

35p

# *The* SHORT WAVE *Magazine*

VOL. XXXIV

MAY, 1976

NUMBER 3



WORLD WIDE COMMUNICATION

**NEW**

# The DXpert

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

Multi-colour LED  
mode indication  
panel

Digital readout  
available as option. 6  
digit indication from  
sum of VFO +  
carrier frequencies  
with 100Hz  
resolution. Memory  
switch retains initial  
dial setting for  
reference

Highly sensitive RX  
with dual gate  
mosfet RF and buffer  
stages gives SSB  
sensitivity of 0.25 $\mu$ V  
for 10dB S/N

200 W PEP input  
TX with RF negative  
feedback between  
driver and PA for low  
intermod products.  
Amplified ALC for  
superb speech  
quality

Five function  
metering for  
complete station  
monitoring

AF signal shaper  
improves received  
signal by automatic  
response limiting in  
SSB and CW modes

IF shift system  
allows operator to  
move IF bandpass  
without retuning  
main dial. Beats the  
nearby QRM and  
matches bandwidth  
to signal

FSK operation with  
switchable 170Hz or  
850Hz shift.  
Automatic TX power  
regulation system for  
continuous operation

RF speech processor  
with fully variable,  
metered compression  
level

Precision dial drive  
with direct  
unambiguous  
readout system. No  
need to add together  
two dial readings

All band operation  
160-10m (10m in  
4 bands) plus  
auxiliary band and  
15MHz WWV

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.

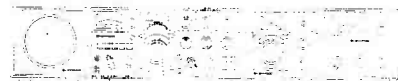
● Outstanding performance on both transmitter and receiver due to fully balanced mixing combined with latest PLL techniques.

● First class frequency stability and large signal handling characteristics.

● All new precision dial drive mechanism with unambiguous mechanical 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.



SP-520 TS-820 VFO-820 TV-502

● 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 monitoring of all important functions gives unparalleled operator control.

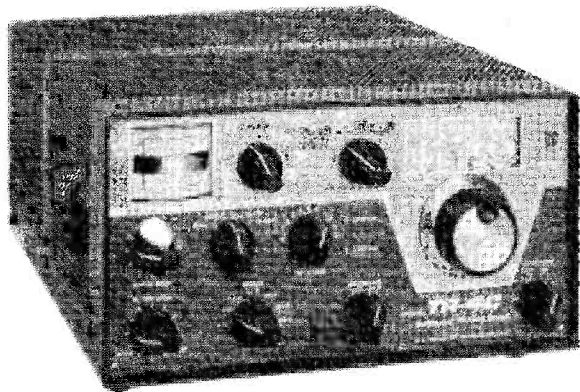
This brief advertisement can only touch upon the main details of the TS820. You have to handle it to appreciate its performance. See it soon at your local branch of Lowe Electronics.

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

 **TRIO**

**DRAKE****Radio Shack Ltd**

# STILL THE BEST VALUE & PERFORMANCE IN A TRANSCEIVER



## The DRAKE TR-4C

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

### INCLUDED FEATURES :

- 300 Watts PEP input on SSB, 260 watts input on CW.
- Complete Amateur Band Coverage; 80 through 15 metre bands complete and 28.5-29.1 MHz of 10 metres. Rest of 10 metre band obtained with accessory crystals.
- Separate Sideband Filters; separate USB and LSB filters eliminate oscillator shifting and insure long term carrier vs filter alignment.
- Nominal 1:7; 1 Filter Shape Factor; These filters stand among the industry's finest with 6 dB, bandwidth of 2.1 kHz (chosen to slice thru QRM), 60 dB bandwidth of only 3.6 kHz and 100 dB ultimate rejection.
- Provision for Highly Effective Accessory Noise Blanker.
- Heavy Irridited Cadmium Plated Chassis.
- CW Side Tone Oscillator for monitoring your CW transmission.
- Finish; scratch resistant epoxy paint.
- Crystal Calibrator built-in.
- VFO Indicator Light eliminates confusion of which main tuning knob controls the frequency when using an RV-4C remote VFO.
- Automatic CW Transmit Receive Switching sometimes called "semi" break-in.
- Full AGC with Drake dual time constant system confines a 60 dB signal change to a 3 dB audio change.
- Effective Transmitting AGC insures clean SSB output.
- Solid State Permeability Tuned VFO for low drift and accurate 1 kHz divisions on all bands. New easy to read dual concentric dials.
- VOX or PTT for use on AM or SSB.
- Receiver S-Meter automatically switches to indicate transmitting AGC on transit.
- Transmitter Plate Ammeter indicates Relative RF Output by depressing load control shaft.
- Adjustable Pi-Network output circuit.

SAE for details please

SECURICOR ★ DRAKE ★ SALES ★ SERVICE  
★ B.R.S. ★ ACCESS ★ BARCLAYCARD ★ HP

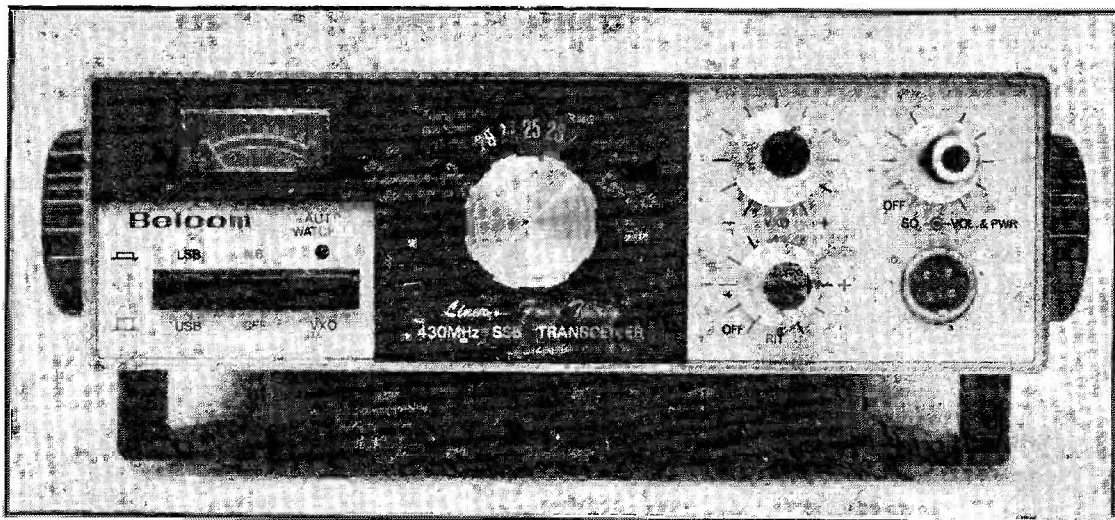
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Telephone: 01-624 7174 Cables: Radio Shack, London, N.W.6  
Telex: 23718

# LOWE ELECTRONICS



Two steps ahead comes the Liner 430. Already being used by us to make mobile contacts with the U.S.A., the Liner 430 opens up a whole new dimension of long distance contacts via the OSCAR satellites.

Covering two 480 kHz bands in 20 kHz steps and using Belcom Auto watch system which detects the presence of a signal anywhere within VXO range without tuning. No more missing signals and worn out fingers from control twiddling.

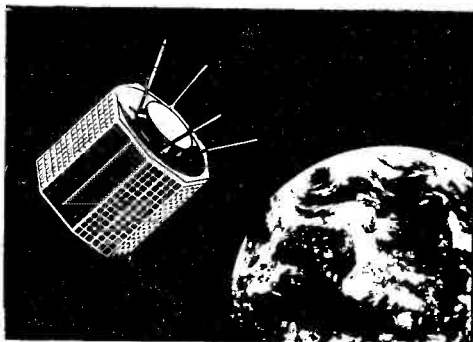
10 watts output. Selectable USB/LSB/CW operation. Dual conversion using 50 MHz and 7.8 MHz IF's results in excellent image rejection and high sensitivity. Truly a new dimension in amateur radio from the Liner 430.

In the same way as the Liner 2 pioneered 2m SSB, the Liner 430 will lead the way on 70 cms. Belcom products are noted for top value, performance, and reliability—the 430 carries on this tradition.

PRICE £228 + VAT.

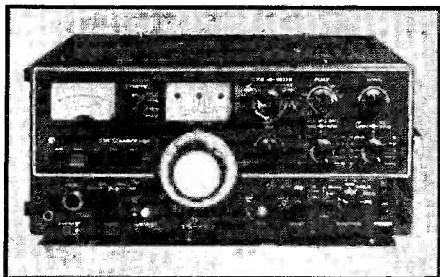
## Liner Four Thirty

FREQUENCY COVERAGE	432.00-432.48 MHz + optional 480 kHz USB, LSB, CW
MODES	10WV
POWER OUTPUT	10WV
CARRIER SUPPRESSION	Better than 45dB
SIDE BAND SUPPRESSION	Better than 50dB
ANTENNA IMPEDANCE	50 Ohms
MICROPHONE IMPEDANCE	600 Ohms. Dynamic
FREQUENCY RESPONSE	400 Hz-2600 Hz (6dB)
RECEIVE SYSTEM	Double Conversion
INTERMEDIATE FREQUENCIES	50 MHz (1st) 7.8 MHz (2nd)
SENSITIVITY	Better than 10dB S + N/N at 0.5 microvolt
SELECTIVITY	2.2 kHz 6dB
SHAPE FACTOR	Better than 2:1
AUDIO OUTPUT	Greater than 1W into 8 ohms
POWER CONSUMPTION	4.5A maximum
POWER SUPPLY	11-16v. DC negative ground
SEMICONDUCTORS	35 transistors 11 FET 41 Diodes 1 IC
DIMENSIONS	67 x 215 x 245 mm.
WEIGHT	4 Kg.



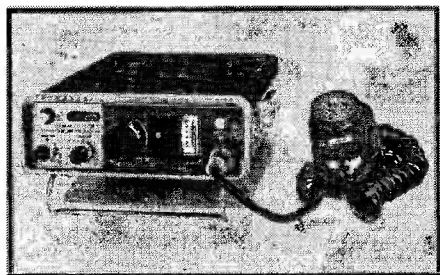
WORK REAL WORLD WIDE DX VIA  
OSCAR 7 WITH THE LINER 430

# LOWE ELECTRONICS



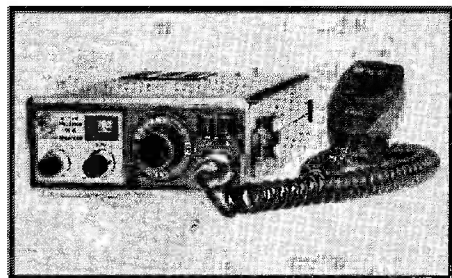
## TS250

The TS250 is the best value for money HF transceiver available in Europe today. It incorporates all the features of more expensive equipment at no extra cost—AC/12v. operation, speech compression, 1 kHz readout, all band coverage 80–10, VOX, calibrator, blower cooled PA, transverter outlets, 4 functions metering, etc., etc. Why not send for details today and find out what Trio design expertise is all about; or just call on us and try the superb TS250 for yourself. You are in for a pleasant surprise.



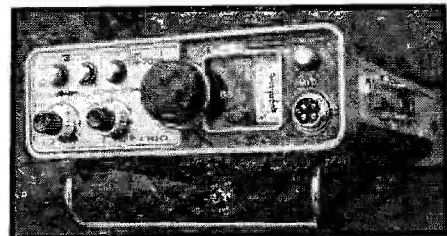
## TR7200G

The TR7200G has set all 2 metre FM operators talking about its outstanding performance on both transmit and receive. Not only is it the best engineered transceiver on the market, but it's also the most sensitive at 0.3 μV for 15 dB quieting and has the cleanest transmitted signal both in and out of band (the economy transceivers simply lack the interstage filtering to ensure that the owner is not put off the air by the Home Office.) Supplied complete with microphone, mobile mount, power leads, spare fuses and incorporating the TRIO exclusive tuning fork access tone generator, the TR7200G includes five fitted channels (S20, 21, 22, R6 and R7) or alternatives if requested.



## TR3200

The newest FM handy transceiver from the TRIO range. Superb performance for the 70 cm. operator, 12 channel capability in the range 432–436 MHz with three channels fitted (SU8, SU18, SU20). Transmitter output switched 2W/400mW and incorporating the TRIO exclusive 1750 hz tuning fork access tone generator. 3-wave detachable antenna for high gain performance on both transmit and receive. Supplied complete with all accessories as the TR2200G and with the new miniature handy microphone.



## TR7010

Following the worldwide success of the TS700, Trio have taken the TS700 basic design and packaged it for 2 metres SSB mobile use. The TR7010 sets new standards in receiver sensitivity and low spurious emission on transmit. Operating CW and SSB from 144.1–144.3 MHz, the TR7010 covers all CW, SSB and beacon activity. 40.5 kHz channels plus VXO and RIT provide continuous coverage. 8 extra channels can be used, without retuning, in the range 144–145 MHz by fitting auxiliary crystals. Single conversion using an IF of 10.7 MHz with a superb crystal filter provides outstanding selectivity. Wide range amplified AGC and newly developed FET devices in RF amplifier and mixer stages allow maximum sensitivity to be used with freedom from overload due to adjacent signals. Single conversion transmitter with new fully balanced mixer system generates a beautifully clean signal with crisp audio quality.

HEAD OFFICE

119 Cavendish Road, Matlock, Derbyshire. Tel. 2817 or 2430 9 a.m. to 9 p.m.

BRANCH OFFICES

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

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

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

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

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# Western

## ITS "WESTERN" FOR YAESU AND "WESTERN" FOR VALUE

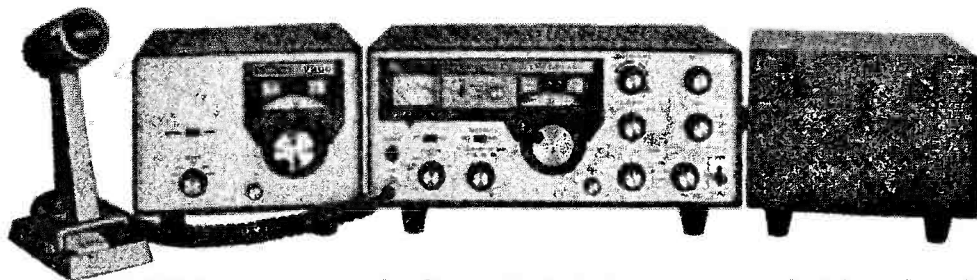
WITH THE NEW YAESU FRG-7  
0.5-30 MHz GENERAL COVERAGE RECEIVER

Stocks arrive in June so delivery should be virtually ex-stock (subject to your making an early decision!) at £120 + VAT. (We could say £150 including VAT but if we did this no doubt the Chancellor would change the rate of VAT in the April Budget which comes out after the preparation of this ad!)



BUYING A HF TRANSCEIVER ?... then "Western's" prices will stand comparison with even those of kits. There's the ... **FT200** offering 260w. 10-80m. and superb reliability.

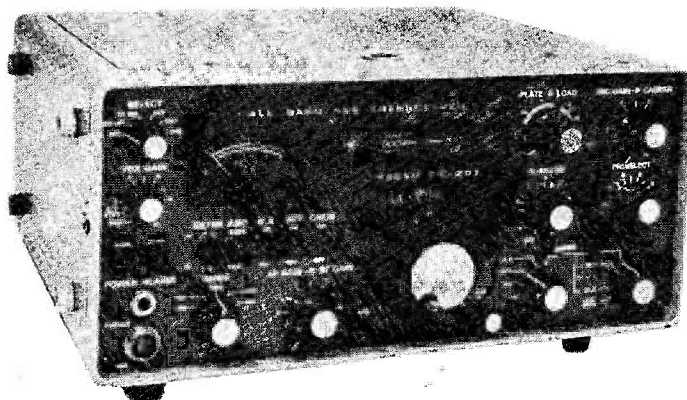
YD844 (£18-00) FV200 (£45-00) FT200 + FP200 (£240) (PRICES exc. VAT)



FOR  
260w. p.e.p.  
10-80m.  
SSB-CW-AM  
1 kHz READOUT  
CLARIFIER  
100 kHz  
CALIBRATOR

THE FT200 is without doubt one of the "best buys" available. Compare its features with similarly priced units and kits. SPECIFICATION : 260W p.e.p., i/p SSB/CW. 75W AM 1 kHz readout on all bands 3-5-4, 7-7.5, 14-14.5, 21-21.5, 28.5-29 MHz (3 optional crystals available for 28-28.5, 29-29.5 and 29.5-30 MHz. Stability : 100Hz 30 mins. after warm-up. Sensitivity : 0.5µV 10dB/S + N. Selectivity : 2.3 kHz (6dB), 4 kHz (60dB). Clarifier ± 5 kHz. Break-in CW keying. You will pay more for a kit with less power, only 5 kHz readout and no receiver incremental tuning (Clarifier control). These prices only apply whilst current stocks last. Three crystals fitted for full 10m. coverage COST £8-44 inc. VAT.

## THE FT-201 10-80m. AC/DC TRANSCEIVER



£270 + VAT (Ex-stock)

### FEATURES :

- ★ Built-in ac/dc psu
- ★ 260W p.e.p.
- ★ 1 kHz readout
- ★ Effective noise blanker
- ★ Break-in cw keying with sidetone
- ★ ±5 kHz receiver clarifier
- ★ Built-in wvw reception
- ★ All mode operation for am, cw and ssb
- ★ Fast/slow/AGC
- ★ Built-in cooling fan
- ★ Complete line of compatible accessories

Performance and portability are among the key features of this economical transceiver along with YAESU innovated modules to simplify servicing. The FT201 has features which you would expect to find only in units costing much more.

Full details in our  
"Communications Equipment"  
Catalogue, 30p.

# Electronics (UK) Ltd

**YAESU NEW SPECIAL OFFER prices (exc. VAT) act quickly!**

★ **FT/FP200 ONLY**  
£240

**HF TRANSCEIVERS**

FT75B	... £160.00
FP75B AC PSU/Spkr.	... £40.00
DC75B DC PSU/Spkr.	... £40.00
FT-101E	... £375.00
FT-101EE	... £350.00
FT-101EX	... £299.00
FT/FP200	... £240.00
FT-201 + DC PSU	... £270.00
FT-401B	... £315.00
FT/FP501	... £415.00

★ **FT-201 ONLY**  
£240

**HF RECEIVERS**

FR-101S	... £240.00
FR-101S Digital	... £315.00
FR-101D	... £315.00
FR-101D Digital	... £389.00
FRG-7 0.5-30 MHz	... £120.00
<i>(available May)</i>	
<b>HF TRANSMITTER</b>	
FL-101 + RF Processor	... £295.00
Bargain	... Bargain
FL101RF + FR101D	... £582.00

★ **FT-101E ONLY**  
£375

**HF LINEAR AMPLIFIERS**

FL2000B	... £215.00
FL2100B	... £215.00
<b>VHF TRANSCEIVERS</b>	
FT-221	... £299.00
FT-224	... £125.00
SIG80R	... £199.00
<b>TEST EQUIPMENT</b>	
YP-150	... £35.00
<b>SPEAKERS</b>	
All Types	... £15.00

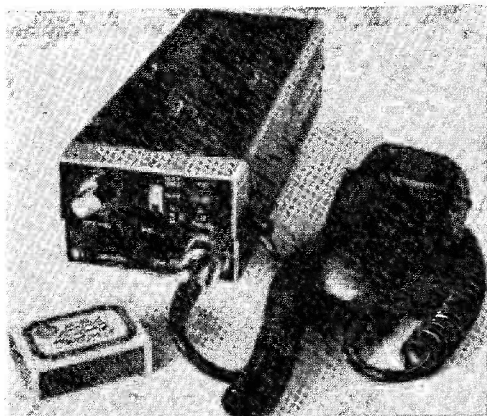
**NEW. EX-STOCK**  
**FT-101EX**  
The famous FT-101E  
but less extras  
**£299 + VAT**  
**FT-221**  
2m. AM/FM/SSB  
at **£299 only**

**Britain's Best Buy!**

for the serious FM Repeater operator—  
the **STANDARD C828!** £135 only (ex VAT).  
There's no other choice! 10 Channels fitted

BASE STATION — MOBILE — PORTABLE

- We're so fascinated by this little beauty that we think it makes everything else "obsolete" (or expensive). The Price! £151.88 inc. VAT.
- \* 10 watts (Hi), 1w. (Lo) output.
- \* 12 channels SIMPLEX or REPEATER. 10 Ch. fitted.
- \* Single crystal control means you only have to buy 1 CRYSTAL PER CHANNEL.
- \* Fitted 50, 520, 21, 22 & 23, R3, 4, 5, 6 & 7.
- \* LED (BUSY) indicates whether you have accessed the repeater or not.
- \* LED's to indicate EXTERNAL VFO, TRANSMITTER ON REPEATER
- \* OPERATION.
- \* SPEAKER/MIC gives PRIVATE LISTENING and has switch to override the channel selector enabling a changeover to be made to an external VFO (Type CV110).
- \* TONEBURST is built in (Automatic on "Repeater")
- \* NEW LEATHER CARRYING CASE/ANTENNA TYPE FCB-011 (available later) makes the C828 into a 12 Ch. 110w. portable unit.

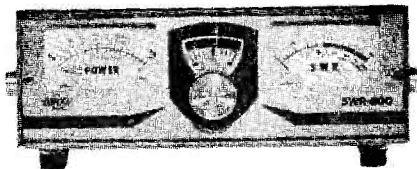


**SPECIAL OFFER!** CDE Rotors. AR30 £24. AR40 £29. + VAT.

**THE OSKER SWR200 POWER METER**

Features: Switchable for 52 or 75 ohm systems. Each instrument is individually calibrated. Four ranges: 0-2, 0-20, 0-200 and 0-2kV, 3-200 MHz. Excellent styling.

Price: £22.68 inc. VAT.



**ANTENNAS**  
(Exc. VAT)

- NEWTRONICS**
- G6-144A 6 dB 2m. Colinear ... £35.00
  - CGT-144, 5-4 dB Mobile Colinear ... £25.00
  - CG-144, as above less mount ... £17.00
- HUSTLER HF range Ex-Stock. J BEAM, MOSLEY, HY-GAIN AND BANTEX.**

**PRICE LIST** Please send S.A.E. Catalogues 50p.

**Western Electronics (UK) Ltd**

Head Office (All mail/enquiries)  
**Fairfield Estate, Louth, Lincs.**  
(Tel. Louth [STD 0507] 4955/6)

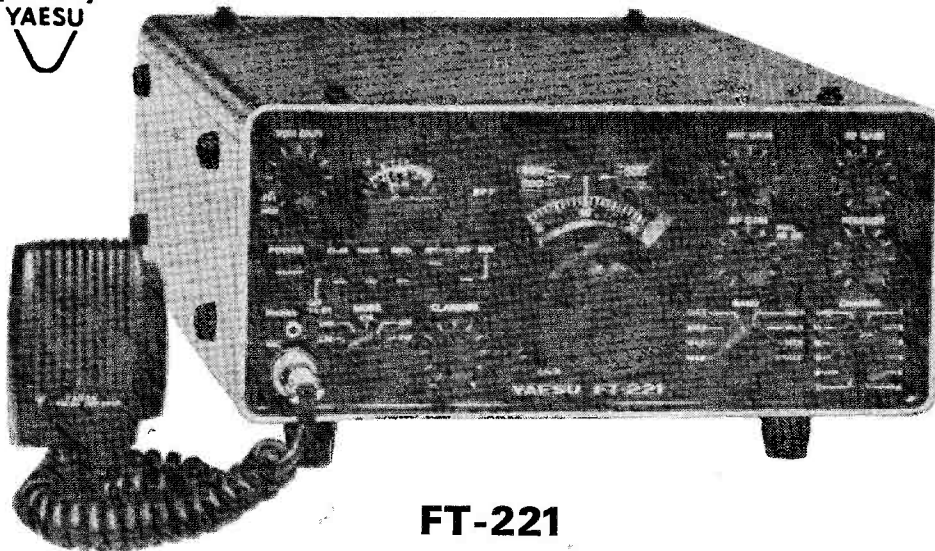
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# YAESU MUSEN — THE



## FT-221

### Solid State Ultimate 2 Metre Transceiver with Versatile SSB/FM/CW/BM Operation

## STAR FEATURES!

- ★ Complete 144–148 MHz coverage in 8 band segments
- ★ Dual rate, concentric VFO dial drive with better than 1 kHz readout
- ★ Built-in AC & DC power supplies
- ★ SSB/CW/FM/AM operation
- ★ Selectable  $\pm 600$  kHz repeater offset
- ★ Built-in VOX and break-in CW
- ★ External tone input connector
- ★ Built-in 100kHz calibrator
- ★ Built-in effective noise blanker
- ★ Three way metering: S meter, power output, and FM discriminator
- ★ 11 crystal channels per band segment = Total 88 channel
- ★ SSB output 12 watts P.E.P.  
FM/CW output 14 watts  
AM output 2.5 watts
- ★ Built-in speaker
- ★ With dynamic fist microphone

### SPECIFICATIONS

#### GENERAL

**Frequency Range:** 144–148 MHz in eight 500 kHz segments.

**Mode:** SSB (selectable USB or LSB), AM, FM or CW.

**Frequency Stability:** Within 100 Hz during any 30 minute period after warm-up. Not more than 20Hz with 10% line voltage variation.

