leamington Spa	20/3/70
10 G8BYV	Dereham, Norfolk	19/10/70
11 G8APZ	Hounslow, Middx.	7/7/71
12 G3UBX	Wolverhampton	10/11/71
13 G8ABP	Paignton, Devon	31/12/71
14 G8CKX	Ambergate, Derby	31/12/71
15 G8CIT	Hampton, Middx.	6/11/72
16 G8EOP	Dewsbury, Yorks.	1/2/73
17 G4AGE	Bolsover, Derby	16/5/74

18 G3NHE	Sheffield, Yorks	15/8/74
19 G8FMK	Thame, Oxon.	29/10/75
20 G8BKR	Bristol, Avon	29/12/75
21 G8GED	Southall, Gtr. London	13/1/76
22 G3FIJ	Colchester, Essex	3/12/76

Four Metres

1 G3IMV	Bletchley, Bucks.	6/11/68
2 G3EKP	Blackburn, Lancs.	6/11/68
3 G3UUT	Acomb, Yorks.	7/2/69
4 G3FDW	Retford, Yorks.	30/12/69
5 G3VSA	Manchester	9/11/70
6 GC30BM	Guernsey, C.I.	27/10/71
7 G3HBG	Godstone, Surrey	30/10/71
8 G13HXV	Finaghv, Belfast	3/3/75
9 G3OHC	Sutton Coldfield	9/11/76
10 G3FIJ	Colchester, Essex	11/11/76

a "first." The Guilford *Oscar 6* telecommand signal in the 2m. band has been greatly reduced in bandwidth and is now command 0-6 more reliably. December 12 was the 15th anniversary of the launch

of *Oscar 1* and in 0-7's Codestore that day was a suitable message. AMSAT members hold a net each Sunday on 144.280 MHz SSB from 1930 local time with G8CSI (New Malden) as M.C. Anyone interested in amateur satellite work is cordially invited to call in. The four QRP Wednesdays on 0-6 are Jan. 5 and 19 and Feb. 2 and 16. Please restrict your power to *ten watts e.r.p. maximum* so that everyone can have a chance to "get in."

Final Miscellany

Send in your final claims for the Three Band Annual Table up to Dec. 31 for the next issue. QSL's for contacts with G8BBC can be sent to John Nelson, G8HAL (*QTHR*). Apologies to anyone left out but there was a very tight schedule this time due to the uncertainties with the Christmas mail. The deadline for February was Jan. 7 and for March, Feb. 4. Everything to: "VHF Bands," *SHORT WAVE MAGAZINE*, BUCKINGHAM, MK18 1RQ. *73 de G3FPK es a Happy 1977!*

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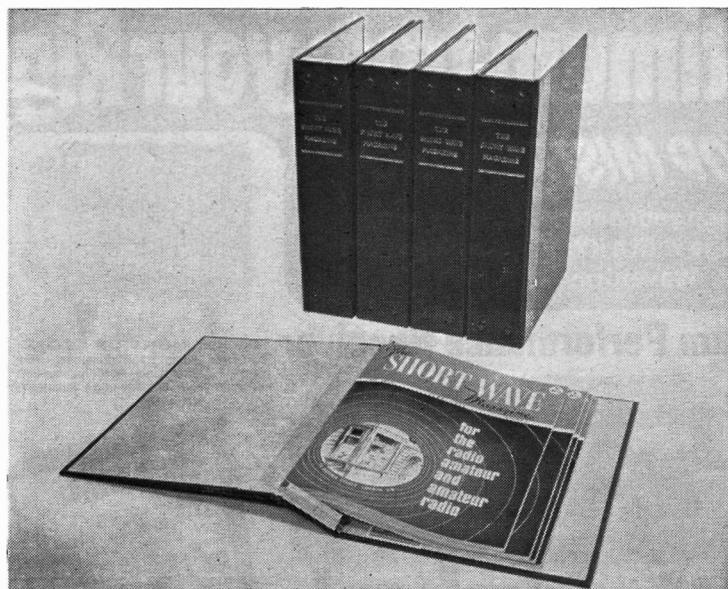
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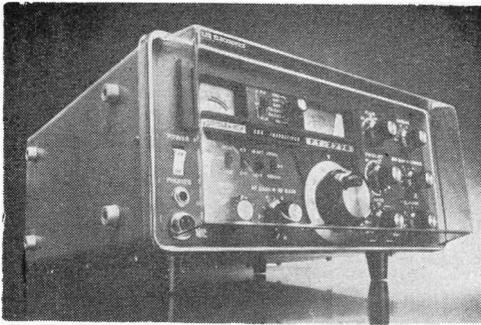
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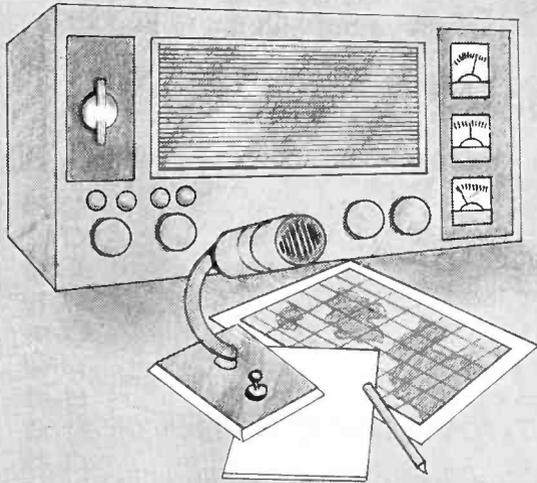
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**For sale:** T.W. Communicator 2-metre 12v. transceiver (valve Tx and solid-state bandsread Rx), with matching mains power supply, £40. s.a.e. for details and list of other items. — Stevenson, 19 Johnstone Road, Newent, Glos.

