

THE SHORT WAVE

Magazine

VOL. XXXVIII

AUGUST 1980

NUMBER 6

Contact Lowe Electronics for all that's Good in Receivers



**TRIO
R1000**
THE FINEST
RECEIVER ON
THE MARKET
£298 inc. VAT

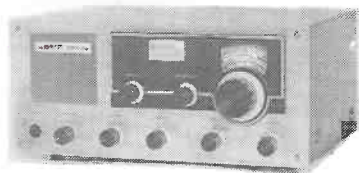
2 metre FM = SR9



**SR9 Value
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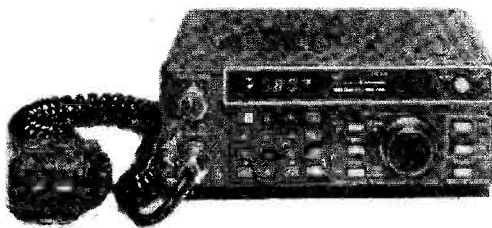
LOWE ELECTRONICS Ltd.



TRIO

TR7800

2m FM at its very best
£268 inc. VAT



The new TR7800 just has to be voted the best 2 metre FM transceiver to appear on the world scene. Following detailed market research, Trio have produced what we think is the perfect mobile/home station rig for all users, incorporating all the features which were requested by amateur radio operators worldwide.

What does it do?

Let's take the basic specification first, and say that the TR7800 is a fully synthesised 2 metre FM transceiver having a minimum output power of 25 W on transmit (typically 30-35 W on random samples), and an incredible receiver which is typically producing sensitivity measurements of 0.12 microvolts for 12 dB SINAD. This is certainly the best FM receiver of which we know (we have naturally checked samples of its major competitors and they are all inferior). That's the basic story so let's go on to the user features.

It's clear from the photograph that you have direct keyboard entry of frequency actually from the front panel. From the keyboard, you can also select simplex and repeater shift functions for use either on UK or American repeaters. The digital readout tells you the operating frequency including any selected shift so you are completely in touch with your mode of operation.

So far so good — but what about the mysterious knob on the right hand side of the panel? Well, that selects a bank of 15 (yes, 15) memories for frequency storage and the smart part is that these are designated not 1 to 15 but 0-14. "So what?" sez you. "Aha!" sez I, that means that if you programme in all repeater channels from R0 to R9 using memories 0 to 9, the memory channel display shows you the repeater channel number whilst at the same time, the digital readout shows you your transmit and receive frequencies. In addition to this, the memory channels also store the repeater shift so that it's called up automatically when you use the memory.

The remaining memories can be used to store any frequencies within the band, but a further smart part is that memories 13 and 14 can store completely separate transmit and receive frequencies for non standard shifts etc. And memory 14 is also designated the priority channel so that any frequency put into it can be constantly monitored at 5 second intervals, whatever else the transceiver may be doing. And if you have

the volume turned down, a piezo bleeper alerts you if a signal has appeared on the priority channel. You also have direct access to the channel by simply pushing the "Priority operate" button. Final features for repeater operation include a tone burst which can be turned on or off as desired, and reverse repeater operation at the touch of a button.

Now for more facilities pertaining to scanning. In keyboard operation, you can scan the entire band in 25kHz or 5kHz intervals by simply touching the SC button. In memory mode, you can scan all fifteen memories using the same SC button. The scan system is (in my opinion) the best yet offered in that the transceiver scans until a signal is heard, stops on the frequency for about 5 seconds to allow you to check what's on, then steps on automatically to find the next busy frequency. If you want to stop the scan, simply press the PTT bar on the microphone or touch the C (cancel) button on the keyboard. By scanning this way, you eliminate the annoying locking up on busy repeater channels that so often ruins your enjoyment of an otherwise satisfactory scanning system.

In addition to scanning, the TR7800 can be stepped up and down the band in 25 KHz or 5 KHz steps using the UP/DOWN buttons on the hand microphone. The microphone is supplied as a standard with the TR7800. If either button is held down, the TR7800 tunes across the band until the button is released.

The mic buttons also allow you to step up and down the memory channels.

LED indicators show Simplex, +600 or -600 operation, a busy lamp on occupied frequencies and "on air" indication. Signal strength and TX output are indicated on an LED bar display.

Memory contents can be retained by installing four standard AA size Nicad batteries inside the transceiver. The batteries are charged when the TR7800 is switched on, and the memories are then retained for up to five days on the batteries.

All in all, the TR7800 is an amazing transceiver and follows the Trio design pattern for the 80s'. Let's face it, Trio are now showing the way to go and the others are truly a long way behind. Why not see the TR7800 soon and test the truth in what I've been saying.

SPECIFICATIONS

(GENERAL)

Semiconductors: MPU 1, ICs 18, transistors 58, FETs 9, diodes 77

Frequency range: 144.000 to 145.995 MHz

Frequency synthesizer: Digital control, phase locked VCO

Mode: FM (F3)

Antenna impedance: 50 Ω

Power requirement: 13.8 V DC \pm 15%

Grounding: Negative

Operating temperature: -20°C to +50°C

Current drain: 0.4 A in receive mode with no input signal
6 A in HI transmit mode (Approx.)
2.5 A in LOW transmit mode (Approx.)

Dimensions: 175 mm (6 7/8") wide
84 mm (3 1/4") high
206 mm (8 1/4") deep
(projections not included)

Weight: 2.1 kg (4.63 lbs) approx.

(TRANSMITTER SECTION)

RF output power (at 13.8 V DC, 50 Ω load):
HI 25 W min
LOW 5 W approx. (Adjustable)

Modulation: Variable reactance direct shift

Frequency tolerance: Less than $\pm 20 \times 10^{-6}$

Spurious radiation: Less than -60 dB

Maximum frequency deviation: (FM) \pm 5 kHz

Microphone: Dynamic microphone with PTT switch

(RECEIVER SECTION)

Circuitry: Double conversion superheterodyne

Intermediate frequency: 1st IF 10.695 MHz
2nd IF 455 kHz

Receiver sensitivity: FM better than 0.2 μ V for 12 dB SINAD

Receiver selectivity: FM 12 kHz (-8 dB)

Spurious response: Better than 60 dB

Squelch sensitivity: 0.16 μ V (threshold)

Auto scan stop level: Less than 0.2 μ V (threshold)

Audio output: More than 2.0 W across 8 Ω load (10% dist.)

Don't forget, we stock almost everything that the keen DXer, short wave listener or radio amateur could possibly need, including the complete range of J Beam aerials, Microwave Modules equipment, feeder, clamps, insulators — in fact our catalogue makes good reading for 48p and includes honest advice on aerial matters. For all that's good in Amateur radio, contact Lowe Electronics at Matlock.

LOWE ELECTRONICS Ltd.



TRIO TR9000

2 metre MULTIMODE
£345.00 inc. VAT



If you sat down at some time and designed your ideal 2 metre multimode rig, you probably laid down the specification for the new Trio TR9000. I believe that this transceiver will satisfy the needs of every radio amateur, combining as it does small size (same as the TR7600), light weight (same as the TR7600), and powerful performance.

As you can see, the TR9000 has a complete array of facilities including all mode operation, noise blanker, RIT, 5 memories, twin digital VFOs and digital frequency readout to 100Hz. Now for the smart parts.

The TR9000 is based on a 100Hz synthesiser controlled either by a photo microsensor on the main dial or by the remote up/down microphone. On FM, the operator has instant selection of either 25kHz steps (for

convenient mobile use), 12.5kHz steps (for future use), or 100Hz steps (for continuous tuning). On SSB and CW, the synthesiser steps are automatically switched to 100Hz and the digital display is extended to match.

A special feature is the search facility on SSB which tunes the whole band, and the scan facility on FM which scans in 25kHz or 12.5kHz steps, stopping momentarily on any received signal. The scan may then be held by touching the HOLD button or depressing the PTT switch on the microphone.

The TR9000 has so much to offer, it's bound to be yet another leader, from Trio. Contact us soon for further details.

GENERAL

Frequency range: 144.000.0 to 145.999.9 MHz
 Frequency synthesizer: Digital control, phase locked VCO
 Mode: SSB (A3), FM (F3), CW (A1)
 Frequency stability: Within ± 500 Hz during the first hour after 1 minute of warm up, and within 50 Hz any 30 minutes thereafter at 25°C (constant)
 RPT tone burst frequency: 1.750 Hz
 Power requirement: 13.8V DC $\pm 15\%$ negative earth
 Operating temperature: -20°C to $+60^{\circ}\text{C}$
 Current drain: 0.4A in receive mode with no input signal
 2.9A in Hi transmit mode (approx.)
 1.3A in low transmit mode (approx.)
 Less than 2.5 mA for memory back-up
 170 x 68 x 234 mm
 2.5 kg (5.5 lbs)

Dimensions:
 Weight:

TRANSMITTER SECTION:

RF output power: Hi (SSB, FM, CW) 10W
 Low (FM, CW) 1W approx.
 Frequency tolerance: SSB, CW: less than $\pm 10 \times 10^{-6}$
 FM: less than $\pm 20 \times 10^{-6}$
 Spurious radiation: Less than -60 dB
 Carrier suppression: Better than 40 dB

Unwanted side band suppression:
 Maximum frequency deviation (FM):
 Microphone:

Better than 40 dB

± 5 kHz
 Dynamic microphone with PTT switch, 500 Ω

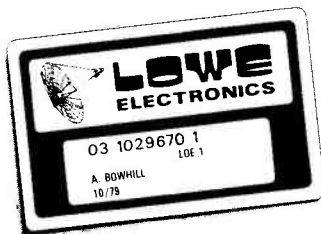
RECEIVER SECTION

Circuitry:
 Intermediate frequency:
 Receiver sensitivity:

FM: Double conversion superheterodyne
 SSB, CW: Single conversion superheterodyne
 1st IF: 10.695 MHz
 2nd IF (FM) 455 kHz
 FM: better than 0.2 μV for 12 dB SINAD
 SSB, CW: 0.2 μV for 10 db S/N
 FM: More than 12 kHz (-6 dB)
 Less than 25 kHz (-60 dB)
 SSB, CW: More than 2.2 kHz (-6 dB)
 Less than 4.8 kHz (-60 dB)

Spurious interference:
 Squelch sensitivity:
 Auto scan stop level:
 Audio output:

Better than 70 dB
 0.16 μV (threshold)
 Less than 0.2 μV (threshold)
 More than 2.0 Watts across 8 ohm load



**THE WAY TO HAVE
TOMORROW'S EQUIPMENT
TODAY**

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 Bradhurst Electronics

Everyone is talking about the new Lowe credit card scheme, following its introduction at Leicester. This is the new, easy way to have the rig you wanted right away and avoid any future price rises. How does it work? You simply agree to pay a fixed amount each month and you then get instant purchasing power of 24 times the payment. For example, a payment of £10 gives you £240 of credit, more than enough to buy that TR2400, aerial and accessories. No fuss and no hefty deposits needed. A further advantage is that as the payments continue your credit is automatically extended to allow further purchases. Why not send for full details right away and join the growing numbers who hold the Lowe blue card — the way to have tomorrow's equipment today. A major advance to your purchasing power.

As sole official distributors for Trio, we recommend that you purchase your Trio equipment from an approved dealer (full list above). Any dealer NOT on this list has no connection with the Trio UK sales and service organisation and cannot, despite claims to the contrary, offer any meaningful guarantee of backup service on Trio equipment.

LOWE ELECTRONICS Ltd.

TS520SE

VOTED "MY FAVOURITE
TRANSCIVER" BY RADIO
AMATEURS WORLDWIDE



In the face of ever increasing complexity in amateur radio equipment, its comforting to know that the TS520SE is still in volume production. Radio amateurs all over the world (and dealers too) have voted the TS520SE "my favourite transceiver" because of its astounding reputation for reliability, high sensitivity receiver, and of course the unequalled Trio audio quality coming from the transmitter. The TS520SE incorporates all of the features demanded by today's amateur, and at an outstandingly low price. No wonder it's top of the list in popularity, and comparison with other transceivers will convince you that the TS520SE is the best value for money on the market today.

Of course, the bare figures cannot tell you just how nice the TS520SE feels in use, nor can they tell you the pleasure of hearing other operators saying "never heard better audio OM, what rig are you using?"

The TS520SE standard specification includes CW wide/narrow switching (using the optional 500Hz filter), semi break-in keying with sidetone, PTT or VOX operation, really effective noise blander, switched AGC time constants, 5 function metering, switched RF attenuator, RIT, speech processing for punchy transmit audio, fixed channel facilities, 25kHz calibrator, fan cooled PA, internal loudspeaker, and of course the TS520SE will take all the wide range of current matching accessories including the DG5 true frequency digital readout, the VFO520S remote VFO unit, the SM220 station monitor scope and panoramic display and so on.

When talking to prospective purchasers of the TS520SE, the question we are most often asked is "how does it compare in price to its rivals?" and the transceiver it is most compared with is the Yaesu FT101Z series. The price for the FT101Z taken from March 1980 RadCom is £575 including VAT and you also should add PA fan at £13.80 (the fan is standard on the TS520SE) making a grand total of £588.80.

THE TS520SE costs £437 including VAT.
Now tell me if that's not value for money.

HOKUSHIN AERIALS

From the makers of our popular HF5 vertical, we have a complete range of vehicle aerials for VHF and UHF use. All the whips terminate in a PL259 plug so that you have complete flexibility, and any aerial in the range will fit the RG4M base or the magnetic mount. The 2E, 2NE, and 430E have a quick foldover joint at the base so that you can drive in and out of your garage without dismantling the aerial.

2E	2M 5/8, 3.4dB gain foldover whip	£6.50 inc VAT
2NE	2M 7/8, 4.5dB gain foldover whip	£11.00 inc VAT
430E	70cm 5/8 + 5/8, 5.5dB gain	£10.00 inc VAT
HS-F1	2M rubber helical on PL259 plug	£3.95 inc VAT
320	2M stainless quarter wave on PL259	£1.50 inc VAT
RG4M	Base for all above units including 4 metres of cable ready terminated in PL259	£3.00 inc VAT
GSS	Heavy duty gutter/boot mount to take RG4M base	£3.15 inc VAT

Please add £1 for carriage on above.

General

Frequency range:

160 metre band:	1.8 to 2.0MHz
80 metre band:	3.5 to 4.0MHz
40 metre band:	7.0 to 7.5MHz
20 metre band:	14.0 to 14.35MHz
15 metre band:	21.0 to 21.5MHz
10 metre band:	28.0 to 28.5MHz
	28.5 to 29.1MHz
	29.1 to 29.7MHz

SPECIFICATIONS

Mode:	SSB (USB, LSB), CW
Antenna Impedance:	50 to 75 Ohms
Frequency Stability:	Within ± 1 KHz during one hour after one minute of warm-up, and within 100Hz during any 30 minutes period thereafter
Tubes and Semiconductors:	Tubes 3(2 x 6146B, 1 x 12BY7A) Transistors 52 FETs 19 Diodes 101
Power Requirements:	120/220V AC 50/60Hz
Power consumption:	Transmit: 280 Watts Receive: 26 Watts (with heater off)
Dimension:	333 (13 1/4) wide x 153 (6.0) high x 335 (13 1/4) deep mm (inch)
Weight:	16.0kg (35.2lbs)
Transmitter	
RF Input Power:	SSB: 200 Watts PEP CW: 160 Watts DC
Carrier Suppression:	Better than 40dB
Sideband	
Suppression:	Better than 50dB
Microphone:	High impedance microphone (50k Ohms)
AF Response:	400 to 2,600Hz
Receiver	
Sensitivity:	0.2 μ V for 10dB (S + N)/N
Selectivity:	SSB: 2.4kHz/-6dB, 4.4kHz/-60dB CW: 0.5kHz/-6dB, 1.5kHz/-6dB (with optional CV filter)
Image Ratio:	Better than 50dB
IF Rejection:	Better than 50dB
AF Output Power:	2 Watts (8 Ohms load, with less than 10% distortion)

Great News!

The AR240 is back in town but with higher battery capacity, provision for separate microphone and the hot performance (better than 0.2 μ V for 12dB SINAD, and 2W output on TX) that you all appreciate. PRICE? Even better value at £168 inc. VAT (price includes Nicads, charger, etc). It has a new name too - the AR240A.

144-148MHz synthesized
FM Hand-Held



MB5 Magnetic mount complete with 5m of cable and PL259 £7.95 inc VAT

Also two really great base station aerials

GPV5	High performance 2m base station colinear. Forget THE S... MJ... M and R... OR... R	£22.00 inc VAT
GDX2	3dB gain over the range 50-480MHz. The classic wideband aerial. 500W p.e.p.	£36.80 inc VAT
HF5	Our original success. 5 band vertical! 80-10m with great performance, great savings	only £41.40 inc V/r

For GPV5, GDX2, HF5, carriage by Securicor £4.50

**SEND 48p IN STAMPS FOR COMPLETE CATALOGUE AND ANTENNA BOOK
PLEASE SPECIFY ANY PARTICULAR INTEREST AND WE WILL SEND FULL INFORMATION**

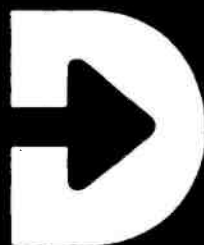
HEAD OFFICE AND SERVICE CENTRE

CHESTERFIELD ROAD, MATLOCK, DERBYS. TEL: 0629-2817 or 2430. TELEX 377482. OPEN 9-5.30 TUES-SAT. PHONE IN 9am-9pm

For personal attention on the South Coast contact John, G3JYG, 16 Harvard Road, Ringmer, Lewes, Sussex. Ringmer B12071.

For equally helpful attention in Scotland contact Sim, GM3SAC, 19 Ellismuir Road, Baillicreston, Nr. Glasgow. 041-771 0364.

FOR ALL THAT'S BEST IN HAM RADIO CONTACT US AT MATLOCK ANYTIME



DATONG ELECTRONICS LIMITED

PRODUCTS FOR THE SERIOUS COMMUNICATOR

WORK MORE DX

Datong RF clippers make your speech sound louder and clearer. The worse the conditions the greater the benefit. This is exactly what you need for working DX. After all, if they can't hear you, you can't work them!

All three models use the same innovative r.f. clipping techniques which have made the name Datong synonymous with r.f. clipping.

MODEL ASP

is fully automatic with calibrated push-button selection of degree of r.f. clipping in steps of 6 db's from 0 to 30 db's. It adjusts itself to suit your voice and microphone.



MODEL D75

is manually adjusted and has LED monitoring to aid in setting.



MODEL RFC/M

is a fully tested printed circuit module for building into your own case.

All three units feature very long life battery operation and connect in series with your microphone.

No internal modifications are required to your rig.

IMPROVE RECEPTION

Our two no-compromise audio filters give a remarkable ability to filter out the intelligence from the noise.

MODEL FL2

the new "top-of-the-line" filter, offers extremely sharp pass-band edges for truly exceptional filtering performance on all modes, but especially for SSB. Its 10

poles of fully variable low and high pass filtering give sharper filter edges even than normal crystal filters. A separate manually tuned notch filter is also fitted.



MODEL FL1

on the other hand, was recently described in "73 Magazine" (October 1979) as "truly the Rolls Royce of the current filter market". It is the only filter in the world which can notch out an interfering whistle from SSB

signals automatically. Additionally, for CW, bandwidths down to 20 Hz are practicable thanks to the use of "limited AFC" - another Datong exclusive.



Both filters connect in series with the loudspeaker and will improve virtually any receiver. An external DC supply is required.

RECEIVE MORE BANDS

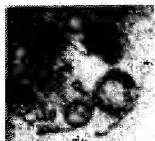
The Datong UP-CONVERTER (Model UC1) converts any good quality ten-metre or two-metre receiver or transceiver into a really high performance general coverage receiver.

It gives full coverage in thirty 1MHz segments from 60 kHz to 30 MHz.

At low cost, UC1 adds a new dimension to your expensive amateur bands only equipment and for sheer performance beats most of the common general coverage receivers.



INDOOR ANTENNA



MODEL AD170

Active Antenna is designed for under-roof mounting and gives sensitive reception right through from below 60 kHz to Band 1 TV around 50 MHz. It needs no tuning and includes a switchable 12 db broadband amplifier.

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

LEARN MORSE THE EASY WAY

The Datong Morse Tutor (Model D70) is your passport to a full licence. Compact, with internal battery and speaker plus personal earphone it provides unlimited random morse to practice on. With D70 you can practice morse anywhere, anytime and at your own pace. With the Morse Tutor, practice

becomes a pleasure because you get results quickly.



Prices: All prices include delivery in UK. Basic prices are shown with VAT inclusive prices in brackets.

ASP £69.00 (£79.35)	D75 £49.00 (£56.35)	RFC/M £23.00 (£26.45)
FL2 £78.00 (£89.70)	FL1 £59.00 (£67.85)	UC1 £119.00 (£136.85)
D70 £43.00 (£49.45)	AD170 £33.00 (£37.95)	AD170 + Mains Power MPU (Mains Power Unit) £6.00 (£6.90)
		Unit £37.00 (£42.55)

Full data sheets on any product available free on request. New literature includes: short form catalogue, new ASP data sheet, FL2 data sheet.

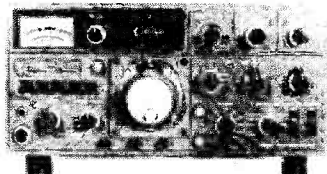
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R820 RECEIVER

THE ULTIMATE IN RECEIVERS

Frequency coverage 160-10m plus SW Broadcast Bands. All modes CW-USB LSB RTTY. Digital Readout. Noise Blanker. Fully variable I.F. Bandwidth, plus Bandpass tuning, plus rejection notch filter. **£1690.00**



TR9000

The TR9000 is a compact lightweight 2 mtr FM USB LSB/CW Transceiver with an outstanding array of functions. FM1 for 25KHz steps (for mobile use) FM2 for precise 100Hz steps (for base station use). Microcomputer control giving many advanced features. Built in 5-channel memory. New type microphone with UP/DOWN switching. Built in high performance. N. Blanker. Side tone for CW. **ALL THIS PLUS MUCH MORE FOR £345.00 inc. VAT.**



TRIO TS120 TRANSCEIVER

ALL SOLID STATE HF BAND TRANSCEIVER

Freq. 3.5-30 MHz Amateur Bands and WWV. I.F. Shift System, Noise Blanker, Vox, Single conversion system using PLL circuit. Digital display dial.

- TS 12CV 10 watts PEP **£347.30**
- TS 12OS 200 watts PEP **£432.40**



TR2300

TR2300 2m Synthesised Portable Transceiver. We have lost count of the number of this model we have sold over the last 12 months. Hikers, campers, climbers, you can hear them all over the country and reliability which is the essence of TRIO equipment. **£166.75**

TRIO

- R820 Receiver **£690.00**
- TS820 Transceiver **£669.30**
- VFOB20 **£118.45**
- DSIA 12v. DC Inverter **£42.93**
- SP820 Speaker **£37.95**
- SM220 Monitorscope **£197.80**
- TL922 Linear Amplifier **£672.75**
- VFO520S **£98.60**
- SP520 Speaker **£17.25**
- TS120V 80 10m. Mobile Transceiver **£347.30**
- PS 20 AC power supply for TS120V **£44.85**
- MB100 Mobile mounting bracket **£17.25**
- SP70 Speaker **£18.40**
- R1000 Receiver **£298.00**
- TR2300 2m. Portable Transceiver **£166.75**
- TS520SE HF Transceiver **£437.00**
- TR2400 Hand held 2m Transceiver **£210.45**
- TS120S200 watt Transceiver **£432.40**
- TL120 Linear Amplifier **£128.80**
- HS5 Headphones **£21.85**
- HS4 Headphones **£10.35**
- MC50 Desk Microphones **£24.15**
- MC30S Hand Microphone 50K **£13.80**
- DM800 G.D.O. Wavemeter **£51.75**

Crystals and accessories in stock

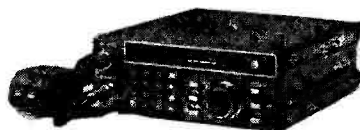


TS 180S

TS 180s. HF Transceiver. An all solid state Transceiver with Digital Frequency Control. A rig that has the facilities that DXer, Contest operator or any Amateur would desire for maximum flexibility on the 160 through 10 metre bands. Up to 200 watts PEP input. No tune final amplifier. With digital readout. **£679.65**

JAYBEAM

- 5Y/2M 5 element yagi **£10.24**
 - 8Y/2M 8 Element yagi **£13.23**
 - 10Y/2M 10 Element **£28.41**
 - PBM/14/2m. 14 element Parabeam **£40.38**
 - 5XY/2m. 5 element crossed yagi **£20.70**
 - 8XY/2m. 8 element crossed yagi **£25.88**
 - 10XY/2m. 10 element crossed yagi **£34.27**
 - Q4/2m. 4 element Quad **£21.51**
 - Q6/2m. 6 element Quad **£28.52**
 - D5/2m. 5 over 5 slot fed yagi **£18.29**
 - D8/2m. 8 over 8 slot fed yagi **£24.84**
 - UGP/2m. ground plane **£9.37**
 - MBM48/70cms. Multibeam **£28.18**
 - MBM88/70cms. Multibeam **£37.49**
 - TAS 1/2m. Whip mobile **£15.30**
 - C5m. Colinear **£40.02**
 - C8 70cm. Colinear **£45.43**
 - D15 1296 23cm. Antenna **£30.94**
- Carriage on Antennas £3.00



TR7800

Continuing TRIO's policy of presenting the Radio Amateur with the finest equipment available, we are pleased to announce the NEW TR7800 2m FM Mobile Transceiver. 15 memory channels - Priority channels with simplex \pm 600 KHz or non-standard operation - "Priority alert" bleeps when signal on M14 priority channel. Frequency coverage 144.00, 145.955 in switchable 5 KHz or 25 KHz steps. Front keyboard for selecting frequencies, programming memories and controlling scan function. **ALL THIS and MORE for £268.50.**

NEW ANTENNA MODELS

- H.S. HFS Vertical 10.80m **£41.40**
- HFR Ground Plane Kit **£23.00**
- GDX 2 Discone Antenna 50-460MHz **£36.80**

RECEIVERS AND TRANSCEIVERS

- (Inc. VAT and Postage)
- SR9 Tunable 144-146 MHz Receiver **£46.00**
 - AMR217B Scanner Receiver. AC or DC operation **£113.50**
 - R512 Aircraft Band Scanning Receiver **£135.00**
 - Regency Digital Flight Scan Synthesised Aircraft Band Receiver **£199.00**
 - Phillips FM321 70cms FM Transceiver **£264.00**
 - Yaesu FRG7 Receiver **£214.00**
 - Yaesu FRG7000 Receiver **£375.00**
 - FDK TM563 Scanning 2m Receiver **£109.00**
 - "SkyACE" Hand held Aircraft Band Receiver **£49.50**
 - Bearcat 220 Scanning Receiver **£258.75**

SECONDHAND EQUIPMENT

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

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5 p.m. Saturday

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

ALL OUR PRICES INCLUDE VAT



TRIO R1000

R1000 Receiver **£298.00**
The latest general coverage from Trio. Frequency coverage 200 KHz to 30 MHz in 30 bands. Using an advanced PLL system. Full digital readout. Three filters 12 KHz for AM - 6KHz narrow AM and 2.7 KHz SSB. Also incorporates a noise blanker. Operation is from 100-240 V AC or 12 V DC.