**Calibration Accuracy:** 1 kHz maximum after 100 Hz calibration.

**Backlash:** Not more than 50 Hz.

**Antenna Impedance:** 50 ohm unbalanced nominal.

**Power Requirement:** 100/110/117/200/220/234v. AC, 50/60 Hz, 100 VA maximum or 13.5v. DC, 3A transmit maximum (11.5–16.5v. DC).

**Size:** 200(W) x 125(H) x 295(D) mm.  
**Weight:** 8.5 kg.

#### RECEIVER

**Sensitivity:** 0.5 $\mu$ V for 10dB Noise plus Signal to Noise Ratio on SSB/CW. 1.0 $\mu$ V for 10dB Noise plus Signal to Noise Ratio with 400 Hz 30% modulation on AM 0.75 $\mu$ V for 20dB quieting on FM.

**Selectivity:** 2.4 kHz nominal bandwidth at 6dB down, 4.1 kHz at 60dB down on SSB/CW/AM  $\pm 6$  kHz nominal bandwidth at 6dB down,  $\pm 12$  kHz at 60dB down on FM. (8 kHz or 18 kHz filter is available on request.)

**Harmonic and Spurious Response:** Image Ratio better than 60dB.

**Audio Output:** 2 Watts to internal or external speaker at 4 ohm impedance.

**Squelch Threshold:** Less than 0.3 $\mu$ V.  
**I.F. Frequencies:** SSB/AM/CW 10.7 MHz, FM 10.7 MHz and 455 kHz.

#### TRANSMITTER

**Spurious Radiation:**  $-60$ dB.

**Frequency Response:** Balanced SSB 300 to 2,700 Hz  $\pm 3$ dB. Low power AM better than 60%. Variable reactance FM  $\pm 5$  kHz maximum.

**Carrier Suppression:**  $-50$ dB.

**Sideband Suppression:**  $-50$ dB.

## YAESU MUSEN KNOW THE PROBLEMS—



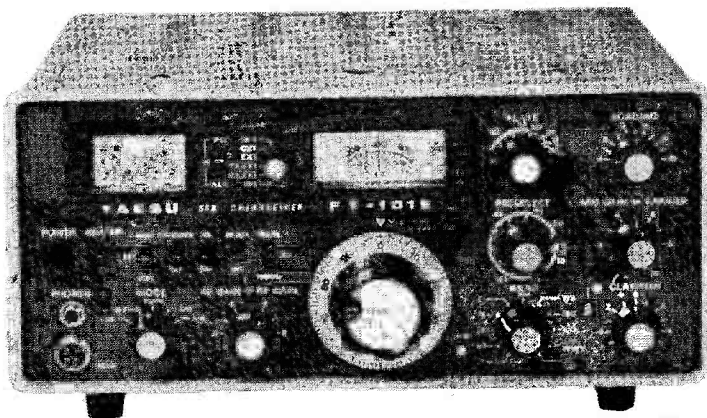
# ULTIMATE—ON TWO OR TEN!

## FT-101E/EE

### ● Solid State 160 thru 10 Metre Transceiver

The world's number one transceiver now offers even more value and performance in one, compact, thirty pound package. An effective, RF Speech Processor is a built-in integral part of this exciting transceiver. Now you can realize that extra talk power to cut through the pile ups—without the addition of a linear amplifier. Except for the final and driver stages, the FT-101E/EE features the latest in solid state technology, incorporating time proven,

plug-in "computer type" modules for unparalleled reliability and serviceability. New lever type switches offer easier operation. Here is a complete radio station designed to go anywhere—ideal for today's active amateur. Just add an antenna and 12v. DC or 100-234v. AC for instant operation on 160 thru 10 metres. The FT-101E/EE is another step forward in amateur communications from the world's leader in communications equipment. YAESU—The Radio Company.



E MODEL WITH R.F. PROCESSOR  
EE MODELS LESS R.F. PROCESSOR

#### Features

- \* Built-in AC and DC power supplies
- \* Built-in RF-speech Processor for increased talk power (E model only)
- \* 260 Watts PEP, SSB, 180 Watts CW, and 80 Watts AM.
- \* Factory sealed, solid state VFO for optimum stability and accurate 1 kHz readout
- \* Effective Noise Blanker, threshold adjustable, for elimination of noise spikes
- \* Built-in, fully adjustable VOX
- \* Automatic break-in CW operation with sidetone
- \* Selectable 25 kHz and 100 kHz calibrator
- \*  $\pm 5$  kHz receiver clarifier w/separate ON/OFF switch
- \* Built-in WWV/JJY reception
- \* Heater switch to shut off final tubes for conservation of current drain
- \* Reliable easy to operate level switch
- \* Adjustable carrier level for tune-up and novice operation
- \* Built-in speaker
- \* High-Q, permeability tuned, RF stages to provide the performance required even in base station operation
- \* Includes dynamic, hand-held type microphone.
- \* Indicator lights for internal VFO and clarifier operation
- \* Eight pole SSB filter for unparalleled selectivity on today's crowded bands
- \* All mode operation—SSB, CW and AM
- \* Built-in internal crystal control provision and Dual VFO adaptor
- \* Complete line of compatible accessories for flexible station design

**AND HAVE SOME PRECISE ANSWERS!**



AND NOW FROM THE LARGEST  
INTERNATIONAL MANUFACTURER—  
**NEW GENERAL COVERAGE  
RECEIVER FRG-7**

**HERE'S THE SET  
THAT YOU HAVE  
BEEN WAITING  
FOR!**



YAESU MUSEN HAVE NOW MET THE NEEDS OF COUNTLESS SHORT WAVE LISTENERS AND OTHERS WITH THIS EXCITING NEW RECEIVER —STUDY THE SPECIFICATION BELOW AND WE ARE SURE YOU'LL AGREE!

**Synthesized All Solid State General Coverage Receiver !!**

**Features and Specifications**

Mode :	SSB (LSB, USB selectable), AM and CW.	Selectivity :	More than $\pm 3$ kHz at $-6$ dB. Less than $\pm 7$ kHz at $-50$ dB.
Coverage :	500 kHz to 30 MHz continuous coverage.	Audio Output :	More than 2 watts.
Frequency Readout :	Better than 5 kHz.	Power Requirement :	100/117/200/234 volts AC 50/60 Hz or 12 volts DC (8 dry cells*). If the AC supply fails the DC supply is automatically connected. * Cells are not included.
Frequency Stability :	500 Hz within any 30 minutes after warm up.	Size :	13 $\frac{1}{2}$ " wide, 6", 7" overall high, 11 $\frac{1}{4}$ " deep.
Sensitivity :	0.5 $\mu$ V for 10 dB S+N/N for SSB and CW. 2 $\mu$ V for 10 dB S+N/N for AM.	Weight :	Approx. 15 $\frac{1}{2}$ lbs.

**ADD STATUS TO YOUR STATION WITH YAESU**



**ONE OF YAESU'S MODERN FACTORIES  
YAESU MUSEN AUTHORISED UK AGENTS**

**AMATEUR ELECTRONICS UK**

**G3FIK**



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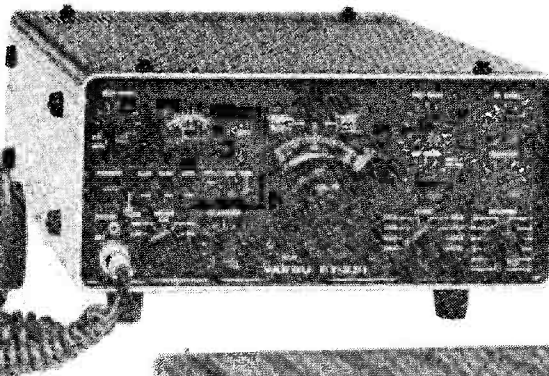


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**YAESU MUSEN MAIN AGENTS**



**FT-221**

SSB/FM/CW/AM  
2 Metre  
Transceiver

**FT-101E/EE**

160 thru 10 Metre Transceiver.

**BOTH EX-STOCK**

TOGETHER WITH ALL ITEMS  
FEATURED IN THE MAIN  
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ALL BACKED UP BY A FIRST-  
CLASS AFTER SALES SERVICE  
AND FREE SECURICOR  
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FIRST CHOICE FOR YAESU MUSEN!**

YAESU MUSEN MAIN CATALOGUE—DUE TO LIMITED SUPPLIES OUR CHARGE FOR THIS REMAINS AT 25 PENCE POST PAID BUT FOR THE BENEFIT OF THE SERIOUS ENQUIRER THIS NOW COMES TO YOU TOGETHER WITH OUR CREDIT VOUCHER VALUE £1 FOR USE AGAINST YOUR FUTURE YAESU PURCHASE.

**CREDIT TERMS : NEW LOW DEPOSIT — TRADE-INS WELCOMED**

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Thanet (0843) 22060. Tel: KEN McINNIS, G3FTE for courteous attention

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DAVE  
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FOR

**ICOM**

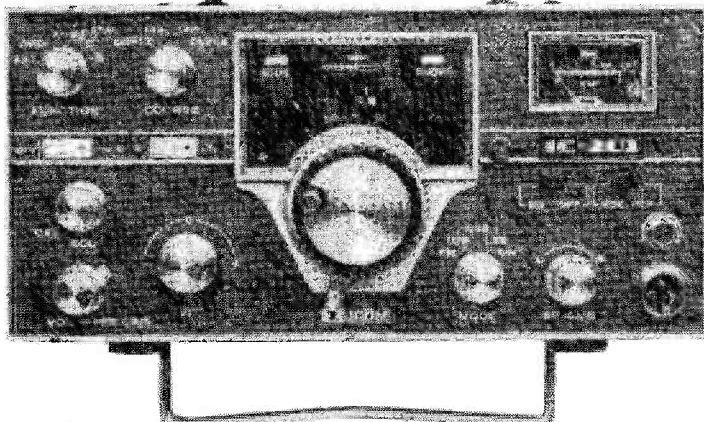
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**ICOM**

**IC-201**

THE MULTIPLE RIG THAT  
SETS THE PACE IN LUXURY  
AND QUALITY

£353.25 INCL.



REVERSE OR NORMAL REPEATER OPERATION AVAILABLE AT THE  
FLICK OF A SWITCH **WITHOUT RETUNING**

ICOM products are renowned for their sheer quality and reliability and the long awaited for IC-201 is no exception. It is difficult to point out all the advantages and qualities in such a well engineered piece of electronics by just writing about it. It needs to be seen and handled to be fully appreciated. Those of you who saw it at Leicester will have had the opportunity already, but for those who haven't been so lucky then we invite you to visit us or one of our agents for a demonstration. If you are thinking of a multi-mode then make sure to consider the IC-201 before you choose. If you have any questions please phone us for a chat.

Compare these features with other multi-mode rigs:

**Centre-Zero** meter on FM  
**Narrow filter** on FM for 25 kHz channel spacing.

Good, well-limited FM.  
600 kHz shift of either Tx. or Rx. on the 145 MHz range for **Repeater and Reverse Repeater** operation

**Automatic** tone-burst introduced on **Duplex**.

4 Crystal positions for net and repeater frequencies.

**Two-speed gearbox** giving easy rapid tuning.

**Crystal Calibrator**

**Vox.** Fully adjustable (works on FM if you really want it).

**CW** side-tone.

Full break-in on CW (separate VOX delay controls for CW and SSB)

**RF gain control** by adjusting the coupling of two helical filters.

**Noise blanker.**

**R.I.T.**

**Mic. gain control** on front panel.

**Dial-readout** to 1 kHz—accurate to 2 kHz or better.

**ACCESSORIES:** microphone, DC power cord with plug, spare fuses, plug for CW key.

**SPECIFICATION**

Transistors ... ..	53
FET ... ..	16
IC ... ..	10
Diodes ... ..	66
Frequency Range	144-146 MHz
Weight ... ..	5.4kg.

<b>Transmitter</b>	
Power Output	A3J 10W pep A1, F3 10W

Carrier Suppression (SSB)	>40dB
Unwanted sideband suppn.	>40dB
Spurious radiation	-60dB
Deviation FM set to	4.5 kHz
Mic. Impedance ... ..	500 ohm
Operation ... ..	PTT or VOX
Dial accuracy	(-10°C to 60°C) + 2 kHz
Modes SSB (usb or lsb), CW and FM	
Ant. Impedance...	50 ohms

Operating Voltage DC	13.8 ± 15%
AC	230v.
Size	111mm. x 230mm. x 260mm. deep

<b>Receiver</b>	
I.F. Frequencies A3J, A1	10.7 MHz
F3	10.7 MHz and 455 kHz
Sensitivity A3J, A1	0.5µV for 10dB S + N/N
FM	0.4 µV for 20dB quieting
Squelch sensitivity (FM)	-8dB (µV) or less

Bandwidth	
SSB, CW	±1.2 kHz -6dB points
FM	±2.4 kHz -60dB points ±8 kHz -6dB ±16 kHz -60dB

Audio output ... ..	2W
Speaker ... ..	8 ohms

These details are accurate to the best of our knowledge at the time of going to press, but there could be variations.

We are the authorised importer of ICOM equipment into the UK and aim to give the best possible service to those who have purchased ICOM equipment from us. We offer a 12-month warranty (with 6 months on semiconductors) and if your rig goes wrong within the first 4 weeks we will also pay for the carriage both ways. We aim to keep large stocks of spare parts and crystals for ICOM equipment. If you would like data sheets on any item of equipment why not leave a message on our Ansafone which offers a 24-hour service. Don't be frightened—it's only a machine and amateurs should be used to talking into machines!

We have YET ANOTHER AGENT to serve all you patient people in the MIDLANDS. He is Tony Fernyhough at SUTTON COLDFIELD who is very handy for Birmingham and Spaghetti junction. Phone him evenings and weekends on 021-239 2305.

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**SCOTLAND—Ian, GM8DOX**  
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**AUTHORISED IMPORTER OF ICOM AMATEUR RADIO EQUIPMENT IN THE UNITED KINGDOM**  
**FREE SECURICOR DELIVERY ON ALL TRANSCIVERS**



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# SOUTH MIDLANDS

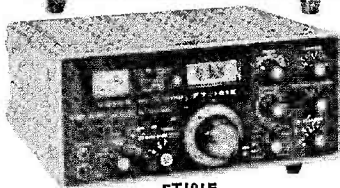
18 YEARS OF PROFESSIONAL EXPERIENCE

## YAESU MUSEN UK MAIN DISTRIBUTOR



### NEW FRG7 GENERAL COVERAGE RECEIVER

The FRG7, the NEW YAESU general coverage solid state receiver with specifications unparalleled in its price range. A spin tuned, phase locked synthesiser provides complete coverage from 500 kHz to 30 MHz to an accuracy better than 5 kHz. Frequency selection is accomplished by setting the RF (pre-selector and range switch), dialling up the required number of Megahertz, then tuning the VFO knob as normal. The receiver is sensitive (0.5uV for 10dB, S + N/N (SSB)) and stable (within 500 Hz for any 30 minutes after warm up) with AM, SSB and CW modes catered for. A 3-position audio filter, RF attenuator, dial lamp conservation switch, recorder and phone sockets are fitted. It is mains powered, but should the supply fail, or portable operation be required, 8 dry cells are automatically switched in.



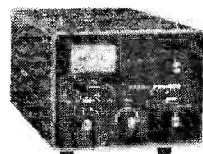
FT101E

### FT101 + FTV250 = 2M Ex Stock

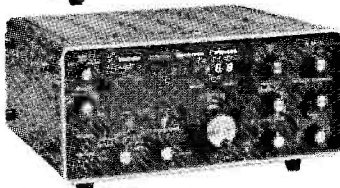
NOT ONLY the complete range of FT101B and E and EE and EX all ex-stock but now from S.M.C. the FTV250. A solid state 2m. transverter (from 10m.) offering a stable 20W P.I.P.

A large rectangular meter indicates drive level and relative power output, whilst 3 LED's show whether HF or 2m. (or 4m.) is in use.

The unit has built-in 12V (2.6A at 10W output) and mains P.S.U. 8 1/2 in. x 6 in. x 1 1/2 in.; 13 lbs: When driven by Yaesu equipment (with heater link) requires no unplugging at all when band changing.



FTV-250



FR101D

### FR101S - FR101D - FR101SD - FR101DD Ex Stock

The FR101D (deluxe) wide coverage (23 (from 1.5MHz) 500 kHz bands + 4 and 2 metres) receiver. Analysis of the signal path shows: 0-20dB switchable attenuator, two section permeability tuned input filter, Mosfet R.F. stage and mixer (crystal controlled), 3 section top coupled bandpass filter, no gain at first I.F., IC balanced mixer, 20 kHz wide crystal filter, shunt diode noise blanker, single FET buffer stage, AM, CW or SSB (RTTY) filter, appropriate detector and audio stage. Add to this, two excellent VHF converters, squelch, FM detector, 1 kHz readout, excellent stability, Tx monitor control, crystal control facility, switchable AGC, transceiver capability (FT or FL, 101) and that digital readout options are available of this (deluxe), or the standard (less the plug-in optionals), converters, broadcast band crystals, filters, etc.) version truly an "apparatus communication sine fills" extraordinary.

### KLM — 144 MHz. LINEAR AMPLIFIERS



Solid State Linears. SSB/CW/FM—12v. DC, 10W drive  
PA10/70/BL 70W + output £105.00 (+ VAT)  
PA10/140/BL 140W + output £155.00 (+ VAT)

INTRODUCTORY PRICE — SAE FOR FURTHER  
DETAILS OF RANGE

### TWS — COAX SLIDE SWITCHES



Up to: — 1kW, 1.5 GHz, 0.3 dB loss, 1:2 : 1 VSWR  
50dB isolation, 50 ohm "N" or "PL" fittings available.  
EX-STOCK P & B 30p, VAT 8%

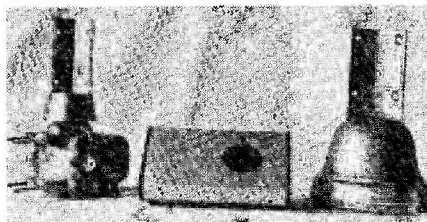
TWS 120G 1 in 2 out Nickel SO239 ... £4.45  
TWS 150G 1 in 5 out Gold SO239 ... £9.50

### CDE Rotators EX STOCK (IN TOTTEN) FOR FAST DELIVERY ROTORS (12 1/2% VAT CABLE AND CAR. 8%)



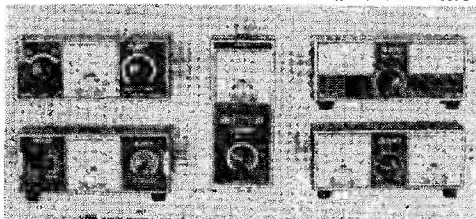
CARRIAGE (B.R.S.) Free. Securicor delivery £1 ex.  
All rotators supplied complete with appropriate  
control box and instructions.

AR30 (illus. centre and immediate right) £26.60  
AR40 (illus. centre and far right) ... £34.60  
AR33 De-Luxe control AR40 ... £41.25  
CD44 (C.B. illus. left) medium duty ... £69.75  
Ham 11 (C.B. illus. left) heavy duty ... £105.50  
2010/220 Stolle ... £37.50  
Control cable 5 core 18p/yard, 8 core 27p/yard



### AEC METERS Power SWR and Field Strength, calibrated to 160 MHz for SWR's of 3 : 1. Post and Packing 40p VAT 8%

SWR10 (T.L.H.), 50/75Ω, SWR (±10%), 1.5 MHz up ... £8.15  
SWR20 (B.L.H.), 50Ω, SWR (±10%), 1.5 MHz up F.S., Power 10 and  
100W FSD (±10%) ... £9.90  
SWR40 (centre) 50/75Ω, SWR (±10%), 1.5 MHz up F.S. ... £7.80  
SWR50A (T.R.H.) 50/75Ω, SWR (±5%), 3.5 MHz up. Power to 1kW  
(±20%) ... £9.60  
SWR50 (B.R.H.) as SWR50A (300μA) but 100μA meters ... £11.20



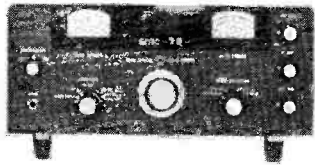
**PLEASE NOTE THESE PRICES DO NOT INCLUDE VAT (12 1/2% or 8%)**  
Terms:—Cash with order or credit card holders just 'phone in for, if possible, same day  
despatch. Immediate H.P. available for card owners for amounts up to £225.00. Holders of  
current U.K. callsigns (where references have been provided) can be speedily cleared or normal  
H.P. at competitive rates is available.



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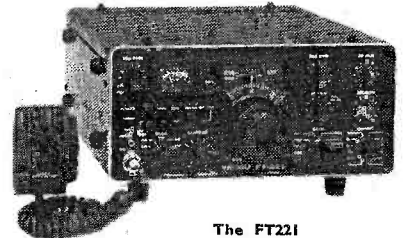


WITH OUR **2 YEAR GUARANTEE + 24** DELIVERY SERVICE



## NEW ★ THE S.M.C. 73 GENERAL COVERAGE RX

The SMC73 is an all Solid State, Mains and 12 volt, communications receiver covering 550 kHz to 30 MHz (without gaps) in four ranges. Frequency readout is by two silk screened illuminated aluminium 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 attenuation), 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 (UHF) 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 our exciting new low price receiver available this month.



The FT221

## EX STOCK IN TOTTON THE FT221

FT221. From the superb all mode (as only Yaesu could produce) FT221 to the 8-channel Auto, the FT224 FM 24-channel set, the Sigmasizer 80R 80 ch., the unequalled experience of S.M.C. and Yaesu in 2m, available to advise you in your choice. Write, 'phone or call for full details.

## TOWERS AND MASTS BUY NOW

British Steel has recently announced yet another price increase of at least 10% (18% on tube). This will reflect in price increases in the near future on all masts. We will try and maintain prices as long as possible. Buy now and save money. Versatowers still only P40 £208.01 P60 £264.84 W40 £162.03 W60 £200.97 + 8% VAT Teletowers, Telomasts, Alimasts etc. Please see previous adverts for details of 'phone/write to S.M.C. over 500 ex-stock.

