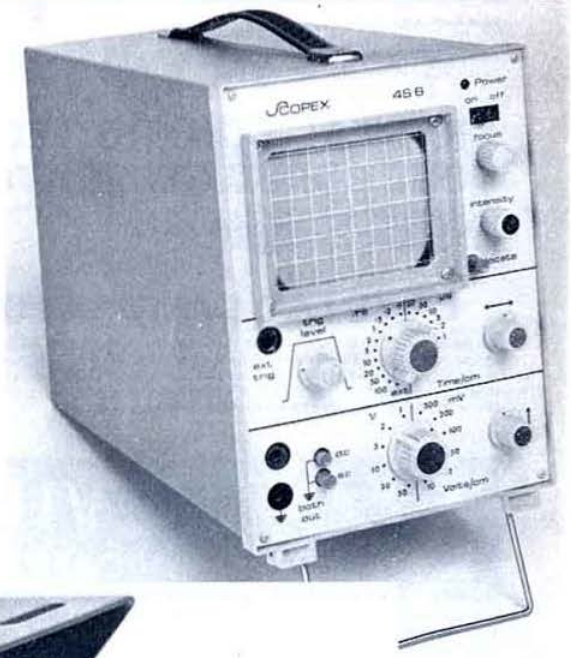
December 1976

radio communication

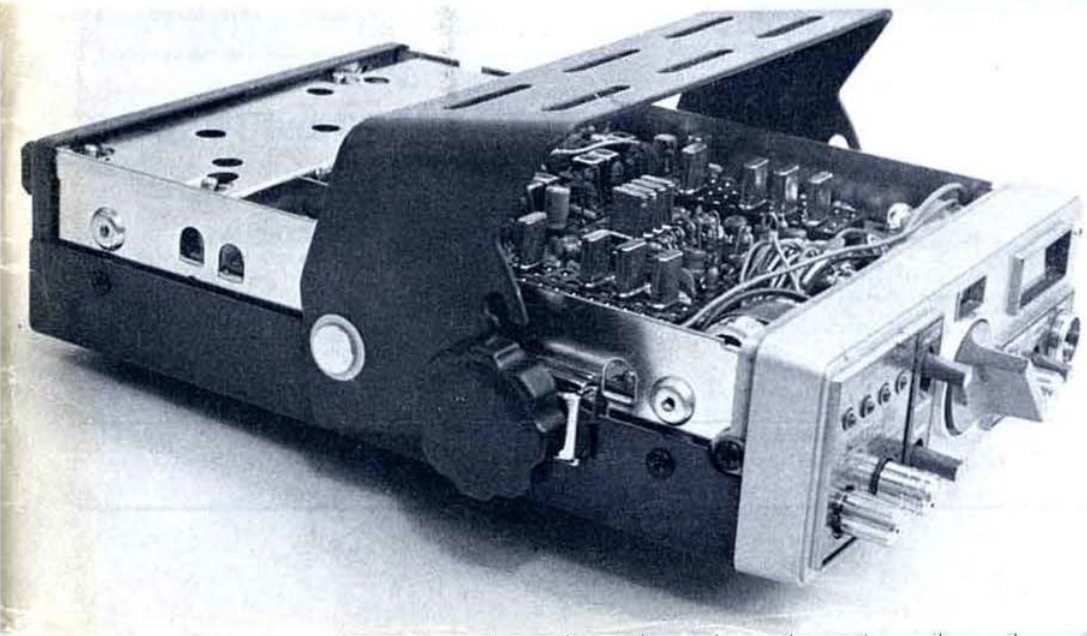
journal of the Radio Society of Great Britain

REVIEWED IN THIS ISSUE



The Scopex 4S-6 single beam oscilloscope

The FDK Multi-U11 432MHz transceiver



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

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

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Please note we will be closed 24th-28th December.

RSGB NEWS BULLETIN SERVICE

The RSGB news bulletin, callsign GB2RS, is broadcast every Sunday morning on hf and vhf, giving almost complete coverage of the British Isles. Its main purpose is to provide an outlet for amateur radio news items and announcements which, by virtue of their topicality or urgency, cannot wait for the next issue of *Radio Communication*.

The bulletin is prepared early on Thursday morning, and news items, marked "GB2RS news" should reach RSGB HQ by first post that day (telephoned items can also be accepted until 10am). No guarantee can be given of inclusion in part or whole of any item submitted and, once broadcast, items are not usually repeated.

SCHEDULE

Time	MHz	Location and coverage (hf) or beam heading (vhf) of station
0930	3·6	G2MI, Bromley, Kent (SE England)
1000	3·6	G8ML, Cheltenham (SW England)
	144·5	GM3UAG, Ellon, Aberdeenshire (NNW)
	144·5	G8GGK, Croydon, Surrey (NE)
1015	3·6	GI3GAL, Belfast (N Ireland)
	144·5	GI3TLT, Bangor, Co Down (N)
1030	3·6	G2CVV, Derby (N Midlands)
	144·5	G4DCH, Burnham-on-Sea (NW)
	144·5	GM3UAG, Ellon, Aberdeenshire (SW)
	144·5	G3PWJ, Brierley Hill (NW)
1045	144·5	G8CDP, Middlesbrough (NW)
	144·5	G8GGK, Croydon, Surrey (SW)
	144·5	G8BHQ, Stockport (NNW)
1100	3·6	G5VO, Bridlington (NE England)
1115	3·6	G3LEQ, Knutsford (NW England)
1130	3·6	GM3EHI, Bellshill, Lanarkshire (S Scotland)
1200	3·6	GM3HGA, Aberdeen (NE Scotland)

An rtty news bulletin, callsign GB2ATG, is also transmitted every Sunday at 1200 on 3·590MHz and at 1230 and 1245 on 144·6MHz. This bulletin carries items of interest to rtty enthusiasts.

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ABC
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

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Closing date for contributions unless otherwise notified: 4th of month preceding month of publication.

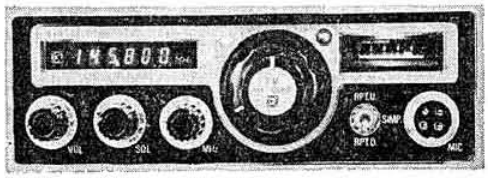
Advertising, other than Members' Ads, should be sent to the above address marked for the attention of Mr C. C. Lindsay. Tel 01-686 5839 (ADVERTISING ONLY).

South Midlands

ESTABLISHED 1958—OVER 18

"Happy Christmas from SMC"

DIGITAL 11 now with SCANNER AND CRYSTAL T.B. OPTIONS



The Digital 11 offers complete 5kHz step coverage across 2 meters and now with the Scanner 33, 25kHz channels from 145MHz upwards covered in around 10 seconds. It offers full lock and lockout on all channels. The scanner stops on a required channel for 10 seconds, then unless locked moves on. The bright digital readout comes from 6 seven segment LEDs.

Selectable 10 or 1 watt output for simplex or duplex (up and down shifts), across 144-146 (rx to 149MHz) from a tiny 6⅝" × 2" × 7½". Easily underdash mounted with the supplied mounting bracket, or slipped in place of the broadcast wireless.

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With any 8 channels from: SU (0, 8, 12, 16, 18, 20) and RU (0, 2, 4, 6, 10, 14)

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WITH KCP2 CHARGER

The handheld KP202 with its 2W of RF and ½W of audio, immunity to image and IF breakthrough, offers performance to rival all walkie-talkies and many mobile 10W sets. The KP202 is supplied with telescopic whip, leather handle/whip case and F type plug. Accessories include automatic (R channels only) crystal tone burst (£10.00), flexi stubby antenna (£5.75), leather case (£4.75), base charger KCP2 (£11.25), set of 10 ni cads (£8.50), F to UHF adapters (£1.45), F plugs, spare whips, spare hods etc. EX STOCK IN TOTTON

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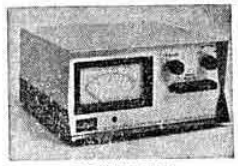

CD44/HAM II

AR33

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RZ100 Stolle (ballrace)	£10.00
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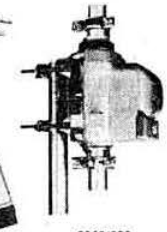
5 core AR30/40/33/2010 per yd	£0.20
8 core CD44/Ham 11 per yd	£0.32

STOLLE

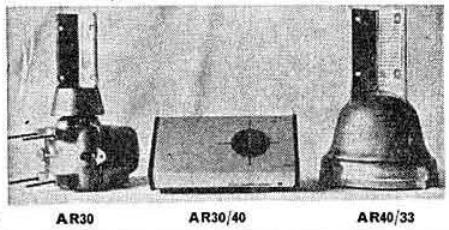
RZ100



2010/220

Control Box

CDE



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Mustang 3 ele 2kW P.I.P.	£82.50	Mustang 2 ele 1kW A.M.	£66.00

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GQ2E 2 element	£119.00	GQ4E 4 element	£238.00
GQ3E 3 element	£178.00	CK1Q 1 ele Conv. kit	£60.00

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

Tribander 10-20m (+ LF)	£14.61	LF40, 80 or 160	£4.87
Multimobile	£18.06	MM40, 80 or 160	£4.87
Flexiwhip 10m (+ FF)	£12.42	FF15, 20, 40, 80 or 160	£5.04
Basemount ⅜" hole mount	£2.20	Telescopic whip for coils	£1.50

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VERSATOWERS The telescopic, 20ft section, with full tilt over facility permits easy antenna adjustments. The low unit weight and superior design of solid ground post allows easy and cheap installation often without resort to concrete. Beware of false comparisons with other brands. Before buying a mast, we advise you to contact us giving full details. With 18 years experience in the design and manufacture of commercial masts and antennas, which are used from the frozen wastes of Antarctica to the deserts of the Middle East, supplied to Nato, the UN, the Red Cross, the British Antarctic Survey, HM Government and to all continents, in fact, to over 100 countries.

We stock the largest range of masts and antennas in the UK from the Versatower (copied but not equalled) to the products of Belgium, England and Australia detailed below.

ALIMASTS
TELESCOPIC LIGHTWEIGHT
3, 2 or 1·5m. Quick lock sections. Many versions 6 to 21 metres. Rigging extra. Carriage £2. VAT 8%.

7 × 2m	**£38.75**	6 × 3m	**£42.50**
4 × 3m	**£28.50**	7 × 3m	**£55.75**

HAMTOWERS
SELF-SUPPORTING
Galvanised lattice 10' sections. Freestanding with climbing steps. Carriage £3.50. Ex-stock 8% VAT.

30' c/w base grillage	**£164.60**
40' c/w base grillage	P.O.A.

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

TELETOWERS
Telescopic Galvanised Lattice and Tube Section. Carriage + 8% extra.
42' **£121.00** (Rigging Kit £28)
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79' **£224.00** (Rigging kit £48)
101' **£303.00** (Rigging kit £76)

LOW PRICE CRYSTAL FILTERS AND CRYSTALS (£3.75 pair or £2.00 singles) P & P 20p. VAT 12½%

YF30F-350	350Hz F(T)101 CW	**£18.00**
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XF30C	600Hz F(T)101 CW	**£18.75**
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YF30F12	12kHz F(R)101	**£18.00**
YF107M600	600Hz 10·7MHz	**£16.00**
YF107M2·4	2·4kHz 10·7MHz	**£16.00**
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10·7 Carrier crystals HC18U each		**£2.00**

YAESU
FT2F, FT2FB, FTAUTO, FT224 (6, 18MHz Tx and 14, 52MHz Rx)
SIMPLEX SO12, 16, 19, 20–24
DUPLEX R0-R9 all IR (T & R)
FT200(B), FT301(S)
FT101EX, FT75(B), **£2.20**

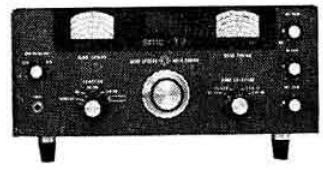
OTHERS
TR2200(G), C146A, C826, MB (12MHz Tx and inc. 44MHz Rx)
SIMPLEX SO 20-24
DUPLEX R3-R7
Selection of inverse receive
CONVERTER CRYSTALS, **£2.20**
38·666 (2m), 42 (4m), 50·5 (70cm)

The SMC73 General Coverage Receiver

The SMC73 is an all Solid State, Mains and 12V, communications receiver covering 550kHz to 30MHz in four overlapping ranges. Frequency readout is by two illuminated dials tuned by coaxial spun aluminium knobs, the larger for general coverage, the inner for amateur band (10-80m) band spread (set by use of internal 3·5MHz crystal calibrator).

FET's are employed in the R.F. Amplifier, mixer, VFO and BFO (these latter two stages being fed from independent stabilised supplies) ensuring good sensitivity, stability (electrical and mechanical) dynamic range, (helped by adjustable RF attenuator), and marked freedom from 'pulling' of both the local and beat frequency oscillators.

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



SMC73 Ex-stock, only £114.50 + VAT

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From Ten, Six or Two Metres (a '101 etc, a '620B or a '221R).

10W output, balanced Tx mixers, low spurious content, high sensitivity with dynamic range. (VAT + 12½%) (full convertor range stocked S.A.E. details).

MMT144/28 or 50	2 metres	**£76.00**
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Analog clock with automatical advancing 24 hour time zone hour disc giving, at a glance, time in principal cities or time zone. Battery powered, self starting, shock resistant.

QTR24 only **£13.00** (VAT +8%)

COAX RELAYS
12V DC 50 ohm, Silver plated.
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Power crosstalk (at 500MHz)

CX120	50W	35dB	Cable entry	**£8.50**
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Up to: 1kW, 1·5GHz, 0·3dB loss, 1·2:1 VSWR, 50dB isolation, 50 ohm 'N' or 'PL' fittings.
Ex stock P. & P. 30p (VAT + 8%)

TWS120	1 in 2 out Nickel SO239	**£4.90**
TWS120G	1 in 2 out Gold SO239	**£5.90**
TWS150G	1 in 5 out Gold SO239	**£10.45**

AEC METERS

SWR, Power (Pr), Field Strength (F.S.)
P & P 40p (VAT + 8%)

Unless stated: SWR (± 10%), 1.5 to 160MHz, 50/75 ohm

SWR10	(TLH) single meter horizontal type	**£8.15**
SWR20	(BLH) 50 ohm F.S., Pr. 10 and 100W FSD (±10%)	**£9.90**
SWR40	(Centre) single meter Vert. type with F.S.	**£7.90**
SWR50A	(TRH) SWR (±5%) 3·5MHz up. Pr to 1kW (±20%)	**£9.50**
SWR50	(BRH) as SWR50A (300μA) but 100μA meters	**£11.20**

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From YAESU — The Outstanding New GOLD LINE FT-301D

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ALL SOLID STATE
200W PIP
DIGITAL READOUT TRANSCEIVER

■ 6-Digit Readout ■ All Modes—SSB/CW/A.M./FSK ■ 160 thru 10 Meters ■ TX & RX Clarifier ■ RF Sampled Feedback ■ 3-Position AGC ■ Rejection Tuning (If Pass band tuning) ■ Built-in DC Power Supply ■ Optional AC Power Supply & Speaker Unit with 12 or 24 Hr. Digital Clock ■ Noise Blanker ■ RF Speech Processor ■ Computer Type Plug-In Module Construction ■ Size: 11 in (w) × 5 in (h) × 13½ in (d) ■ Light Weight: 22 lb.

The Model FT-301D is a precision-built, all solid-state, compact high performance transceiver of advanced design.

Fully solid-state using many ICs and FETs for reliability and a band tuning system with preset pass band tuning, combined with a wide-band amplifier that eliminates final amplifier tuning for band changes.

Also available as an option is an automatic (programmable) CW identifier.

THE FT301D, JUDGED ON PRICE, PERFORMANCE OR OPERATIONAL FEATURES

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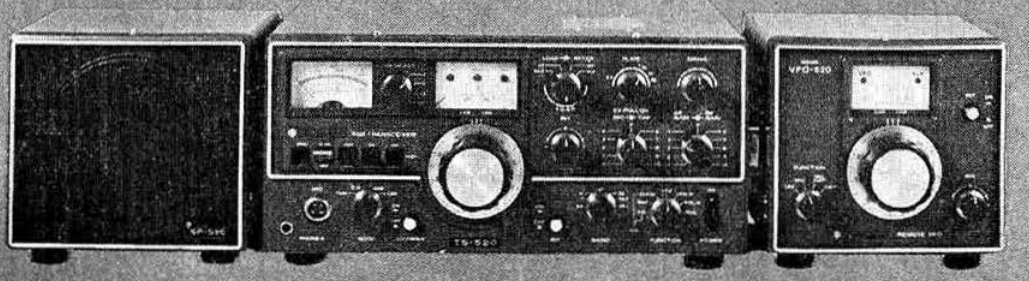
5 Band SSB/CW Transceiver TS520

The Transceiver with everything



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

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

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

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

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

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

Built-in Power Supplies—for fixed station use with 120/240 VAC 50-60Hz line voltage or for mobile operation with 12-13·8 VDC by means of the built-in DC/AC converter.

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

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LOWE ELECTRONICS
119 Cavendish Road
Matlock Derbyshire
Tel: Matlock 2817/2430

TS520 £384 VAT Exc.

TRIO

The 2m First Family

Where quality is a prime requirement

Regardless of where you are: in your QTH, on the road, on vacation, on a hike: you will always find a QSO on the 2m band with TRIO VHF equipment. And no matter on which transmit and receive frequencies other 2m stations are operating, with TRIO equipment you can always join in, because you'll be qrv on all international fixed-frequency channels—either in simplex or via repeaters.

TRIO 2m equipment is designed for versatility and can be combined to provide station systems for mobile or fixed-station use, operating on line voltage, 12 VDC car batteries or conventional dry cells—just as you like. Take a close look at the two transceivers: the TR-2200GX is from a proven line—the TR2200 and the TR-2200G two of the most popular and best-selling 2m rigs on the world market. Like its predecessors, the

2m FM Portable Transceiver TR-2200GX

is a striking example of advanced technology, optimum performance, solid construction and unmatched reliability. In addition it offers plenty of features, 2m radio operators have been asking for:

2 watts RF output power—choice of fixed channel operation or continuous tuning through the entire 2m band by merely adding the External VFO-30G. Plus: 12 RX and TX channels (S20, S22 and R7 factory-equipped with crystals) to be fitted with crystals of your own choice; receiver and transmitter section with improved semi-conductor complement and higher power (TX input now 4 watts, RX input sensitivity now 0·4μV for 20dB S N : N); IF shape factor 2 : 1; improved squelch action; detachable telescopic antenna; built-in 1,750Hz generator, plus many others.

The TR-2200GX can operate on the following power sources; standard 1·5 volt penlight cells, rechargeable NiCad batteries (optional), 12V DC car battery or Power Supply Unit PS-5. Standard accessories: PTT microphone with hanger, carrying bag with shoulder strap, charger for NC batteries, battery holders, etc. A special mobile mount MB-1A is now available for easy and safe installation of the TR-2200GX in your car.

2m FM Mobile Transceiver TR-7200G

The TR7200G is the best selling 2m FM mobile transceiver in Europe. Some of the reasons why this is so may not be obvious from the basic specification. It's not just the high sensitivity (0·3μV 15dB quieting) or the superb finish, it's the full range of accessories and the finest service backup in the country. It's the little details like the LED under the channel number indicator that is RF powered and only lights when you have a receive crystal fitted. The "transmit" lamp gives the same function for the transmit crystals. This means that you no longer have to wonder which channels are operational when you are mobile. Did you know that by removing the rear panel accessory plug you can drop the receiver gain by 10dB to prevent the fellow next to you in the car park at the rally from blowing your head off!

Did you know that the swr protection system is not the "sudden death" variety but gradually reduces the Tx power with increasing SWR so that you are not put completely off the air when your mobile whip antenna gets wet. The same system protects the PA and driver from over voltage damage when the rig is used in a vehicle having a high charge voltage from the alternator.

Only Trio equipment has the unique tuning fork controlled repeater access tone generator to ensure access first time, every time.

All these features and more, can only be provided in equipment made to professional standards by a professional company. The Trio Corporation is the largest electronics manufacturer in Japan offering a range of amateur equipment and you, the customer, benefit every time.

The TR7200G comes to you complete with mobile mounting bracket, stand off feet for fixed station use, microphone, microphone bracket, cable manual and fitted S20, 21, 22, R6 and 7.

Extra channels available for TR7200G at £10 inc VAT for 3 channels, £20 inc. VAT for 6 if ordered at the time of equipment purchase.

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TRIO

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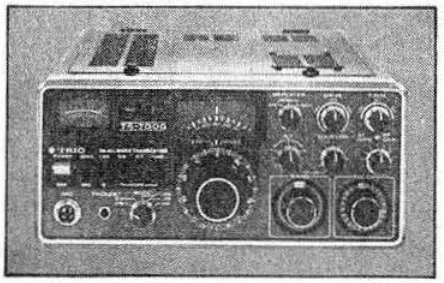
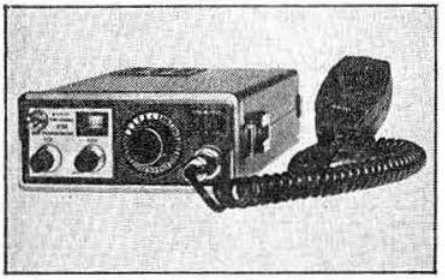


Season's Greetings to All Our Customers and Friends

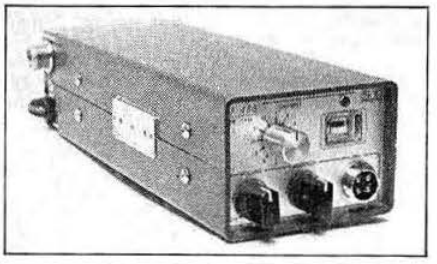
TS700G £398 excl VAT

The standard by which all others are judged. Full 2 metre coverage, VFO or crystal controlled. All modes AM, FM, USB, LSB, and C.W. Mains or battery operation. Normal and reverse repeater facilities. Trio exclusive tuning fork access tone generator. Plus, of course, Trio quality and reliability backed by Lowe Electronics service. If you haven't seen it yet, go to one of our branches and be prepared to be impressed.
15 Watts output. 0·25 microvolt sensitivity. European standard FM selectivity. This rig has all others beaten.



TR3200G £152 excl VAT

The newest FM handy transceiver from the TRIO range. Superb performance for the 70cm. operator, 12 channel capability in the range 432-436MHz with three channels fitted (SU8, SU18, SU20). Transmitter output switched 2W/400mW and incorporating the TRIO exclusive 1750hz tuning fork access tone generator. ⅝-wave detachable antenna for high gain performance on both transmit and receive.
Supplied complete with all accessories as the TR2200G and with the new miniature handy microphone.



KF 430

* SMALL SIZE only 240 × 85 × 60mm.
* LIGHT WEIGHT only 1·2 Kg.
* FREQ. RANGE 433-436MHz.
* POWER O/P. 10W or 3W switched.
* SENSITIVITY 0·4μV for 20dB q'tng.
* AF. B/Width. 500-3000Hz.

These brief details cannot convey the sheer quality of construction of the KF430. The entire receiver front end is housed in its own fully screened enclosure, as is the transmitter output section. Multiple tuned circuits ensure a clean output signal at all power levels. All crystals are fitted with individual trimmers for spot on accuracy. The receiver selectivity is to current UK and European standards and an automatic tone burst is fitted.
The KF430 comes with 9 channels fitted to cover all simplex and repeater channels in current use. A matching microphone and mobile mount are included.

70cm FM

is now on the increase as more and more repeaters are licensed by the Home Office in preference to those on 2 metres.
70cm operation has some advantages when compared to 2 metres, for example, the scattering of the 70cm signal due to many multiple reflections can result in a much more even coverage of built-up locations even in road tunnels where the 2 metre signal vanishes.

Relatively short operating radii mean that there is less likelihood of co-channel interference which occurs on 2 metres. (Cries of "which repeater have I opened, KR or HH ?")

What we all need is a compact 70cm FM rig with good performance that will not take up too much room in the car. We think that the KF430 fits the bill.
See it soon, it's a little smasher.
KF430. THE rig for 70cm FM.

FS1007P on offer at £125

The home station FM transceiver with everything. ★ Mains or 12 volt operation ★ 16 channel scanning ★ channel skipping facility ★ priority channel with front panel crystal sockets ★ manual or auto scan ★ switched high/low power ★ switched wide/narrow deviation ★ S meter ★ RF output meter ★ centre zero tuning meter ★ RF fine tuning control ★ built in SWR bridge ★ built in digital clock with alarm and auto switch on ★ built in loudspeaker ★ 10 watt TX ★ 0·3 microvolt sensitivity ★ superb styling and finish ★

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130–174MHz ⅝w 3dB Gain. DC Grounded, Base Station Ant.
Power Capability 100W.
Termination SO-239.
Complete with mounting brackets for masts up to 1¾" O.D.
Available now.
£14.44 plus 75p carriage

ASP659UK

425–440MHz 5dB Gain Base Station Colinear
Power capability 100W
Termination Female 'N' Type connector.
Complete with mounting brackets for masts up to 1¾" O.D.
Available now, **£15.49** plus 75p carr.

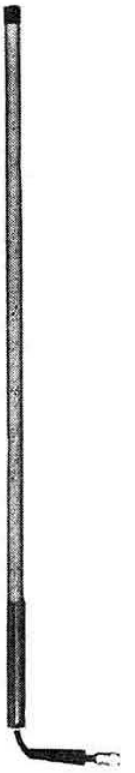
NEW!

HELICALS FOR THE FOLLOWING PORTABLES

Trio TR2200GX	£3.85
Trio TR3200	£3.35
Icom IC-215	£3.85

(p & p for helicals 40p)

FOR AMATEURS WHO DEMAND THE BEST



ASPA680UK ▶

144-148MHz 6dB gain DC Grounded Base Station Colinear.
Power capability 350W,
Length: approx. 12'
Weight: approx. 4lb.
Rated wind velocity: 118 mph.
Termination: Male 'N' Type Connector.
Available now.
£47.25 plus £2.00 carriage.

ASPN701UK ▶

430-440MHz 12dB Gain. DC Grounded Base Station Colinear.
Power Capability 250W,
Length approx. 18'.
Weight approx. 9·5lbs.
Rated wind velocity 128 mph.
Termination Male 'N' Type Connector.
Available now.
£105.00 plus £2.50 carriage.

MOBILE ACCESSORIES

ASP332

Gutter mount suitable for use with ASP629, ASP393 complete with 10' RG-58U cable and PL-259 connector **£8.09** plus 50p post and packing.

K-203

No hole boot mount, suitable for ⅜" hole snap in mount, easily adaptable for other mounts.
£3.70 plus 50p post and packing.

ASPR332

Gutter mount suitable for use with ASP677, ASPE667, easily adaptable for use with other antennas. Complete with 10' RG-58U cable and PL-259 connector.
£8.09 plus 50p post and packing.

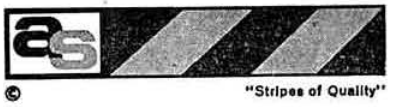
New Magnetic Mount ▶

Shown with ASP629, but also fits ASP393, ASP677 and ASPE667. Complete with 10' RG-58U cable.
£9.19 plus 50p post and packing.

VAT of 12½% to be added to above prices.

Please send SAE for catalogue of complete range.

FOR MOBILE ANTENNAS PLEASE SEE PREVIOUS ISSUES.



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Electronics (UK) Ltd

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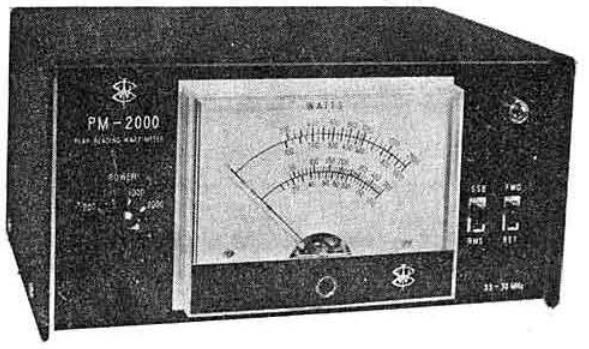


★ Measures accurately

★ Peak envelope power on SSB

★ RMS watts on AM/CW

★ S.W.R.

GONE ARE THE DAYS OF OSCILLOSCOPES, CALCULATIONS OR EMBARRASSMENT WHEN THE HOME OFFICE MAN ASKS WHAT POWER YOU RUN!

INTRODUCTORY PRICE £48.60 (incl. VAT)

The PM-2000 is a precision built in-line wattmeter providing P.E.P. and R.M.S. power indication.

This new design (Pat. applied for) employs a flat frequency response directional coupler which enables forward and reflected power also to be measured from 3·5-30MHz.

With a SSB Transmitter the output power occurs only sporadically during voice transmission and has no direct relationship between the peak and average power. The ratio of peak to average power varies widely with voices of different characteristics.

The power contained in the signal at the maximum peak is the basic transmitter rating and is the peak envelope power (usually called p.e.p.) This makes the peak reading wattmeter essential for SSB.

General power meters indicate average or R.M.S. values and are calibrated using a continuous sine-wave signal which a voice modulated signal definitely is not. Such a power meter is meaningless in terms of "p.e.p."

The PM-2000 indicates accurately the p.e.p. which is four times the single-tone level.

SPECIFICATION:

Power range:	0-200, 500, 1000 and 2kW
Impedance:	50 ohms
Frequency range:	3·5-30MHz
Measuring Accuracy:	7%

Power source (SSB only): 100/117/234VAC

Overseas enquiries invited

YET ANOTHER 'Western' PRODUCT WITH QUALITY UP AND PRICE DOWN

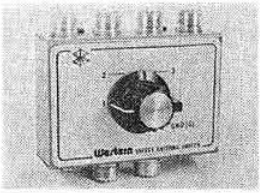
NEW 5-WAY ANTENNA SWITCH MODEL ASW-1

★ **Handles 1·2kW**

★ **Earths antennas not in use**

★ **Fitted Yaesu-style knob**

★ **Mounting holes for wall or equipment, £8.85 (inc. VAT/P & P)**



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NORMAL/REVERSE REPEAT
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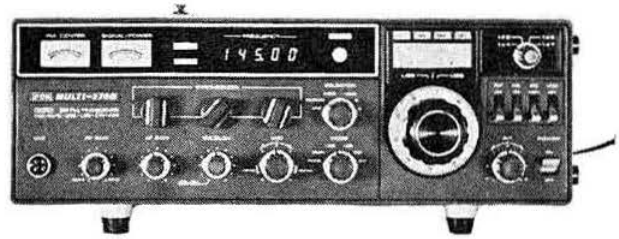

10W/1W OUTPUT
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DIGITAL OR ANALOGUE PLL FOR STABILITY

FEATURES INCLUDE: 12V DC/230V AC psu—dual speed p.1.1 vfo with 1kHz readout—second synthesized vfo with digital readout switchable in 10kHz steps and fitted 5kHz vox—the digital vfo is particularly suitable for mobile/fm working and instant switching between both vfo's is possible—all-mode operation is provided including narrow and wide fm deviation (ideal when multiplying up to 70cms)—AM mode included—repeater shift 600kHz above or below receiver signal is provided plus 2 additional repeater shifts such as 1·6mHz for 70cm operation—both vfo's fitted IRT control—high or low power operation switchable on all modes—provisions for accessory cooling fan to be fitted at future date if higher power PA module introduced—noise blanker, vox, slow/fast agc, separate fm and ssb gain controls—switchable DX speech compressor for ssb and am—Tx tunable 144-146 and Rx 144-148—OSCAR operation possible through the inclusion of a 10 metre up-converter built-in and tuning 29·5MHz (in fact it covers the whole of 10 metres)—a separate 10m antenna socket is fitted enabling true transceive operation through OSCAR 6 and 7—FOR FULL DETAILS SEND SAE.

23 CHANNELS + 4 AUTOSCAN

Multi-II fitted 7 channels
£199.68 (inc. tone-burst) or £40.68 deposit ▶

Multi-UII fitted 7 channels
£229.50 (inc. tone-burst) or £46.50 deposit ▼

FDK for 2 metres Multi-II

Complete with Autoscan for safer driving!

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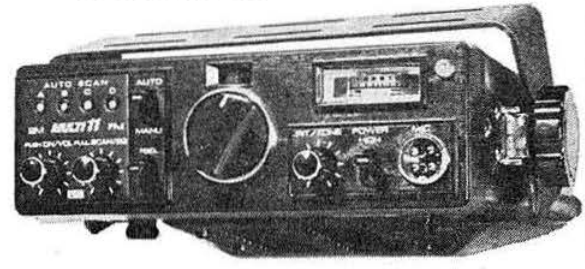

FDK for 70 cms Multi-UII

NOW with 9 channels and 1750MHz tone-burst

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BOTH MODELS FEATURE 10 watts or 1 watt of fm—Narrow or wide deviation—narrow or wide rx filters (switchable)—RIT ± 5kHz—Automatic 4 channel scan (enables you to fit your local calling frequencies and repeater input channels so that any local activity is immediately heard)—Manual override on scan—test tone button—tx netting/monitor switch allows you to hear your transmitted audio and check your frequency—s-meter/centre zero/rf-meter—the channel-number dial is only illuminated when switched to channels fitted with xtals—on air light—p.a. heat-sink for cool operation—automatic p.a. protection—receiver, pre-amp fitted dual gate MOSFET—remote vfo socket—built-in speaker—supplied complete with mobile mounting brackets, DC power cord, microphone and comprehensive. English handbook. Matching AC psu and remote control vfo in stock November.

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AND THE LATEST
SSB/FM/CW/AM
FT-221R
2 METRE TRANSCEIVER

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Sincere Xmas greetings to all

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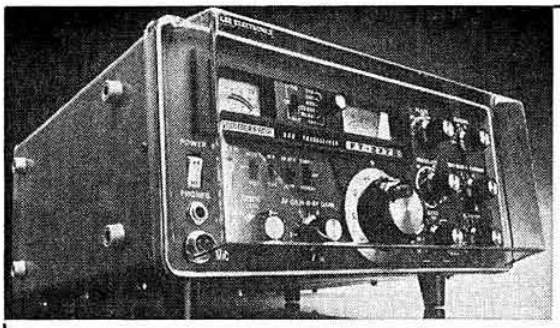

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Perspex Dust Covers designed and manufactured by us to keep your Yaesu equipment in mint condition. Suitable for Models FT101, 101B, FL101, FR101, FT201, FT101E, FL2100, FT277, FT288A, FRG7. etc. Price £4.00 each inc. VAT. Carriage 45p. FT301, FT221, FT220, FT620, £3.00 each inc. VAT. Carriage 45p.

YAESU MUSEN

FT101EX	£365
FT101E	£429
FT101EE	£400
FT221R	£329
FT301S	£320
FP301.P/supply	£70
FP/FT200	£290
FRG7 Rx	£148.50
FT224	£148
YO100	£118.00
FL2100B	£248
YP150	£44
FV101B vfo	£54.50
FTV250	£139
YC355D	£139
FL101	£325
FR101S	£290
FR101D	£387
FR101DD	£480

STANDARD

C146 hand held	£99
C828 10W mobile	£159
C432 70cm h/held	£125
C430 70cm mobile	£160
C830 VHF Marine	£139
CSA Base Charger	£16
Mains Charger	£3.25
Stubby Antenna	£3

NEW MODEL

C8600 12ch. 10W mobile transceiver fitted 144–48, 144·6 and 145MHz £99

ELECTRONIC DEVELOPMENTS

EDT144 Transverter	£100
EDL144 Linear Amp.	£100
EDL432 Linear Amp.	£130

Both above linears are mains powered.