ROTATORS	
DR7500X	£98.04
DR7500R	£107.98
ART 300C	£97.50
Sky King SU200	£40.40
Sky King SU400	£75.00
DR7600X	£135.00

CABLE	
UR43	24p metre
UR67	80p
300 ohm Ribbon	
12p metre	
75 ohm low loss	24p

SRX-30	
Solid State Receiver 550kHz 30MHz	£178.00

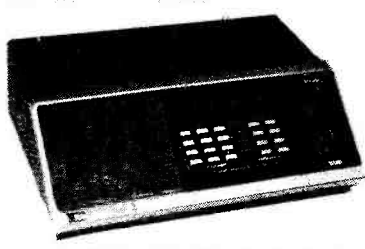
Mobile Antenna Range	
5'8th Whip PL259 fitting	£6.50
Magnetic Mount PL259 fitting	£8.50
7'8th Whip	£11.00
Basemount and lead	£3.00
Gutter mounts	£3.50
Bantex Magnetic mounts	£12.59
Bantex S/S Whip 5'8th	£9.50
Bantex G. fibre 5'8th whip	£9.10

Accessories	
2 way Antenna Switch 50 ohm 200 watt	£6.60
3 way Antenna switch SWL push button type	£4.60
3 way Antenna Switch 2 kW PEP 0.500MHz	£10.60
4 way Antenna Switch 50 ohm 200 watt PEP	£10.60
Single Meter SWR Wall type	£10.87
Single Meter SWR Desk type	£11.00
Twin Meter SWR Desk type	£13.55
T345N Thru Line Wattmeter 140-435MHz	£34.45
DL20 20 watt 50ohm Dummy Load	£6.30
DL50 50 watt 50ohm Dummy Load	£7.50
DL-1000 1kW Dummy Load 50ohm	£37.95
Morse Keys Lightweight	£3.25
Oscerblock SWR200B Twin Meter	£40.19
HyMount HK70B	£10.50
Katsumi EK150 Electronic Keyer	£79.00
Katsumi MK 1024 Electronic Keyer, with memory	£135.00

DX-008 Programmable Frequency Counter	£116.25
HP3A High Pass Filter	£3.25
Twin Keying Paddle Chrome plated with heavy base Precision Unit	£26.50

Full Range; of Insulators - plus Valves - Etc.	
Mini Products	
C4X 3band Vertical	£48.00
HQ1 Mini Beam	£96.00
Hy Gain	
12AVO 3band Vertical	£43.12
14AVT/WB 4 band Vertical	£60.37
18AVT/WB 5 band Vertical	£87.40

Diawa 144 Mhz and 70 cms Antennas in stock



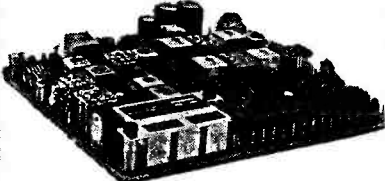
S.T.E. Prices include VAT and postage
 AAI Audio Module for AR10 £4.10
 AD4 FM Discriminator £5.00
 ATAL 2m AM-FM Tx £129.00

STANDARD	
C8800 2M FM Mobile Transceiver	£252.00
G-WHIP	
Tribander Helical 10-15-20m	£24.72
LF Coils for Tribander	£6.55
LF Telescopic Whip Section	£3.35
Basemount standard type	£4.48
Multimobile 7B, 10-15-20m	£28.75
MM Coils	£6.55
MM Telescopic whip section	£3.33
Flexiwhip basic 10 metres section	£17.25
Basemount standard	£4.48
Ball type Basemount	£6.32
Coils for Flexiwhip	£6.55
Base thread adaptor USA/G Whip	£0.75
Extendarod 40"	£11.50

DRAKE	
TR7 Digital Transceiver	£1035.00
PS7 Power supply	£207.00
RV7 Remote VFO	£138.00
MS7 Speaker	£29.90
R7 Digital Receiver	£989.00
Filters for TR7	£39.10
FA7 Fan for TR7	£20.70
MN7 ATU/R Meter 250 Watts	£124.20
MN270 ATU 2 KW	£207.00
DL300 Dummy Load 300watts	£20.70
DL1000 Dummy Load 1 KW	£37.95
TV3300 Low Pass Filter	£18.40
AK75, Doublet Antenna 132" top with 470 ohm Feeder	£23.00

MICROWAVE MODULES	
MMT 1296/144 1296 MHz Lin Transverter	£159.85
MMT70/144 4m Lin Transverter	£99.00
MMA 1296 Receiver pre-amp	£25.88
MML 144/40 40 watt Linear Amplifier	£69.00
MMA 144V 2m RF Switched preamplifier	£24.90
MML432/20 Lin Amp and Pre-amp	£69.00
MMT 144/28 2m Transverter	£90.85
MMT 432/285 70cm Transverter	£136.85
MMA 432/144R 70cm Transverter	£173.65
MMT70/144 4m Transverter	£99.00
MML 144/25 2m 25 watt Linear	£48.30
MML 144/100 2m 100 watt Linear	£142.60
MMC 70/28 4m Converter	£21.85
MMC 144/28L 2m Converter	£24.15
MMC 432/285 70cm Converter	£29.90
MMC 1296/144 23cm Converter	£32.20
MMD050/500 500MHz freq. conter	£69.00

COMING SHORTLY
 From the SHIMIZU-DENSHI group the SS-105-S Solid State 10 watt mobile Transceiver. 3.5 MHz to 30 MHz with USB/LSB; CW and FM (ideal for use with VHF Transverter). Small compact - more details next month.



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



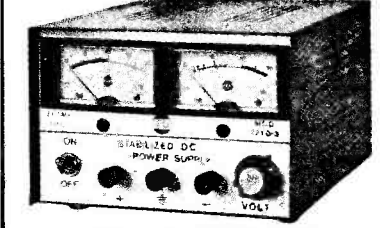
455 kHz FM DISCRIMINATOR AMPLIFIER. Limiting threshold 100uV. Amplitude modulation rejection 40dB. Audio output voltage at 1 kHz 20 300mV frequency deviation ± 3kHz
 Price £5.00

SECONDHAND EQUIPMENT

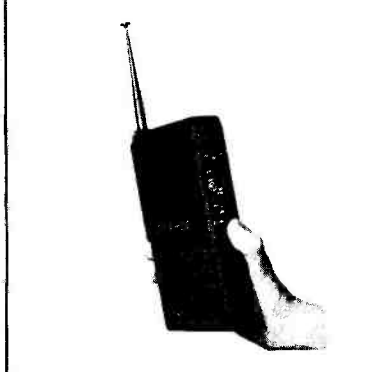
We have a very rapid change over of secondhand equipment, especially in receivers. Our lists are updated each day, please send SAE for latest or telephone. Here are a few of the items from our range. All prices include VAT
 Heathkit SB301 Rx-SB401 Tx-SB610
 Monitorscope Speaker-Microphone £350.00
 Drake TR4C HF Transceiver MS4S Speaker power supply £395.00
 Eddystone EC958/9 Solid State Digital readout Receiver AM/FM/CW/SSB 10KHz to 30MHz £1,200.00
 Yaesu FR101 D Receiver £300.00
 Drake TR7 Transceiver PS7 £900.00
 Trio TS700G 2m All Mode Transceiver £325.00
 Swan 100MX Transceiver + AC PSU £450.00
 Drake R4C Receiver + CW Filter £395.00
 Trio TR7010 2m SSB Mobile Transceiver £130.00

SOLID STATE STABILISED POWER SUPPLIES

Maximum ratings quoted. Prices include postage.
 Model 122 12.6V 2.5A £15.55
 Model 125 10-15V 5 amp £28.00
 Model 156S 4-15V 5 amp Twin Meter £85.00
 Model 1210S 4-20V 10 amp Twin Meter £35.00
 Model 1210SV 4-20V 10 amp Digital Readout £110.00
 Model 153SV 4-20V 3 amp Digital Readout £38.00
 Model 1220/1 13.5V 20 amp £90.00
 Model 1220/2 13.5V 12 amp £80.00



Mod. 1210 S



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G13KDR	John	Bangor	(0247)	55162
GM8GEC	Jack	Edinburgh	(031665)	2420
G13WWY	Mervyn	Tandragee	(0762)	840656
GW3TMP	Howarth	Pontybodkin	(035287)	846/324
GW4GSW	Alan	Swansea	(0792)	24140

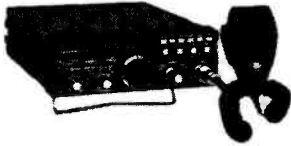
Communications Ltd

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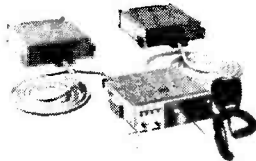
FT480R NEW 2m MULTIMODE

The FT480R is a 12v, 10w. revolutionary high performance multi-mode (USB, LSB, CW, FM) transceiver. The 'single knob' microprocessor controlled synthesizer tuning is simply superb. On SSB switchable; 10Hz (yes 10Hz), 100Hz and 1KHz steps and on FM 1KHz, 25KHz (or 12.9KHz) and 100KHz steps are provided on the dual VFO's. Tuning may also be accomplished from the microphone up/down button, press for one step, hold down for 1/2 second and the scanner operates over the band or just the 4 memory channels. The memories are simply programmed by a "write in" push button and the contents are 'kept alive' as long as a DC supply is provided to the set. Any one of the memories may be used as a priority channel when the set is dial controlled, it checking the designated frequency every 5 seconds. The very sensitive transceiver is fitted with all the features one would expect on a 1980 Yaesu radio, very bright digital display and string LED meter, receiver offset, tone, F set (clears all digits of the operating frequency below the step frequency in use) \pm 600KHz offset, any split with the dual VFO's, satellite control (disables RIT etc and allows slow scanning on Tx to eliminate doppler shift on Listen Through) etc. — all at a very affordable price of £312.17



FT720R NEW 'REMOVABLE'

The FT720R is a new concept in mobile FM. Take a neat 'removable' control head (2m or 4m of extension cable, and your choice of 2m (10 or 25W) and 70cm 10W main units. Add if you wish a switching box and then both 2 and 70cms are available from the one money and space saving controller. The package offers sophisticated microprocessor PLL control system, optical coupled tuning, 5 memory channels, priority channel, up/down scanning from the mic (stop on busy or empty), auto or man. Tone burst up/down repeater shift and a string of yellow and red leds for power out and S meter etc.



FT720R Control Head £130.00
S72 Switching Box £47.50

E72S 2m Cable £20.00
720RV Transceiver 10W 2M £148.00

E72L 4m Cable £23.50
720RVH Transceiver 25W 2M £153.00

720RU Transceiver 10W
70cm £179.00

FT225RD MULTIMODE 2 METRE TRANSCEIVER

144-146-148MHz, USB, LSB, AM, FM, CW (semi-break-in with side tone). Smooth dual speed VFO control and 11 (x 4) crystal channels. Simplex and (auto tone burst) repeater, 600kHz and auxiliary shifts both up and down. Single signal mix, with phase locked conversion oscillator, for spurious free output. Mains 234-100V 50/60Hz and 12V DC for world wide portability. Excellent selectivity, SSB 2.4kHz with 1.75:1 SF, FM 12kHz at -6dB. High sensitivity with modern MOSFET RF stage. High power output 10W AM, 1-25W CW and FM, careful gain distribution, mixer and crystal filter design. High power output 10W AM, 1-25W CW and FM, SSB 25W + + with great reliability and low IMD's. Mode sensitive digital readout to 100Hz and easy to service superior plug in board construction. Front panel controls for: SSB mic gain, FM power, squelch, Vox/Mox sensitivity, noise blanker, AGC, readout brightness, meter functions (S/centre plus relative power) etc.. Digital and Analogue versions and memory option.



FT225RD Transceiver £485.00

FT225R Transceiver £445.00

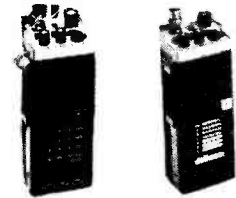
MEM memory option £85.00

COUNT Counter R/RD £50.00

FT207R — FT202R: 2m HANDHELDS

The FT207R is a microprocessor controlled synthesized handheld that offers 12.5kHz channel steps!! 4 memory channels are provided and these may, as can the whole band, be scanned. Any one of the memories can be used as a priority channel. Simply operate as normal on any frequency, designate one of the memories as priority, and every few seconds, for a few milliseconds, the set will check occupancy of the channel. All frequency entry is by the keyboard (which includes touch tone). The readout displays frequencies (to 100Hz), memory channel number and "P". Switches are provided for keyboard lock (prevents accidental operation) and display "time-out". A 600kHz shift, and any programmable split, is available, both of course plus and minus. Memory back-up is provided but can be switched off for long-term storage. 2.5W + 200mW outputs and a whole host of accessories complete the brief specification of this exciting transceiver.

The FT202R is an economical 6 channel handheld physically similar to the FT207R.



FT207R Transceiver £173.04
NC 1A Slide-in charger £16.50
NC 2 Charger eliminator £34.50

NC 9C Small charger £6.50
NBP 9 Nicad pack spare £14.50
FBA 1 Pack/charger adaptor £2.25

YM24 Speaker/mic £14.50
FLC1 Heavy duty case £18.00
AA Nicads, each £0.87

FT202R Transceiver £103.50
NC-1 AC charger 202 £16.50
PA-1 12V PSU 202 £16.50

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SMC (Jack Tweedy) LTD.

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Tel.: Chesterfield (0246) 34982
9-5 Tuesday-Saturday



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SMC & YAESU FOR HF — SMC & YAESU FOR HF



FT707 Transceiver 100W	£455.00	FV7070M Ext. Dig. VFO	£157.00	FP707 12 Volt P.S.U.	£95.00	MMB707 Mobile Mounting	£12.00
FT707S Transceiver 10W	£425.00	FC707 Antenna Tower	£83.00	MR7 Rack Mount Cabinet	£11.50	YM35 Scanning Microphone	£11.00

FT707 NEW SOLID STATE TRANSCEIVER

The FT707 'The Wayfarer' is an ultra-compact solid state transceiver covering 80-10m, including 30, 17 and 12m — all factory installed, with 100W output (10W 'S' model); 50% out developed in 3:1 VSWR, digital (bright LED's in mode sensitive counter) and analogue readout, status at a glance (from string LED and single displays) 16 poles of crystal filtering adjustable IF bandwidth 2.4kHz to 300Hz. Noise blanker of most advanced design using local AGC loop, Schottky diode ring module, power transistor buffers, ultra-clean low noise local oscillator are combined to produce, size and price notwithstanding. Probably the best receiver you have ever used.



FT107M

FT107M Transceiver	£660.00	FV107 Ext. VFO	£90.00	FV107 Transverter frame	£96.50	YM34 Mic. desk	£18.50
MEM.OMS Memory	£87.00	FC107 Antenna Tuner	£92.50	430 440 70cm module	£158.50	YM35 Mic. hand scan	£11.00
FP107E AC PSU Extnl.	£92.50	SP107 External Speaker	£24.00	144 148 2m module	£68.50	YM36 Mic. noise cancel	T.B.A.
FP107 Int. AC PSU	T.B.A.	FTV107/21 Transverter	£181.50	50 54 6m module	£68.50	YM37 Mic. Hand	T.B.A.

FT107M NEW SOLID STATE TRANSCEIVER

All solid state transceiver, 160-10M (+ WWV Rx and 2 Aux). 12V DC, SSB, CW, FSK and AM 240W PIP. The fan cooled (thermostatically controlled) no tune "broad band" power amplifier delivers 75% power output into 3:1 VSWR. Analogue and digital readout to 100Hz. Sensitive and with excellent dynamic range (hard driven Schottky diode ring mixer). Continuous variable bandwidth 300Hz to 2.4kHz plus optional "basics" of 350 600Hz and 6kHz. Full equipment includes: audio peak/notch filter, full metering including SWR, RF speech processor, advanced noise blanker, semi break in with side tone, VOX, clarifier on Tx, Rx, or both, 20dB attenuator etc. The optional memory system provides 12 stored channels (with fine tuning), and offers scanning from the microphone. The store employs DMS — digital memory shift — to allow tuning, via a photo interrupter of any of the memorised frequencies (equivalent to 13 VFO's!).



FT901DM

FT901DM Transceiver	£800.00	YVM 1 Video Monitor	£125.00	FTV901 Transverter	£245.00	FC901 Antenna Tuner	£115.00
FT901O Transceiver	£710.00	Y0901 Monitorscope	£240.00	430 440 70cm module	£160.00	FL2100Z Linear Amp	£355.00
FT901OE Transceiver	£700.00	Y0901P Y0901 with pan	£280.00	50 54 6m module	£60.00	FV901DM Synth Ext VFO	£215.00
VR901 Morse TTY read	£395.00	PAN Kit Mod kit	£47.00	70 74 4m module	£75.00	SP901 External Speaker	£24.00

FT901DM THE SUPERB PERFORMER

160 10M (+ WWV Rx), 12 and 234V (PSU Built-in). SSB, AM, CW, FSK and FM (Tx & Rx), 180W PIP, 80W FL. Analogue 1kHz and digital to 100Hz. Sensitive μ V with AGC controlled Mosfet RF, to push pull FET RF. Balance active mixer, push pull IF amp, to crystal filter then noise blanker. Continuously variable selectivity 300Hz to 2.4kHz and fixed 350 600Hz, 2.4kHz, 6kHz and 12kHz (at 6dB). 80dB cross mod rejection, 90dB desensitisation immunity (at 20kHz off at 14MHz). Audio Peak and separate notch tuning. Negative RF feedback on 6146B stage (-31dB 3rd order). RF processor, VOX, Curtis electronic keyer, tune button (10sec on full power), PLL VFO with memory for any Tx, Rx or T-Rx frequency. Modular plug-in construction, permeability tuning (for new band allocations) 25kHz calibrator, 20dB switchable attenuator, sidetone, clarifier and an advanced noise blanker, etc.



FT1012Z

FT1012Z Transceiver Digital £575.00

FT101Z Transceiver Analogue £500.00 Count Analogue/Dig. Kit £80.00 FV101Z £110.00

FT1012Z PERFORMANCE AND ECONOMY

A hybrid HF transceiver, 160-10M (+ WWV Rx + Aux). 234V AC and 12V DC (inbuilt inverter option). SSB, CW and AM. 180W PIP from a pair of 6146B with negative feedback. Analogue and "mode sensitive" digital readout to 100Hz. Continuously variable IF bandwidth 300Hz 2.4kHz plus optional "basic fixed" of 350 600Hz. Full equipment includes: adjustable level RF processor, advanced adjustable level noise blanker, front panel adjustable VOX, semi break in with side tone, 0-10-20dB attenuator, switchable AGC, Slow fast/off, clarifier (RIT) selectable on Tx, Rx or both, etc., etc. The FT1012Z is compatible with nearly all the FT901 accessories listed above — Morse reader and video display, monitor scope with pan adaptor, 3 band transverter, ATU, linears, speakers, and a choice of synthesized or conventional (NEW FV101Z) external VFO's.



FT7B & YC7B

FT7B Transceiver £375.00

YC7B Digital Readout £60.00

FP12 12V 12A PSU £67.00

YD148 Desk Mic £18.50

FT7B MOBILE AND BASE TRANSCEIVER

A compact all solid state HF transceiver, 80-10M (full 2MHz coverage of 10 with optional crystals). USB-LSB CW, AM, 100W PIP (A3) and A1), 25W (A3). VFO control with clear analogue scale to 1kHz, plus an optional digital readout unit that can be conveniently sited above the transceiver, on the dash or steering column. The front panel remains remarkably uncluttered for a transceiver boasting a: crystal calibrator, vox, clarifier, side tone, and an excellent audio peak filter for CW. A mosfet RF stage for sensitivity, and a Schottky diode ring mixer for dynamic range. Complete with mobile bracket, microphones, leads, plugs, etc. The FT7B provides the economic answer to world wide communications from home or from the car.

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GM8GEC Jack	Edinburgh	(031665)	2420
G13WVY Mervyn	Tandragee	(0762)	840656
GW3TWP Howarth	Pontyboodin	(035287)	846/324
GW4GSW Alan	Swansea	(0792)	24140

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High power handling
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V.H.F. LINEAR AMPLIFIER
80W out for 10W nom drive. 145 MHz 12V
(circa 10A). Switchable; SSB/FM Hang time.
RF or man cont. Low noise pre-amps.
RC1 Remote control (pBp £0.40) £15.00
B108 Amplifier (pBp foc) £99.00



WATT METERS
Through line. 1.8-54MHz. SWR scale.
LPM885 20, 200, 1000W FSD (pBp foc) £51.00
Absorption 1.8-500MHz.
LDM8805. 2, 120W FSD (pBp foc) £79.00



MULTIMETERS
20k ohms per volt. 1000X overload on ohms.
Plug in range selection.
60 Microtest 40 Ranges (pBp foc) £16.50
680Q Superest 48 Ranges (pBp foc) £24.50
680R Superest 80 Ranges (pBp foc) £32.00



VHF/UHF SWR/POWER METER
Power 10W FSD on 50 (70), 144, 432MHz
VSWR. Calibrated to 3:1 50 ohms.
Detachable RF head/indicator unit
UH74 (pBp £0.60) £112.75



DIGITAL MULTIMETER
1- 10- 1000- 10000. ACV-DCV-ACmA. DC-
mA, Ohms. 10M ohm input impedance, AC &
DC. Automatic zero and polarity.
ME521 (pBp foc) New Low Price £38.26



COAXIAL RELAYS
12V dc operation, 50 ohms. 1kW PEP @ 30MHz
50dB isolation at 1GHz. 0.2dB loss at 0.5GHz.
CX5400 3BNC Sockets (pBp foc) £18.50
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CX5200 3'N' sockets (pBp foc) £18.50



AERIAL ROTOR 'OFFSET TYPE'
Carriage UK, post free, all models
CDE manufacture
Silent self-calibrating control box
AR30 - "Dial and push" £41.00

Stolle manufacture
Silent automatic control box. Turning shaft
passes through rotor (as illustrated)
2050 Memomatic control box with moving
light gives indication of beam heading during
rotation period £37.50
2010 - "Dial up direction" control box with
excellent synchronization £46.83

HIGH EFFICIENCY VHF VERTICALS (illustrated right)
RINGO RANGER: 6dB gain over $\lambda/4$ ground plane. Uses 3 phased $\lambda/4$ and $\lambda/8$
stub. Ultra low angle radiation. No radials required.
ARX2 144MHz 9' 6" tall, 1½lbs (pBp £1.00) New Low Price £20.00
Other Cushcraft VHF antennas - horizontal and vertical in stock.
All at 10% off list prices!!!



POWER SUPPLY
12V dc regulated supply.
240V 50/60Hz input
3 Amps cont. 5 Amp peak 3x 4½ x 6". 3½lbs
ODR123C (Post free) £13.50



V.H.F. LINEAR AMPLIFIER
160W out for 15W maximum drive. 145MHz
12V dc (circa 18A). RF or manual switching.
SSB/FM Excellent heat sink - over temp. trip
out/reset.
PA 15-160BL (Post free) £178.50



COAX SLIDE SWITCHES
50 ohms impedance SO239 sockets
TWS1201 in 2out (pBp 20p) £5.75
TWS1201 in 5out (pBp 30p) £10.50
TWS1202 in 4out (pBp 30p) £10.85



ANTENNA COUPLER
3.5 30MHz. 50/75 ohm Coax (VSWR<5:1)
and Single Wire (10-250 ohms) transformed
to 50 ohms. To 500W PIP SSB.
Wattmeter 20 + 250W FSD meter
LAC895 (pBp foc) £92.00



HF/VHF SWR METER
Twin Meter. 3.5 to 170MHz. 50 ohms.
SWR. Calibrated to 3:1
Relative Power. SO239 sockets.
T3-170L (pBp £0.60) £11.25



DIGITAL FREQUENCY COUNTER
100kHz to 30MHz. 12V dc operation. 5-7 seg-
ment displays resolves to 10Hz.
Only 6¼ x 2¼ x 5½"
RT75D (pBp 50p) New Low Price £38.26



TRANSVERTERS, SOLID STATE
MMT28/144 10m, 2m, 1F 10W out £79.00
MMT70/144 4m, 2m, 1F 10W out £100.00
MMT144/28 2m, 10m, 1F 10W out £86.00
MMT432/28 S 70cm, -10m, Satellite £119.00
MMT432/144 70cm, -2m, Repeater £151.00
MMT1296/144 23cm, 2m, 1F 1.3W £160.00



ANTENNA ROTATORS 'BELL TYPE'
Carriage UK (Post or Securicon) free
AR40 Silent self-calibrating control box
to 3sq ft ant wind area £52.00
BT1 4 pre set plus manual control to
5sq ft ant wind area £79.00

Continuous readout on large meter
Superior brake mechanism
CD45 to 8½ sq ft ant wind area £99.00
Ham IV to 15sq ft ant wind area £145.00
T2X to 30sq ft ant wind area 199.00



QUARTZ & CERAMIC FILTERS
QUARTZ 3, 18, 9, 10, 7MHz centre frequency;
350/600Hz, 2.4/6/12kHz, 6B9 pole
CERAMIC 45kHz centre frequency;
2/4/6/12kHz, 96/11 poles
Prices: Ceramic £5-£11 Crystal £16-£22



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Chesterfield, Derby.
Tel.: Chesterfield (02461) 34982
9-5 Tuesday-Saturday.

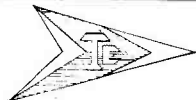
NORTHERN (Leeds) BRANCH

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Leeds 16, Yorkshire.
Tel.: Leeds (0532) 782326
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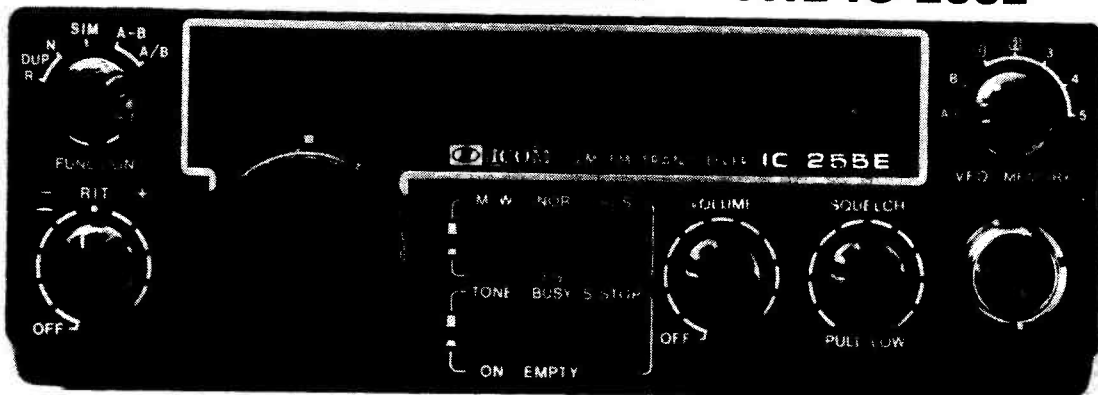
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25 WATTS — 5 MEMORIES — SCANNING — 600 KHz AND USER SELECTABLE REPEATER SHIFT — FULL COVERAGE IN 5 KHz or 25 KHz STEPS

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

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

Price
£255 inc.