### CUSHCRAFT HIGH QUALITY EX STOCK

#### 6db GAIN OMNIDIRECTIONAL LOW COST

VHF OMNIDIRECTIONAL (Car. 80p) VAT 12½%  
RINGO RANGER-ARX2 — 6 dB gain over ½ ground plane. Uses 3 x ½ in phase and 1/8 stub, ultra low angle radiation, approx. 9°6' high (illustrated right). 135 — 175MHz.  
ARX2 6dB Ringo Ranger £19.50  
AR2 3dB Ringo Vert. ... £12.00  
AR25 QRO AR2 ... £14.20  
CX1000 29MHz Ringo ... £23.20  
ABW133 2m. Big Wheel £14.50  
ABW125 ABW harness £7.30  
ASQ1 2m. Squalo ... £11.75  
ASQ22 Stacked ASQ1 ... £24.15

#### JAYBEAM 70 (4m) 144 (2m) 432 (70) (Car. about 80p) 12½% VAT

D5/2M 5 over 5 slot ... £9.00  
D8/2M 8 over 8 slot ... £12.00  
5XY/2M 5 ele. cross ... £9.40  
8XY/2M 8 ele. cross ... £11.70  
10XY/2M 10 ele. cross ... £16.15  
5Y/2M 5 ele. yagi ... £4.90  
8Y/2M 8 ele. yagi ... £6.40  
10Y/2M 10 ele. long yagi ... £12.60  
14Y/2M 14 ele. long yagi ... £16.25  
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Q6/2M 6 ele. quad ... £12.80  
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B5 145 MHz ... £6.35  
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BSU 432 MHz ... £5.00  
70½ ½ 70 MHz ... £4.00  
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Magnetic Base Mount ... £8.50  
In lieu of standard base ... 50p



### HY GAIN HF RANGE (Car. £1.00-£2.50) VAT 12½%

18AVT/WB - 10-80m - wide band, 50 ohm, 1 KW. Self supporting, 25' crapped ¼, roof or ground mounted, low radiation angle vertical.  
BN86 1 : 1 Balun ... £11.00  
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153BA 15m. 3 element £49.60  
203BA 20m. 4 element £54.00  
402VA 40m. 2 element £133.00  
18V 10-80 Load Vert. ... £22.00  
12AVQ 10-20m. Trap Vert. £29.60  
14AVQ 10-40m. Trap Vert. £42.00  
18AVT 10-80m. Vert. ... £58.60  
TH2M111 10-20m. 2 ele. £85.60  
TH3JNR 10-20m. 3 ele. £87.60  
TH3MK111 10-20m. 3 ele. £124.60  
TH6QX 10-20m. 6 ele. £149.60  
HY QUAD 10-20 2 ele. £138.00  
DB1015A 10-15m. 3 ele. £90.00  
LA1 Lghtn. Arrs. ... £18.50  
LA2 Lghtn. Arrs. ... £3.00  
Hy Tower 10-80m. Vert. £149.00

### GEM QUAD FIBREGLASS QUAD (Car. £2.00) VAT 12½%

GQ2E 2 element ... £95.00  
GQ3E 3 element ... £147.00  
GQ4E 4 element ... £198.00  
CK1Q 1 ele. Conv. ... £55.00

### G WHIP HF MOBILE (Carriage 75p) VAT 12½%

Tribander 10-20m. (+LF) £13.53  
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Basemount ½" hole mount £2.20  
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### MOSLEY TRI-BAND BEAMS (Carriage £2.50) VAT 12½%

TA33 3 ele. 200W. R.M.S. ... £58.00  
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### CABLES RF FEEDERS (Carriage extra) VAT 8%

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T327 75 ohm Distribu'n yd. 20p  
UR43 50 ohm Solid Cent. yd. 14p  
UR76 50 ohm Strand Ct. yd. 14p

### PLUGS COAX (Car. extra) VAT 8%

PL259 U.H.F. Plug ... 48p  
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N Type plug 50 ohms ... 81p  
SO237 2 hole socket ... 37p  
UHF T adaptor ... £1.20  
N sockets ... 76p

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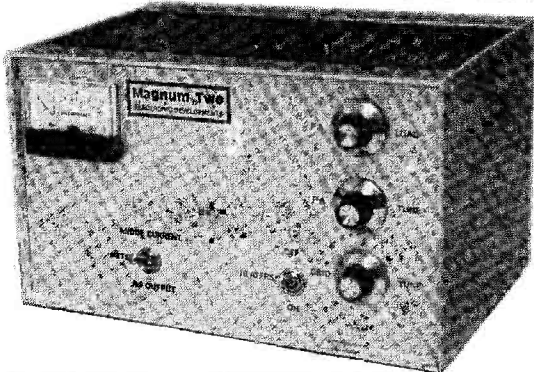
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Yaesu	
FT101E Transceiver ...	£493.00
FT101EE Transceiver ...	£468.75
FT221 VHF Transceiver	£398.12
FT200 Transceiver ...	£326.00
FT401B Transceiver ...	£412.50
FR101S Receiver ...	£337.50
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FR101D Receiver ...	£437.00
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SPI01 Speaker ...	£18.75
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Decca Communications	
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2020 Transceiver ...	£475.00
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Bauer Keying unit lever	£6.97
Planet Speech Compres'r	£35.00
Technical Associates	
Audio Filter ...	£32.50

Audio Compressor ...	£28.12
G-Whips mobile antenna range.	
Full range in stock, send for	
leaflets. SAE please.	
Microwave Modules. SAE for	
information.	
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quads, masts, clamps, couplers,	
etc. Send SAE for catalogue.	
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Heathkit HW 100	
Transceiver ...	£185.00
Accessories	
PL259 Plugs 46p, SO259 Sockets	
40p, Cable reducers 15p, In Line	
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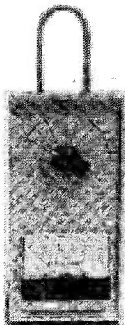


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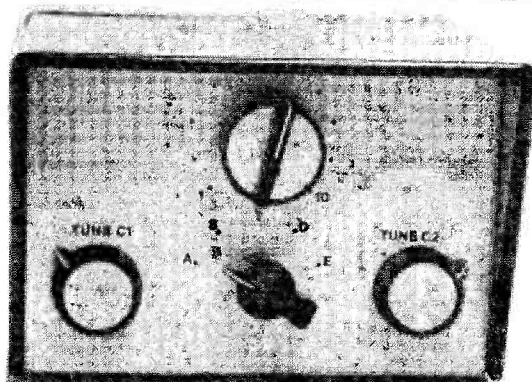


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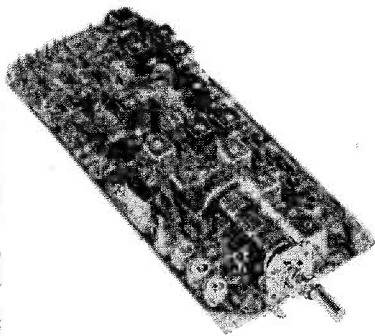
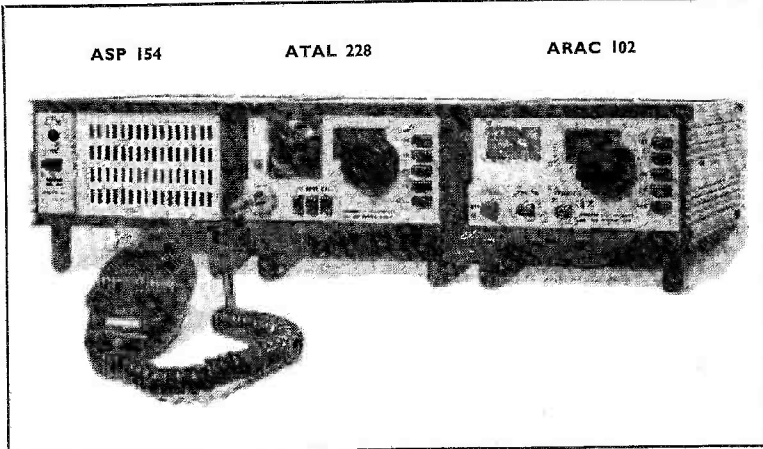
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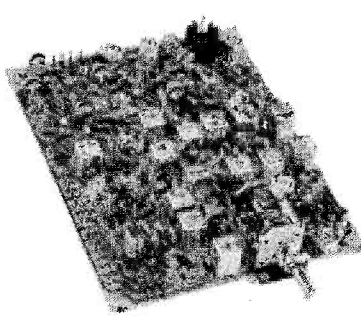
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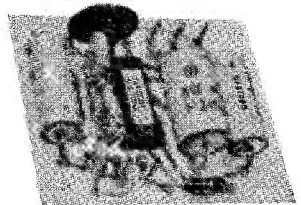
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- AG 10 Tone Generator ... £4.75
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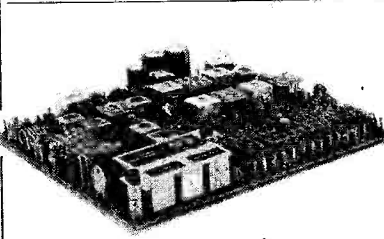
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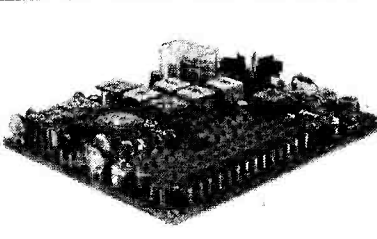
**AT222.** A complete transmitter exciter unit for 144-146 MHz on AM or FM. VFO controlled or fixed channel operation. Complete with microphone pre-amp., speech processor including active audio filter. 1 watt output. FM. .25 watt AM. Output impedance 50-75 ohm adjustable. Frequency deviation 3-10 kHz adjustable.



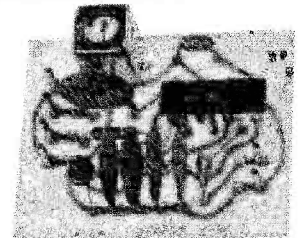
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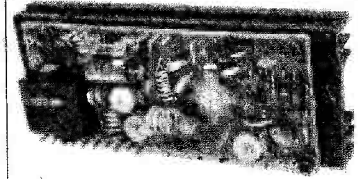
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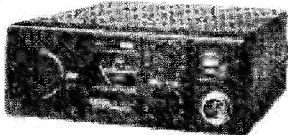
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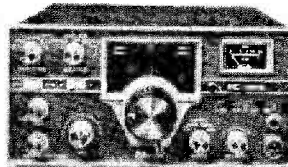
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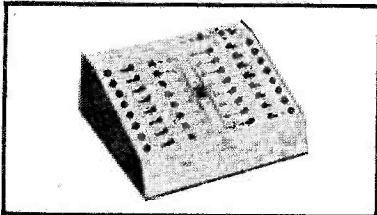
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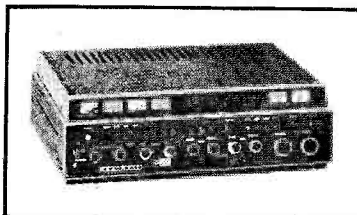
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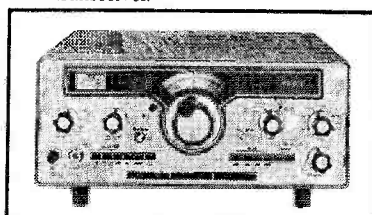
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# SHORT WAVE MAGAZINE

(GB3SWM)

Vol. XXXIV

MAY, 1976

No. 391

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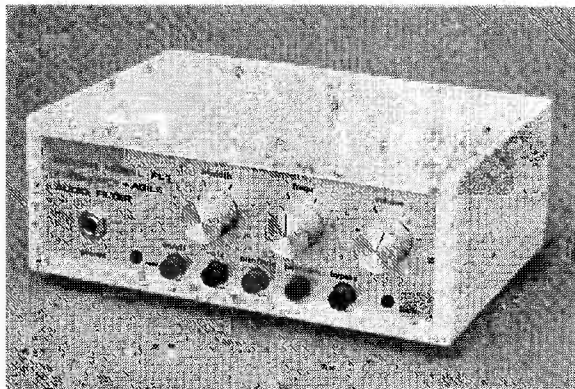
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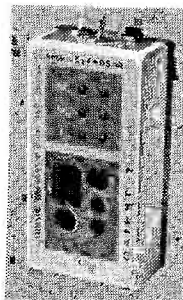
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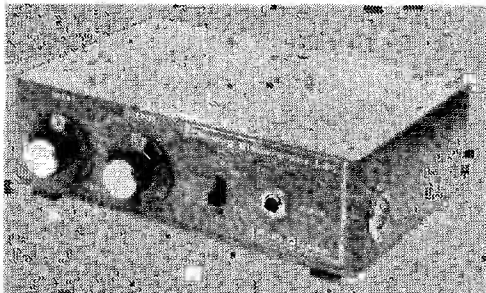


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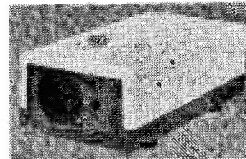


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E D I T O R I A L

## **Reversion**

We hope readers will notice, and be pleased with, a change in the appearance of this issue. We are able to drop the small print (6pt setting) used for the last two years or so for the news-feature articles and go back to the larger, 8pt, type face.

This is because the number of pages is now stabilised at 64 plus cover, whereas when the 6pt setting was instituted, the make-up was 56 pages. The extra eight pages worked into issues since then has enabled us to get back to the easier-to-read 8pt setting.

As we well know, the small print was never popular with readers—we didn't like it much ourselves, either!—but it served its purpose while we had to keep the total paging down.

However, there are disadvantages in going back to the larger print. We cannot get in quite so many pictures as recently and we are going to be hard hit by the next increase in postal charges—which affect every copy sent out, whether to direct subscribers individually or in bulk to our retail distributors, who handle about 70% of the total circulation. And, of course, we shall also be using more paper which, these days, is very expensive and an important factor in costing. It seems extraordinary now that when "Short Wave Magazine" was launched, way back in 1937, the cost of paper and postage hardly entered into the calculations. Paper was cheap and plentiful in all grades and postage rates reasonable and stable.

What it all comes to is that we still, after all these years, aim to maintain our status as one of the world's leading Amateur Radio periodicals—still entirely independent and unsubsidised, relying solely on reader-choice in a free market and a highly competitive field.

*Austin Forsyth  
96 Fo*



# COMMUNICATION and DX NEWS

*E. P. Essery, G3KFE*

## Twenty

So they tell us, this is where it all happens. As far as the writer goes, he will coyly admit to having hooked a couple of new ones in the last month after a distressingly long interval of non-scoring. Oddly enough, this has occurred at a time when the main aerial, as already noted, is down, and at the same time the Big Boots have been disposed of (all in the cause of DX—the linear is by now en route to A4-land!) leaving us with only exciter power.

Things have been quite hectic for G3DNF (Leeds) of late, but Gordon still manages to get in the odd session on the band, using his QRP and Best Bent Wire. Being, as he put it, a bit cheeky, he put in an entry for the *ARRL CW Contest* Section—almost invariably when he sent his RST plus 002, the other chap would come back and ask for his power under the impression that Gordon was dishing out a serial number! On March 21, the band was well open, because nearly all the reports from the W's were 599—and overall, a QSO every five minutes with a W, using just two watts of CW, would be fair going with 100 watts for most of us!

Another to have savoured the real thrill of QRP, even for an old-timer, was G6ZG (Caister) who, having raised on 80m. DL6ZG (Essen), running two watts, G6ZG tried his 9002-6AQ5 800 milliwatt Tx and had a full normal QSO, since confirmed by card. The point is that the G6ZG transmitter was built for probably less than a pound, the Rx being an old HRO-5T and the aerial a trap dipole—all of which proves that if you have the know-how there is just no need to spend £100's on expensive equipment.

We have already mentioned GW4BLE in Newport, Gwent. Steve has himself a spot of competition on Twenty now—G4CXM has become GW4CXM and settled up the road, with a dipole which is eight feet high at one end, and sixteen feet at the other, even though the top is level, compared against the

'BLE beam at 70 feet. This wonder-working dipole yielded CW contacts with AA0NVZ, AJ3AA, EP2EA, FG7AT, FL8AL, HH9DL, K0FLY (Iowa), K7NHV (Idaho), KL7PI, PYICND, VE5NN, VE5RA, W8BT/KP4, various W5's, WA0ONL (S. Dakota), some Minnesota W0's, W7RM, ZS1NX, ZS1ZF, ZS2CV, ZS4AG, ZS5JF, ZS5DZ, ZS6CR, ZE3JO, 3D6AF, 5Z4LW, 6W8FM, 9G1GE, 9G1LZ, 9J2CL, 9J2BO, 9V1SH and 9Y4AC; but SSB was not neglected, and came up with A4XGC, A4XGF, A6XP, CT2AK, CT3BK, EA8LD, EA9FJE, EL1K, EL9RL, FR7AE, G3RSP/MM (when Alan was near FM8) JY9CS, OJ0MA, PY, PZ5AA, SU1MA, T12CAP, TR8LE, TR8JCV, TU2GA, TU2GM, UH8BZ, VE1XU/SU, VE6AVX, VP2G, VP8NV, VP9HE, VK9XX, YB0CR, YB0IN, ZD7's, ZE's, ZS's, ZW6AHU (a PY6!) 4M5EUX, 4S7DA, 5N2AAJ, 5N2ESH, 5N2NAS, 5T5AT, 5T5CJ, 5R8AL, 5Z4QQ, 6W8HO, 7P8AC, 9G1LZ, 9G1JX, 9G1GJ, 9J2WR, 9L1BH, 9L3SL (Banana Is.), and 9X5JB.

Hearing all this, and reading through the GW4CXM log for good proof, caused GW4BLE, we are reliably informed, to foam at the mouth, particularly as he can only beam in certain directions if TVI is to be avoided. However, his *riposte* was along the lines of SSB QSO's with AJ3AA, AL4AAC, 6CABC, K6OJ/C6A, CP1HW, CP8BS, CX8DF, EI1AA, FM0BKZ, FY7AN, FY7AW, FY0BHI, HC2AF, HD5EE, HK5ACV, HI8MOG, LU's, OA4AHA, PJ3DO, PZ1BF, PZ5AA, VP2G, VP2KF, VP2KJ, VP5TI, YN1MAB/VP9, VP9IG, XE1UF, YS1MAE, 4Z4RM, 6Y5HJ, WB9AJF/6Y5, 8P6BN, 8RIJ, 8R1X and 9Y4AC.

In a letter which just missed the bus last time, we hear from G4EPW. Les passed the RAE back in 1950, but doesn't believe in rushing things until he sees whether the interest is more than just a fad; so, in September 1975 the mind was made up and the licence obtained,

the shack equipped with a Heath HW-7 into an inverted-Vee. So far it has been all Europeans—but no difficulty in raising them, which augurs well for the future decision to have a go at something a little more distant.

It was largely a Twenty-CW sort of month for G2BJY, who offers UA9NW, UK0AAC, CT4CP, LX1MK, UA9FDW, UD6DHW, UF6DZ, UH8HAI, UI8LC, UJ8AQ and 4Z4; but only weak W's, and no South Americans. Which, logically enough, leads Geoff to wonder just *what* is up, and what is needed to lift these W's into the workable-strength category. As he says, he has three ATU's, and plenty of RF current up the spout; indeed the aerial is one of the shortest flat-tops known to have raised W on Top Band, which says much for the quality of the earth arrangements. Interesting problem, as one cannot imagine a pattern *null* wide enough to exclude all of North and South America. What about a loft-mounted dipole for Twenty, bent into the space, just as a cross-check—if that shows the same effect there is something absorbing the RF sent in that direction (what about a 33-foot earthed metal mast, or a similar length copper water-pipe?)

With G4DJY it was rather interesting to notice how things "began to hum" on Twenty when the *ARRL CW Test* weekend came round—from a pretty normal sort of collection of stuff, mainly EU's with the odd good 'un, such as appears, say, in the G3KFE log, suddenly the scene changes to a long string of W's, knocked off at about one every two minutes for two pages, with the interesting feature that each time he started by knocking off just one station on Fifteen as a starter before steaming down to Twenty and piling on the revs. Over the whole log, only Africa among the continents is unrepresented.

G2HKU seems to have had a little try this time, and he picked out EP2DB, VP2KJ (St. Nevis), W7WST/MM/R1, and 9H1CH on Phone,

plus UJ8JCE on the key—the regular ZL skeds seem to have fallen on stony ground for the moment and are probably gone until autumn.

This opinion seems to tally with that of G3NOF, who found the early morning pretty poor on Twenty, albeit the VK's had re-surfaced around 0800 on the last few days prior to this letter; Africans have been noted between 1600 and as late as 2100 on some days, 1600 being also the bogey time for the appearance of W6, W7 and VE7 if the band was going to produce them at all. The other W's have been noted from noon to as late as midnight, though the summary is one of rough and unstable conditions. SSB QSO's were booked in with AA6BMG, AC7KEO, C5AL, CP1HW, EL80, FY0BHI, K5QHS, OA4RB/W7, OE6DK/YK, VE7HN, VP2G, VP9GE, VQ9R, W7MG, WA7PMT, WB9AJF/6Y5, XJ7WJ, ZD7FT, ZD7SD, ZD8ACG, ZE1DP, 4I3A, 4U1ITU, 5T5DY, 7P8AC, 7Q7BC, 9G1GE, 9J2GJ and 9L1NP.

Another of these long-list merchants—and what a pleasure it is to seem 'em, despite the poor conditions—is from G4DMN, who has, after pruning, come up with: AA5DVH, AD0IET, AH3FF, TI2PTS/AJ4, C21NI, CE3FH, CE5BF, CE7BDW, DU6EG, EP2SN, HB0AWQ, HD5EE, HK3BLA, HK4DF, HI8LAR, JE1OMD/HP7, JA1NVE, JA8ISU, JA8LRG, KA6JH, KC4AAC, KG4CB, KL7I0C, KL7IEH, AB9REK/AL7, KP4EDP, KP4KE, PW4AKL, PT2JB, PY's, PZ1AP, PZ1PF, PZ5AA, TI2RO, YN5JAR/TI2, UK9's, UK0AAB, UK0SAJ, UL7LA UV0EX (Sakhalin Is.), UX3R, VE6UK, VE7AV, VK6CB, VK9XI, VK9XX (both the latter on Christmas Is.), VP2DQ, VP2KF, VP2KJ, VP2AYL, VP2LCG, VP8LP, VP9GE, YN1MAB/VP9, all W call areas, OE6DK/YK, YS1GMV, YS1SC, YV's, ZD7FT, ZD7SD, ZL1BD, ZP5CF, K2IZN/4X, 4J6A, 4M5EUX, 4S7PB, 5N2NAS, WB9AJF/6Y5, 8P6AH, 8P6GN, 9J2GJ, and 9L3SL.

The return to shift working for GM3YOR has resulted in him spreading his attention more around the other bands; on Twenty, he filled in with CW to several W's, HC2IK, JA8AT, JA8SW, JH1CJQ,

JW2CF, UK9WBD, UW9EY, UA0BBR, UW0FM, UL7GBM and VO1LP.

The QRP activities of GM3RFR, up in Baltasound took in Twenty CW working TF3KX, and UV3GE, while SSB managed EA6DP, F6DYH, EA8EB, JW5NM, 6W8DY, SM4CGM, 5T5CJ, TF3BB, UB5PS, I0MC, W3WJD, W3GRF and K2BMI, all with a maximum input of five watts. So far the QRP total of countries is up to 38 total, 27 CW and 28 SSB; 19 QSL's so far towards the requirement for the G-QRP Club certificate.

Another twenty-metre QRP merchant is G8PG, who was knocking off W's every five minutes during part of the *ARRL CW Contest*, and in not one case did he have to repeat his number. As Gus says, it is a shame so many of us use QRO quite unnecessarily for local QSO's, and in the process of being "fashionable" everyone causes far more QRM than he needs to. If only we all could use our power *wisely* what an improvement there would be on the bands. True enough, and it is also true that much of what is stigmatised as liddery and sloppy operating, cloth ears and the rest of it, is no more than the result of a *tolerable* operator trying to cope with QRO station QRM. And, let it be stressed, receivers that can't cope with the modern power levels coming in.

G2HLU seems to have stuck to CW on this band, and found it "giving" more than most others. The "Commonwealth Contest," yielded some VK's, and 9G1GE for a new one, as also was HP1AC, although FM7WH was lost under the European QRM.

### Pressing On

Already space begins to press upon us, and we haven't discussed the LF Bands yet, nor the activity news; let us look at this first, and then what is left over can be spread amongst the other contenders for attention.

The ARRL decision to grant country status to Oki-No-Torishima as part of the JARL 50th anniversary celebrations seems to have caused some heart-burning among, oddly enough, the JA's themselves, the place being about 45 miles short of the 225 miles normally required for "country status." There will be

some activity by a JA on an Oceanographic expedition, probably signing JD1YAH and using a 14AVQ, but the big JA effort is set for the June-July period.

The 9L3SL foray was all booked to be from Turtle Island, or second choice Banana Island—in the event the latter, albeit neither place qualifies as a new country for DXCC purposes. There was talk also of an expedition to Sombrero Is., when someone realised this one also didn't rate DXCC status, it being considered to be administered with Anguilla.

The Bill Rindone DX-pedition started on schedule from A35NN, then he was on his way to Niue as ZK2AQ; after that there was a planned stop in Western Samoa to try and sort out some minor performance shortfall in the gear. Since then, Bill has opened up from Christmas Island, signing VK9XX, and the next stop is planned to be Cocos-Keeling, from whence there will be a doubling back to Singapore, and on into the S.E. Asia area, where it is now believed Bhutan is where WB7ABK and Gus Browning, W4BPD, should be joining forces. QSL's for the WB7ABK stops should all be sent to Bill's home QTH, at 3049 Doris Court, Lake Oswego, Oregon 97034, although it is understood the printing of cards is being handled by NCDXF.

Having dealt with the WB7ABK expedition (and it pays to keep an eager ear on his favoured frequencies—Bill moves *fast* and is understood to have one hot-shot warranted gold-plated new country in his itinerary) we now have to turn to the other stirrers-up of the bands, namely Lloyd and Iris Colvin and the *Yasme Foundation*. From Nauru they went on the New Hebrides, but there was a documentation problem which resulted in no operation and a smart QSY to the next stop in New Caledonia, FK0KG, from whence they were on at the time of writing.

If you hear SV0WZ signing "stroke portable" at any time in the near future, snap him up—he is aiming for a trip to Thera in the Cyclades group north of the Dodecanese, and there is a move afoot to run this one past the DXCC microphone as a new country.

VQ9HS is at St. Brandon,

operated by WN3SHX and providing the Smithsonian Institute with its feedback on the progress of the expedition research into sea life; they have a trapped vertical and an Atlas rig. Incidentally, W4UMF has a personal interest in this one, so any word passed on to Ted as to how they are going on will be appreciated.

Anyone wanting a QSO with Europa? Word has it that FR7ZL is going to activate from here, possibly for a two-month stint, some time in May.

Later information on the movements of Gus Browning seem to indicate his route will be by way of KH6, JA, VS6, CR9, HS, XZ, AP, S2 and VU, to arrive in Bhutan about May 1. For CW, he will be just inside the the lower band-edges, on SSB at 3773, 7100, 14100-110, 21090 and 28490 kHz; no transceive operation, his listening spots being as follows: 3525, 3890, 7025, 7225, 14025, 14275, 21025, 21270, 28005 and 28500 kHz.

### 80 and 40

Despite all the agitation and activity on Twenty, these two have been going their serene old way and giving their devotees their fair share of DX, some of which has been reported in letters. However, we beg their tolerance for a moment while we mention a letter from G3ANQ. He recalls how, twenty-five years ago, he and G3EJN ran a sked, completely unbroken, for some months for an hour or two each night three or four times weekly—G3EJN had a couple of watts VFO/PA, and a BC-348, in Bristol, while G3ANQ on top of Magnet House had 2½ watts, also VFO/PA, and a BRT-400 receiver, which last had a 500 Hz bandpass filter which could be sharpened-up symmetrically and a 1000-cycle audio filter. Now, they found by chance that they could survive by working through the QRM rather than trying to dodge it, although at that time not many of readers believed what that article said, saving only those few, who, like the writer, saw the point of what they were trying to say.

O.K., you say, so what? So this: The G-QRP Club has, as members will know, suffered its first Silent Key, and the result is a QRP "Whyndham Project," in his memory.