MICROWAVE MODULES

MMC144/28	£16	(20p)
MMC144/4	£16	(20p)
MMC432/28	£17.60	(20p)
MMC432/144	£17.60	(20p)
MMC1296/28	£21.60	(20p)
MMC1296/144	£21.60	(20p
MMV1296 varactor	£24.00	(20p)
MMDO50 F/counter	£61.11	(20p)
MMD500P Pre-scaler	£25	(20p)
MMD500 F/counter	£79.65	(20p)

MICROWAVE MODULES TRANSVERTERS

MMT144/28	£76	(50p)
MMT432/28	£84	(50p)
MMT432/144	£112	(50p)
MMA Pre-Amp.	£10.40	(20p)

F.D.K. 70CM MOBILE

FDK U11, 23 ch. + 4. Auto scan fitted with 8 ch. £200

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PBM10/2	£16.40	(1.50)
PBM14/2	£21.00	(1.50)
5XY2M	£10.30	(1.20)
8XY2M	£12.90	(1.25)
10XY2M	£17.75	(1.75)
Q42M	£10.50	(1.50)
Q62M	£14.00	(1.75)
UGP2M	£5.20	

70CM ANTENNAS

D8/70cm	£11.30	(1.00)
PBM18/70	£13.75	(1.50)
MBM48	£15.20	(1.50)
MBM88	£20.35	(1.75)
12XY/70	£20.90	(1.50)

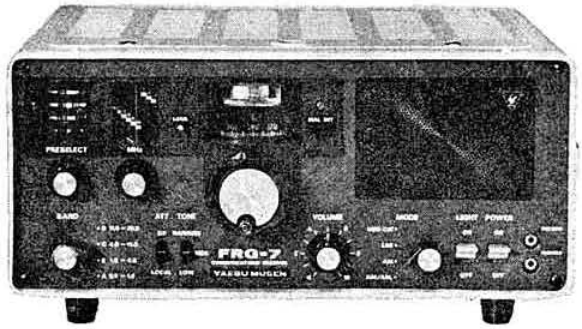
AR40 ROTATORS

FROM STOCK £39 (1.00)

UR43/UR67 and Rotor Cable in stock

FRG-7

£167.00 inc. VAT



NEW MICROWAVE MODULES FROM STOCK:

144/28MHz Transverter at **£76**; 432/144MHz Transverter at **£112**; 500MHz Frequency Counter at **£79.65.**

SPECIAL NOTICE: Will customers kindly note—We will be closed from 5th to 19th January, 1977, inclusive.

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STOP PRESS OFFER. EX-COMPUTER FULLY STABILISED POWER SUPPLIES 6v TO 30v, 5 amp DC, ADJUSTABLE, WITH CURRENT OVERLOAD TRIP. **PRICE £18.00 + VAT.** CARRIAGE £1.95.

PRINTED BELOW IS AN UNSOLICITED TESTIMONIAL FROM A SATISFIED FRG-7 OWNER

TRUE COPY

Lee Electronics Ltd.,
Amateur Communications,
400 Edgware Road,
PADDINGTON, W.2

Flat 68,
496 Lordship Lane,
DULWICH, S.E.22
Sunday, 12th September '76

Dear Mr. Lee,

I would like to thank you once again for the kindness extended to me on Friday last when purchasing the new Yaesu Musen FRG-7 Receiver.

I arrived home safely, opened the packing-box to find packing to a standard certainly not experienced here in England. The receiver I can assure you is first-class in every way, certainly in finish which I have closely inspected. These Yaesu people have certainly produced the most perfectly made pieces of equipment, the word "pride" has played a great part, and obviously the inspecting department calls for the most high-class competition.

I have a very poor antenna, only a long wire fitted in the roof space owing to not being allowed to erect an outside antenna in the property. The result even with this disadvantage is fantastic. The FRG-7 is exactly what Yaesu says it is, and it is a great pity that we, with all the years of experience cannot produce the equivalent, and within a reasonable price range. This model is close to the finish of "Collins" and in the Yaesu Leaflet they state that the design has been used with a great deal of concern for the prevention of "DRIFT" and it is a great pleasure to find honesty still exists in the world if only in Japan, as all the stations (amateur) I have not had to retune once the receiver has warmed. I am so delighted with it, I intend writing to the factory to show my appreciation of something which is first-class in every detail, and at a reasonable cost to those interested in amateur radio.

I was also pleased to transact business with you once again, remembering my previous purchase from you concerning the pick-up and motor which has given great service for the past 3-4 years. The best of good business to you, and with your personality this will increase: as we discussed at some length, the amateur field is and has been calling for someone to "HELP" in its promotion, someone who is prepared to take the trouble to "TALK" not necessarily for that day, but to give confidence to those about to invest in amateur equipment—so like myself —to return to those that do just that.

So Mr. Lee, sell the FRG-7 with every confidence, it is a very fine example of the future of electronics in all its sophisticated state. The best of luck in every way, hope to come and see you again, certainly I shall give your name to everyone I talk amateur radio to; and thank you kindly for accepting my cheque.

Yours very sincerely,
(Signed) HENRY F. HOWARD

NEED WE SAY MORE!!!

NEW PRODUCT

UP-CONVERTER MODEL UC/1

Synthesiser Controlled General Coverage Receiving Adaptor Plus Two-Metre Converter for Receivers Covering 28-29MHz and/or 144-145MHz

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

- Gives complete no-gap coverage from 90kHz to 30MHz, in thirty switched 1MHz bands.
- Also operates as a 2-metre converter with receivers covering 28-30MHz.
- Two separate outputs are provided, one for 144-145MHz and the other for 28-29MHz receivers.
- No receiver modifications are required. Model UC1 simply connects in series with the aerial feeder.
- Overall performance is limited primarily by that of the main receiver.
- Straightforward digital switch selection of the desired 1MHz band segment eliminates critical adjustments such as "tuning for lock".
- Built-in aerial attenuator.
- Frequency synthesiser locked to 1MHz crystal ensures excellent frequency stability.

PERFORMANCE DATA

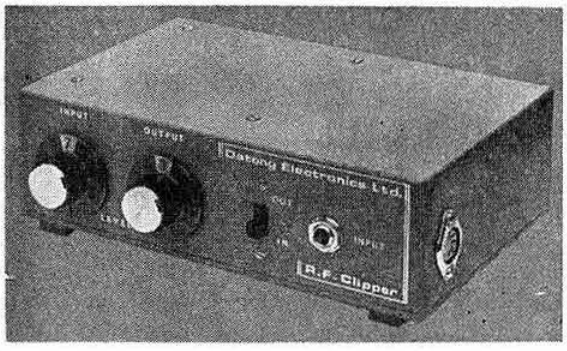
Input frequency range: 90kHz to 30MHz (down to 60kHz at reduced sensitivity) and 144-146MHz.

Sensitivity: Input for 15db (min) signal-plus-noise to noise ratio (CW or SSB in 2·4kHz bandwidth).

0·8–30MHz	0·5μV pd (1μV emf)
0·3–0·8MHz	1μV pd (2μV emf)
90–300kHz	2μV pd (4μV emf)
144–146MHz	0·5μV pd (1μV emf)

Spurious responses: more than 60dbs below main response.
Rejection of 144–146MHz feedthrough: more than 80dbs.
Rejection of 28–30MHz feedthrough: more than 60dbs.
Internally generated spurious signals: harmonics of 1MHz are equivalent to 4μV pd.
Typical overall gains:
29MHz input to 144MHz output 2dbs.
29MHz input to 28MHz output 15dbs.
145MHz input to 29MHz output 15dbs.
Power requirement: 120mA at 8 to 23 volts.

Price £97.50 plus 12½% VAT, total £109.69 (including delivery in UK)



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Still unmatched after two highly successful years, the "Datong r.f. Clipper" is used the world over by serious DXers and professionals.

★ Comparable to a linear the Datong r.f. clipper introduces negligible distortion while raising your average radiated power. ★ Gives true *r.f.* clipping. Simply connects in series with microphone. ★ Works with virtually any make of transmitter. ★ Equally effective for FM and AM as well as SSB.

Model RFC (illustrated). Price: **£38.88** plus VAT (12½%).

Also available with Jap 4 pin input connector and complete with matching output lead, inclusive price **£41.90** plus VAT (12½%). Please state pin connections required.

Fully aligned and tested P.C. Module, RFC/M. Price: **£19.50** plus VAT (12½%).

FOR DETAILED INDEPENDENT TEST REPORTS OF MODEL FL1, PLEASE SEE RADCOM JUNE 1976 AND SHORT WAVE MAG. JULY 1976.

Free data sheets on any product are available on request. Prices include delivery in U.K. only.

FREQUENCY AGILE AUDIO FILTER MODEL FL1

Fast becoming a classic, Model FL1 delights and amazes all who hear it in action. This unique product improves any receiver and is installed simply by connecting in series with the receiver's loudspeaker. It offers the following advanced features:

★ A notch filter which *tunes itself* for fully automatic removal of unwanted whistles in phone reception. With Model FL1 in circuit you can ignore tune-up whistles.

★ Fully variable bandwidth tailoring for enahncing phone reception in the presence of interference and sideband splatter.

★ Band pass filtering with fully variable centre frequency and bandwidth (1,000Hz to 25Hz) plus a.f.c., for the kind of CW reception which you would not have believed possible.

Supplied with connectors and full instructions. Ready-made connecting leads also available. Price: **£47.50** plus VAT (12½%).

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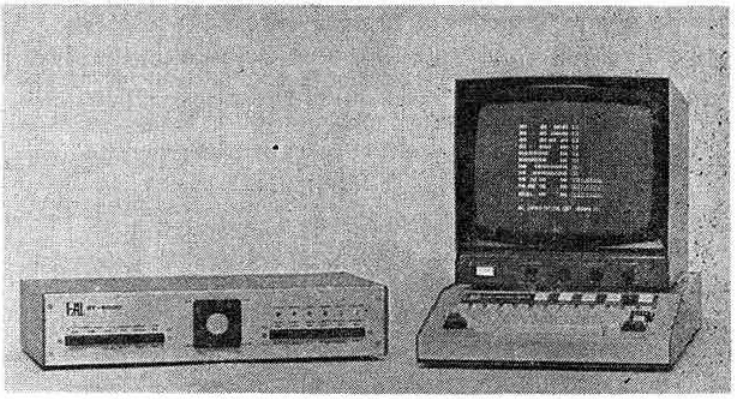
RTTY AND MICROPROCESSOR EQUIPMENT



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ELECTRONIC TTY SYSTEM	ST-6	RTTY demodulator	237.60
	425Hz	Discriminator	31.00
	XTK-100	Crystal tone keyer	58.32
	ST-6	Kit	144.72
	425	Shift kit	28.80
	XTK-100	High tones or low tones kit	54.00
	ST-6	Table-top cabinet	35.00
	RVD-1005	Visual display unit	280.80
	DKB-2010	Dual mode keyboard	280.80
	DKB-2010	Dual mode keyboard with 128 key buffer memory	345.60
		128 key buffer memory	64.80
		64 key buffer memory	38.88
	DS-3000	KSR version 1 · X Baudot	972.00
	DS-3000	KSR version 2 · X ASCII/Baudot	1,134.00
	DS-3000	RO version 2 · X ASCII/Baudot	837.00
	DS-4000	KSR version 1 · X ASCII	972.00
	DS-4000	RO version 1 · X ASCII	756.00
		All DS-3000 and DS-4000 units come with 11" monitor.	
	ST-6000	Demodulator/keyer with scope	459.00
	ST-6000	Demodulator/keyer with meter	378.00
MCEM-8080 MICROCOMPUTER SYSTEM	MCEM-8080	Single board Microcomputer	280.80
		Extra 1 K 8102A-4 RAM on board	27.00
		Monitor in 8708 EPROM in place of 3624 PROM	27.00
		Extra 8708 EPROM	54.00
	MCEM-PS	Power supply	43.20
	MCEM-KB/VDU	Keyboard/video display unit	237.60
	MCEM-7K RAM -4K	Static RAM board with 4K RAM	199.80
	MCEM-7K RAM -7K	Static RAM board with 7K RAM	270.00
	MCEM-PROM PROG	PROM programmer for above boards	27.00

NOTE: Microcomputer integrated circuit prices apply only to users of the HAL MCEM-8080 Microcomputer. Orders for integrated circuits only cannot be accepted.

PRICES INCLUDE VAT

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THE MICROWAVE MODULES TRIO!

The MMT144/28 pictured below is representative of our current range of professional quality all mode solid state linear Transverters which now comprises-:

MMT144/28 — 28MHz to 144MHz all mode solid state linear Transverter
RX — Gain: 30dB Noise Figure: 2·5dB
TX — Required input: ½ watt. Power output: 10 watts continuous
PRICE — £85.50 inc. VAT

MMT432/28 — 28MHz to 432MHz all mode solid state linear Transverter
RX — Gain: 30dB Noise Figure: 3·0dB
TX — Required input: ½ watt. Power output: 10 watts continuous
PRICE — £94.50 inc. VAT

MMT432/144 — 144MHz to 432MHz all mode DOUBLE CONVERSION solid state linear Transverter
RX — Gain: 10dB Noise Figure: 3·0dB
— Separate receive converter output gives independent second receiver facility
TX — Required input: 10 watts (Suitable 10 watt termination network supplied)
— Automatic RF VOX minimises the interconnection between the transceiver
— Power output: 10 watts continuous
PRICE — £126 inc. VAT

All three models are designed around latest state of the art devices, and high stability construction techniques are the main theme throughout.
A spurii rejection of better than —65dB is achieved on all models by high-Q circuitry and the incorporation of ultra-linear amplifier stages ensures the best possible "ON THE AIR" sound.

FEATURES

★ Highly stable zener-controlled oscillator stages

★ Latest state of the art front end RF amplifier transistors ensure consistently low noise figures

★ PIN diode aerial changeover relay has a through loss of less than 0·2dB

★ High quality double sided glass-fibre printed circuit board is incorporated for RF stability

★ Separate internal PA compartment ensures excellent electrical and thermal stability

★ Low distortion balanced transmit mixers achieve a high degree of linearity and spurious rejection

★ By virtue of their linear mode of operation our transverters will accept SSB, FM, AM or CW modes

For further data on these and our converters, frequency counters etc., please do not hesitate in contacting our sales department at your earliest convenience. If you need any technical advice just a phone call will put you in touch with our technical staff.

Guarantee? All of our products are fully guaranteed for 12 months.

MICROWAVE MODULES LIMITED

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TEL.: 051-523 4011

Electronic Developments — new location

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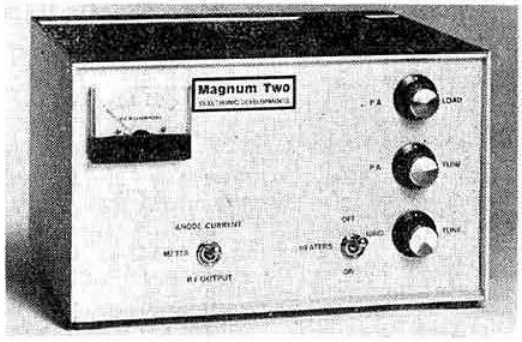
THE MAGNUM TRANSVERTER EDT 144/28: EDT 70/28: EDT 50/28



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The national society representing all UK radio amateurs

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Applications for membership should be made to the general manager, from whom full details of Society services may also be obtained.

GENERAL MANAGER AND SECRETARY
G. R. Jessop, CEng, MIERE, G6JP

EDITOR
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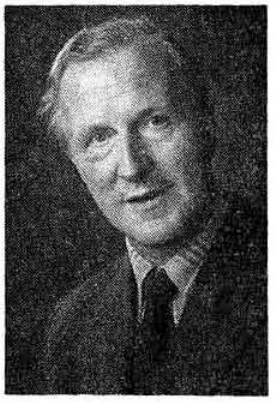
A seasonal message from the President



The past 12 months, during which I have had the privilege of being President of our Society, have been difficult but very exciting. One of the biggest decisions which the Society has ever had to take—the acquisition of the data processor—was made in the early part of the year. Thanks to a great deal of hard work and application by members of headquarters staff it is now coming into full use and its capabilities are being recognized as even more extensive than originally envisaged.

In the field of publications the new edition of the *VHF/UHF Manual* has been published and acclaimed, and Volume 1 of the 5th edition of the *Radio Communication Handbook* has at last become available and is now on sale.

The Society has re-established the custom of holding an annual exhibition. Hopefully this will continue to provide a venue where members will be able to meet each other and Society officers.

During my period in office I have represented the Society at international gatherings in the USA, Germany, Japan and the Netherlands, and I have been greatly impressed by the goodwill which exists towards the RSGB all over the world. The amateur radio service is an international service and my experience is that never have the world's radio amateurs spoken with a more united voice or better understood each other's views. With WARC 1979 less than three years ahead this is vital.

Much improvement in the effectiveness of headquarters has been seen during the year, and I should like to place on record my sincere thanks to the members of the staff, in all departments, who have done so much with such willingness during 1976. My thanks are also due to all those Society members who have given their services in any way—they *are* the Society and without them we would not exist.

In conclusion I should like to wish all members and their families a very happy Christmas and a very successful new year.

John Allaway, G3FKM

CURRENT COMMENT

New comprehensive licences

Members will recall that in the July 1976 issue of *Radio Communication*, and over GB2RS, the RSGB announced that the Home Office was to introduce new comprehensive amateur licences early in 1977. Since that time there have been exchanges of correspondence between the Society and the Home Office, and several meetings at which, among other items, the matter was discussed. The Society is now pleased to be able to give details of the licences, reasons for the changes, and the manner in which they will be introduced.

From 1 January 1977 the Home Office will issue to *new applicants* an "Amateur Licence A" or "Amateur Licence B", for which the qualifications are the same as for existing "Sound" A or B licences. Also from 1 January 1977 *existing holders* of "Sound" A or B will have their licences replaced (by the new A or B) as soon as possible after the renewal fee for the licence has been received. Therefore, although licensees will not necessarily receive their replacement licence until later in 1977, they will be permitted to use the facilities set out in the new licence and shown below from the date of implementation, 1 January 1977.

An amateur television licence holder who does not hold an A or B licence will have his licence replaced by a new B licence. Holders of mobile licences E and F, ie those who have no main station licence, will be issued with the new A or B as appropriate. All this means that licensees will hold either the new A or the new B. (Maritime mobile is a separate matter.)

As will be explained in a covering letter that will accompany replacement licences, the purpose of the exercise is two-fold. Firstly, to enable amateurs to pursue each aspect of amateur radio without having to apply each time a new facility is required, and to discard several anomalies which, for legal and other reasons, have been unavoidable without re-writing licences. Secondly, to enable the Home Office to cope with the increase in licensing and regulatory work over the next few years with the minimum of delay while keeping within the government's staff and financial ceiling.

The issue and renewal fee for the new A and B will be £5.50; but the Home Office has stated that it cannot rule out an increase later if the inflationary trend continues.

The new A and B licences include the following facilities in addition to main station telephony (and telegraphy for A licences):

(i) Operation in any vehicle or vessel but not on the sea or within any dock or harbour;
(ii) Operation as a pedestrian;
(iii) Facsimile;
(iv) Radio teleprinter;
(v) Television;
(vi) Slow scan television;
(vii) Data (on 144MHz and up);
(viii) Double sideband, suppressed carrier;
(ix) Inclusion of County Planning Officer in respect of Raynet.

Clauses in respect of log-keeping have been re-written, but except for showing separately the conditions for mobile/pedestrian and fixed station operation the provisions are similar to those now in force. And the frequency *bands* used (not specific frequencies) are to be logged.

Callsign procedure is slightly amended; /T is abandoned; and in the Bailiwick of Guernsey the prefix GU must be used, with GJ for Jersey. Two new clauses have been included and they are reproduced below:

2(a) The station shall not be established in an aircraft or a public transport vehicle.
9(5) When sending high definition television signals the callsign sent for identification purposes must be adjusted to the centre of the video channel.

And the clause about spark transmissions has been omitted, the Home Office feels that everyone now knows the score on this; Class B emissions are prohibited by the Radio Regulations. From the Notes, the paragraph prohibiting connection of the public electricity mains to an aerial has been omitted because it is obvious.

Changes which affect new applicants have also been made to the pamphlet *How to become a Radio Amateur*. A simplified application form is included which, apart from requesting evidence of nationality and an examination pass in the C & G examination and the Post Office Morse Test (if appropriate), now carries a paragraph in which the applicant has to sign the following declaration:

"I undertake to maintain at the station, frequency-checking equipment of sufficient accuracy to ensure that transmissions are within frequency bands allocated for amateur use, and equipment to enable me to confirm that harmonic and spurious emissions are suppressed. I understand that out-of-band working, whether intentional or not, will be regarded as a serious misdemeanour and could result in the withdrawal of the licence."

The Home Office does not require details of the amateur bands to be used and therefore omits reference in the form to crystal or vfo control. Neither does it want to know the registration number of the vehicle if mobile operation is envisaged, or the type of test equipment to be used at the station.

The revision of licences will also apply to alien licences, and fixed and mobile operation will be combined in the new C and D licences for A and B style qualifications for both six-monthly and renewable licences.

The Home Office has asked us to state that the replacement of over 22,500 licences is a mammoth task to be undertaken while maintaining new issues, and it will be helpful if renewals are paid promptly—in future there will only be one reminder. □

Educational visits scheme

At a recent meeting of the RSGB Education Committee some attention was given to the progress of the Educational Visits Scheme.

If your club/area has not sent a report recently please write and give us your latest news. This will enable us to evaluate the success of the scheme so far and let you have a report of its first year of operation. Remember you can join in the scheme either as a club or an individual at any time.

Reports and enquiries to: R. Wallwork, G3JNK, 7 Beacon Heights, Newark, Notts NG24 2JS.

QTC
amateur radio news

Christmas holidays
RSGB headquarters will be closed from 24 December until 3 January.

Region 7 election
The result of the ballot for a new representative for Region 7 was:

J. Korndorffer, G2DMR	21 votes
N. A. Smith, G3HFO	28 votes
M. Hearsey, G8ATK	3 votes

The appointment of Mr N. A. Smith as Region 7 representative was approved by Council on 9 November.

Membership cards
This month RSGB will be issuing temporary membership cards to UK members. These will automatically be replaced by an annual card after subscriptions are next renewed.

Overseas subscription rates
Resulting from the increase in overseas postage, overseas subscription rates are being raised by 50p from 1 January 1977 to £8 with surface delivery of *Radio Communication*. Air mail rates will also be increased by 50p. Subscription reminders for overseas members will in future state the new subscription rate.

"Radio Communication" distribution and changes of address
Following completion of the transfer of membership records to the data processor, *Radio Communication* is now being mailed in polythene wrappers to all members, with the exception of copies for air mail and British Forces subscribers which in future will be despatched in envelopes from RSGB headquarters.

The time required to effect changes of address has now been considerably shortened. However, members should note that the address labels for despatching *Radio Communication* are printed during the week before each publication date, so that any changes received after that cannot usually be actioned in time for mailing the next issue.

Changes of address can only be accepted in writing and should ideally consist of the latest address label received together with the new address. Alternatively, the following information should be supplied: callsign or RS number as shown on the address label, name and old address, and new address and post code.

Book orders
An order form for RSGB books and other items is printed in this issue, and members are asked to assist RSGB headquarters by using it when placing orders. This will help considerably over the Christmas period when orders reach their peak. It is essential that the member's callsign or RS number is shown clearly on the form, and that only the latest published RSGB price list is consulted when ordering.

1977 Presidential Installation

The installation of Lord Wallace of Coslany as 43rd President of the Radio Society of Great Britain will take place on

Saturday 22 January 1977
7 for 7.30pm

in the

Members' Dining Room,
House of Commons,
London S.W.1

Admission will be by ticket only. Tickets will be limited to two per member, and the total number available will also be limited.

Single ticket.....£2.50 **Two tickets.....£4**

Dress: informal (men, lounge suits)

Applications for tickets should be addressed to: The General Manager, RSGB, 35 Doughty Street, London WC1N 2AE.

Reception at the RAC
The last two RSGB presidential installations have been held at Cardiff and Birmingham respectively, and a number of the representatives of the Home Office and other organizations based in London who normally attend these occasions have been unable to be present. Accordingly the President, Dr John Allaway, G3FKM, held an informal reception at the Royal Automobile Club in Pall Mall, London, on 19 October to which representatives of the Home Office, the Cabinet Office, the Appleton Laboratory, the IBA and BBC were invited. Lord Wallace, President-elect, and members of the Telecommunications Liaison Committee and the IARU Working Group were also present.

Certificates
The RSGB Council has recently approved the extension of the *British Commonwealth Radio Transmission Award*, the *British Commonwealth Radio Reception Award* and the *DX Listeners' Century Award* to allow endorsements for five-band operation.

A revised edition of the Society's *HF Certificates and Awards* leaflet is now available together with a new countries list designed to facilitate claims for five-band awards. This list can be used to claim single-band awards and later returned with a five-band claim. All claims must be accompanied by proof of membership (eg a *Radio Communication* address label) or the appropriate remittance. Copies of the awards leaflet and the countries list may be obtained from the Society's hf awards manager by sending a large sae to G5GH, Westbury End, Finmere, Buckingham, Bucks.

Lecture at the IEE
A very successful lecture evening was held at the IEE on 19 October when C. Grant Dixon, G8CGK, and Michael Bues, G8AAI, spoke on image transmission. The former dealt with slow-scan and the latter with high-definition systems. More than 100 members were present to hear the lectures and to see the demonstrations of the many pieces of equipment brought by the speakers. The Society would like to record its thanks to G8CGK and G8AAI.

UHF repeaters
This is a final reminder that all applications for repeaters under Phase 2 of the uhf plan must reach RSGB headquarters by 7 December 1976. ▶

The editorial staff extend their best wishes to readers and contributors for a joyful Christmas and a happy New Year

Ray Hills, G3HRH

Mr R. C. Hills, BSc(Eng), CEng, FIEE, FIERE, has recently been elected vice-president of the Institution of Electronic and Radio Engineers. In offering its congratulations the Society would like also to express its appreciation of the help given by G3HRH in the establishment of a number of beacon stations. As the chief engineer (transmitters) of the Independent Broadcasting Authority, Mr Hills has been able to assist with the siting and facilities for beacon stations.

Radio Amateurs Examination, May 1977

RSGB headquarters will again be arranging an examination centre at University College, London, for candidates wishing to sit this examination.

All applications to sit the examination at this centre must reach RSGB headquarters by 25 February 1977. The examination will be held on 19 May from 6.30 to 9.30pm.

Louth RAE course

An RAE course is taking place at Cordeaux High School, Louth, under the auspices of the Cordeaux Evening Centre. Further enrolments are acceptable and the fee is 35p per evening. Further details are available from Mr White at the above school.

Facts and figures

The Home Office advises that the following numbers of amateur licences were in force at 31 October 1976:

Class A	16,007	Class B/M	2,514
Class B	6,209	Class F/M	23
Class A/M	4,221	Television	316

The callsign record received from the Home Office dated 15 October 1976 gives the latest callsigns issued in the G4 and G8 series as G4FKU and G8MGJ respectively.

432MHz interference

A French manufacturer is selling and installing equipment known as "Syeldis". This is a radio-navigation system intended for use on trawlers. Centred on 438·05MHz, the system has a bandwidth of ±2·5MHz, the mode is fm and the power 100W. Syeldis uses three beacons and the interference created extends over a considerable distance. Areas of use at present are the Channel, Denmark and Canada. Any reports of interference from this system should be sent to G3PSM, QTHR, the IARUMS Region 1 co-ordinator.

"Radio Communication" publication dates, 1977

The following table gives the dates of the first Thursdays of months in 1977 on which publication of *Radio Communication* is scheduled. Copies are scheduled to be posted to members on the day before these dates, excepting January and September issues when it will be the same day due to the preceding Bank Holiday.

6 January	5 May	1 September
3 February	2 June	6 October
3 March	7 July	3 November
7 April	4 August	1 December

IARU meets in Geneva

Representatives of the three regional IARU organizations met in Geneva during September to take part in a conference convened by IARU President Noel Eaton, VE3CJ. Extensive discussions were held concerning the preparations for WARC 79. Of particular importance was the means of ensuring adequate representation for the amateur service in countries where there is no IARU member society. A model position paper was developed to assist the smaller societies in negotiations with their administrations concerning WARC 79. Copies of this paper will shortly be available to societies throughout the world.

The regional representatives: Michael Owen, VK3KI; Vic Clark, W4KFC, and Roy Stevens, G2BVN, also met the president and officers of the French national society (REF), attended a meeting of the International Amateur Radio Club and a reception at the ITU for those attending the frequency management seminar arranged by the International Frequency Registration Board, one of the internal organizations of the ITU. This latter occasion afforded an opportunity to present amateur radio to many delegates coming from Africa and Asia.

Old-timers' international event

The three-day event organized by the British RAOTA and the Dutch OTC held in October was successful for the second year. Almost 100 stations took part and many old friendships were renewed. The average age of the operators was over 70. Many stations were licensed in the 'twenties but the record was held by G2DX, who was first licensed in 1912 as TXK, and with 64 years of amateur radio experience, he has literally seen and heard it all. G2DX, as President of RAOTA, called the Dutch OTC President, PA0NP, for the closing QSO.

The third event is planned for 3-5 October 1977.

Particulars of RAOTA may be obtained from Miss May Gadsden, 79a New River Crescent, London N13 5RQ. Membership will be of interest to all UK amateurs with licences issued before 1951—especially those who have retired.

Round Table net

Three licensed members of Widnes Round Table, (G3MAZ, G3PPN and G4EJA) are trying to bring together any other Round Tablers who are also radio amateurs. As a first step, G4EJA will call CQ RTBI on 3·700MHz (± QRM) at 7pm on Friday 7 January and again at 9am on Saturday 8 January. Any tablers, past or present, are welcome to join either or both nets.

Anyone who cannot make the dates given is invited to write requesting a sked to G4EJA or G3PPN (QTHR).

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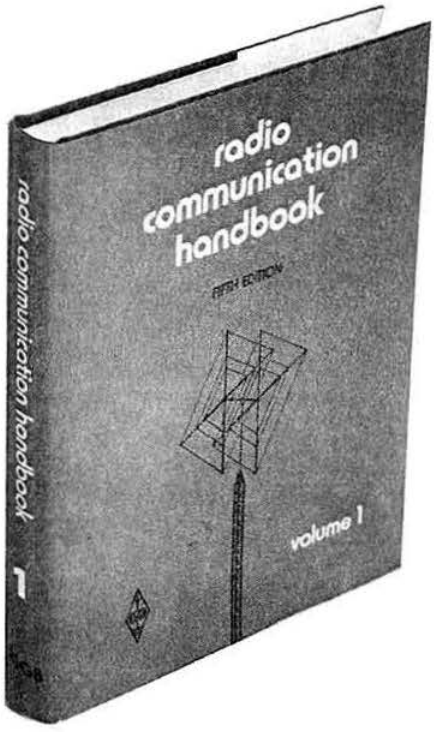

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Chapter titles in this volume are: *Principles; Electronic tubes and valves; Semiconductors; HF receivers; VHF and uhf receivers; HF transmitters; VHF and uhf transmitters; Keying and break-in; Modulation systems,* and *RTTY.*

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VHF/UHF MANUAL

by D. S. Evans, PhD, AIM, G3RPE, and G. R. Jessop, CEng, MIERE, G6JP

Since 1969 the RSGB *VHF/UHF Manual* has been a best seller around the world as the standard textbook on techniques and equipment for amateur radio transmission and reception at frequencies over 30MHz.

Packed with ideas, information and constructional details of tried and tested equipment, each specialist topic contributed by an acknowledged expert in the field.

Chapters on receivers, transmitters, space communications, filters, aerials, microwaves and much more. Simple amateur television is covered and a data section provides valuable facts and figures to help the constructor. Many of the designs make use of integrated circuits, and the microwave chapter gives details of equipment for use up to 24GHz.

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RSGB AMATEUR RADIO CALL BOOK 1977

This latest edition incorporates new callsigns and amendments notified by the Home Office between August 1975, when the previous edition closed for press, and August 1976, together with corrections notified by licence holders.

It also includes valuable operating data such as band plans, beacons, special callsigns including repeaters, QSL Bureau, amateur radio prefixes, ITU zone list and beam headings. Lists of societies affiliated to the RSGB and of RSGB groups also form part of this popular annual without which no amateur station is properly equipped.

176 pages **£2.10 inc p & p**

These and all other publications listed on the inside back cover may be obtained from

RSGB Publications (Sales), 35 Doughty Street, London WC1N 2AE

(Please use the order form printed on page 951)

Some experiments with high-frequency ladder crystal filters

by J. A. HARDCASTLE, G3JIR*

Part 1. Construction

Introduction

Although electrical networks textbooks have long acknowledged the existence of this type of filter, almost nothing has been written about them in amateur radio journals. It is hoped that this article will rectify the situation and will show how simply an effective filter may be produced using only a handful of crystals and capacitors. The crystals used are of identical frequency, while the capacitors are silvered mica two per cent tolerance and preset trimmer types. An experimental approach has been adopted throughout and full details of test procedures and the results obtained are given.

Half-lattice filters

Early attempts by the author to make high frequency crystal filters using 8·3MHz 10X and FT243 type surplus crystals in the familiar half-lattice, four-crystal configuration (Fig 1), produced such poor results that they never progressed beyond the breadboard test stage. They suffered from too narrow a bandwidth (2kHz), poor stop-band discrimination (40dB) and numerous spurious responses immediately adjacent to the hf cut-off frequency. It was considered that while they would be suitable for an ssb upper-sideband filter for a transmitter, they would be unusable in a receiver.

Ladder filters

Ladder-type filters, however, are not so vulnerable to the effects of the additional series resonances present in the crystals. This is because of the unlikelihood of these resonances occurring at identical frequencies in all crystals, so the resonances of one section are attenuated by all the other sections.

Armed with this knowledge, the author sought a cheap source of suitable crystals. Happily HC6U crystals were

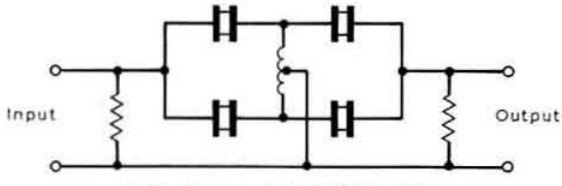


Fig 1. Four-crystal half-lattice filter

*82 Acacia Avenue, Huyton, Liverpool L36 5TP.

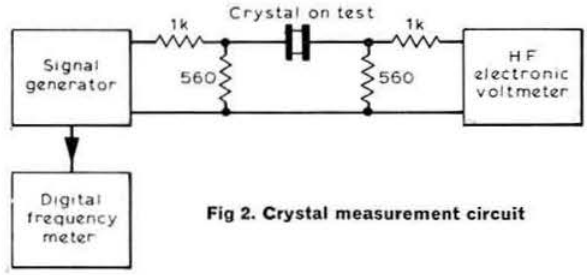


Fig 2. Crystal measurement circuit

being advertised in *Radio Communication* at an attractive price and the advertiser readily agreed to supply a batch of his choice of frequency, between 9 and 10MHz.

Crystal measurements

The width of the passband of any crystal filter is dependent on the spacing of the series resonant frequency and the parallel resonant frequency of the crystal. The test circuit shown in Fig 2 was made so that these frequencies could be checked, and comprises a signal generator, a digital frequency meter and a sensitive hf electronic voltmeter. A typical test measurement made with this equipment is shown in Fig 3(a). In order to demonstrate the presence of numerous series and parallel resonances the response has been drawn out in full, but it is generally sufficient to check only the first pair of these frequencies. Table 1 summarizes measurements made on a number of different types of crystal and it is immediately apparent that the plated type of crystal is capable of a much wider bandwidth than the older type of clamped mounting. Clearly the 9·6MHz HC6U crystals will readily achieve the 2·4kHz bandwidth required for an ssb filter.

First steps

Before attempting to produce a high-performance, multiple-section ladder filter it was decided to add two shunt capacitors to the test circuit of Fig 2, transforming it into a simple bandpass filter (Fig 4).

Using various values of capacitance for C1 and C2, the frequency responses were measured so that some idea could be obtained of the size of the components which would be required in a full-sized filter. The result of one of these tests is shown in Fig 3(b) where C1 and C2 were each of 150pF.