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



FROM

THANET

OF COURSE



ICOM IC251E £479 inc.

**DON'T WORRY — WE GUARANTEE
ALL SOLID STATE RIGS
INCLUDING PAs**

AFTER YEARS OF SUCCESS THE IC211E HAS NOW BEEN REPLACED BY THE IC251E. NOT JUST A FACELIFT, BUT A NUMBER OF IMPORTANT DEVELOPMENTS HAVE BEEN INCORPORATED.

MICROPROCESSOR CONTROL — CPU control with Icom's original programs provides various operating capabilities. No backlash dial controlled by Icom's unique photo-chopper circuit. Band edge detector and Endless System provides out-of-band protection. No variable capacitors or dial gear, giving problem-free use. The IC251E provides FM, USB, LSB, CW coverage in the 144-146 MHz frequency range. Thus the IC251E can be used for mobile, DX, local calls, and satellite work.

MULTI-PURPOSE SCANNING — Memory Scan allows you to monitor three different memory channels. Program Scan provides scanning between two programmed frequencies. Adjustable scanning speed. Auto-stop stops scanning when a signal is received in all modes.

DUAL VFO's — Two separate VFO's can be used either independently or together for simplex operation, and any desired frequency split in duplex operation.

CONTINUOUS TUNING SYSTEM — Icom's new continuous tuning system features a luminescent display that follows the tuning knob movement and provides an extremely accurate readout. Frequencies are displayed in 7 digits representing 100 Mhz to 100 Hz digits.

Automatic re-cycling restarts the tuning at the bottom of the band when the top is reached — and vice versa. Quick tuning in 1 KHz steps is available, and fine tuning in 100 Hz steps in the SSB and CW modes, and 5 KHz steps and 1 KHz steps in the FM mode, is provided for trouble free QSO.

EASIER OPERATION AND LIGHTER WEIGHT — The most compact, lightest weight all-mode 144 MHz transceiver. First



to use a pulse power supply in communication equipment, for lighter weight. 50 mm-diameter large tuning control knob for smooth and easy tuning. Trouble-free controlling knobs for both receiving and transmitting. LED indicator for transmit and receiving modes.

MOST SUITABLE FOR BOTH FIXED AND PORTABLE STATIONS — Built in 240V AC and DC power supplies. Convenient Dial Lock switch for mobile operation. Easy carry handle. Effective Noise Blanker. IC SM5 high quality stand microphone is suitable for fixed station operation. Powerful audio output 1.5 Watts at 8 ohm, for easy listening even in noisy surroundings.

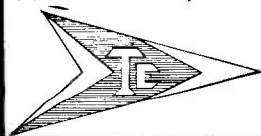
OUTSTANDING PERFORMANCE — The RF amplifier and first mixer circuits using MOS FETs and other circuits provide excellent Cross Modulation and Two-Signal selectivity characteristics. The IC251E has excellent sensitivity demanded especially for mobile operation, high stability, and with Crystal Filters having high shape factors, exceptional selectivity. The Transmitter uses a balanced mixer in a single conversion system, a band pass filter and a high performance low-pass filter. The system provides distortion-free signals with a minimum spurious radiation level.

MODES — USB, LSB, CW and FM output.

SENSITIVITY — CW and SSB — Less than 0.25 microvolts for 10 dB S + N/N. FM — More than 30 dB S + N + D/N + D at 1 microvolt or less than 0.3 microvolts for 20dB Noise quieting.

IC-251E Typical Technical Characteristics: General. Numbers of semiconductors: Transistors 99, FETs 12, ICs 37. Diodes 132. Frequency coverage: 144-146 MHz (easily extended to 148 MHz at no extra charge). Frequency resolution: SSB 100 Hz steps FM 5 KHz steps. 1 KHz steps with TS button depressed. Frequency Control: Microcomputer based 100Hz step Digital PLL synthesizer Independent Transmit-Receive Frequency Capability. Frequency Readout: 7 digit LED 100Hz Frequency stability: Within ± 1.5 KHz Memory channels: 3 channels, any inband frequency programmable. Usable conditions: Temperature: -10°C - -60°C (14°F - 140°F). Operational time: Continuous. Antenna impedance: 50ohms unbalanced. Power supply requirement: 13.8V DC $\pm 15\%$ (negative ground) 3A max. or 240V AC $\pm 10\%$. Current drain (at 13.8V DC): Transmitting, SSB (PEP 10W). Approx. 2.3A, CW, FM (10W). Approx. 2.3A FM (1W). Approx. 1.0A. Receiving. At max. audio output. Approx. 0.6A. Squelched. Approx. 0.4A. Dimensions: 141mm (h) \times 241mm (W) \times 264mm (D). Weight: Approx. 5.0 Kgs. Transmitter. Output power: SSB 10W (PEP). CW 10W. FM 1 — 10W (Adjustable). Emission mode: SSB (A3J,

USB/LSB), CW (A1). FM (F3). Modulation system: SSB Balanced modulation. FM Variable reactance frequency modulation. Max. frequency deviation: ± 5 KHz. Spurious emission: More than 60 dB below peak power output. Carrier Suspension: More than 40 dB below peak power output. Unwanted Sideband: More than 40 dB down at 1000 Hz AF input. Microphone: 1.3K ohm dynamic microphone with built-in preamplifier and push-to-talk switch. Operating mode: Simplex. Duplex. (Any inband frequency separation programmable). Receiver. Receiving system: SSB. CW Single conversion superheterodyne. FM Double conversion superheterodyne. Receiving Mode: SSB A3J, USB/LSB, CW (A1), FM (F3). Intermediate Frequency: SSB, CW 10.7 MHz, FM 10.7 MHz, 455 KHz. Sensitivity: SSB, CW Less than 0.25 microvolts for 10 dB S + N/N. FM more than 30 dB S + N + D at 1 microvolt. Less than 0.3 microvolts for 20 dB Noise quieting. Squelch sensitivity (FM only): Less than 0.4 microvolts. Spurious response rejection ratio: More than 60 dB. Selectivity: SSB, CW More than ± 1.2 KHz at -6 dB point. Less than ± 2.4 KHz at -60 dB point. FM More than ± 7.5 MHz at -6 dB point. Less than ± 15 MHz at -60 dB point. Audio output power: More than 1.5W. Audio output impedance: 8 ohms.



FROM

THANET

OF COURSE



IC2E

AT LAST!! A two-metre FM handy Talkie from the famous ICOM stable; probably the smallest sized one, too!

CHECK THE FEATURES —

FULLY SYNTHESIZED — covering 144-145.995 in 400 5KHz steps.

POWER OUTPUT — 1.5W with the 9V rechargeable battery pack as supplied — but lower or higher output available with the optional 6V or 12V packs.

BNC ANTENNA OUTPUT SOCKET — 50 ohms for connecting to another antenna or use the Rubber Duck supplied.

WEIGHT — 450 Grams with supplied power pack and antenna.

DIMENSIONS — Height 116.5mm (without battery pack), width 65mm, depth 35mm.

SEND/BATTERY INDICATOR — Lights during transmit but when battery power falls below 6V it doesn't light indicating the need for a recharge.

FREQUENCY SELECTION — by thumbwheel switches, indicating the frequency.

+5kHz SWITCH — adds 5KHz to the indicated frequency.

DUPLEX SIMPLEX SWITCH — gives simplex or plus 600kHz or minus 600kHz Transmit or 700kHz for you travellers!!

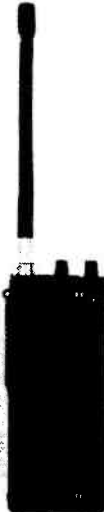
HI-LOW SWITCH — reduces power output from 1.5W to 150mw reducing rapid battery drain.

EXTERNAL MICROPHONE JACK — If you do not wish to use the built-in electret condenser mic an optional microphone/speaker with PTT control can be used. Useful for pocket operation.

EXTERNAL SPEAKER JACK — for speaker or earphone. This little beauty is supplied ready to go complete with nicad battery pack, charger, rubber duck AND the famous THANET WARRANTY.

By skilful design and the use of highly advanced technology ICOM have produced this gem for

£159 incl VAT!



THIS IS THE CHOICE FOR THE MAN WHO WANTS THE MOST FROM HIS MOBILE — THE IC260E

THE NEW ALL-MODE MOBILE

The IC-260E is obviously going to be one of the best selling multimode 2M Transceivers of all time. Never before has so much been offered in such a small package.

Replacing the IC-245E, the IC-260E offers such extras as full frequency read out, upper and lower sideband, and scanning. Thus, it makes an ideal base station, when used with a DC power supply, as well as a mobile. The use of a microprocessor instead of an LSI chip has enabled Icom to offer this at a lower price than the IC-245E.

144 MHz ALL-MODE TRANSCEIVER INCORPORATING A MICRO-COMPUTER — CPU control with Icom's original programs provides various operating capabilities. No backlash dial controlled by Icom's unique photo-chopper circuit. Band edge detector and Endless System provides out-of-band protection. No variable capacitors or dial gear, giving problem-free use. The IC-260E provides FM, USB, LSB, CW coverage in the 144-146 MHz frequency range. Thus the IC-260E can be used for mobile, DX, local calls and satellite work. Easily extendable to 144-148.

MULTI PURPOSE SCANNING — Memory scan allows you to monitor three different memory channels. Program Scan provides scanning between two programmed frequencies. Adjustable scanning speed. Auto-stop stops scanning when a signal is received, in all modes.

DUAL VFO'S — Two separate VFO's can be used either independently or together for simplex operation, and any desired frequency split in duplex operation.

CONTINUOUS TUNING SYSTEM — Icom's new continuous tuning system features an LED display that follows the tuning knob movement and provides an extremely accurate readout. Frequencies are displayed in 7 LED digits representing 100 MHz to 100 Hz digits. When in Duplex and using the tuning-knob the two VFO's track together. Automatic recycling restarts tuning at the top of the band, i.e. 145.999.9 MHz

**£339
inc.**



when the dial goes below 144.000.0 MHz. Recycling changes 145.999 MHz to 144.000.0 MHz as well. Quick tuning in 1 kHz steps is available, and fine tuning in 100 Hz steps in the SSB and CW modes, and 5 kHz steps and 1 kHz steps in the FM mode, is provided for trouble-free QSO.

OUTSTANDING PERFORMANCE — The RF amplifier and first mixer circuits using MOS FET's and other circuits provide excellent Cross Modulation and Two Signal Selectivity characteristics. The IC-260E has excellent sensitivity demanded especially for mobile operation, high stability and with Crystal Filters having high shape factors, exceptional selectivity. The transmitter uses a balanced mixer in a single conversion system, a band pass filter and a high performance low pass filter. This system provides distortion free signals with a minimum spurious radiation level for an output of 10W or more.

ADDITIONAL CIRCUITS — The IC-260E has a built-in Noise Blanker, CW Break-in CW Monitor, APC and many other circuits for your convenience. The IC-260E has everything you need to really enjoy VHF operation, in an extremely compact rugged transceiver.

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

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STANDARD

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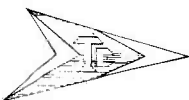
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YAESU MUSEN

RSGB PUBLICATIONS

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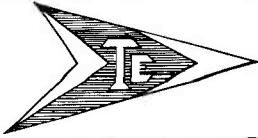
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| IC240 | The most popular, simplest to operate, synthesized 10w — 2m — FM mobile ever made | ★ £ 169 | INC
VAT |
| IC255E | The 25w, digital, synthesized, 2m — FM mobile for the man that wants just a little more | ★ £ 255 | INC
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| IC260E | The 10w, multimode, synthesized, digital, 2m mobile for the man that wants even more again! | ★ £ 339 | INC
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| IC2E | The smallest, synthesized, 2m — FM, hand-portable available | ★ £ 159 | INC
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| IC202S | The <i>BEST</i> SSB/CW, 3w-2m, portable made | ★ £ 169 | INC
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| IC402 | The <i>ONLY</i> SSB/CW, 3w-70 cm portable made | ★ £ 242 | INC
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Note all our prices include VAT, some dealers prefer to show the lower VAT-less prices — so don't get caught out.

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ANNOUNCING A NEW COMMUNICATIONS COMPUTER!

TONO

Theta 7000E



£640 inc.

The new THETA 7000E means that every Amateur can enjoy the visual display of CW, RTTY, and ASC11 in both transmit and receive modes. Just connect the TONO to any TV set via the antenna terminals or to a page printer from the parallel port provided. Bring up your CW speed in receiving or sending by either watching receiver sent or from recorded cassettes. Connection to the transceiver is via the key, phone and mic sockets.

Some of the Outstanding Features

COMMUNICATIONS COMPUTER THETA 0-7000E
VHF and Composite Video Output Provided
Printer interface ★ Wide range of transmitting and

receiving speeds — 10CW speeds + 8RTTY ★ Built-in demodulator for high performance for 170, 425 and 820 Hz shift ★ Crystal controlled modulator for AFSR — Hi or Lo tone ★ Convenient ASCII key arrangement ★ Large capacity display memory — 2 pages 32 chr × 16 lines split screen for Rx & Tx if required ★ Automatic transmit/receive switch ★ Anti noise circuit ★ Battery backed-up memory 7 channels of 64 chrs ★ Send function ★ Buffer memory — 53 character type ahead, rub out function ★ Simultaneous access of the memory ★ Pre-loading function ★ CR (carriage return) LF (line feed) cancel function ★ Cursor control function ★ Word mode operation ★ Automatic CR/LF (72, 60 or 80 chrs per line) ★ Echo function ★ Word Wrap around function ★ Transmit/receive in ASSC11 mode in RTTY ★ CW identification function ★ Mark and break (space and break) system ★ Monitor circuit ★ CW practice function ★ Variable CW weights ★ Cross pattern checking output terminal ★ Log computer output provided ★ Test message function (Ry and QBF).



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facilities. Free
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HOW TO REACH US (EASY PRIVATE PARKING ON OUR 90ft. FORECOURT)

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

FROM NORTH. Leave M6 at Junction 6 (Spaghetti) and follow left fork down to traffic island beneath motorway complex. Take third turning off to Lichfield. One mile further on follow A4040 to the right and within 100yds veer again to the right, approximately one mile further on brings you to the Fox & Goose. Turn right and see preceding directions.

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

AMATEUR ELECTRONICS UK

source for YAESU MUSEN

The superb FT-107M all Solid State H.F. Transceiver is now appearing in increasing numbers on the bands and the impressive reputation that it has already built is largely due to the fact that it incorporates time proven design techniques borrowed from the outstanding FT-101Z and FT-901 transceivers. The receiver performance of the new FT-107M has brought high praise from experienced and critical operators and this, coupled with the undoubted convenience of all solid state construction, makes operating a joy and a delight indeed. The specification of the new FT-107M includes variable IF band width, audio peak/notch filter, RF speech processor, variable — threshold noise blanker, and full metering including SWR. An all new memory system is included providing twelve memory channels with fine tuning, scanning from the optional scanning microphone and YAESU's exclusive digital memory shift system. Modes include SSB, CW, AM and FSK with variable band width on CW.

Hard on the heels of last month's announcement of new Yaesu products comes the very latest release by Yaesu — the brand new FT-480R 2metre all-mode mobile transceiver. By the time this appears in print we hope to have stocks of this exciting new model which will set new standards for 2 metre mobiles.

This month we also include a view of the new YAESU FT-707 compact H.F. all Solid State Transceiver which combines the technology engineered in the FT-107 and the FT-7B. The new FT-707 is, as would be expected, typically YAESU in design, construction and cosmetics and sets new standards for equipment in its class. Taking into account the time, money and effort which YAESU MUSEN put into their extensive research and design laboratories it is no wonder that YAESU MUSEN, the world's largest manufacturers of amateur radio equipment, always lead the field.



AEUK — THE COMPLETE AMATEUR RADIO STORE

Don't forget that when you buy from Amateur Electronics UK you are dealing with one of the oldest established amateur radio businesses in the country — seven of our staff being fully licensed ACTIVE operators. The latest full time additions to our strength are Joe Rothery, G3RJR, who is chief service engineer and who has a lifetime of experience in electronics and Fred Rendell G4HXK, who you will find on our sales floor. Both Joe and Fred, like the rest of us, are very active and can be heard regularly on the bands and the point that we are making is that Amateur Electronics UK is an organisation dedicated to the amateur radio hobby and offers you the combined experience of long established operators when making that important and final choice on equipment. Remember also that you have the advantage of dealing with the direct importer with all the benefits this entails on spares and after sales service. If you cannot call in for a friendly chat with us then we guarantee you the finest mail order service available on the U.K. market today with our free Securicor delivery facilities. Why not write, 'phone or call today and find out exactly why Amateur Electronics UK has the finest reputation in the business.

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This month we scoop the pool with news of YAESU's latest, the exciting

FT-280/480

A demonstration model of this fantastic new 2m All-Mode Mobile Transceiver is here for you to try NOW. So, don't just read the spec. Come in and use it on the air. It's superb.

- ★ Bright green fluorescent display
- ★ Steps FM — 1 KHz/12½ or 25 KHz/100 KHz SSB and CW, 10 Hz/100 Hz/1 KHz
- ★ Step or scan control from mic
- ★ Scan stops or pauses on signal
- ★ Scans whole band or memories
- ★ Auto tone-burst with repeater shift
- ★ Listen on repeater input selectable from mic
- ★ Monitors priority channel and locks on when busy
- ★ Digital clarifier plus or minus 10 KHz
- ★ Clarifier shift displayed
- ★ LED S-meter true peak reading on SSB
- ★ Semi break-in and sidetone on CW
- ★ "Satellite" mode cancels all shifts and permits tuning during transmission.



SECONDHAND FRG-7s from £140

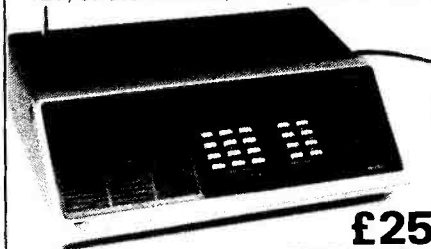
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THE FABULOUS R-1000 **£289** inc. VAT

JUST LOOK AT OUR PRICE

Something different, the fabulous new synthesised VHF/UHF **BEARCAT 220FB** receiver from the USA. Covers three amateur bands plus aircraft, marine and public service bands on these frequencies: 66-88MHz, 118-136MHz, 144-148MHz, 148-174MHz and 420-512MHz. Scans between any two pre-set channels, and also offers a priority-channel signal-finder and a lock-out facility. Operates on mains or 12V, so use at home, in the car, or on the boat.



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220 FB

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(GB3SWM)

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

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The **SHORT-WAVE** *Magazine*

EDITORIAL

Repeaters

The outcome of the inept plan to quadruple the number of London repeaters can now be seen: this appeasement of the deliberate interferers (of all kinds) has merely played into their hands and produced four times the abuse and misuse of these relays. The time is now well overdue for firm action to be taken, for the good of amateur radio. For example, howls of justified criticism of the behaviour of the illegal CB fraternity sound a trifle thin when that part of our own house — in some areas, at any rate — is so badly disordered; to safeguard and promote the interests of amateur radio requires that at least we start from a position of integrity.

If the Home Office is unable or unwilling (as seems to be the case) to make a concentrated effort to find, close-down and prosecute the offenders, then the RSGB — which holds the licences for these repeaters — has no choice but to simply close down the repeaters.

Although absolutely necessary, this would also be the unsatisfactory and second-best course of action since it would be merely allowing the Home Office to escape one of its responsibilities. A sad commentary indeed on 'authority', demonstrating once again that when it is not needed it is overwhelming and overbearing, yet when it is needed it's nowhere to be seen.

John Collins
G3KFE.

VHF BANDS

NORMAN FITCH, G3FPK

Awards

ANOTHER 432 MHz VHF Century Club certificate has been awarded, a somewhat rare event. The recipient is Ian Gordon, G8IFT, from Birmingham, who now holds award number 28. His first QSO on the band was on 30-3-1975 using a '3-20 tripler, after which he obtained a *Microwave Modules* varactor tripler. In July 1976, SSB was added via a home built G3ZVC 10m transceiver into a *Microwave Modules* transverter, with a 2C39A amplifier. The next gear comprised an *Icom* IC-202 and *Trio* TS-700G, both used with a home built down converter to 28 MHz feeding a transverter. The present set-up uses an *Icom* IC-402 feeding a 2C39A with a BFR34A preamplifier. The aerial has been an 18-ele. *Parabeam* throughout.

Three more 144 MHz VHFCC's have been issued. No. 322 goes to regular contributor Tony Collett, G8GXE, from Langley, near Slough. Operation from this QTH began in December, 1978 using a *Yaesu* FT-221 and 40 watts amplifier. Initially, a 2m "ZL-special" aerial in the loft was used until the 9-ele. *Tonna* was put up at 25 ft. outside in June last year. Tony spends most of his time on 70cm. now and is also QRV on 23cm. Future projects include getting more power on all bands and curing a bit of TVI.

Award No. 323 goes to David Thorpe, G4FKI, from Hainault in Essex. He was first licensed in September, 1976 and operated with one watt of FM for some time. The following year, he bought a *Belcom* Liner 2 and added a *QM70* amplifier. In 1978, Dave disposed of these items and went over to HF and 4m. operation. This year he acquired a "jinxed" IC-201 which now runs 5 watts, the aerial being a 5-ele. *Yagi* at 25 ft.

Although 100 stations were worked in the first month of activity, it has taken *four years* to accumulate the QSL's to prove it!

Vernon Boldy, G8SVG, from Wakefield in West Yorkshire, fared better. His cards were all collected since September last year and has resulted in Certificate No. 324 being issued. The QTH is 125 ft. *a.s.l.* and the gear comprises a *Trio* transceiver plus 80 watts amplifier with a 12-ele. "ZL-Special" aerial.

Mike Lee, G3VYF, holder of QTHCC No. 7, now has 126 QTH Locator Squares confirmed on 2m. so receives his "125" sticker.

Contest News

The results of the BARTG Spring RTTY Contest have been announced and show the winner of the single operator section to be G8LWY, with DC1ZN/P runner up and G18HXV in 3rd place. G3NNG won the multi-operator part with G8DVR/P in second spot and G4ARD/A third. This contest took place over March 22-24.

Coming events: The 144 MHz QRP event is on Aug. 3, presumably 0900-1700 GMT as last year. The RSGB's European MS Contest starts at 1700 GMT on Monday, Aug. 11, lasting 24 hours. British Isles operators must be RSGB members to enter, though why any EI participants should have to be members of a British society seems silly. The contest is on 144 and 432 MHz and skeds may be arranged. Exchanges to consist of both calls, standard two-figure MS report and first two letters of the square, using conventional IARU MS procedures. Scoring at one point per kilometre with a multiplier of two for each new square worked. On 432 MHz, an additional multiplier of 15 will apply, the final tally being the sum of points on each band.

The 70 MHz Trophy and SWL Contest is on Aug. 17, presumably from 0900 to 1700 GMT as last year. Aug. 24 sees the fourth session of the 10 GHz *Cumulatives* from 0900-2000 GMT. The VHF version of the WAB Contest is listed for Aug. 31 but no details can be discovered.

Beacon Notes

The 23cm. and 3cm. Isle of Wight beacons are operational again. Dave Sellars, G3PBV, (Exeter) first heard

GB3IOW on 1296.1 MHz on June 28. The 3cm. one on 10.1 GHz is using a 3 dB omni-directional slotted waveguide aerial and Joost Berden, G3RND, reckons the signal to be about 6 dB down on that previously registered at his QTH on the island.

For what good it will do, once again it is requested that the beacon bands be kept free of other traffic. On 2m. in particular, FM operators come up on or near beacon frequencies, thus interfering with their reception by those studying propagation. Some of the offenders are well aware of the internationally agreed band plans, but newcomers may not be. Of course, the pirates couldn't care less. The "defence" that these operators put up that *they* cannot hear any signal is no excuse. A number of keen types keep a receiver on, say, DL0PR on 2m. listening for meteor pings, or on SK4MP1 to monitor possible *Auroral* propagation. The beacon band on 2m. is 144.85-144.99 MHz, in case anyone is uncertain. This was agreed to by all Region 1 IARU national societies at the Miskolc-Tapolca Conference in 1978.

The Satellite Scene

Parts of the ill-fated *ARIANE LO-2* launch vehicle have now been fished out of the Atlantic Ocean. A preliminary announcement from the European Space Agency suggests the motor "D" had a "foreign body" in its fuel supply. It is understood that this motor had been successfully fired 166 times before so was considered reliable. It seems that the erratic operation of the motor, as reported last month, caused tremendous vibration which probably shook the spacecraft to pieces. When this kind of thing happens, the fuel tanks automatically self-destruct.

The *Firewheel* hardware has been recovered, but to date, *A-O-9* remains submerged in a watery grave and is unlikely to be recovered for fear of igniting the kick motor which is "live".

AMSAT-UK reports that the official word from the Soviet Union is that the opportunity for a 1980 launch of more *RS-series* amateur satellites has faded. However, unofficially they seem somewhat more hopeful; we will have to wait and see.

Oscar 7 has been in Mode "B" whenever your scribe has had time to listen. AMSAT requests telemetry

from listeners and details of the modes, particularly any changes during a pass. For both 0-7 and 0-8, TLM is required including RTTY, and times of closest approach - TCA - observations from as many folk as possible.

The latest Orbital Calendar is now available from AMSAT-UK at £1.27, inc. postage, from G3AAJ at 94 Herongate Road, London E12 5EQ. It lists all orbits of 0-7, 0-8, TIROS-N and NOAA-6 till October 2 and includes spacecraft information to umpteen decimal places. Inquiries about the AMSAT-INTERNATIONAL symposium at the University of Surrey in Guildford, Sept. 19-22, should be addressed to G3AAJ with *s.a.e.*

DX Notes

Marc de Munck, ON5FF, Freddie de Guchteneire, ON6UG, and Ian Lucking, G8RNM, plan to operate from County Mayo in the Irish Republic between Aug. 2 and 14, principally for the aforementioned MS Contest. The probable locator will be UO80d. They hope to get up Slievemore, 2,204 feet high, on Achill Island. Marc has been issued with the call, EI2VAH/P and -/M. They will be QRV on the 20m. VHF net for skeds, etc. On 2m., they will run the maximum legal output to one, perhaps two, 16-ele. *Yagis*, on SSB and CW. Likewise on 70cm. using four 21-ele. *Yagis*. G8RNM told your conductor that 23cm. operation might occur.