Basically the idea is to have a research and operating programme, aimed at, instead of retiring from the QRM, working through it, so that the QRM retires instead. This seems to divide into several sections, each of which is an interest in itself, for example (1) Operating techniques—the receiving station always to be in charge of the QSO, which implies break-in transmitters at both ends, ready for an *instant* dodge the moment QRM upsets the appletart, by a specified amount just enough to see the signal through and no more. (2) Equipment—easily-controlled transmitters, break-in systems (true BK that is, not key-trolled changeover as in the modern SSB transceiver used on CW), receivers that have infinitely better characteristics than those we can buy today in the line of rejection of spurious responses of all kinds and instant recovery for good break-in between dots and dashes. (3) DX-chasing using techniques of this sort. (4) Contests, QRP or otherwise, using the technique of working through any QRM. (5) The normal CW QSO using these techniques when the AM chaps sit in their usual way in the wrong area of the band. (6) Adaptation of the technique to deal with Fax, SSB, RTTY at 180 Hz shift (this might be a tough one to crack, but on the other hand cracking it will be in the end very beneficial to RTTY ops. themselves). FSK is another tricky one, though most Nav-Aids are not too hard to cope with. All this, within the orbit largely of the QRP Club, but having the results passed on to a wider audience if and when there is felt to be a major break-through. And, even if there is no break-through, the Project will sharpen up wits and make people think (and operate)

more "smartly" which must in itself by a good thing. G3RJV is the QRP Club Man—get in there and join, and write a note to G3RJV with any results—don't worry if you can't spell or your grammar is punk—so's G3KFE's, and he relies on The Boss to cover up his failings! (Who *does* he mean! *Editor*). Just get something going and report it. As for the QRO lads, join in too, but tackle the bigger targets, like Radio Moscow and Radio Peking, and report either to G3RJV or this piece. Even if you are a never-operate always at the bench constructor, have a listen, see what they are up against, and try to brew up some gear to cope with it, either complete rig or a "bolt-on goodie"; and, again, write it up, either for G3RJV or this piece, so the world can benefit. Just recall—you passed the RAE without being a literary lion, you can write to us without being one too! And, to start this project to be a worthy memorial to a QRP club member, G3KFE will mention the use of the new Datong Frequency-agile Filter; from the reports coming in from the first users, this is possibly the greatest step forward in QRM-attacking for twenty years. Mind, as GW4BLE says of this box-of-tricks "Had it for six weeks now, and still not fully explored its potential worth in QRM-reduction!"

### In Conclusion

For next time, the deadline is, as ever, seventeen days before publication day which is always the last Friday in the month. This gives you **May 11**, at the latest to arrive, addressed: CDXN, SHORT WAVE MAGAZINE, BUCKINGHAM, MK18 1RQ. Meantime, watch out for the Colvins and the Bill-and-Gus expeditions—they could have some surprises up their sleeves!

### TOP BAND COUNTIES/COUNTRIES

Starting date, November 1, 1975

Call	AM	CW	SSB	Countries	Total
G4CBQ	23	86	71	13	193
G4EAX	50	25	80	10	165
GW3WMY	71	80	0	10	161
G4AYS	18	58	—	6	82
G4EPL	15	2	57	7	81
GM3YOR	—	—	—	27	27

Scoring is on the following basis: one point for a county on SSB, two per county on CW and three per county on AM. In the case of an AM/SSB contact, claim two points, scored in the AM column by the AM station and the SSB column by the SSB end. No other cross-mode contacts permissible.

# OPERATIONAL AMPLIFIERS

## SOME NOTES ON APPLICATION

I. D. POOLE, B.Sc. (G3YWX)

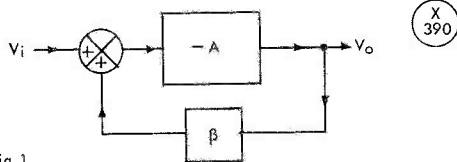


Fig. 1

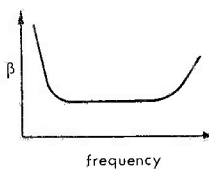


Fig. 2a

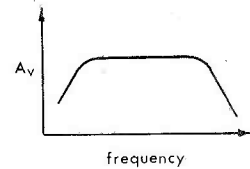


Fig. 2b

MANY projects in the shack will involve the construction of an audio amplifier, and very often one will refer to a design used for a slightly different purpose. With the coming of integrated circuits it is possible to design and construct high-performance amplifiers using a minimum of components and basic mathematics. By controlling the amount of feedback in the system it becomes a simple matter to alter the gain and tailor the frequency response to suit the requirements for each system.

To understand the design a minimal amount of feedback theory is required. Consider the diagram Fig. 1. Here there is an amplifier with voltage gain A and the proportion  $\beta$  is fed back to the input; this may be either positive or negative. It can easily be shown that:

$$A_v = \frac{A}{1 - A\beta} = \text{Overall Gain}$$

If the feedback is positive, *i.e.* A  $\beta$  is positive, the overall gain can be seen to increase until it reaches a point when A  $\beta$  is one, when all the output is fed back to the input, and the gain becomes infinite. This, of course, means that the circuit becomes well and truly unstable. If, on the other hand, the feedback is made negative, then the gain will be seen to fall, which may at first sight seem to be of no use at all! Fortunately, there are many advantages of using negative feedback. First, the proportion of distortion is reduced by the same amount as the amount of feedback applied. Secondly, the frequency response is made much flatter. Thirdly, the input and output impedances are altered. Usually, the feedback is applied so that the input impedance rises and the output falls, but the reverse can be done. There are many other advantages of using negative feedback, but they are not as important.

Consider an amplifier with infinite gain. It does not take much imagination to see that the expression for the overall voltage gain of the amplifier with feedback now becomes:

$$A_v = -\frac{1}{\beta}$$

Therefore, it is possible to see that the overall gain is now only dependent upon the feedback. For all practical purposes it is only necessary that the gain be large for this to become an exceedingly good approximation. With an amplifier whose gain is only dependent on the feedback, it now becomes easy to design an amplifier with a tailored frequency response. If, for example, the feedback is increased at the low frequencies then the gain will be correspondingly reduced at LF or if one decreases the feedback at high frequencies then the gain will be increased at HF.

Looking into this method of controlling frequency response more closely one must consider a simple RC network (Fig. 3). At low frequencies the capacitor will

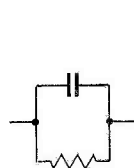


Fig. 3a

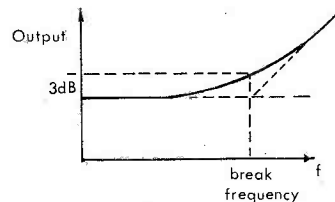


Fig. 3b

have a very high impedance and its effect in parallel with the resistor will be negligible. Thus, the overall impedance will be that of the resistor. As the frequency increases so the impedance of the capacitor falls and eventually its impedance will be the same as that of the resistor. At this frequency the total impedance will be  $1/\sqrt{2}$  that of the resistor. This is known as the break point, and the output is 3 dB up on that of the resistor alone. Then, as the frequency increases still further, the action of the capacitor predominates as its impedance falls below that of the resistor, giving a response curve as shown in Fig. 3(b). Eventually, the response will rise at 6 dB per octave. This is, of course, a high-pass filter. The converse of all this occurs in the arrangement in Fig. 4 which shows a low-pass filter.

### Practical Circuitry

Having considered the theory, the next problem is to realise the circuitry in a usable form. Probably the easiest way to do this is by using an Operational Amplifier (Op. Amp.). This form of amplifier has two inputs, an inverting and a non-inverting one. These are so called because the output is an amplified and inverted form of the first and an amplified but not inverted form of the second. They also run from twin supplies, *i.e.* positive and negative rails with the signal referenced to zero. Another advantage is that they have a high immunity to supply noise and ripple.

Operational amplifiers are readily available and are very easy to use. Such IC's as the 741, 709 and 748 are examples of these amplifiers. The 741 is probably the simplest, requiring only connections to the two inputs,

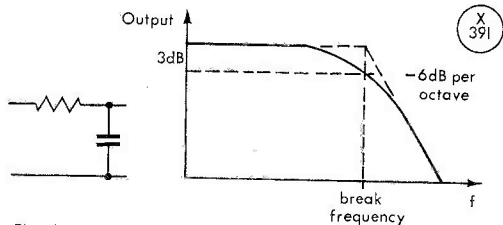


Fig. 4

the output, and the supply rails. Therefore, let us consider an example using a 741.

The design shown is for an amplifier to drive low-impedance headphones, and running from +12 and 0 volts. The final circuit is shown in Fig. 5. Owing to the fact that the circuit is not run from dual supplies the correct conditions have to be simulated and therefore the non-inverting input is set at half the supply voltage. The current required by the transistors within the IC is only very small and fairly high value resistors are chosen to give a suitably high input impedance. This is effectively R1 in parallel with R2.

Tr1 is an emitter follower, and is included because the current handling capacity of the 741 is only small. Owing to the fact that there is 100% DC negative feedback around the whole amplifier the emitter of Tr1 will be at the same voltage as the non-inverting input of IC1, *i.e.*, half the supply voltage. In order to drive the headphones sufficiently for most people's hearing, take the collector current to be 100 mA. Then:

$$R5 = \frac{V}{I} = \frac{6}{0.1} = 60 \Omega \text{ ohms}$$

The nearest value to this is 56  $\Omega$  ohms. Therefore, the transistor used here should be able to dissipate 0.6 watts, and any NPN transistor capable of this should work. If higher impedance headphones are to be used then the value of R5 can be increased somewhat to cut down on the current consumption.

C1 is the input coupling capacitor. To give the amplifier a response down to 30 Hz at -3 dB its impedance should be the same as the input resistance at that frequency:

$$X_c = \frac{1}{2 \pi f C}$$

$$30000 = \frac{1}{2 \pi 30 C}$$

$$C = \frac{1}{2 \pi 30 \cdot 50 \cdot 10^3}$$

$$= .106 \mu F$$

Likewise the output capacitor should have the same impedance as that of the headphones at 30 Hz:

$$C = \frac{1}{2 \pi 30 \cdot 8}$$

$$= 663 \mu F$$

Take 500  $\mu F$  as the nearest convenient value.

The resistors R3, R4 and the capacitor C2 form the feedback network. The feedback is applied to the invert-

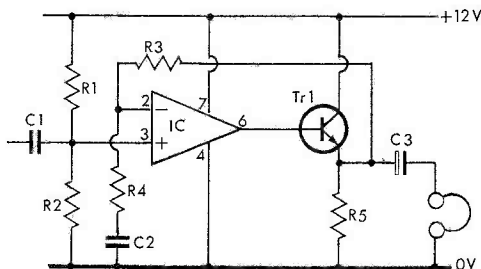


Fig. 5

Fig. 5. Circuit of the amplifier. Values are: C1, 0.1  $\mu F$ ; C2, 1  $\mu F$ ; C3, 500  $\mu F$ ; R1, R2, 100K; R3, 180K; R4, 6.8K; R5, 56 ohms; Tr1, see text; IC1,  $\mu A741$ , SN72741, et. .

ing input of the 741 to make the feedback negative.

C is included in the circuit to give 100% negative feedback for DC and hold the emitter of Tr1 at exactly the same voltage as the non-inverting input. At high frequencies when the impedance of C2 is negligible the feedback becomes:

$$A_v = \frac{R4}{R3 + R4}$$

Hence:

$$A_v = \frac{1}{\beta} = \frac{R3 + R4}{R4}$$

If the gain is 30 choose R4 to be 6.8K as a compromise so that neither C2 nor R3 becomes too large. Then:

$$30 = \frac{R3 + 6800}{6800}$$

$$R3 = 197.2K.$$

The nearest value to this is 180K.

If the feedback is to fall off at the same frequency as the rest of the circuit then C2 should have an impedance of 6800 ohms at 30 Hz.

$$X_c = \frac{1}{2 \pi f C}$$

$$\therefore C = \frac{1}{6800 \cdot 2 \pi \cdot 30}$$

$$= .780 \mu F.$$

The nearest preferred value to this is 1  $\mu F$ . Also this capacitor should *not* be electrolytic.

With the frequency response being limited mainly by the internal frequency compensation the bandwidth of this amplifier will be quite wide. In fact, when it was built it was found that the output began to fall at around 20 kHz, although the -3 dB point was not measured.

Whilst this amplifier does have its limitations, it can be seen that using operational amplifiers relatively sophisticated circuits can be constructed with the minimum of effort. Apart from amplifiers, these integrated circuits can be made to perform a wide variety of functions. For example, they are commonly used as comparators, integrators, monostables, etc., and being easily available off the shelf, are the ideal choice.



## SOME RECEIVER IMPROVEMENTS

### CALIBRATORS AND PRODUCT DETECTORS

MANY a faithful old war-horse in the shape of an AR88, HRO, BC-348 or R.107, is now causing its owner a certain amount of heartache. Likewise several home-built receivers which were considered very good a few years ago are now regarded with a jaundiced eye.

The reason? Overwhelmingly, it is because SSB has become the modern method of Amateur Radio communication on the HF bands. The veterans still perform just as well as ever on AM phone, but if you are a keen DX man that is not enough—you must be equipped to regard SSB as the obvious and natural means of receiving phone DX.

Quite apart from this many of the older receivers are lacking in any means of calibration; and if you are looking forward to the day when your receiver will be helping you to *work* DX, then it is highly desirable that it should have an accurately calibrated scale. You ought to be able to switch on and tune your receiver, immediately, to 14115 kc, or 3796 kc, or whatever the frequency may be . . .

A directly calibrated dial is a great help. Once you have used a receiver fitted with one, you will feel as if you have lost one arm when you go back to one of these plain dials calibrated only in degrees (or divisions). And, admittedly, there isn't much you can do about this in most cases, except to draw up an accurate calibration chart showing frequency against dial reading, thus making the best of a bad job.

#### Frequency Curves

This is not such a tedious business as one might imagine. Certainly it doesn't involve the plotting of scores of known points within one of the amateur bands, because the scales of most of the popular receivers are reasonably linear within the very small sector represented by one of the amateur bands.

Take the AR88 as an example. On the direct-reading scale one can infer that a station is roughly on 7050 kc—merely because he appears to be half-way between the 7000 and 7100 kHz marks. But between these two marks the "degree" scale, you will find, has moved from a reading of 41 to one of 61 (to take an actual figure from an individual receiver). Twenty divisions of the scale to a bandwidth of 100 kHz gives the simple answer of "5 kHz per division"—and you can draw a straight-line "curve" on a piece of squared paper to correspond with this. *But*—you must know accurately where the 7000 and 7100 kHz points fall, and for this you will need a calibrator of some sort.

The most modern receivers have not only a directly-calibrated scale but a built-in crystal calibrator giving 100 kHz marks; and some simple means of setting the dial readings to correspond. (The Drake 2B, for instance, has a glass scale which is movable, and if the 7000 kHz "cali-pip" does not correspond exactly with the hairline on the scale for 7000 kHz, you simply slide the scale along very slightly until it does.)

Fig. 1 shows a simple crystal oscillator which is

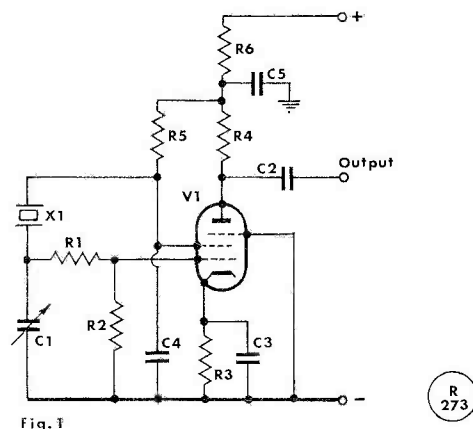


Fig. 1

Fig. 1. Typical 100 kHz crystal oscillator which, when very loosely coupled to the receiver aerial terminal through C2, should produce audible "pips" every 100 kHz through the spectrum. C1 is a trimmer used to shift the crystal frequency very slightly in final checks against WWV.

### Table of Values

Fig. 1. Circuit of 100 kHz Crystal Calibrator

C1 = 3-30 $\mu\mu\text{F}$ air-dielectric trimmer	R3 = 1,000 ohms
C2 = 5 $\mu\mu\text{F}$ ceramic	R4 = 250,000 ohms
C3, C4 = -001 $\mu\text{F}$	R5 = 100,000 ohms
C5 = 5 $\mu\mu\text{F}$ ceramic	R6 = 10,000 ohms
R1 = 100 ohms	V1 = 6AM6, 6F91, 6BA6, 6BZ6
R2 = 1 megohm	X1 = 100 kHz crystal

suitable for a 100 kHz calibrator for a valve receiver. The crystal is in a Pierce circuit between the grid and screen of a pentode, and output is taken from the anode circuit, the anode being coupled through a very small condenser (C2, 5  $\mu\mu\text{F}$ ) direct to the aerial terminal of the receiver. With the constants shown in the Table of Values, this circuit will produce 100 kHz "pips" up to 30 MHz or even further. Naturally you will insert a switch in the HT line of the calibrator, so that your certain identification of the "pips" is achieved by merely switching them on and off. (Incidentally, this calibrator should be operated at the very lowest value of HT at which the pips are clearly audible. . . . and that may be as low as 50 volts.)

However, even without such a device you can still arrive at some useful curves for your receiver, if you have recently confirmed that the direct-scale readings are not too far out. If you can borrow a frequency meter such as a BC-221, or, better still, build your own calibrator, then you can produce really *accurate* curves. Going back to the AR88 already referred to, spot checks reveal that the "divisions" scale gives roughly 1 kHz per division on *Top Band*; 5 kHz per division on *Forty*; 3 kHz per division on *Twenty*; and that the curves come out as virtually straight lines, at least over each 100 kHz of the bands. The non-linearity is only such that the LF end of *Twenty*

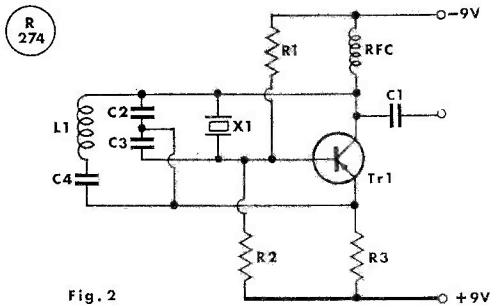


Fig. 2. Transistorised marker oscillator using a 1 MHz crystal, although this same circuit can be adapted also for 100 kHz crystals. A 1 MHz oscillator has its uses, since the harmonics will extend further through the spectrum and should be audible up to the VHF bands.

### Table of Values

Fig. 2. Circuit of Transistorised 1 MHz Crystal Calibrator

C1, C2,	R1 = 33,000 ohms
C3 = 22 $\mu$ F ceramic	R2 = 68,000 ohms
C4 = 250 $\mu$ F	R3 = 10,000 ohms
L1 = 80 turns 32g. on 1/4-in. former	TR1 = OC45 or similar
	X = 1 MHz crystal

may give, say, 3.1 kHz per division whereas the top 100 kHz gives 3.2 or 3.3.

If you don't want to have to refer to curves (which does take time) you can draw up a table relating dial reading to frequency. You may be tempted to write down the dial readings on the one hand, and the exact frequencies against them; but it is surely a little more useful to tackle it the other way. Write down frequencies—at 5 kHz intervals—and in the adjacent column show the exact dial reading for each one. (You will have to draw a curve in the first place to arrive at these figures, but your table will be more useful than the actual curve for giving a quick frequency-check.) Remember that it is more likely that you will want to look for a station on, say, 14272 kHz than that you will hear a station and then want to know what his exact frequency is. Thus to have frequencies in the left-hand column, plotted against dial readings on the right, is more useful than the other way round.

Fig. 2 shows a simple transistorised calibrator, in which the values given are those for a 1 MHz crystal; this, of course, will give you at least one edge of each band and is a useful device to have in conjunction with a calibrated frequency-meter. But the 100 kHz calibrator is naturally a far more desirable piece of gear to possess.

#### Stability

Many of the older receivers are prone to oscillator drift as they warm up. Oscillator circuits can be improved, it is true, but this becomes rather a major operation and is not advised unless you are experienced in receiver modifications.

Calibrate only when the receiver has been running for long enough to be really warm, and, in actual use, don't switch the receiver off if you intend to come back to it in, say, half an hour's time.

This long-term drift or instability is something you get used to; short-term instability is far more serious and makes a receiver almost hopeless for SSB work. A stable oscillator is a *necessity* these days, not a luxury, and if you are unlucky enough to have a receiver in which the oscillator shifts around unpredictably, then you will really have to tackle it. (A change of valve is usually what is needed!) AR88's, on the whole, are extremely stable both from the long- and short-term point of view; HRO's, particularly the war-time models with metal valves, are pretty good on short-term stability but rather poor over a long period. And if you have the band-spread coil-packs they will naturally make the warm-up shift even more obvious—stations will appear to drift by *ten* dial divisions rather than one!

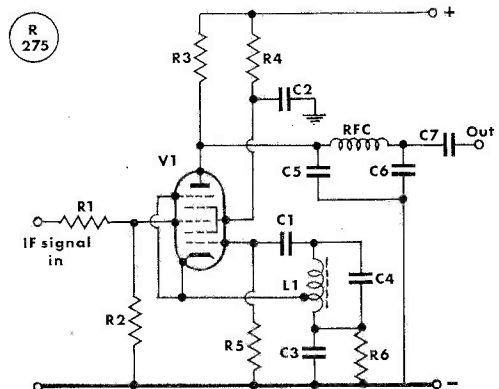


Fig. 3. A product detector with its own BFO, using a pentagrid valve. The oscillatory circuit L1, C4 should be of rigid construction and well screened, and the inductance of the RF choke will depend upon the frequency of the IF and the BFO.

### Table of Values

Fig. 3. Circuit of Combined Product Detector and BFO

C1 = .001 $\mu$ F	R1, R2,
C2 = .01 $\mu$ F	R5 = 22,000 ohms
C3 = 0.1 $\mu$ F	R3 = 47,000 ohms
C4 = .002 $\mu$ F	R4 = 15,000 ohms
C5, C6 = .0025 $\mu$ F	R6 = 220 ohms
C7 = .005 $\mu$ F	RFC = <i>see text</i>
L1 = <i>see text</i>	V1 = 6BE6

#### Product Detectors

Another highly desirable modification for SSB reception is the substitution of a so-called "product detector" for the diode type. This term "product detector" is misleading; we have even heard someone who should have known better giving it out that it was so called because the emergent signal represents the *product* of the incoming signal and the BFO voltage, instead of the sum! It is nothing more nor less than another form of mixer, or heterodyne stage. Without the BFO, nothing happens; with the BFO beating with an incoming signal, the beat-frequency is passed on to the audio stages.

In the case of most receivers that already have a

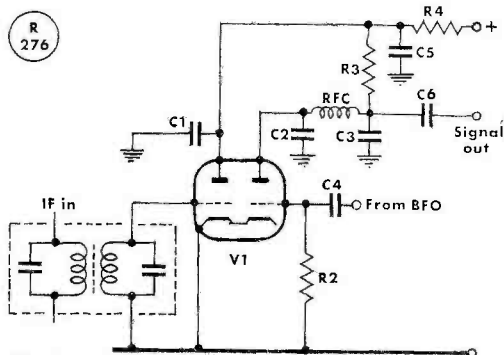


Fig. 4

Fig. 4. Simple form of product detector which can be substituted for the diode in many types of receiver which already have a BFO. The amount of BFO injection can be adjusted by varying the values of the R2 and C4.

**Table of Values**

Fig. 4. Circuit of Simple Product Detector

C1 = .01 $\mu$ F	R2 = 100,000 ohms
C2, C3 = 220 $\mu$ $\mu$ F	R3 = 47,000 ohms
C4 = 100 $\mu$ $\mu$ F	R4 = 15,000 ohms
C5 = 40 $\mu$ F electrolytic	RFC = 2-5 mH choke
C6 = .01 $\mu$ F	V1 = 12AU7
R1 = 1,000 ohms	

satisfactory BFO, a product detector can be installed very easily, even using the valveholder housing the existing diode detector.

Fig. 3 shows an actual circuit, taken from one of the modern receivers, of a combined product detector and BFO. The oscillator section is across grid 1 and screen, with a cathode tap on the coil and the screen earthed (at RF). The signal from the receiver's IF goes into grid 2 of the pentagrid valve, and the combined mixed signal is passed out from the anode circuit through a low-pass filter (RFC, C5, C6) to the audio. The oscillator inductance, L1, naturally has to be designed for the particular BFO frequency in use, which is why no details can be given in the Table of Values. (The same applies to the RF choke.) But this circuit is probably a little more complex than most beginners would like to tackle, so turn to Fig. 4, which is suitable for receivers already equipped with a BFO. Nothing could be simpler than this double-triode circuit in which the BFO voltage is applied to one grid, the signal voltage from the IF to the other; one anode is earthed with regard to RF and the other feeds out the combined signal, again through a low-pass filter, to the audio of the receiver.

**Pros and Cons**

The advantages of a product detector? Mainly that it reduces the distortion due to intermodulation, at low signal levels, which occurs in conventional diode detectors. Many receivers of the older type have a BFO which does not give sufficient output for good SSB reception and if you increase the BFO output by some means, the diode detector probably will not handle it without introducing distortion. So the mixer, or converter, which has become universally known as the "product

detector" is used in all modern receivers which will naturally have to cope with SSB.