An intermediate stage

Expanding the simple filter of Fig 4 to three sections proved to be an easy operation. When three identical filter sections (Fig 5(a)) are combined, the resulting circuit becomes that

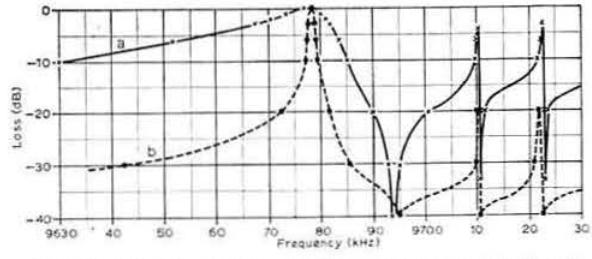


Fig 3.(a) Crystal parallel and series resonances. (b) Simple bandpass filter

Table 1. Crystal measurements

Nominal frequency f_o (kHz)	Case Reference	Mounting	Series resonant frequency f_s (kHz)	Parallel resonant frequency f_p (kHz)	$f_p - f_s$ (kHz)	$\frac{f_p - f_s}{f_o}$ %
8,300	FT243	Compression	8,310·99	8,312·45	1·46	0·018
8,300	CR1AR	Compression	8,306·09	8,308·2	2·11	0·025
8,300	10X	Compression	8,309·7	8,312·52	2·82	0·034
8,325	10XJ	Plated	8,324·05	8,328·86	4·81	0·057
3,250	HC6U	Plated	3,250·8	3,254·7	3·9	0·12
40,500 (13,500)	HC6U	Plated (overtone)	13,507·6	13,524·1	16·5	0·12
9,681·2	HC6U	Plated	9,672·55	9,687·95	15·4	0·16

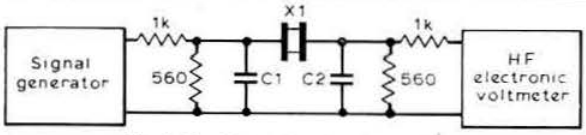


Fig 4. Single-section bandpass filter

of Fig 5(b). Note how connecting similar stages in tandem results in the end-section capacitor being half the value of the others.

A quick scan over the frequency band showed that the circuit was behaving like a bandpass filter, with a sharp cut-off on each side of the pass-band. However, the shape of the passband left a great deal to be desired and the test set-up was insufficiently sensitive to enable adequate stop-band measurements to be made.

In order to solve the sensitivity problem a simple superhet receiver, shown in broad outline in Fig 6, was constructed; this will be described in detail in Part 2. All the tests described subsequently were made using this test set.

The shape of the passband was improved by providing the correct source and load impedance in the form of preset variable resistors, as shown in Fig 7. The frequency characteristics of these two filters (Fig 8) show how careful adjustment of R1 and R2 has resulted in a passband ripple of less than 1·5dB. R1 is a shunt resistor to reduce the output impedance of the buffer amplifier and R2 is a series resistor to increase the input impedance of the rf amplifier. When the filter is used in a circuit of the correct impedance, R1 and R2 will no longer be required, but for the purpose of these tests they enabled a variety of filters to be tested quickly, without the necessity of continually modifying the test equipment.

Note the fringe of spurious responses which were found above 9,710kHz. More than six of these extremely sharp responses were found—they are only about 100Hz wide—and reference back to Fig 3(a) shows how they correspond with two of those shown there. However, as mentioned previously, they have been greatly attenuated by the other two stages.

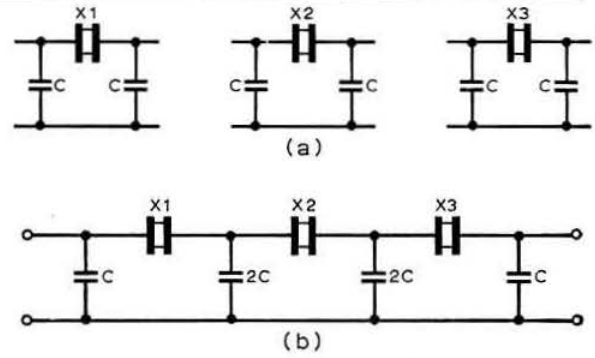


Fig 5. Addition of three single-filter sections to produce a three-section filter

Bandwidth

It was found that the bandwidth of the three-section filter could be controlled by selection of the size of the shunt capacitors. By increasing their capacity the bandwidth could be reduced, but this also reduces the filter's impedance and so necessitates the readjustment of R1 and R2. Figs 7(b) and 8(b) show the result of a 50 per cent increase in capacity, which reduced the 3dB bandwidth from 3,500Hz to 2,600Hz. It was impossible to achieve a completely satisfactory passband ripple by adjusting R1 and R2 alone, but when C4 was reduced to 50pF a ripple of 1dB was obtained. Note also how the stop-bands have been affected by the change, the lf being improved and the hf degraded.

At this point it was considered that sufficient experience of the behaviour of simple filters had been acquired and that an attempt to produce a full-sized filter should be made.

Six-section filter

Adding three more crystals produced the filter of Fig 9, the values used for the capacitors being derived from the three-section filter described previously. As expected from previous measurements, stop-bands of greater than 70dB

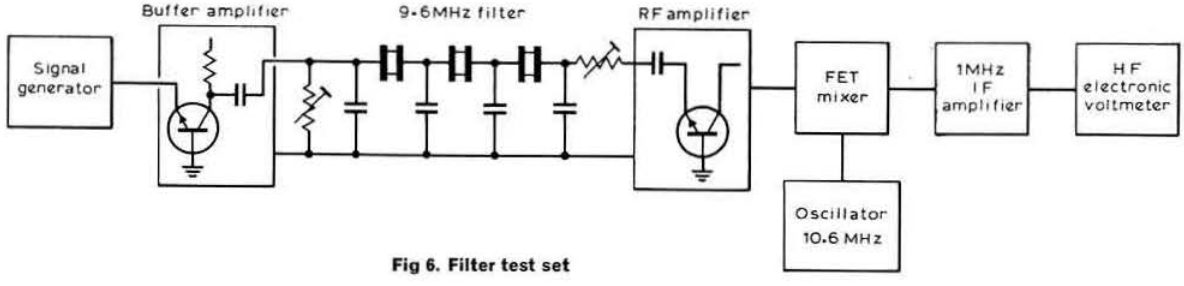


Fig 6. Filter test set

C

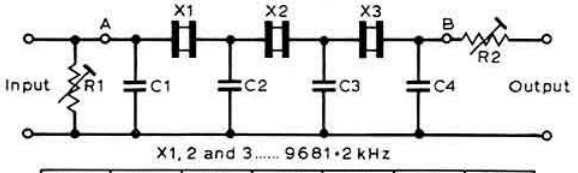


Fig	R1	C1	C2	C3	C4	R2
7a	3 kΩ	50 pF	100 pF	100 pF	50 pF	330 Ω
7b	1·8 kΩ	75 pF	150 pF	150 pF	50 pF	200 Ω

Fig 7. Three-section filters

were easily produced and the region requiring most effort was again the passband. Besides adjusting R1 and R2 it was also found necessary to adjust C1 and C7. In fact C7 was eventually removed altogether, stray capacitance alone being sufficient in this position. As a final contribution to a flat pass-band, C2 and C6 were also slightly reduced and the resulting ripple in the response is 1dB.

The bandwidth at −3dB is 2,757Hz, at −6dB 2,923Hz and at −60dB 6,698Hz, giving a 60:6dB shape factor of 2·29:1. The insertion loss, measured between points A and B in Fig 9, is 3dB. Fig 10 shows the full frequency response.

Filters with the same capacitor values, using five and seven crystals, were also checked. The characteristics of these filters have not been given here, but the five-crystal filter had a shape factor of 2·93:1 and the seven-crystal filter a shape factor of 1·89:1. In both cases the 6dB bandwidth was almost identical with the six-crystal filter. The response, at −60dB only, is plotted in Fig 10 for ease of comparison.

Conclusion

These experiments with high-frequency ladder filters have led the author to conclude that they have several advantages over lattice-type filters, particularly for the amateur. They may be summarized as follows:

(1) All crystals are of the same frequency and no matching, grinding or etching is required.

(2) Spurious responses are not so detrimental to the overall performance of the filter and, for filters having more than four sections, may be virtually undetectable.

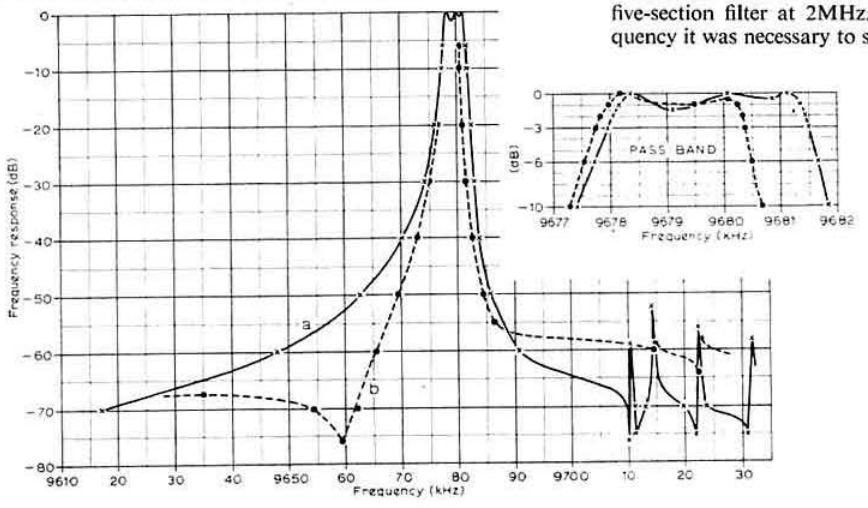


Fig 8. Three-section crystal ladder filters

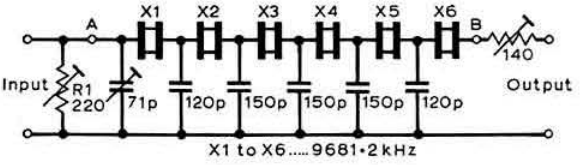


Fig 9. Six-section crystal ladder filter

(3) Filters may be constructed using an odd or even number of crystals; this is a very useful attribute when one is dependent on surplus sources for the supply of crystals.

(4) The only other components required are two per cent tolerance silvered mica capacitors and preset trimmers, which are readily available.

(5) Due to the very low equivalent series resistance of modern crystals the insertion loss of these filters is very low.

Job lots of suitable HC6U crystals have been offered by advertisers in *Radio Communication*, usually as batches of "our choice of frequency". Perhaps these will now become available as lots of one frequency; or an enterprising crystal manufacturer may decide to mass-produce 9MHz crystals at a price attractive to amateurs. Finally, when buying groups of crystals remember to buy an extra one for use as a carrier crystal.

Bibliography

As mentioned earlier not a great deal has been published in amateur magazines about crystal ladder filters, but two articles were found by the author which clearly pointed the direction for the present series of experiments.

[1] "An introduction to crystal filters", Hamish V. Bell, G3MAZ, *RSGB Bulletin* January-February 1962.

Part 2 of this general review article contained a description of a simple filter using an FT243 crystal in a circuit which was very similar to Fig 4. G3MAZ noted the shortcomings of these crystals for use in filters, but clearly recognized the usefulness of this design when suitable crystals became available.

[2] "PE wideband hf communications receiver", R. Hirst, *Practical Electronics* February 1970.

Part 5 of this series discussed the ssb filter which was a five-section filter at 2MHz. Due to the relatively low frequency it was necessary to select crystals which were slightly

Continued on p905

Low pass filters

This is a summary of an article which appeared in *QTC*, the journal of the Swedish national society, SSA. The author is Bo Jakobsson, SM5BML. Seven commercial filters and one home-built unit are compared, using a Hewlett-Packard spectrum analyser with a tracking generator together with a H-P vector impedance meter.

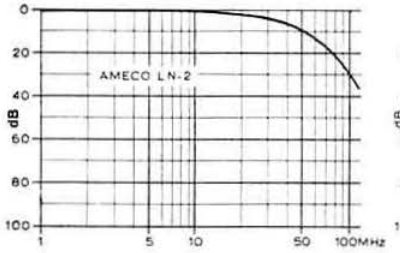
The diagrams and tables below show the curve and the attenuation figure in decibels for each filter for the hf

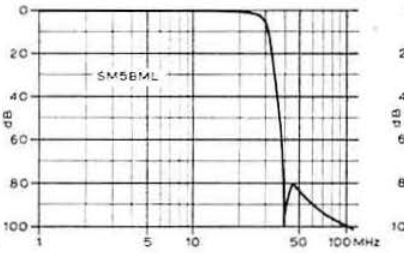
Continued on p905

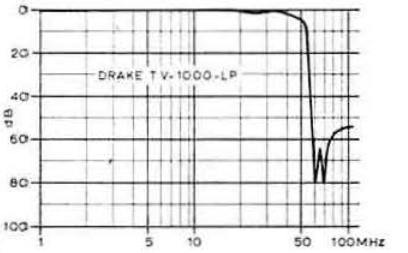
Band (MHz)	Atten (dB)	Impedance/ phase angle	SWR
Ameco LN-2			
3·5	0·2	54Ω +7°	1·15
7·0	0·2	57Ω +15°	1·35
14·0	0·5	80Ω +25°	1·9
21·0	1·5	135Ω +20°	2·9
28·0	2·5	210Ω —20°	4·8
Johnson Viking			
3·5	0	56Ω —2°	1·12
7·0	0	52Ω —4°	1·08
14·0	0·5	52Ω 0°	1·04
21·0	0·5	48Ω 0°	1·04
28·0	0·8	48Ω +6°	1·1
Drake TV-3300-LP			
3·5	0	50Ω 0°	1·0
7·0	0	48Ω —2°	1·07
14·0	0	55Ω +6°	1·15
21·0	0	44Ω —16°	1·38
28·0	0·5	38Ω —10°	1·4

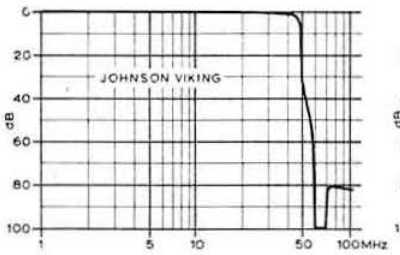
Band (MHz)	Atten (dB)	Impedance/ phase angle	SWR
Home-built (SM5BML)			
3·5	0	53Ω +2°	1·05
7·0	0	54Ω +2°	1·09
14·0	0	50Ω 0°	1·0
21·0	0	54Ω +8°	1·15
28·0	0·5	56Ω —10°	1·2
Yaesu Musen FF-50DX			
3·5	0	50Ω —6°	1·1
7·0	0·2	44Ω —7°	1·19
14·0	0·4	40Ω +8°	1·3
21·0	0·4	52Ω +8°	1·16
28·0	0·5	54Ω +2°	1·08
Trio LF-30A			
3·5	0	50Ω +2°	1·03
7·0	0·1	48Ω ±0°	1·04
14·0	0·2	54Ω ±0°	1·08
21·0	0·3	44Ω +2°	1·14
28·0	0·4	48Ω —6°	1·12

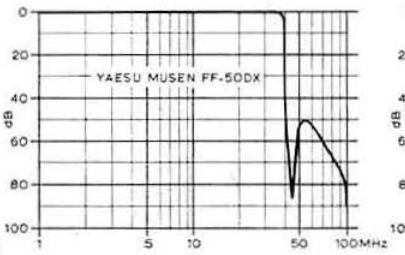
Band (MHz)	Atten (dB)	Impedance/ phase angle	SWR
Drake TV-1000-LP			
3·5	0	54Ω +3°	1·09
7·0	0	60Ω —2°	1·21
14·0	0	48Ω —14°	1·3
21·0	0·5	38Ω +10°	1·4
28·0	0	74Ω +8°	1·5
Trio LP-30			
3·5	2·0	60Ω +6°	1·25
7·0	0	64Ω —2°	1·28
14·0	1·0	52Ω —5°	1·11
21·0	1·5	50Ω —3°	1·05
28·0	2·5	46Ω +10°	1·21

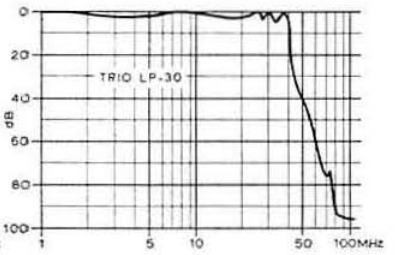


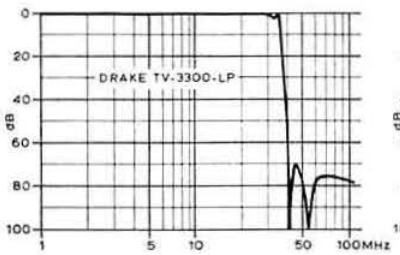


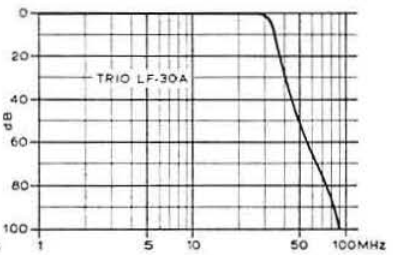












A receiver for 144MHz

by N. DAVIES, G8IBR*

THIS receiver was designed to overcome the deficiencies of the author's original 144MHz receiver (block diagram shown in Fig 1). It consisted of a single superhet receiver tuned by a 10-turn potentiometer driving a varicap-tuned local oscillator 10·7MHz above the signal frequency. Its stability was not very good, and this together with its simple diode detector made it totally impractical as the swing toward ssb working—especially in contests—gathered momentum. The design criteria for the new receiver could therefore be summarized as follows:

1. Good stability.
2. Reasonable calibration (the original receiver had only a turns-counting dial).
3. A multimode detector.
4. 12V battery working (the original required an exceedingly well-stabilized 15V rail for the varicap oscillator).
5. Good cross-modulation performance.
6. As low a price as possible.

These are not necessarily all the design criteria of a receiver but are the ones on which effort was concentrated as a result of the previous failures.

The i.f. strip

A final i.f. of 455kHz was chosen as various bandwidth filters are cheaply and readily available, and nbfm detection is easier at lower frequencies. For similar reasons, and because 11·155MHz crystals are also readily available, the first i.f. was chosen as 10·7MHz. Use is made of two ICs used in television receivers, the Motorola MC1350P i.f. amplifier and the MC1351P fm demodulator; the latter serving very well as a mixer.

The i.f. strip thus consists of a 10·7MHz ceramic filter, an MC1350 i.f. amplifier, and another 10·7MHz filter which in turn feeds an MC1351 working as a mixer. The 11·155MHz local oscillator feeds the limiting amplifier of the MC1351 through a small capacitor and the output of the mixer is filtered by a 455kHz, 8kHz-wide Toko filter. Another MC1350 is used to further amplify the signal and feeds two Toko filters—one 8kHz wide, which feeds the fm portion of the detector and agc amplifier, and the other 6kHz wide, which feeds the a.m. part of the detector.

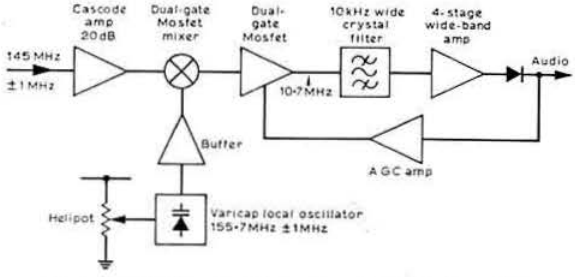


Fig 1. Block diagram of the author's original receiver

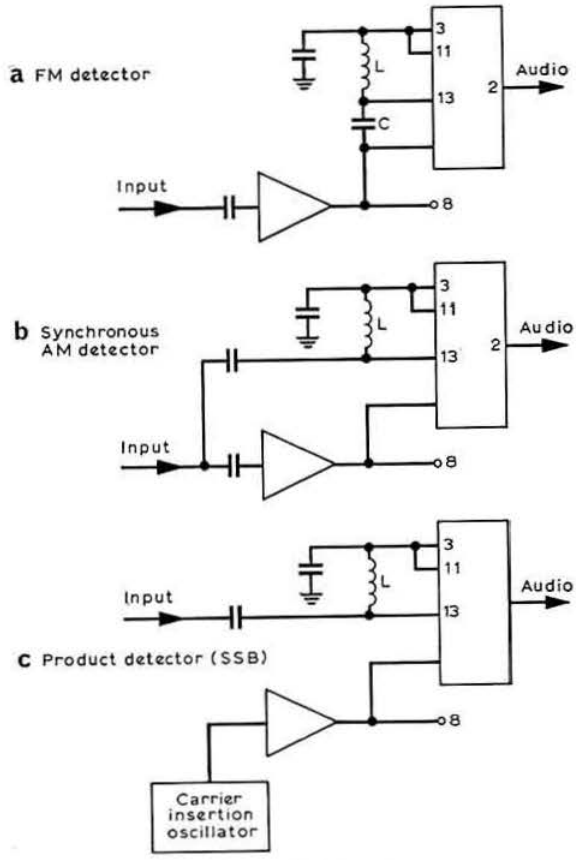


Fig 2. The multimode detector

The multimode detector

This was the result of an idea by G4BLT mentioned in *Technical Topics*. The MC1351 consists of a limiting amplifier feeding a balanced modulator and is meant to be used as an fm detector by placing a 90° phase shift network between the output of the limiting amplifier and the free input of the balanced modulator. However, by putting the signal into both the limiting amplifier and the modulator inputs it becomes a synchronous detector for a.m., and by feeding a carrier-insertion oscillator into the limiting input and the signal into the modulator it makes an excellent product detector. The switching is simple and can be made to select the appropriate bandwidth output from the i.f. strip at the same time.

Fig 2 shows the basic configuration for each of the three modes. Pin 8 is the output from the limiting amplifier as well as one input to the balanced modulator. Pins 3 and 11 are bias points which are decoupled to earth.

The agc amplifier and metering

This consists of an amplifier, which brings up the signal level in order adequately to feed a diode detector, an emitter follower with pot chain to adjust the dc level, and a 741 operational amplifier to set the loop gain. The 4kHz-wide

* 1 Jarvis Field, Little Baddow, Chelmsford, Essex.

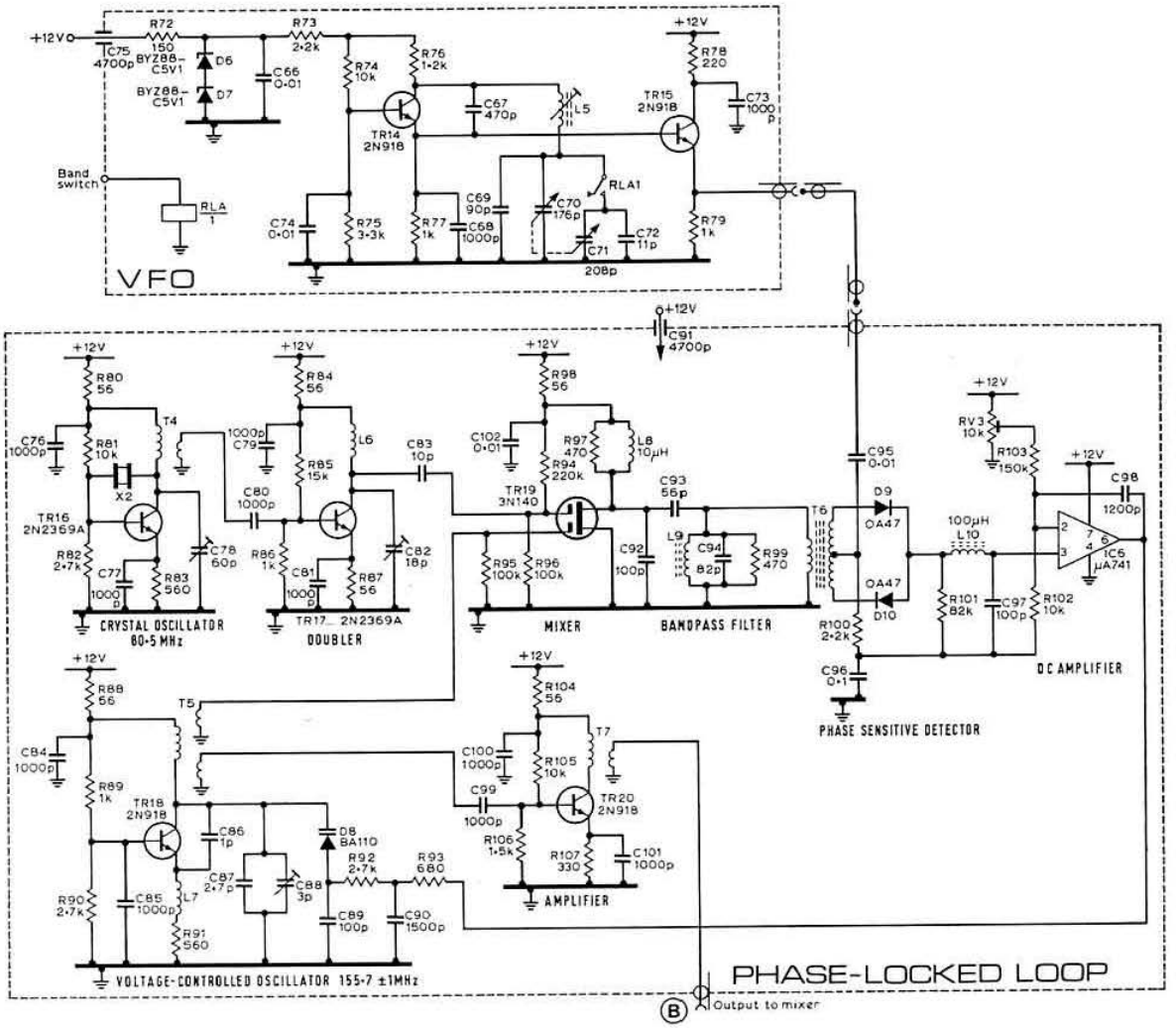


Fig 3. Part of circuit diagram showing vfo and pll

mechanical filter is taken off the input amplifier through an emitter follower, as this compensates for the extra loss in this filter.

The agc line is metered to provide a signal-strength indication. A simple transistor detector on the detector output gives some indication of deviation on fm. The 12V supply and phase-lock voltage are also metered.

The converter

Approximately 20dB of gain with a 2·5dB noise figure is provided at the signal frequency by a cascode amplifier using a 2N3571 and a BFY90. The input and output are matched to 75Ω—the latter to feed a ring bridge mixer, which has a reputation for excellent cross-modulation performance.

The local oscillator is fed into the mixer via two buffer amplifiers, as this type of mixer requires a large amount of local oscillator drive.

The local oscillator

An 80·5MHz crystal oscillator feeds a frequency doubler. The output at 161MHz is mixed in a dualgate fet, with the voltage-controlled oscillator at 155·7 ±1MHz to give 5·3 ±1MHz. This output is fed into a pair of diodes connected as a phase sensitive detector together with a reference oscillator tunable over the 5·3 ±1MHz range, and the output used to drive the vco via a 741 operational amplifier, thus closing the loop. The stability of the output from the vco is now the same as that from the reference oscillator in terms of hertz (not ppm).

The reference oscillator is a Clapp which was found to be more stable when checked over a temperature range in an oven than any of the others which were built. When built using normal mica capacitors, with no attempt to play with capacitors of differing temperature coefficients, it had a stability of approximately 100Hz/°C. This, helped by a

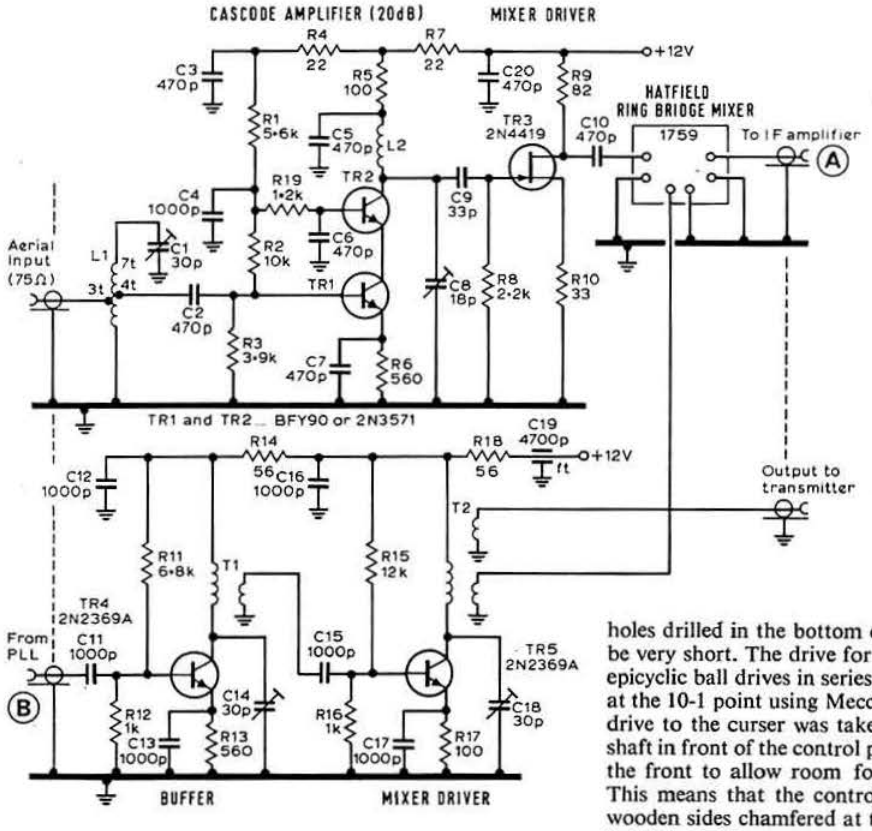


Fig 4. Circuit diagram continued

certain amount of care in construction, has proved to be very adequate.

Construction

Use is made of the small ITT die-cast box (approximately 4½in by 3¾in by 1in deep) for the detector, the i.f. strip, the phase locked loop and the converter. The reference oscillator is built in half an Eddystone box, 2in deep by 3¾in by 4½in. Unless there is a dual-in-line package on the board, all the construction consists of short wire lash-ups on top of a piece of printed board as an earth plane. This can be made quite solid, but further stability is added to the reference oscillator and the vco by pouring silicone rubber over them after they had been working for a while.

The reference oscillator is similarly built on a 1½in square piece of board. The transistor, a 2N918 with a separate connection to the can, is soldered, by the can, to the middle of the piece of board. The rest of the circuitry is hung on its legs on the board, which is fixed to the side of the die-cast box with a 6BA bolt in each corner. This produces a well heat-sunk and very rigid construction when the silicone rubber is poured over it.

The main chassis consists of sides and bottom of ⅛in aluminium fixed together with bars of $\frac{7}{16}$in square aluminium tapped 2BA at the ends. The whole construction is 12in by 9in by 4½in.

The flat die-cast boxes are in pairs with their bottoms bolted together, so that interconnections passing through holes drilled in the bottom of the boxes can, on the whole, be very short. The drive for the vfo was taken through two epicyclic ball drives in series, and a "fast" control tapped in at the 10-1 point using Meccano gears and chain. The string drive to the curser was taken off a small drum on the 10-1 shaft in front of the control panel, which is set 1in back from the front to allow room for the curser and string drive. This means that the controls are also set back, but with wooden sides chamfered at the bottom this adds a touch of individual styling.

Success or failure

Most designers of a piece of equipment such as this have a number of points which, if they repeated the exercise, they would alter—and, the author hopes, a large number with which they are well satisfied. On the whole, the author is very pleased with the results; the concept is right and it has met most of the design criteria. Stability is almost perfect; it can be switched on, tuned into an ssb station and normally retuning is not necessary.

The calibration suffers from slippage in the drives and is adequate if the cursor is set with the transmitter for the beacon (GB3VHF). Backlash is present in the drives and the author intends to replace these with some antibacklash gears removed from an old receiver.

The price depends on what may be scrounged or found in the junk box, but the ring bridge mixer is the only really difficult item.

It was felt that the i.f. bandwidth was slightly wide at the front end and that it was unfair to expect it to produce a good cross-modulation performance. As a precaution a 25kHz-wide crystal filter was put between the converter output and the i.f. input.