Another Joker

Walter Mitty is alive and well and living in the Ukraine! So it would seem. At least three readers have received *s.w.l.* reports from one Alex, UB5-073 2589 in TH04d, who would have us believe that his 15-ele. beam and 20 tubes Rx can miraculously copy both MS and E's signals from the odd distance of 3,000-odd kms. All he does is to read that, for example, DM2GPL (GL 79e) had a QSO *via E's* on 28-6-79 with G8HTE (XK56f) and then send a report claiming to have

THREE BAND ANNUAL VHF TABLE

January to December 1980

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	countries	
G4CMV	—	—	66	15	42	12	135
G8OPR	—	—	64	17	46	8	135
GD2HDZ	24	4	48	11	37	7	131
G3BW	—	—	68	20	36	7	131
G4HNS	14	3	57	11	35	8	125
GJ4ICD	—	—	54	16	38	9	117
G8GXE	—	—	55	11	42	9	117
G3PBV	5	2	52	10	37	8	114
G8IFT	—	—	56	11	35	8	110
G8FMK	—	—	58	11	33	6	108
G8MFJ	—	—	55	13	27	7	102
G8HHJ	—	—	48	8	36	9	101
G4BYP	20	5	40	9	21	3	98
G4DEZ	—	—	67	27	—	—	94
G3CO	22	3	36	11	9	4	85
G8KGF	—	—	48	14	17	6	85
G3FPK	—	—	67	17	—	—	84
G4ERX	15	2	30	10	18	8	83
G8VLQ	—	—	52	10	16	3	81
G8KAX	—	—	31	9	31	8	79
G3KPU	—	—	33	5	28	6	72
G3FIJ	12	1	37	8	10	2	70
G4IGO	—	—	47	22	—	—	69
G4ARI	12	2	44	7	—	—	65
G8JJR	—	—	48	8	—	—	56
G8VJJ	—	—	28	7	19	1	55
G8TST	—	—	42	9	1	2	54
G8RWG	—	—	45	9	—	—	54
GW3CBY	7	4	25	6	5	3	50
G4HGT	—	—	42	6	—	—	48
G8RZA	—	—	36	9	—	—	45
G4FKI	18	3	16	3	3	1	44
G8JGK	—	—	33	9	—	—	42
G8TIN	—	—	35	7	—	—	42
G8BMNG	—	—	33	5	—	—	38
G3EKP	9	4	12	4	2	2	33
GM4CXP	—	—	16	7	—	—	23
GM4COK	—	—	4	9	—	—	13

heard it. It is a give-away that these reports do not arrive very quickly, only *after* a genuine QSO has been reported in a magazine somewhere. Amateur radio is strictly controlled in the U.S.S.R. so hopefully their licensing authority will curtail this dishonest activity.

Six Metres

Not a great deal of 6m. news this month. ZD8TC on Ascension Island is now QRV on 50.1 MHz and listens on 10m. on 28.885 MHz. 15TDJ contacted E12W and E16AS on June 10. E-layer propagation allowed reception of the Cyprus, Gibraltar and Italian beacons on June 30 from southern England, through the Midlands to Dublin. The FY7THF beacon on 50.039 MHz has also been received *via* the F-layer, in the latter part of June.

Four Metres

Welcome to new contributor G4ARI from Leicestershire who enters the annual table and who operates on the 4m. band which will please Dave Thorpe, G4FKI, in his task of compiling a list of all 4m. operators. Dave would appreciate it if devotees of the band would advise him of any regular skeds they have in which they would welcome company. He operates on AM mobile on 70.26 MHz and also on FM and SSB with an *Icom* IC-201 or *Yaesu* FT-227R feeding a transverter. During a recent, short holiday in Jersey, he met GJ8's EZA and KNV and took some gear along with which he contacted G3DAH (Kent).

Arthur Breese, GD2HDZ, concluded 34 QSO's in the June 1 contest, but reckons conditions were not up to much. Even so, it provided him with another nine counties and another

country for the 1980 table. John Baker, GW3MHW (Dyfed), reports increasing activity and mentions that more 4m. men are now appearing on 80m. on 3,718 kHz, for the net commencing at 0830 local time.

Gordon Pheasant, G4BPY, a dedicated 4m. operator, has built a new solid state beacon for 5B4CY from private funds. Initially to be tested on 70.04 MHz, it will eventually operate on 70.110 MHz, using a new crystal. Previously such private donations have provided beacons in ZB2 and TF, plus the famous PX1RI in the late 1960's.

GW3MHW also reports that Chris Tran, GM3WOJ, has offered to build a solid state beacon for ZB2VHF, but suggests a change of frequency to avoid current QRM. A news item on GB2RS on June 29 asked for a 70.150 MHz crystal for this beacon for a *Pye* "Westminster" board which G4BPY was working on.

John, GW3MHW, is claiming the first GW/SM 4m./10m. crossband QSO with SM6PU on June 27. A little earlier, G4BPY did the same for the first G/SM?

Two Metres

By now, if the past few years are anything to go by, there should have been lots of *E*'s activity to report, but to date, only a few, short openings have occurred. In the June 1 event, Mick Allmark (Leeds), heard HG4YF (JH63g); YO21S (KF17e); YU1NWN (KF24f) and YU21Q between 1850 and 1921 GMT. On the 10th, he heard SP7FSF and SP7CNL (JL27c) in a short affair that ended at 1758. During the *Arietids* shower, Mick heard good bursts from EA3ADW (BB) and DF7RG (GI) on the random SSB MS frequency of 144.200 MHz. The aerial is a 10-ele. *Yagi* at present but he has the material to make four 7-ele. *Quads*, which he does not think the local Council will appreciate.

Bill Hodgson, G3BW (Cumbria) has concentrated his time on MS work and lists the following "star turns" for June: OH3MS (MV); SR6ASD (HL); HB9BBD (EH) and 13TJQ (GF). John Hunter, G31MV (Bucks.), caught the fleeting *E*'s affair on June 10 and worked SP2LU (JN61); RZ2AAB (NN18c); and UC2ABN (NN18e). He was called by UK2CAU (NO) who was wandering in and out of QSO's in Mercurial fashion! Mike Lee, G3VYF (Essex) also worked the

QTH LOCATOR SQUARES TABLE

Station	23 cm.	70 cm.	2 m.	Total
G8GML	11	74	122	207
G8HVV	12	73	130	215
G3JXN	36	73	94	203
G3COJ	24	66	93	183
G3VYF	—	63	144	207
G8LEF	—	62	101	185
GJ4ICD	—	56	153	209
G2AXI	2	54	93	149
G4CMV	—	53	145	198
GJ8KNV	—	46	118	164
G8ATK	5	43	93	141
GD2HDZ	12	41	76	129
G4ERX	1	41	72	114
G4HYD	—	40	83	123
G8KAX	2	40	63	105
G8LHT	7	39	98	144
G8HHI	—	36	103	139
G3SPJ	10	36	71	117
G3PBV	—	35	64	99
G8GXE	3	35	57	95
G30HC	4	33	104	141
G4J1W	1	30	108	139
G8OPR	1	30	86	117
G8IFT	14	30	68	112
G4BWG	—	29	118	147
G4AEZ	5	29	61	95
G4GEE	—	28	60	88
G3RAX	1	27	73	101
G3FJJ	—	27	68	95
G3BW	3	26	120	149
J4EAT	—	25	238	263
GM4CXP	—	25	136	161
G3KPU	—	25	91	116
G18EWM	—	25	67	92
G4AWU	—	22	110	132
G8KGF	—	20	95	115
G8MFI	—	19	79	98
G4ERG	—	16	168	184
E43LL	—	15	137	152
G8LGL	—	15	87	102
PH1CD	—	13	178	191
GM4COK	—	12	154	166
GM8NCM	—	12	84	96
G8PRG	—	12	39	51
9H1BT	—	11	163	174
G8JJR	—	9	78	87
G8KPL	—	7	87	94
G8JAG	—	7	79	86
G4FBK	—	5	98	103
G8KSP	—	2	76	78
G6UW	—	1	89	90
G4GXT	—	1	56	57
G4GSA	—	1	50	51
G3POI	—	—	283	283
DK3UZ	—	—	223	223
G31MV	—	—	213	213
G3CHN	—	—	185	185
G3SEK	—	—	182	182
G3FPK	—	—	159	159
G4IGO	—	—	134	134
G4IJE	—	—	131	131
G4DEZ	—	—	113	113
G8IXG	—	—	106	106
G8LFI	—	—	83	83
G4GET	—	—	72	72
G4GHA	—	—	67	67
G8JGK	—	—	52	52
G8RWG	—	—	29	29

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

RZ2 at 1737, soon after the start of the event.

Dave Sellars, G3PBV (Devon) was on in the French contest but found conditions rather poor, best DX being AG square, with stations in BF and CG heard weakly. SM0LAN/MM in the English Channel was an unusual one and Dave worked GW8GXE/P in Gwynedd. From W. Yorks., Clive Morton, G4CMV, now has the

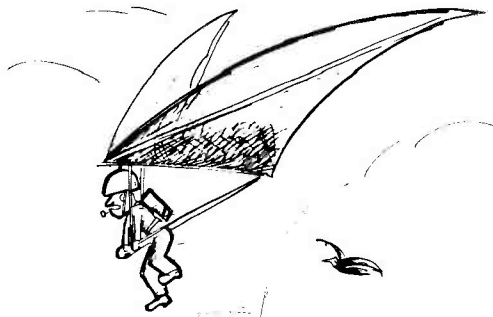
amplifier running again on a 15-ele. *Yagi* outside of TV hours. On June 29, he worked G8PWX (Tyne & Wear); GM8HVB/P (Central) and G18TBQ (Down) for three more 1980 counties. Ken Osborne, G4IGO (Bristol), added country No. 30 on June 8 thanks to a 90 min. MS QSO with EA6AU (BZ55c) and on the next day, he worked SR6ASD on MS.

Prior to his radio/holiday trip to Wales, Tony Collett, G8GXE (Berks.) collected G8GII/P (Cleveland); G14GVS (Antrim); G4ISQ/P (Cornwall); GW41OW/P (Gwynedd); G8DDY (I.O.W.); G8AGU/P (Northumberland) and G4CJG (Durham). Poorly located for the south, Tony was disappointed with the French contest on June 7/8 and could not raise several needed squares which were heard. George Gullis, G8MFJ (Wilts.), did contact F6CTT/P (YH) and F6KHX/P (YI) on June 7, however.

Vernon Boldy, G8SVG (W. Yorks.), was lucky to catch HG8ET (KG) at 1600 on June 10 and heard YU2CBE and an OE6, in an opening *via E*'s lasting about one minute. He has joined the growing band of MS folk and completed with SM7AED (GQ) in 47 mins. on SSB on June 21.

"Just for a change, I have to report an opening which I didn't miss; the *E*'s on June 10." writes GD2HDZ. Alerted by the very strong FM broadcasters on 4m., Arthur switched on to 2m. and worked SP7FSF straight away, but missed out on an OK station. Geoff Brown, GJ4ICD, worked one new square in an *E*'s event on June 8; 17WAT (JA62e) and added another two the same day, *via* MS, with LA6HL (CS) and SM7GWU (HS). Ian Raine, GM8TSI (Midlothian) had a hectic quarter hour in the *E*'s opening on the 10th working; SP9BIF (JK); SP9CSO: SP9GVD: SP6AQA (IL); SP6ARE, UT5DL (LI) and UT5DT (LI), all "five by nine" both ways. UT5DL at 1884 kms. was the best DX.

Edmund Ramm, DK3UZ, is now up to 223 squares worked and 47 *WAE* countries. During the VHF Contest on May 3/4, he worked GW8BHH/P in flat conditions and thinks that many more DL/G QSO's could be made if only we would beam to the east. Eddi mentions the recent activity by PA0RJV/MM from BO square but reckons the supposed 200 watts to a clover-leaf aerial did not produce



GW3COI°

"... sorry about the mike noise ..."

much of a signal. He thinks Rob's Rx, "... virtually seemed to be a reversed biased diode ..." so let us hope the next station to operate from BO will fare better. On June 18, Eddi worked UK5JAO (QE) via E's but missed an earlier opening into LZ and a loud Aurora due to his being at work. On MS, he worked YU2RTU (HD) and likes this mode as the time element is under one's control, even if QSO's take a while to complete. A nice new one on tropo. was GM8TLO, the sole GM one evening even though the band was well open.

Szgy Iulius, YO2IS (KF17e), missed an E's opening to Israel on May 30, but was in on seven others. On June 1, he worked UA3's in WQ and TS, plus a UD6 in WA. In a second opening at 1842, he contacted G4CMV in ZN; a nice long haul. On June 8, a couple of EA6's were worked and two days later, there were two more events, the first providing DL and PA, the second, a GM in YS square. On the 11th, Szgy contacted PA3AMF at 2125 GMT which is 0025 local time for him. Finally, on the 18th, more UA's were worked in QO, RN and SN squares.

Seventy Centimetres

One of the recent highlights for G3BW was the "terrific opening" on June 3. Bill says it was quite outstanding to hear such strong signals from the south. This time it seemed to be concentrated down the west side for a change. G8GXE worked Bill in this opening, also GD2HDZ and G8KBQ in Somerset.

Other nice ones were G8EEM (Durham) on the 7th; GW4EZT/P (Gwynedd) the next day and G8SFM (Glos.) on the 17th. The only station heard in the European event on the 7/8 June was PA3ALK/P (CL02a) worked at 1742 on the 7th. Tony's station now comprises a Trio TS-120S and transverter, driving a 3CX100-A5 PA, the aerial being an 88-ele. Multibeam at 35 ft.

John Pilags, G8HHI (Hants.), now runs a 100 watts amplifier and finds it makes all the difference. G8MFJ mentions a "small opening" on June 3 during which he worked GU8FBO, G3BW and G3KMS (Gr. Manchester) between 1920 and 2300. On June 8 he had QSO's with F6CTT/P (YH) and F6KHX/P (YI). That contest weekend gave GJ4ICD squares Nos. 55 and 56 in the shapes of F1EJZ/P (CH) and F1DFE/P (CI).

Twenty-three Centimetres

G3BW has acquired a Microwave Modules transverter and put up a 15-over-15 aerial at the top of his tower. So far he has only worked his good friend GD2HDZ and has heard the Wrekin beacon once, so concludes it will be a hard slog as it is on 70cm. G4CMV is now on the band using a S.O.T.A. transverter. Clive could do well from his good location near Bradford. G8GXE commissioned his 23cm. gear on May 19 and, up to the time he went on holiday, had worked six counties. Tony uses a Microwave Modules transverter with a Quad Loop Yagi at 32 ft. on the mast.

VHF NFD

There has been no time for written reports on VHF NFD weekend. Initial impressions were that conditions were rather flat with no exotic DX worked. On 2m., DL0IH (DO) was worked by a number of stations but was weak at G3FPK. OZ1CWM/LX/P in DK was also on and heard, too, on the 7th July at 1620 working G3NAQ. E12VGN/P (WN69j) was on CW whenever heard at G3FPK. He was probably just in Co. Wicklow on a 2,473 ft. mountain called Kippure. As usual, the contest revealed some lousy signals. It is apparent that those which sound raspy in SSB mode are invariably nasty and clickey on CW too. There seems to be little attempt to shape the keying to avoid thumps and clicks in several of the well-known, Oriental transceivers. On the other side of the coin, mention must be made of the exemplary signal from the Reading Club's 2m. station, G4CCC/P. The equipment was Dave Crisp's (G8IXG) Yaesu FT-225RD driving a pair of Eimac 4CX350F's. A modest 6 dB of processing was used essentially to avoid any possibility of non-linear operation. If all contest stations were as clean as this, there could be no genuine complaints of splatter. As to scores, G4BWG/P (AL) on 2m. concluded 805 contacts, mostly with continental stations.

Miscellany

The QTH Locator Square Table has grown somewhat lately. However, there are several folk whose calls are included but who have not shown any interest in the table for the best part of a year. Accordingly, it is proposed to delete these soon unless we hear to the contrary. Concerning repeaters, VHF relay GB3BP (Crawley) came on R6 on July 8. GB3NM (Notts.) suffered a lightning strike on June 26 so was out of service.

Deadlines

The deadline for your contributions for the September piece is Aug. 6 and don't forget to send your latest squares totals. The next deadline is September 3. Everything to: "VHF Bands", SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts., AL6 9EQ. 73 de G3FPK.

THE RABBIT PATCH, PART III

THE FIRST OF FOUR PARTS DESCRIBING THE
CONSTRUCTION OF A MULTI-TEST UNIT

BY "BUCK"

"Pennywise — without being Poundfoolish"

While getting the items together to build the previous two pieces of test equipment I had, necessarily, to scan the various advertisements for components on offer. The situation generally followed the patterns that trade has followed since time immemorial: items in short supply, or heading the fad-list of the day were expensive, whilst the unpopular items were on sale in ten-ton lots for a pittance. At the same time, the price of bread-and-butter items that everyone needs all the time gently bobbed up and down close to the level reached by the rising tide of inflation.

There were the usual pressures to buy this, that, or the other penny-catching, chromium-plated gimmick that was "essential to improved performance"; and without which, apparently, no self-respecting enthusiast could consider himself worthy of the name. On top of which were the strident exhortations that "Only the Best is good enough" and "You owe it to yourself . . .". Now this is such nice, comforting advice that it is a great pity close examination should reveal it as being a load of old lentils: in the first place, whilst it is true that the best is always good enough, it is not true that the best is the only thing that can be 'good enough'. Even further from accuracy is the (implied) criteria that 'the best' is synonymous with 'that which costs the most money'.

This is not to say that any old thing will do for any particular end-result: quite obviously it will not. But the verdict that any item is 'good enough' should always be dependent upon the comparison that is made by the user between the results desired and the results achieved, and should not be dependent upon influences outside the user's requirements. All of which boils down to the hard practicality that if any approach produces the right result in the judgement of the individual concerned, then that approach will be 'good enough'. In the light of increasing experience the standards set by the individual will change and the requirement will alter. Which is as it should be, reflecting as it does the natural order of things to mature and evolve in their own pattern and in their own time.

Applying the foregoing to the business of acquiring components for projects leads to the conclusion that some 'Bargain Offers' are worth considering. Equally, some are not. The purchase of a bag of mixed resistors can be a saddening experience when they are found to consist of largely useless values. But 50 general purpose RF amplifier transistors (untested) for 50p can't be all that bad, because even if 50 or 60% of them prove to be non-operational you'd still be ahead of the financial game with the value of the remainder. To say nothing of the difference in confidence which arises when the consequences of destroying a component in a new project can be reduced to the lowest financial impact. (In the event, of

course, the absence of 'fear and trepidation' means that the new circuit is usually successful anyway!). Objections have been raised against the use of second-hand and/or below-makers-specification components on the grounds that such items can lead to misery when installed in a pet project — and fail to work.

However, there is nothing against using a component from any source whatsoever — just so long as it is tested and found to meet the performance requirements *before* being included in circuit.

Which is why the third item of test equipment automatically became a Multi-Test Unit.

Description

"Measure a thousand times — and cut once".

Turkish Proverb

What to measure, and how to do it, took some time to decide. To what standard of accuracy should measurements be made? What levels of measurement were needed? How could flexibility of use be accommodated within reasonable financial limits? The temptation to indulge in over-elaboration had to be resisted. So, too, did a strong inclination to include provisions for more facilities than were strictly necessary.

The eventual decisions on these points may prove useful to others as a guide. The builder, however, must be ready to amend, add or omit details in design to suit his individual choice. Only by exercising his own judgement in what is needed can the Test Unit have a real chance of pleasing the owner. To assist in any re-planning that may be necessary details of those points that should be taken into consideration at each stage will be given at the appropriate time.

Because small units tend to get 'buried' on a workbench, the Test Unit is built in one case measuring 8" wide by 12.5" high by 3" deep, and consists of four Sections:—

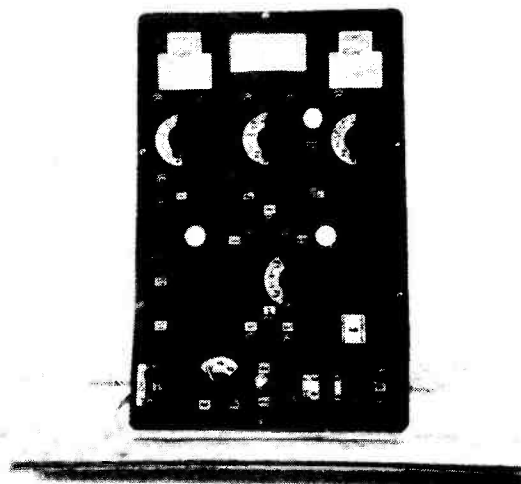


Fig. 1 Front view of the complete Tester

Section 'A' — Meter Section: Three panel meters provide overlapping ranges for DC Voltage, DC Current, and one range of resistance measurement. Two are inexpensive 1 milliampere instruments, and the third is a 100-0-100 microampere meter which is slightly dearer. Three meters are necessary for field effect transistor (FET) testing. The meters are also used in a general application, various outputs from the other sections being plugged in when necessary.

Section 'B' — FET Tester: Nine terminal posts, two potentiometers and a slide-switch form this section which enables the relationship between gate voltage, (V_g), and drain current, (I_d), to be measured with sufficient accuracy for comparative performances to be determined.

Section 'C' — Capacitor and Continuity Tester: Using a complementary metal oxide silicon integrated circuit (CMOS IC) and a few resistors, one half of this section provides a testing facility for capacitors from 2.2 picofarads up to 250 microfarads. The other half-section provides an audio frequency (AF) oscillator output that is used for continuity testing — thereby relegating our battery and bulb lash-up to the museum. The AF output also provides the alternative current (AC) source needed by the RC(L) Bridge Unit that is now clamouring to be built. Finally, the Loudspeaker in this section can, of course, be used independently.

Section 'D' — Transistor and Diode Tester: By turning a switch an indicator light identifies a transistor as being a PNP or an NPN type. The Tester also checks the component for short-circuits (s/c), open-circuits (o/c), and determines relative performance by measuring leakage and gain currents. Diodes can have their polarity established, be tested for s/c or o/c, and their forward and reverse currents measured.

A general view of the front panel and the wiring of the prototype are given in Figs. 1 and 2; Fig. 3 is a detailed lay-out of the front panel showing typical dimensions. These dimensions may need to be amended to suit the design of the builder — especially in the matter of the panel meters obtained. The components needed for the complete Unit are given in the Table of Values (Figure 4).

Materials

All that has been said in previous articles concerning supplies of components and hardware applies equally in this instance — so back to the nearest super-market for more supplies of casing materials from their discarded wooden boxes.

Precision resistors (plus or minus 1% or 2%) are only required in the voltage and current measuring circuits associated with the meters, (Section 'A'). All the rest, including those in the Ohm measuring circuit, can be of any tolerance that comes to hand, the precise values needed being made up by series and/or parallel connections.

Rotary Switches could be replaced by a system of banana or wander plugs and sockets — but would be infuriating to use. Slide switches could be replaced by the toggle variety, although the latter are more expensive.

Terminal posts were selected because of the flexibility of coupling arrangements they afford. They are designed to accept 4mm wander plugs, bare (tinned) wire, spade terminals, and — with a panel pin pushed into the bare-wire hole — crocodile clips. In this, as in everything else, the criteria

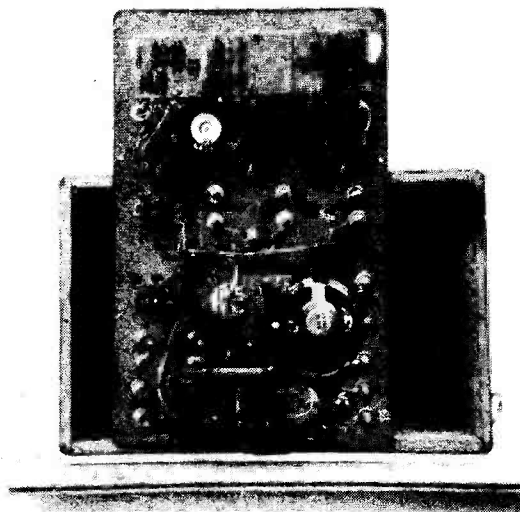


Fig. 2 General view of the wiring on the reverse side of the front panel. The tag-strip mounted in the base section to carry the voltage-dropping resistors for the power supply can be seen in the bottom right corner.

demanding by the builder, together with his available resources, must determine the eventual selection.

The choice of the three meters can be made in the knowledge that high quality precision instruments are not essential for this project. The two 1 mA. meters can be the cheapest available; they will be individually calibrated and thus provide the necessary accuracy. The third meter is required to be a little more sensitive and to be capable of reading both positive and negative going currents; hence this one is a shade more expensive than the other two. Don't allow yourself to become over-ambitious at this stage in your planning; be content with the situation, bearing in mind that a really sensitive volt-ohm meter will be needed, and built as a separate instrument, for more delicate and advanced work. The 1 mA. meters can be of the battery-level measuring variety, with the scales turned over and re-calibrated in indian ink. The other meter is a standard, low-priced 100-0-100 microampere type, which has a printed scale in 4 microamp. divisions and which can be used without alteration. (Unless you are feeling particularly venturesome and wish to scale it to read ohms directly in addition to its normal presentation.) Needless to say, if you have meters available, then use them. The principles to be described in succeeding paragraphs apply to meters generally.

The loudspeaker in Section 'C' will not be called upon to reproduce speech or music with high fidelity, so that the smallest and cheapest of those on offer will do very well. In an existing speaker is to be used it might be necessary to mount it separately, and to revise the driving stage.

Cost

At 1979, post-budget prices the Unit should cost around £21.50. Of this sum one third is spent on the meters and one third is swallowed up by the screw terminals. A study of the various units on offer soon establishes the twin facts that, in

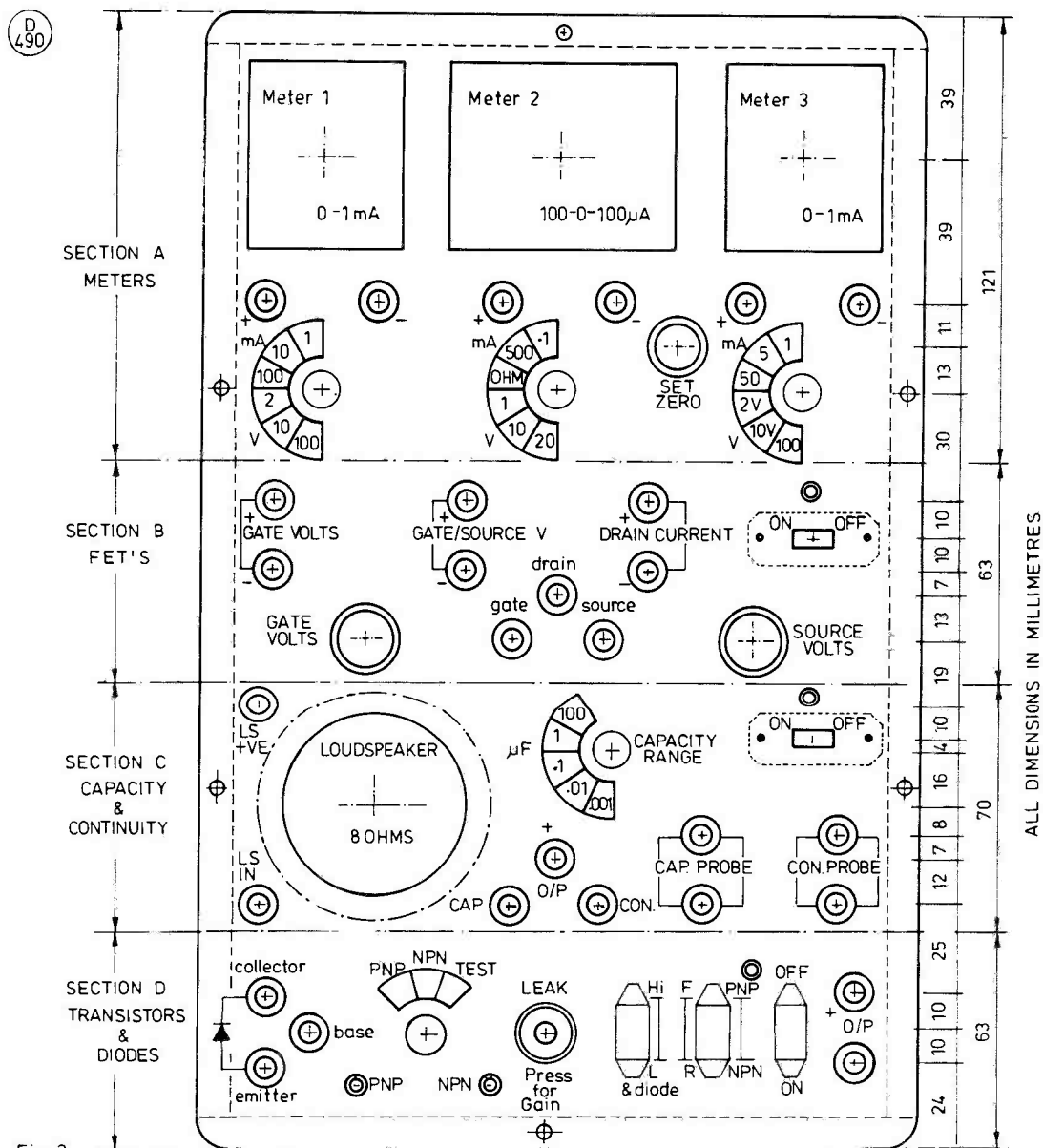


Fig. 3

Front view and dimensions; overall size 203×317×76mm. Knobs omitted for clarity. The components are distributed symmetrically about the centre-line, and the separation between each row is shown. However, the builder's choice of components may well affect all these measurements.

the first place, an equivalent Unit is just not on the market; and, secondly, 3 simple multimeters alone would cost as much, without regard to the testing facilities offered by Sections 'B', 'C', and 'D'. In any case, the Unit permits job-lot components

to be bought with confidence, which will considerably reduce future outlays. It is tempting at this stage to claim that, "The more you buy, the more you save". Alas, that also is a fallacy of the Market Place.