And the disadvantages? Well, it is really unsuitable for AM phone reception. If you switch off the BFO there is virtually no output. But leave the BFO on, and treat the carrier-wave as if it doesn't exist, by tuning it to zero-beat, and you will receive the station on one sideband, with all the advantages of SSB. An AM phone station coming in with heavy phase distortion on an ordinary diode detector will "clean up" and sound as sharp as an SSB signal if you leave the BFO on and tune to zero beat.

The low-pass filter shown in the product detector circuits is necessary to filter out the two individual frequencies and leave only the beat, which is at audio frequency. One might have a 465 kHz IF and a BFO tuned to 466 kHz, to give an audio beat of 1 kHz on a CW signal, or reasonable mid-band reception of an SSB signal—only the 1 kHz (for CW) or a band of frequencies stretching up to about 3 kHz (for SSB) is wanted by the audio stages. And if you are using a very low final IF, such as 50 kHz, this filtering is even more important, also the very heavy decoupling of the anode circuit—hence that 40  $\mu$ F electrolytic condenser in Fig. 4 (C5).

**Receiving SSB**

Finally, a few notes on SSB reception, whether you have modified your receiver or not. In general, keep the RF gain as low as possible, and use as much audio gain as you need to bring the signal to a reasonable level. This is more important with the older receivers than with the modern variety—shortage of BFO voltage can be compensated for by reducing the signal in this way.

Find the correct setting of your BFO control first for upper sideband and then for lower sideband and *do not alter it* thereafter. Quite a few misguided people tune in an SSB signal roughly and then use the BFO to make it intelligible. This is quite wrong, as there is only one optimum setting on each side for the BFO. If you can set it to give a beat (a real peaky one for preference) of about 1500 cycles on CW signals, then it will be about right for SSB reception. (The idea that the BFO must be at zero with the IF is, of course, hopelessly wrong... it must be in the middle of the band of frequencies that represents the SSB signal, usually ranging from 30 up to about 3000 cycles.) *Mark* your BFO control to give this position on either side of the zero setting, and use it that way all the time. Remember, too, that upper sideband is customary on the HF bands, and lower sideband on 40, 80 and 160 metres—although you must be prepared for the odd exception to the rule, as in the case of someone who switches sidebands for a quick escape from QRM.

One is always reading that AVC should be switched off for SSB reception, but this is really rather pointless since it isn't operating when the RF gain is turned well back, as it should be. On an AR88, for instance, with the RF gain about a quarter of the way up, switching from AVC to manual makes no difference whatever.

A modern receiver is a beautiful addition to the shack, these days, but much more can be made of some of the "old brigade" than one would imagine, and it is hoped that the foregoing hints will result in the extended life of a few veterans of this kind.

# "INTELLIGENCE"

OR, INCREASING TALK-POWER  
BY AF CLIPPING

S. G. PHILLIPS (DA4BM/G8HQ4)

**I**NTELLIGENCE has two meanings. One is the true sense of mental ability, and the other information conveyed by some means. In Amateur Radio we tend to ignore the first meaning, but we use the second all the time. In an amateur telephony signal the information conveyed (the intelligence) is speech. The very factor we wish to have of maximum intelligibility is often of very poor quality indeed.

There must be many, amateurs especially on VHF, who have experienced, together with the frustration that goes with it, a DX station going up and down in QSB. You raise him, only to get the report that you are virtually unreadable because *your* signals are peaking S5, but the average is on or below the noise. There are, however, ways of combating this. You can increase your output power (a difficult thing to do if you are already up to the limit) or you can do something to increase the average power out. This is especially true for SSB. The peaks contribute very little to its intelligibility, and so they may be removed without distorting the signal.

### Increasing Average Power

The most effective way of increasing the average power is to use an RF clipper. True RF clipping, where the actual RF is amplified, clipped, and filtered at RF will give the 6-10 dB increase in average power. If, however, the filtering is done at AF, then 3-4 dB of the advantage will be lost, as clipping cannot be raised to such a high level without harmonic distortion. This method of raising the average power has one problem, the need for a second crystal filter. The actual increase in average power is perhaps more easily achieved at audio frequencies than at RF.

If the high-amplitude peaks in the audio are removed, the signal at audio can be further amplified, and so increase the average level. Of course, by amplifying the audio after "chopping off" the peaks, causes more high peaks which must again be removed. Therefore, the onset of clipping must be at a fixed level. An ordinary diode provides the means to do this.

The performance curve of a typical junction diode is shown in Fig.1. As can be seen, at approximately 0.6v., the diode "switches on" and conducts heavily. This threshold effect may be used to cut off all the high amplitude peaks

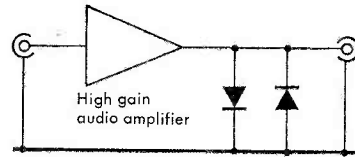


Fig. 2

X  
394

from the audio signal. So the action of a typical audio speech clipper may be described. The audio signal is amplified so that its amplitude is greater, this resulting signal is then clipped symmetrically by the action of two back-to-back diodes (see Fig. 2). Two diodes are used as the audio signal contains both positive and negative peaks.

However, a problem now arises. The diodes, being square law devices, generate harmonics in their clipping action. These harmonics range up to quite high frequencies, well outside the accepted bandwidth for good communication (300 Hz-3 kHz). In the transmitted signal these harmonics occur as splatter which degrades the signal. Therefore these harmonics must be filtered out. This is done simply with a low-pass filter with a cut-off of 3 kHz. This attenuates all higher frequencies, as illustrated in Fig. 3. Thus most of the harmonics that cause splatter can be eliminated.

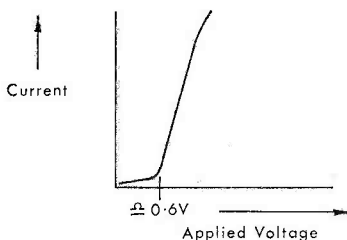
### Simple Audio Clipper

The circuit in Fig. 4 is the result of considerable experimentation with different circuits. The result is so simple the author wonders why he didn't use it in the first place. The circuit performance is good and results show that of all those tried this is the one that works the best.

Circuit operation is straight forward. The two operational amplifiers are wired as inverting AC amplifiers, with the gain controlled in each case by VT1 and R2, VT2 and R4.

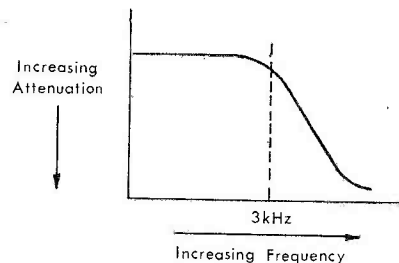
$$\text{Gain} = \frac{R2 + VT1}{VT1}$$

So it can be seen that both U1 and U2 have variable gain. The resulting signal output is 4-5v. peak-to-peak. This, after clipping, should not exceed 0.6v. in amplitude, which should be more than enough to drive most transmitter audio stages. The signal after clipping is filtered by L1, C4, C5, which form a low-pass filter with a cut-off of 3 kHz. The clipping level is controlled by RV1 which with the component values given should vary from 5%



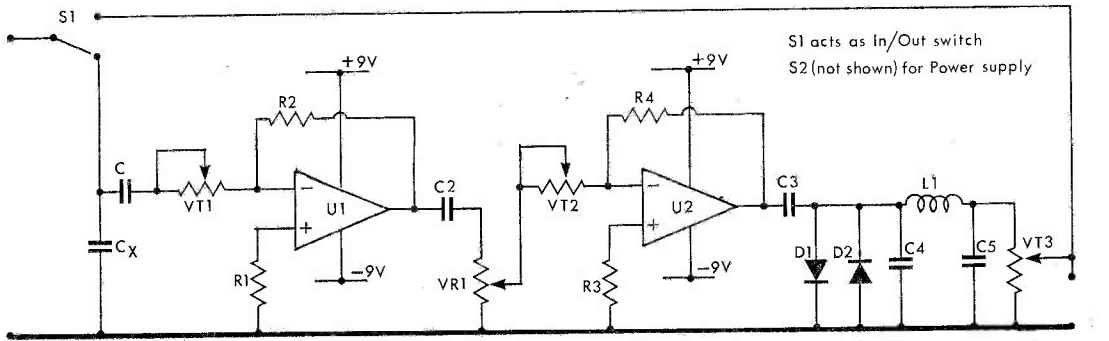
X  
393

Fig.1 Forward characteristic of typical diode



X  
395

Fig.3 Response Curve of Low-pass filter



Circuit Diagram

X  
396

to 80% clipping. As operational amplifiers are used, dual polarity supplies are needed. These are given by two PP3's which cope easily with the modest current drain, about 4-5 mA on peaks.

**Construction**

The author's final version was constructed on perforated board with a 0.1in. matrix which fitted the 8-pin DIL package of the IC. A straight-through configuration was used to isolate the input from the output, although the actual layout is not critical if the above proviso is observed. It is suggested that a metal box be used to contain the clipper to minimise pickup of RF. Two switches were fitted as the author preferred toggle switches and couldn't find a 3-pole changeover toggle.

**Setting Up**

Adjust the output control VT3 to provide enough audio to drive the transmitter without overloading, *i.e.*, adjust so that the peak output of the clipper does not exceed that of ordinary speech. The clipping depth control should be set at half-travel. If a signal generator is connected to the input and the output is fed to an oscilloscope, the output may be seen. Set the frequency to one kHz and increase the audio output of the generator slowly. The 'scope should show a sine wave with about 1% distortion on full output. It should be found that after a very small increase of the amplitude control of the generator, no further increase in the amplitude of the output occurs. At full clipping, this should occur with an input of less than 50 mV. Now go on the air and get some reports, adjusting, if necessary, the presets controlling the gain. These should be initially set as follows: VT2 on U2 at minimum, and VT1 on U1 at 10% of its travel from the input side. In the absence of a signal

TABLE OF VALUES — Fig. 4. Circuit of the Speech Clipper

C1, C2 = 0.1 $\mu$ F, poly.	VR1 = 22,000 ohms, 1in.
C3 = 0.47 $\mu$ F	Vt1, Vt2, Vt3 = 10,000 ohms pre-set
C4, C5 = 0.1 $\mu$ F	L1 = 3 Hy. choke
Cx = .001 $\mu$ F	U1, U2 = 741 Op. Amp.
R1, R3, R4 = 10,000 ohms	S1 = SP, c/o
R2 = 22,000 ohms	

generator get reports from a station at least 60 miles away. It should be found that over medium and long distances the clipper gives an improvement of 5-6 dB, roughly equivalent to quadrupling your output power.

**Conclusion**

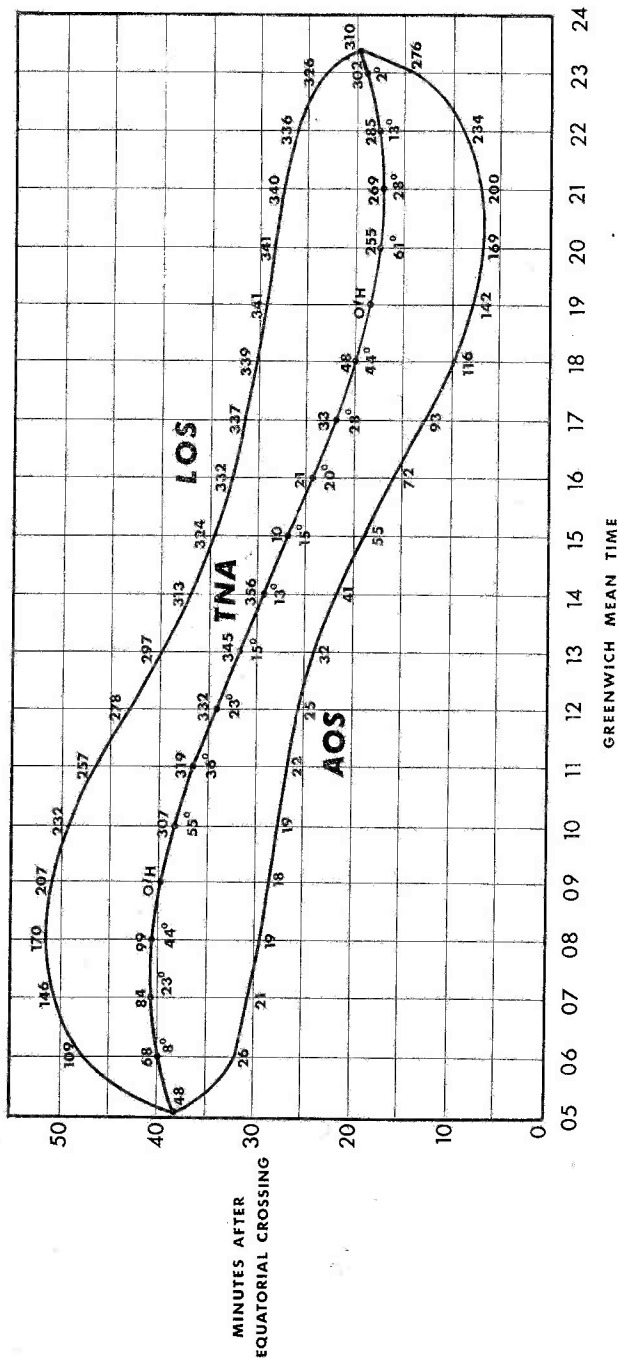
Because of recent bad publicity, many people look on AF clippers as an evil to be avoided. However, this article is entitled "Intelligence," for two good reasons:

- (1) Would you have read the article if it had said "An audio speech clipper" as the heading? Psychologists will, hopefully, agree that having started to read most will continue to the end.
- (2) Used intelligently, an AF clipper is as good as pseudo-RF clipping, providing 6 dB increase in average power at a tenth of the cost.

By intelligent use the author means the following: (a) Don't use it for short distances or for contacts where the signal strength is S5 or better; (b) Adjust it properly.

Provided these two conditions are observed, no trouble should be experienced, the clipper giving great assistance in working to DX. The author acknowledges the assistance he has had from DA4BL/G8IMW and stations worked for their reports and criticism.

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Notes:

1. AOS = Acquisition of Signal;
2. TNA = Time of Nearest Approach.
3. LOS = Loss of Signal.
4. - Figures on AOS, LOS, and above TNA curves are true beam headings.
5. - Figures below TNA curve are beam elevations above horizon.

**OSCAR 6 and 7 SATELLITE PREDICTION CHART**

COMPILED FOR 54°N., 2°W (Applicable to U.K.)  
by L. WOOLF, GC8AAZ



## OSCAR, WHERE ART THOU?

### DETERMINING THE SATELLITE POSITIONS

N. A. S. FITCH (G3FPG)

FOR every amateur actually communicating through the two satellites, *Oscar 6* and *7*, there seem to be dozens more keen to try their hands at this challenging branch of Amateur Radio. Successful communication through an orbiting satellite requires fairly accurate predictions of its whereabouts and the chart presented here will help in this respect. Before describing it, a few words for the uninitiated about Orbiting Satellites Carrying Amateur Radio.

The amateur satellite programme dates back to the early sixties. *Oscar 6* was launched on October 15, 1972 with a predicted, active life of a year and at the time of writing, it is still functioning satisfactorily!

#### Operating Procedure

You transmit to it on CW or SSB between 145.9 and 146.0 MHz and it re-transmits signals in the 10-metre band, between 29.45 and 29.55 MHz. *Oscar 7* was put up on November 15, 1974. On odd days of the year, you transmit to it in the range 145.85—145.95 MHz, signals being relayed in the 29.4—29.5 MHz part of the 10m. band. This is called "Mode A" and again CW/SSB is preferred although some FM experiments have been carried out.

On even days of the year, it operates on "Mode B" when you transmit to it in the band 432.175 MHz, signals being re-transmitted, inverted, on a down-link of 145.975—145.925 MHz. This inversion means that a USB signal will come back on LSB, and *vice versa* and, if you increase your uplink frequency by a few kilohertz, your downlink QRG will go down by a similar amount. For both *Oscars*, Wednesday is reserved for special experiments only and the operating schedule for *Oscar 6* is further restricted to Monday, Thursday and Saturday evenings and Sunday mornings. Each completes one revolution in about 115 minutes, at an approximate height of 920 miles, giving a theoretical, maximum range of some 2,500 miles. A new orbit starts each time the satellites cross the Equator, going north, termed "ascending node," whilst descending node is when they cross the Equator going south. So much for the brief facts.

This chart was the idea of Lawrence Woolf, G8AAZ, and has been re-drawn based upon the latest, orbital data. Purists will know that the two satellites do not cross the Equator at the same longitude for any particular time. However, the difference is only about three degrees, equivalent to just over 200 miles, so average curves applicable to either satellite have been drawn.

#### Interpretation of the Chart

The practical use of the chart can best be explained by working through an example for an equatorial crossing at 1500 GMT. From the A.O.S. curve we read 19

minutes so would expect to hear signals at 1519. The "55" gives the true, azimuth bearing for the aerial in degrees. From the T.N.A. curve we see that the closest approach will be at 1527, the figure above the curve showing an azimuth bearing of 10°, nearly due north. As the satellite would still be about 1,600 miles away, its elevation above the horizon is low, 15°, as indicated by the figure below this curve. From the L.O.S. curve, we can predict a loss of signal around 1535 with the aerial headed 324° true, approximately north-west. These figures indicate that the aerial should be rotated, incrementally in an anti-clockwise direction during the 16 minutes pass.

To make this chart applicable to the U.K. generally, it has been compiled for 54°N and 2°W (the Skipton area of North Yorkshire, as it happens). Obviously, it can be used for any equatorial crossing time by interpolation. There are several other ways of presenting this kind of orbital information which have been published but in all cases, a knowledge of the equatorial crossing time is needed. The attraction of this chart is that you do not need to bother at all with the longitude figures. Basic orbital information is given over the GB2RS Sunday-morning news service from which all other data can be calculated for the days simply by adding—or subtracting—1 hour and 55 minutes, each time. A further refinement is to place a piece of tracing paper over the chart and mark on vertical lines at 1 hour, 55 minute intervals. If this is subsequently laid over the chart with one of the vertical lines coinciding with the reference time given, you will not have to do any mathematics at all.

Satellite communication is a very specialised activity and in a general Amateur Radio periodical, there is insufficient space to do it justice. If you are seriously interested in it, it is worthwhile joining *AMSAT U.K.*, which publishes a regular pamphlet devoted to this medium. Details may be obtained from:—Tony Bailey, G3WPO, 5 Erin Way, Burgess Hill, West Sussex, RH15 9PN.

Subscription rate to  
Short Wave Magazine  
is £4.80  
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## SHORT WAVE LISTENER FEATURE

By *Justin Cooper*

### MORE IDEAS ABOUT AERIALS — CONTRIVING AN ATU — READERS' NOTES AND QUERIES — THE LADDER POSITIONS

THE subject of the lesson this time could well be regarded as the most important part of the station, namely the aerial. Now, many of us are faced with the necessity for an aerial which is not visible to the outside world, either because the house has some restrictive covenant on it, or maybe simply because one doesn't mind crawling in the loft but one "hates heights."

Some people think this problem signifies the end of their SWL career; others make do with a "bit of wire"; and yet others find in the situation a most interesting technical and practical challenge. Last time in CDXN G3KFE was saying his outside aerial looked somewhat sorry for itself, so, while waiting for the time when he should have replacements for his broken parts, he decided he would modify his linear. Then, the dawn broke—the *CQ WW WPX Contest* was all but on top of him and he wanted to play!

No attention at all was given to the linear, not any even to the chasing-up of aerial spare parts, but the Top Band wire was resonated to cover 14 and 21 MHz by means of a bit of fiddling with a reflectometer and a Joymatch 111B ATU, which also coped well enough on 7 MHz. Then, it was up into the loft space with some wire and a W8JK bi-directional aerial was created. This was in fact a Mark II, insofar as the initial tests with a two-element Yagi beam which was supposed to be reversible showed it to be giving *too good* an SWR across the band and precious little front-to-back ratio. That coped adequately with signals to East and West, leaving the small remainder (yet, it is really a small remainder!—you look at the Great Circle map) of the earth's land surface to be covered. The Top Band wire used on Eighty would serve the purpose, but in fact another W8JK array cut for 21 MHz and firing North-South did the trick. A veritable aerial farm, in fact, all up in the loft and out of sight. The point to recall is that an indoor beam will usually "run the pants off" an outdoor dipole at the same height but outside, at least at HF; but parasitic arrays are *not* so successful as beams in which the elements are driven, particularly as, at least at 14 MHz, the ends of the elements have to be dropped down, or bent in some way, to fit into the space. And, of course, the W8JK arrangement can be made up very easily using 300-ohm ribbon feeder.

#### The Mail — — —

As ever, this divides into three sections essentially: The general chat, the technical questions, and the HPX queries. Let's look at the technical ones first. *A. G. Evans (Barr)* has brewed himself up a receiver from a kit, which has given some satisfaction. However, he feels that it isn't playing as well as it could do with the help of an

ATU; however, dear old Murphy stepped in at that point and no circuits were found in his magazines not yet after a hunt in the local library. Well, now, there are various recipes for these devices, and, in general, one chooses the one which one prefers. Possibly the best of the general-purpose ATU's consists of a couple of variable capacitors, one of about 200 pF maximum and the other a two-gang or, better still, a three-gang tuning condenser out of an old valve radio set, plus a coil and some croc-clips. Let's just consider it in terms of a single band for a moment; you must first of all wind a coil which looks as though it will "hit the band" with the 200 pF capacitor as tuner. Now, take the centre of the coax to one side of the big variable C, and the other side of the capacitor to the top of the coil, while the coax braid and the station earth all join to the bottom of the coil; thus, you have a coil, with a variable capacitor in parallel, with earth at one end, and the lead, through the two-gang condenser to the receiver, at the other. Now you hang the end of the aerial on to a croc-clip, which is used to tap the aerial on to the coil, and start adjusting until the thing "perks" on your aerial and on the specified band.

However, most of us like to be a bit more sure that the coil and its shunt capacitor do in fact resonate on the band; one can use a grid dipper of course, but if you haven't, no problem, just make up the parallel tuned circuit, tack the aerial on one end of the coil, and take the other direct to the *aerial* terminal of the receiver. Since you have just taken the aerial off the receiver to do this, you know the band is open; now all you need to do is to tune the capacitor for a sudden *drop* in signals; that is, the tuned circuit has become a wave-trap rejecting signals on that band, so therefore you know it will "hit the band." Take away the temporary clips to the aerial and the receiver, and put it back as first described, ready for the adjustment to suit the aerial. What you have to do is to adjust the aerial tap up and down the coil, the while tweaking the two capacitors (they interact to an extent), such that you get the best "peaking" effect and yet do not end up with the tuning *too sharp*—an ATU should not need a slow-motion drive. As a rough sort of guide, when the wave-trap part of the exercise is being done, one can adjust the coil turns until, by eye, the tuning capacitor looks to have about  $1\frac{1}{2}$  pF per metre of wavelength—*e.g.*, for Twenty, you would expect to see about thirty pF, for Forty, sixty pF and

#### WANTED—FOR THIS FEATURE

Good photographs (not colour, or negatives) of SWL stations, with brief description of equipment in view. All that can be used are paid for on publication. Send to: "SWL," Short Wave Magazine, Buckingham, MK18 1RQ.

so on—no need for measurement, just a “guesstimate” based on the proportion of the rotor which is in mesh. So we now have a one-band ATU, and it doesn’t take a genius to see that in order to make it cover several bands we need to have a switch to short out some turns of the coil as we go higher in frequency, and another one to direct the aerial to the right place on the coil for each band; the required settings can be determined by the use of a couple of croc-clips before finally wiring the switch into the positions so found. It will also be found that on the lower bands the capacitor in series with the receiver lead will almost certainly require to have both gangs wired in parallel. When you come to put the thing in a box, you need to recall that this same capacitor must have both sides insulated from chassis or panel, so use a plastic box and a large knob to avoid hand capacity effects, or alternatively use a metal box, insulate the capacitor itself, and use an insulated coupler to join the shaft to an earthed shaft running through a panel bush. Personally, the writer has found it is preferable to use two such couplers; one for Top Band to Forty and the other for Twenty to Ten, simply to keep the wiring and switching fairly clean and simple.

Next we have *R. C. Brook (Leamington Spa)* who wonders about the use of a loop aerial with his Grundig Satellit 2000 receiver; his sketched version seems to fit the bill, or his alternative proposal of a Joystick, depending on how tolerant the XYL is! As for getting hold of a general-coverage communications receiver, the prices of new ones are out of this world; the alternative is to look for a second-hand Eddystone 750, or 680X, or even an AR88; in the latter case the D is to be preferred to the LF model.

Still on aerials, *J. Watson (Bolton)* is after a bit more DX and wants to know about “loft-space wonders.” Some of the points have already been covered, but it is worth recalling that a vertical aerial is good at DX; a 14AVQ on the chimney-stack will strike the locals as a new type of TV aerial, and the radials can be made of thin wire running across the roof-tiles, or even led inside the loft. Another way is to get a mobile whip with coils for each desired band, stick it in the middle of the loft, and run radials (two quarter-wave ones for each band, bent to fit) around the loft. Then to change bands, you nip up and change the coil (or use one of the multi-band whips which resonate automatically on each band) and adjust the top height to suit, and away you go on a new band. The only snag, which is more or less inevitable with loft (or bent) aerials, is that you have to tune them up carefully using a grid-dip oscillator or such, by adjustment of the top length, or pruning the coil; a look at the 14AVQ data covering, say, CW ground-mounted and CW roof-mounted adjustments will make this painfully clear! But in the 14AVQ case, of course, the maker has done it all for you.