There are three further points the author would consider changing if he were to start again. First, to move the local oscillator 10·7MHz below the signal frequency as the non-linearity of the oscillator cramps the low (ssb) end of the scale, thus reversing this effect. The two ranges were put on to help

Components List

R1, 40	5·6kΩ	**R15**	12kΩ
R2, 27, 39, 52, 58, 59, 61, 62, 69, 74, 81, 102, 105, 108, 109, 110	10kΩ	**R19, 54, 76**	1·2kΩ
		R20, 30, 31, 34, 51, 107	330Ω
		R72	150Ω
R3	3·9kΩ	**R21, 103**	150kΩ
R4, 7	22Ω	**R23, 35, 85**	15kΩ
R5, 17	100Ω	**R28**	75Ω
R95, 96, 111	100kΩ	**R29, 55**	820Ω
R6, 13, 41, 83, 91, 112, 114	560Ω	**R44, 106**	1·5kΩ
R8, 73, 100	2·2kΩ	**R45**	39kΩ
R115, 116	2·2Ω	**R46, 49, 53**	4·7kΩ
R9	82Ω	**R64**	120kΩ
R101, 38	82kΩ	**R68**	25kΩ
R10	33Ω	**R70, 97, 99**	470Ω
R50	33kΩ	**R75**	3·3kΩ
R11, 47, 65	6·8kΩ	**R78**	220Ω
R12, 16, 48, 56, 60, 63, 66, 67, 77, 79, 86, 89	1kΩ	**R94**	220kΩ
		R82, 90 ,92	2·7kΩ
R14, 18, 22, 24, 25, 32, 36, 37, 42, 43, 57, 71, 80, 84, 87, 88, 98, 104, 113	56Ω	**R93**	680Ω
		RV1	25kΩ log
		RV2	2kΩ lin preset
R26, 33	56kΩ	**RV3**	10kΩ lin preset

All resistors are Electrosil TR4 or Welwyn MR4 2% ¼W

C1, 14, 18, 50, 51	30pF trimmer, Mullard
C2, 3, 5, 6, 7, 10, 20, 67	470pF
C4, 11, 12, 13, 15, 16, 17, 47, 68, 73, 76, 77, 79, 80, 81, 84, 85, 99, 100, 101	1,000pF } mica, Lemco 350V ± 2%
C8, 82	18pF trimmer, Mullard
C9	33pF mica, Lemco 350V ± 2%
C19, 75, 91	4,700pF feedthrough, wide tolerance —20 + 80%
C22, 35	4,700pF polystyrene, 125V ± 2%
C21, 23, 24, 27, 29, 30, 31, 32, 33, 38, 41, 49, 53, 54, 57, 66, 73, 74, 95, 102	0·01 μF ceramic, Erie Redcap 100V ± 20%
C25, 89, 92, 97	100pF mica, Lemco 350V ± 2%
C45	100pF electrolytic, Mullard 15V ± 20%
C26	390pF } mica, Lemco 350V ± 2%
C28	50pF }
C34, 36, 37, 40, 55, 58, 96	0·1μF polyester, 160V ± 10%
C39	4·7μF tantalum bead, 35V ± 20%
C42	510pF mica, Lemco 350V ± 2%
C43, 46, 64, 65, 103	1 μF tantalum bead 35V ± 20%
C44, 90	1,500pF mica, Lemco 350V ± 2%
C48	0·047μF polyester, 160V ± 10%
C52, 56	300pF mica, Lemco 350V ± 2%
C59, 60, 61, 62	3,900pF polystyrene, 125V ± 2%
C63	25μF electrolytic, Mullard 15V ± 20%
C69	90pF mica, Lemco 350V ± 2%
C70	176pF } ganged
C71	208pF Jackson 00 }
C72	11pF mica, Lemco 350V ± 2%
C78	60pF trimmer, Mullard
C83	10pF } ceramic tubular ± 1pF
C87	2·7pF }
C88	3pF trimmer, Mullard
C93	56pF
C94	82pF } mica, Lemco 350V ± 2%
C98	1,200pF }
C104, 105	220μF electrolytic, Mullard 15V ± 20%
C106	560pF mica, Lemco 350V ± 2%
C86	1pF ceramic tubular ± 1pF

TR1	2N3571 or BFY90	**IC1, IC3**	MC1350P
TR2	BFY90	**IC2, 5**	MC1351P
TR3	2N4419	**IC4, 6, 7**	μA741
TR4, 5, 16, 17	2N2369A		
TR6, 14, 15, 18, 20	2N918	**D1, 2, 9, 10**	OA47
TR7, 8, 10, 11, 12, 13	BC107	**D3**	BZY88 C5V6
TR9	BCY71	**D4**	BZY88 C10
TR19	3N140	**D5**	BZY88 C6V8
TR21	2N3053 BFX85	**D6, 7**	BYZ88 C5V1
TR22	2N2904A	**D8**	BA110
		D11	1N916

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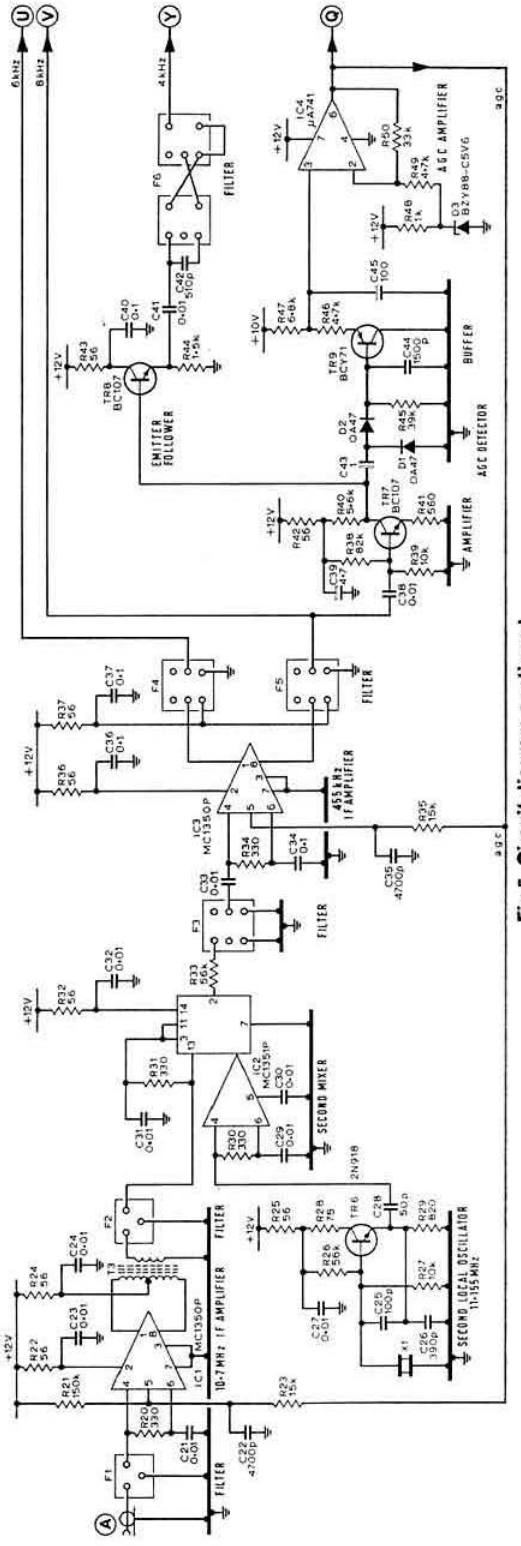


Fig 5. Circuit diagram continued

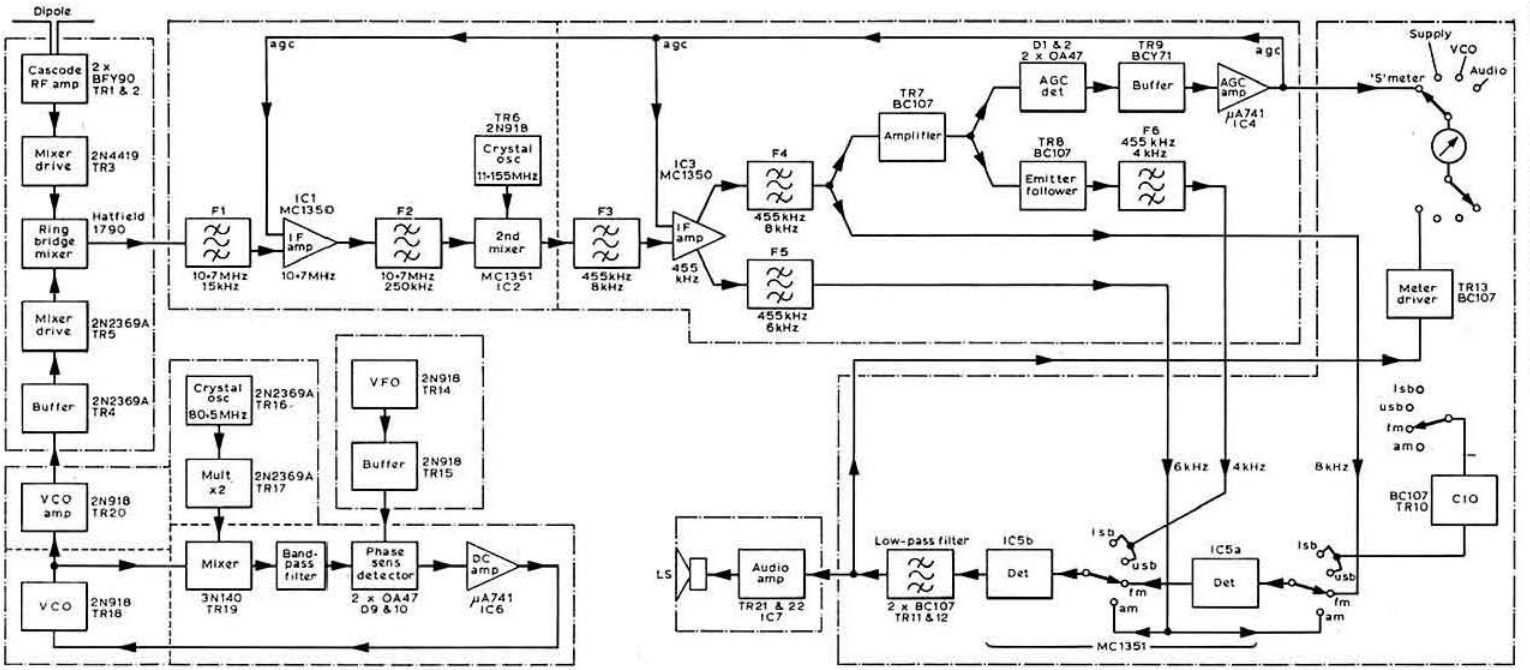


Fig 7. Block diagram of the receiver

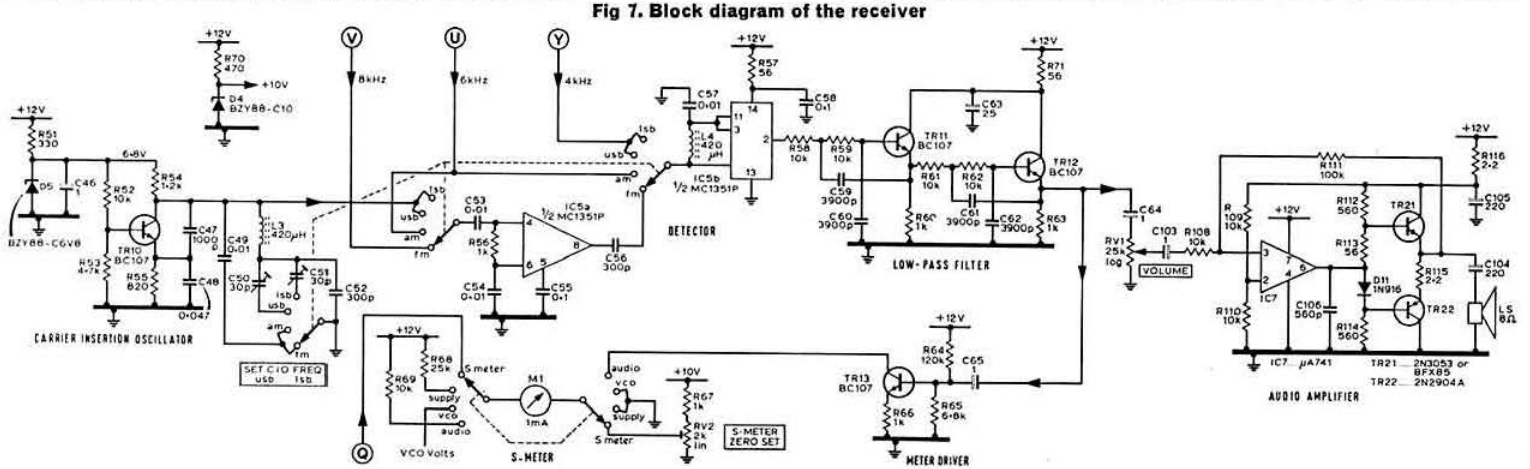


Fig 6. Circuit diagram continued

Components list (cont'd)

X1	Crystal 11·155
X2	Crystal 80·5MHz
Mixer	Hatfield 1759
F1, 2	10·7MHz 250kHz Toko CFS or Murata
F3, 5	455 8kHz Toko CFT 455B
F4	455 6kHz Toko CFT 455C
F6	455 4kHz Toko MFH41T
L1	7t on ¼in dia tapped at 3 & 4t 22swg
L2	2½t ¾in dia on wiring side of pcb
L3, 4	420μH on LA1157 100t 38swg wire
L5	24t 32swg on ⅞in neosid former with tuning slug but no screening can
L6	6t on ¼in dia 22swg tinned copper
L7	10t on ¼in dia 26swg enamelled
L8, 9	10μH Plessey choke
L10	100μH
T1, 2	6t 22swg tinned on ¼in dia + 1t link pvc covered wire (2x) 22swg
T3	FX2073 pri 8 + 8t sec 8t 32swg
T4	10t on ¼in dia 26swg enamelled + 1t 22swg pvc covered
T5	6t on ⅞in dia 22swg tinned copper + 1t 22swg pvc covered (2x)
T6	Toroid FX2073 pri 20t sec 10 + 10t 32swg enamelled
T7	6t on ¼in dia 22swg tinned copper + 2t 22swg pvc

out in this respect. Switching out one gang of the variable capacitor and padding correctly produces a second range from 144-145MHz.

The second point simply involves eliminating the inconvenience of tuning through the band when switching on in order to lock the phase locked loop.

Third, the 8kHz-wide filter is too narrow for fm and causes some distortion. It would probably help if the two 8kHz filters were replaced with i.f. transformers. The filter does, however, pull fm signals out of the noise extremely well and this narrowness has little effect on weaker signals.

These points have not been raised because the author feels disappointed with the results, but so that others may benefit from them, as he is extremely pleased with the way the receiver performs. A check with a signal generator showed that 1μV was a considerable signal on the meter compared with readable signals from an aerial. Stability is excellent and the whole apparatus takes 0·25A from a 12V battery, with the dial lights taking another 0·25A. □

Some experiments with hf ladder crystal filters

Continued from p898

staggered in frequency. The graph of the filter's performance showed a passband ripple of 5dB which is rather excessive.

On a professional level the following paper by a well-known writer on half-lattice hf crystal filters was the first detailed article on hf ladder filters to come to the author's attention:

[3] "A new approach to the design of high frequency crystal filters", R. A. Sykes. *Bell System Monograph 3180.*

[4] *Handbook of filter synthesis*, A. I. Zverev.

This is a reference work for the specialist, giving design information on all types of filter. Chapter 8 on crystal filters

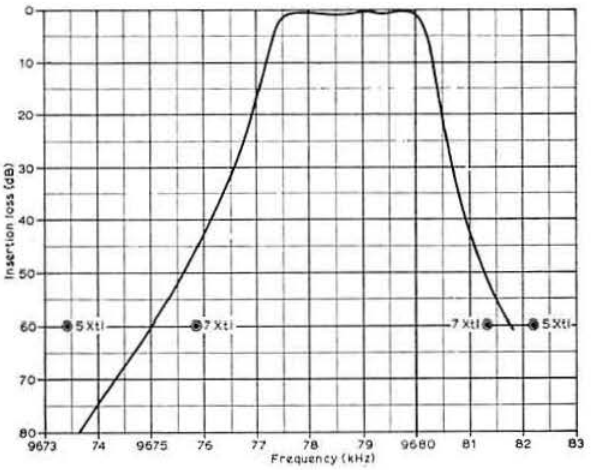


Fig 10. Six-section filter response. Response of five- and seven-section filters is also indicated

gives considerable information on the design of hf crystal filters.

Postscript

As this article was nearing completion the September 1976 issue of *Wireless World* came to hand, to be closely followed by the September issue of *Radio Communication*. The description by G3VA of the designs of F6BQP contained therein have been read with great interest and it is hoped to be able to test them in the near future for comparison with the designs which have been described here.

Part 2, Test equipment next month. □

Low pass filters

Continued from p899

amateur bands, the impedance/phase angle and the standing wave ratio. The table gives the attenuation in decibels for four specified frequency bands corresponding to Swedish television channels in Band 1 together with the attenuation above 70MHz.

Attenuation in decibels for four bands of frequencies and above 70MHz

Filter	Ch 1 33·4–38·9	Ch 2 48·25–53·75	Ch 3 55·25–60·75	Ch 4 62·25–67·75	>70MHz
TV-1000-LP	0·5– 1·5	2·5– 12	15 – 55	66–80	55
TV-3300-LP	1·8– 55	72 –100	77 –100	75–77	80
Johnson Viking	0·8	20 – 40	45 – 60	100	80
Trio LP30	0·5– 3	43 – 50	51 – 58	65–75	95
Ameco LN2	3 – 6	9 – 11	11·5– 13	14–16	20
Home-built	20 – 60	80 – 85	88 – 90	92–95	100
Trio LF-30A	6 – 30	45 –58	60 – 70	71–80	80
Yaesu FF-50DX	0·5– 20	50 – 62	50 – 52	53–58	60

In conclusion, the author gives a performance figure for each of the commercial filters. This figure lies between 0 and a maximum of 5.

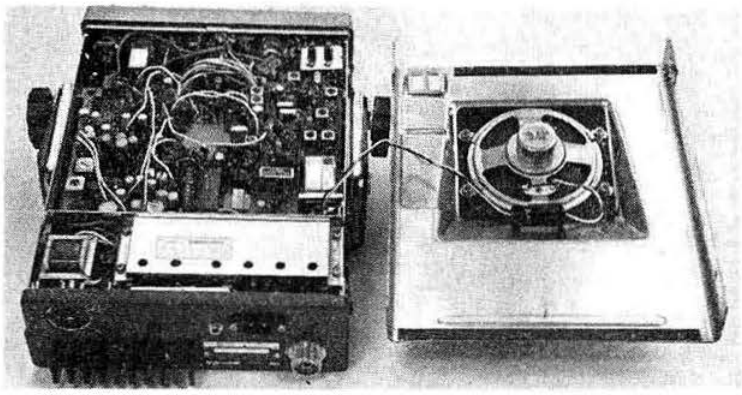
Drake TV-3300-LP	4	Yaesu FF-50DX	2·5
Johnson Viking	4	Trio LP30	2
Trio LF-30A	3·5	Ameco LN2	0
Drake TV-1000-LP	3		

G2BVN □

EQUIPMENT REVIEW

The FDK Multi-U11

by J. P. MARTINEZ, G3PLX



Underside view of the Multi-U11

The coming of 432MHz repeaters is triggering off a rapid increase in fixed-channel fm activity on this band, and some manufacturers of 144MHz fm equipment are therefore introducing 432MHz versions of their transceivers which in many cases are similar in appearance and performance. One of these is the Multi-U11, the 432MHz version of the Multi-11 by the Fukuyama Electronics Company.

Circuit description

The transmitter uses crystals in the 18MHz range, and a conventional phase-modulator multiplying to 36, 72, 144 and 432MHz. The pa is a 2N5945 giving over 10W output. This is followed by forward and reverse power detectors driving the panel meter and the thyristor shut-down circuit respectively. Antenna changeover is by PIN diodes.

The receiver uses triple conversion, with two rf stages, mixing down to 45MHz, 10·7MHz and 455kHz. The first local oscillator is fixed in frequency, the second is selected by the channel switches, and the third can be "pulled" by the RIT control. Wide or narrow filters at 455kHz can be selected by an accessible switch, and these are followed by a conventional limiter and Foster-Seeley discriminator.

The squelch operates from the noise component of the last limiter collector current, and, in addition to muting the audio output, is also used in the autoscan circuit. Four of the 27 sets of channel crystals are scanned by the autoscan circuit, and the scan stops when the squelch trips.

Other facilities provided include a CAL switch to turn on the transmitter oscillator while on receive, for channel alignment; a tone button which, when pressed, causes the transmitter to radiate a tone; a low-power facility which drops the pa supply voltage through a resistor, and the meter can be switched to read the receiver discriminator dc output.

On the bench

The receiver sensitivity was measured by noting the unmodulated signal input which caused a drop of 20dB in the audio noise output; 0·4μV pd was the result, which is very good. This was measured with the bandwidth in the narrow position. The bandwidth of the narrow filter was 7kHz at 3dB, and that of the wide filter was 5kHz. This was an unexpected result, and closer examination showed that there was a pronounced slope across the passband. Measured at 10dB down, the bandwidths were 19kHz on narrow and 22kHz on wide, and these figures give a better idea of the difference between the two filters. It is understood that "peaky" responses of this sort can give rise to misleading quieting-sensitivity measurements, and it is regretted that the reviewer did not have the equipment available to carry out the more accurate signal-to-noise-and-distortion (sinad) measurement.

It was found that a 1·1mV signal 1·6MHz above the wanted channel degraded the s/n ratio by 3dB, quite a good figure for a triple conversion receiver with two rf stages. The S-meter read half-scale (S3) at 1·4μV and full-scale (S9) at 10μV. The RIT control varied the centre frequency by $\pm$ 3kHz.

On transmit, the power output, with 13·5V supply, was 13W, dropping to 8W at 11·2V, and on low power these figures were 2W and 1·5W. The output spectrum was very clean, no second harmonic was visible above the 70dB baseline of the analyser, and the only two unwanted signals seen were at 144MHz and 288MHz. These were slightly higher in absolute level when transmitting on low power, being 54dB and 53dB below the 2W output level on 144MHz and 288MHz respectively. On 433·2MHz, the lowest channel available on the reviewed equipment, the peak deviation was 7·4kHz on narrow and 8·6kHz on wide. On the highest channel available—434·95MHz—these figures became 6·2 and 7·6kHz. The internal deviation preset was capable of setting the deviation to lower levels. The tone button, when pressed, caused a tone of 5·5kHz deviation (on narrow) at about 1,600Hz. Although not shown on the circuit diagram, a preset was found to set this to 1,750Hz, but varying the supply line from 11·5 to 13·5V caused this to shift by 30Hz, and a quick dose of heat from a hair dryer revealed a poor temperature characteristic. However, to be fair to the manufacturer, it is quite clear from the manual that this facility was never intended as a repeater access tone.

On the air

Operation of the transceiver was found to be quite straightforward, the only problem encountered by the reviewer, unused to autoscan, was that of forgetting to switch the autoscan off before replying to a call on an autoscan channel. This usually resulted in the reply coming out on another channel! On the 23-channel switch, the light illuminating the dial is only lit when selecting a channel loaded with a crystal, a useful reminder as it is unlikely that many operators will load all

Technical details

Frequency range: 430-450MHz, preset to cover the amateur band in this country.
Channels: 23 channels on a rotary switch; four manually-or automatically-scanned channels.
Supply voltage: 11-15V negative earth.
Supply current approx: transmit: high power 2·5A, low power 1·3A; receive: squelch off 0·3A, full volume 0·6A.
Size: width 163mm, height 56mm, depth 230mm.
Weight: approx 2kg.
Transmitter: power output, high—10W, low—approx 1W.
Peak deviation: wide—15kHz, narrow—5kHz.
Spurious outputs: more than 60dB.
Antenna impedance: 50Ω. **Microphone:** dynamic 500Ω.
Receiver: Sensitivity less than 0·5μV for 20dB quieting.
Squelch sensitivity: less than 0·5μV.
Selectivity: wide—12kHz minimum at 6dB, 20kHz maximum at 60dB.
narrow—7kHz minimum at 6dB, 12kHz maximum at 60dB.
Image and spurious responses: better than 60dB.
Power output: 3W at 10% distortion.

23 channels for many years. On receive there was no obvious sign of the effects of the sloping passband, which might have caused breaking-up of weak signals. There was a noticeable improvement on weak signals when switching to narrow passband.

On transmit the audio was reported to be crisp and full. The CAL switch proved a useful self-test facility, providing a strong signal in the receiver on simplex channels, modulated with one's own voice.

The Multi-U11 comes complete with mobile mounting cradle, table stand, accessory plugs, a microphone hook, and an assortment of fixing screws, together with a printed English-language manual. It should give good service, particularly in the future higher levels of band occupancy, both as a mobile and fixed station transceiver. The unit reviewed was supplied by Waters & Stanton Electronics, 31 Spa Road, Hockley, Essex. □

EQUIPMENT REVIEW

Scopex 4S-6 single beam oscilloscope

by P. J. HORWOOD, G3FRB

In the past, oscilloscopes were tools which allowed the engineer and technician to view waveforms, but if measurement of amplitude or duration was needed more conventional test-gear had to be applied to a circuit. Of course, measuring 'scopes have been available for many years, but were relatively expensive, while in more recent years even the cheapest 'scope incorporated calibrated vertical deflection and time-base speed. In this respect, therefore, the Scopex 4S-6 is not unique, but it does offer reasonably accurate deflection calibration at a very reasonable price. It is particularly suitable for school laboratories and for use by technicians and tv repair shops.

The claimed −3dB bandwidth is 6MHz and the vertical deflection offers a maximum sensitivity of 10mV/cm. Time-base calibration spans 1μs/cm to 100ms/cm. Measurements and tests have been made to ascertain how useful this basic performance is.

Measured performance

Gain/bandwidth: −3dB at approx 7·5MHz, 1V rms input; −3dB at approx 6·5MHz, 10mV rms input.
Vertical calibration: within the claimed ±5%.
Horizontal calibration: accuracy is acceptable.
Triggering: reliable locking up to the following frequencies:
1V rms input, approx 14MHz;
10mV rms input, approx 8MHz;
1V rms carrier, 100% modulated with 1kHz, 15MHz;
10mV rms carrier, 100% modulated with 1kHz, 11·7MHz.

General comments

Brightness is noticeably lower than with a pda tube; eht is 1·5kV. At maximum brightness the flyback is visible. The astigmatism control is not available on the front panel.

Due to the diameter of the tube a 6 by 8cm graticule is fitted. It is therefore not quite so convenient as the larger 8 by 10cm size when measuring pulse duration, for instance. An 8 by 10 aspect ratio could be provided by using an arbitrary dimension, but this would render vertical calibration non-standard. However, the full bandwidth of 6MHz can be displayed over the whole screen area without the limiting which is often the case on other oscilloscopes in this price range. No fine timebase control is provided; this can make viewing of complex waveforms difficult to adjust. Higher timebase speeds above the 1μs/cm maximum would be useful. The beam-locate button is particularly useful, many more expensive 'scopes do not have this facility. Either positive or negative edge triggering is possible, thus permitting inversion of the scan.

General appearance and construction are good; compact dimensions are 8½in (height) by 6½in (width) by 12in (depth), and the weight is reasonably low at 10lb.

Options: P7 phosphor; 110V operation; high impedance probe (not tested).

The reviewer was impressed with the performance provided at such a moderate price (£98 + VAT), particularly when compared with the inferior sensitivity and bandwidth of many low-priced instruments.

Obtainable from: Scopex Instruments Ltd, Pixmore Industrial Estate, Pixmore Avenue, Letchworth, Herts SG6 1JJ. □

INTERFERENCE PROBLEMS

Members accused of causing interference or who suffer interference from external sources are invited to seek the assistance of the Interference Committee in solving their problems.

Enquiries should be addressed to: The Chairman, Interference Committee, RSGB, 35 Doughty Street, London WC1N 2AE.

Tropospheric disturbances to vhf radio signals

by R. A. HAM, BRS15744*

THROUGHOUT Europe thousands of vhf transmitters are in daily use by broadcast networks; official, private and business mobile radio; aircraft; satellite communication; amateur radio; and beacons for both propagation studies and navigational aids. This results in increasing demand for space in the radio spectrum, and international bodies are trying to solve it by getting the maximum number of radio stations operating inside the minimum possible frequency space.

It is generally accepted that the normal range of a radio signal transmitted between 100 and 200MHz is approximately 100 miles—therefore, by careful geographical siting of the transmitter, many vhf users can operate on the same or similar frequencies, providing that they are far enough apart not to interfere with each other under *normal* tropospheric conditions. But international frequency planners cannot control a tropospheric disturbance which can periodically upset their plans for orderly communication. Many vhf users know the effects of a tropospheric opening on their signals; some have lasted for several days, and the normal range of a signal has been increased sufficiently to cause interference to other systems which have been allocated the same frequency.

In these cases "one man's meat is another man's poison"—while television viewers are complaining about criss-cross lines on their screens, European radio amateurs are taking advantage of the opening to make long-distance contacts, establish new vhf records, and make a valuable contribution to the better understanding of these problems.

Amateur beacon service

While theoretical studies tell us a great deal about the passage of radio signals through the troposphere, they can never simulate the complexities of the actual conditions which prevail during an opening, and the routine observations of known radio sources can play an important role in furthering our knowledge and assisting with future frequency planning. Among these sources are a number of strategically placed radio beacons which have been operating in the 2m band for more than a decade, and their continuous signals have provided vhf enthusiasts with instant information about the prevailing conditions.

The idea of setting up a vhf beacon station was conceived by Major K. E. Ellis, G5KW, to assist with propagation studies during the International Geophysical Year programme, and an experimental beacon (GB3IGY) operating on 145·5MHz was set up at his home in Kent and used periodically from September 1957 to March 1959. This amateur project proved the need for a continuous beacon service and encouraged the RSGB to obtain official permission to set up a permanent vhf beacon. Through the goodwill of the BBC, and such manufacturers as Venner, AEI, BICC and Jaybeam, and the hard work of many Society members, GB3VHF went on the air from Wrotham and became the first of a chain of RSGB beacons.

It has been known for many years that a tropospheric opening is likely to occur when an anticyclone is present, but it is not easy to predict the geographical extent of such a disturbance until it is under way. Under normal conditions the expected range of a vhf beacon signal is about 75 miles, but during an opening these signals have been known to travel hundreds of miles. However, with knowledge of the distance and terrain between the various beacons and his receiver, the vhf operator can judge the geographical extent of the prevailing disturbance by the strength of the beacon's signals.

11-year study

This article has been prepared from an 11-year study by the author of the relationship between atmospheric pressure (ap) and tropospheric openings. Throughout the study period from January 1965 to December 1975 the author used a Short & Mason Barograph to record continually the ap, and these readings have been compared with vhf activity in Band 3 (television 176–215MHz), the 144–146MHz amateur band and Band 2 (fm broadcasting 88–104MHz). From this study period the author has concluded that when the atmospheric pressure is above 30·0in, and *then* rises further, a tropospheric opening can be expected to begin around the time that the pressure starts to fall.

Observations and equipment used

Observations of a television signal in Band 3 were made with a Marconiphone receiver fed by a vertical dipole and tuned to the IBA transmitter on 189MHz situated at Lichfield, Staffordshire, approximately 150 miles NW of the author's observatory in Storrington, Sussex. Under normal conditions only receiver noise can be seen on the screen, so that when a picture begins to form there is a tropospheric opening building up on that path. Signals from the propagation beacons and amateur stations operating in the 144MHz band were received on a horizontal Yagi (usually 8-element) feeding a crystal-controlled converter, with an Eddystone 680X communication receiver tuning the intermediate frequency of 28–30MHz. Receivers such as the S36, R216, and Eddystone 770R have been used over the years to monitor the broadcasting stations in Band 2 with only a horizontal dipole to collect the signals.

Although it has not been possible to make observations all the time, the author has tried to maintain a check on these three bands at least twice a day, and so has built up what may well be a unique collection of records. A variety of signal strengths was received from the following beacons: GB3LER (600), GB3GW (130), GB3DM (275), GB3ANG (400), GB3GI (350) and GB3CTC (200). The numbers in brackets represent the approximate mileage between the author's observatory and the respective beacons.

Under normal conditions using a Yagi aerial mounted as high as possible above the ground, clear of obstructions such as trees and buildings and directed towards the wanted signal, the strongest signal should be received from the front of the beam, and very little from signals at the rear or on the sides of the aerial. However, this is *not* the case during the

* "Faraday", Greyfriars, Storrington, Sussex RH20 4HE.

peak of a tropospheric opening, and while monitoring signals in the 144MHz band during an opening the author has frequently observed strong signals coming from unlikely directions relative to the beam heading of the receiving aerial: several examples are quoted later.

Evidence in this article will show that a tropospheric opening can be expected around the time that the ap, when above 30·0in, begins to fall, and based on this a check through the barograph charts for the 11-year period reveals that for the first nine years an average of 21 tropospheric openings a year was possible:

January to December			1965 21	January to December			1970 21
,,	,,	,,	1966 21	,,	,,	,,	1971 24
,,	,,	,,	1967 19	,,	,,	,,	1972 19
,,	,,	,,	1968 20	,,	,,	,,	1973 25
,,	,,	,,	1969 21				

However, there was a sharp increase to more than 30 possible chances during the years 1974 and 1975.

Memorable tropospheric openings

September 1965: 144–146MHz

It was sufficient to leave the aerial (4/4 slot at that time) facing east on the 21st and 22nd in order to hear the signals from amateur stations in Germany, the low countries and France come pounding in. At the same time strong signals from stations in Wales (in contact with the Continentals) were being received on the back of the beam. At 2026gmt on the 22nd the signal from OZ9OR was received while he was in contact with ON4HC.

The ap rose sharply from 30·0in at noon at the 18th to 30·5in at midnight on the 19th. During the evening of the 20th, signals were heard from amateur stations in EI and ON, just before the ap began to fall, indicating the start of an east-west opening. The ap began to fall sharply at about midnight on the 20th and some 18 hours later the 144MHz band was wide open, predominantly from Wales to Germany. This disturbance ended before noon on the 23rd when the ap fell below 30·0in.

October 1965: 144–146MHz

Following a quick change in the prevailing ap, a brief east-west opening between Holland and Wales took place on the 5th. This event lasted only a few hours and is a good example of how suddenly an opening can occur. A major disturbance began at noon on the 7th, when the ap rose sharply from 30·0in to reach 30·25in by midnight on the 8th. Just before the ap began to fall, a 569 signal was received from GB3LER, and from stations in GM, GD, the border counties, northern G, and PA0. The ap fell during the morning of the 9th and settled at 30·2in in the afternoon. The vhf disturbance continued in the same direction on the 9th, and became widespread in Europe on the 10th. All was quiet on the 11th until the ap began to rise and a signal from EI was heard—sufficient warning that a change was in the offing.

By noon on the 12th the ap reached 30·3in, settled for 24 hours and then fell sharply to 30·0in by midnight on the 14th. During the fall a path was open for radio signals between Holland and the western counties of England. An ap rise followed immediately, reaching 30·5in by noon on the 17th and opening a limited east-west path. A slow fall in ap began almost immediately, reaching 30·2in at noon on the 20th. During the evening of the 20th the author received signals from GB3LER, indicating that the north-south path was open. All was quiet while the ap rose from 30·2in at midnight on the 20th to 30·4in at noon on the 22nd. Throughout the evening of the 22nd and the early morning of the 23rd—just prior to a sharp fall in ap—strong signals were heard on a predominantly north-south path from amateur stations in Scandinavia and Shetland down to France.

July 1966: 144–146MHz

The ap increased rapidly from 30·1in at noon on the 20th to 30·25in by midnight on the 21st, when it began a rapid fall, reaching 30·0in by midnight on the 23rd.

A tropospheric opening in a north-easterly direction began at about 1900gmt on the 21st, and later strong signals were received from LA4FE and OZ3TI. At 2257gmt the Norwegian beacon LA4VHF was heard at 569, and just before the ap fell its signal was 599. A much weaker LA4VHF signal was heard periodically until about noon on the 22nd. During the evening of the 22nd the opening was east-west, identified by strong signals from G3MPS in Somerset through to PA0 and DL in the east.

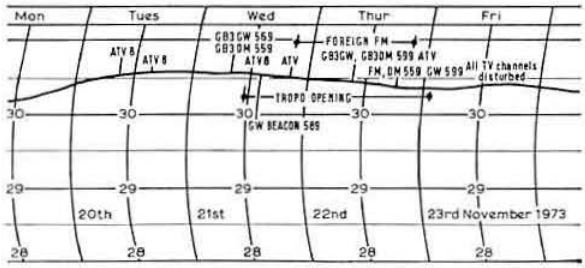


Fig 1. A textbook example of the theme of this article taken from the barograph

June 1967: 144–146MHz

A vhf radio disturbance began on 3 June, reached its climax on the 16th, 17th and 18th and ended on the 19th. There was a long build-up to this event: the ap rose to 30·1in on 28/29 May and then continued a gradual rise to 30·4in at noon on 3 June. At 1400gmt on this day a signal from the Swansea beacon, GB3GW, was 579 and by the evening the east-west path was open with signals being heard from Wales through to Belgium and France.

On the 4th the 144MHz band was open only to France and the western counties of England—no doubt because the ap was steady, but at noon on the 5th the ap began to fall and by noon on the 7th it was down to 30·0in.

During the fall the east-west path was open and strong signals were received from GB3GW in the west and ON4RY in the east. A sharp rise in ap began at midnight on the 7th and reached 30·4in by noon on the 10th. As this rise took place the westerly path opened and signals from Wales and the western counties of England, as well as a weak signal from GB3GW, were heard on the 9th. On the 10th the signal from GB3GW increased in strength to warn of the forthcoming fall in ap.

The fall began at noon on the 12th, from where it had peaked at 30·5in, to 30·3in at noon on the 14th. During the descent the east-west path was open. The ap rose to 30·3in at noon on the 15th to 30·4in at noon on the 16th. During the evening of the 16th an extensive tropospheric opening began, bringing strong signals from amateur stations in Scandinavia and Holland into southern England. The ap was falling between noon and midnight on the 17th, and as it fell the opening extended from Shetland and Scandinavia through to France, and from Wales to Holland and Germany. This disturbance died away during the early morning of the 18th, with final signals from GB3LER and a German amateur.

July 1968: 144–146MHz

From 17 to 28 June, the ap was almost entirely below 30·0in but on the 29th it rose to 30·2in, and just before it settled at midnight the GB3GW signal came up to strength 6. The ap remained at 30·2in until noon on the 30th, and during that period the east-west path was open from Germany through the low countries into Wales. As the ap fell from noon on the 30th the path towards Scandinavia opened for a short time.

Another sharp rise in ap from below 30·0in to 30·2in occurred on 2 July, reaching 30·25in by midnight on the 3rd and followed some 12 hours later by a fall which continued until noon on the 6th, when it stabilized at 30·0in. At 0700gmt on the 6th the signal from GB3GW was at strength 8 and by evening the easterly path was open to Holland, Belgium and France. During the morning of the 7th signals were heard from amateur stations in Germany, Holland and Belgium through to Radnorshire.

March 1969: 144–146MHz

The ap gradually rose from 30·05in at midnight on the 3rd to 30·2in at noon on the 5th, where it settled for about 24 hours. At noon on the 6th the ap began to fall, but a few hours prior to this the east-west path had been open, as indicated by a 589 signal from GB3GW in the west and DL0ER in the east. DL0ER was again heard at 0725 on the 7th and during the evening the opening swung west and the signal from GC2FZC was heard at 1916.

September 1970: 144–146MHz
The prevailing ap was below 30·0in from early afternoon on the 7th to 0200gmt on the 16th, when it rose sharply from 29·9in to 30·35in by noon on the 17th. The ap stayed there for 24 hours, and then fell to 30·3in, and as it fell the Swansea beacon's signal came up to 569 for a few hours. By noon on the 19th the ap was back to 30·35in where it remained until noon on the 24th.