**Selling:** Drake TR4-C, with AC/PSU and MS-4 speaker, one year old, as new, little used, £425. Pye AM-25B Vanguard complete with control box, cables, speaker and tulip mic., working 70.26, £25. — Ring McIntyre G13YDH, Belfast 643913.

**Must sell:** Crank-up tilt-over tower, 40-ft., complete with Thunderbird Senior tri-band beam rotator and control, £100 the lot. Swan 700CX with 16-pole special filter and matching external VFO, little used, £350. Rex 100 LED readout all-band transceiver, new, £300 (same as NEC 101). — Ring Goodbody, 01-592 7800 daytime, 01-595 4251 evenings.

**For sale:** Brand new Datong FL-1 frequency-agile audio filter, £40 or near offer. Microwave Modules 432/28 MHz converter, £10. — Williams, 39 Clockhouse Way, Braintree, Essex. CM7 6RD.

**Sale:** R.216 VHF Rx, 19-150 MHz, very good condition, complete with AC/PSU. Offers? Wanted: Cabinet for Eddystone 770R; also urgent loan of handbook. Return guaranteed. (Warks.) — Box No. 5546, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

**Selling:** Pye Pocketphone, Hi-band AM (hardly used), and Westminster Hi-band AM, £125 each post paid. — Parry, Quennevais Drive, Jersey, C.I.

**Selling:** Collins HT transformers, 1200v. 383mA., 240v. input, £7.50 inc. carriage. Rack cabinet, modern design, 6-ft. high, 24-ins. deep, 19-in. standard, £20. Valves ex-equipment: 2C39A, 85p ea.; 3E29, £1.10 ea.; 6080, 807, 5T4, 5R4GY, 50p ea.; OA2, OB2, 2D21, 6AK5, 5517, 6570, 6J6, 6AG5, 6AQ5, E180F, 6829, 5686, 6668, E182CC, 13D6, 15p ea. p/p 25p, orders over £2 post free. Ex-Air Ministry heterodyne frequency meter Model W-1270, 26-131 MHz, £15. The following American test equipment: Precision power supply John Fluke Model 301E, adjustable from 1-449v. in 0.1v. steps, standard cell reference, as new condition, £50. Bird Termaline Model 82A 50-ohm coaxial resistor with VSWR calibration chart, as new, £45. USM-16 signal generator, 10-440 MHz, AM/FM, pulse, sweep, AFC etc., complete with maintenance manuals, requires alignment, £45. — Austin, G4FLN, Monday's Lane, Irford, Woodbridge, Suffolk. (Tel: Orford 328).

**For sale:** The following equipment has been used for few hours only, offered at greatly reduced prices: Drake R4-C with extra xtals 1.5 MHz, 15 MHz (WWV), 28 MHz, also extra filters 4 kHz (AM), 1.5 kHz, 500 Hz, T4X-C with AC-4 and MS-4, £875. Atlas 210 with de-luxe mobile mount and antenna matching transformer, £385. Hustler bumper mount, mast, resonators for 10/15/20/80 metres, £40. Hy-Gain BN86 balun, £10. Tandberg Model 12 stereo tape recorder in portable case, 3 watts per channel on internal speakers, 10w./ch. on external, £100. — Barry, 13 Mill Rise, Bourton, Gillingham, Dorset.