\* \* \*

A completely different tack now, with *G. Dalloway (Albrighton)* who is taking R.A.E. but notes that he has a problem remembering circuits for R.A.E. Don’t we all! But, having said that there is some hope yet. With any circuit, try and “break it down” into its component elements; for example, in a mixer stage using a valve, you need to have an oscillator circuit feeding one

### HPX LADDER (All-Time Post War)

SWL	PREFIXES	SWL	PREFIXES
PHONE ONLY		PHONE ONLY	
W. Bingham	(Carrickfergus) 1595	C. K. Verstage (Old Basing)	800
S. Foster (Lincoln)	1559	W. H. Smyth (Hartlepool)	754
K. Kyezor (Irchester)	1508	M. Rodgers (Harwood)	741
R. Shilvoek (Kingswinford)	1500	L. Craven (Alvechurch)	737
R. Carter (Blackburn)	1342	B. T. Mackness (Dagenham)	733
J. Fitzgerald	(Gt. Missenden) 1334	J. Dougherty (Sunderland)	733
M. J. Quintin	(Wotton-u-Edge) 1259	A. C. Roberts (Shepshed)	719
P. C. Jane (East Loos)	1258	P. Rooney (Liverpool)	691
B. Hughes (Worcester)	1243	M. Eccles (Lancaster)	682
A. W. Nielson (Glasgow)	1156	J. Bell (Hampstead)	676
M. Cuckoo (Herne Bay)	1134	J. Aspinall (Leeds)	623
K. A. Whiteley (Castleford)	1108	L. Gibson	(Barrow-in-Furness) 619
H. A. Londesborough	(Swanland) 1079	D. Taylor (Harborne)	591
G. W. Raven	(London, S.E.13) 1075	M. Law (Chesterfield)	587
J. H. Sparkes (Trowbridge)	1067	M. Rivers (Leyton)	565
R. H. McVey	(Weston-super-Mare) 1067	R. C. Woolley (Ashbourne)	544
Mrs. J. Jane (East Loos)	1000	N. N. Graham (Gosforth)	541
N. Henbrey (Northiam)	957	M. Barton (Market Deeping)	531
E. W. Robinson	(Bury St. Edmunds) 914	G. Cless (Deeping St. James)	506
H. M. Graham (Harefield)	903		
P. Barker (Sunderland)	849	CW ONLY	
E. Parker (Hove)	848	A. Glass (Plymouth)	1220
M. C. P. Bennett (Datchet)	822	N. A. Phelps (Devizes)	1066
G. F. Gullis	(Ogbourne St. George) 806	H. A. Londesborough	(Swanland) 876
		G. Richards (Aberdeen)	524
		A. F. Roberts	(Kidderminster) 451
		A. W. McNeill (Newbury)	353
		T. Grimbleby (Hull)	324

Starting Score 500 for Phone, 200 for CW. Listings include only recent claims.

Our “DX Zone Map,” with supplement, gives a full Prefix List. It is a colour production for wall mounting, price £1.50 post free, from: Publications Dept., Short Wave Magazine, Ltd., 29 High Street, Welwyn, Herts., AL6 9EE.

### ANNUAL HPX LADDER (Starting date January 1, 1975)

SWL	PREFIXES	SWL	PREFIXES
M. Gibson	(Barrow-in-Furness) 362	J. B. Clarke	(North Walsham) 312
J. J. Ryan (London W.11)	333	R. Rennard (Redditch)	298
S. T. Bowen (Kipnax)	329	R. A. Charlesworth	(London, N.22) 238
M. Kelly (Lisburn)	312	G. Ridgway (Ardleigh)	220
		R. Staples (Lymm)	214

Starting Score 200, in accordance with HPX Rules. All prefixes to have been heard in 1976.

electrode, and a tuned circuit connected to the previous stage to bring the signal in. Up in the anode you need an IF coupling (usually a simple IF transformer) and between that and the HT there will be a resistor and a decoupling capacitor to ground. You have to obtain the bias by some suitable element, and having done so you have to make sure you haven’t shown it shorted out by the coil by forgetting the blocking capacitor; and of course every electrode of the device must have a return path to cathode, even though this path *may* be through the power-supply which you aren’t drawing in—but it’ll remind you to look and see that the part of the return path in the circuit you are trying to draw is present.

Break any circuit down to these tiny sub-circuits, and remember them—and then any major circuit which needs to be recalled can always be checked simply by thinking whether all the required sub-sections are in fact present.

F. G. *Brisby (Ashford, Kent)*, found himself in the wars and unable to tune SSB signals with his Codar CR70A receiver. Basically, there is no difference at all in the way of receiving SSB signals with any receiver, though of course the better ones make the task somewhat simpler. Essentially, one has to accept that the BFO must be on, which says that the AF gain needs to be run up higher and the volume in fact controlled by the RF/IF gain. Then, if one is careful, one can find a single setting of the BFO which will cope with SSB on 160, 80, and 40 metres and another which will handle the SSB on the HF bands; which settings can be marked as, respectively "Lower" and "Upper" Sideband settings. Usually, switching on the BFO will cut the AGC, but if there is a separate AVC or AGC switch, turn it off for Sideband reception. The other difficulty, which is inevitable in a general-coverage receiver is simply the fact that the tuning-rate, on even the bandspread control, is too fast, which means slow and careful tuning as compared with a receiver such as the transmitting amateur uses. However, it is a lot easier than the technique of using a couple of transistor portables, the oscillator of one acting as the insertion oscillator of the other so that the spacing between them is an essential part of the tuning process!

That tuning factor in the SWL game is brought to the fore by P. *Baker (Sunderland)*, when he mentions that he heard KG6JBX and AG7ZJD/AG8 both at S7—but a couple of hours later, the former had come up to be S9+20! Incidentally, Paul wants us to have an HPX Ladder for SS/TV—would there be any other takers?

R. A. *Charlesworth (Wood Green)* has his receiver in the office, and since this is high up, he also has a high aerial. After "playing" at SWL for about ten years, he went seriously into the game at the beginning of the year, and started, first with an SW-717, and later with a used Trio JR-310. Although he is an ex-Signals type, he does not—at least to date—seem to have attacked the CW end, although there is a hint that this will be looked at in due course—good!

#### The General Chat — — — —

Although he never says much these days, R. *Shilcock (Kingswinford)* still makes his HPX entries, and this time it goes up to 1500; a nice round figure, the more so when one recalls that ten years ago the leaders used to give up at 1000!

A familiar scrawl appears from a new location: C. K. A. *Verstage* is at the moment in New Zealand, where he has his Drake SSR-1 and FR-101D receivers with him, as well as a SS/TV monitor; interestingly enough, he finds it easier to hear the G's from there using a 5/8 wave 430 MHz whip, than he did hearing ZL's from home with a two-element beam! This, of course, is partly a matter of time, again, the VK/ZL contingent being generally buried under the QRM during the evenings here in the U.K. and of course there is the local QRM situation over here at any time, as compared with the ZL scene. Again, all those rare Pacific Islands which we can hear so seldom are "the locals" to ZL. Yet another interesting factor is that the band noise seems lower—

proof positive, one would think of the degree to which ether pollution and cross-modulation affects our lives in Europe, from stations largely outside our bands.

J. *Fitzgerald (Gt. Missenden)* wrote in some haste, he being off to the wilds of North Yorkshire "on a course," mainly to point out that his UA1/M was not a mobile of course, but one of those Russian bases in Antarctica. John seems to be thinking of a new receiver, but if the time he took to make his mind up to get his present one is any guide, it'll be some years away yet!

The *Bingham* family in *Carrickfergus, Co. Antrim* are still around; young Bill has been placed firmly to the O-Level grindstone, which in fact will be resulting in exams. around the time this comes to print—and afterwards there will be rather more time for playing with wireless. A couple of prefix queries concern the C4 and C9; not sure whether by C4 he means D4, but the C9 was a CR7; however, we have it that all the CR7's had their gear taken away from them, so C9's look like being yet another hostage to a weak government.

R. *Staples (Lynn)* has a KW202 running to a trap dipole with which he makes a first entry in the table; Richard is suggesting that there should be a five-band HPX Table to make it a bit less boring for the chaps at the top of the Ladder—which, one suspects, will lead to some comments from the Upper Echelon!

P. C. *Jane*, and his *XYL Mrs. J. B. Jane* are from *East Looe*; they rarely if ever write, but the table entries are pretty regular and this time Mrs. Jane becomes the very first YL entrant to make the four-figure mark—congratulations!

M. *Law (Chesterfield)* has now only one free day a week and the time at the receiver is somewhat limited—work was ever the curse of the listening classes! What makes it worse is that the New Year gales took away half the aerial, and every free day since has seen a fall of rain! However the remaining 36 feet struggles on happily enough for the moment.

R. *Carter (Blackburn)* has been caught two ways—the house being rewired throughout on one hand and the paint-pots which followed quite inexorably! Thus, Ben's total has not risen as much as he would have liked; but when knocking up 74, those paint-pots have even less attraction, and when the task is done perhaps one does not feel overkeen on the shack.

We nearly fell in the water over the two different *Gibsons*, both from *Barrow-in-Furness*, the more so as their handwriting is rather similar! However, we now have Michael and Les properly sorted out, and their entries placed in the right tables.

J. H. *Sparkes (Trowbridge)* notes that many of the W's are not using the new Bicentennial prefixes at all, and others quite erratically, changing from one to the other during the day, or even during a contact! One must admit it is a pity there were no ground rules laid down by the authorities about the use of these prefixes.

E. W. *Robinson (Bury St. Edmunds)* hasn't been too active of late, due to the lack of prefixes and the deadness of the bands at sunspot minimum; but a few new ones were logged and claimed.

T. *Grimbleby (Hull)* adds once again to his score on the CW ladder, by way of 55 new ones, while at the same time, N. A. *Phelps (Trowbridge)* managed to add 33 to

his total up at the top, again on CW; it is quite interesting to compare the logs, and note that SWL Grimbleby has a far higher proportion of the Yank "A-type" call signs logged, as compared with SWL Phelps. Furthermore, if we compare two more CW entries, namely those from Bert Glass (Plymouth) and Tony Roberts of Kidderminster, one notices the same trend.

\* \* \*

J. Aspinall (Leeds) sends us his 11th and 12th lists, and simultaneously enquires as to the whereabouts of his tenth one—sorry to say, it doesn't seem to have reached home base. However, just in case, Joe gave us a copy with his letter, so now we should be all on the level.

A HPX problem occurs with S. T. Bowen's (Kippax) list regarding a queried "UI3FFF"; oddly enough, your conductor found UA3FFF and reckoned his letter "A" sounded rather I-ish, until the receipt of phonetics thanks to a spot of QRM resolved the question. So—one deletes this one in the absence of anything to the contrary.

Those good resolutions made at the end of last year don't seem to have borne much fruit, complains A. W. Nielson (Glasgow), and on the few occasions when it has been possible to listen there has not been much about, and so the result for this time is . . . a Nil return.

B. J. Mackness (Dagenham) reckons that if we all took up astronomy and looked at sunspots we would not need to look for other people's forecasts; and that is as good a point as any to mention that you should never, ever, try to look at sunspots directly. The way to do it is to aim the telescope at the sun, and focus the image on a sheet of white paper, the while looking at the image with a bit of smoked glass between it and the eye. But, in any case, there is another factor to be taken into account, which is the level of geo-magnetic activity; this last at high level reduces the good effects of sunspots. And, of course activity—if Ten is open to some place and there is an operator at each end, if both sit and listen, both will conclude the band is dead. If one operator calls CQ, and the other one is listening the chances are that a QSO will result and both stations will conclude that the band is open, as indeed will the hundreds of SWL's who may also be listening to the QSO. The moral is just what you think it is!

H. M. Graham (Harefield), is one of the many who have found things a bit thin of late, although Maurice spreads his activity out well across most of the bands. Twenty has shown the most pay-dirt although even here there has not been anything in the nature of a bonanza. On an entirely different tack, Maurice notes that on Forty, after all these years he has heard his first LA on the band!

#### OTHERS

Table entries are noted and acknowledged from: B. F. Hughes, Worcester; M. J. Quintin, Wotton-u-Edge; D. Taylor, Birmingham; G. Ridgeway, Arleigh; M. C. P. Bennett, Datchet; G. F. Gullis, Ogbourne St. George; and M. Cuckoo, Herne Bay.

#### NEXT TIME

By the time our next piece finds you, many will be waiting for the answer to the question of how they fared in the R.A.E. To all these, and particularly to those who are doing it again after a miss first time, go the best wishes and hopes of us all for their success. Good luck

lads and lasses, and may you all be able to let us have a call sign for the "New QTH" page!

#### FINAL

Which is, as usual, where we have run out of space or breath; all your comments and Table entries, please, for next time, to be with us by May 28 latest, the address being "SWL," *SHORT WAVE MAGAZINE, BUCKINGHAM, MK18 1RQ*. Meantime, may your agricultural efforts be successful—especially if you are aerial-farming!

### BOOK REVIEW

#### "THE RADIO AMATEUR'S HANDBOOK"

*New (53rd) Edition, 1976*

IT would astonish most people to know that, since its inception in 1925, in successive editions the *ARRL Handbook* (as it is generally known) has sold nearly five million copies, all over the world! It is still one of the leading titles in the American non-fiction best-seller list—and each year it gets bigger and more comprehensive.

One of the treasured possessions in our own quite extensive library of books on Amateur Radio is a signed copy of the 3rd edition of the *ARRL Handbook*, dated 1928, by now quite a collector's piece—and we have a copy for most issues since.

The present edition of the *ARRL Handbook* runs to some 700 pages, and is about 1½-ins. thick, weighing nearly 2 lbs. Under 25 chapter headings, it covers the whole field of Amateur Radio, from first principles right through to the construction and operation of an Amateur Radio station.

A vast amount of practical information and constructional data are given—covering receivers, transmitters, power supply units, aerial systems and mobile gear, for all amateur bands from Top to VHF/UHF, in all modes, with a chapter of nearly 40 pages on Test Equipment and Measurements. There are also 26 pages of valve and semi-conductor data—and, as important as anything, a comprehensive 12-page Index, which also indicates the extent of the coverage. It can truly be said "It's all in the *ARRL Handbook*."

There are about a dozen new projects, *i.e.*, those that have not appeared in previous issues. Though an American publication, the common language of Amateur Radio is English and most, if not all, the constructional designs can be repeated using parts or components of the same type or value available from British sources.

An important feature of the *ARRL Handbook* is that it is copiously illustrated—there are circuit diagrams, sketches, photographs or tables on practically every page, and all constructional projects are fully illustrated. The text is in a clear print, the treatment is lucid and easy to read, and the general approach to every aspect of Amateur Radio is essentially practical. The book can be recommended to any amateur, old or new, who needs an up-to-date reference manual to the subject.

*The Radio Amateur's Handbook*, 53rd Edition (1976) price, in soft cover, £5.20, or in hard-back (library edition, same content) £6.75, post free, from: Publications Dept., Short Wave Magazine, Ltd., 29 High Street, Welwyn, Herts., AL6 9EE. Delivery is from stock, despatch day of order.

## VHFCC Awards

**B**EFORE listing this month's winners, a recap on the simple rules for the VHF Century Club certificate. First, all contacts must have been made from one, fixed QTH, which rules out all portable operation and any mixture of main station and -/A operation. Secondly if you have changed from a G8 to a G4 during your accumulation period of the 100 cards, that is quite all right. Thirdly, only direct, station-to-station contacts may be counted; i.e., no repeater or satellite QSO's. Fourthly, when you claim, just send a list of the 100 confirmations you possess to the address at the end of this feature. Six cards will then be selected at random to be submitted for verification. Lastly, the VHFCC is issued for operation on 2m., 4m. and 70 cm. separately.

All two-metre certificates again this month: No. 259 is awarded to Stephen Prior, G8KQB, from Minster Lovell, Oxon., who runs a *Liner 2* into an 8-ele. Yagi at 35ft. He occasionally uses FM with an *IC2F*, but much prefers SSB. Licensed in August, 1975, he had worked 54 counties and 16 countries up to the beginning of March, with 10 watts. George Zitterstein, G8ITS, receives VHFCC No. 260 in recognition of his hard work from his Barbican flat, right in the City of London. By aiming his 8-ele. Yagi at his "... favourite reflective tower block ..." George has managed some excellent DX including OZ and HB. The prime mover is a *KW-2000* to a *Europa-B* and the aerial has since been changed to a 6-ele. Quad. G8JNF is I. D. Berry from Leigh, Lancs. and got his licence at the age of 16, starting on 2m. with a Pye *Cambridge*. His station now consists of an *FT-101*, *Magnum 2* transverter and home built, 4CX250B linear amplifier. The aerial was a 10XY at 45ft. but a 14-ele. Parabeam at 55ft. was projected at the time of his claim for award No. 261. Certificate No. 262 goes to Peter Gamble, G4ECQ, from Hollywood, Birmingham, and includes G8JUR operation prior to the attainment of the full licence, in May, 1975. Initial operation was with six watts of crystal controlled AM using a 4-ele. Quad, indoors. The aerial is now on a 35ft. mast outside whilst the prime

# VHF BANDS

NORMAN FITCH, G3FPK

mover is an *FT-201* with a home built transverter.

Readers who receive QSO's from certain Dutch stations may have seen a sticker on some of them referring to the *Kenemerland VHF-UHF Activity Award*. An application for this was submitted by G3FPK at the beginning of January since when nothing has been heard, in spite of several inquiries to the manager, PAØZV, and to PAØLCR, one of the Kenemerland stations. In view of the number of IRC's required—at 20p each now—it would seem prudent not to apply for this particular Award, since not even an acknowledgement of receipt of the claim has been forthcoming.

### Three Centimetres

The following notes on activity on the ten-Gigs band have been compiled from information given by Don Hayter, G3JHM, during a QSO just before our deadline. Don will be operating as FØAKD from August 1 to 31st this year and invites those equipped for 3cm. to write to him (*QTHR*) for skeds. He will be crystal controlled, in the 10.05-10.10 GHz range, as well as with the Gunn diode oscillator. In last year's operation from the Cherbourg peninsula, G3VPF in Weymouth, Dorset, was worked.

GB3IOW, the 10.1 GHz beacon on the Isle of Wight, has now been heard in at least nine English counties—Berks., Devon, Dorset, Hants., I.o.W., Surrey, East and West Sussex and Wiltshire. Reception in Guernsey has been reported. G3JHM has noticed that when the strength of the GB3VHF beacon on 144.15 MHz increases, so does that of GB3IOW. Don reports that G8DEK (3 miles SW of Winchester) is crystal controlled on 10.061 GHz with 3 watts output to an 18-inch

dish. His signals have been heard at 9 dB above noise, 10 kms. North of Worthing with a 2ft. dish, with three obstacles in the path. Future plans are to try to receive G8DEK at Ditchling Beacon then in the Chilterns. G3JHM can now receive G8DEK, house-to-house, any time, signals being from 7 to 22 dB above that minimum detectable. G3KSU, running 5 milliwatts, has

### QTH LOCATOR SQUARES TABLE

Station	Total	2 m.	23 cm.	70 cm.
G3COJ	109	54	45	10
GD2HDZ	66	41	19	6
G8BKR	79	72	6	1
G8IFT	41	29	11	1
G8FUF	201	138	63	—
G3POI	132	132	—	—
G4BWG	119	102	17	—
G3FPK	109	109	—	—
G4CDF	109	109	—	—
GM4CXP	99	90	9	—
G4DGU	94	64	30	—
G8HVV	86	86	—	—
G6UW	80	80	—	—
G8GML	72	68	4	—
G3BW	68	47	21	—
G2AXI	62	33	29	—
G4CIK	61	61	—	—
G4AEZ	59	44	15	—
GC8AAZ	53	50	3	—
OZ9IY	53	53	—	—
G8KSP	52	52	—	—
G8KLN	51	51	—	—
G8KKX	48	48	—	—
GD3YEO	48	48	—	—
GW8HVP	48	48	—	—
G8JJR	44	44	—	—
G4EYL	41	41	—	—
G3FLJ	40	34	6	—
G8JEF/A	38	38	—	—
G8ITS	32	31	1	—
G8JEF	25	25	—	—
G8JAJ	23	23	—	—
G8JKA	21	21	—	—

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



now worked 8 counties from the Isle of Wight.

The following is a list of some of those active on 3 centimetres. If any readers not listed are, nevertheless either actually on, or plan to get going on the band, please let us know. G3BNL, G3EEZ, G3JHM, G3JVL, G3KSU, G3OBD, G3PQR, G3RPE, G3VPF, G3WDG, G3WJG, G3ZEZ, G4ALN, G4CNV, G5HD, G8ADP, G8AYN, G8AZU, G8BCH, G8BCO, G8BDJ, G8CIU, G8DEK, G8DIC, G8ECO, G8FJG, G8JKV, GW3PPF, GW4AMV. The above are in the Southern part of the realm. FIRJ and PAØDBV are also QRV on 3cm. There is an activity period on the last Sunday in each month from 1000 to 17/1800. G3JHM mentions that many of the amateurs experimenting on 3 cm. are professionally engaged working at these frequencies, and advises that G3WJG and G3THQ are on 5.7 GHz.

#### Nine Centimetres

G3JHM advises that G8AGN (Sheffield) is on this band. G3LQR (Cransford, Suffolk) has a BXY37 giving half-a-watt into a 5ft. dish.

#### Thirteen Centimetres

G4BYV (Dereham, Norfolk) suggests that anyone interested in tests on 13 cm. might like to know that there is a Friday night session from 2130-2330 between himself, G3PQR, G3ZEZ and G3LQR. This starts off on 70 cm. with a later QSY to either 23 or 13 cm. G3LQR tells us that he has a 7289 (2C39A) amplifier giving 10-20 watts into a 5ft. dish. Simon hopes to have SSB on this band soon. During the lift on February 25, he heard a very weak signal from HB9RG.

#### Twenty-three Centimetres

G3LQR has a pair of under-driven 7289's on this band into a 5ft. dish, with a BFR91 converter. Going back to the February 25 opening, Simon worked HB9RG in QTH square EH, G4AEZ (Enfield) with VHF NFD in mind, hopes to have some SSB going on 23 cm. by the summer. Nobody has sent in any up-dated claims for the All Time Table this month. Has nobody worked anything new lately?

#### Seventy Centimetres

The January gales saw the demise of G3LQR's 20ft. dish so Simon is

off the E-M-E circuit. He says "Will have to start again, with something bigger!" The present aerial array for 70 cm. is a pair of WØEYE Yagis, urged by a single 4CX250B final, the converter being a BFR90 affair. During the February 25 event, G3LQR worked HB9RG, plus DJ9VS in QTH square EJ, F1ANH (CH), F50A (CI), F6APU (DI) and LX1DB (DJ). The March 26 Aurora produced a QSO with SM7BAE in GP and 52A/53A reports, Simon's second 70 cm. Auroral contact, the previous one being with GM3ZBE last November. G4BYV reports that conditions were very good on February 24/25; F1SA and F9FT were both 5 and 9 in Dereham, but HB9RG and DCØPP were only S4.

G8HBQ (Leeds) has been rock-bound on 432.18 MHz AM but is now on SSB with a *Modular Electronics* transverter and 46-ele. *Multibeam*. Paul hopes to have an amplifier soon. He remarks upon the upsurge of FM on 433.20 MHz lately. During a QSO with your scribe, G8HBQ mentioned the following as QRV on the band from his area: G3HCW (Knottinglay), who is on CW and PM, G3LRP near Wakefield, G8EOP (Dewsbury), G8EPG (Sheffield), G8INL (Leeds) and G8KB, near Sheffield. Paul would welcome 70 cm. skeds any mode, local or DX, to boost his counties score. (*QTHR*).

GM4CXP (Borders) now has SSB and CW going from his *Microwave Modules* transverter into a 46-ele. *Multibeam* at 44ft. with plans for a 2C39 amplifier. In addition to those mentioned last month, Derrick says that GM3ZBE, GM3EOJ, GM4DSZ, GM8BDX, GM8BKE, GM8DMZ, GM8FFX and GM3PQU are all known to be on Seventycems. G3BW (Cumbria) reckons activity is at rock bottom at present and hopes that things will improve soon. During the March 26 Aurora, Bill reports that some of the SM's on 2m. were asking for QSY to 70 cm. Whilst GB3SC was auroral, no DX was heard at Whitehaven, *via* that mode.

#### Two Metres

The main event this past month was undoubtedly the very extensive auroral opening on March 26 which was enjoyed by stations as far apart as UP2 and I4. Rumour

has it that a GM/14 QSO took place, though no confirmation has yet been forthcoming. For G3BW (Whitehaven) "... the whole band went mad ..." at 1430 GMT. Having been in on quite a few of these events now, Bill admits to having been a bit choosy, working DL, OK, PA, OZ, SM and SP! His greatest pleasure was working UP2BBC (LPØ7j) far and away his best 2m. DX at 1055 miles. G2AXI (Hants.) was a bit late getting in on the act but did work a couple of GM's on SSB which Syd has never done before on 2m. G8HBQ (Leeds) started off at 1403 GMT with GM4AOR (YPØ4b) who reported auroral signals from 1330. GB3GI was 5 dB over S9, whilst GB3VHF was very much 58A. Paul managed four DL's, FICRP and ON6AT in addition to G, GM and GW. He also heard a couple of GI's and an OZ but rightly imagines that all the DX was on CW.