During the evening of the 20th signals were received from both the Durham (GB3DM) and the Swansea beacons at 559, indicating a widespread tropospheric opening over most of England and Wales.

An extensive tropospheric opening occurred on the 22nd and 23rd when strong signals were received from DJ, PA0, ON and F. On the 22nd the signal from GB3GW was too weak to log, but GB3DM was 599 and the GB3ANG Angus beacon's signal was 559, indicating that this opening had bypassed Wales. On the 23rd the GB3ANG signal had gone, the GB3DM signal was down to 579 and the GB3GW signal was up from nothing to 579, showing a marked geographical change in the influence of the disturbance.

On 22 September strong signals were received on the back of the author's beam from amateur stations in Wales, and during the evening a strong signal from the RAF expedition station on Lundy Island (GB3LI), on the back of his 8-el beam. The RAF station was in contact with DC8BP near Cologne, and they were receiving the German station at "40dB over S9"—a distance of about 700 miles.

October 1971: 144–146MHz
The sudden sharp rise in ap from 30·35in at noon on the 4th to 30·6in by noon on the 5th was followed by an extensive tropospheric opening on the 6th and 7th as the high pressure gradually declined. Signals from GB3DM were 589 and from GB3GW 569, and between 2140 and 2240gmt on the 6th the author recorded the signal from the beacon OZ7IGY in Denmark. On both days strong signals were received from amateur stations in Germany, France and Holland, but the opening towards Scandinavia was confined to the 6th.

Another interesting point about aerial direction during a tropospheric opening; the author received an S9 signal at 2051gmt on the 6th from a Dutch station who stated that he was beaming north/east towards Scandinavia. This example must indicate the reflective properties that exist in the troposphere during an opening.

August 1972: 144–146MHz
A classic event began at midnight on the 17th, when the ap shot up from 30·2in to 30·45in by noon on the 19th. During the afternoon it fell to 30·4in (the Swansea beacon came up to 589), and apart from a slight change on the 23rd remained at 30·4in until noon on the 25th. As the ap fell to 30·25in by midnight on the 26th, the north-south path opened. Signals from GB3DM were 569 at 2331gmt on the 25th, and up to 589 at 2000gmt on the 26th. The ap was steady on the 27th, and the 144MHz band opened up towards the north. At times the author was receiving the signal from GB3ANG at 599 plus. The peak of the disturbance was reached during the evening of the 27th, when a change was observed.

1933gmt .. GB3ANG 599 2157gmt .. GB3ANG 569
2026gmt .. GB3GI 569 2334gmt .. GB3ANG 589

At 1933 GB3ANG was a steady 599, but at about 2026 the path of the disturbance changed and the signal went down to 569 and the GB3GI Northern Ireland beacon signal came up for about 1·5 hours. At about midnight the signal from GB3GI died away and GB3ANG returned to 599, falling to 539 by 0620 the following morning.

August 1973: 144–146MHz
From 1 February to 31 December 1973 the author paid particular attention to signals from the beacons located at Durham and Swansea, in order to show their true value to the vhf dxer and the scientifically-minded observer. GB3DM is situated 275 miles north of the author's station and GB3GW 130 miles to the west. For the purposes of this study, GB3GW was logged only when its estimated signal strength was S5 or more. Throughout 1973 there was an above average chance of a tropospheric opening taking place, and these two beacons, coupled with a normal barometer, provided an excellent early warning system.

TABLE 1

1973	Days heard			Average signal strength	
Month	GB3DM	GB3GW	Both	DM	GW
Feb	5	10	3	3	7
Mar	9	13	6	2	7
Apr	6	10	4	2	7
May	7	11	1	2	7
June	9	22	7	3	7
July	8	25	9	3	7
Aug	15	24	15	5	7
Sept	13	18	10	3	7
Oct	6	14	2	3	7
Nov	4	10	2	4	7
Dec	2	8	1	4	7

Table 1 shows that during the 334-day observational period, the westerly path was open on 165 days, and the northerly path on 84 days. The openings were more widespread on the 60 days when both beacon signals were heard.

GB3DM reached S9 on two days in August and on one in November, while GB3GW was received at S9 on 40 days, emphasizing the predominance of the east-west openings.

A good example of the value of beacons in identifying a signal path came during a lift in vhf conditions which began on 9 August and ended on 16 September. The ap rose sharply from below 30in at noon on the 7th to 30·35in by noon on the 8th, remaining there for about 12 hours. When the ap began to fall, signals from both GB3DM and GB3GW were heard, setting a pattern which persisted for the following 39 days. GB3GW was heard on 36 days, showing the predominance of the east-west openings, and on 24 of these days the beacon's signal was above the year's average (S7) (14 days S9, 10 days S8) strength.

Table 2 shows that the northerly path was open on 23 days. An opening generally occurred just before or during the falling of the prevailing ap.

TABLE 2

Date	SS-GW	SS-DM	Noon ap	Date	SS-GW	SS-DM	Noon ap
Aug				Aug			
9	5	3	30·3in	29	5	5	30·25in
10	6		30·25	30			30·15
11	8		30·3	31	8	2	30·35
12	9	3	30·35	Sept			
13	9	5	30·35	1	9	2	30·30
14	8		30·25	2	6		30·30
15	9	5	30·15	3	8	3	30·25
16	8	9	30·10	4	8	4	30·20
17	8	2	30·15	5	8		30·10
18	9	5	30·25	6	8		30·25
19	9	5	30·20	7	8		30·35
20	9		30·20	8	7	4	30·30
21	9		30·30	9	9	4	30·25
22	7	3	30·40	10	9	3	30·20
23		9	30·30	11	9	4	30·25
24	9	6	30·25	12	9	4	30·25
25	6	3	30·20	13	5		30·30
26	5		30·25	14	9	6	30·20
27	5		30·20	15			30·15
28	6		30·20	16	5		30·10

January 1974: 144–146MHz
Possibly the most extensive disturbance during the study period occurred on the 20th and 21st, and is a textbook example of the theme of this article. The ap had been erratic and hardly went above 30·0in from the 2nd to the 16th. Throughout this period wind and rain prevailed, with the weather reaching its peak on the 16th when severe gales and heavy rain swept across southern England. The barograph chart (Fig 2) shows the dip in ap as the storm passed over.

At 2000gmt on the 16th the ap began to rise sharply and some 18 hours later it reached 30·4in. From then on it slowly increased until it reached 30·5in at midnight on the 18th. During the evening of the 18th the tropospheric disturbance began with a number of Continental broadcasting signals coming up in Band 2 between 98 and 100MHz, and throughout the 19th the number of these signals increased as the opening spread.

Close examination of the barograph chart will show that the ap began to fall at about 1600gmt on the 19th and declined slowly until 1400gmt on the 20th, when there was a rapid fall which ended at noon on the 22nd.

Throughout the 20th strong pictures were received from the IBA Midlands transmitter (Ch 8 189MHz) and many strong vhf broadcasting signals from the Continent were firmly entrenched in Band 2. During the evening these Continental signals were so strong that they equalled and sometimes overpowered the established UK stations. At 2100gmt the BBC told their vhf listeners about this tropospheric disturbance.

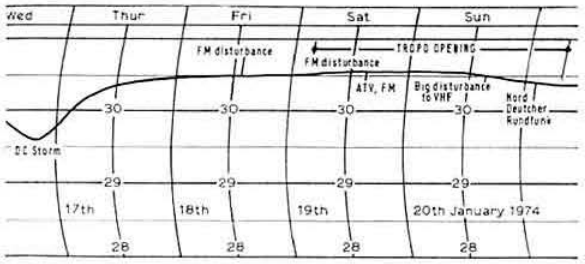


Fig 2. Barograph record of the storm of January 1974

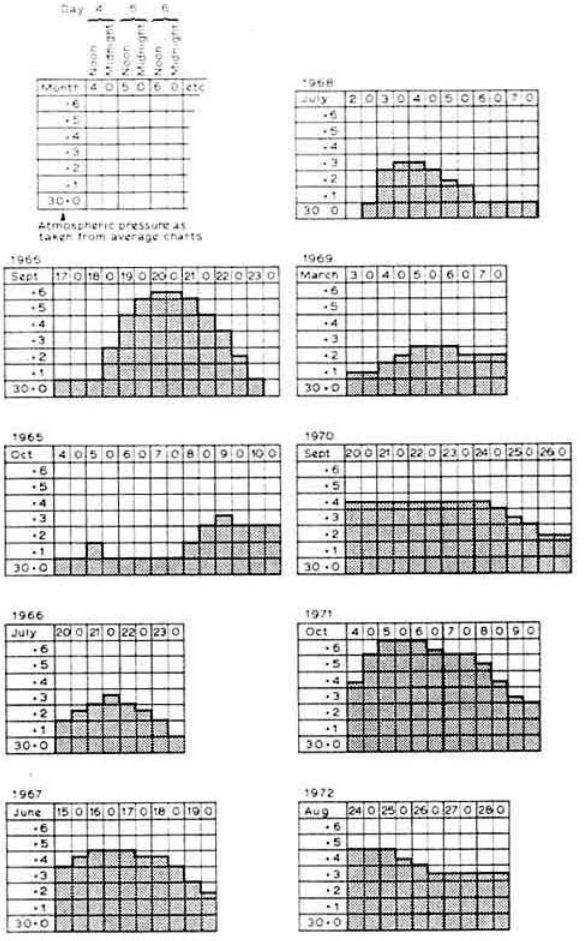


Fig 3. Pressure charts during the observation period with explanatory diagram at top left

From about 2300gmt until 0300gmt on the 21st the path to Germany was wide open and signals from several transmitters of Nord Deutscher Rundfunk dominated Band 2. According to an official list of vhf broadcasting stations there are about 50 transmitters for NDR, and at 0220gmt on the 21st—when all BBC stations had closed down—the author counted 20 of these transmitters between 88 and 100MHz.

The 144MHz band gradually opened up on the 20th, and by the evening very strong signals were coming from amateur stations in Scandinavia, Germany and through to France, and from Austria through to Wales. It was reported that an amateur station in Wales made two-way contact with an amateur station in Spain. As the ap continued to fall through the 21st, the band remained open to Germany, a picture was received on Ch 8, and Band 2 was disturbed. By midnight it was all over.

October 1975

The widespread tropospheric opening which took place between the 24th and 29th was closely allied to the falling ap. The actual disturbance to vhf radio signals can be traced back to the evening of the 22nd, when the ap at 30·25in began to fall.

Table 3 shows the increase in the geographical range of vhf signals as the ap began to fall on the 26th and 28th.

TABLE 3

Date Oct	AP noon	SS GB3DM	SS GB3CW	No of Continental broadcasting stations	SS Midlands TV	Dx heard by author
22	30·25	0	0	6	Weak	—
23	30·20	0	0	6	Strong	—
24	30·20	3	0	9	Weak	—
25	30·45	3	3	23	Strong	—
26	30·40	9	6	18	Strong	DJ, ON, PA0, SM, GI, GD, HB9
27	30·40	9	5	36	Strong	OZ, DJ, HB9, F
28	30·40	0	9	38	Strong	OZ, DJ, ON SM
29	30·25	0	0	8	—	—

During the evening of the 25th, the BBC told tv viewers that the interference on their screens was due to an atmospheric disturbance. At that time the author was receiving a very strong picture on Ch 8 and a few German amateurs were heard on 144MHz. Conditions were so good on the 26th that DJs could be heard on the back of the beam and Continental broadcasting stations around 89MHz were stronger than BBC Radio 2. Early on the morning of the 26th DLs were calling EI, and a GD8 easily worked a DK6, and around 1400gmt an SM was in contact with a GC.

As the author counted the Continental broadcast signals between 88 and 100MHz on the 27th, it was obvious that these were predominantly of German origin. At 1935 a 5 & 9 plus signal was received from a DC/M using 4W to a 4-el beam. The BBC issued another warning about the disturbance at 2127gmt.

This event reached its peak on the 28th and provided an abundance of strong dx signals in Band 2 and the 144MHz band. By midnight these bands were closing as the ap fell rapidly, reaching 30·25in by noon on the 29th.

Conclusion

Readers should bear in mind that this work represents a study made by a single observer from his private observatory in Sussex, and that it was not possible to make observations all the time. The author realizes that there are gaps in the record, but he feels that there is sufficient evidence in this article to enable him to say with confidence: **Watch that barometer.** □

oscar news

The satellite band plan

The following thoughts concerning future Oscar operation have been contributed by G3IOR on behalf of AMSAT-UK.

Anyone who has tuned through 3·5 or 7 MHz during the hours of darkness will realize the results of high-density mixed-mode communications, ie maximum noise and minimum readability for all users, due, in this case, to the random appearance of virtually every conceivable form of emission at competing power levels in what could otherwise be a superb amateur band.

It was the realization of the consequences of this that brought about the voluntary band plans, introduced by IARU Region 1, that established the practice of hf having the cw mode at the lower frequency end of the band, and the various telephony modes the higher end. Similar practice has since been introduced at vhf, and mutually accepted slots have appeared for rtty, sstv and other users. These plans have proved to be remarkably effective, with the vast majority of operators adopting them for their mutual benefit; the consequent advantage of preventing cross-mode QRM permits effective weak signal operation by aligned common mode similarity. By tradition most new operators now follow the code and, despite the enormous density on the amateur bands, reliable communication is normally possible for the user.

With Oscar operation, a few complexities become apparent, and consideration should be given to these:

1. Considerable numbers of Oscar users are crystal controlled, normally cw only, and do not have access to the expensive vfo-controlled multi-mode equipment. This is particularly true in many of the developing countries that we wish to encourage.
2. In Europe many vhf-only licences exist. These operators cannot, in fact must not, utilize cw, which exists for many of them merely as a noise source, producing only a source of annoyance to their ears. In addition, they are more used to the wide open QRM-free spaces of the vhf bands, and are consequently less tolerant of QRM than the more experienced hf band operator. Further, their recognition of the high-gain low-angle requirement for the 29MHz downlink is apt to be critically limited, thus producing a tendency for them to run higher than necessary power in order to achieve a reasonable signal in their receivers.
3. The coverage of some communication receivers stops at 29·500MHz thus restricting operation (on Oscar 6) to only half the available band.
4. Up to this time, relatively little Oscar information has been put out by the media, due to its complexity, and relatively few amateurs are fully *au fait* with its best deployment. Oscar codestore messages are in cw and cannot be understood by many of the telephony-only licensees. Until very recently, no news source has been possible through Oscar itself, and 144MHz nets have very limited range. Few vhf-only operators listen on the wider coverage hf nets, and cannot enter them in any case. The result is some degree of ignorance of the requirements of the operator himself, which can lead to frustration for other users.
5. On Oscar, high-power usage can produce a critical attenuation to all other users of the satellite. Where on the hf bands, only localized and adjacent blocking can occur from its effects upon the affected receiver; on Oscar the entire transponder is the receiver, and one high power station in the passband can render all other logically-powered signals unreadable due to the necessary alc system employed in the satellite to limit total power demand. Due to (4) above, this is not always realized by the offender.

Most users of Oscar 6, whether cw or ssb, tend to deploy the 29·490–29·500MHz portion, where they fit into the mixed mode area in any case, and qualify for the requirements of all cases.

It looks as if we shall soon be having two new satellites, if all goes according to plan. The June 1977 ITOS launch may bring us the JAMSAT 145 to 435MHz transponder, and the A-O-D transponder of AMSAT-USA, which is virtually another Oscar 6 or 7 mode A. Oscar 6 may not get over this coming February and the maximum sun period. The year 1979 may bring us Phase 3, with 150kHz of 145—435MHz and 435—145MHz in range of all the northern hemisphere without any skip isolation problem to aid limitation. The current overcrowding could well increase by a factor of 10 or more. By the time this happens, it will be vital to have an operating band plan and all-round recognition of power limitation. It will be preferable to have it effective by June 1977 and ideal to have it functional right now!

The points for consideration are thus:

Do we continue with the sharing according to the satellite used, risking complications during common passages and giving continuous advice to the newcomer, or do we try to establish the fundamental IARU Region 1 plan, ie hf for cw and lf for ssb etc on all satellites, as seen on the downlink band? With the possible early demise of Oscar 6 the thought is that the latter plan is the more sensible, and that the sooner it is put into operation by all users the better off we shall all be.

More will undoubtedly be heard of this issue, as current consideration is being given to the possibility of the allocation of special frequencies for special cases, and world-wide consideration will have to be given to the entire matter. In the meantime, anyone having any strong objections or considerations, or wishing to express approval of the suggestions made, should let G3IOR, QTHR, know, as they are the people who will need to use the system to maximum advantage and, we hope, with minimum QRM.

University of Surrey AMSAT telecommand station

The ground telecommand station controlling Oscar 6 for the European sector located at the University of Surrey has recently commissioned a fully automatic telecommand system. The station now covers all visible passes of the satellite and is responsible for maintaining Oscar 6 in the correct operation mode according to the agreed schedule. Its most important functions are to ensure that the spacecraft is kept off to allow the internal batteries to recharge after use; switched on for use when scheduled so that European amateurs may have orbits that are reliably active, and to switch on orbits scheduled for news bulletins.

The basic command station has been operational now for a total of over 18 months but only controlling certain orbits which normally fall during working hours. The new facility will provide positive control over all visible orbits day or night and at weekends. The location of the command link in

the 144MHz band has caused some consternation (especially as it is a wideband transmission) but transmission time will be kept to a minimum; likewise, the transmission bandwidth will be maintained at the minimum necessary for reliable command of Oscar 6.

An internal malfunction of the spacecraft has given rise to spurious mode switching, an inconvenient occurrence on an "on" orbit but potentially disastrous on a scheduled "off" (recharge) orbit.

The useful life of Oscar 6 has been extended from an initial one year period to over three years by meticulous control of the spacecraft. The command station at Surrey University is a vital link in the control network and 144MHz operators are asked to react sympathetically to any possible inconvenience caused by the presence of the command transmission on or near their channel. The command transmissions will be noticed to a far greater extent now that they take place during leisure hours as well as normal working hours. □

swl news

Bob Treacher, BRS32525 *

MOST readers will be surprised to find *SWL News* in print this month: please do not become too ecstatic, it is not the beginning of a regular monthly article. It results simply from *Radio Communication* production changes, and *SWL News* will now appear every **even** month starting with this issue. Fortunately, your scribe was able to obtain information from certain regular contributors in sufficient time to enable this commentary to appear.

3·5MHz dx news

The time has come to sing the praises of the 25kHz from 3,775 to 3,800. This is the position reserved by "gentlemen's agreement" for inter-continental dx traffic when the band is capable of producing dx signals. During these next two or three months this period will start as early as 1530gmt and could last beyond midnight—such is the 3·5kHz band's potential. Very few people seem to realize that by convening a "local" QSO on 3,785kHz at 1700gmt they could be QRMing an HZ, ZL or even a 9V1 trying to work into Europe. Such openings so early in the evening are commonplace during December, January and February.

It will be extremely beneficial to listeners to give serious thought to improving the antenna farm to cater for such openings. The better forms of antenna for 3·5MHz dx are dipoles, either sloping or in inverted-V configuration, a delta loop or a vertical. These are all designed to receive low-angle signals better than the more commonplace dipole or long wire.

During the latter half of October the band was showing distinct signs of its potential by offering signals from A9, JA, EP, 4X4 at around 1800, while WB4ZKG/KC6 was heard in GW on 3,802kHz at 2050gmt.

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1976 HF Countries Table (updates only)

Station	10m	15m	20m	40m	80m	160m	Total	Mode
BRS35608	77	149	201	164	112	37	740	cw
BRS17567	70	163	227	104	133	10	707	ssb
A8312	31	122	162	74	112	28	529	ssb/cw
A8961	12	76	148	27	55	9	357	ssb

1·8MHz dx

CQWW ssb probably gave the more dedicated listeners to this band at least one all-time new country in the shape of VP5M. Those who do not QSX this band regularly during contests will also have missed 17 other countries on ssb reported by G4BXT.

On the cw scene, Dave, A8312, has added three all-time new ones — UW3PAW (although the UAs are not licensed for top band it is believed that this one did emanate from UA), ZL3GQ, and VP5IZ. Dave also reports VP1MPW and ZC4 as got-aways. Noel, BRS35608, also reports the UA but little else.

Other bands

It seems that conditions on the higher bands were showing signs of improvement at the time of going to press. CQWW certainly bore this out, especially on 21MHz where all continents were audible. There also seem to have been several openings to the west coast of the USA. The 7MHz band (cw) has also shown signs of greater activity for those dx types who find time to burn the proverbial candle. Noel, BRS35608, reports "plenty of dx" during the early morning hours; on some mornings, stations in W6/7, VE7, ZL and VK have been heard. Best dx for Noel recently has been FO8EX (7,015kHz at 0100) and VK9RH.

There are innumerable comments concerning Far East and Pacific dx; Noel, BRS35008, comments on 9M2FK, VS5DB and FB8XO all on 7MHz cw at around 1900, while Robert Small, A8841, has heard FO8EX, AH8EX, KJ6DL, FW8CO and C21GT/MM all on 14MHz ssb. Noel also has one addition to his 1·8MHz score in the shape of OH0NI (Aland Is). David Hawes, A9191, informs us that VQ9HCS was heard to say that the Seychelles will be using their new S7 prefix very shortly.

Andrew Glanville, A8849, and Keith Morrison, A8883, both comment on entering the Cray Valley listeners event and having a good time on all bands, there being sufficient dx around to make it interesting. The results may well be published in this column next year but by far the safer course of action is an sae to Roger Smith.

Here and there

It has been said that the Brazilian authorities would introduce a new series of prefixes as stations renewed their licences during the course of 1976. However, at the time of writing not one new prefix has been heard signing PP etc. It may well be that they have changed their minds and will specify a date when all stations will transfer to PP callsigns. One exception to this has been heard, however: W7BVZ/PP6.

Letters are also acknowledged from Cyril Youll, BRS35699, and Steve Collis, A8961.

To conclude, your scribe reminds prospective reporters that the next *SWL News* will be in the February 1977 issue. Any news, comments and information will be greatly appreciated before 31 December 1976. In closing may I wish all readers a very happy festive season and best wishes for a happy and successful 1977. □

technical topics

Pat Hawker, G3VA

AS the year ends, a word of apology to those readers who have submitted items or comments that have not yet been used. There are various reasons why this happens: we try to maintain a fair balance in subjects covered; some ideas, although good, are suitable only with specific equipments or in rare situations; some are really too complex or too long to be explained in this type of feature; a few (not many) get mislaid; some are flogging dead horses; some I do not understand; some need further research; quite a number await a suitable opportunity. The new publishing arrangements eliminate the alternate "short" and "long" months and should help. Certainly every idea is very carefully considered (usually many times) and serves as a reminder of how catholic are the interests of those who engage in our hobby. Many thanks for all the ideas that *have* appeared—and apologies that a good deal is still in my files, although these are combed through every month.

Flexible logic probe

The increasing use of digital logic techniques has created a lively interest in the various types of logic probe used to check the operation of the devices and circuits. A useful probe, based on two ttl integrated circuits and three led indicators, was published some years ago in *TT* (also in *ART5*, p297). A rather more flexible type of probe which is suitable for ttl, cmos and htl devices has been described in *Electronic Design* by Arthur R. Klinger. It can also be readily modified to provide accurate level detection over a range of reference levels by the incorporation of a potentiometer to adjust the potential applied to pin 5 of the 555 timer ic. The probe takes advantage of the high-impedance input of the 555 and this device is capable of driving 1·6V 40mA led indicators directly so that only one ic is used.

This probe is claimed to indicate the presence of short input spikes that would otherwise be virtually undetectable (300ns pulses, spaced 500μs apart, are detectable), while a square-wave input lights both led indicators equally (visible to over 400kHz) and the ratio of indicator brightness will also provide an indication of the duty cycle of the pulse train applied to the input.

The back-to-back input diodes limit the input and prevent erratic behaviour of the 555 for inputs near earth potential.

The 555 functions as a comparator with a threshold of one-third of V_{cc} when set by the internal bias (this reference can be varied when the potentiometer is incorporated). Output pin 3 has an inverted state to that of the input so that LED1 lights continuously on a steady *high* input; LED2 on a steady *low* input.

As shown in Fig 1, R1 and R2 are compromise values allowing 1·6V 40mA LEDs to be used with supply voltages from 4·5–16V. If the probe is wanted only for a single supply level (eg if the probe is to be used only with ttl devices) the values can be optimized to provide maximum light

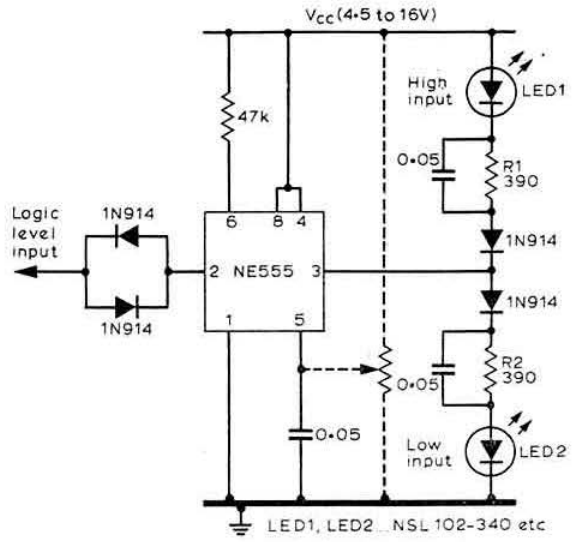

Fig 1. A logic probe suitable for use with ttl, cmos and htl devices. Accurate level detection can be added by connecting pin 5 of the 555 device to a potentiometer as shown dotted

(eg 120Ω for ttl; 820Ω for cmos or htl). Normally the supply voltage (V_{cc}) is taken from the circuit under test. The probe can be fitted into a penlight case or similar convenient package.

Bandpass filter for rtty etc

Lionel Lear, G3PPT (whose vlf converter of *TT* March 1975 continues to attract interest), has developed a simple bandpass filter based on the differential mode of a 748 op-amp: Fig 2. This clearly has applications to rtty but may well also find other uses.

The input is fed in parallel to two resonant circuits and the op-amp then, in effect, measures the difference between the two responses, so producing a bandpass function. Gain is adjusted by means of the 1kΩ resistor shown connected between the two inputs to the op-amp, with heavy dc negative feedback via the two 27kΩ resistors in order to set the

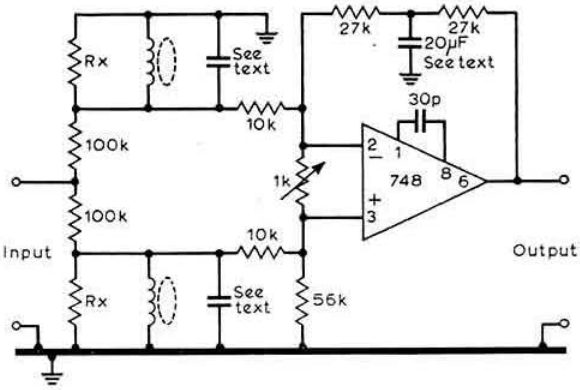

Fig 2. G3PPT's method of using the differential mode of an op-amp to provide a bandpass filter for rtty and similar applications

dc output level around zero. The 20μF decoupling capacitor prevents negative feedback at the working frequency (polarity of connection should be determined by checking, since the dc potential at this point is very low but will normally show either a small negative or positive voltage).

G3PPT has used this circuit as a bandpass filter for rtty using 170Hz shift at 2kHz. In this case the ubiquitous 88mH toroids (actually using 44mH) were used for the two resonant circuits, with the capacitors chosen to resonate the toroids to the two tones. In this application the gain control can be switched out; the circuit then functions as a limiter with some 40dB gain at the passband frequency. While G3PPT does not have the equipment needed to plot the passband accurately, he achieves a flat response (within 3dB) across the passband and some 40dB down 200Hz above the passband. This type of filter has already been successfully duplicated by A. Lambe, G4BRU.

For wider passbands, G3PPT suggests that the *Q* of the inductors should be lowered by adding the shunt resistors shown as R_x in Fig 2.

Dutch 0-v-2 receiver

Last June details were given in *TT* of a "straight" receiver using dual-gate mosfet devices and it may seem to be stretching nostalgia a little far to suggest that many readers are still interested in a valve 0-v-2 receiver, or that there could be anything novel in such a receiver to comment on. But there are still many people with stocks of twin triodes, ECC81 (12AT7) pulled from old tv sets. As to novelty I have never before noticed anyone using a cascode regenerative detector.

The arrangement shown in Fig 3 is that of a commercially manufactured Dutch receiver: the Radio Rotor Model IV. We suspect that if carefully put together such a receiver would not be entirely outclassed by some receivers costing a good deal more, even on ssb. Details of the plug-in coils are not given (the circuit comes from *Electron* August 1976) but it could be safely assumed that the coil tap would be about one-quarter of the total turns away from the earthy end.

Polarization and vhf propagation

One still finds considerable debate and some misunderstandings among amateurs on the choice of polarization and what effect this has on vhf propagation. The following summary, derived in part from *EBU Review—Technical Part*, No 155, February 1976, may help put the matter in perspective.

Horizontal polarization (ie electric vector in horizontal plane) normally provides maximum range, except in specific types of countryside which favour vertical polarization or where the aerials are very low.

Vertical polarization suffers less attenuation than horizontally polarized signals when diffracted over smooth rounded hills (without vegetation or obstructions higher than about 1m) and provides better signals when the receiving aerial is close to the ground. Is less affected by fading when transmitted across tidal waters to locations close to the shore. May have less indirect wave when transmitted between high points across a valley or bay, but multipath reflections from nearby vertical or near-vertical structures (eg high buildings, cranes, etc) generally significantly greater.

Slant polarization has the electric vector inclined at 45° to horizon (resultant of equal amplitude vertically and horizontally polarized components). The polarization is termed *right* slant when the vector is rotated by 45° from the vertical position as seen from the transmitting point.

Circular polarization. Electric vector continuously rotating (ie equal amplitude vertical and horizontal components combined in phase quadrature). Termed right circular polarization when vector rotates clockwise as seen from the transmitting point.

Dual polarization has substantially equal-amplitude vertical and horizontal components radiated without particular control of phase relationship between them.

Mixed polarization is a collective term embracing slant, circular and dual polarized signals.

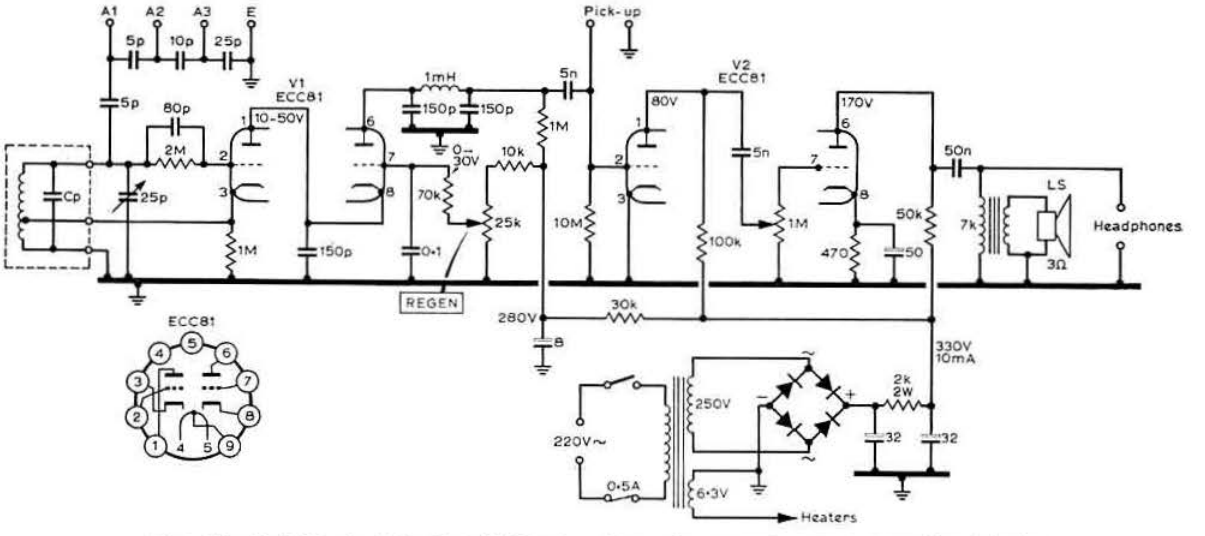

Fig 3. The Dutch Radio Rotor Model IV 0-v-2 receiver using cascode-type regenerative detector

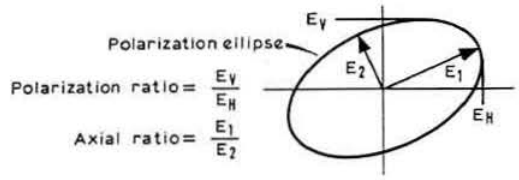

Fig 4. Illustrating the difference between "polarization ratio" and "axial ratio" in circular polarization terminology

It has previously been suggested in *TT* that circular polarization can provide more homogeneous coverage over mixed terrain than either of the two basic linear polarizations alone, particularly in heavily wooded areas (especially those with coniferous trees) where vertical polarization is subject to considerable attenuation. However, it should be appreciated that where circularly-polarized transmissions are received on a linearly-polarized aerial there will be a loss of approximately 3dB. In other words, to provide equal (though more homogeneous) coverage with cp you really need twice as much power delivered to the transmitting aerial.

In considering circular polarization some additional terms are likely to be encountered, including elliptical polarization, polarization ratio and axial ratio. Elliptical polarization is where the vertical and horizontal components are not equal and the major axis is at a specific or changing angle. Both polarization ratio and axial ratio define the degree of "circularity": polarization ratio in terms of the vertical and horizontal components; axial ratio in terms of the major and minor axes: see Fig 4. It should also be appreciated that even where the transmitting aerial radiates truly circular polarized signals in the direction of the receiver, it is quite likely that local conditions may change this into an elliptically-polarized signal—just as on hf a skywave which started off as linearly polarized is certain to bounce down with mixed polarization.

Miniature VK2ABQ "X" beams

A previous item (*TT* January 1974) has reported on a low-cost wire-type triband "X" beam developed by Fred Caton, VK2ABQ (formerly G3ONC). Recently, two techniques for reducing the dimensions have been brought to my notice by VK2ABQ and a design for a reasonably compact 7MHz beam (usable also on 14MHz) has been published in *Amateur Radio* (August 1976) by David Down, VK5HP.

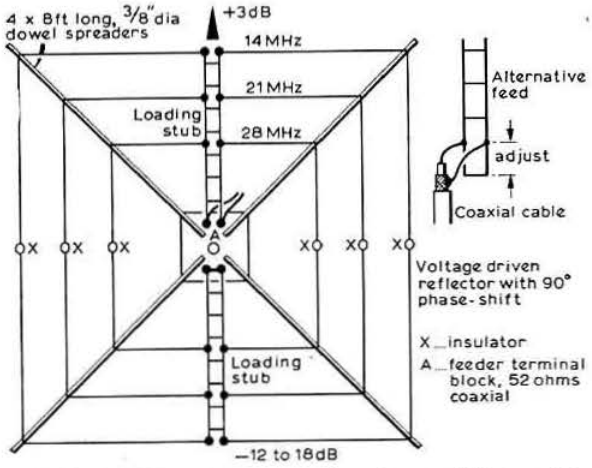

Fig 5. VK2ABQ's voltage-driven phased array minibeam with loading stubs

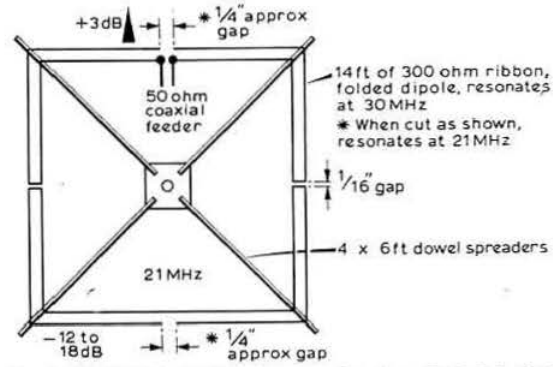

Fig 6. VK2ABQ's 21MHz beam using two 300Ω flat ribbon folded dipoles (about 14ft long). The dowel rods should be 4ft for 28MHz, 8ft for 14MHz

VK2ABQ suggests that his designs should provide about 3dB forward gain (reference dipole) but about −12 to −15dB in the backward direction.