**Wanted: Eddystone 1001 receiver, must be in mint and unmodified condition. All letters answered. — Bradley, 6 Linden Grove, Folkestone Street, Hull HU5 1BP.**

**Selling:** Heathkit SB-104 with CW filter, SB-644, HP-1144 and KW-107, all excellent condition. Offers in writing please. All letters answered. — Marshall, G4BJF, 19 Kings Avenue, Loughborough, Leics. LE11 0HU.

**Sell or exchange:** "Wireless World" electronic music synthesizer with 4-octave keyboard. "Practical Wireless" TV tennis game (UHF 625 output). — Ring Westell, Whalley 3769 after 6 p.m.

**Selling: The following all brand new:** Halson (G3FIF) mobile aerial with 80/160m. coils, £7.50; Webster Bandspanner mobile aerial with 10/15m. coils and Hy-Gain bumper mount, £11.50; Waters 335 coax switch, 1/p 6W., £6; Labgear CM-6002WB UHF amplifier, £5; E5031 lowpass filter, £1.50. **Valves:** 4X250B, £10; QV06-40A, £8.50; QV07-40, £7.50; 832, £4; Nuvistor 6CW4, 80p; bases, 25p. **Crystals (B7G):** 130, 140, 150, 160, 180 kHz, £2 each. **Handbooks:** Collins 75S-1, National 200, Eddystone 960, £1.25 each. Mint Swan 500 transceiver with 230XC PSU, £285. K.W. trap dipole, used, £16.50. Used Klystrons 723AB, KS920B, £35.50 each.

**Wanted:** Unmodified Trio PS-5 PSU and 30G VFO; also Drake MN-4 and Hy-Gain 18-AVT/WB. — Hope, GM3MGT, 17 Longhill Gardens, Dalgety Bay, Fife KY11 5SG. (Tel: 0383-822932).

**Sale: Standard C828M 2m. FM transceiver, 10 channels fitted, as new, few hours use only, mobile mount and ½-whip included, £130.**—Ring Dudley, G3YRP, Derby 515287.

**Sale:** Trio JR-500S with 2m. Mosfet converter, £55. Trio TS-700 with pre-amp., £300. Both mint condition. — Ring Taylor, G8AKN, 061-336 3182.

**Wanted:** Buy, hire or borrow circuit diagram for Epsylon Type PM8(625) picture monitor. — Straw, 7 Deepfield Way, Coulsdon, Surrey. (Tel: 01-660 0803).

**Sale:** Storno Viscount, 4 channels, ½-whip, complete, very good condition, £38 or near offer. Heath RF-1U signal generator, £10. Spare 4-Ch. board for Viscount, £4. R5, R6, R6 xtals for FT-2F, £1 pair. — Newman, G8HUU, QTHR. (Tel: 084421-4200, Thame).

**Wanted:** Handbook, photocopy or circuit for Tx/Rx A510. **For sale:** Photocopies AR88D handbook, £1.50 post free. — Finley, 70 Edinburgh Avenue, Gt. Yarmouth, Norfolk.

**For sale:** 12-AVQ, less than 12 months old, £28. Trio JR-310 with 10AZ filter, SP-5DS speaker and manual, mint condition, £70. Trio 9R-59DS with voltage stabiliser, SP-5DS speaker and manual, £35. Hamgear PM-VIII calibrator, £12. — Browne, Willoughby, Westhill, Yarmouth, Isle of Wight PO41 0RX. (Tel: Yarmouth 760148).

**Wanted:** For AR88D: Metal case, all or part dial gear mechanism, valves, trimming tools; can collect. — Smith, 97 Welling Way, Welling, Kent. (Tel: 01-432 2348 daytime).

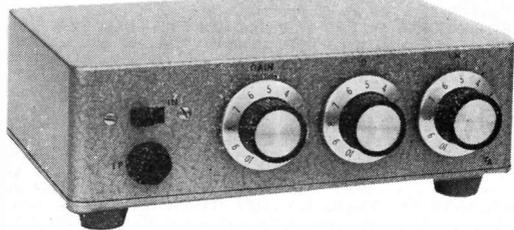
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**Sale:** Racal SA-535 counter/timer with SA-548 decade divider, complete but requires attention, £11. Will separate. — Crisp, G3BSW, QTHR. (Tel: Ascot 20992).