At G3FPK, the event was discovered by accident following repairs to a dodgy coax plug and switching on to see if it worked. First QSO was with G8HBQ at 1435. A quick listen on CW proved the event to be a "big 'un" so most of the time was spent on A1. Prize gotaway was the UP2 who was being called when a telephone call broke in on the proceedings; that was at 1507. Two new QTH squares were bagged thanks to SP2AOZ (JO44f) and GM8BKE (XPØ9f) in Strathclyde, a new 1976 region for the Table. Wherever possible, the beam headings of the stations worked were obtained but many of those on CW did not seem to know what "QTF?" meant. Generally, it was found that the heading from London for U.K. stations was optimum between 015 and 025 degrees, true, whilst not much variation in signal strengths from SM was noticed over 015-030°. DL8ZQA (DKØ6e) was loudest with the beam at 060°. In one QSO, an experiment was carried out to ascertain if there was any difference in readability between USB and LSB, but none was noticed. During a contact with G8KTD in NE Lancs., the latter found little difference in received signal strength or readability when switching from vertical to horizontal polarisation. Amongst the more distant stations worked

were SM5FVH (IT25c) and SM5FND (HT80j). GW3NNF (XN49f) was a welcome first from Gwynedd for 1976, another new one being GM8DOX (YQ61f) in Central Region. GM3JFG (XR40c) is always a very good auroral signal but by 1857 had just about faded out in London.

G4CDF (Messingham, S. Humber-side) started off at 1415GMT and had 48 QSO's, the last being with GM4CXP (YP37c) at 1912. Mike reports that the last station heard was GM3JFG at 1930, and his list shows 13 countries worked broken down as follows:— 2 F, 1 G, 1 GD, 4 GM, 1 LA, 2 OZ, 4 PA, 2 OK, 4 SP, 6 SM, 1 UP2, 3 DM and 17 DL. Pick of the bunch were obviously UP2BBC, OK1FRA (HJ05a), OK1BMW (HK52b), SP5JC (KM56f). The two F's were in BI square. On the matter of beam headings, G4CDF says that most F, G, GM, and PA signals peaked at 010° whilst the DX, such as OK, SP and UP2, same in best at 045° with no signals peaking at more than 050° even though he expected the more distant stations to the East to require a more Easterly QTF. G3LQR was another lucky one who booked in the UP2 plus UC2ABN in NN square, both new ones for Simon. Others worked included SP5JC and SP2EFO (JO54h). G8BKR (Bristol) was tipped off about the Aurora by a phone call from GW4BXE and started up at 1630 GMT. G8HDM (ZO30c) was first Cleveland QSO and John's best DX was GM8AOB (XQ15j) in Fort William. Consistently the strongest signal in London on these occasions is GM3JFG in Fortrose. Iain worked 62 stations including DL7QY in Berlin, plus F and ON and feels that the recent months have been exceptional as far as Aurorae are concerned. He wonders if there really *have* been more such events or is it because of the early warning system?

No Auroral report would be complete without a contribution from GM4CXP. Derrick worked all the countries G4CDF managed, plus HB9, between 1530 and 1930 GMT, adding a further six QTH squares to his score.

To sum up this large-scale Aurora, there is no doubt that the *real* DX can only be worked on CW. Obser-

## THREE BAND ANNUAL VHF TABLE

January to December 1976

Station	FOUR METRES		TWO METRE		70 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	
G5DF	33	3	57	13	13	1	120
G3BW	23	5	46	14	17	5	110
G4BWG	26	3	50	14	8	3	104
GM4CXP	8	2	65	19	6	2	102
G2AXI	23	2	39	9	19	3	95
G4AEZ	20	2	35	8	13	1	79
G3FPK	—	—	61	16	—	—	77
G3BOC	26	3	37	9	—	—	75
G8GML	—	—	46	9	9	1	65
G4CZP	—	—	51	7	—	—	58
G8BKR	—	—	36	8	4	2	50
G8KLN	—	—	36	10	—	—	46
GD3YEO	—	—	35	7	—	—	42
G4BYP	5	2	22	5	—	—	34
G8ITS	—	—	29	5	—	—	34
G8KSP	—	—	24	6	—	—	30
G3FIJ	11	2	10	4	—	—	27
GC8AAZ	—	—	11	7	3	3	24
GD2HDZ	1	1	1	1	2	1	7

vations on SSB signals at G3FPK revealed that some were relatively easy to read whilst others were well nigh impossible to tune in. It is naturally tempting to work as many stations as possible on these occasions and often one hesitates to suggest time-consuming tests once a QSO has been established. However, it would be very interesting to try to ascertain if there is any advantage to be gained from, say, circularly polarised aerials, whether or not speech processing is beneficial—observations here suggest very much the reverse—and so forth. It is also very instructive to have contacts with nearby stations being received directly as well as from the Curtain so as to determine any Doppler shift.

A few days after the March 26 affair, we received advanced warning of another Aurora due on April 1. When your scribe and others passed on this information, there were, understandably, quite a few who figured it to be an April-Fool spoof. Of course, even though there was every indication that the very large

sunspot group—area some 825 millionths—due to cross the Sun's central meridian at midday on March 31, *should* spew out enough particles to cause an Aurora, there could be no guarantee that it would. It was, therefore, with a sense of relief that the familiar signals were heard in the early afternoon, the first QSO at G3FPK being with GM4BVD (YQ43e) at 1336 GMT. As far as we in the South were concerned, this one proved to be a bit disappointing with no real DX being copiable. A new county in Tyne and Wear was worked for 1976, thanks to G3YRH (ZP37f), the only other countries worked being GD and GW. Beam headings were all 015° the signals soon disappearing either side. The last QSO was with GD3YEO at 1600 when the strongest signal from Richard came in at 025°. GD3YEO's QTF was 066°.

G4CDF did quite well in this event with seven countries worked, DL, G, GM, GW, LA, PA and SM. Mike lists 15 contacts between 1330 and 1754, the last station heard

being GM4CXP at 1805. A good one was GM3ZDH in Wick, for QTH square YS, the best DX being SM5FVH in IT25c. This time, beam headings for the U.K. and PA stations were much more East, being between 030 and 050 degrees, whereas the SM's were better with the beam more Northerly. G8HBQ has hoped that the April 1 event would be a good one but was rather disappointed at only working GM8CMV and GM8FFX, plus "half a QSO" with G13GXP. GM3JFG also found all signals weaker but nevertheless notched up 40 stations including ON. Prize gotaway was a UA1, who, whilst only S1, was quite readable, but who does not seem to have had the keen ears of Iain! "So it wasn't 'April Fool' after all!" is how GM4CXP starts his report. Derrick missed the start but did work a string of G's and one PA between 1526 and 1809 GMT. Other countries heard included DL, LA, ON and SM, plus an OH2 at RST 21A.

The third Aurora was in the afternoon of April 3, but was a mini event, in the South. At G3FPK, only CW contacts with GM3JF and GM4CXP were achieved and many stations were quite unaware of any Aurora at all. We were on the fringes of this one. G4CDF's log shows 10 contacts between 1541 and 1805 GMT, only OZ10F (EQ78f) being outside of the U.K.; QTF for one was 040° whilst the others were all 005-020 degrees.

For the rest of the period, conditions have been generally rather flat but with occasional more DX-type tropo. signals popping up. On March 28, conditions were good to the South and West in the evening strong signal reports being exchanged with GC4ASO, GC8FBO and GC8JKS in Guernsey and Cornish stations G3GZJ, G3NPB and G8JAB. Also from G3FPK, GC3JHM/P in Alderney gave a new 1976 county. Don was using just a *Liner 2* and a dipole. The same evening, March 20, during a multi-way with G8HAL/A on the Long Mynd (Salop) and other stations, EI9Q was worked although only S3 reports were exchanged. Dick has 200 watts output to his 6-ele. Quad. On several occasions, GM4CXP and GM8FFX have been worked by

your scribe and others who happened to be beaming North. This occurred on March 31, April 1 and 7th, often with very deep QSB.

GD8EXI (Port Erin) is now very active again. Richard reports that the main activity from the Island is between 2300 and 2400. He advises of a Monday evening, EI/GI net on 144.310 MHz so we have asked him to try to persuade them to shift it away from the racket of the calling frequency is they want to try to get over here. GD8EXI has recently worked GI8JQZ (Antrim) but who has a poor QTH for the mainland, GI8KIA (Antrim) and GI8KYJ (Tyronne) who has a good signal. Richard has not heard GI8HXY lately, whilst GI8EWM has been busy with his finals. It is hoped to get going some system with GD8EXI rounding up GI's with reasonable signals to try to work into the further corners of the Kingdom.

Finally, the Home Office has asked us to remind readers that the frequencies that have to be avoided are 144.0 and 144.54 MHz—a point worth remembering in these days of VFO control.

#### Four Metres

G4AEZ reports a successful sked with G4ASR/P at Lands End following the abortive 2m. attempt in March. G2AXI called GM4AOR in the April 1 Aurora on CW but no luck. G4DWZ (London) has also heard him at 55A. G3BOC (Salop) has rejoined the fold and was QRV for the March 26 Aurora. Harry found it easy to read 4m. SSB stations whereas on 2m. he reckons it to be almost impossible. G3BW has spent quite a bit of time on the band but finds activity very low, even though GB3SX is copied fairly regularly. Bill hopes that might encourage Southern stations to try the Northern path. He too spent the last hour of the March 26 Aurora on Four, working G3AUS (S. Devon) but reports activity far lower than on Two. G3BW puts out a call on 4m. every evening at 2000 BST, by the way. GM4XCP worked G5UM *via* Au. on March 26.

#### Contests

GM3YOR (Kirkcaldy) reports poor conditions for the 4m. Open Contest on April 4 with 17 QSO's. Several G's were heard at low strength on SSB and Drew feels sure

some contacts would have been possible had they switched to CW. Best DX was with GW3ONP/P (YM44d). Of the GM's he worked, only 4AQO, 4BHU and 4BQ were rockbound, transceive, on 70.26 MHz, AM. 3AEY and 4BYF were 70.26 AM "transmit," with tunable receive, 3IVZ being CW/AM on 70.29 but tunable "receive," and 4CXP 70.26 and 70.32 Tx, tunable Rx, SSB/CW. The rest were fully tunable Tx/Rx on SSB/CW/AM. Further comments on the 2m. Open on March 6/7; "... what a fiasco!" G8KKX. "... what a demoralising event?" G4AEZ. "The 200 km. rule spoils the contest... hope this is the first and last time we see this unfortunate rule." was the opinion of the University of Lancaster Group operating as G8DOU/P. Their spokesman, G8ILO, wrote a chilling account of the Spartan conditions, 1400ft. up in the East of the Forest of Bowland. The Calor gas, as well as their feet, froze up!

Your reports, please, on the 1.3 GHz Open on April 24/25 and you will just have time for your reports on the 432 MHz Open over May 1/2 before our May 7 deadline. The 144 MHz Portable Contest is on May 22/23, 1600/1600 GMT, with the 144 MHz Open CW Contest on the 23rd from 0800-1600 GMT.

#### Beacons

GB3DM has been taken out of service for overhaul and will reappear on its new QRG of 144.935 MHz. GB3EM is putting out a good signal on 432.91 MHz from Emley Moor. GD8EXI reminds GB3GI listeners that this beacon on 144.137 MHz switches its beam heading every two minutes so one should listen for some time for it before concluding conditions are poor. Last month we mentioned the French plans for 2m. and 70 cm. beacons. From the April issue of *Radio REF* we learn that 500 watts e.r.p. is proposed for all these beacons.

#### VHF Convention

May 8/9 is the weekend all VHF/UHF buffs will be looking forward to, at Brunel University, Uxbridge, Middx. This is a far better venue than the "Winning Post." Your conductor plans to be there and at the dinner.

#### Repeaters

G3BHT reports that the Turners Hill job, GB3BM on R5, is going

great guns. The 70 cm. repeater at Race Hill, Brighton, GB3BR, is now licensed for RB6. At their recent AGM, the Isle of Man Amateur Radio Society voted unanimously *against* repeaters.

### DX-Peditions

The Cambridge University Wireless Society plans to make the pilgrimage to Scotland from June 11-20 incl. GM6UW/P will be on 144-275 MHz from 1900-2300 GMT with GM4CIK/P on 70-17 MHz 1900-2000 and 2200-2300, both stations SSB/CW. During the journey, G(M)8IBO/M will be on SSB. Please send s.a.e. for skeds to Nigel Houlst, G4CIK, 40 Lower Park St., Cambridge.

In view of the increased interest in the QTH squares, G3POI G3FPK and others suggest that a tour, in the G6UW style, to Ireland to activate some of the rarer squares would be very welcome. Any offers?

### Satellite News

From June 16-18, commencing with orbit No. 7245, AMSAT is planning QRP tests on Mode B including Wednesday. To make this experiment a success *all* users are requested to restrict their power to *ten watts e.r.p.*

### Final Miscellany

Clanger! C2 in Fig. 1 last month (p. 102) should be 47 $\mu$ F, not 47pF. Those of you who counted GW4BSP/P as Gwynedd in the 2m. Open will be disappointed to read that the station most definitely was in Clwyd. G3LKK (Horsforth) is a keen VHF SS/TV type and wonders if the mode is dying a death on 2m.? Dick reports that G3UEU (Colne) is another devotee and they would welcome some more activity. G8ILO asks if a mobile can take part in the QTH square table. No Julian, only fixed stations. Concerning our mention of G3OSS's tests on inter-

ference to hi-fi sets, G8ILO offers a reward to anyone who can cure his Father's *Goodmans* "One-Twenty" stereo amplifier/tuner of picking up his 2m. FM and SSB. *QTHR.*

Lastly, Edgar Brockmann, DJ1SB, advises that PA0FTF (CK10e) will put out automatic "CQ E's" on 144-095 MHz from 0800-1800 GMT during the coming Sporadic-E season. The call will be 60 seconds followed by a 15 seconds listening period, after which it will start again in the event of no response. This will be at weekends or other free days.

### Deadline

Ring May 7 on your calendars for the next issue and June 4 for the July one. All your offerings—not forgetting the "Liner Clinic"—to:—"VHF Bands," *SHORT WAVE MAGAZINE*, BUCKINGHAM, MK18 1RQ. 73 de G3FPK es CU at Brunel.

## THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for June issue: May 7)

### Up North

York starts the ball rolling; they have a place at the British Legion Club, 61 Micklegate, York, on Fridays, *except* the third Friday each month. Activities seem to be of various sorts, with special-activity stations prominent at various local functions. May 5 (and the overflow on May 12) sees them off to the local Sorting Office to see how it's all done.

For Tyneside we have simply an enigmatic letter to mention a correction to an earlier one which wasn't received! Never mind, doubtless the Secretary—see Panel—will be only too pleased to put you in the picture as to when they foregather and where.

White Rose are based at 83 Town Street, Armley, Leeds 12, where they have shack, lecture room, library, workshop facilities and canteen; a good Top Band half-wave aerial is up aloft, and a good pub next door with whom they are on friendly terms—what more can a Club want, save a programme? As for that, the newly-elected secretary is doing his best to ensure a better card than even his predecessor.

The other Leeds group, Star, also meet on a Wednesday, their place being the New Inn, Bramley Town Street, Bramley, Leeds 13, each week. For May, we understand the emphasis is on TV DX'ing, with details of simple mods to your old TV to fit it for the new task.

How nice it is to hear again from G3MDW of Northern Heights, who tells us the venue is still the Peat Pitts Inn, Ogden, Halifax, on Wednesdays; May 19 is

down for a quiz against Denby Dale at the latter's Hq., with the return match slated for June 9, at home. One was rather amused by Arthur's comment about the Treasure Hunt on June 30 "I hope, *this* time, they find the pirate!

All the groups in the Sheffield area seem to be in the "Association of Sheffield Amateur Radio Clubs" and to have both co-ordination in their programme planning on the one hand, and combined meetings on the other. The Association meeting is at Room 3106, Sheffield Polytechnic, and is given by G3CSG; Sheffield are at the Sheaf House Hotel, Bramall Lane, on the third Monday in each month; the University and Polytechnic combined group are at the "Phoenix" in Charles Street, 5.30 every Thursday; and Workshops also have weekly Thursday sessions, their being at "The Anchor" in Workshop.

### Midlands

Where better to start than at Midland, who announce that from July they will break their age-old tradition of having Hq. at the Midland Institute, because of rising costs; they will move to the University of Aston at Gosta Green, Room 110. Meantime, for May 18, they have a talk and demonstration of the Post Office Radiophone System, by G4ELO, at the Midland Institute, Margaret Street, Birmingham. In addition, a new departure from September will be the booking of a room at Brasshouse Lane Centre of Further Education, off Broad Street, for an extra Meeting each month, which will probably be some sort of informal or constructional session.

South Birmingham have bookings at West Heath Community Centre, Hampstead House, Fairfax Road, West Heath; the first Wednesday in each month is *the* meeting, but "the shack is open" every Friday evening as well. For May 5, there is a lecture with slides on the working of the West Midlands Motorway Links control

centre, given by the West Midlands police, which we understand is to be followed in July by a visit to the centre.

**Bury** next, where they get together at the Mosses Community Centre, Cecil Street, Bury, every Tuesday, the second one each month always being kept as the "formal" for which some sort of lecture or whatever is fixed up, while on the others you have the choice between a natter, R.A.E., or Morse.

The **Greater Peterborough** crowd have Hq. at Southfields School, Stanground, with the booking for the fourth Thursday, starting at 7.30. No details are noted of the activity for May, though we notice G8COB did them proud with his talk on Aerials back in March.

As for the other **Peterborough** group, we only have news of them indirectly this time—for their "vital statistics" we refer you to the secretary—see Panel.

On to **South Manchester**, where the Friday evenings are the main events, at Sale Moor Community Centre, Norris Road, Sale. May 7 is down for a review of Club goings-on, and the 14th for the AGM. Then there is May 21, for a D/F contest, and a visit to Greater Manchester Fire Services on May 28.

**Wirral** have another Problems Night on May 5—a popular item on the programme of this Club, regularly—in which members bring up their problems in the Amateur Radio field, however simple they may be, and they are solved by the others. As for May 19, that one is the NFD meeting—this year they hope to have enough bodies to enter the VHF NFD contest at least.

On to **Sutton Coldfield** who have been silent for a long time now; they seem to have changed Hq., and now are to be found at Sutton Coldfield Youth Headquarters, Clifton Road, on the second and fourth Mondays of each month. For May, we see that on the 10th they will have a look at the Scout Communications Caravan, superintended by G8ALO, and on the 14th a session on Spectrum Analysis, when G3MNV will be using his own home-built analyser to explain what it's all about.

**Northampton** get together at Spencer Dallington Community Centre, Tintern Avenue—the address is given as "off Gladstone Road." There they are to be found on every Thursday evening, with, on average, two talks or "set pieces" every month right through until November; a pity we could not keep all these in the file, as the Hon. Sec. is about to go out of circulation and into the examinations—best of luck! For May, G8GHZ and G3XTT will be talking about Contest Operating, and on 27th G4DAW talks about the measurement of SSB Power.

Quite a change on May 14 for **Bromsgrove**; they have a talk on Dowsing—and they reckon that if they find underground water, it should help their earthing problems! Seriously, though, dowsing is a technique that is well enough substantiated, a sensible explanation is yet to be found and proven, most "scientists" when confronted with the effect claiming it to be mere *hokum*, despite the number of times it has been used successfully after the scientific types had given up looking.

**Nottingham** next, where Woodthorpe House in Mansfield Road is their base, this being Sherwood Community Centre. On May 6 there is a Forum, and on May 13 they will be having a talk by QRP-man,

G3RJV; this is followed by an Activity Night on May 20, and the month is rounded out by a Tape Lecture.

**Derby** are at 119 Green Lane, Derby, at 7.30 on Wednesdays; but the room is open on Tuesdays and Fridays too, for R.A.E. and Morse tuition. May 5 sees a Surplus Sale, and on the 12th the ladies take on the men in a Quiz, this meeting being one of their regular "Ladies' Nights." May 19 is a D/F Practice, and on May 26 there is a discussion on technical topics.

### Wales & West

Further west in fact, to Northern Ireland, where we have a report from **Bangor**. They have upwards of 80 members, who foregather on the first Friday in every month (saving for June, July and August) in Redcliff Hotel; this is also the place where they have the Club shack and workshop facilities, open every Tuesday evening. R.A.E. has been tackled, thanks to their enthusiasm, by Bangor Technical College, under the tuition of G13WSS. The May formal will be in the nature of films, the main one being the Activities of a Coastguard Station. A little further ahead, we see that there is a Mobile Rally—June 20 at Castlewellan Forest Park.

Back on the mainland, our first call is at **Yeovil** where we notice their faithful scribe now signs as G4EVI—congratulations to him! May 6 is the AGM, and on May 13, G3XFW will be talking about "Using Transistors." May 27 will be a popular one for sure—a Junk Sale. The general form is that the members assemble every Thursday evening at the Youth Centre, 31 The Park.

GI, G, and now GW. **Blackwood** have an advance notification of their annual Welsh Amateur Radio Convention, which is down for September 26, at Oakdale Community College, Blackwood in Gwent, South Wales. From the letter-heading this is also the Hq. address, so for more data on the local gang—see Panel for the Secretary's QTH.

**Bristol (RSGB)** are one of the few groups that have the courage of their convictions and issue a membership card with all the next year's activity lined up. From it, we see the Hq. is at Becket Hall, St. Thomas Street, which is near Bristol Bridge, where, on May 24, they will have Prof. G. F. C. Rogers of Bristol University, answering the questions "Energy Conservation—Choice or Necessity?"

### Southern

Our first stop under this heading is at **Southgate**, where the Hq. is at "the usual place." For a newcomer that is a great help! However, memory tells us there is a Scout Hut in Wilson Street, near Winchmore Hill Green, where they may be found on the second Thursday in each month—for May we have it that TV detection is the subject, so presumably this means "with Post Office assistance."

Further towards the Equator yet is **Medway**, where the group gets together in the Aurora Hotel every Friday evening, this venue being known to thousands of the older generation as the "Gillingham NAAFI Club." No more details as to what goes on, but we do know they have their own room, and no doubt the Secretary would be pleased to tell the rest of the story.

On to **Horndean**, who have been running for seven months and now have thirty-plus members to attend the

regular gatherings at Merchiston Hall, London Road. May 13 will be a Junk Sale and on Sunday they have a local net starting at 1830, on 21.40 MHz.

**Thames Valley** consider they are fortunate in having their Hq. at Giggs Hill Green Library, Thames Ditton, where they will be on May 4, no doubt resolving their doubts and details for the NFD entry. A point the Publicity lad lays stress on here is the welcome for any newcomers.

At **Maidenhead**, where again G3FVC has phased himself out of the secretary's chair, and G4ALG complains that he was elected because he nodded at the wrong time, he having forgotten that an AGM is a little like an auction! Find him—and the group—on the first Thursday and the third Tuesday of each month at the Red Cross Hall, The Crescent, Maidenhead.

The Victoria Hotel, Latimer Road, Eastbourne, is "home" for the **Southdown** crowd, and on May 3, G3MXJ will be talking to them about the past, present and future of Amateur Radio.

An Audio Speech Processor is the topic for **Acton Brentford & Chiswick**, the builder and demonstrator being G3CCD. This one is on May 18, at the Chiswick Trades and Social Club 66 High Road, Chiswick, London, the start being at 7.30 p.m.

Home-Brew is *not* a thing of the past! This is the triumphant word from **Sutton & Cheam** after their recent home-construction trophy entry had been under the eye of the judges—this follows the experience in your scribe's own Club where the home-construction trophy has been known to produce an *entry from every member present*, and that without prodding. Anyhow, the lads get together on the third Tuesday in the month at the Sutton College of Liberal Arts, and the May meeting will be largely concerned with Ways and Means in that they are to enter a station in NFD and put on an exhibition station at Benhilton Fayre *the same day!*

We have included this entry in the Southern clip even though it refers to the Royal Navy Club; they have a sub-section based on **H.M.S. Belfast** opposite the Tower of London, where the Hq. is the Bridge Wireless Office. This is being turned partly into a shack and partly at least into a fairly true representation of the appearance of the BWO on board during the ship's active life. The next meeting will be on May 24, at 1900.

A new committee have taken office at **Winchester**. They are still getting together at Antrim House, St. Cross Road, on the first and third Fridays in each month—a programme will be given just so soon as the committee can get things all teed up.

Now a Special Meeting: **Dorking** have one on May 4, at Mulberry Centre, Junction Road, Dorking (behind Waitrose). This is to discuss Club re-organisation and future programme, and all, licensed or SWL, member or not, are equally welcome. For more details, refer to G3JKV at the address in the Panel.

**Echelford** had their AGM just before this came to the typewriter, so the new committee are probably right now in the process of thinking up what to present in the next year. However, we can tell you that they foregather on the second Monday and the *last* Thursday in each month, at St. Martins Court, Kingston Crescent, Ashford, Middx.

**Cray Valley** have a talk on "Ceefax" by a member of the BBC staff for May 6, and a Natter-Nite comes up on May 20; for June, we see on the 3rd, G2MI will be reminiscing on Early Days, and then the natter will be on June 17. All these functions will be held at Eltham United Reformed Church Hall, 1 Court Road, London S.E.9.