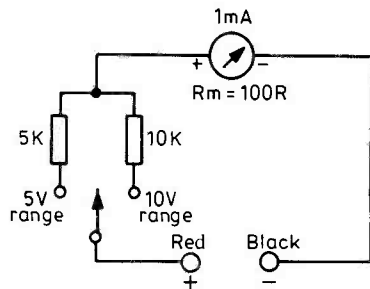


Fig. 5 DUAL RANGE VOLTMETER

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the circuit between the terminals will produce a meter reading that is less than f.s.d. If the resistance is so large (to that particular meter) that it offers an infinite amount of opposition to current flow, the meter will read zero current. By suitable calibration the resistance values can be read directly off the meter scale, or the reading can be checked against a graph or set of tables.

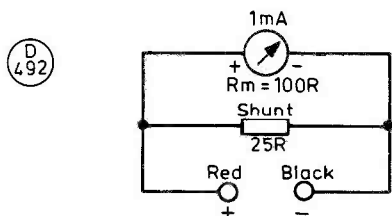


Fig. 6 EXTENDING METER RANGE TO 0-5mA

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In Fig. 7 a meter has been connected up as a resistance measuring device. Special attention should be paid to the polarity of the terminals in this application of the meter. Later on, when considering how to identify transistor lead-outs, this point will be of importance. Under normal conditions when measuring voltage or current, the Positive (Red) Terminal of the meter is connected to the positive side of the circuit from which the measurement is being taken, and the Negative (Black) Terminal is connected to the negative side. Any attempt to reverse these connections will result in the meter needle being driven in the opposite direction to the scale until brought up against the end stop. This is the case in which the motivating voltage is derived from an external circuit. However, when switched into a resistance measuring role, it is the meter circuit which provides the motivating voltage. Examination of Fig. 7 will show that in this case the Red Terminal is connected through the limiting and zeroing resistors to the negative side of the cell or battery and therefore presents a negative connection to the external circuit; likewise, the Black Terminal will present a positive connection. (I am sure that these things are arranged just to confuse us. Successfully, too!).

to be continued

A PUSH-PULL FET OSCILLATOR

A VERSATILE CIRCUIT FOR THE EXPERIMENTER

P. C. COLE, G3JFS, ex-VK6AI, 5Z4PQ

MANY different oscillator circuits have been developed but when analysed they are found to be variations of a few basic types. Theoretically one circuit should be as good as another but in a practical world this is not always so and each type of oscillator, be it a Hartley, Colpitts, Clapp, Reinartz or what-have-you, is found to possess particular merits which make it more suitable for a specific use than another type. It is therefore of advantage to the experimenter or amateur designer to have as wide a choice of oscillator circuits as possible, and the push-pull circuit is suggested as a useful alternative to the more usual designs when a simple, wide-ranging oscillator of good performance is needed.

The Push-Pull Oscillator

Fig. 1 shows the circuit of the basic push-pull oscillator with typical component values for use in the HF range. As can be seen it bears a close resemblance to the circuit of a free-running multivibrator except that the amplifier loads are tuned instead of aperiodic. The cross-coupled capacitors C1, C2 provide positive feedback to maintain oscillation and the output is taken from a loosely coupled link or through small coupling capacitors, C8 and C9, to the next stage.

There is nothing new about this circuit as push-pull designs were once very common in amateur equipments, and in its valved version a popular application was as a tunable VHF oscillator in such classic designs as the G21Q 2-metre receiving converter. With tuned lines in place of the LC circuits this oscillator could be used at much higher frequencies, and in these days of highly sophisticated equipment it is hard to believe that many early VHF and UHF transmitters were nothing more complicated than a modulated push-pull oscillator coupled to an aerial.

However the versatility of this circuit and its usefulness at

Table of Values
Fig. 1

R1, R2 = 100K	C3, C6, C7 = 0.047 μ F
R3, R4 = 470R	C4, C5 = 22 pF s/m
TR1, TR2 = 2N3819 or similar	VC1A, VC1B = Twin-gang var. capacitor, 20-350 pF/section
RFC1 = 1 mH choke	L1 = 6½ bifilar turns of 22 s.w.g. enamel covered wire, one wire spacing between turns on ¼" dia. dust-cored former.
C1, C2 = 10 pF s/m	

Note: All resistors are ¼-watt; C8, C9 are small coupling capacitors if required.

Table of Values
Fig. 2

R1 = 50K	C1 = 4.7 μ F electrolytic
R2 = 10K	C2 = 220 pF ceramic
R3, R4 = 100K	C3, C4 = 22 pF s/m
VC1, VC2 = varicap diodes suitable for frequency in use.	

Note: All resistors are ¼-watt.

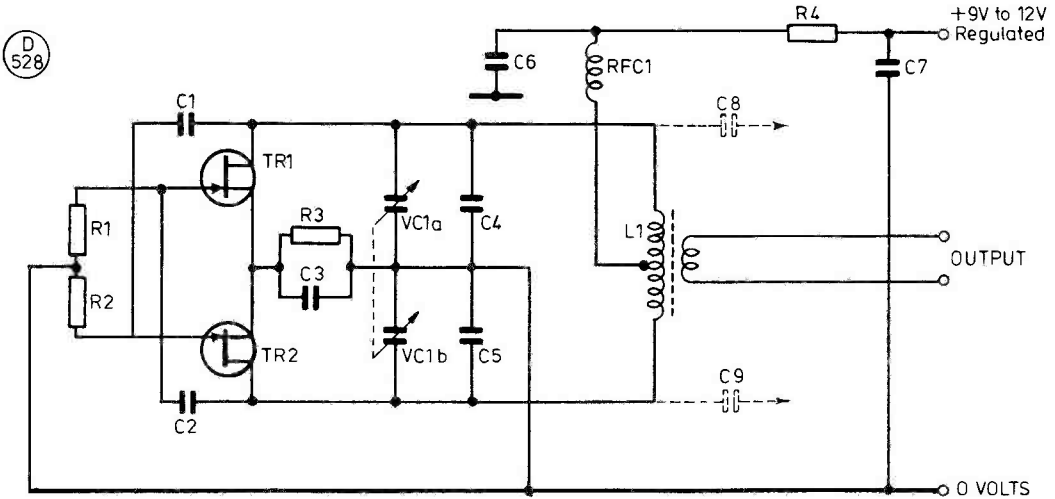


Fig. 1

The basic push-pull FET oscillator with typical component values for a VFO covering 8 to 18 MHz. Note that the centre tap of the coil should not be decoupled.

much lower frequencies was not fully appreciated by the author until some repairs were being made to a commercial signal generator which covered 50 kHz to over 50 MHz using a push-pull circuit. For such a wide-ranging instrument and so simple a circuit it had quite remarkable frequency stability, and since this discovery both valve and FET designs have been used with considerable success over the normal HF range.

Practical Considerations

The circuit is tolerant of a wide range of LC ratios, component values are not critical and the balanced arrangement is well suited to being built on a matrix board or PC board. Stability is largely determined by the quality of the components used and the care taken with the construction.

One point to note: high stability and miniaturization usually do not go together so inevitably there must be some

compromise, especially with the inductor. The small bi-filar wound, dust-cored coil specified in the components list for Fig. 1 gave adequate stability for the reception of SSB in a general coverage receiver, but for more demanding applications a much larger air-cored coil might be more appropriate. A bifilar wound coil is not essential but it helps to preserve symmetry when a small iron-cored coil is used – particularly if this is mounted in a screening can.

Noise and ripple on the regulated supply can have considerable effect on the frequency stability and it is worthwhile comparing the behaviour of the oscillator when it is run from a good battery with that when it is run from the regulated supply.

Frequency Modulation

Direct frequency modulation of a free-running oscillator can be achieved by applying audio to a varicap diode connected across the tuned circuit. However, because most oscillator designs rely on a high C/L ratio in the frequency determining circuit to swamp unstable circuit capacities, it can be very hard to get even a ± 2.5 kHz shift with good linearity and stability at fundamental frequencies in the HF range. In the Push-pull oscillator the C/L ratio can be much lower than in a single-ended one without loss of stability, so making it easier to modulate the frequency. Fig. 2 shows a suitable circuit which was used at VK6AI to generate a direct FM signal at 9 MHz for mixing up to 52 MHz. By experimenting with component values it was possible to get ± 15 kHz deviation with excellent linearity and stability. Many reports of very good speech quality were received when operating with deviations of this order.

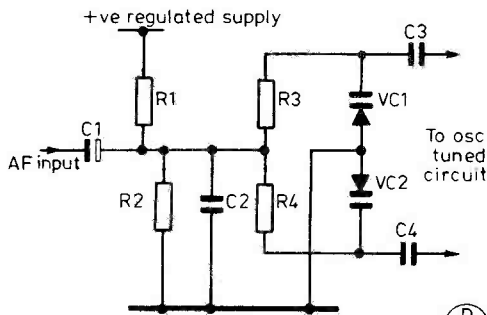


Fig. 2

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A varicap diode circuit for frequency modulating the push-pull oscillator. By experimenting with component values (C3, C4 which will control the coupling to the tuned circuit, and R1/R2 which set the varicap bias) deviation and linearity can be optimized.

Crystal Control

A crystal connected between the 'gates' of the FET's can be used to control the oscillations. Operation is in a parallel resonant mode and by proper adjustment of the tuning this can be at the fundamental, or an overtone of the crystal frequency.

FIVE-FIFTY FM TRANSMITTER

CONCLUDING THE PROJECT BEGUN IN
LAST MONTH'S ISSUE

F. G. RAYER, T.Eng (CED) G3OGR

Modulator

This uses a twin triode, Fig. 2. It is intended for the general purpose or popular type of high output crystal microphone, and incorporates some speech shaping. VR1 is the audio gain control.

The positive line at R9 is connected to C3 of the power supply; if necessary with other PSUs, R9 could be changed to leave about 250v. for the modulator HT line.

A chassis is bent approximately 2in. long, 1½in. deep and 1¼in. wide, and the valvholder is fitted centrally to this. Fig. 2 is wired within this chassis, excluding VR1, C8 and R9. A screening can is placed over the valve. The front of the chassis fits to the back of the panel, with the valve horizontally inwards. The mike socket is near, underneath, with screened grid lead, and the output socket comes near the valvholder.

This section may, if wished, be tested by plugging in the microphone and high resistance headphones or other suitable amplifier or reproducer system. There was no hum whatever in the amplifier, or on transmission. An *Avo 8* on its 10v. range shows about 1.5v. peaks across Tx audio input socket.

A case or cover will be needed for the PSU/Modulator, for safety. A cover is most easily made from perforated or expanded metal, which bends readily along lines formed by the perforations.

Inductors

L1 to L4 use 7mm cored formers. L1 is 50 turns of 32swg enamelled wire, side by side; begin about ½in. from the tagged end for HT positive. Turns can be secured with a few very small touches of *Uhu*, clear *Bostik*, or similar cement. Core can be set for about 9 MHz with C4 connected, using a GDO.

L2 has 15 turns of 24swg enamelled wire side by side, starting about ½in. from the tags or HT positive end; it can be adjusted to about 24 MHz with C6 connected.

L3 and L4 resonate at 72 MHz with circuit capacitances. Each is five and three-quarter turns of 24swg enamelled wire, side by side; begin about ½in. from tagged end of the former, for L4 grid end. Termination of this winding is taken to C14/R14. Leave about 1/8in. space, and start L3 (this is HT end) winding in the same direction. The finish of this winding is for anode (tag 8). VHF-grade cores are needed with L3/4.

L5 is five turns of 18swg wire, self-supporting. The coil is 0.4in. outside diameter, turns spaced so that it is ½in. long; solder with short leads directly to T7.

L6 is one turn of 20swg insulated wire, same diameter as L5, situated between middle turns of L5; L7 is the same as L6.

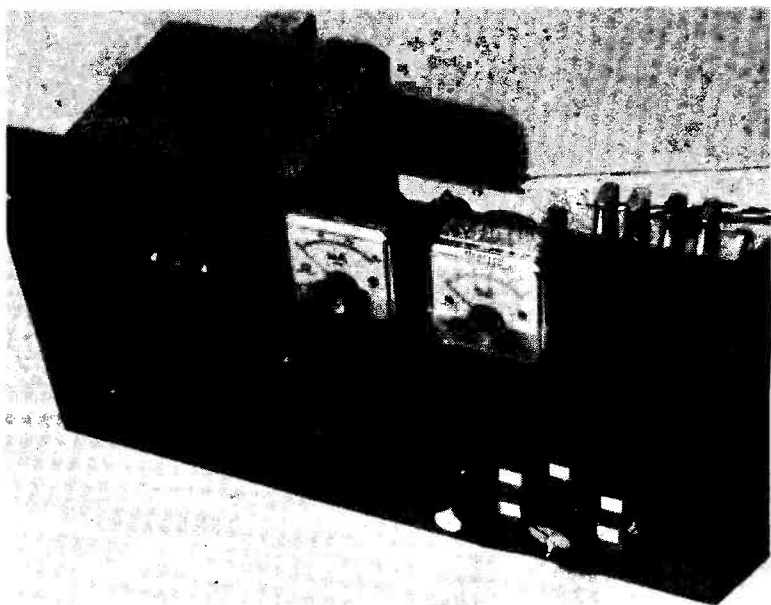
L8 has six turns of 18swg wire, 0.35in. outside diameter, and is 0.9in. long. L7 is centrally placed; L6 and L7 are further held with adhesive.

L9 is 14swg, and has four turns, 1in. outside diameter and 1½in. long; L10 is one turn, well insulated, same diameter, between turns of L9.

Crystals

These are in the 8 MHz range, and can be purchased by channel or frequency; multiplication is $3 \times 3 \times 2$, or 18. Typically 8.0847 is used for channel 21, 8.0861 for 22, 8.0875 for 23, and so on. Only T5 and one crystal appear in

Front of the transmitter: the switch selects one of the five channels.



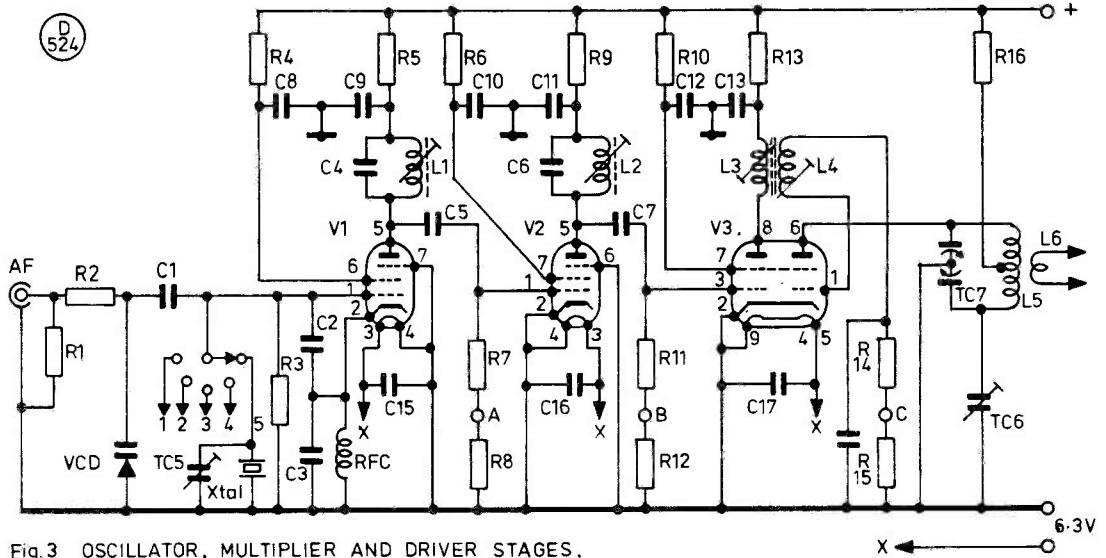


Fig.3 OSCILLATOR, MULTIPLIER AND DRIVER STAGES.

Tables of Values

Fig. 3

R1 = 390K, $\frac{1}{2}$ w.	C1, C4, C6 = 22 pF
R2, R7, R11 = 100K, $\frac{1}{2}$ w.	C2 = 8.2 pF
R3 = 33K, $\frac{1}{2}$ w.	C3, C7 = 47 pF
R4 = 150K, $\frac{1}{2}$ w.	C5 = 100 pF
R5 = 2.2K, $\frac{1}{2}$ w.	C8 to C17 = 4.7 nF, 5 nF or 10 nF
R6 = 100K, $\frac{1}{2}$ w.	TC1 to TC5 = 30 pF trimmer
R8, R12, R15 = 1K, $\frac{1}{2}$ w.	TC6 = 8 pF trimmer
R9, R13 = 1K, $\frac{1}{2}$ w.	TC7 = 15-plus-15 pF, to 25-plus-25 pF,
R10 = 82K, $\frac{1}{2}$ w.	butterfly
R14 = 82K, $\frac{1}{2}$ w.	V1 = 6BH6
R16 = 270 ohm, 1w.	V2 = 6EF9
L1 to L6 = see text	V3 = 6QQ03-10
	VCD = BA102

Also: 8 MHz crystals; crystal holders; two B7G skirted holders with cans; B9A holder; 3.5mm jack socket; 5-way switch.

Fig. 3. Each crystal has its own trimmer, for adjusting to channel. (One was panel-operated for experiments.)

As many QSOs are likely to be with commercial transceivers having no adjustment, crystals should be set on channel. This can be done with good accuracy with a converter and bandsread receiver if dial readings are noted, and the 'Net' facility of the transmitter is then used to adjust each crystal to agreement; if a channel is too far in error, reports will indicate this. No re-adjustment was found necessary after twelve months' use.

Oscillator-Multiplier Tuning

With HT feed to V3 interrupted, clip a meter from 'A' to chassis. Set L1 core so that all crystals start readily and maximum grid current is found for V2 — probably about 0.25mA.

Transfer the meter to 'B' and tune L2 for grid current, which should be a little greater; meter negative can then be clipped on at 'C', and HT applied to V3. Adjust L3 and L4 cores, expecting about 0.5mA at 'C'. L5 may already have

been set to about 145 MHz with a GDO; if not, tune T7 to resonance, as shown by a lamp loop near L5, or indicating wavemeter in the vicinity of L5.

Do not run this section other than very briefly without grid current at 'C', with HT present, or dissipation in V3 is unnecessarily heavy. When the PA with its grid meter is fitted, all adjustments can be directed towards securing a suitable indication there, and the points 'A', 'B' and 'C' have no further use, unless a need arises for an easy test of individual stages.

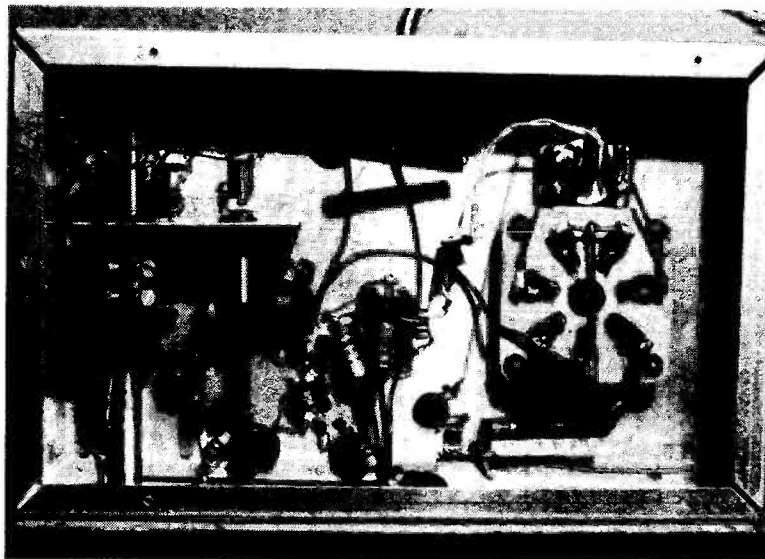
V3 is run with no can; T6 is to equalise valve capacitance. Later, slowly adjust T6 from minimum, while re-tuning with T7, to find the setting for T6 giving maximum PA grid current; T6 setting is flat. Stretching or compressing L5 so that resonance is obtained with T7 as quite low capacitance provided greatest grid drive.

Power Amplifier

This stage is shown in Fig. 4. Adjust the earlier stages and T8 to obtain about 2mA grid current on M1, before switching on the PA anode and SG supply.

T9 may be adjusted with the PSU 'High-Low' switch at low, for reduced input. A dip in current shown by meter M2 will approximately correspond to maximum RF output. If wished, a suitable lamp load for reduced power only is a 12v. 3W. lamp, which is approximately 48 ohm; for full power, three 12v. 10W. lamps in series will be around 45 ohms.

Input depends on the degree of coupling between L10 and L9, and also T10. Tuning is carried out into the aerial itself, after a preliminary test, preferably using some form of RF indicator. Very good results are obtainable over a wide range of inputs, depending on the PA voltage, and extent to which the stage is loaded. (Remember that maximum reading on M2 is *not* an indication of maximum RF output). Maximum ratings for the valve differ somewhat, as given by various makers, but range up to 600v. at 100mA, or 60 watts. It is probably as well not to let dissipation in the valve exceed 15 watts — that is, input *less*



Under chassis: crystals, switch and trimmers at left back; driver stage (middle) link coupled to PA grid at back right.

output, so the stage should not be run other than briefly at high input (over about 30 watts) off-tune or with much reduced RF output.

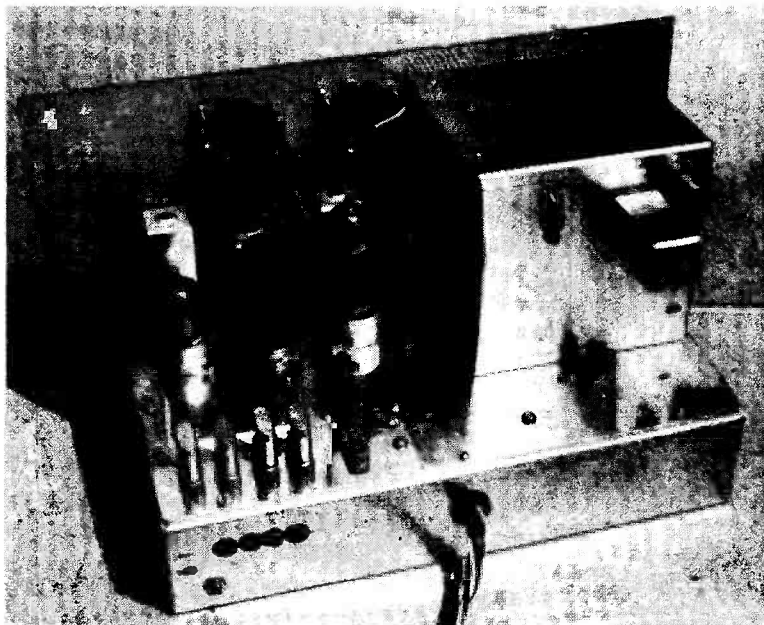
The relay contacts normally take the aerial to the receiver converter; when the relay is energised, the aerial is connected to L10. D1 and D2 are a precaution to keep high-level RF out of the converter-receiver circuits.

Aerials will naturally be a matter of choice, but substantial coverage can be expected with a ground plane or simple dipole, which will need no rotation.

Construction

Layouts other than that shown, Fig. 5, could no doubt be used. The chassis is 10×6×2in. and panel 12×7in. to fit a 12×7×7in. cabinet. Holders for V1, V2 and V3 centre 2¼in. from the panel, at 1in, 2½in. and 4in. from the side of the chassis; V4 holder centres 2¼in. in and 3in. from the panel. This holder is on long bolts so that the disc screen visible in V4 is level with the chassis and the hole is 2in. in diameter.

Back of the transmitter: left to right, oscillator, multiplier, driver valves, PA in screened box with relay and co-ax sockets on the back.



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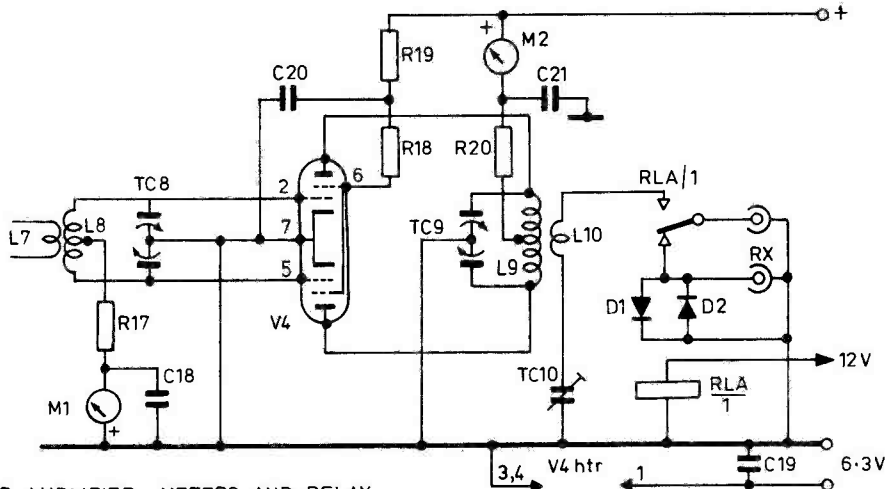


Fig. 4 POWER AMPLIFIER METERS AND RELAY.

The PA box is 4x4x4in., outer side and top being perforated metal fitted later by self-tapping screws; a neat box is readily made from universal chassis flanged members. (*Home Radio*, Mitcham.)