**Selling:** Heath SB-104 all solid-state digital transceiver, £395. SB-644 RVFO, £49. HP-1144 PSU, £59. SB-230 linear, £195. SB-614 monitorscope, £79. All constructed to professional standards; delivery arrangeable. — Robinson, G2KF, QTHR. (Tel: Par 2337).

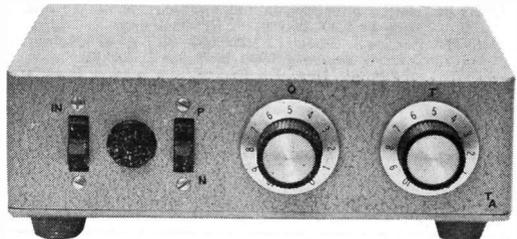
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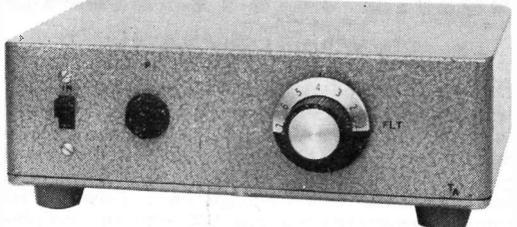
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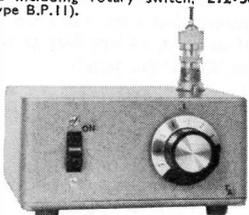
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**For sale:** Codar preselector, mains, £7. Eagle 0-1mA meter, new, £2. American straight key, £2. Eagle straight key, ball-bearings, new, £8. FL8 CW filter, £3. ATU, compact, £1.50. (Yorks.)—Box No. 5547, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

**Wanted:** Heathkit HP-23 power unit; also manuals for early airborne radar equipment.—Ring Stookey, Egerton (Kent) 296.

**For sale:** Monitor suitable for SSTV, separate CRT. Instruction/operation manuals for Ampex 5100, 5103, 7003. Video tape recorders. Offers? Buyers collect.—Rolls, 23 Brandreth Avenue, Duntable, Beds.

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**Sell or exchange:** Marconi H-111 marine base Tx/Rx, £35. Or exchange for Eddystone 659/670 marine Rx, or similar. Detail please.—Pearson, West View, Upsall, Thirsk, Yorks.

**Sell or exchange:** Datong FL1 audio filter. Offers? **Wanted:** K.W. Atlanta VFO, 2m. transverter, monitorscope. (Eire).—Box No. 5548, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

**Selling:** SPR-4, mint, all Drake options fitted including noise blanker, 100 kHz calibrator, MW loop, antenna, built-in speaker, 23 crystals covering 10-160 MHz, every broadcast band plus seven HF aircraft bands, with carton and manual (save pounds on list price), £400. Davies, GW4BVN, QTHR. (Tel: Port Talbot 4278).

**Wanted:** Amateur Bands only solid-state receiver, will pay up to £150 for mint model.—Ring Moore, 01-530 4934 (Woodford).

**For sale:** IC-22A, two months old, with 13 channels and fitted pre-amp., £140. IC-202, brand new, £130. Sony 9-band Rx, AM/FM, SSB/CW, AC/DC, amateur bands etc. (cost £150), £75, 4-ele quad., £7. 4-over-4, unpacked, £6. 3-tone generator, £3.—Ring Shipton, G8IXY, South Benfleet 53997.

**Sale:** KP-202, with 6 channels and all accessories, £120 or near offer. Would exchange for KW-2000A. Or W-H-Y?—Slack, G4ANW, 16 Chestnut Drive, Broadstairs, Kent.

**For sale:** Liner-2 with pre-amp., as new, £115.—Middleton, 49 Wolsey Road, Stafford.

**Wanted:** Hallicrafters, BC-342N ex-govt. receivers, 20-160m. dish antenna.—Roberts, 71 Gibbins Road, Selly Oak, Birmingham.

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**Selling:** A few 25w. VHF RF transistors, unused, £7; also UHF, 12w., £4. All-12v. Motorola 0.5w. single-channel VHF walkie-talkie, no information, £30. UHF PA, 10w. output, 100mW. input, 12v., £12. Racal Model 850 VHF frequency calibrator, £70. UHF 35w. output transistor, 12v., £12.—Ring Cooper, Crayford 528915.

**Sale:** Yaesu FT-101 160-10m., £285. TR-44 rotator, £50. Europa 4m., £70. Microwave Modules 4m. converter, £12. 12-core cable, 40-yd., £10. **Wanted:** FV-101B VFO.—Ring Thurlow, 01-654 2761.

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