The first of these designs (Fig 5) shows how the elements can be shortened by using "loading stubs" rather than lossy inductors. These stubs are made of a length of 2in (not less) spaced home-made line, permitting a 14/21/28MHz beam to be made with a turning radius of about 8ft. With the aid of a gdo the correct tapping points for the 21 and 28MHz can be found using crocodile clips, afterwards soldering them. The 2in spreaders were made from plastic ice-cream holders.

Fig 6 shows another technique for compact single-band beams, the "X" spreaders being dowel rods 4ft long for 28MHz, 6ft for 21MHz and 8ft for 14MHz, using 300Ω ribbon feeder to form the folded elements with small cut-out "gaps".

Fig 7 shows a version using 300Ω line (without gaps) described by VK5HP for a 7MHz beam with a turning radius of about 12ft 6in. He claims he built the entire beam for $A13: "It took two hours to build and can be turned by hand or by rotators such as the Stolle and has proved very effective with low power." The bamboos (Rangoon canes) are

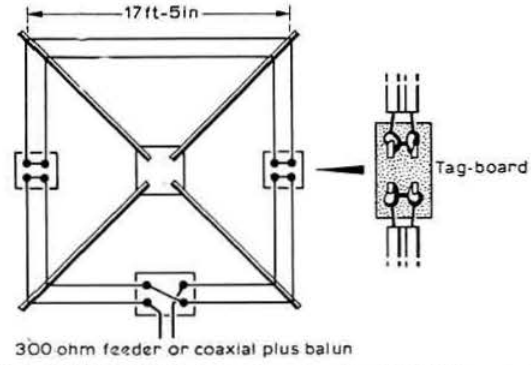

Fig 7. VK5HP's 7MHz beam based on the VK2ABQ approach

fixed by U bolts to the 15 by 15in square of ¾in marine plywood. Elements are adjusted by gdo and VK5HP states that it also works on 14MHz. It should be noted that all these beams need a "correction factor" when gdo-resonated at a low height as the resonant frequency will increase by a few hundred kilohertz at full height. The original full-sized VK2ABQ triband remains one of the few designs for a simple home-made aerial that does not involve the constructional problems of the quad.

Inverted-Vs, diversity and vhf

Several follow-up comments have been received on the September notes on inverted-V aerials and the general question of using long-wire techniques on vhf. First, to clear up one point, I have come to the conclusion that the gain comparisons between the half-rhombic (terminated inverted-V) and Yagi arrays were rather misleading and unfair to the hf Yagi. Although the power gains reported by Ma and Tveten included the figure of 16·7dB at low angles, this extremely high gain is not representative of what an amateur is likely to achieve at normal dx angles over normal ground. As a more direct comparison with the Yagi "gain barrier" of about 6dB, a more typical figure for a half-rhombic would be of the order of perhaps 4 to 8dB, although it should be stressed that large commercial rhombics can have true power gains (reference dipole) up to and beyond the figure of 16·7dB.

Owen Jackson, A9XU/G3LKZ, is in the fortunate position of being able to comment on a recent evaluation of a half-rhombic used at a professional receiving station in Bahrain. He writes:

"This aerial was erected as an experiment in compressing our site size due to encroaching housing developments, although to amateur eyes it could not be considered a back-yard effort. It consisted of a single wire with a terminating resistor, the apex at 150ft and the total ground length about 900ft. It was deliberately erected alongside a full-sized rhombic in order to use this as a comparison. As indicated in Fig 8 the inverted-V used one of the masts of the rhombic. Initially I had doubts as to the wisdom of using a vertically-polarized aerial over such an apparently poor ground as the desert of Bahrain, and ground mats about 100ft by 50ft made up of a grid of wires about 2-3ft apart were used under the terminated end and the feed end.

"The first results were so poor as to be unbelievable. This was fortunate since it led to the discovery of a faulty terminating transformer at the feed point. With this replaced the subsequent tests showed that it was a very encouraging aerial considering its simplicity. The rhombic had a known gain of between 14 and 18dB depending on frequency; the average gain of the inverted-V was some 10dB less. But this meant that we were achieving gains of almost up to 10dB over poor ground, over the range 8 to 18MHz. In fact it performed as well as a commercial log-periodic costing about £9,000, although the log periodic could be rotated.

"However, the most interesting part of the experiment came when we used the two aerials as a diversity reception system. While I naturally hoped to achieve some benefit from polarization diversity between the rhombic and half-rhombic, the results were beyond expectation. It was quite normal to see 20dB or even up to 30dB difference between the two aerials (paths were balanced for this test by attenuating the rhombic so that these figures are true differences in the fading pattern). The combination meant that in practice it was impossible to tell if the receivers were operating in normal space diversity using two full-sized rhombics 500 yards apart or the rhombic and adjacent inverted-V.

"I am now firmly convinced that much of the fading we know so well in amateur operation arises more from polarization coupling losses brought about by the constantly changing polarization of the incoming signals than most of us realize. The experiment convinced us that we could dispense with one of the rhombics and still achieve the required diversity reception at a lot less cost.

"All this points to aerials having mixed polarization offering a definite advantage over those confined strictly to one linear plane, as is normal practice in amateur hf and vhf installations.

"It will be appreciated that these tests were for reception only and it was not possible to try the half-rhombic for transmission. However, it could well be that the usual warning about poor ground conductivity may be no more serious than in the case of the common vertical ground plane or monopole."

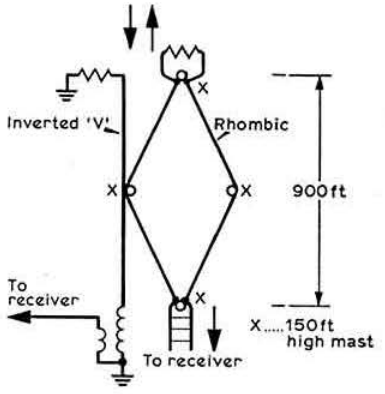

Fig 8. The experimental "half-rhombic" inverted-V erected alongside a rhombic in the system investigated by A9XU/G3LKZ and found to provide excellent polarization diversity reception

Long-wires on vhf

Owen Jackson also reports on the use of rhombics at vhf, based on some experiments carried out in conjunction with a friend while at Benghazi, Libya. He comments:

"At that time Libya had no national tv service and many attempts were made to achieve reception of stations in Malta or even in Rome, at distances up to 800 miles. To cut a long story short, the finest aerial proved to be a rhombic array which outperformed the best Yagi aerials used (up to four bays of 10 vhf elements). It is indeed a pity that information on long-wire systems for hf and vhf is disappearing from the handbooks—presumably reflecting the increasingly limited space available to most of us."

To add to this saga, W. D. Kidd, who is the IBA's engineer-in-charge of the television stations on the Channel Islands, has kindly sent me some background information on long-wire arrays used until recently for the reception of mainland transmissions. Since these signals have to be rebroadcast, very high orders of signal/noise and reliability are sought, despite the difficult long sea paths (this has now led to the

development by the IBA of a null-steerable adaptive aerial for 625-line uhf colour signals, but that is another story). He writes:

"The story goes back to 1954–5 when I was associated with the setting up of a BBC Band 1 receiving station at Torteval, Guernsey. Initially the system was based on double Yagi arrays directed towards both Wenvoe and Alexandra Palace (130 and 190 miles respectively). Results, despite the use of masthead amplifiers, offered little encouragement. However, about this time the Channel 2 station at North Hessary Tor opened and it became possible to receive signals with a simple Yagi. As a result a system was built with diversity on North Hessary Tor (Cornwall) and Wenvoe (South Wales).

"However, this was not a complete answer since there was a 60dB variation in signal strength under varying propagation conditions, and rather severe precipitation static on the Yagi aerials. So as an alternative we experimented with the EMI type of sloping wire (this was a long-wire 'quarter rhombic' or 'tilted wire' system using capacitance loading as in the G6CJ 'stretched dipole' approach). Our early experiments aimed at establishing direction and vertical angles were carried out in the foulest possible weather. However, subsequently we used banks of these stretched quarter rhombics with 12 wires in the North Hessary Tor array and 16 on Wenvoe. The forward ends were terminated and supported about 6ft above ground level; the top ends, matching sections and head amplifiers were supported on a catenary slung between 110ft masts, ropes being used to keep the whole structure rigid. These long-wire arrays, together with the Yagis, allowed the BBC to start its service in 1956. However, the sloping wires proved mechanically weak and were replaced not long after I left the BBC.

"The inverted-V array which was installed by the British Post Office for the IBA service was erected at Alderney and consisted of a bank of 12 continuous lengths of solid copper arranged as half-rhombics. This array was directed on Caradon Hill, Cornwall, and was intended for use as an alternative to Stockland Hill, South Devon, which was the main source and for which two large 10m dish aerials were used. The half-rhombic, however, was needed since there were occasions, particularly during the summer months, when deterioration of the Stockland Hill–Alderney path was found to coincide with an improvement in the Caradon Hill–Alderney path. In practice, little or no signals of rebroadcastable quality were received from Caradon Hill between the autumnal and spring equinoxes, so that the half-rhombic was used only at times during the summer. The half-rhombic array is no longer in existence, having been taken down quite recently as part of the re-engineering of the link to allow the 625-line colour service to be started by ITV last summer. At the same time we also removed some 'bedstead' arrays directed on Chillerton Down, Isle of Wight. The uhf link is now based solely on Stockland Hill using the 10m dishes and the special adaptive aerial ("SABRE") which at present uses only half the number of elements of the final design."

So both these accounts of long-distance tv reception show once again that the long-wire techniques have a useful role to play, particularly for instance where you do not have a pair of 10m dishes or a computer-controlled steerable array! My thanks to Bill Kidd and to A9XU/G3LKZ for letting us know of these practical applications of rhombics, half-rhombics and stretched quarter-rhombics at vhf.

Simple party-line intercom

At first sight an intercom system might seem to have little relevance to amateur radio; but in reality many amateurs still tuck themselves away from their domestic and external environments in the traditional "shack" whether this is an attic, garden shed or understairs cupboard. As the cynic might say, what matters it to know that it is raining in Tokyo if meals are getting cold and domestic storm-cones are being hoisted a few feet away.

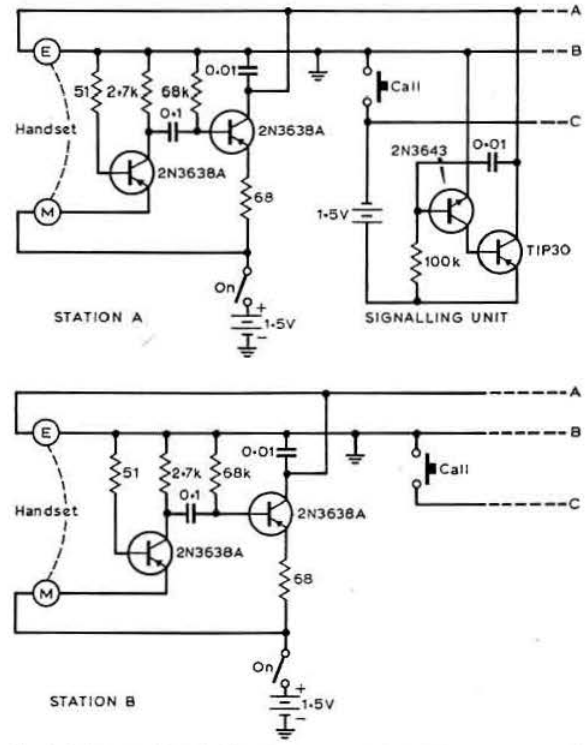

Fig 9. A low-cost party-line intercom system (*Electronic Design*)

A party-line system that uses no costly items other than a standard carbon-microphone handset was described recently in *Electronic Design* (No 16, 2 August 1976, p76) by Andrew M. Hudor: Fig 9. As many units as necessary can be tied together using a three-core cable or twisted-pair plus separate earths. The signalling circuit alerts all units but of course a simple "call code" can be adopted if needed. As indicated a separate 1·5V (or 3V for greater volume) battery is fitted at each "station" but an extra wire would allow the whole system to be run off a single battery; however, it is claimed that the low-consumption of the system ensures that batteries do not need replacing frequently.

Each intercom unit has a two-stage high-gain amplifier and there is just one signalling oscillator based on a complementary-pair multivibrator. All the telephone earpieces are in parallel across the line. The original author suggests that simplicity, ruggedness, redundancy and low-power consumption make the system well suited for field applications or for underground mining—so if you ever get tired of amateur radio and take up pot-holing your work will not have been in vain. □

microwaves

Dain Evans, G3RPE*

Operating news

Omitted from last month's *Microwaves* was a rather fine contact G4BYV had on 2·3GHz with DC0DA. Even with a transmitter generating only 1W, the signal strengths over the 472km path were S5/6. G4BYV is currently building a more potent ssb transmitter based on the 2C39 cavity described in *Ham Radio* February 1975. Also not passed on was the news from G8KBB in Warrington that he, G8GYC and G8FPV have now got equipment working on 10GHz. Best dx so far is 5m across G8GYC's shack.

On 24 October G8BCO and G8ECO operated /P from the Hogs Back (1km west of Guildford) and worked G8BDJ and G3JHM over the 43km optical path to Truleigh Hill, 4km north of Shoreham. The latter stations then moved to Ditchling Beacon (8km north of Brighton) and contacts were again made, this time over a non-optical path 53km long which was obstructed by a tree-covered hill. So what came out of it? Well, four operators had an enjoyable morning; they had a technically interesting contact over a non-optical path; the added satisfaction of using equipment that they had built themselves, and one operator increased his dx record by a factor of 50. Not a bad way to spend a Sunday morning.

In other journals

In the 5/75 and following issue of *DUBUS-INFO* (obtainable from GW3NJW), DL7QY gives details of his 10GHz equipment. This uses one Gunn oscillator as the transmitter, a second as a self-oscillating mixer, and a uhf tv tuner as a tunable i.f. A feature of the circuitry is that both oscillators are operated within a temperature-controlled environment to reduce frequency variations. Part of his stabilized psu/modulator is given below. In the 2/75 issue of that journal, he describes a 1,150MHz driver which starts with a crystal oscillator at 90-96MHz; the output from the final varactor is about 0·5W.

The current issue of *Marconi Review*, Vol XXXIX, No 201, contains a review of recent information on microwave radiation hazards. For far too long an article on this important subject as it relates to amateur radio has been in preparation; perhaps this review will provide the stimulation to get it completed.

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Gunn diode PSUs

Fig 1 shows the simple stabilized variable psu which is currently in use in the London 10GHz beacon GB3LBH. It uses a 7805 regulator ic (obtainable from Radiospares) which will supply up to 1A when used with a suitable heat sink. The ic has built-in short circuit and thermal protection. The basic regulator is intended to produce a fixed output of 5V which it does very successfully. However, by fitting a resistor between connection *C* and earth, the output voltage can be increased up to within 2·5V of the input voltage by an amount equal to the voltage drop across this resistor. The maximum input voltage to this regulator is 25V. The resistor is a convenient means by which modulation may be applied to the output voltage, as is shown, and it should also be possible to introduce an afc voltage although this has yet to be tried.

The "biasing" of the regulator inevitably means some loss in regulation but this is small: in a unit set up to produce 9V from a 12V supply, the output voltage dropped by only 35mV when a load taking 200mA was connected, and by only about 10mV/V as the input voltage was changed. During these measurements the ic was bolted to a small die-cast box used as a heat sink. Its increase in temperature was only just detectable. With such a simple psu, it would be nice to have an equally simple modulator. For example, now that single ICs containing two 741 amplifiers are readily available, one could think of using one as a speech amplifier and the second as a tone generator.

Fig 2 shows a similar regulator complete with modulator which is due to DL7QY and published in the 5/75 issue of *DUBUS-INFO*. □

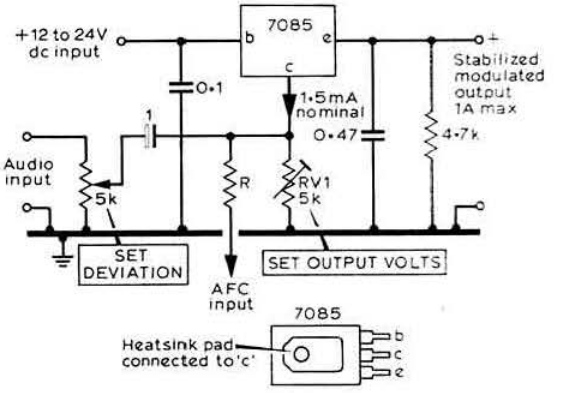

Fig 1. A simple psu/modulator based on the 7805 ic

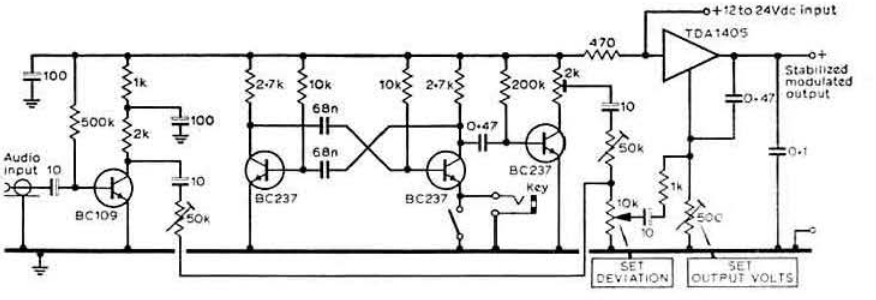

Fig 2. A complete modulator/psu for a Gunn oscillator

4-2-70

Martin Dann, G3NHE*

Convention '77

At next year's national convention at Alexandra Palace in north London a special area will be set aside for the vhf component of this important event in the amateur radio calendar. Well aware that these things do not organize themselves, the VHF Committee at its October meeting addressed itself to the forward planning that will coalesce into lecture sessions, get-togethers and other practicalities by next May. It is as yet too early to go into detail, but what may be said with assurance is that the vhf/uhf content at the convention will not suffer by comparison with the former events at Twickenham.

FM channel

Seeking a simple method of converting elderly a.m. transmitters on 432 and 144MHz to the fm mode, G5UM found himself faced with such a plethora of information in the literature that he was uncertain which route to follow. However, a nearby friend, G8CXK, strongly recommended the single 12AX7 solution suggested by G8DVL in *Technical Topics* February 1972. This is a simple phase modulator from which output is taken to the screen grid of the transmitter oscillator stage, and G5UM highly recommends it.

However, saddled with a quantity of redundant a.m. modulators from the old TR1986 airborne transceiver, he felt these could be pressed into fm service if suitably modified. (This modulator became extremely popular in the late 'fifties when advertised in this journal for 30 shillings). All that is needed is to remove the two 6C4 push-pull output valves, which are preceded by an EL91 driver stage, itself equipped with a small driver transformer in its anode circuit. The secondary of this transformer should be connected in series with the ht line feeding the screen grid of the transmitter oscillator stage, resulting in the desired fm.

It is important to disconnect the bypass capacitor from oscillator screen grid to earth. If this is not done a large proportion of the audio output from the phase modulator will be lost.

Getting channelized below 145MHz

In most parts of the country where a reasonably large amateur population exists it is easy to obtain contacts on any of the simplex channels above 145MHz, either by direct CQ or by transference from a contact initially set up via a repeater. But this facility carries its own drawback: this is the difficulty of finding a clear space free from interference on any of the standard S-channels. The problem does not arise with the many users of fully-tunable equipment, but it is a very real one for those limited to certain spot frequencies: the former can move anywhere but the latter cannot.

Obviously the answer is to equip channelized transceivers with crystals to provide QRM-free contacts, but where to go? Equally obviously, the answer is "below 145MHz", and already many owners of channelized equipment have realized this fact of 144MHz life and taken steps (and crystals) to give them one or more positions in the clear below 145MHz. It is hoped that this trend will continue.

Where to go below 145MHz? Certainly not into the beacon area (144·9-145MHz) and preferably not below 144·5MHz, which is the upper limit for A3j operation and increasingly used by sidebanders to get away from the QRM in *their* particular area of the band. This still leaves 400kHz available for individual choice, subject to the avoidance of fixed known frequencies already used for other purposes. Meanwhile the fully-tunable users of FT221R/TS700/Multi 2000 *et al* can set a good example by conducting their contacts in that area.

Accumulator alternative

By now there must be several thousand ex-vehicle sets in amateur use on 144MHz, most of them Pye, but with a sprinkling of Storno, Cossor and Murphy. To operators who do not have these rigs it is a source of constant amazement that their users should put up with the inconvenience of operating them from wet accumulators in a domestic environment. The messy corrosiveness of these cumbersome power sources, plus the need for constant charging entailed by the "thirsty" nature of most ex-vehicle transmitters, ought by now to have discouraged their use.

It is such a simple matter to construct a power supply unit to substitute for the accumulator that it is surprising more people do not do so. Two replacement-type transformers with their lt windings connected in phase to give 12·6V are all that is needed. Each transformer will probably deliver enough from its ht windings to furnish power for the transmitter driver and pa stages. As for the requirements for transistor modulators, what better than the ingenious arrangement suggested by BRS29738, and described in detail in *Technical Topics* last January (p43)?

Accumulators are for operating transceivers installed in vehicles (as well as the vehicle electrics of course!) and are subject to constant charge from the engine. They are of dubious value in the radio room.

Room for simplicity

G8VN of Mickleover, Derby, maintains that there would be more enthusiasm and activity on vhf/uhf if simple equipment could be effective in making contacts. But, as Harold points out, current trends on vhf/uhf mitigate against the use of simple gear such as the crystal-controlled transmitter. Since the bands have been divided by technology (cw, ssb, nbfm, sstv etc) rather than geographical location, the result has been a few overloaded frequencies, with a fair proportion of the bands being unused for much of the time.

While stations using cw and ssb are usually vfo controlled, they are limited to transceive, and the use of transceivers and fixed frequency receiving modes both inhibit band searching, leaving the user of simple crystal-controlled gear high and dry.

To encourage better use of all available frequencies, G8VN suggests several possibilities: the encouragement of local nets in unused parts of the band; the introduction of short-period cumulative contests in parts of the band not in general use; the encouragement of the use of VFOs and, finally, more use of both vertical and horizontal polarization at each station.

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G2HLL of Leeds also advocates the use of simple equipment, particularly in these days of escalating costs. Frank uses crystal controlled cw on 144MHz, although he is disappointed by the lack of interest in this mode at present. He concurs with comments made in *4-2-70* earlier this year that a.m. seems to be "out" as a mode these days, a fact which he regrets.

"The handle here . . ."

Not every operator would agree with the Wiltshire amateur who, on principle, will not exchange forenames over the air, nor with the Sussex portable station who was goaded into the riposte that his handle was on the side of his TS700. The use of Christian names, the prerogative of the family circle and close friends before the war, is now more widespread, and in the writer's view society is none the worse for it.

Nevertheless, it sometimes gets a little out of hand on the 144MHz band, and is frequently given priority, especially through repeaters, when "location" should be stated first. Names are used in place of callsigns ("over to you Pete"), which is not what the licence requires, and there must be 500 Petes and Johns and Mikes on the band. They are neither unique nor properly identifiable: the callsign is both.

Contest comment

While conditions have not exactly sparkled for the first few sessions of this year's 432MHz Cumulative Contest, it has been pleasing to note a healthy increase in the level of activity. It is to be hoped that the number of logs submitted to the VHF Contests Committee is considerably better than the poor showing after last autumn's event.

Miscellany

When establishing contact on telegraphy on 144·5MHz it is a good idea to move off this calling channel to a spot well up the band, preferably above 144·1MHz. This will allow the many operators who key Liner 2s to at least know that there is some cw activity about, this transceiver not tuning below 144·1MHz. Remember, however, to leave 144·1MHz clear: this is the random meteor-scatter calling channel, and someone might be desperately digging for a vital "ping" from some exotic dx!

Members interested in radio teletype will be interested to know that several *enthusiasts* of this mode exist in the Cambridgeshire and (former) Huntingdonshire areas, notably G3TEJ, who has been on 144MHz for most of his amateur career, and G8MEI of Great Shelford, to name only two. The latter's equipment automatically samples any rtty appearing on 145·3MHz at any time of the day.

A reminder about activity periods on vhf/uhf: 144MHz telegraphy every Monday night from about 8pm 70MHz, any mode, Wednesday night from 10pm (some activity Tuesday lunchtimes); 432MHz, every evening from 9·30pm. Frequencies to activate are 144·05, 70·26 and 433·2MHz respectively, where almost certainly someone will be waiting.

Farnborough & DRS will be holding an activity day on Sunday 12 December, on 144MHz, to promote their Blackwater Valley Award. The award is open to both transmitting and receiving amateurs, and points are gained by working members of Farnborough & DRS in the counties of Hampshire, Surrey and Berkshire. Operation will be 1000-1200, 1400-1600 and 1900-2100gmt on S22 fm, and 144·28MHz ssb. Further details may be obtained from awards manager G8ATK or PRO G8IMX, both QTHR.

Awards

G8BMJ of Stoke, in claiming and receiving 144MHz Senior Transmitting Award No 103, offered his thanks to all those portable expeditions which made the collection of the necessary cards possible. No fewer than 25 of his cards were for GM expeditions, 22 of them from the redoubtable GM8AGU/P, but it took two years before the last two countries could be added, these being captured in the recent big openings.

G8GED of Southall has found getting the QSLs in to be the hardest job of all. He remarks that there must be several dozen stations still holding his SAEs and prepared cards, and adds that it makes it hard to believe in the so-called "amateur spirit". However, David now has 432MHz Transmitting Award No 119. Next to receive this award was GW4DRR, who now has No 120. From way out on a limb in Holyhead, Geoff comments that he is not able to hear the two beacons unless conditions are exceptional, yet he can work stations in the vicinity of the beacons at good strength, probably because the latter beam at him while the beacons do not. It is worth noting that there are now three stations in Anglesey on 432MHz, plus at least three GIs, two GDs and one known EI.

The latest 432MHz Senior Award was won by G8GP of south London. Eric secured all the cards within a year, with a good mixture of ssb and cw.

The first 144MHz Transmitting Award to go to Scotland this year was issued to GM3XNE of Ardrossan, who received No 493, while a few days earlier, No 492 went to G8JPW of Banbury.

RSGB Supreme Award holders

No	Callsign	Year	No	Callsign	Year
1	G3MCS	1970	9	G3NHE	1974
2	G5NU	1972	10	GD2HDZ	1975
3	G3ZYC	1973	11	G5UM	1975
4	G3COJ	1973	12	G3XBY	1975
5	G4BEL	1973	13	G3JXN	1976
6	G5DF	1974	14	G3EHM	1976
7	G3DAH	1974	15	G3BHW	1976
8	G3ZMD	1974			

The Supreme Award is granted to holders of three Senior Awards or two Senior Awards plus one 1·3GHz Standard Award. Intended to acknowledge effort by individual operators, it is awarded to fixed site stations only.

The "final" final

This really is sign-off time for G3NHE as compiler of this column, and he would like to take this opportunity to thank again those who supplied the necessary information and inspiration over the last couple of years. Thanks are also due to all those who kindly passed on their good wishes after the "Finale" piece appeared in the October issue.

There will be few regular users of the vhf/uhf bands to whom the call GM8FFX is not familiar, and we are delighted to "pass the pen" on to Graham, knowing that it will be in excellent hands. □

the month on the air

John Allaway, G3FKM*

AT the time of writing, the quite appalling interference emanating from the Soviet Union seemed to be continuing unabated, in spite of official protests by a number of administrations—including that of the UK. At times the whole 14MHz band has been unusable and several members have contacted the writer to say that they intend to refuse to have any more contacts with stations in the USSR until the problem ceases. This total disregard of internationally agreed frequency allocations tends to suggest that assurances of support for the amateur radio service by the Soviet government put forward by the USSR delegation at the Region 1 IARU Conference in Warsaw last year carry no weight.

G3FKM would like to thank all those who have helped in the compilation of *MOTA* during the year, and to wish all readers a happy Christmas and every success in 1977.

Top band news

Some very interesting contacts have been made on 1·8MHz recently. EI8H reports that during October ZL stations have been heard on most mornings between 0630 and 0715. There was a good opening on 13 October and Patrick made contact with ZL3GQ, ZL4NH and ZL1HY on cw, followed by a contact on ssb with ZL4NH. This may be the first New Zealand to Europe two-way ssb contact on the band and reports were good in each direction. On 15 October ZL2BT was worked on cw with reports of RST 569/579, and the biggest surprise of all was a contact with VR1AA on the same mode just before 0730—again signals were RST 569. Signals peaked for 5min, and again this is believed to have been an all time "first" between the Gilbert Is and Europe. G3YMC has also reported a contact with ZL3GQ, but otherwise has found the band activity rather low this season so far although he has contacted W1HGT and K1PBW, and heard W2IU, WA4SGF, K8HKB, WA8IJI and W9MAL. Your scribe would appreciate more reports of activity on this band.

The latest W1BB *160 Meter DX Bulletin* says that the old first timer's tests have become outmoded. However, GD4-BEG has suggested setting aside the period 0600 to 0630 each Sunday morning during January/February for newcomers, and this has been modified to cover the **first 10 minutes of every hour** on Saturdays and Sundays **when the band is open for dx working.** These "first timer's dx periods" will be world-wide, and regular band occupants are asked to call "CQ-FT" at these times.

News from overseas

Geoff Smith, A9XBD, has written to say that the Amateur Radio Association of Bahrain has applied for permission for Bahrain stations to use the special prefix A9Z on one day only—16 December—which is Bahrain National Day. He says that he is active on or around 3,790kHz at about 2000, running 1kW input to a half-wave dipole, and is pleased to arrange skeds. He is also active on rtty and believes that he may be the only Middle Eastern station using that mode so far. Usual operation is on 14,335 and 21,300kHz and he is looking for UK contacts—and again skeds will be arranged. His power output is 200W, speed 50 bauds, and shift 170Hz (forward) but he can receive any shift between 170 and 900Hz forward or reverse. He has a Creed 54 machine, and SME TU5 TTU, plus a Yaesu FT200 and FL2500 linear, and his receiver is an HR11 (Marconi). His address is c/o Cable & Wireless Ltd, PO Box 14, Bahrain Is, Arabian Gulf.

DX news

As from Saturday 4 December the Gibraltar ARS will be organizing a net for present and ex-ZB2 callsign holders. This will take place on the first Saturday of each month at 1200 on 14,120kHz.

Sunil Abeyesundere, 4S7AB/9J2AB, is now in England and will be here for several years. He would like to meet as many of the British amateurs he contacted from Sri Lanka and Zambia as possible and may be reached at: Postgraduate Preliminary Year, Elvyn Richards Hall, Loughborough University of Technology, Loughborough, Leics, LE11 3TU. Sunil says that contacts with 9J2AB after July 1975 should be QSLd via W3HNK, and with 4S7AB after August 1968 to the address in "QTH Corner".

D2AAI should be QSLd via SM0GMG for all contacts after 1 September 1976. Stations in Botswana may use the 8O5 prefix until 31 December. XT2AG should be back in Upper Volta at the present time, he was expected to spend two months there starting in mid-October. Mention of 21,315kHz at 1600 as a suitable place and time to find him has been made.

G5RV was expected to be in Ivory Coast during November and December. He was hoping to have the callsign TU4RV and to be active around 14,025, 14,105 and 14,110kHz between 1200 and 1430. It was also said that he would try to operate from Upper Volta.

Simon, VR1AF, is often to be found acting as m/c in the Pacific DX Net which meets at 0600 on Tuesdays on 14,265kHz. VR3AR is K7SAD who is working at a space station project and will be in VR3 until May 1977. He has been reported on 14,202kHz and has also been worked in the UK on 3,795kHz.

ZL4LR/A is a new operator on the air from Campbell Is. It is believed that he is only licensed to operate on 3·5MHz and that contacts need to be made at a rather leisurely pace. ZL3OG/C is thought to be active from Chatham Is, and ZL3NR/C has been received well in the UK on 3·5MHz ssb. ZK1BA will be returning to Manihiki early in 1977 and is hoping to be on 3·5, 14 and 21MHz. KG6RT from Rota (in the Marianas Is) was scheduled to be on the air for three months commencing in October 1976 and was expected to be heard mostly on 14MHz ssb.

There is a rumour that a group of Australian amateurs is interested in visiting the Maldive Is late this month or early in January. They are also believed to be interested in operating from the Laccadive Is but no details are available.

DJ9ZB is now acting as QSL manager for TA2DX, and other stations for whom he deals with QSL requests include A6XN, A7XA, FK8BB, JY3ZH, ST2SA and YK1AA.

*10 Knightlow Road, Birmingham B17 8QB.

QTH Corner

CE9BSA	Antarctic Dept, Navy Post Office, Valparaiso, Chile.
D2AAI	(wef 1/9/76) SM0GMG, L.Mohlin, Granbacksv 15, S-17010 Ekero, Sweden.
D6AA	H. Laugaudin, BP 289, Moroni, State of Comoros.
FG7WO	(see 5W1AB)
FH8CY	Y. Seguineau, BP 50, Dzaoudzi, Mayotte, Comoro Is.
KG6RT	via W6IAE, A. Morton, 944 E Cardinal Drive, Sunnyvale, Cal, 94087, USA.
KV4AA	YASME Foundation, PO Box 2025, Castro Valley, Cal, 94546, USA.
LU1ZA	via LU4EGE, J. Rydzik, Sgto Cabral 1972, Mariano J. Haedo, BA, Argentina.
PJ0A	VERONA, PO Box 383, Curacao, Netherlands Antilles.
TA2DX	via DL9ZB, Carl-Kistner Strasse 19, D-7800 Freiburg, Breisgau, W Germany.
VQ9HCS	via WA1HAA (new QTH) W. Delage, 7534 Purdue Ct, Manassas, Va, 22110, USA.
VR1AF	via W7OK, W. D. Brickley, Box 95, Las Vegas, Nev, 89101, USA.
VR3AR	via WA7GQA, Kay W. Hargis, 2615 W 5730 S, Roy, Utah, 84067, USA.
VR4DN	D. Newman, PO Box 81, Honiara, Guadalcanal, Solomon Is.
YS1MAE	via W2KF, K. M. Miller, 309 Cherry Hill Blvd, Cherry Hill, NJ, 08034, USA.
ZF1RE	Buzz Jehle, 6960 Bunker Hill Rd, New Orleans, La, 70127, USA.
ZL4LR/A	via ZL4NH, P. McRodden, 18 Fraser St, Sawyer's Bay, Dunedin, New Zealand.
4S7AB	PO Box 907, Colombo, Sri Lanka.
5W1AB	via W4KA, 1044 SE 43rd St, Cape Coral, Fla, 33904, USA (enclose sae + irc).

RSGB QSL Bureau, G2MI, Bromley, Kent, BR2 7NH.

WB6EWH/VQ9 says that there are at present three active amateurs in the Chagos Is, but that 30 others are studying for their licences. A51PN has been heard and worked again on 14MHz cw—he asks for QSLs via W3KVQ. A station using the callsign XU1OIK on 14,027kHz cw has been heard mostly contacting the USSR stations and quoting his listener number. The time was appropriate (1500) but it is not known whether activity is beginning again from Cambodia.

Torres, CR9AJ, is very active on 21 and 14MHz. Your scribe had the pleasure of visiting him in September and at that time he had just lost his aerials in a typhoon. He has been reported on 21,200kHz around 1000.

ZD9GF keeps a schedule with PY1ZAG on 14,265kHz at 1245 on most Saturdays and Sundays. He is expected to close down soon.

YS1MAE is now active on 3·5 and 7MHz, and willing to arrange schedules. He is often to be found around 3,795kHz at 0400, 7,080kHz after 0500, and on 14,075 and 21,150kHz around 2300, especially at week-ends. QSLs should be sent to W2KF.