Both switch and panel operated trimmer fit on a bracket set 2 1/4in. from the back, 3 x 1 1/4in. in size, using couplers and extension shafts. The switch is of the type shorting all unused contacts to chassis, and the trimmer bank and audio socket are immediately adjacent to the crystal holders.

A 5-way cord is made from colour-coded flex and runs from a tag-strip. The numerous by-pass capacitors are disc ceramics, with short leads down to nearby chassis tags; small stand-offs or single insulated tags are used where necessary to support HT and other points, and a tag strip

Tables of Values

Fig. 4

- R17 = 22K, 1/2w.
- R18 = 100 ohm, 1/2w.
- R19 = 18K, 2w.
- R20 = 47 ohm, 1w.
- C18, C19 = 10 nF
- C20, C21 = 1800 pF, 1kV
- L7 to L10 = see text
- V4 = QQV03-20A/6252 and holder
- Also: coaxial sockets.
- TC8 = 15-plus-15 pF, to 25-plus-25 pF
- TC9 = 17.5-plus-17.5 pF wide spaced
- TC10 = 50 pF
- M1 = 5mA moving coil meter
- M2 = 150mA, ditto
- D1, D2 = 1N4148
- RLA/1 = 12v. aerial changeover relay, approx. 300 ohm.

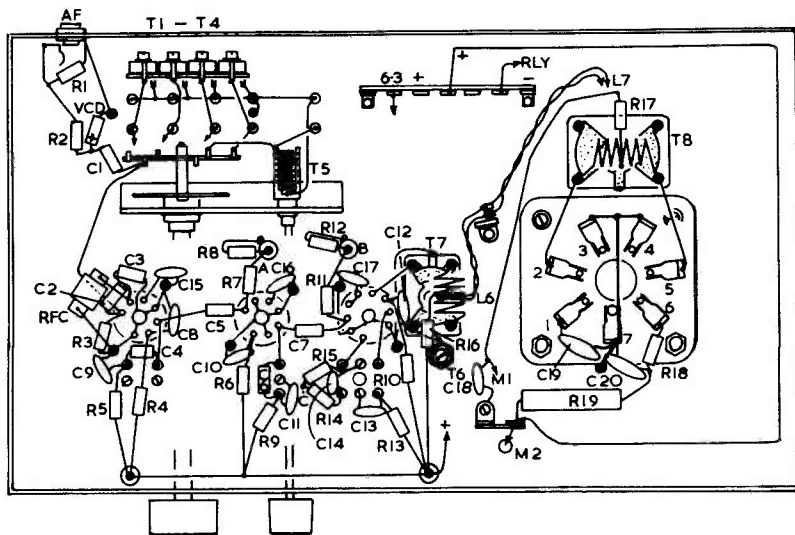
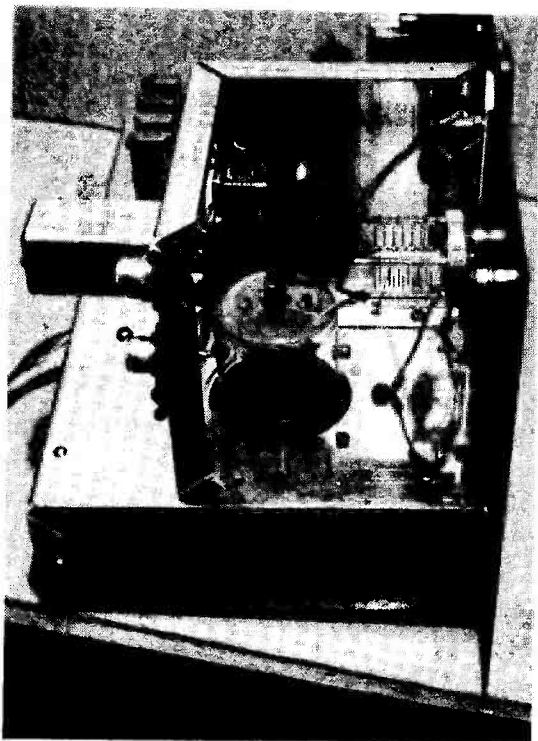


Fig. 5 UNDER CHASSIS VIEW (Wire heaters and HT first, leads against chassis)

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THE TEEMING WORLD BELOW "TEN"

JACK HUM, G5UM



PA with tank coil, loop, capacitors, and relay.

also provides a junction point and additional support for the single turn links.

RF wiring to V4 is stout, short and symmetrical (to equalise drive to each section); ground T9 rotor with a stout lead down to chassis.

R20 is close against L9: undue heating in R20 can arise if this tap is off centre. T10 fits on the back of the PA box, with the relay and two co-axial sockets near; these take the co-axial leads to the aerial and converter. Leads from T9 to V4 anodes are flex — just over 1in. of stripped, doubled flexible wire will do for each.

If there is a temptation to substitute a QQV06-40A here, for even greater current, it may be mentioned that the extra capacitance of this type made L8 and L9 unsuitable, as described for the '20A.

The three butterfly capacitors are adjustable by means of a screwdriver, and T9 through a panel hole.

Tuning-up procedure has been described. Harm to V4 is very unlikely provided 1½mA to 2mA grid current shows on M1 (to indicate that bias is obtained) and with the switch in the low-power position. Afterwards, all tuning can be touched up with normal power, and provided a suitable aerial or other load is present, to draw power, the whole transmitter should prove to be without trouble or the need for any tricky adjustment. It is not necessary to load V4 to any particular input or degree, for satisfactory operation. Optimum tuning consists in obtaining maximum RF output with minimum DC input, and can in practice be achieved over a wide range of powers.

HE was one of those operators whom you would probably call a middle-life man. His callsign wasn't up at the front with those greying G3A three-letter men who got their tickets back in Forty-Six, just after the war ended. Nor was he one of the newer G4-plus-threes who were first heard around at the beginning of 1972. Somewhere between the two, you could rate him as having been on the air for a couple of decades plus, perhaps a respectable family man in his late thirties with a good all round knowledge of the amateur radio scene.

But one part of the scene to which he admitted until recently almost complete ignorance was the metre-wave spectrum, as indeed he confessed to Old Fangler when the latter ran across him on one of the S-channels of the 2m. band. What had persuaded him on to "Two", asked Old Fangler, after all those years on frequencies where aerials were long and where the specification for a home QTH required a garden 136ft. long by 10 inches wide?

"What indeed!" he exclaimed. He had, he said, been impressed by the accent of VHF equipment so apparent in the advertisements he saw in the amateur radio journals; and he was also made aware when he visited any of the annual amateur radio exhibitions or rallies how very many operators were to be seen around communicating with each other or talking through distant repeaters while using no more than hand held electronic artefacts. Here, he thought, was a new world to explore, a new window to open onto a different scene from the one he knew so well.

Accordingly, translating thought into deed he bought himself a 2m. converter from one of the advertisers in this journal together with a modest beam aerial to go with it (arguing that if television receivers, which worked at metre wavelengths, required directional aerials then his converter would, too); and in no time at all he was sampling the teeming world below 10m., until then an uncharted one to him.

And how did he find it? asked Old Fangler. In many ways remarkably akin to what he already knew, was the reply. There were the same long wound contacts just like those he had been bored with on "Eighty". There were the extrovert "funny men" anxious to maintain a reputation for being, well, "funny men". But it was the broad commonsensicality of the majority of voices he heard on 2m. that persuaded him that his next move should be from converter-only to full transceive capability.

One of the things he *didn't* want to do was to buy a transceiver with fixed channels that would leave him cribb'd, cabin'd and confined on a handful of congested frequencies which everyone else had. As an old hand at tuning around on the so-called DX bands for weak signals he felt the need for full tuning capability on "Two". Yet much of his observation of the band had shown him that many operators were quite content to use it almost as a local telephone, either *via* a repeater or direct if the other was not too far away, remaining all the time oblivious of the delights of continuous tuning.

He observed further that many operators seemed equally content to use exiguous aerials that scattered the available RF

around all 360 degrees of the compass instead of pushing it (as he thought more economical) only in the wanted direction. Admittedly on the HF bands, he went on to say, you were stuck with "omni" and aerials that didn't have much inherent directivity. But why on VHF, where they did? At least he had his "modest beam aerial" for 2m.; at least his transmitter's output would be turned on to *one* point of the compass rather than on to all of them.

Right: aerial okay. But what about the transceiver and the requirement for continuous tuning? The advertisement pages revealed to him a positive plenitude of desiderata, but they also brought him to the conclusion that the wife would have to wait a little longer for that new car.

To his surprise she told him she didn't mind a bit: "If that new radio thing is going to give you pleasure and be an investment for the future, buy it", she had said. So he did. (Remember they were in their late thirties and enjoyed quite obviously a stable relationship).

All of which came out in the contact which he had with Old Fangler initially on that S-channel but very soon, as both of them had continuous tuning, on a quiet spot down band below 145MHz — strictly, below 144.9MHz to avoid that beacon segment.

And had he enjoyed his debut on 2m.? "It's one of the best moves I ever made" was his parting phrase as the QRU point was reached.

Later that day while Old Fangler was tuning the SSB segment of the 2m. band he was surprised to hear a GW station clipping away on CW. A quick call — also on CW — and communication was established.

But why CW in the SSB segment? asked Old Fangler, hastening to add that "... there's no objection to it and often it helps you raise weak and watery stations you couldn't even identify on SSB. I'm just interested and that's why I asked". (Yes, all this on CW: it's surprising how much you can put over if you send quickly and don't bother to write the incoming stuff down ... just read it in your head like phone).

The GW-man disclosed that he had been on 2m. only a week. He had heard all about its teeming life from some of the many GW8-men at his local club, and he felt the urge to "have a go". No, he wasn't aware that CW was "unusual to say the least" on the SSB calling frequency of 144.3MHz, nor did he know that there was a regular Monday Night CW Night on "Two". Assured by old Fangler that he would earn himself many more A1 contacts on 144.05 than on 144.3 the GW-man, an experienced telegraphist on the lower frequency bands, said he would search around that very next Monday to see what he could work on the key. He did and was much surprised. Now he is there every Monday night.

And so that night at the club . . .

When Old Fangler regaled The Sceptic at The Club with these stories he was met with narrow eyed suspicion. "It's all very well" growled the SATC "giving me all this stuff about how those chaps were converted to what you call the delights of the metre-waves, but before you persuade *me* you'll have to give me some hard facts".

This, thought Old Fangler, was a challenge. Was the SATC interested in what the Americans used to call bangs per buck, in other words the maximum number of QSOs per pound expended on equipment? Well, yes, thought the SATC, he rather was.

Was he interested in high signal levels, high audio quality and low QSB content? "Tell me more" growled SATC,

adding quickly that Old Fangler was still doing no more than to generalise, and where were the *facts* that would persuade him to unbutton his cheque book? Facts you want? Then here they come, was Old Fangler's riposte.

At the middle of 1979 there were 17,213 Class A licences extant in the UK, plus 8146 Class B that permitted operation only on 144MHz and up. That was a ratio of about two to one.

Since then about a block-and-a-half of G4-plus-three Class A licences had been issued, say 800; but nearly four blocks of G8-plus-threes (with of course the usual GD, G1 and other variants). In any block there are 676 possible combinations of callsign. Deduct those few callsigns which add up to naughty words and you could say that each callsign block yields 670 permutations.

"I can't do sums: you tell me how many licences that represents" muttered the SATC. Answer: roughly a thousand new Class A men (and women) and two and half thousand Class B. Of that little lot all of the Class B people would be on 2m. or 70cm. (or even lower). A fair slice of the Class A people would appear there, too, not forgetting that for them a further VHF band existed where those who had the Morse qualification could exercise their skills — meaning 4m. — add to the teeming world below "Ten".

By now the look of suspicion on the SATC's face had changed to wrinkle-browed curiosity. He admitted that all this represented a very considerable accretion of activity on the metre-wave scene (that wasn't quite what he said: it sounded more like "A helluva lot").

Even so, sceptical to the last, the SATC reminded Old Fangler of the bangs per buck analogy. "It's all very well for you to tell me that all these people are on those metre-wave bands you talk about, but how many actual contacts can I get in the course of a year if I go out and buy a transceiver?"

By now the last of the club members were drifting off. It was time, thought Old Fangler, to invite the SATC back home and over a soothing cup that cheers show him some statistics.

And so back at the electronic QTH Old Fangler flipped through the pages of last year's log and of logs before that. In 1979 a total of 3838 contacts on 4m., 2m. and 70cm. was revealed (and Old Fangler used the phrase "contacts" deliberately, for 1552 of them were not what he called "real QSOs": they were *via* repeaters). In 1978 the three-band tally came to 3703 (1051 *via* repeaters), in 1977 it totalled 3585 (635 through repeaters) and in 1976 it was 3029 (349 *via* repeaters — much lower, explained Old Fangler, because 70cm. repeaters had not appeared at that time).

All of this, Old Fangler emphasised, was from a very ordinary station operated at a fair degree of inefficiency. His listener appeared to be impressed. But scepticism failed to be submerged even by the soothing balm of tea: "Look!" cried the SATC, "you made only seven more contacts in 1979 than you did in 1978. That's not much of an increase".

But Old Fangler had been waiting for this one: he reminded the sceptic that he had been away from home for three months in 1979, that the 3838 contacts of that year were made in nine months, and that if you added an average of 426 contacts per missing month the total would have been over the 5,000 mark.

The last of the tea was downed. Old Sceptic seemed convinced that there was after all something to be said for the teeming life below "Ten". Then almost as a parting shot he said: "I see you show through-repeater contacts separately . . . now, tell me more about repeaters".

"Not tonight OM" said Old Fangler firmly: "That's another story for another time.

CLUBS ROUNDUP

BY 'Club Secretary'

HOWEVER you look at it, no two clubs are alike, and indeed no two radio amateurs are alike. This is no bad thing — life would be awfully boring were we all the same — but it can make it very difficult indeed for the Hon Sec who has to make up a programme, or for the lads who want to go into, say, NFD and find the majority of the members don't want to be bothered; or, for that matter, for the peace of the club containing diehard CW operators and two-metres FM-ers — both arguing the merits of their respective interests. One could at least hope that the various sects among us could try to live in peace one with another. However, it does not seem to be possible in some parts of the country, and it would seem to be infinitely desirable that strife could be kept to purely verbal arguments at the club or wherever, rather than over the air.

The Mail

Our first stop must be **Brighton**, where the venue would appear to be 47 Cromwell Road, Hove; the dates for August are 13th for a discussion on RTTY, and 27th when a party will be going to visit the Police Hq at Lewes to see the operations room and new training centre — those not going will be able to have a natter in the clubroom anyway.

A change of venue seems to be indicated at **Swansea**; it is now fortnightly on Thursdays at the Technicians Common Room, which is on the second floor of College House, University of Swansea.

Another new one to this piece is **Sefton**, which seems to have made a good start on very little advertising, and to have found a Hq — the most important thing — at the Liverpool Prison Officers Social Club, where they can foregather fortnightly on Wednesdays. They seem to have lots of interests and to be heading in the "self-sufficiency in activities" direction, with shack, VHF and HF rigs, some talks, club constructional projects and whatever. Details from the Hon Sec at the address in the Panel, or just come along to a meeting.

Next we have a works group — **Marconi Space & Defence Systems**, Portsmouth, covering the Broad Oak and Browns Lane sites; they have 100 members of whom some 48 are fully licensed. Details from the Hon Sec — see Panel.

Now to **Loughor**; the venue is still Loughor Boating Club and there is, if needs be, usually some talk-in available, or the Hon Sec — see Panel — can give telephone directions. On the programme side, they usually have something set up, but do not normally publish too far ahead lest there be late changes.

Now we go down West, to **Axe Vale**, where the situation is that they hope to announce the new Hq address soon, possibly before this issue gets to the bookstalls; thus we suggest a contact with the Hon Sec — see Panel, for latest details.

For **Cray Valley** the berth is at Christchurch Centre, High Street, Eltham, S.E.9. on Thursdays — the first and third ones in each month. August's formal is down for a talk on "TV for the Enthusiast", and the provisional details are settled for the next twelve-month!

Members of the **G-QRP Club** now number over 800, with an ever-increasing number coming in from overseas. Get a look at

the magazine 'SPRAT' and add it to the general interest in QRP operating which is manifest these days, and you have to have a successful club! Details of course from the Hon Sec — see Panel.

Now to **Mid-Sussex** where the current problem is the lunacy of the local authority — they want to "lose" Marle Place, but after a great rumpus have granted it an 18-month reprieve, provided it is "seen to be used". However, they press on, with informals only in August; details, dates and venues from the Hon Sec — see Panel.

We have a letter to hand which fills in the gaps in our knowledge of East Anglian affairs — thanks! The writer is the Hon Sec of **Great Yarmouth** club, which is based on 67 Southtown Road, on the last Thursday in each month.

He also mentions **Lowestoft**, who have a place at the North Suffolk Teachers Centre, Lovewell Road, Lowestoft; August 15 is down for a D/F Hunt, and the meeting scheduled for 29th is cancelled. That takes us into September 12, for the AGM.

His last mention is **Norwich** who have a place set aside for them at Crome Community Centre, on Wednesday evenings. The Centre is located in Telegraph Lane East.

Deadlines for "Clubs" for the next three months—

(September issue—July 25th)

October issue—August 29th

November issue—September 26th

December issue—October 31st

Please be sure to note these dates!

It is to be a 'meal' of "Game and Chips" at **Cornish** on August 7, G4EIK being the speaker, at the SWEB Clubroom, Pool, Camborne. One never ceases to be amazed at the way this group can "live on itself" in the matter of speakers and activities and yet consistently yield an attendance of over fifty-plus visitors.

For **Wirral** we can't offer you the name and address of the Hon Sec, since we know that he is moving out of the district before this comes to be read — surely a drastic cure for an overdose of the secretarial chore? — but we can tell you that they are booked in on the first and third Wednesdays of each month at the Sports Centre, Grange Road, West, Birkenhead.

On we go to **Cheltenham**, where they have a regular date at the Old Bakery, Chester Walk, Clarence Street, Cheltenham on the first Thursday and the third Friday in each month: we have a programme that stops at the end of July here so we must refer you to the Hon Sec — he will have everything at his fingertips no doubt, and his name and address are to be found in the Panel.

Now to **Guildford**, and the current newsletter has some innocent leg-pulling by way of a reprint of some of the first "Trans-Atlantics" correspondence of 1923, telling readers what information they are to submit to P. R. Coursey if they intend to take part. The give-away on the back page of the newsletter is again a copy, this time of a letter from A. R. Burrows accepting the idea of a visit from Guildford members to the London BBC station at Savoy Hill, the date being May, 10, 1923. For the current stuff, we are to tell you they have a

Names and Addresses of Club Secretaries reporting in this issue:

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- REIGATE: Dr. J. S. Roberts, G8FDJ, 15 Bakehouse Road, off
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- WEST OF SCOTLAND: I. E. McGarvie, GM4JDU, 3 Kelso
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- WIRRAL: (Temporary) A. Fisher, G3WSD, 25 Kylemore Drive,
Heswall. (051-342 1662)
- YARMOUTH: A. D. Besford, G3NHU, 49 Blake Road, Great
Yarmouth, Norfolk.
- YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

base at the Guildford Model Engineers Hq at Stoke Park, on the second and fourth Fridays of each month.

At **Cheshunt** there is a beautifully clear map of the route to the Hq, which the Editor and G3MWF took on their recent visit — they had to be the ones to find *another* Church Lane, some two or three miles away! The group get together in the Church Rooms, Church Lane, Wormley every Wednesday evening. It should also be noted by those in the district that there will be an RAE class in this area — with the cut-backs of the past few years it will be the only one for miles around, so get the details for G30JI who is QTHR or can be reached at home on Ware 4316.

Now we look over to **Southgate**, where the group get together on the second Thursday of each month at the Scout Hut, Wilson Street, Winchmore Hill. For August there is an open meeting, and it is specially requested that the *Hon Sec* should be contacted to confirm the venue.

At **Surrey** there is a place called *T.S. Terra Nova*, which lies at 34 The Waldrons, and is the Hq among other things of the local group mentioned. They are to be found there on the first and third Wednesdays in each month. More details from the Hon Sec — see Panel.

Over now to **Bishops Stortford** where the revival of the club thanks to a strengthening of the committee is an object lesson to all clubs who feel themselves on the slippery slope towards extinction. They are now in a flourishing condition, and have

their date booked on the third Monday in each month. For August however, we suggest you contact the Hon Sec and check whether they will be 'at home' or out and about somewhere. He is in the Panel.

Further north one comes to **Cambridge**, who are to be found at the Visual Aids Room, Coleridge Community College, Radekund Road on Friday evenings. However, on the list we have here, it looks as though the pace of things is allowed to slacken a bit during the peak of the holiday season: we note a Fox Hunt on August 2, to end with a Barbecue. The time for this one to start should be checked with the Hon Sec, as should the venue for the meeting on August 15 (Coleridge being closed) when there will be a talk on Teletext.

Hereford now where the cider comes from. The locals foregather in the County Control, Civil Defence Headquarters, Gaol Street; G3NPA will be talking about "Microcomputers for the Radio Amateur" on August 1, August 15 is down for an informal, and on 30th we hear they will be at Much Marcle Show with G3YDD on the air.

A new year's programme is in the making at **Northern Heights**, so we can't tell you what is going to happen in August with any hope of being right — but we can say that if you head for the Bradshaw Tavern, Bradshaw, Halifax, on a Wednesday evening, you will be almost certainly dead on target.

We mustn't forget the next one — **RAIBC**, who cater for the

unfortunate blind and invalid group among us; they need donations, of course, and your club could help in this line. However, they also need more people — supporters and local representatives — who will have the “get-up-and-go” to spare when it becomes known that an RAIBC full member is in the district, or indeed a potential full member who could be brought into membership. Essentially the objective is to get all full members listening first, then to get them through the RAE, then on the air. To that end, the Tapes Manager has made some 25 sets of the revised RAE course, one as a master and 24 for distribution — that alone adds up to 650 cassettes and a fearsome quantity of dubbing work. Once the RAE pass is obtained, he says, he has tapes for Morse. . . Not everyone can take on such a task, of course, but such simple things as getting someone to the odd club meeting or whatever, or shifting a receiver from ‘A’ to ‘B’ are still helpful. Details from the Hon Sec — see Panel.

There seems to be quite an upsurge of reporting from the Liverpool area, albeit we guess there have been clubs about all the time; **Ormskirk** are to be found on Tuesdays at the ‘Over-Sixties Hut’ in Liverpool Road, opposite Christ Church. More details from the Hon Sec — see Panel.

For **Reigate** you have to look for the Upstairs Meeting Room at the Constitutional and Conservative Centre, Warwick Road, Redhill, and do so on August 19. This will be a Members’ Evening. On a sadder note, the issue of “Feedback” we received was the last for quite a while: G8AMU retired after 21 years and 235 issues, and at the AGM there was no one with the courage to follow in the master’s footsteps — or perhaps they thought Chris would carry on if no one accepted nomination? Whichever way it is, the club will be the loser, and G8AMU will have quite enough to do being the Treasurer.

Talking of retiring editors, we have in front of us the latest issue of “Mobile News” which most people will know as the newsletter of the **A.R.M.S.** — the /M club. Our own G3FPK has been editing this for a long time, but Norman’s business workload has been building up fast of late and he now finds it quite impossible to get out the requisite number of issues on time. G3FPK is a stickler for “getting it right” and he is urgently looking for a member who could help by becoming assistant editor, with a view to taking it over completely in the future.

Series

That completes the pile of letters sent to us this month. However, we have a few updates to look at, not to mention a spot of misfiling to clear up!

Derby have the Top Floor of 119 Green Lane, every Wednesday for their ‘main’ meetings although there are other activities to fill up the week, such as RAE and Morse, and whatever. Details from the Hon Sec — see Panel.

Acton, Brentford & Chiswick are now in the large committee room of Chiswick Town Hall, where they are to be found on the third Tuesdays of each month. They always have something fixed up between them, and one gets a ‘feel’ of a steady-going group with plenty enough to keep them busy.

Isle of Wight is a club with a pretty clearly defined catchment area — the sea, without doubt, makes the limit!

The group are on the lookout for more new members and would like to meet any visitors to the island; it all happens at Unity Hall, which is near the Sloop Inn, Wootton Bridge, I.o.W. Although the Hon Sec — see Panel — isn’t on the

phone, G8SOH, Ian Moth, will be pleased to answer queries of that sort on Freshwater 3948.

West of Scotland have a place at 27 Robertson Street, where they get together on Fridays, with all sorts of interesting activities going on — details from the Hon Sec.

Down west we go again, to **Plymouth**; they are now in Hq at Tamar Secondary School, Paradise Road, Stoke, Plymouth. Normally they have alternate Mondays, but whilst there is a D/F Hunt on August 11, the 25th is cancelled as being the Bank Holiday.

Special Note

Crawley will be celebrating their 21st year of activity on September 21, with a net starting on 14 MHz, and then 3.5 MHz before rising to 144 MHz, in the hopes that all present and past members will hook up with them. 0830-1000 GMT is 14130 KHz with G3TR acting as Net Control station; then to 3.7 Mhz between 1000 and 1130 GMT under the control of G3YVR, finishing with an hour (1130-1230z) on S21 for the VHF types, G3GRO being Net Control. It is hoped to hear from lots of the older members who have moved away from the town but are still known to be active on the air. Turning back to the venue and the programme, they have Hq at Trinity Church Hall, Ifield, Crawley, and on August 13th it is an informal. If in doubt, contact the Hon Sec — see Panel.

The letter from **Liverpool** indicates that for those who want to know — and the numbers are increasing — G4AMX is prepared to impart the secrets of “How to win Constructional Contests”. This offering comes up on August 19, and on 26th they set-to for the final preparations for SSB Field Day. The venue for meetings is the Conservative Rooms, Church Road, Wavetree, every Tuesday evening, starting at eight.

While **Bury** can be found at the Mosses Community Centre Cecil Street, Bury, on every Tuesday, they regard the second Tuesday of each month as the Big One, and try to set up something for that date. Thus on August 12 they will be visiting an IC manufacturer.

Change of Venue & Dates

Verulam have had some poor Hq places to put up with, and with rents rising all the time it has not been any too easy for them, albeit they are lucky in that their ‘informals’ at Salisbury Hall, London Colney, in summer and the local R.A.F.A. in winter have remained stable. Anyway, cutting a long story short, they have now moved to the Charles Morris Hall, at Tyttenhanger Green, near St. Albans; as a result it has been necessary to change the meeting day to be the fourth Tuesday of each month. This gives us August 26. Informals remain as before.

At **York** the group foregather on Fridays *except* the third one in each month, at the United Services Club, 61 Micklegate York. We had to chuckle this time at one sentence in G3WVO’s letter, in which he comments that “we do enjoy visitors”. Boiled or roasted? Seriously, we have feedback from our spies that visitors to this club do get a welcome (something to remember the club by) much heartier than at many others.

Finale

That seems to be it for the moment. The next deadline is in the ‘box’ in the body of the piece; the date is for arrival at SHORT WAVE MAGAZINE, 34 HIGH STREET, WELWYN, HERTS. AL6 9EQ.

AN EXPERIMENTAL HALF-WATT TRANSMITTER FOR FORTY

R. W. MICKLEWRIGHT, G3MYM

THE writer has always been interested in QRP, and the little transmitter described below is in current use at the writer's QTH. The best DX to date, using a 1/4-wave inverted-L aerial, is a 120-mile contact from Somerset to Kent with a signal report of 579.