We would almost run a separate Eastern section this time if we were to bend the map a little; and the first on the clip would have been **Colchester** who have Hq. at Stanway School, Winstree Road, Stanway, where they may be found on any Wednesday evening in term-time. In May they have two "at home" evenings, on the 5th and 19th, but on May 12 they are going out to visit the new communications centre at Harwich Docks, and on the 26th to look at Colchester Hospital Radio.

Then there would be **Stowmarket**, with a monthly date at Stowmarker Adult Centre, on the first Monday of every month; for more details we must refer you to the Secretary.

One supposes **Bishops Stortford** would be on the edge of such an area listing; they have a Quiz set for May 17, the compiler of the puzzles being the new Secretary; this one is, as usual, at the British Legion Club, Windhill.

**Surry** seem to have made a change of venue, to the *T.S. Terra Nova* of the Croydon Sea Cadets, 34 The Waldrons, Croydon, which is very close alongside the Croydon Flyover. In addition, it has been necessary as a result of this to change the date of the meetings to the third *Wednesday*.

Another group to have been revising their dates, though in this case not their Hq. location, is at **Basingstoke**, where they now have the first Saturday in each month for practical work, station operation and like activities; and the third *Wednesday* for the formal session of talks or films or whatever. The venue is still at Chineham House, Shakespeare Road, Popley.

**Verulam** have their main meeting on the fourth Thursday in each month in the Market Hall, St. Albans; during the summer there are also informals at Salisbury Hall, London Colney on the second Thursday each month.

Another lot to favour Thursdays is at **North Kent**, who use the second and fourth in each month; for them the venue is at St. Mary's Institute, 2 North Cray Road, Bexley; and the May 13 date is the vital one, being the AGM.

It seems quite odd to receive a **Crystal Palace** newsletter without the G3FZL signature on the bottom; but he has, after all these years, given up as Secretary, his place being taken G4AVV. They next get together on May 15, when at the moment the activity is "to be confirmed" but will doubtless be settled by the date. Hq. is at Emmanuel Church Hall, Barry Road, London, SE22.

### Finishing Up

That's the bottom of a bumper crop, largely inflated by the tightness of the last month's deadline. For next time, your deadline will be **May 7**, containing all your June dates, venues, and so on. The address is, as usual, "Club Secretary," *SHORT WAVE MAGAZINE*, BUCKINGHAM, MK18 1RQ.



PAUL  
G3VJF

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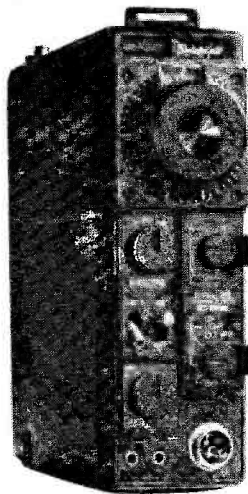
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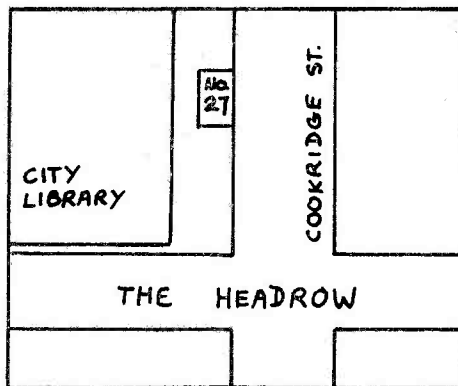
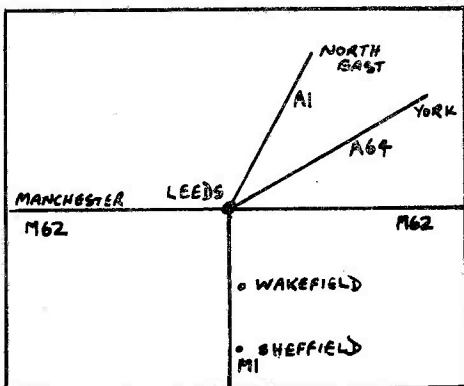
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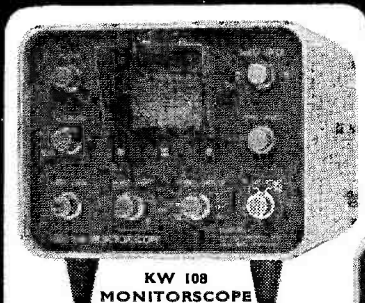
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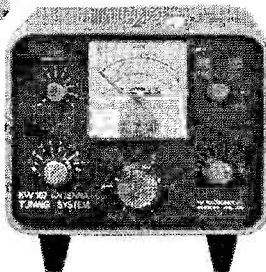


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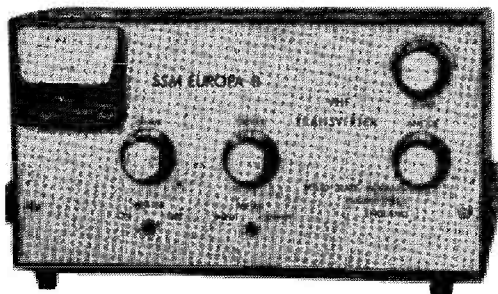
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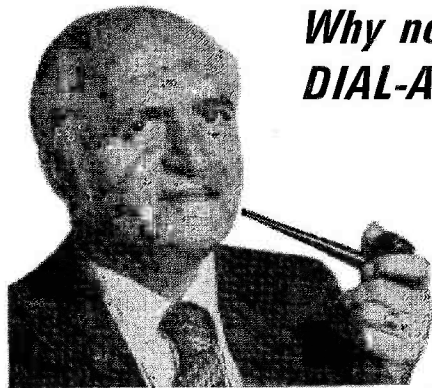
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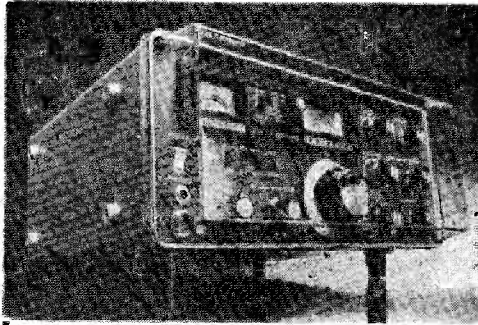
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FR101DL general coverage rx.	£350
FR101DL as above with	
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FL101 transmitter ...	£275
FT201 transceiver ...	£310
FT501 transceiver with p.s.u.	£425
FT224 2m. 10W transceiver ...	£130
FT221 2m. AM/FM, SSB tx/rx...	£318
FL2100B linear amplifier ...	£230
YC355D counter 200 MHz ...	£135
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FV101B ...	£52
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J-BEAM ANTENNAS	Price	p/p
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5Y 2m. 5 ele. Yagi ...	£4.90	(75p)
8Y 2m. 8 ele. Yagi ...	£6.40	(75p)
10Y 2m. 10 ele. Yagi	£12.60	(1-00)
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PBM 14 2m. parabeam	£19.20	(1-00)
D5 2m. 5 over 5 ...	£9.00	(1-00)
D8 2m. 8 over 8 ...	£12.00	(1-00)
5XY 2m. Crossed Yagi	£9.40	(1-00)
8XY 2m. Crossed Yagi	£11.70	(1-00)
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Yagi ...	£16.15	(1-25)
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beam ...	£12.50	(1-00)
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PMH/2C phasing		
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boot lip mount ...	£9.75	(65p)
Bantex magnetic mount	£7.95	(50p)
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coil and base ...	£6.35	(85p)
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mounted bases ...	£5.25	(25p)
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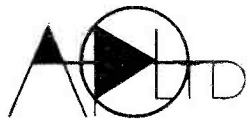
ICOM RANGE	Price
IC22A 2m. transceiver, 22	
channel with 10 xtals fitted	£140
IC225 2m. 80 channel ...	£220
IC201 2m. VFO 10 watt	
12v./230v. FM/SSB ...	£315
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scal cone burst if required.	
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N.B.—ASP AERIALS AND FREQUENCY COUNTERS SUBJECT TO 8% VAT. OTHER ITEMS 12½% VAT.      ★ FREE PARKING AT REAR OF SHOP

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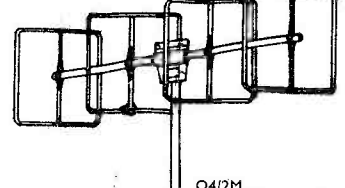
DEPT. 312,  
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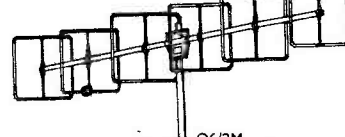
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\* Tone burst delay circuit to give the best access with the shortest tone.  
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Power rating 1kW, Length 1.5 metres  
AT NEW LOW PRICE, £10.80, inc. 12.5% VAT



Gain: 12dB, Horizontal Beamwidth 36°  
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OUTPUT FREQUENCY														
144-030	...	b												
144/433-2	...	b												
144-480	...	b												
144-600	...	b												
144-700	...	b												
145-000/SO	...	b												
145-050/R2T	...	b												
145-075/R3T	...	a												
145-100/R4T	...	a												
145-125/R5T	...	a												
145-150/R6T	...	a												
145-175/R7T	...	a												
145-200/R8T	...	a												
145-300/S12	...	b												
145-350/S14	...	b												
145-400/S16	...	b												
145-500/S20	...	a												
145-525/S21	...	a												
145-550/S22	...	a												
145-575/S23	...	a												
145-600/S24	...	a												
145-650/R2R	...	b												
145-675/R3R	...	b												
145-700/R4R	...	b												
145-725/R5R	...	b												
145-750/R6R	...	b												
145-775/R7R	...	a												
145-800/R8R	...	a												
145-950/S38	...	a												

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CRYSTAL TYPE	HC6/U	and 4039	£2 each.	25% discount 10 or more.	2179	2189	2222	2753	2760	2764	2802	2805	2840	2854	2868	2875	2889	2938	2948																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
2951	2952	2954	2957	2966	2985	3023	3232	3319	3333	3354	3375	3389	3396	3403	3404	3410	3411	3417	3419	3431	3432	3438	3445	3473	3481	3488	3854	3868	3869	3876	3883	3889	3897	3904	3911	3918	3924	3925	3932	3938	3939	3946	3966	3973	4002	4118	4320	4365	4432	4467	4481	4654	4668	4674	4686	4709	4730	4744	4751	4758	4765	4786	4800	4807	4814	4821	4828	4843	4952	5000	5010	5025	5092	5119	5133	5140	5147	5154	5161	5224	5231	5238	5252	5259	5266	5273	5280	5287	5294	5301	5320	5326	5338	5332	5337	5341	5345	5349	5354	5362	5366	5378	5379	5383	5389	5400	5415	5438	5455	5506	5521	5524	5525	5589	5611	5619	5649	5668	5910	5920	5934	5952	5956	5964	5971	5984	5985	5986	6084	6089	6091	6093	6106	6110	6121	6125	6132	6136	6143	6145	6165	6171	6182	6187	6198	6210	6221	6332	6337	6376	6387	6410	6415	6423	6431	6488	6495	6498	6502	6506	6509	6511	6522	6552	6554	6559	6567	6589	6598	6604	6607	6611	6619	6627	6632	6649	6657	6662	6677	6686	6721	6729	6743	6820	6937	6937	7137	7167	7171	7177	7210	7270	7311	7319	7326	7341	7356	7354	7371	7379	7386	7394	7401	7409	7424	7431	7439	7446	7461	7491	7500	7533	7542	7552	7557	7562	7566	7567	7572	7577	7582	7583	7587	7600	7616	7633	7664	7683	7685	7700	7716	7732	7766	7850	7866	7883	7950	8116	8133	8139	8150	8266	8345	8350	8359	8357	8360	8366	8387	8402	8409	8410	8417	8432	8447	8454	8484	8516	8845	8854	8862	8871	8930	8953	9096	9285	9293	9302	9313	9319	9327	9336	9344	9353	9361	9370	9378	9395	9404	9412	9413	9421	9432	9461	9487	9519	9781	9815	9837	9845	9863	9868	9871	9873	9883	9893	9937	9962	kHz.	10021	10031	10062	10087	10112	10137	10158	10162	10187	10212	10237	10262	10287	10437	10465	10486	10513	10549	10908	11250	11500	11520	11859	12087	12312	12337	12362	12387	12412	12437	12412	12487	12512	12537	12562	12587	12612	12637	12687	12712	12737	12750	12762	12787	12837	12900	13032	13075	13087	13112	13137	13162	13187	13212	13237	13262	13287	13329	13337	13350	13327	13375	13304	13312	13337	13350	13387	13412	13425	13427	13462	13487	13500	13540	13590	13640	13690	13729	13739	13740	13747	13749	13750	13769	13779	13789	13790	13799	13809	13840	13890	13940	13972	13990	14112	14250	14408	14416	14500	14750	14762	14787	14812	14848	14887	14898	14912	14937	14948	14962	14987	14998	15000	15012	15037	15048	15062	15087	15098	15112	15137	15148	15162	15187	15198	15212	15248	15250	15262	15287	15294	15298	15311	15337	15344	15377	15511	15512	15537	15544	15561	15562	15577	15587	15594	15611	15612	15617	15623	15662	15686	15712	15725	15737	15762	15772	15837	15887	15912	15937	15962	16837	18247	18250	18372	18431	18497	18662	18747	18872	18997	19122	19247	19372	19497	19512	19747	19872	23720	23720	23820	24620	24720	24820	25020	28000	31200	31225	31250	31275	31300	31325	31350	31375	31400	31425	31450	31475	31500	31521

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2572	2575	2577	2580	2588	2863	2868	2909	2922	3166	3166
2979	2983		2987	2995	3137	3150	3154	3158	3166	3166
3170	3225	3227	3236	3254	3339	3418	3423	3475	3481	3479
3505	3818	3866	3925		4131	4166	4222	4228	4231	4232
4238	4266	4275	4351	4354	4381	4444	4447	4448	4450	4451
4452	4454	4458	4458	4459	4528	4530	4573	4616	4619	4620
4621	4623	4624	4625	4626	4630	4633	4644	4722	4739	4743
4744	4745	4746	4747	4750	4753	4754	4755	4756	4757	4758
4759	4760	4761	4763	4764	4775	4777	4787	4791	4793	4795
4803	4804	4805	4807	4816	4817	4825		6423	6455	6708
6745	6746	6748	6749	6752	6753	6754	6756	6757	6802	6822
6933	6937	7015	7016	7017	7018	7019	7020	7203	7204	7205
7206	7207		8368	8400	8477	8631		9461	9529	9545
9160	9288	9375	9381	9387	9404	9406	9410	9461	9529	9545
9562	9566	9841	9859	9891	9925	9941		10025	10040	10141
10158	10208	10324	10325	10341	10355	10365	10366	10367	10394	10483
10496	10524	10525	10536	10650	10681	10687	10692	10693	10694	10695
10696	10698	10699	10701	10703	10704	10707	10708	10709	10710	10711
10713	10714	10716	10717	10724	10732	10733	10741	10742	10760	10764
10767	10772	10785	10786	10798	10807	10814	10929	10933		
11004	11016	11049	11065	11066	11067	11107	11132	11133	11142	11157
11158	11159	11504	11637	11752	11897	11908		12287	12288	12290
12293	12294	12295	12300	12302	12306	12305	12308	12378	12379	12380
12313	12312	12370	12371	12372	12373	12375	12376	12378	12379	12380
12381	12384	12387	12390	12391	12392	12394	12395	12400	12406	12409
12467	12468	12469	12473	12474	12475	12476	12477	12478	12479	12480
12484	12486	12491	12522	12523	12524	12526	12527	12528	12529	12530
12531	12532	12533	12534	12535	12536	12537	12538	12539	12541	12543
12544	12545	12546	12548	12550	12559	12562	12572	12586	12480	12482
12483	12485	12487	12488	12489	12490	12492	12493	12494	12496	12503
12704	12706	12802	12816	12851	12856	12858	12859	12867	12868	12909
12950	12964	12966	12967	12968	12969	12972	12973	12975	12976	12977
12978	12979	12980	12981	12983	12984	12985	12986	12987	12988	12989
12990	12991	12992	12994	12995	12996	12998		13001	13009	13017
13032	13041	13052	13055	13061	13071	13088	13090	13100	13106	13117
13121	13128	13145	13146	13209	13260	13266	13301	13327	14085	
14157	14158	14177	14161	14164	14166	14167	14168	14169	14170	14171
14172	14173	14175	14174	14177	14178	14176	14179	14181	14182	14183
14183	14184	14185	14186	14187	14250	14251	14252	14253	14254	14255
14256	14257	14259	14260	14261	14262	14264	14265	14266	14267	14269
14271	14273	14274	14275	14276	14278	14279	14360	14361	14362	14363
14364	14365	14368	14369	14370	14374	14375	14377	14378	14381	14382
14384	14385	14387	14389	14390	14406	14408	14410	14412	14414	14423
14424	14425	14426	14428	14429	14431	14432	14433	14434	14435	14439
14442	14445	14446	14447	14449	14450	14481	14484	14485		15268

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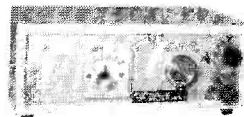
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### READERS

**Wanted: Marconi Mercury receiver in good working order; or W-H-Y in the way of LF receivers? (London).—Box No. 5501, Short Wave Magazine Ltd., 29 High Street, Welwyn, Herts. AL6 9EE.**

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**For sale:** HW-100 with AC/PSU and mic., reasonable condition, £125 or near offer. — Nicholls, G3VMZ, 49 Mills Road, Melksham (704935), Wilts.

**Sale:** Eddystone EC-10 Mk.II, brand new, unused, £150.—Ring Leighton, Guildford 66543 evenings.

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**Selling:** HW-17A, two-metre, 10 watts, switchable AM/FM, auto tone burst, channels R6, R7, S20, S22, 9 xtals, spare valves/output transistors, mobile mountings, DC/PSU, all manuals, £70 or near offer. — Ring Trickey, G4DCX, 0272-671409.

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**For sale:** HRO receiver, coverage 1-30 MHz, good condition, £15. Courier Portapack 130 MHz aircraft-band transceiver, unused, (new £120) accept £25. No. 52 Set receiver, £6. — Ring Watmough, G3WXB, Eastbourne 35311.

**Selling:** Trio JR-310 receiver, with narrow filter, £65. — Ring Jenson, 021-353 3337 (Sutton Coldfield).

**For sale:** Heathkit HW-101 SSB transceiver, factory aligned, mint condition, never used, light oak desk included, £175. (Bereavement reason for sale). — Bond, 98 Horne Street, Bury, Lancs.

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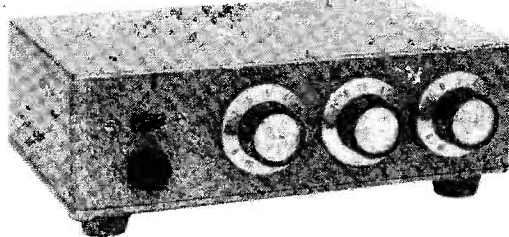
**Sale:** Hammarlund HQ-17A receiver with speaker and manual, £70. Buyer collects. — Passnett, 11 Purley Hill, Surrey. (Tel: 01-660 5709).

**For sale:** Trio JR-599 receiver, coverage 1.8-30 MHz and 2-metres, with unused 5XY/2m. antenna, £130. Buyer to inspect and collect. — Russell, 23 Garston Crescent, Calcot, Reading (28603), Berks.

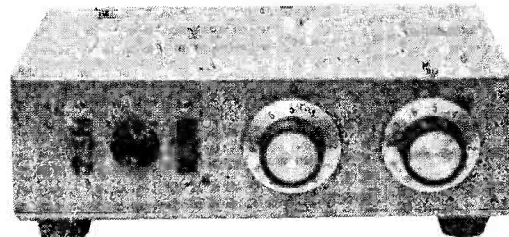
**Help! Can anyone sell or lend me a manual for the Pye FM-10B?** — Marlow, Deddington Mill, Deddington, Oxford.

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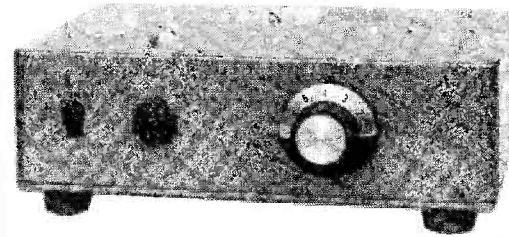
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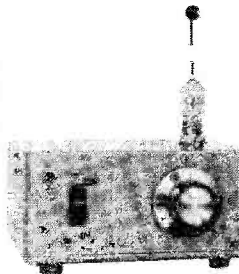


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**Wanted:** RTTY terminal unit A, T and E, FSW or similar.—Wixon, 34 Lime Road, Hanham, Bristol.

**Selling:** FR-400S, no 4m. converter, slight faults, £160 or near offer. Telford TC-10 Tx, very little used, £135. Buyers inspect and collect.—Allen, G8IFU, QTHR. (Tel: Staines 58889, evenings and weekends).

**Sale:** Heathkit HW-17A transceiver with four xtals 145.08 to 145.8 MHz; HW-108 VFO; 12v. battery inverter. £60 the lot, or near offer.—Markland, G2BNZ, 64 Georgina Street, Bolton, Lancs.

**Wanted:** Instruction book for Zenith Model M660 multiband receiver; also plug to fit tuner output socket of above.—Docherty, 59 Glenhuntly Terrace, Port Glasgow, Scotland.

**For sale:** A quality Collins KWM-2, mint condition, few hours' use only, latest "round-emblem" series, with separate VFO, Walters rejection tuning, noise blanker and antenna, mobile mount, PM-2 portable AC/PSU, MP-1 mobile PSU, CC-2 carrying case, all manuals (owner purchased intending to use mobile, pressure prevents this), cost over £1,800. (Worcs.)—Box No. 5492, Short Wave Magazine Ltd., 29 High Street, Welwyn, Herts., AL6 9EE.

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**Wanted:** New or second-hand Tx. Also 'FADA' No. D105356 for Type AN/USM-24A oscilloscope. — Davey, 53 Stalham Road, Hoveton St. John, Norwich NR12 8DU. (Tel: Wroxham 3153).

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**For sale:** Heathkit RG-2 receiver, 6 bands, coverage 0.6-32 MHz, £30. K.W. receiver front-end, 1F output 4.6 MHz, 6 bands, 10/11/15/20/40/80m., £20. Or the two, £40. — Lee, G8JGJ, QTHR. (Tel: Downland 54388).

**Sale:** Collins 51-J3 receiver, coverage 0.5-30.5 MHz, mechanical filters, 30 wave-bands, manual, £250. Prefer buyer inspects and collects. — Ring Catherall, Rossett 570738 (Clwyd).

**Wanted:** Amateur bands only receiver, good price paid for set in good working order. Details and price please. — Ring West, 01-303 3945, or Dartford 22381.

**For sale:** Latest Sony Global Model CRF-220UK receiver, 23 bands, suitable mains/battery/car/boat, £300. No offers. — Ring Norman, 01-570 5830, evenings only.

**Selling:** Yaesu FR-101S receiver, fitted two-metre unit, FM unit, with SP-401 speaker, Joystick, Joy-match 111B, Jaybeam 2M8Y, 3 months old and little used, £350. — Ring Hensman, Burntwood 5418 (Staffs.)

**Wanted:** Eddystone EA-12 in good condition. Would **Exchange** FR-50B with cash adjustment. — Evans, 7 Castle Street, Clackmannan. (Tel: Alloa 5449 anytime).

**For sale:** KW-2000A with 6146B's, clean looking but with fault, suspect dry joint in RF stage, could be OK when this adv. appears, £135. 18-AVT/WB, £20. K.W. trap dipole, 75-ohm, unused, £25. — Ring Groucott, GW3YTJ, 0633-63578 or 0633-51525. (QTH ¼-mile from M.4, could be talked-in on 2m. FM, or will deliver reasonable distance).

**Selling:** Liner-2 with mains PSU, excellent condition, original packing, £150. Carriage extra. — Ring Wood, G3YXX, Hythe (Kent) 68566 weekends, or 01-727 4821 Mon. to Thurs. evenings.

**Selling:** Heathkit GR-78 general coverage receiver, aligned and tested by Heathkit, good condition, (kit now costs over £140), £75. — Ring Henderson, Hawick (0450) 2251, evenings.

**For sale:** Drake R4-A Rx, full coverage 160-10m., mint condition, with set of unused valves, nine xtals and handbook, £140. — Glass, 152 Churchway, Plymouth (35815), Devon.

**Sale:** Sentinel MF converter, as new, £15. Pre-amp., box type, £5. Separately, or both for £17.50. — Devine, 58 Moxon Street, Outwood, Wakefield, West Yorks.

**For sale:** Trio 9R-59DS receiver, general coverage and 10-160m. bands, BFO, SSB, £55 or near offer. — Ring Ledger, Chestfield (Kent) 3250.

**Bargain sale—emigrating:** Rascal RA-17 communications receiver; Heathkit RF-1U generator; Heathkit GD-1U grid dip meter; Airmec 712 valve voltmeter. The lot for £245 (this is less than the price of the receiver alone). — Ring Coussens, Reading (0734) 477399.

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