LU1ZA, located in the S Orkney Is, is often to be found around 14,033kHz between 1200 and 1400. He also uses 7,036kHz at 0030. Those looking for a contact with Sable Is may like to know that VE1BFV, who lives on the island, is often on or near 3,654kHz most days after 2300.

The special amateur station, K2UN, which is located in the United Nations building in New York, is likely to be visited during mid-December by some of the delegates attending the General Assembly meeting. It is hoped that it will be possible to demonstrate contacts which give a favourable impression of amateur radio.

The ARRL DX Advisory Committee has been asked by the ARRL Executive Board to look into the desirability of establishing a new beginning for DXCC, with updated country criteria, to commence on 1 January 1980. It is also being said that DXCC Rule 9 (which states that all contacts must be made from the same country or call area etc) is shortly to be amended.

Some special USA stations have been logged recently. Included were the following, with the stations indicated as targets for QSL requests: WF4WBC (WB0OYX), WI9ANG (WA9DZL), WM3PEN (WA3RCA), WY6FDA (WA6WMT), WT1AAA (DJ9ZB). UA3AEL is said to be acting as QSL manager for 4K1D and 4K1F.

Mac Dry, G4CSW, departed for Signy Is (S Orkney) on 28 October, and is due to arrive on 7 January. He will be there for two and a half years and during his absence G3LIK will act as his QSL manager. At the time of writing Mac had not received his callsign.

Dxpeditions

Lloyd and Iris Colvin, W6KG and W6QL, are once again on the YASME trail. They say that they are literally following in the steps of Danny Weil—the first radio amateur in the world to go forth on a sustained full-time dxpedition. Like Danny they started their expedition from the American Virgin Is—they began operations on 6 October and were to stay for one month. From there they planned to visit all nine of the VP countries, and intend to operate on all bands, cw and ssb. They ask others to work them once only per band per mode please. All QSLs should be sent to YASME Foundation, PO Box 2025, Castro Valley, Calif, 94546, USA.

There is a rumour that an Argentinian amateur will be visiting Libya this month and is hoping to obtain operating permission.

OH0NA reports that the lighthouse on Market Reef is now operated automatically and that any further activity from the reef will only take place when expeditions visit it. This is not likely to occur before next spring.

Odds and ends

Although the propagation bulletins broadcast by WWV at 14min after each hour were discontinued after 30 September, propagation information will continue to be transmitted at 18min past the hour. This consists of solar flux figures, A index, details of solar activity, and geomagnetic field behaviour during the previous 24 hours, followed by a forecast of solar activity for the current day. In general high A index figures indicate the possibility of high absorption on the lower frequencies and better conditions on 21 and 28MHz. The general trend of flux numbers is significant—rising numbers suggest periods of improved hf propagation. It is possible that the bulletins will be enlarged to provide more varied and current information.

Frank Anzalone, W1WY, who is closely involved in the *CQ Magazine* contests sphere, was recently awarded membership of the DX Hall of Fame at DXPO 76 in Washington. Frank has supplied RSGB with contests information for many years and your scribe is certain that readers would wish to join him in congratulating him on his award.

Richard Thurlow, G3WW, is anxious to contact anyone who has achieved the 5BDXCC award using two-way phone contacts only.

Guy Simmons, G4DWV (11 Castle Hill Rd, Prestwich, Manchester M25 8FR), is thinking of starting a net—preferably on 28MHz—for licensed amateurs who are still at school. He would be grateful if anyone interested would contact him.

G2OF reports that his callsign is being pirated and that the illegal operator has been active for over a year and gives his name as Fred and location as Warrington. It is understood

that the VP9AH who has been heard active recently is also a pirate.

Awards

The ARI Cinquantenario—1927/1977 Award

Issued to celebrate the 50th anniversary of ARI. Available to licensed amateurs and listeners who have contacted/heard at least 80 Italian stations located in at least 14 Italian regions. (Applicants outside Europe need 50 contacts in 10 regions). Any band 3·5 to 28MHz, and any mode, may be used but each station may only be counted once. No special endorsements are available. All contacts must be during the calendar year 1977, and no contacts/loggings made during contests, competitions, marathons, QSO parties etc of any kind may be counted. Applications should consist of a list of claimed stations giving date, time, band, mode and location, with specific reference to the region. This list should be certified by the award manager of a national society. The award is free, but applicants are requested to enclose $1, or 10 IRCs for return postage. Applications should be sent to: ARI Award Manager, I8KDB, G. Nucciotti, Via Fracanzano 31, 80127 Napoli, Italy, to arrive before 31 March 1978. Note that during the first three months of the year Italian stations are authorized to use the prefixes IK1–IK0 if they so desire.

Contests

The Spanish CW Contest

2000 11 December to 2000 12 December.

3·5 to 28MHz. Exchange RST plus serial number (from 001). One point per QSO, the multiplier is the total number of EA call districts worked on each band added together. Include summary sheet and signed declaration, and name and address in block letters with log which must be posted no later than one month after the contest to: URE Concurso Internacional CW 1976, PO Box 220, Madrid, Spain.

The Hungarian CW Contest

1600 11 December to 1600 12 December.

3·5 to 28MHz. Exchange RST and serial number (from 001). HA stations will also send two letters to indicate their county. One point per contact and a multiplier of one for each different HA county worked on each band. Counties are: BA, BP, BE, BN, BO, CS, FE, GY, HA, HE, KO, NO, PE, SA, SO, SZ, TO, VA, VE, ZA. Final score is QSO points multiplied by the sum of the county multipliers from each band. Logs should include summary sheet and signed declaration and should be sent within six weeks to: Radio Amateur League of Budapest, PO Box 2, H-1553 Budapest, Hungary.

The ARRL 10 Metre DX Contest

1200 11 December to 2359 12 December.

Each station may be worked on phone and cw. Exchanges consist of RS/T plus serial number from 001. VE/W stations give their state/province. Contacts count two points (with USA novices four). Contacts via Oscar are valid. Any stations may be worked. All cw operation must take place below 28,500kHz. The multiplier is one for each state, Canadian call area, DXCC country (except USA and Canada) and for each ITU region (given by /MM stations only and only appropriate in this case). Send logs to: ARRL 10 Metre Contest, 225 Main St, Newington, Conn, 06111, USA, before 21 January.

AGCW-DL Happy New Year Contest

0900 to 1200 1 January 1977.

This is a cw-only event covering 3·5, 7 and 14MHz, and is confined to the IARU Region 1 cw bands. It is open to all licensed amateurs and listeners in Europe. Full details may be obtained by sending a sae to Noel A. Phelps, BRS35608, "Fair Haven", Station Rd, Patney, Devizes, Wilts SN10 3RD.

International DARC Christmas Contest

0830 to 1100 26 December.

3·5 and 7MHz phone or cw only (two sections). Stations may be contacted on each band. If after calling "CQ" any contact is made, the end of this should be followed by a change of frequency. Exchange RS/T and serial number (from 001), DARC members will also give their DOK number. Logs should indicate time, frequency, callsign, number sent and received, if new prefix, if new DOK, and points (one per QSO). Score is the last mentioned added together multiplied by the total of prefixes/DOKs worked on each band added together. Enclose statement giving QTH etc, and post to: H. P. Guenther, DL9XW, Am Strampel 22, D-4460 Nordhorn, W Germany, before 15 January.

Band reports

Unfortunately a change in the *Radio Communication* production schedule meant that it was not possible to use reports received after 8 November. Sincere apologies to those affected. The situation was of course made worse by the breakdown of postal services at weekends.

Conditions during the past month have been rather disappointing, but some quite rare dx has been heard and worked on the lower frequencies. David Whitaker, BRS-25429, organizer of the October 10m Activity Day, reports that the level of activity was much less than during the previous test in April. He makes the point that a quiet band does *not* mean that there is no propagation—calling "CQ" may produce surprising results. The only non-European signals he noted were from ZS3, ZE, 5V4, 9G1, PY and K4EEX. G4DYO reports that he has worked 116 countries on 28MHz ssb since he received his licence in March 1975. So far in 1976 he was worked 100, and he too makes a plea for more activity and more "CQ" calls—*the band is not useless.*

Many thanks to the following for information used in this section: Gs 2CDT, 3HB, 4RZ, 5JL, 3GVV, 3KSH, GM3IAA, 4DYO, 4EAN and 4EDG; BRSs 25429, 35608 and 36999, and A8713.

Stations listed in italics were using cw, the rest ssb.

1·8MHz. 0700 *ZL1RH*. **2300** *UB5SAA, UW3PAW*. **2400** *VP5IZ*.

3·5MHz. 0000 OD5GB, 4J3AM. **0200** PJ0A. **0500** CP1CO, TI3SA. **0600** ZLs. **2000** EP2AX, 9L1NP. **2100** 5B4PW, 6W-8DY. **2200** A9XBD, EP2OD, UH8, UL7, WA6EGL/VQ9, VS6DO, 4J9B. **2300** JW9WT (Bear Is), *ZD9GH*.

7MHz. 0400 6W8A. **0500** CX, EL2EB, FP8AA, WB6KBF/HK0 (QSL to K6JR), LU, PY, VP2KF, VP5M, ZL, WB4SJG/6Y5. **0700** FK8AT, FO8EX, PY, VK, VK9RN (Norfolk Is), VP1MPW, ZL, 5T5s CJ, ZR. **1500** VE7IG. **2000** *JA, ZS*. **2200** W6KG/AJ3, VP9HO. **2300** CM, JH3, PY, W3/4/8/9.

14MHz. 0700 HM9A. **0800** *JA, XW8EX* (?), ZL, 9L1RO. **0900** *HM5HW*, JA, ZL. **1100** VP2KAA, 9Y4SF. **1200**

FB8XO, *P29MO*, WA7AMK. **1300** TF3ST/4U. **1400** FG7AR/FS7, VU2BK, 9K2DR. **1500** KL7IRN, W6, VP9AL. **1600** W6/W7, 8P0A. **1700** *VE7*, W6/W7. **1800** TD76GI, WA6EGL/VQ9. **2100** EA8NF, FM0COO/P/FG7, LU6DIN.

21MHz. **0800** JA, *9Q5SW*. **0900** ST2SA, VE2ZN/SU, WA6ELG/VQ9. **1000** AP2KS, *VK6DS*, *VU2BK*. **1100** AP2s AL, SA, DU1REX. **1200** FG0MM, OX3VO, PY0-ZAE (Trindade Is), VP2G, YB2JL. **1300** A4XFE, FR7BE, VK6HE. **1400** FG7AM, FG0CXG/FS7, VP5M. **1500** *CE0AE*, YN1AZ. **1700** VQ9HCS. **1800** VP5A. **1900** VP2s KAA, KF.

28MHz 0800 *UW0FM* (Sakhalin Is). **1000** *OX3UA*, *VO1AY*, 7P8AC. **1200** *FR7BE*, *VU2LO*, 9G1LZ. **1300** *OA7BI*, *ZD8TM*, 9J2s CB, WR. **1600** 9G1GE. **1700** EL2T, FG7AS, TU2FW, 6W8FP.

Many thanks to all correspondents and especially to the following for items obtained from their publications: *The 29 DX Club Bulletin* **(VK6RV)**, *Long Skip* **(VE1AL/3)**, the *West Coast DX Bulletin* **(WA6AUD)**, *DX'press* **(PA0TO)**, *CQ Magazine* **(W1WY)**, and the *Ex-G Radio Club Bulletin* **(W3HQO)**.

Please send all items for the **January** issue **to reach G3FKM** no later than **4 December,** and for February by **8 January.**

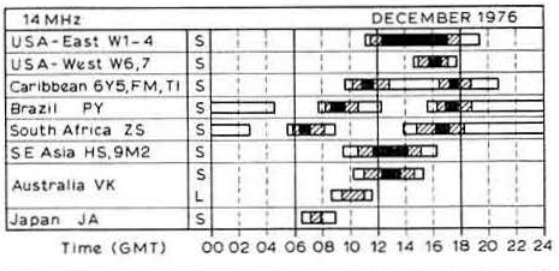
Propagation predictions

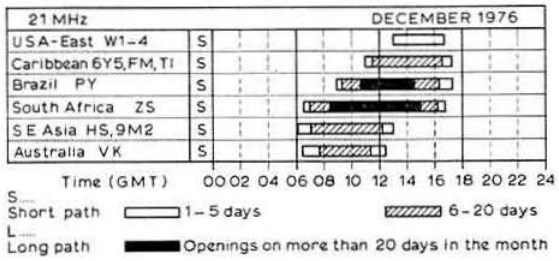
Conditions on the hf bands will be slightly worse than they were in November because of shorter days and the present low level of sunspot activity. **28MHz** will hardly be usable except perhaps under exceptional circumstances to Africa between 1000 and 1430gmt, and South America between 1045 and 1130gmt. On **21MHz** only traffic with South America and Africa will be possible with certainty. On the whole, traffic will be easier from southern countries than from the more northerly parts of Europe. Because of the early sunset, dx will cease about 1700gmt on 21MHz.

In contrast to 21MHz, all continents will be open to traffic on **14MHz**, but again because of shorter days dx possibilities will be brief and cease about 1900gmt: there will be a good chance of WAC on 14MHz between 0700 and 1300gmt. Midwinter conditions on this band favour dx traffic via the indirect path; specially to South America and East Asia before noon and to South America and southern Africa during the early evening. Static may make contact difficult with the southern hemisphere. Between 1630 and 1800 traffic with KH6 should be possible via the indirect path.

After 1900gmt **7MHz** will be the main carrier of dx traffic. From about 1930gmt eastern North America will be heard, as will South America from about 2030gmt. Traffic on this band will be interrupted during the latter half of the night. The **3·5MHz** band will give better opportunities than 7MHz for dx with North America in the latter half of the night. Relatively good conditions can be expected on this band, but during the latter half of the night, and sometimes even before midnight, this band will be interrupted by the dead zone.

The provisional sunspot number for October 1976 was 21·8 with the maximum solar activity occurring during the second half of the month. At this stage of the sunspot cycle the figure represents an active month. It will be noted that the predicted figures show an increase for the first time, indicating the first influence of the new cycle. The predicted smoothed numbers for February, March and April 1977 from the Swiss Federal Observatory are 10, 11 and 12 respectively.





HF PROPAGATION STUDY

Predicted HPFs (MHz × 10) for December 1976

GMT =	00	02	04	06	08	10	12	14	16	18	20	22	24
Aden	135	124	120	211	308	336	321	308	206	164	148	143	135
Ascension	145	147	145	126	265	322	324	301	299	213	172	163	145
Bahrain	131	126	117	206	301	333	315	280	182	155	139	134	131
Bangkok	116	106	102	176	276	307	274	209	145	124	112	110	116
Barbados	134	125	129	122	128	213	317	310	303	260	166	144	134
Bermuda	108	111	107	97	110	150	286	312	299	249	150	124	108
Bogota	133	117	122	114	122	174	310	313	299	261	164	144	133
Buenos Aires	147	139	143	133	163	270	301	200	303	238	171	157	147
Cape Town	143	150	134	166	294	336	326	313	277	185	167	162	143
Colombo	106	122	115	208	298	326	312	375	178	147	133	126	106
Cyprus	124	125	121	166	274	317	299	281	194	148	134	129	124
Dakar	145	134	145	125	265	319	324	301	299	213	172	163	145
Denver	86	86	86	87	94	94	106	196	265	205	126	96	86
Fairbanks	97	101	105	110	94	102	100	100	105	114	107	97	97
Falklands	148	141	143	131	209	266	290	300	301	230	171	158	148
Gibraltar	93	92	91	83	161	214	219	206	178	119	103	100	93
Hongkong	98	88	93	139	237	230	168	138	117	98	93	91	98
Honolulu	96	94	111	105	94	128	128	121	128	128	107	97	96
Iceland	60	60	60	59	73	145	200	195	168	103	70	60	60
Jamaica	111	111	112	100	110	147	279	314	296	252	150	124	111
Lagos	143	148	140	135	284	332	327	304	288	200	171	163	143
Las Palmas	129	129	128	119	204	285	296	279	262	188	150	139	129
Lima	139	128	134	130	135	172	317	308	304	257	167	149	139
Los Angeles	91	87	87	87	100	110	110	138	255	182	121	94	91
Malta	106	108	107	108	214	262	256	246	188	128	115	114	106
Mauritius	136	135	120	204	307	336	326	315	230	164	153	150	136
Mexico	88	93	88	86	88	136	154	290	282	235	131	105	88
Moscow	84	82	79	92	196	255	256	225	135	100	89	89	84
Nairobi	139	116	122	192	308	338	324	315	242	171	161	153	139
New Delhi	120	108	107	194	284	312	267	186	148	129	119	115	120
New York	88	92	89	86	89	111	210	294	288	234	133	105	88
Osaka	94	93	86	94	167	136	122	119	102	88	82	82	94
Perth	130	121	115	208	295	323	288	263	176	145	131	124	130
Rio de Janeiro	148	140	143	131	181	295	322	300	303	230	172	158	148
Salisbury	140	140	128	187	305	338	327	317	253	176	166	158	140
Seychelles	135	114	120	210	308	336	324	310	218	166	150	150	135
Singapore	124	112	107	194	284	314	298	261	158	133	119	106	124
Suva (s)	100	106	107	100	101	163	181	158	122	94	87	94	100
Suva (l)	143	158	148	130	266	251	239	213	176	204	174	163	143
Sydney (s)	98	88	93	139	237	263	262	195	117	98	93	91	98
Sydney (l)	140	130	135	131	145	239	210	162	150	201	167	149	140
Teheran	131	122	115	208	298	323	308	270	173	145	133	122	131
Wellington (s)	98	97	93	79	150	227	243	163	101	88	77	86	98
Wellington (l)	148	145	149	133	219	221	162	159	172	220	176	157	148

Special event station

G3FVU, 10–12 December

Wessex ARG will operate this station from the Haven Hotel, Sandbanks, Dorset, to mark the 75th anniversary of Marconi's first transmission across the Atlantic. They will operate in the area of the hotel used by Marconi, and a number of items used by him when his experimental station was set up at the hotel from 1898 to 1926 will be on display. Operation will be on 80–20 and 15m, and 2 and 4m fm for local communication.

IARU Region 1 VHF Managers' Meeting
Amsterdam 16-17 October 1976

by G. STONE, G3FZL, RSGB vhf manager

IARU Region 1 conferences are held at three-yearly intervals, the last being in Warsaw in April 1975. Between these conferences a vhf working group meets usually once under the chairmanship of Kees van Dijk, PA0QC, to review progress and begin preparations for the next full meeting. On 16-17 October 1976 such a meeting was held in Amsterdam, a convenient travelling centre for western Europe. The following countries were represented: Belgium, Czechoslovakia, Denmark, Finland, France, Federal Republic of Germany, Italy, Netherlands, Norway, Sweden, Switzerland, Yugoslavia and the UK. Roy Stevens, G2BVN, Secretary of Region 1, represented the Executive Committee, and the RSGB delegates were Dain Evans, G3RPE, and G3FZL.

The main business concerned preparations for WARC 1979 when all amateur allocations will come under review. The task is to prepare a co-ordinated approach to the retention of our allocations above 30MHz, to determine potential new allocations and to show in the best possible light the responsible use of present allocations. Agreement was reached to attempt to obtain a new allocation, perhaps several hundred kilohertz wide, in the 50–51MHz band. It is expected that in the 1980 time frame current usage in this band will reduce and the amateur movement should be ready to seek some of the space so freed. This would be a valuable allocation, already available in Regions 2 and 3, where all modes of propagation occur, including trans-equatorial scatter—a mode discovered by amateurs during the International Geophysical Year in 1957. The RSGB has included 50MHz in its plan for future UK amateur radio allocations submitted to the Home Office several months ago. It would be wrong to raise false hopes, as there is likely to be considerable opposition from those countries in Region 1 who wish to continue their established television service, but WARC 1979 will probably be the best opportunity in the foreseeable future. Other Region 1 Societies will make similar requests to their administrations.

The 144–146MHz band, by far the most used allocation above 30MHz, will certainly come under pressure from other interests such as land and aeronautical mobile services, and we will have to fight hard to retain this band. There is already a common allocation to Region 1 on an exclusive basis although there have already been some encroachments from military aviation users, although most of this traffic has now transferred to the 225–400MHz band. Another vhf band that could be of interest to amateurs is 220MHz and it was decided in Warsaw to sound out administrations unofficially to see what possibilities there might be. Almost every approach proved negative, except in Denmark; to such an extent that it has now been decided not to pursue what is likely to be a hopeless case.

The 430–440MHz band, especially 430–432 and 438–440MHz, is another one subject to potential outside pressure. Loss of the upper part would have a very serious impact on atv, the main justification for the retention of a wide allocation. Unfortunately there is not much atv activity outside France, West Germany and the UK, and the preservation of this bandwidth is likely to be very difficult. However, we will not concede defeat and atv users will be encouraged to continue and to expand their utilization of the upper part of the band. ATV will have to share the amateur space service allocation 435–438MHz and share with narrow band communications in the lower part of the band below 434MHz.

A big expansion of activity is planned in the lower part, both of normal traffic and by the addition of many new repeaters to the Region 1 plan agreed in Warsaw, and others such as the Swiss/German scheme using 431/439MHz input/outputs, and the RSGB modification of the Region 1 plan designed to improve compatibility with existing atv systems. Thus 432MHz will be treated as one of our most valuable allocations and we must make even better use of the band than we have in the past—or we risk the loss of some, or even all, of the band to other users.

The microwave bands at present in the range 1–24GHz are now being increasingly well used and this trend must be maintained. It was agreed by the meeting that each society should nominate a national microwave co-ordinator to be responsible for the exchange and dissemination of information. The RSGB is responsible for sponsoring the 10GHz band, and DARC the 2·3GHz band, and it was agreed that these two societies should act as focal points for the distribution of microwave data throughout Region 1. Additionally, it was agreed to seek several allocations in the segment 40–275GHz.

The next step is for those societies which have not yet contacted their national administrations to make their requirements for the future known. *The Amateur Service*, the RSGB paper on the subject already submitted to the Home Office, was shown to the meeting and created much interest.

Band plans

The 144MHz band plan updated in Warsaw was reviewed and some minor amendments agreed. S20, 145·50MHz, is now designated the international fm calling channel and the use of 145·0MHz for this purpose by the UK was deprecated. The RSGB was asked to discourage the use of 145·0MHz (repeater input channel R0) as a calling/working simplex channel. France (REF) wanted an a.m. calling channel, possibly 144·80MHz, but there was very little support for this as a.m. is rapidly disappearing from this band. The question of amateur emergency network channels was discussed. It was agreed that any channel could be used for emergency purposes and that other amateurs should always give priority to such traffic. Another agreement was to discourage the use of fm simplex on repeater input channels.

ATV sound and control channels were discussed. France proposed channels 144·17/·18/·19MHz fm for use since the third harmonic of this falls outside the 432MHz band video channel. This was strongly opposed by most societies and instead the channel 144·750 MHz proposed by BATC through RSGB was agreed.

The 432MHz band plan as modified in Warsaw was the subject of much discussion. There is a potential conflict between atv, the amateur space service and narrow band traffic. The new RSGB 432MHz repeater plan came in for some criticism owing to the unilateral adoption of a plan different from the Region 1 agreement. RSGB problems were explained and the success of the modified Warsaw repeater plan reported. In fact there was some support for the RSGB revision, but societies were worried about the prospect of a change to a plan so recently adopted by Region 1.

The present situation is that there are now four Region 1 432MHz repeater systems. These are the original Austrian/German/Swiss wideband system 431/439MHz input/outputs; the Swedish 4·6MHz system using 433/437MHz input/outputs which SSA members retained at their annual meeting in preference to the Region 1 plan; the Region 1 plan itself now being implemented in Denmark, with others planning to do so, and the RSGB adaptation of the Warsaw plan reversing input/output frequencies to place the outputs of well-sited repeaters lower in the band. Thus Region 1 has two choices, to change the plan adopted at Warsaw or to continue with the four different systems currently in use. It was unanimously agreed that no precipitate action should be taken and that the subject would be reviewed again. However, the author predicts that others will follow the RSGB example, especially those countries bordering on the North Sea where, under good conditions, a ring-round could occur between two repeaters sharing the same channels but with reversed input/output frequencies.

The relationship of atv to repeaters was discussed fully, together with picture standards CCIR1 and 2 and the German "Schmalband" narrow band dx tv system. ATV interest is strong in comparatively few countries, and in no other country besides the UK and Sweden has there been strong reaction against the Warsaw repeater plan. In West Germany atv successfully coexists with that country's wide-spaced system, and in France there is no amateur allocation between 433 and 434·5MHz so that the Region 1 plan is not applicable. In any case, repeaters are only just being recognized by the French administration and initial plans concern the 144MHz band only.

Technical aspects of vestigial sideband atv transmissions were discussed and the problems of overspill outside the amateur band noted. ON4ZN of UBA was not convinced that these problems were insuperable (he is professionally engaged in television engineering). Clearly atv amateurs should be encouraged to develop a satisfactory solution and to have the results published. The Schmalband system should also be encouraged.

Another interesting problem affecting DARC and VERON was the published availability on imported Japanese equipment of 432·0MHz as an fm channel. This conflicts with the worldwide eme allocation, and the importers and manufacturers were therefore approached. They agreed to cease supplying this channel and also 431·96 and 432·04MHz based on the Japanese 40kHz frequency separation scheme—a splendid example to all manufacturers of the need to co-operate with national amateur radio societies.

The next band for which planning has yet to be effected is 2·3GHz. In the UK this band is 2·3 to 2·45GHz, while in West Germany the present allocation is 2·3 to 2·35GHz. DARC is currently planning the first repeater in this band on 2,303·925/2,348·925MHz input/output. The principal justification for a wide allocation is that this band is the lowest on which pulse modulation is permitted. It is shared with a planned ESRO satellite with a frequency between 2·3 and 2·31GHz: there are also military radar interests. It was agreed that DARC should draft a plan for the whole band by April 1977 given inputs from national societies by 31 December 1976. Details of the draft plan will be sent to Regions 2 and 3 to permit full international co-ordination.

Of particular importance in all allocations above 30MHz are harmonic relationships. These must be preserved in any negotiating adjustments that may occur at the time of WARC 1979, and IARU representatives at the conference will be supplied with priorities for segments within existing allocations and for harmonic relationships in any new allocations.

Repeaters

Linear repeaters are comparatively few in number, an example being the Czechoslovak 144·570/145·470MHz 20kHz bandwidth which is due to change to 144·470/145·470MHz on 1 January 1977. It was agreed that in-band 144MHz repeaters presented special problems and new ones should be discouraged. Outputs on the 144MHz band from 432MHz repeaters are also to be discouraged for future repeaters. All fm repeater and simplex channels are to be avoided, as the prime purpose is for dx working and this means mainly cw and ssb. Terrain is such in Czechoslovakia that the above-mentioned repeater has proved to be very popular and has considerably enhanced 144MHz activity in more remote parts of the country. At the next Region 1 meeting, plans will be developed for linear repeaters with outputs in the 432MHz band.

Many societies are planning and implementing both 144 and 432MHz fm repeaters, and inter-country co-ordination is essential to minimize mutual interference. The names of repeater managers or co-ordinators from each society, together with 144 and 432MHz plans and repeater listings (including altitude), are to be sent to DJ1XK to assist overall Region 1 planning.

Another repeater issue was the use of pilot tones. It was unanimously agreed that all tendencies towards private or selective repeaters should be prevented and that the only tone permitted should be the standard 1,750Hz initiation toneburst. Comment was made that the UK practice of a toneburst before each transmission was not in accordance with the Region 1 standard and it was found that the specification clause is open to differing interpretations. This will be referred to the RSGB Repeater Working Group for consideration.

Beacons

The RSGB co-ordinates Region 1 beacon allocations and proposed a standardized keying pattern developed by G3COJ aimed at overcoming the long wait and differing keying methods of beacon callsigns. This will now be finalized into a draft standard for adoption at the next Region 1 meeting. Another issue was the conflicting views (a) that repeaters supersede the need for beacons and (b) that they are in no way related, as much beacon use is for dx propagation assessment and as such is not associated with channelized fm. It was agreed that both will continue to have their place in amateur radio. The Region 1 executive has suggested that Region 1 beacons should be registered with the International Frequency Registration Board in Geneva as a legitimate service. This will be done progressively to strengthen the amateur service hold on frequency allocations.

Contests

As usual at vhf managers' meetings, contests were discussed. The RSGB suggested that a distinction should be drawn between the "waveguide" bands and lower microwaves and that the October contest should cover 432MHz, 1·3 and 2·3GHz, and the June microwave contest the bands from 3·4GHz up. This received some support although some thought that the "waveguide" bands should start at 2·3GHz. It was agreed that all societies should write to Dain Evans, G3RPE, as a microwave contest focal point, and that recommendations would be put to the next conference.

DARC proposed the use of a standardized cover sheet for contests (already RSGB practice with Form 427). However, the DARC form is designed to minimize work in checking, and copies will be given to the RSGB VHF Contests Committee to see if any improvement can be made to the RSGB form. The duration of co-ordinated Region 1 contests was reviewed, as some societies consider 24 hours to be too long: they prefer 18 hours or even less. However, it was agreed that no change should be made to the general rule of 24 hours, although the November cw contest, at present 12 hours, 2000 to 0800 in the first weekend, will be reviewed later. There was general agreement as to categories of entrants when segregated. The two agreed are single-operator home stations and any other category multi-operator/A/P/M etc.

A further point stressed was the need for prompt publication of regionally judged contests such as the September 144MHz and the October uhf/shf events. Several very long delays which have occurred during the past few years are causing a loss of interest in such contests. The results of the 1974 contests had not yet been published, although they had been sent out from the judging society SRJ (Yugoslavia) in April 1975 and only received in two countries. Further copies of the results booklet will be sent out as soon as possible.

Amateur satellites

Karl Meizner, DJ4ZC, briefed the meeting about AMSAT Phase 3. Oscar 8 is being developed by AMSAT-DL for probable launch in mid-1979. The orbit will be elliptical with a 40,000km apogee over the North Pole. As a result it will be usable in the northern hemisphere for hours at a time. DJ4ZC stated that if Oscar 8 is successful, amateur radio will never be the same again. The final choice of up and down links in the 145 and 435–438MHz bands had not yet been made although a 145MHz downlink offered some advantages. Its on-board computer will be reprogrammable from the ground and will provide ample opportunity for the application of the very latest digital techniques. The planned life is four years.

The meeting closed on a very harmonious note, again demonstrating the ability of vhf managers to co-operate and to compromise. WARC 1979 can be faced with confidence but not complacency, and much work remains to be done. □

Welsh Amateur Radio Convention

The third Welsh Amateur Radio Convention was held in glorious sunshine on Sunday 26 September, and attracted over 400 visitors to Oakdale Community College, near Blackwood in Gwent, home of Blackwood & DARS which organized the event. Attendance was 25 per cent up on last year, and the increasing popularity of this annual event now extends beyond south Wales and the west country, with visitors coming from London, the south coast, west and central Wales and the Midlands. The trade exhibition was much larger this year, and this appeared to be a popular move, keeping bargain hunters happy. Other features included a tape/slide lecture, "Oscar 6 and all that" by Pat Gowen, G3IOR, supplemented by a model of Oscar 7; "DX operating", a fascinating talk by Roger Brown, G3LQP; and "Israel—the promised land", a colour film showing many Israeli amateurs and famous sights. The convention station, GW6GW, was operational all day on 20m, and the first QSO was with VK6CT in Perth.

The committee would like to thank all who attended, the traders, lecturers and the members and XYLs/YLs who helped on the day. We look forward to seeing you next year.

Among the visitors to the convention were (l to r) GW3XVQ, GW8FCV, GW8GKF, Steve Rees, GW8FXM and GW4BLE

council proceedings

A brief report of the Council meeting held on 7 September 1976

Present: Dr E. J. Allaway (*President, in the Chair*), Messrs D. J. Andrews, P. Balestrini, Dr D. S. Evans, Messrs W. F. McGonigle, C. H. Parsons, W. A. Scarr, R. F. Stevens, G. M. C. Stone, C. J. Thomas, D. M. Thomas (*members of Council*), G. R. Jessop (*general manager*), A. W. Hutchinson (*editor*), D. A. Evans (*minutes secretary*).

Apologies for absence were received from Messrs R. J. Baker, J. O. Brown, D. Byrne, R. W. Fisher, D. Pratt, A. W. Smith and Lord Wallace.

Welsh beacon
Mr Parsons reported that the Welsh beacon GB3SGW was not yet on the air and that although the equipment was now almost ready for use, some siting problems had to be resolved. The general manager said he would discuss this with Mr Hills, G3HRH, of IBA.

Financial report
In the absence of the honorary treasurer, it was decided to leave the full report until the next Council meeting.

Progress on data processing project
Mr D. A. Evans reported in detail on the progress made to date in programming and testing the IBM32. He said that it was performing as envisaged and he expected a further 8 to 10 weeks programming and testing would be required. Mr Stevens, on behalf of Council, thanked Mr Evans for all the extra time he was spending on the data processing project.

Structure of committees
Mr Jessop circulated a report on the structure of committees as a basis for discussion resulting from a meeting of interested parties. He further explained the diagram associated with the report, and the proposed structure of an improved committee organization.

Mr C. Thomas felt that zonal members were the least lightly loaded on committee work.

Mr Stone said committees were not co-ordinated effectively.

Mr Balestrini said that a co-ordinating function was certainly required.

Mr McGonigle said there might be a problem with expense if zonal members had a greater involvement.

Dr Allaway said that in a re-organization as suggested zonal members would not be involved in more expense.

Mr Scarr said the main question was "was there an inadequate committee structure at present or an inadequate communication system?"

Dr Evans said that he thought that the main attractive feature of the proposal was clearly defined responsibility for hf, vhf and microwaves; this basically divided activities as per the rf spectrum.

Mr Stevens said that he did not think that there was a great deal wrong with the existing committee structure and said that many other societies in the world were trying to emulate the RSGB. He thought, however, that the area of liaison between each committee and headquarters could be improved, and that the plan should be put to all committee chairmen to see what their reaction to the scheme would be.

Mr Parsons said that in his view the Society tried to give too many services for the manpower and finance which the Society had available. He thought it was trying to behave as if it were a large commercial organization and that this placed heavy loadings on certain individuals. If the Society were trying to become more efficient and reduce costs it should be looking for some simplification in the committee structure.

Society trophies
Council approved the following awards for 1976:
ROTAB Cup for outstanding and consistent dx work to Mr P. A. Miles, G3KDB;
Calcutta Key for outstanding service to international friendship through amateur radio to Mr B. Clark, 9J2CL/G3VCL;
Founders Cup for services to the Society to Mr I. Jackson, G3OHX.

Election of President for 1977
The President called for nominations for the Society's President for 1977. Mr Stevens proposed that Lord Wallace of Coslany be the 43rd President of the Society. Mr Parsons seconded this proposal and it was carried unanimously.

Membership and representation
Mr Jessop said that as from the beginning of August all new members were being entered on the IBM32 and that as yet it had not been possible to produce listings of new members as this was not considered an initial high priority.

It was resolved:
(i) to accept reduced subscriptions from 15 members;
(ii) to waive the subscriptions of three members;
(iii) to grant life membership to Mr R. B. Crofts, G3UPK;
(iv) to grant affiliation to the Sierra Leone Amateur Radio Society; St Andrews C of E School, Croydon; Tyne & Wear Repeater Group.

Mr Jessop reported that as there were three valid nominations for a Region 7 representative there would have to be an election.

Alexandra Palace Exhibition
Mr Jessop reported that the profit from the exhibition was in the order of £250.

Mr Andrews said that he thought Alexandra Palace had been very successful and that it had been refreshing to see an exhibition without "black boxes". He proposed a vote of thanks on behalf of Council to Messrs J. Hitchins and P. Thorogood for their work on the exhibition.

It was reported that Brunel University would not be available for the 1977 VHF Convention, and it was intended to have a combined vhf and hf convention and exhibition at Alexandra Palace in May 1977.