Circuit

The circuit, which is an experimental one, is shown in Fig. 1, and is a directly coupled, xtal controlled Franklin oscillator, using a P-channel jFET and an npn power bipolar. The transmitter is keyed in the supply lead, and in the writer's rig the note is completely stable, with no chirp or key clicks.

The source resistor R2 may require some experimenting with values: too low a value will cause the 2N3866 to dissipate too much heat, and too high a value will result in low RF output. In the writer's case, a value of 10K was ideal.

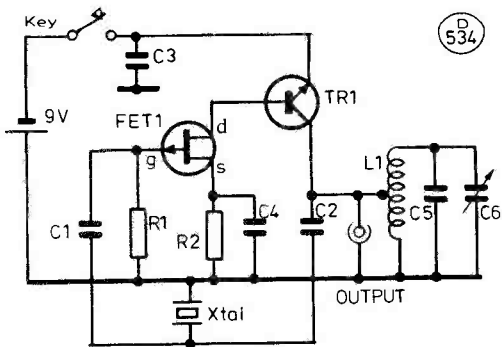


Fig.1 CIRCUIT OF EXPERIMENTAL 1/2W TX

Table of Values
Fig. 1

R1 = 100K	C6 = 730 pF var. (2 x 365 pF)
R2 = see text	L1 = 1.2 μH, tapped half-way
C1, C2 = 2.2 pF cer. plate	FET = 2N3820
C3 = 0.1 μF disc cer.	TR1 = 2N3866
C4 = 0.001 μF disc cer.	Xtal = to suit CW end of 40 m. band
C5 = 100 pF cer. plate	Battery = 9 v PP9

Fig. 2

D1 = AA113 or similar point contact diode	C1 = 0.002 μF disc cer.
	R1 = 300K

Setting Up

To maximise the RF power output it is essential to know the optimum load for the transmitter. The procedure for finding this is as follows:

- (1) Connect the peak reading RF voltmeter, shown in Fig. 2, across the output socket of the transmitter.
- (2) Connect various values of carbon resistor, as a dummy load, across the transmitter output socket.
- (3) For each dummy load resistor:
 - (a) Adjust C6 on the transmitter (with the key down) for the maximum reading on the RF voltmeter. Note the meter reading.
 - (b) Calculate the RF power dissipated in the dummy load by using the formula $P = \frac{V^2}{2R}$, where P is the RF power in watts, V is the peak RF voltage (this is obtained by multiplying the reading on the 0-50 scale of the RF voltmeter by 0.3), and R is the value of the dummy load in ohms.

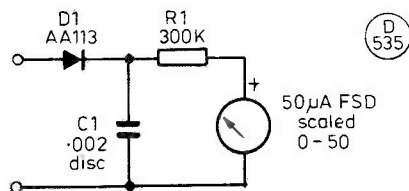


Fig.2 CIRCUIT OF PEAK READING RF VOLTMETER

- (4) Plot a graph of RF power output as a function of dummy load value, and determine the value of load resistor that gives the maximum output; see Fig. 3. In the writer's case the optimum load was 133 ohms with an RF power output of 200 mW; the DC power input was 640 mW.

Once the optimum load is known the aerial can then be connected to the transmitter, and with the RF voltmeter still in place, the aerial (or ATU) and C6 are adjusted until the maximum reading on the RF voltmeter is the same as that obtained when using the optimum dummy load resistor. The transmitter is now loaded for maximum output.

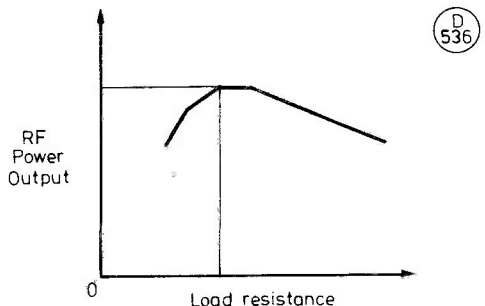


Fig.3 LOAD RESISTANCE / RF POWER OUTPUT CURVE

Conclusion

Success with QRP requires a good aerial and patience, but once a contact is made the sense of achievement is such that you will almost certainly want to QSL direct.

AN FET/CMOS FREQUENCY CALIBRATOR

G. W. SUTTON, C.Eng., MIEE, G4EVW

THIS weekend project provides a precisely tunable signal source at 100 kHz intervals up to 146 MHz. A reliable source which can be easily checked against a frequency standard is an essential aid when calibrating frequency meters and dials of RF equipment. As a starter project, this unit provides experience of using the three modern devices – a field effect transistor (FET), an NPN transistor and a CMOS integrated circuit.

Circuit

Several previously published circuits were tried, but they were unsatisfactory with the 100 kHz crystal available. The circuit shown in Fig. 1 gave no problems. It comprises a FET Colpitts oscillator, a buffer stage and a CMOS Schmitt trigger squaring stage.

A fine frequency trimmer allows the unit to be adjusted to within 1 part per million. The 2.5 mH coil L1 and capacitor C2, connected in series with the crystal, were found necessary to pull the frequency below 100 kHz. With C1 at its mid position, the core of L1 provides course frequency adjustment to exactly 100 kHz. Thereafter, fine settings of C1 vary the frequency by plus or minus 1 cycle per second: this is quite adequate for phasing against the 200 kHz Droitwich carrier (1500 m. Long Wave).

With the supply voltage to the IC reduced to 4.7 volts by the zener diode and series resistor R8, a square wave output is produced of about 2 volts peak-to-peak. The total current required is about 11 mA. An LED on/off indicator could be fitted but this would increase the current drain considerably.

The CMOS IC used was an MC14093 quad Schmitt trigger, mainly because it was available (the CD4093 is an equivalent). A TTL device like the 7413 dual NAND Schmitt trigger might be even better but has not been tried.

Construction

An aluminium box of about 4 × 2.5 × 2 inches can be

used, and stripboard with 0.1 inch hole spacing is suitable for the circuitry. The crystal and trimmer capacitor were mounted directly in the box. Coil L1 and capacitor C2 were soldered to the trimmer so that only two wires (X-X in Fig. 1) connect the crystal and trimming assembly to the circuit board. Insulation and some mechanical protection inside the box can be achieved using pieces of rubber carpet underlay. This also holds the battery in place.

Screwdriver holes are drilled in the box above the core of L1 (and above the trimmer if a screw adjustment type is used) to permit adjustment after assembly.

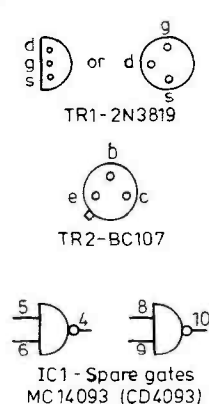
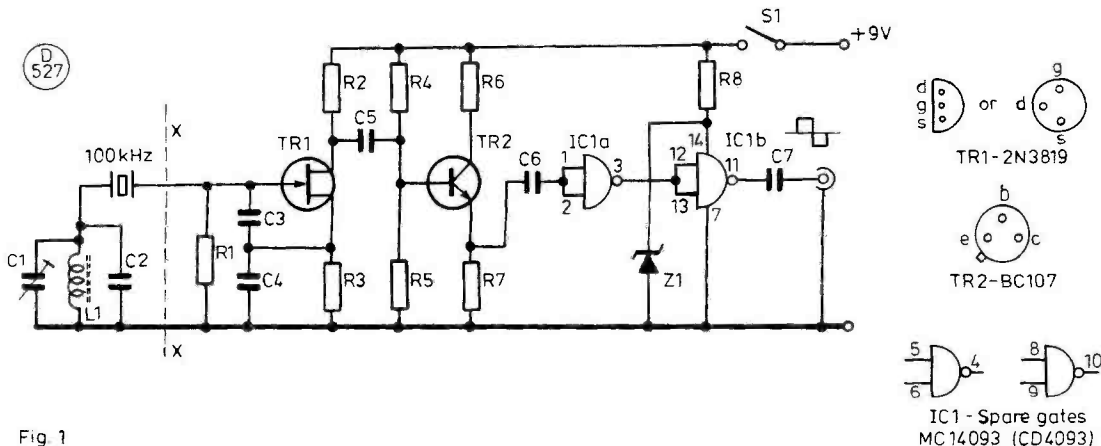
Adjustment

Check the connections carefully before switching on. If all is well, switch on and position the unit alongside a radio tuned to 1500 metres; you should hear a regular "Swooshing" variation of the radio programme. Adjust C1 to mid-position and then the core of L1 until the phasing in and out of the sound slows down and, if you are careful, stops: the second harmonic of the unit is then exactly tuned to 200 kHz. After the initial setting up, precise adjustment can be made using C1.

Higher harmonics will be available in 100 kHz steps at the output terminal. Adjustment to 1 part per million is quite easy. With the author's unit, the 1443rd harmonic could be heard almost exactly on the 2-metre calling channel at 144.30 MHz, both after setting against Droitwich and several days afterwards as soon as switched on. When connected to a frequency meter the fundamental read 100.0001 kHz and was quite stable.

Table of Values
Fig. 1

R1 = 1.5M	C4 = 1000 pF, s/m
R2, R6, R7 = 2.2K	C5, C6, C7 = 0.01 μF, ceramic
R3 = 2K	L1 = 2.5 mH, adjustable core
R4 = 8.2K	S1 = s/pole, sub-miniature
R5 = 9.1K	X1 = 100 kHz crystal
R8 = 430R	Z1 = 4.7 v Zener Diode
C1 = 50 pF Var.	TR1 = 2N3819
C2 = 220 pF, s/m	TR2 = BC107
C3 = 330 pF, s/m	IC1 = MC14093 (CD4093)



COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

SUMMER is here; but to look at the weather since last writing this piece, one would wonder. The number of times thunder has meant earthing-down the aerials and QRT, not to mention the number of times the S9 rain-static and the Woodpecker Thing have been on, have inhibited this scribe's pleasure in amateur radio more than a little — and at a time when he would normally be extra active. As for the garden, one can guess what the alternation of rain and sun has done for the lawn, and the period when the OM was in hospital seemed to be the one in which growth-rate at least tripled!

Look Ahead

That's the direction in which the snag usually lies! And the first one definitely comes under that heading if you've not worked XW8; JA8BMK visited Laos in May at the invitation of the Chief Officer of the Laotian Forestry Office, and when he asked about a licence he was told that "A foreigner was found operating near the national airport and was subsequently deported". That seems to mean there jist ain't nuthin' doin'!

Come September-time it should be possible to cross Mozambique off your wanted list, says the *DX Bulletin*, as it is understood an operation by ZS5UU (possibly with others too) is planned. There are no resident C9 licensees at the moment.

From the same source come rumblings of a forthcoming Malpelo exercise; but no doubt some Columbian aid will be needed to get this one off the ground.

Look Astern

If you snagged G3JK1/5A working to a list, it sounds as though you might have a counter for DXCC — F6CYL is handling the QSL chores.

For the weekend of July 4 we hear of another big show by the Mexican DX Club from Revilla Gigedo. At about the same time K2L1 will be operated from Liberty Island (where the Statue of Liberty lives), says Geoff Watts' *DXNS*.

The ST2FF/ST0 activities involved OH2MM and OH2BH, and arose indirectly from their assistance with the

final tweaking-up of the 6T1YP Youth Palace station. ST2FF is in fact the personal call of Mr. Fadul Kabbar who is in charge of the Youth Palace complex.

A week before he actually appeared the consensus of opinion was that KP2A had only a fifty-fifty chance of getting an operating permit for his proposed Macao expedition. In the event, he turned up on June 13, and carried on till the end of the month, knocking them off at a fair old rate both CW and SSB.

We hear that JA1ELY is aiming at a Sri Lanka session, followed by (hopes!) three days from the Maldives 8Q7. As yet no more on this — by the time you get to read this, Toshi will have come and gone, alas.

At various times over the past couple of years we have mentioned SM0AGD; since 1972, says Geoff Watts' *DXNS* Erik has visited 80 countries and operated from 20 of them. However he is now posted in Sweden, but he and SM3CXS and the Sundsvall DX group are planning some DX-peditions — and it's an interesting thought that one of the said DX group is stationed in Peking!

The Bands

By and large, considering the position in the sunspot cycle, and the time of year, the past month has been pretty awful, with a few bright patches, one of which appears to be happening right now on 21 MHz. However we must turn to the reports and see what's been happening, just remarking in passing that a real oldtimer T1 with drift has suddenly appeared on the band — he was heard calling CQ as he went through the CQ filter passband but your conductor didn't get the callsign as by that time all that was left were clicks — a bit like the Cheshire Cat in 'Alice in Wonderland'.

Ten Metres

Naturally, most affected by summer conditions. Nonetheless, G4EZA (Colchester) says this is where it's all been happening. The intermittent fault on his FT-200 mentioned last time round at last condescended to become a proper one, and so Tim was able to find it; now the PA can be run up

without smoke coming out of the back. So CW yielded QSOs with HZ1HZ, JA1QF1, JH1UGN, LU8DQ, TF3JB, VK2VPG, VK3AMY, VK6NLU, ZW4OD who turned out to be a PY with a funny prefix, and 4X4UF. On the SSB front, C31UN, UK8MAA, 4S7KG, 4X4MS, 4X4YM, and 4X4BD. The C31UN provoked the comment that it must be national Andorra week or something, Tim having a list which contains (peppered around the various bands) more C31s than this writer can ever recall seeing since he started writing this piece. And, be it noted, G4EZA has only been home for 15 days out of the previous two months!

How nice to hear again from Neville, G3RFS (London N.22) — your scribe first recalls Neville at an NFD in the wee small hours when G3GZB was operating and the writer logging, while the then-SWL Nev had the "We've already worked 'em" sheet and a pair of phones; came a call under the QRM which neither 'GZB nor the writer could get hold of, until this quiet SWL told us the call and that we wanted him. The writer is not red-hot with the key anyway, but anyone who could do that to G3GZB when the latter was cracking on had to be, potentially, a fine CW operator. It came out, of course, when Neville got his call — but having let the call lapse for nine years he had to resist the Morse test. Anyway, having moved from East Barnet to Wood Green, the present place proved to be much noisier than the old QTH, despite lots of work on the aerials. There is a 53-foot trap vertical, home-brewed, with *lots* of radials, put in a few months ago when the lawn was torn up and re-turfed; there is also a 7 MHz dipole inverted-vee, taking up some of the front garden, and in the shack a TS-520S with CW filter and outboard VFO, plus linear. G3RFS has been back on the air for a year (to the very day when he wrote) and in that time has made, between Top Band and Two, a total of 238C worked.

G2HKU (Sheppey) wrote in commenting that in his opinion last month was the worst for years, and reporting nothing on 21 or 28 MHz. On a different tack, Ted sent along a cutting of the May 29 incident in which a Dutch

coaster loaded with inflammable spirit was seen by radar to be heading straight for the wreck of the "Richard Montgomery" which sank during the last war with some 4000 tons of assorted bombs and ammunition. Luckily a Medway Port Authority launch managed to warn the coaster, but only when she was within a half-mile of the wreck. To put it in perspective, one seems to recall the Hiroshima bomb was ten kilotons, and so if the coaster had set off the wreck, the result would have been half the size of the first atom bomb used in anger *plus* all the spirit in the coaster. No wonder people continue to shout for the wreck to be removed. Although it is very well marked on the chart and with buoys all round, anyone looking at the chart cannot but be amazed that someone hasn't bumped into it in 35 years, particularly as the deep-water channel is so narrow and given a bit of thick weather.

An interesting letter from G4JNH (Workshop). Ron wrote just as he finished his first three months on the air, and finds he has been delighted and amazed at the fun he has got from it all, with simple wire aerials at that; However a planning application is in for a beam aerial — this is the difficult bit! In round terms the first 100 countries took 63 days, all-band, using wire aerials and an FT-101ZD. Recent ones on Ten included SSB with 8J3ITU, WP4ADA, 3B6CD, CE3CKE, 9J2FC, 4Z4RZ, VE6EP/4U in Syria, EC6AB, 3B8CF, and LU6DMZ.

Fifteen

G4EZA says he still hasn't got a 'real' aerial for the band, making use of a forty-metre dipole operated on the third harmonic, which accounts for some at least of the DX *not* worked — but CW managed to find C31TY, VO1AW, 4Z4KX; 4X6AG came into the log by way of SSB.

On the other hand Ron at G4JNH compared his aerials with the ones he used as an SWL, and came to the conclusion *his* forty-metre dipole inverted-vee was quite as good as the 21 MHz dipole and so took the latter down. Ron's version starts at 22 feet high in the top of the roof-space, and then slopes down to the ends at ten feet, these being outside the house. This aerial set-up plus the FT-101ZD on 21 MHz resulted in SSB to JM1ABW, ZL1ADN, VS6IC, XT2AX, 9J2FC, VE7BRI, VK2AMD, ZL4BX, VK2EQ, KH6IJ, 5NØATU, G3XVN/5NØ, 9G1JX, HM2JD,

CE9AF, AP2MQ, VP8SB, JØ6QDL/P (Okinawa), DA2DC/HBØ, HC6MN, EA9JE, 6T1YP, 5U7AF, 4U5ITU, KS6DV, KØSST (Nebraska), UAØSGJ, VK2QK, N6CUQ/KH2, UAØCDK for Zone 19, WA2TTI/OX, and HSIABD.

At G3CED/G3VFA (Broadstairs) the arrangements were altered a little: Joystick with eight feet of feeder and a new compacted version of the five-band radial system. "Tests" therefore meant that George, for part of the time at least, was running 100 watts instead of his usual two. We reckon this is unfair to the traders of Broadstairs as G3CED must be the best customer for lantern-batteries for miles round! The two-watts managed CW with DF8JH, F6KII, W9TO, UA10AI, DLØXX, UK3KXR, VE3DTL.

G3NOF (Yeovil) only commented about Ten that it was not too good, and made no QSOs on that band, keeping most of his operating time for 21 MHz. Here the situation has been that things have been quiet during the day between, say 0800 and 1600, perking up outside these times. In the mornings, around 0600, there have been regular openings to W5, W6, W7, KH6, and the Pacific, long path, and the same areas have been noted on the short path about 1700 together with YBO, HS, and JA up to about 2100z. The KL7s have been noted around 0700 along with a few VKs; Africa north of the Equator was to be heard strongly around 1700, but little was heard of Africa anywhere south of the equator. In the mornings around 0700 and again the late evenings around 2200 ST and J28 were strong signals. Few South Americans were heard, but there was a lot of short-skip about. In QSO terms, Don talked to AP2SA, CR9A, DU1JB, FRØFLO, G3JKI/5A, HS1AID, HS1ABD, HS4AM1, HZ1AB, IJ7DMK, J6LKU, J28CC, many JAs including JD1ALU on Ogasawara Is., HK5EHM/HKØ, KH6IJ, KH6N, N2BRI/MM off Florida, N4ADJ/KH2, P29CC, ST2MM, ST2SA, ST2FF/STØ, UL7JCA, TU2GH, VP8SD, VQ9JC, VS6BB, VS6IC, VU2BBJ, VU2RAK, VY1AL, W7LR, W7XN, YBØWR, YBØYJ, ZS3KC, ZSSZO, ZS6BEC, 4S7DJ, 4S7FG, 5NØPSN, 5W1BP, 6T1YP, 6W8JI, 9K2DR, and 9V1UH.

Twenty

G4EZA typed out his letter to this piece, starting it by commenting that he had to "practice his typing on *some-*

body". Charming! Clearly Tim likes the morning activity even if, like the writer, he doesn't like rising early, and he reckons the noise on 14 MHz at this sort of time is worse than on 7 MHz. Be that as it may, CW contacts were recorded with C31MG (who was not thought to be quite genuine) and EA9GK, while SSB found C31TT (The Real McCoy for sure), VE7DGI, VK2DDA/M, VK4NM, and VK5IT.

G2NJ (Peterborough) had a couple of /M exercises; the first when he went to Sevenoaks and operated 14 MHz CW from the passenger's seat while G3JKW/M operated VHF and drove. Some 20 continentals were worked after this fashion, and almost the same number were hooked while out with G5NX/M to Southwell and back. One interesting one was with G3JEC who was using an adaptation of the "S.C.D." rig as described by G3RJV in *S.W.M.* a few issues back.

G2HKU it was who described conditions as poor, in that on some days his ZL skeds on Twenty were a washout; SSB contacts were, however, made with 6W8MW, UK9SAD, ZL1VN, ZL3SE, ZL3RS, ZL3FV, and 4NIU, while CW penetrated to N4TO/KP4, UAØSID, OA2CD, and EA9EU.

Now to G4JNH, who comments that so many of these VHF-only types think they would have to have a superb aerial to operate on the HF bands and are deterred from so doing by the lack of aerial facilities — a good point, but one which they could have resolved for themselves had they ever been SWLs before they got their ticket. Anyway, the indoor dipole at Ron's place managed to find W6PDG/AH2, SV9JI, VK3OM, W7IH1 (Utah), KH6IJ, KH6FKG, VK3WT, TI2EY, FØWV/FC, TG4NX, VK2LX, FØ8FU, ZN3GK, XE2CB, TF3GN, OY6FRA, F9UW/3A, JY5MM, YV4AYK, 7X2AE, VP9AN, VP9KK, GJ4DSD/A, HK5EHM/HKØ, JX9YY, XE1TL, VE5PK, LX1HP, KG4WM, 4X6AZ, and VP5SDA/HK1.

G3CED managed HA7KLC, RK2AAR, UK2CAU, and F2MA with the two watts, while a moment or two with fifty watts dealt with YU2QO — but the interesting thing with this one was that George couldn't resist winding the power back down to five watts and getting the same report — the other chap just didn't notice the difference. Odd sort of thing, human nature.

Snippets

BARTG have sent us in the results of their Spring RTTY contest. The winner was W3FV with some 592012 points for 325 contacts in 37 countries. Top G was G3HJC in tenth place with a score of 351430 from 199 contacts in 23 countries, with the next G down at thirtieth place. It seems an odd sort of scoring system, though, wherein the chaps in 5th and 48th places have both worked the same number of countries. However, it obviously goes down well with 105 single-operator entries, 22 multi-op efforts with G stations sitting second and fourth, and an SWL entry of nine. Some 53 countries were on the air with RTTY during the contest period.

Contests to come include the European DX Contest, CW August 9-10, and Phone September 13-14. A full 48-hour bash, but with only 36 hours to be used by single-operator stations; the twelve hours rest period to be taken in not more than three periods. Exchange RS(T) plus serial number. This contest is another of the ones that contains the QTC feature which makes it all a bit complex — we suggest you get hold of the details from DARC, WAEDC Committee, P.O. Box 1328, D-895 Kaufbeuren, Federal Republic of Germany.

August 23/24 is the weekend for the All-Asian CW Contest; all-same previous years except that it is now for the full 48 hours, QSO points are three per for Top Band, 2 per for Eighty, and one per for the other bands. CW entries will be in the hands of the committee by November 30, addressed to JARL Contest Committee, P.O. Box 377, Tokyo Central, Japan.

'CDXN' deadlines for the next three months—

September issue — August 7th
 October issue — September 4th
 November issue — October 2nd

Please be sure to note these dates.

The LF Bands

On the one hand summer static, and on the other the domestic chores: they always take their toll on the LF bands at this time of year on the reports. Of course with old Freckle-Face up there bringing good conditions on the HF's, not to mention the two-metre black box

and the repeater if all else fails — 'nough said!

G3CED/G3VFA has always been keen on 80 and 40 with QRP; and with the extra power also being used on occasion there were some nice contacts all round Europe. One in particular was a ragchew QSO with GB2RN with apologies to the waiting multitude — that was a bit of a startler for G3CED in that he dished out RST579 and got a 599 back with two watts!

For G2HKU, the question of 7 MHz was very simple — a CW contact with VP2VGF; nothing on Eighty, and on Top Band SSB to PAØPN, plus CW with OZ1LO, GM3PFQ, UAIDZ, OZ5DX, GW4BRS, SP3FLR, EI9J, DLØWN, OE3JPK/3, DL2XS, F8EX/SUN (Sein Island), F6BWO, and UC2AAK.

G3RFS has his main interest in 7 MHz CW/SSB, and as we have already seen, his aerials reflect this — and we might remark that while the garden he had in East Barnet was quite small for a Top Band man, the present back garden is a matter of 35 × 14 feet only! As always in such a fix, it is very definitely true that the more work done on the ground, with radials, counterpoises and so forth, the better will be the results with a given vertical aerial — and all the radials won't harm the performance of the inverted-vee one bit either. As proof of the pudding comes the eating — in the first year back, G3RFS collected up 174 countries on 7 MHz all-modes.

Input or Output Power?

While QRO types have always been licensed on a power-input limit and left to scratch the most out of that input (and even our modern SSB output power measurement using a 'scope is directly traceable to a power-input measurement), it seems to your scribe that, particularly for QRP, the thing we should be measuring should be power output delivered to the feeders. This then means that one has a direct comparison standard as between one QRP contact and another from the same site; and it would enable the matter of aerial gain to be taken into the question. It seems to this writer that the basis of the power-input measurement is technically bunkum, but was really the only possible way in the days when about the only useful tool for *measuring* (as against comparing) was the station multimeter. Thus one could put an

ammeter in the PA anode circuit and read current, put the testmeter across the HT line and read volts. In those days the only way of measuring output power involved the manufacture of dummy aerials and their calibration indirectly by means of a grease-spot photometer with one bulb driven from a *Variac* — none of which was much use save as a comparison standard in the individual's own station. Nowadays we can get, or make, power meters which can register power from under one watt up to the legal limit or above; and we can *calibrate* them with some degree of reliability even if we do have to turn to the photometer, simply because of the vastly improved stability of the modern resistor and diode types available. In addition there are so many ways open to one if a cross-check is required — modern 'scopes will look at the RF on most bands through a 10:1 probe without difficulty, while the use of an RF detector head in conjunction with a simple electronic voltmeter or 'scope will deal with bands outside the range of the 'scope alone; and of course until the arrival of ferrites capable of coping with HF and VHF RF — which was after the war — no in-line wattmeter could be contrived with reasonable accuracy across the bands.

So — the simple answer *then* was to measure DC input; but even then if one had a pentode PA, one had to disregard the screen current, not to mention avoiding detuning the PA and so pulling the HT volts down a bit. It still is, one supposes, tolerable as a method for defining one's maximum limit easily for Home Office purposes. For any other practical purposes one needs to know the RF output power, or the relationship between input power and output power *directly*; and most modern rigs recognise this by giving you metering of PA anode volts, of RF volts output, and of course of PA anode current.

Wind-Down

Which is where we bid you farewell once again; the dates are all in the 'box', and we wouldn't mind in the least were you to beat the deadline for arrival (which is the *last* possible date — not the first!) by a couple of days, so we can get on with the beginnings of the putting-together, and so save a little of the rush that bedevils the tail-end of the piece. Address, as ever, is "CDXN", SHORT WAVE MAGAZINE, 34 HIGH STREET, WELWYN, HERTS. AL6 9EQ. See you all further down the log!

NEW QTH's

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

E14DQ, T. F. Cocking, "Maryville", Main Street, Ballinacurra, Midleton, Co. Cork.
E14DS, J. A. O'Riordan, 59 Bandon Road, The Lough, Cork City.
G3JDI, K. R. Strellis, 63 Downer Road, Benfleet, Essex. SS7 1BQ (re-issue.)
G3JKW, J. K. Warrington, 12 Granville Street, Peterborough, Cambs. PE1 2QJ (re-issue) (Tel: 0733-53005.)
G4HMD, H. D. Drury, 39 Wemborough Road, Stanmore, Middlesex. HA7 2EA.
G4HTS, W. H. Etheridge, L.D.S. (ex-G8LLW), 78 Manor Road, Stretford, Manchester. M32 9JB. (Tel: 061-865-3873.)
G4ILR, C. Howell, 10 Bishops Close, Little Downham, Ely, Cambs. CB6 2TQ.
G4IPW, D. P. Meare, "Sunstone", 17 Holbeach Close, Bury, Lancs. BL8 1XA.
G4IQM, D. L. Hill, 6 Reigate Close, Pound Hill, Crawley, West Sussex. RH10 3TZ. (Tel: Crawley 882641.)
G4IVJ, J. K. Harvey (ex-G8KLO), 38 Bodenham Road, Northfield, Birmingham, West Midlands. B31 5DS. (Tel: 021-477-7447.)
G4JAL, M. R. Vaset, "Heatherlea", Adbury Holt, Newtown, Newbury, Berks. RG15 8PN.
G4JBL, C. H. White, 20 Fowey Close, Shoreham-by-Sea, West Sussex. BN4 5HE. (Tel: 07917-2617.)
G4JCC, S. P. Richardson (F0FDB/ex-G8SOR), 52 Salters Lane, Hayling Island, Hants. PO11 9PJ.
GW4JCD, D. R. Evans, 1 School Road, Gurnos, Lower Cwmtrwrch, Swansea. SA9 1EQ. (Tel: Glantawe 843331.)
GM4JDU, I. E. McGarvie, 3 Kelso Avenue, Paisley, Renfrewshire. PA2 9JE.
G4JGM, R. Clarke, 46 Rakeway, Saughall, Chester. CH1 6AZ. (Tel: 0244-881487.)
GM4JKL, J. A. Fleming (ex-GM8OHF), 10 Irvine Crescent, Coatbridge, Lanarkshire. ML5 3QJ.
GW4JKR, F. Wilson, 8 Maes-y-waen, Llanfairpwll, Anglesey. LL61 5TJ.
GM4JNB, N. D. Baird (ex-GM8PPP), "Loch Goin", 6 Cardross Road, Colgrain, Helensburgh, Dunbartonshire. G84 7JW.
G4JNH, R. Barker, 27 Rowan Crescent, Workop, Notts. S80 1BA. (Tel: 0909-476339.)
G4JPB, Canon J. P. Beaumont (ex-G8USC), The Vicarage, Finedon, Wellingborough, Northants. NN9 5NR. (Tel: 0933-680285.)
G4JQO, L. Hobson (ex-G8KQK), 2 Parkhill, Middleton, Kings Lynn, Norfolk. PE32 1RJ. (Tel: 0553-840401.)

G4JVO, F. B. Le Cocq de Dotteville (ex-GJ8PKU), "Les Cailloux", Green Road, St. Clement, Jersey. (Tel: 0534-37166.)
G8SNN, N. B. Wright, "Denbury", South Road, Beccles, Suffolk. NR34 9NZ.
G8TFZ, A. P. Tapp, 13 Montgomery Close, Saltash, Cornwall. PL12 4HU. (Tel: Saltash 5311.)
G8UAR, B. D. Harper, 51 Lady Edith's Park, Scarborough, North Yorkshire. (Tel: Scarborough 73961.)
G8UBN, G. Hodgson, 32 Whin Bank, Scarborough, North Yorkshire.
G8UVL, G. F. Rhodes, 23 Whitby Avenue, Ingrave, Brentwood, Essex. CM13 3NT.
G8UXY, C. F. Bone, 33 Fairway Rise, Chard, Somerset. TA20 1NT.
G8UZM, R. L. Jefferson, 16 Edge Dell, Scarborough, North Yorkshire. (Tel: Scarborough 76732.)
G8VAH, S. Alport, 5 Westbourne Park, Scarborough, North Yorkshire. (Tel: Scarborough 75773.)
G8VBU, P. J. Cook, 4 Russell Way, Higham Ferrers, Wellingborough, Northants. NN9 8EJ. (Tel: Rushden 09334) 58049.)
G8VCS, C. R. Mortimer, "Meadow Bank", Dowlish Wake, Ilminster, Somerset. TA19 0NZ.
G8VEH, R. Bray, 21 Victoria Road, Shoreham-by-Sea, West Sussex.
G8VGM, P. Hodgkins, 7 Mere View Gardens, Scarborough, North Yorkshire. (Tel: Scarborough 69592.)
G8VGS, J. Brennan, 16 Sandyknowes Grove, Glengormley, Co. Antrim. BT36 8DG. (Tel: Glengormley 6860.)
G8VHG, I. W. Gower, 10 Homethorpe, Hull, North Humberside. HU6 9EU. (Tel: 0482-855436.)
G8VIJ, J. Rawlinson, 15 Spring Gardens, Gainsborough, Lincs. DN21 2AY. (Tel: Gainsborough 4491.)
G8VKA, R. J. Coulter, 8 Grange Valley Green, Ballyclare, Co. Antrim. BT39 9HD. (Tel: 09603-23800.)
G8VKK, V. A. Tomkins, 56 Springfield Road, Exeter. EX4 6JL. (Tel: 0392-51843.)
G8VLH, Mrs. K. Niebuhr, 15 Westfield Road, Witney, Oxford.
G8VMX, R. W. Wooten, 29 Liverpool Road, Reading. RG1 3PP.
G8VQV, N. W. Jaques, 40 Broad Lane, Upper Bucklebury, Reading. RG7 6QJ.
G8VZW, D. King, 60 Haw Lane, Yeadon, Leeds, West Yorkshire. LS19 7XG.
G8WCB, W. Stewart, 11 Fairway Gardens, Castlereagh, Belfast. BT5 7PS. (Tel: 0232-59687.)

GM8WGU, A. M. Irving, 23 Woodlea Park, Sauchie, Alloa, Clackmannanshire.
G8WHG, M. J. Axson, "Fieldings", 23 Leek Road, Congleton, Cheshire. CW12 3HU. (Tel: 026-02-2916.)
G18WHT, T. Milne, 9 Dermott Hill Way, Belfast. BT12 7GJ.
G5MQN, J. V. J. Rohowsky, 146 Moorland Avenue, Lincoln. LN6 7HX.

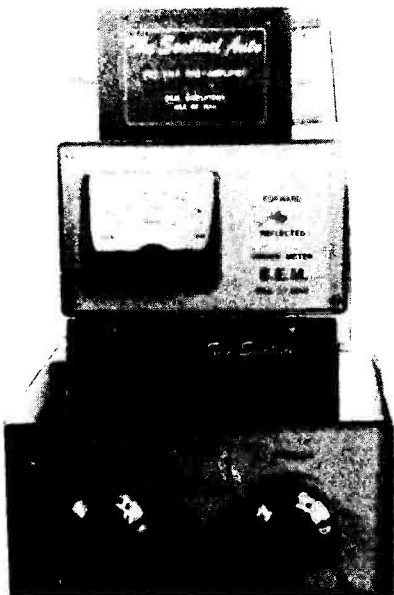
Change of Address

G3AAS, M. D. Glynn, 7 Southfield Avenue, Leeds, West Yorkshire. LS17 6RN.
G3RGM, M. A. Sandys, 36 Redhill Court, Portiswood Drive, Moorndon, Bourne-mouth, Dorset.
G3FYV, H. G. Gosling, 134 Bird Hill Road, Woodhouse Eaves, Loughborough, Leics. LE12 8RG. (Tel: Woodhouse Eaves 890773.)
GM3KKG, M. Darke, c/o 100 Princes Street, Edinburgh. EH2 3AA.
G3LZV, C. Berry (VS6EF), 13 Spa Road, Atherton, Manchester. (Tel: 0942-892205.)
G3MAE, Dr. A. E. Wilson, 8 The Paddocks, The Meadows, Appleton Wiske, Northallerton, North Yorkshire. DL6 2BE.
G3POD, D. E. A. St. John, 26 Henry Street, Rainham, Gillingham, Kent. ME8 8HE.
G3QD, J. G. Treece, 32 Broughton Street, Beeston, Nottingham. NG9 1BD. (Tel: Nottingham (0602) 257197.)
G3RJV, Rev. G. Dobbs, 17 Aspen Drive, Chelmsley Wood, Birmingham. B37 7QX. (Tel: 021-770-5918.)
G3VUV, E. J. Smith, 217 Woodlands Road, Gillingham, Kent. ME7 2SW. (Tel: 0634-572988.)
GM3ZXC, J. Higgins, 97 Woodstock Road, Greenock, Renfrewshire.
G4DIE, I. A. R. Dredge, Menamber Farm, Releath, Helston, Cornwall.
G4FKH, G. Williams, 62 Chestnut Walk, Chelmsford, Essex. CM1 4JT. (Tel: 0245-66709.)
G4FRX, J. H. Nelson, 30 Rosslyn Hill, Hampstead, London. NW3 1NH. (Tel: 01-794-9411.)
G14FUM, Dr. W. D. Hutchinson, 8 Oakglen, Greystone Road, Antrim. BT41 1JK.
G4GHJ, M. Dixon, 86 Bostock Avenue, Northampton.
G4HYG, C. J. Moulding, 115 Cemetery Road, Darwen, Blackburn, Lancs. BB3 2LZ.
G4IJG, J. R. Owen, 75 Merseybank Avenue, Chorlton, Manchester. M21 2NW.
G4IQL, H. Fleischmann (ex-GW4IQL), 32 Osborne Road, Thornton Heath, Surrey. CR4 8PB. (Tel: 01-653-3456.)
G8PWR, W. F. Raver, Segar's House, St. Edward's School, Oxford.
G8SOH, I. H. Moth (ex-GM8SOH), "Claygate", Solent Hill, Freshwater, Isle of Wight. PO40 9TG.

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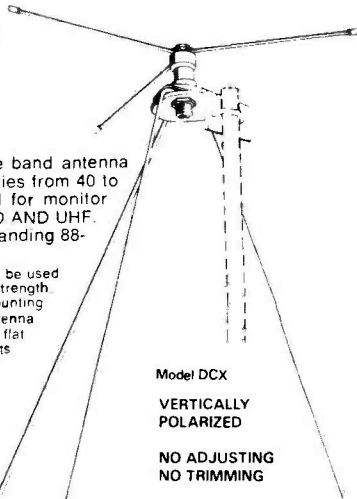
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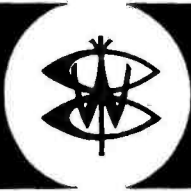
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THE UNIQUE ALUMAST "THE TOWER THAT COMES IN A TUBE"

The ALUMAST is a 15" (375mm) wide triangular cross section lattice sectional aluminium mast based on a 10ft (3.05m) section length. It is supplied "knocked-down" in a tubular carton for ease of transport, but can easily be assembled needing no special tools or skills. The system includes top plate with bearing sleeve, rotor plate and a choice of a fixed base frame (FB-1) or one with hinge joints (HB1) to enable the mast to be pivoted at ground level. Guy brackets are available for use at heights above 30ft.

- ★ Made from high strength corrosion resistant alloy using WESTERN'S EXCLUSIVE 'W' section leg extrusions.
- ★ Easy assembly using bolts and "Nyloc" locking nuts for security.
- ★ Free-standing to 30ft (9.15m) with a typical tri-bander plus VHF/UHF antennas.
- ★ Heights to 250ft (75m) with appropriate guy configuration (ask us for quotes).
- ★ Lightweight — only 25lb (11kg) per 10ft (3.05m) section.
- ★ 30ft (9.15m) mast is delivered in a tube only 10ft 6in (3.2m) long, 6in (0.129m) dia.

**A COMPLETE
30ft (9.15m) MAST for
375/PSS/3; HB-1; RMP-1; TP-1**

£ 240.35

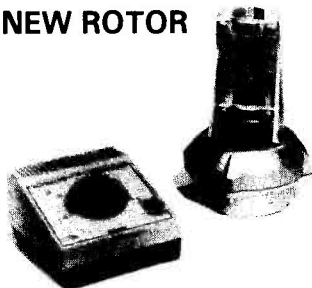
FULL PRICE LIST

375/PSS/3	30ft mast (3 sections)	£184.00
375/PSS/1	Additional 10ft section	£62.68
HB-1	Hinged base unit	£31.05
FB-1	Fixed base unit	£21.85
RMP-1	Rotor mounting plate	£12.08
TP-1	Top plate with sleeve	£13.23
GB-1	Guy brackets (set of 3)	£11.50

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

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

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**SR11 VHF
Receiver**
ONLY £69 inc. VAT &
Carriage

6 Channel Scanning + Tunable 156-162 MHz
The SR11 is a self-contained VHF Monitor receiver suitable for use at home or mounted in a car or boat using the bracket supplied. It requires only a 12V supply. The automatic scanning of up to six crystal controlled channels is ideal for continuous monitoring of the important services whilst the VFO allows you to listen to the complete band.

2 METRE RECEIVER



**FDK TM56B
VHF MONITOR RECEIVER**
12 fixed + 4 scanning
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This receiver is designed for use as either a Base Station incorporating a 240V A.C. supply or as a Mobile Monitor in a car or boat. The four scanning crystal channels can continuously monitor priority channels and immediately lock onto any signal. The Rig comes complete with mobile mounting bracket, hardware, power lead, etc.

TRANSCEIVERS

H.F.	
Trio TS 120V	£347.00
Trio TS 120S	£432.00
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Icom IC 240	£169.00
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AOR AR 240A	£166.00
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Trio TR 2400	£210.00

2 M MULTIMODES

Icom IC 260E	£339.00
Icom IC 251	£479.00
FDK Multi 750	£295.00
Trio TR 9000	£345.00

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H.F.	
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Trio R 1000	£298.00
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Search 9	£45.00
AR22	£99
FDK TM56B	£105.00
Bearcat 220	£258.00

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V.F.O. TUNES 156-162 MHz
Scanning of 6 Xtal channels

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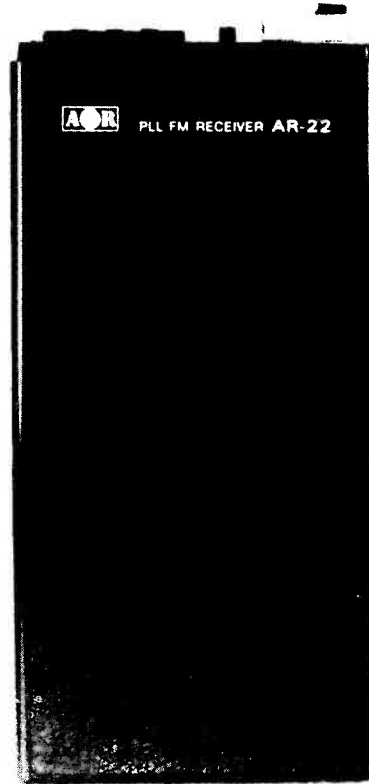
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QSL leads the field in supplying crystals world wide to major communications companies, broadcasting authorities and posts and telecommunications administrations. As a result we can supply the amateur with a high quality, competitively priced product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

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

	HC6/U	HC6/U	HC25/U 30pF and 40pF TX	HC25/U 20pF and 30pF RX	HC25/U 25pF and 20pF TX	HC6 & 25/U SR RX
RO	4.0277	8.0555	12.0833	14.9888	18.1250	44.9666
R1	4.0284	8.0569	12.0854	14.9916	18.1281	44.9750
R2	4.0291	8.0583	12.0875	14.9944	18.1312	44.9833
R3	4.0298	8.0597	12.0895	14.9972	18.1343	44.9916
R4	4.0305	8.0611	12.0916	15.0000	18.1375	45.0000
R5	4.0312	8.0625	12.0937	15.0027	18.1406	45.0083
R6	4.0319	8.0638	12.0958	15.0055	18.1437	45.0166
R7	4.0326	8.0652	12.0979	15.0083	18.1468	45.0250
S8	—	—	12.1000	14.9444	18.1500	44.8333*
S9	—	—	12.1020	14.9472	18.1531	44.8416*
S10	—	—	12.1041	14.9500	18.1562	44.8500*
S11	—	—	12.1062	14.9527	18.1593	44.8583*
S12	—	—	12.1083	14.9555	18.1625	44.8666*
S13	—	—	12.1104	14.9583	18.1656	44.8750*
S14	—	—	12.1125	14.9611	18.1687	44.8833*
S15	—	—	12.1145	14.9638	18.1718	44.8916*
S16	—	—	12.1167	14.9667	18.1750	44.9000*
S17	—	—	12.1187	14.9694	18.1781	44.9083*
S18	—	—	12.1208	14.9722	18.1812	44.9166*
S19	—	—	12.1229	14.9750	18.1843	44.9250*
S20	4.0416	8.0833	12.1250	14.9777	18.1875	44.9333
S21	4.0423	8.0847	12.1270	14.9805	18.1906	44.9416
S22	4.0430	8.0861	12.1291	14.9833	18.1937	44.9500
S23	4.0437	8.0875	12.1312	14.9861	18.1968	44.9583

SR = Series Resonance *HC25 only

Also in stock: RO to R7 for FT221 RO to R7 and S8 to S23 for following: Belcom FS1007, FDK TM56, Multi 11 Quartz 18 and Multi 7, Icom IC2F, 21, 22A and 215, Trio Kenwood 2200, 7200, Uniden 2030 and Yaesu FT2FB, FT2 Auto, FT224, FT223 and FT202.

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

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

70cm CRYSTALS in stock 8.0222 and 12.0333 in HC6 **£1.85**. Pyc Pocketfone PF1, PF2, PF70 and Wood and Douglas **£4.50** a pair or TX **£2.25**, RX **£2.50**, S8 (433.2) RBO, RB2, RB4, RB6, RB10, RB11, RB13 and RB14.

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

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

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

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Fundamentals	1	200 (total)	10 to 19.999 kHz	— £23.00
	2	200 (total)	20 to 29.999 kHz	— £16.50
	3	200 (total)	30 to 99.999 kHz	— £10.50
	4	200 (total)	100 to 999.999 kHz	— £6.00
	5	50	1.00 to 1.499 MHz	£9.00 £6.00
	6	10	1.50 to 1.999 MHz	£4.75 £4.20
	7	10	2.00 to 2.599 MHz	£4.75 £4.00
	8	10	2.60 to 3.999 MHz	£4.55 £3.70
	9	10	4.00 to 20.999 MHz	£6.00 £5.40
	10	10	21.00 to 24.000 MHz	£4.55 £3.60
3rd OVT	11	10	21.00 to 59.999 MHz	£4.55 £3.60
5th OVT	12	10	60.00 to 99.999 MHz	£5.00 £4.00
	13	10	100.00 to 124.999 MHz	£6.15 £5.20
5th, 7th & 9th OVT	14	20	125.00 to 149.999 MHz	— £6.00
	15	20	150.00 to 225.00 MHz	— £7.50

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

HOLDERS — Please specify when ordering — 10 to 200 kHz HC13/U, 170 kHz to 170 MHz HC6 or HC33/U, 4 to 225 MHz, HC18 and HC25.

DELIVERY. Column A 3 to 4 weeks (this service is subject to availability). Column B 6 to 8 weeks.

Please note that it is not always possible to provide the A delivery service but a telephone call will confirm its availability. Any orders received for A delivery when it is not available will automatically be placed on B delivery and a credit note issued for the difference in price.

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

EMERGENCY SERVICE SURCHARGES (to be added to A delivery prices). 4 working days £12, 6 working days £7, 8 working days £5, 13 working days £3 (maximum of 5 crystals on 4 day delivery).

CRYSTAL SOCKETS HC6 U and HC25 U **16p**.

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TERMS. Cash with order, cheques and postal orders payable to QSL Ltd. All prices include postage to UK and Irish addresses. Please note Southern Irish cheques and postal orders are no longer acceptable. Please send bank draft in pounds Sterling.

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144.4 (433.2)	a	b	c	d	e	f	g	h	i	j	k	l	m
144.480	a	b	c	d	e	f	g	h	i	j	k	l	m
144.800	a	b	c	d	e	f	g	h	i	j	k	l	m
144.850	a	b	c	d	e	f	g	h	i	j	k	l	m
145.000/ROT	a	a	a	a	a	a	a	a	a	a	a	a	a
145.025/R1T	a	a	a	a	a	a	a	a	a	a	a	a	a
145.050/R2T	a	a	a	a	a	a	a	a	a	a	a	a	a
145.075/R3T	a	a	a	a	a	a	a	a	a	a	a	a	a
145.100/R4T	a	a	a	a	a	a	a	a	a	a	a	a	a
145.125/R5T	a	a	a	a	a	a	a	a	a	a	a	a	a
145.150/R6T	a	a	a	a	a	a	a	a	a	a	a	a	a
145.175/R7T	a	a	a	a	a	a	a	a	a	a	a	a	a
145.200/R8T	a	a	a	a	a	a	a	a	a	a	a	a	a
145.300/S12	a	a	a	a	a	a	a	a	a	a	a	a	a
145.350/S14	a	a	a	a	a	a	a	a	a	a	a	a	a
145.400/S16	a	a	a	a	a	a	a	a	a	a	a	a	a
145.425/S17	a	a	a	a	a	a	a	a	a	a	a	a	a
145.450/S18	a	a	a	a	a	a	a	a	a	a	a	a	a
145.475/S19	a	a	a	a	a	a	a	a	a	a	a	a	a
145.500/S20	a	a	a	a	a	a	a	a	a	a	a	a	a
145.525/S21	a	a	a	a	a	a	a	a	a	a	a	a	a
145.550/S22	a	a	a	a	a	a	a	a	a	a	a	a	a
145.575/S23	a	a	a	a	a	a	a	a	a	a	a	a	a
145.600/S24	a	a	a	a	a	a	a	a	a	a	a	a	a
145.625/R1R	a	a	a	a	a	a	a	a	a	a	a	a	a
145.650/R2R	a	a	a	a	a	a	a	a	a	a	a	a	a
145.675/R3R	a	a	a	a	a	a	a	a	a	a	a	a	a
145.700/R4R	a	a	a	a	a	a	a	a	a	a	a	a	a
145.725/R5R	a	a	a	a	a	a	a	a	a	a	a	a	a
145.750/R6R	a	a	a	a	a	a	a	a	a	a	a	a	a
145.775/R7R	a	a	a	a	a	a	a	a	a	a	a	a	a
145.800/R8R	a	a	a	a	a	a	a	a	a	a	a	a	a
145.950/S38	a	a	a	a	a	a	a	a	a	a	a	a	a

S18 and S19 are now added to our stock range

PRICES: (a) £1.95; (b) £2.32; (c) £2.80; (e) £3.94.

AVAILABILITY: (a), (b), (c) stock items, normally available by return (we have over 5000 items in stock). (e) 4/6 weeks normally but it is quite possible we could be able to supply from stock.

N.B. Frequencies as listed above but in alternative holders and/or non stock loads are available as per code (e).

ORDERING. When ordering please quote (1) Channel; (2) Crystal frequency; (3) Holder; (4) Circuit conditions (load in pf). If you cannot give these, please give make and model of equipment and channel or output frequency required and we will advise if we have details.

JAPANESE AND AMERICAN EQUIPMENT We can supply crystals for YAESU (FT2F, FT2 Auto, FT224), most of the ICOM range and the TRIO-KENWOOD range. We can also supply from stock crystals for the HEATHKIT HW202 and HW17A.

CRYSTALS FOR BRITISH 70CM CHANNELS

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

We are stocking the following channels RB0 (434.60/432.00), RB2 (434.66/433.05), RB4 (434.70/433.10), RB6 (434.75/433.15), SU8 (433.20), RB10 (434.85/433.25), RB14 (434.95/433.35), SU18 (433.45) and SU20 (433.50) — TX and RX for use with: PYE UHF Westminster (W15U), UHF Cambridge (U10B), Pocketfone (PFI) and STORNO COL/COM 662 all at £2.32. For the U450L Base Station we have the Tx crystals for all the above channels. The RX crystals for the U450L Base Station, together with the TX and RX crystals for the remaining SU channels (SE12—433.30 RTTY, SU16—433.40 and SU22—433.55) for all the above equipments are available at £3.94 to Amateur Spec. or £4.64 to same spec. as stock items. Delivery approx. 4/6 weeks.

4M. CRYSTALS FOR 70.26 MHz — HC6/U

TX 8.7825 MHz and RX 6.7466 MHz or 29.780 MHz £2.32.

10.245 MHz 'ALTERNATIVE' IF CRYSTALS £2.32. For use in Pye and other equipment with 10.7 MHz and 455 kHz IF's to get rid of the "birdy" just able 145.0 MHz in HC6/U, HC18/U and HC25/U.

CRYSTAL SOCKETS — HC6/U, HC13/U and HC25/U (Low loss) 16p each 10p p&p per order (p&p free if ordered with crystals).

CONVERTER/TRANSVERTER CRYSTALS — HC18/U

All at £3.00, 38.6666 MHz (144/28), 42 MHz (70/28), 58 MHz (144/28), 70 MHz (144/4), 71 MHz (144/2), 95 MHz (342/52), 96 MHz (1,296/432/144), 101 MHz (432/28), 101.50 MHz (434/28), 105.6666 MHz (1,296/28) and 116 MHz (144/28).

TEST EQUIPMENT FREQUENCY STANDARD CRYSTALS

100 kHz in HC13/U and 100 kHz in HC13/U and 200 kHz and 455 kHz in HC6/U, £2.95.

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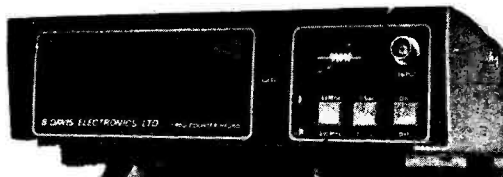
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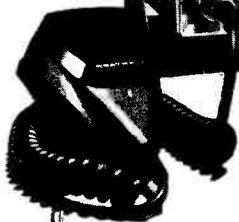
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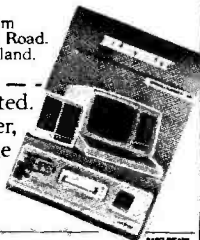
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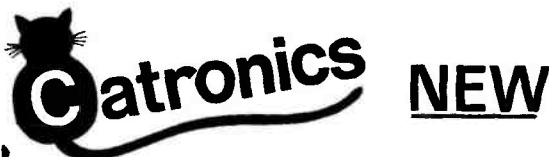
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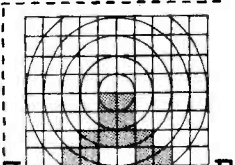
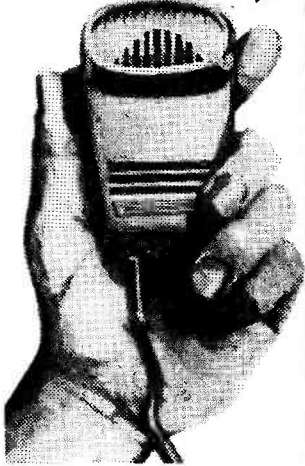
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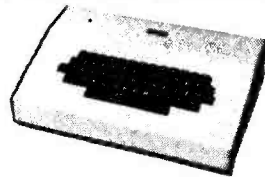
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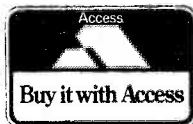
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