Membership card
Mr Jessop reported that towards the end of 1976 a membership card would be circulated to all members of the Society. The card would be renewable each year on payment of the membership subscription and act as a receipt for payment.

Raynet
Mr Balestrini said that Raynet was a hybrid organization which was open to any amateur, not necessarily a Society member, and at present had 1,800 members. Assistance was received from the Society but he did not feel that Raynet should be a Society organization. Mr Balestrini said he hoped that national Raynet frequencies could be set up and wished to see more hand portable operation.

Mr Stone said that there could well be significant changes within Raynet which could result in a sudden demand for operators. Since the County Emergency Officers had been included there had been many calls and it was necessary to issue broad guidelines to controllers.

Mr Stevens said that Raynet should outline to Council its proposals for providing a service within the context of the amateur radio service. It was vital for information to be circulated informing members what was going on.

Citizens' band
A paper prepared by the Telecommunications Liaison Committee on citizens' band had been circulated to Council members. Mr Stevens said that many members were concerned about the citizens' band situation and that as yet the Society had made no definite statement, and he asked Council to approve the paper for publication.

Mr Stone said he thought that the paper had set out the position very well but asked if a paragraph could be included stating why the 27MHz band was considered a very unsuitable band for citizens' band operation.

This was agreed and Council approved publication of the paper as so amended.

Mr Stevens said that it must be the duty of the RSGB to see that the amateur service is not affected in any way if a citizens' band is introduced at some stage into the UK.

Committee minutes
Council received the minutes of the following committee meetings:
Technical & Publications (18.5.76, 13.7.76), HF Contests (20.5.76), Propagation Studies (27.5.76), Mobile & Exhibition (8.6.76, 21.7.76),

Repeater Working Group (19.6.76), VHF Contests (24.6.76), Education (26.6.76), VHF (17.7.76), Telecommunications Liaison (15.7.76), Finance & Staff (15.7.76).

Council approved the following awards recommended by the Technical & Publications Committee:

Norman Keith Adams Prize for the most original article contributed to *Radio Communication* during the year to Messrs F. Charman, G6CJ, and R. Harris, G3OTK, for "Subjective selectivity and stereocode" published in September 1975;

Courtnay Price Trophy for outstanding technical development in the field of amateur radio during the year to Mr P. Blair, G3LTF, for his work on 1·3GHz ssb;

Wortley-Talbot Trophy for outstanding experimental work in the field of amateur radio to Mr L. Moxon, G6XN, for his work on aerials reported in "Technical Topics", January 1976;

Ostermeyer Trophy for the most meritorious description of a piece of home-constructed radio or electronic equipment published in *Radio Communication* during the year to Mr C. S. Gare, G3WOS, for "A 70 to 432MHz transmitter converter" published in November 1975.

your opinion

The Editor
Radio Communication

Sir—To judge from recent correspondence, it does not appear to me that members have taken into account the possibility that any citizens' band licence granted to British nationals will be different from that presently granted to USA citizens.

It has been made abundantly clear that the experiment of granting a totally non-exclusive licence has resulted in many worthy, but entirely non-technical citizens not taking up their options. They have left the other, less worthy, ones to dominate the band more and more. With a non-exclusive licence, it is every citizen's right to forego the opportunity of joining the general melee, but I cannot help feeling that society has failed if it cannot offer some broad choice to suit everyone.

The history of licensing in this country has revealed a surprising paradox. Before the war, when most equipment had to be built rather than bought, there was no technical test. On the other hand, operating ability had to be good, and literacy compulsory. Illiterates cannot, by definition, learn morse code.

In recent years, as the availability of "off the shelf" radio stations has become commonplace, the emphasis has, paradoxically, been on technical proficiency rather than good operating ability. The ultimate in paradoxical results in an age of "off-the-shelf" radio stations is the Class B licence, where the ability to build equipment is strongly favoured, but literacy and good behaviour remain untested; thus confirming a headlong descent into a situation where selection is of the *un*fittest.

Would a world in which the driver of a motor-car, the piano player or the computer operator had to show they could build a motor car, a piano, or a computer before being allowed to use one be considered equitable by the vast mass of people generally? Emphatically no. Yet that is the logical outcome of present policies.

Many members may be unaware of the efforts being made in the world of pmr (private mobile radio), to develop foolproof vi (vehicle identification). Surely, one might have thought, the master station knows who is operating which vehicle? They do, of course, *provided the operator gives a callsign.* But 144MHz operators may be astonished to learn that in many cases they do not.

All the evidence, both from within the radio communication world and outside it adds up to a total condemnation of the whole principle of permissiveness. This has always been so in all societies and at all times in man's history. Only one conclusion can be drawn; citizens have got to be selected on their record before being given any privileges whatever. It is quite improbable that there will be any "over-the-counter" citizens' band licence in this country, though, by proper selection, some citizens may be permitted to use a citizens' band, eventually.

B. J. P. Howlett, G3JAM

raynet

S.W. Law, G3PAZ *

THE end of an eventful year is upon us. Eventful by reason of concessions by the Home Office which have made possible the expansion of our activities to an extent unthought of some years back, although earnestly hoped and worked for by the committee and many dedicated members. The amazing summer produced an extremely hazardous situation in respect of forest and heath fires; thanks to the newly introduced County Emergency Officers user service, our groups in the affected areas were able to provide emergency communications which not only received grateful commendation from the authorities but also resulted in some very welcome publicity from local newspapers and even from the national press. We note with gratification that the latter even found space to report the reformation of groups in Hertfordshire.

Again, the large attendances at a number of county shows due to the fine weather gave many groups an opportunity to "show the flag" and to prove the value of the service we are now able to provide thanks to the Home Office's special provision for these events. Once again the relevant authorities were only too happy to express their appreciation of the facilities our groups provided. One group worked so hard that a really worthwhile record was set up for operation hours in Raynet (see last month's issue). As to the flooding consequent on the heavy rainfall which followed the summer, no reports are yet to hand of requests for Raynet services but we await their probable arrival with interest.

Further publicity was given to Raynet during the Radio London broadcast in October; in connection with this we must correct the information in the November column where, due to the copy deadline, the correct data was not finalized at the time of writing. In the event, G3BPT and G3GJW were not present due to other commitments and Raynet was ably represented by G3IIR. Due credit must also be given to all those RSGB representatives who made this amateur radio programme such an outstanding success. We all hope to hear (and see?) more such items appear in due course.

Raynet Committee

The annual committee dinner took place on 19 November when members and their ladies enjoyed a pleasantly relaxed evening, the former secure in their knowledge that those who had travelled far would have to go only a short distance to RSGB HQ for the next day's committee meeting, while the ladies enjoyed the delights of the London shops! As usual much work was on hand for the attention of the committee and details of the principal items will be reported in due course. Membership figures continue to rise and the committee were well satisfied with the day's work.

Newsletter

Controllers in particular are asked to bear in mind that in order to make the proposed newsletter possible, and to produce something of interest to every member, it is necessary to receive news from all quarters. Items should be forwarded to the hon secretary at the address given in the November column. If a foolscap sae is enclosed it will ensure that the sender receives a copy of the newsletter when compiled. Remember that this is one case when no news is certainly not good news!

Good wishes

It only remains to tender the good wishes of the committee and this column to all our members for the festive season and 73 (and 88 where applicable!) for 1977.

Hon Registrations Secretary: Mrs L. A. Crane, "Greta Woods", Bromley Road, Ardleigh, Colchester, Essex.

*130 Alexandra Road, Croydon, Surrey CRO 6EW.

contest news

RSGB UHF Open Contest results

This IARU-oriented event is rarely favoured with good weather and this year was no exception. A short lift occurred on Sunday afternoon, otherwise conditions were poor. East coast stations worked PA0, ON and DL on 432MHz, and one QSO was made with PA0 on 1·3GHz. Overall winner of the portable section was March & DRAS, with Martlesham RS as the runner up. G4DKX was the leading fixed station and G6XM was the runner up. Band winners were G4BPO/P and G8GP on 432MHz, and G4BEL/A and G6XM on 1·3GHz. Runners up were G3PMH/A, G4DKX, G3ULT/P and G3TQF. Certificates go to these stations. All logs have been forwarded to the IARU adjudicating society. *G5HD*

	432MHz			1·3GHz		Overall position	
Posn	Callsign	Points	Posn	Callsign	Points	Overall points	Overall posn
1	G4BPO/P	95,925	3	G3XDY/P	23,750	119,675	2
2	G3PMH/A	89,000	1	G4BEL/A	45,125	134,125	1
3	GW3UBX/P	74,650	6	GW3UBX/P	10,475	85,125	3
4	G3AKF/P	45,960	2	G3ULT/P	33,275	79,235	4
5	G4BRA/P	45,760	4	G4BRA/P	17,525	63,275	5
6	G3WIR/P	37,670	5	G3WIR/P	10,575	48,245	6
7	G8GP	27,945	—	—	—	27,945	8
8	G4DKX	25,885	17	G4DKX	3,925	29,810	7
9	G3OHM	19,841	16	G8GDZ/P	3,950	23,791	10
10	G3NKL	18,525	15	G3NKL	4,875	23,400	11
11	G6XM	13,835	7	G6XM	9,975	23,810	9
12	G8IDZ	12,745	18	G8IDZ	2,650	15,395	17
13	G8IWD/P	12,620	—	—	—	12,620	18
14	G5UM	11,720	—	—	—	11,720	19
15	G3SBV	11,565	13	G3SBV	5,800	17,365	13
16	G8EOP	10,860	14	G8EOP	5,225	16,135	15
17	G8IQL/A	9,600	—	—	—	9,600	21
18	G3UUT/P	9,055	11	G3UUT/P	7,450	16,505	14
19	G4ASR	9,015	19	G4ASR	2,025	11,040	20
20	G8GLM/P	8,950	8	G3PQY/P	9,050	18,000	12
21	G8HGN	8,345	—	—	—	8,345	23
22	G3WHL	8,065	10	G3WHL	7,500	15,565	16
23	G8HBQ	7,985	—	—	—	7,985	24
24	G3RND	2,620	—	—	—	2,620	26
25	G3RQZ	2,335	12	G3RQZ	7,025	9,360	22
26	G8BBN	1,720	—	—	—	1,720	27
27	GI8EWM	850	—	—	—	850	28
	—	—	9	G3TQF	7,825	7,825	25

DF Final Contest results

Fifteen competitors, who had previously qualified to take part, assembled in mist and light rain at the White Horse Hill, Wiltshire, on 12 September; there was one non-starter. Signal strength at the start was arranged to give a false impression of distance but, unfortunately, although each station had been carefully checked earlier only one could be identified because of deteriorating conditions and continual interference. In accordance with rule 4, approximate bearings were issued to all competitors, and the contest started 10 minutes late.

Transmitter A, G3KLT/P, was hidden in a clump of bushes half a mile from the start and was inaudible until a modified aerial was erected before the second transmission. Transmitter B, G3WIR/P, in a disused chalk pit some 12 miles from the start could be reached by road without difficulty, but this road was just off the border of the map and only one competitor found it. An alternative route from the east was on foot along a three-quarter mile rough track. Transmitter C was well concealed in a ditch some 14 miles from the start and made use of 600m of aerial wire arranged in a circle around G4DDL/P, giving most competitors considerable difficulty.

The result was a well-deserved win for Paul Tyler, who found his third transmitter at 1641 and was the only competitor to find all three stations.

The contest was unfortunately not up to the standard expected from a final. While accepting the explanations and apologies of the organizer, we realize that the difficulties were mainly due to deteriorating conditions and hard luck, and our thanks are due to him and to the three transmitter crews for all the work they put into a contest which could with just a little good fortune have been a first-class event. An excellent tea was provided by Mrs Mollart and her helpers at the Stanton St John village hall and did much to restore and refresh the competitors. Miss Findlay kindly presented the trophy and first prize to Paul and well-deserved prizes to the next two arrivals.

			Time of arrival		
Posn	Name	Club	Station A	Station B	Station C
1	Paul Tyler	Chilterns	1641	1447	1534
2	A. Simmons	Oxford	—	1534	1447
3	E. L. Mollart	Oxford	—	1556	1421
4	G. Whenham	Coventry	—	1602	1455
5	B. J. Mahoney	Rugby	—	1610	1451
6	P. Woollett	Dartford Heath	—	1628	1452
7	M. P. Hawkins	Chelmsford	—	1640	1508
8	D. Holland	South Manchester	—	1644	1549
9	P. Lisle	Oxford	—	1645	1433

Six competitors found only station C.

The Commonwealth Contest 1977 rules

Transmitting section

1. Rules. The general rules for RSGB hf contests, to be published in the January 1977 issue of *Radio Communication*, will apply.

2. When. From 1200gmt on Saturday 12 March 1977 to 1200gmt on Sunday 13 March 1977.

3. Eligible entrants. Members of the RSGB resident in the UK and radio amateurs licensed to operate within the British Commonwealth or British Mandated Territories.

4. Contacts. CW (A1) only, in the 3·5, 7, 14, 21 and 28MHz bands. Contacts may be made with any station using a British Commonwealth callsign, except those within the entrant's own call area. UK stations may not work each other for points. In accordance with current IARU recommendations, contestants are requested to confine their operations to within the lower 30kHz of each band.

5. Scoring. Each completed contact will score five points. In addition, a bonus of 20 points may be claimed for the first, second and third contact with each Commonwealth call area (as listed in the accompanying table) on each band. All British Isles stations (G, GB, GC, GD, GI, GM and GW) count as one call area.

6. Logs. Separate logs are required for each band. Each band log should be separately totalled and should include at the end a check list of call areas worked on the band. Logs should be set out as shown in the general rules for RSGB hf contests. Separate band totals should be added together and the total claimed score entered on the cover sheet.

7. Entries. Entries may be single- or multi-band. Single-band entries should show contacts on one band only; details of contacts made on other bands should be enclosed separately for checking purposes. Multi-band entries will not be eligible for single-band awards.

Each entry will consist of the separate band logs together with a signed declaration. The form of declaration is shown in the general rules for RSGB hf contests.

Entries should be addressed to D. J. Andrews, G3MXJ, 18 Downsview Crescent, Uckfield, East Sussex TN22 1UB, England. Adjudication will commence on Monday 16 May 1977. Any entry received after this date may be excluded from the contest. Overseas stations are therefore advised to forward their logs by airmail.

8. Awards. To the winner, the BERU Senior Rose Bowl. To the runner-up, the BERU Junior Rose Bowl. To the leading UK station, the Col Thomas Rose Bowl. Certificates of merit will be awarded to:
(a) First, second and third placings in home and overseas multi-band sections.
(b) The leading home and overseas single-band entries on each band.

Commemorative certificates will be sent to the leading station in each overseas call area. Commemorative certificates are also available to other entrants on request and five IRCs should be enclosed to cover postage.

Receiving section

1. When. Times and dates as for transmitting section.

2. Eligible entrants. Members of the RSGB resident in the UK and all SWLs resident in the British Commonwealth or British Mandated Territories. Only the entrant may operate his receiving station for the duration of the contest. Holders of transmitting licences are not eligible to take part.

3. Scoring. To count for points a station outside the entrant's own call area must be heard in a contest contact. CQ or test calls will not count for points. A station may be logged only once on each band for the purpose of scoring. Where both stations in a contact are heard they should be logged separately and points may be claimed for both entries, provided that the stations are outside the entrant's own call area.

Each complete log entry will score five points. In addition, a bonus

of twenty points may be claimed for the first, second and third stations heard in each Commonwealth call area on each band. All British Isles prefixes count as one call area.

4. Logs. A separate log is required for each band. Logs should show the following details: (a) Date/time gmt, (b) callsign of station heard, (c) report and serial number sent by station heard, (d) callsign of station being worked, (e) points claimed, (f) bonus points claimed. Each log must be set out on one side of foolscap or A4 log sheets and must show the band to which the log sheet refers. A check list showing the call areas heard on each band must also be included.

5. Entries. (a) Each entry will consist of the log sheets, check list and a signed declaration that the receiving station was operated in accordance with the rules and spirit of the contest and that the entrant does not hold an amateur transmitting licence. (b) Entries should be addressed and sent as in rule 7 of the transmitting section.

6. Awards. The BERU Receiving Rose Bowl to the winner. Certificates of merit to the leading entrant in each continent.

Commonwealth call areas

The following call areas are recognized for the purposes of scoring in the 1977 Commonwealth Contest:

A2	Botswana	VR1	Gilbert & Ocean Is
A3	Tonga Is	VR3	Fanning & Christmas Is
A5	Bhutan	VR4	
C2	Nauru	VR6	
C5	Gambia	VR8	Tuvalu
C6	Bahamas	VS5	
G/GC/GD/GI/GM/GW		VS6	
P2	Papua New Guinea	VS9	Gan
S2	Bangladesh	VX9	Sable Is
VE1		VY0	St Paul Is
VE2		ZL/C	Chatham Is
VE3		VU	India
VE4		VU	Laccadive Is
VE5		VU	Andaman & Nicobar Is
VE6			
VE7		YJ	
VE8		ZB2	
VK1		ZC4,5B4	
VK2		ZD7	
VK2	Lord Howe Is	ZD8	
VK3		ZD9	
VK4		ZE	
VK4	Willis Is	ZF	
VK5		ZK1	Cook Is
VK6		ZK1	Manihiki Is
VK7		ZK2	Nuie
VK8		ZL1	
VK9	Christmas Is	ZL2	
VK9	Cocos Is	ZL3	
VK9	Norfolk Is	ZL4	
VK0	Heard Is	ZL5	
VK0	Macquarie Is	ZL	Auckland&Campbell Is
VK0	Australian Ant	ZL/K	Kermadec Is
VP1		ZM7	
VO		3B6,3B7	Agalega & St Brandon
VP2A	Antigua, Barbuda	3B8	Mauritius
VP2D	Dominica	3B9	Rodriguez Is
VP2E	Anguilla	3D	Fiji
VP2G	Grenada & Dep	3D6	Swaziland
VP2K	St Kitts, Nevis	4S7	
VP2L	St Lucia	5H3	
VP2M	Montserrat	5N2	
VP2S	St Vincent & Dep	5W	Samoa
VP2V	British Virgin Is	5X5	
VP5	Turks & Caicos Is	5Z4, 6Y5	
VP8	Falkland Is	7P8	
VP8	S Georgia	7Q7	
VP8	S Orkney Is	8P	
VP8	S Sandwich Is	8R	
VP8	S Shetland Is	9G1	
VP9		9H	Maltese Is
VQ9	Chagos Is	9J2	
VQ9	Aldabra	9L1	
VQ9	Seychelles	9M2	W Malaysia
VQ9/D	Desroches Is	9M6/9M8	E Malaysia
VQ9/F	Farquar Is	9V1	
VR1P	British Phoenix Is	9Y4	

This list has been compiled from the RSGB Countries List and from information supplied by the Foreign Office.

Contests calendar

(We apologise for the incorrect date of HF NFD given last month. The correct date is **11-12 June.***)*

9 January	Affiliated Societies (Rules in December issue)
23 January	70MHz CW
12-13 February	1st 1·8MHz
5-6 March	144MHz Open
12-13 March	Commonwealth (Rules in December issue)
20 March	432MHz Open
2-3 April	70MHz Open
17 April	Low Power
24 April	144MHz CW
1 May	Queen's Jubilee CW
14 May	1·3GHz Open
15 May	432MHz Open
22 May	Queen's Jubilee Phone
28-29 May	144MHz Portable
11-12 June	HF NFD
18-19 June	Microwave
25-26 June	Summer 1·8MHz
2-3 July	VHF NFD
17 July	3·5MHz FD
31 July	144MHz QRP
13-14 August	70MHz Open
3-4 September	SSB FD
3-4 September	144MHz Open
1-2 October	UHF Contest
8-9 October	21/28MHz
15-16 October	7MHz CW
23 October	70MHz Fixed
October-November	432MHz Cumulative
5-6 November	7MHz Phone
12-13 November	144MHz CW
12-13 November	2nd 1·8MHz
4 December	144MHz Fixed

Affiliated Societies Team Contest 1977 rules

There are minor additions to the rules of this event which will not affect the majority of entrants (rules 3(e), 9(b) and 9(c)). Note the changed times—now 1300-1700gmt.

Please include comments on the event with the logs.

1. The general rules for hf contests to be published in the January 1977 issue of *Radio Communication* apply.

2. The Affiliated Societies Team Contest is a competition between teams of stations, each team representing an affiliated society or club. Each club is encouraged to enter as many stations as it can but the result will be determined by the aggregate scores of the five highest scoring stations in each club team.

3(a). Eligible entrants. Each operator must be a member of the affiliated society he represents. In this contest operators need not be RSGB members.

(b). Each station may be single-operator or multi-operator but no operator may use more than one callsign during the period of the contest.

(c). All stations representing a club are to be operated within 25 miles of the normal club meeting place.

(d). No station may represent more than one club.

(e). An affiliated society may enter more than one team. In the case of a society with national coverage, eg RNARS, each team may define a different club meeting place but this should be a place of recognizable significance, eg a naval base or a training establishment. For all purposes other than the indication of affiliation each team entry will be considered to be entirely separate.

4. Contacts. CW (A1) in the 3·5-3·6MHz band. Entrants are requested to confine their operations to frequencies between 3,510kHz and 3,590kHz.

5. Exchanges. Exchange RST, serial number commencing with 001 and "AFS". Stations active during the contest period but not submitting an entry are requested not to send "AFS".

6. Scoring. Five points for each contact. A bonus of five points may be claimed for "AFS" received but will not be granted if unconfirmed by an entry.

7. Logs. Column 5 to be headed: AFS received.

8. Times. 1300-1700gmt Sunday 9 January 1977.

9(a). Entries. Each individual entry from a competing station shall conform to rule 8 of the general rules. All entries from one affiliated society are to be sent in one package to the RSGB HF Contests

Committee, c/o A. M. Smith, 21 Hamsey Green Gardens, Warlingham, Surrey CR3 9RS, accompanied by a declaration by an officer of the affiliated society that each entrant is a member of that society. Entries must be postmarked not later than 24 January 1977.

(b). An individual entry will be invalid if more than 20 per cent of the points claimed are for contacts with members of the entrant's own team.

(c). If it is clear that an entrant has deliberately failed to send "AFS" to certain stations then the entry will be disqualified and points claimed by his team for contacts with that entrant will be disallowed.

10. Awards. The Edgware Trophy will be awarded to the affiliated society whose five highest scoring members have the highest aggregate.

A certificate will be awarded to the station having the highest individual score.

British Amateur Television Club UK SSTV contest

When. 11 and 12 December 1976.

Frequency bands. 3·5 and 144·00MHz bands only.

Times. 1900 to 2300gmt on Saturday 11 December on both bands.
0700 to 1100gmt on Sunday 12 December on 3·5MHz.
0900 to 1300gmt on Sunday 12 December on 144·00MHz.
Contacts via Oscar will also count.

Eligible entrants. All entrants must participate from a UK location.

Section A. Stations both transmitting and receiving sstv.

Section B. Stations only logging sstv signals.

Contest exchange. The contest exchange shall consist of callsign, signal report (RST), serial number, QRA locator or QTH. Of these the last three shall be exchanged in video only. If the location is given in sound it must be given in a form different from that given by video, eg, video-Didcot could be in sound - 10 miles south of Oxford. Serial numbers shall commence at 001 and advance by one during the duration of the contest. Only one contact with each station will count for points.

Scoring. Section A—5 points per station contacted on 3·5MHz. 10 points per station contacted on 144·00MHz. 25 points per station contacted via Oscar. Section B—As above for each station logged.

Contest log. The contest entry log must give the following information: date, time, band, callsign received, report and serial number sent, report and serial number received, QRA locator/QTH received, points claimed and final score.

Entries. All entries should be postmarked not later than 1 January 1977 and should be sent to: Mr P. A. Johnson, G6AFF/T, 38 Kynaston Wood, Harrow Wealdstone, Harrow, Middlesex. Entries will not be returned.

General. Each entry should be accompanied by a brief description of the station together with details of the callsign used, the QRA locator and QTH locations as transmitted on sound and vision together with any other relevant information. Stations entering the contest may only operate from one location for contest contacts. Stations who confirm their video message contents by sound will render themselves liable to disqualification. Results of the contest will be published in *CQ-TV* as soon as is practicable. Recommended frequencies are 3·730 ± 5kHz and 144·23 ± 5kHz and via Oscar.

obituaries

The Society records with regret the deaths of the following radio amateurs:

Mr J. V. Beavan, G3GBL
John Beavan died on 4 October. Licensed for more than 20 years, he was active mainly on 10 and 20m. He was a founder member of Cheshunt & DRC and had been its chairman for the past eight years.

Mr T. Hayhurst, G3NJE
T. Hayhurst died recently. He was active on hf using home-constructed equipment.

Mr E. Rawlings, G5RS
Eric Rawlings, who died recently, obtained his first licence in the 'twenties and throughout his life retained a keen interest in all constructional matters. He was a founder member of RAOTA and president of Guildford & DARS.

Mr A. J. Rourke, GI3JIM
Jim Rourke died on 11 July aged 69. He was a well-known dx and contest operator on hf and a member of DXCC Honour Rolls with over 340 countries confirmed.

The Society has also been informed of the deaths of:

Mr S. Bowman, BRS36299,

Mr C. Humberstone, G3BPO,

Mr F. H. Ladd, G3UFL, and

Mr R. Palmer, G5PP.

The sstv scene

by R. F. G. THURLOW, G3WW*

DJOKQ worked OA4ARE 14MHz on 29 August for his 100th Country two-way sstv and became fourth only in the world to do so. GW3LKK/M operated two-way sstv from Anglesey in October on 3·5MHz.

Pictures from the screens of normal commercial tv sets in the USA continue to be "frame grabbed" through the many new Robot model 400 slow-to-fast and fast-to-slow scan converters and well "viewed" in the UK. DF4FX is believed to be the first user of this model outside the USA but G3XER says it should be available here by December.

While on a short holiday in London in August Clarence Munsey, K6IV, contacted the writer who, with G3GGJ, took him to evaluate G3GRJ's version of the WB9LVI design slow-to-fast scan converter. The opportunity was taken to discuss "the innards" of the 400, of which Clarence is the designer as technical consultant to Robot Research Inc. K6IV confirmed that Ron's video was equal to any he had seen from this 'LVI converter design in many parts of the USA.

G4BLL has started to build this converter also after viewing the results obtained by G3TKR. Boards to add fast-to-slow scan are now available from W3GKW and are being installed by two UK amateurs.

At least two amateurs, both professionally engaged in digital work, have said they are "coming into sstv" with "ram" memories, as to them the trusty 5FP7 type monitor method needs updating.

Interference to video from adjacent channel splatter has been found to be greatly lessened when the sstv filter AF-2 of Modular Communication Systems, Glasgow, is used.

Above: cartoon (insert lower right) seen through flying spot scanner and WB9LVI design slow-to-fast scan converter built by D. J. Raven, G3TKR, on 12in portable tv set

Below: picture received from 14MHz French sstv station using the same equipment

*2 Church Street, Wimblington, March, Cambs.

members' ads

These subsidized flat-rate advertisements are accepted as a service to members of RSGB. They must be submitted on the Members' Ads order form printed in alternate issues of *Radio Communication*, or on a postcard similarly laid out. Each **must** be accompanied by a **recent** *Radio Communication* wrapper addressed to the advertiser, as proof of membership, and a remittance by postal order or cheque for 50p (stamps not accepted). They will not be acknowledged. Those not clearly worded or punctuated will be returned. No correspondence concerning this service can be entered into.

The closing date for each issue is the 1st of the preceding month, but no guarantee of inclusion in a specific issue can be given. Valid advertisements not published in the issue following receipt will be held over until the next issue.

Trade or business advertisements, even from members, will not be accepted for Members' Ads but should be submitted as classified or display advertisements in the usual way. Traders who are members must enclose a signed declaration that the items for sale or wanted are part of, or intended for, their own personal amateur station.

The RSGB reserves the right to refuse advertisements, and accepts no responsibility for errors or omissions or for the quality of goods offered for sale. Advertisements may be edited or abbreviated as necessary.

Post to: MEMBERS' ADS, "RADIO COMMUNICATION", 35 DOUGHTY STREET, LONDON WC1N 2AE.

FOR SALE

RAE comp ICS course, all manuals, £20. Henderson, 53 Dumyat Drive, Falkirk, Scotland. Tel Falkirk 25559.

Eddystone EC10, £60. G8IKF, QTHR. Tel 01-397 8003 after 6pm.

Hartley 13A double beam oscilloscope, with leads, probe, handbook and spare valves, £20. Buyer collects. G4DNY, QTHR. Tel 0742 482755.

KW E-zee match, Asahi ME-IIB twin swr meter, both perf, £25 the pair. G3DVY, QTHR. Tel Hexham 3279.

LA600 linear amplifier by Green & Davis, exc unmarked cond, £85 or exchange for best offer ssb tx or tx/rx, cash adjustment if necessary. G3RTN, QTHR.

Trio TR7200G, S20, S21, S22, R6, R7, as new, £120. Edwards, GW4ESL, 14 Northfield Close, Caerleon, Newport, Gwent. Tel Caerleon 421 195.

IC2F, fitted R5, S0, 20, 21, 22 and xtal toneburst, £75. Linear (4-8075) 80-10m and power pack, £40. Many valves etc. Shack clearance. G3JEP, QTHR. Tel Wisborough Green 339.

RTTY equipment. Creed 7E, 85R, R300, 1200C, rx 9095, tx 7703, Marconi VFT fsk TDMS 5BV3, 5EB, 6EB etc. Offers. G3LDG. Tel Bedford 720241.

Shure model 401A controlled magnetic hand mic, with ptt and bracket, £5.50 post paid. G3RDG, QTHR. Tel 01-455 8831.

Hammarlund HQ170 amateur band rx, 160-6m, good cond, £100. Heathkit Marauder ssb tx, 80-10m 180W p.e.p., immac cond, £175 ono. Bradmatic tape deck, takes old 2,400ft reels, £10. *Wanted:* Atlas 210. G3NAS, QTHR. Tel Walsall 53718.

Rx Lafayette HA800, with xtal calibrator, £42. EMU vfo, 8MHz, £6. Converter MMC 144/28 lo, £14. Stolle rotator Memomatic with control cable, £22. Emsac tx 2, 2m a.m./fm, £10, carr extra. G4DEV, QTHR. Tel 01-850 3304.

PFICV Pye compact Pocketphones. Two tx/rxs, QRV 433·20MHz, F3. Nicads, charger cases. Offers. Consider exchange Hasselblad items. G8HNM, QTHR.

Gone Japanese. Selling Swan 500C tx/rx, 500W p.e.p. input, 80-10m, all valve except the vfo and has just been professionally realigned, features an exc 2·7kHz, 1·6:1 shape xtal filter, £200. C/o G3EQF, QTHR. Tel Mansfield 34058.

KP202 in immac cond, with all accessories same, genuine reason for sale, £115 ono or would consider exchange for Trio 2200G with accessories in same cond. All letters answered. T. R. Slack, 16 Chestnut Drive, Broadstairs, Kent.

Vanguard AM25B, £20. Cambridge boot mounted, £20. Collins TCS12 tx, £12. Redifon GR410 tx/rx, £20. *Wanted:* SP600 rx or similar. Information on R278/B rx. G3HVI, QTHR. Tel Blythe Bridge 3349.

FT101 Mk1, cw filter, fan, SP101, as new, £245. FT2 auto, £120. Heathkit GDIU gdo, £19. SP101, £8. Datong rf clipper, £29. TE2OD rf sig gen, £16. AG71 af sig gen, £16. GW3SFC, QTHR. Tel 068 588 4880 after 5pm.

Comp unused British National Radio School RAE course, now £80, accept £28 ono. Van Hoffelen, 89 Stockshill Road, Scunthorpe, South Humberside. Tel 4760.

Heathkit DX100U, prof built, vgc, £35. G4DZS, QTHR. Tel 01-398 0778.

Multi-meter, Taylor model 75A with instruction book, good cond, £10 plus postage. G3JBU, QTHR. Tel 0604 43020.

Katsumi electronic keyer EK108A, mains operated internal spkr, monitor and socket for headphones, exc cond, £28 ono. G3YTL, 26 Kinsley Road, Knighton, Powys. Tel Knighton 8030 after 6pm.

TR2200G xtals, R5, R6, R7, £2.25 each. 10XJ 8064 (R6 ip), 8053, £1 each. HC6U 3579, 8019, 8081, 24004, 75p each. A.M./cw 80/160 tx inc psu (callers only), £5. *Wanted:* TR2200G xtals 144·4, 144·72, 145·32 or why? Harris, 13 Trenchard Road, Locking, Weston-Super-Mare, Avon.

Pleasant QTH, with FB60 Versatower, planning approved, three bedrooms, dining room, bungalow, Det garage, oil ch, insulated, gardens front, rear, exc cond, radio room inside, pine forest opposite, good neighbours, £18,000. GI4BUJ, QTHR. Tel Glengormley 3032 evenings.

Clearing shack, everything must go. HRO and 10 coils. H/B cw tx, hf bands. H/B topband a.m. tx. Power packs. *RadCom* from 1947. Xtals, valves, components, all at giveaway prices. G2AFV, QTHR.

National RQ413S battery/mains cassette recorder, £30. MA102 fm band masthead amp with psu, £10. Ferguson STA206 stereo vhf tuner/amp and Garrard SP25 turntable, £35. G8BPK, QTHR. Tel Aylesbury 630600.

Belcom Liner 2, with mic and mobile mount, fitted with PA3 preamp, this rig has worked many dx stations (IT8, HB9, DM, OZ, SM and many others), as new cond, £120. G8KOM, 42 Choseley Road, Knowl Hill, Reading, Berks. Tel Littlewick Green 2453.

Drake SSR-1 GC rx, as new, £160 cash. Buyer collects. Tel Dereham 2790.

Hewlett Packard dual trace oscilloscope, laboratory grade 32MHz, frequency response 1/10ms, timebase accepts optional horizontal or vertical plug-in modules, waveform measurement module inc, internal xtal calibration, original cost £760, now £235. G5BPK, QTHR. Tel Holmer Green 2351.

Anglian tx/rx 600, 3·5-29·5MHz, plus psu, all spares, 14AVQ and 40 yards coaxial, comp hf full-gallon station, first sensible offer for cash or exchange accepted. G3AAJ, QTHR. Tel 01-989 6741.

2m solid state Monitor rx, with S0, S20, S21, S22, R5 and R7 xtals, £15. Storno CQM13 hiband fm tx/rx, unmoded, £3.50 ono. G8IWY, QTHR. Tel 01-863 2483 anytime.

QM70 2FM70 transverter, consisting of 2m-70cm tripler and 70cm-2m converter, brand new, never used, £47 ono. G8BXJ, QTHR. Tel Bristol 695839.

Electroniques amateur band unit, with Heathkit rx, £15. AM10D, £13. *Radio Communication*, £1.50. Woden UM1, small motors approx ⅜in sq, DIN plugs. Offers. No cheques please. G8ERQ, QTHR. Tel Harrogate 69801.

100kHz HC13U xtal, £1.30. 2N3055 comp with plug-in sockets, three for £1.20. 10kΩ 1% ¼W resistors, 30p dozen. All post paid. CW/repeater/rtty filters, about £2. SAE details. Silence cover, Creed reperforator, free collect. G3SBA, QTHR. Tel 05827 4815.

FT101, with fan, cw filter, 160m, £240. TW 2m transverter, psu, 200W p.e.p., £95. High power 2m linear, pair 4CX250Bs, professionally built, £120. Many other items, mostly vhf, valves, aerials, rotators, PSUs etc. SAE list. G3LAS, QTHR. Tel Hertford 56122.

No realistic offer refused. Trio TS700 2m all mode tx/rx, will deliver within 30 mile radius of Southampton, reason for sale, going QRT. G4BLV, 32 Ashley Gardens, Waltham Chase, Southampton. Tel Bishops Waltham 2469.

Cambridge AM10 dash, 6ch on 2m, £30. Hiband, 12½kHz, wkg, £35, p&p inc. G8JEW, QTHR. Tel North Shields 79887.

Liner 2, fitted with PA3 preamp and new mic insert, £120. Microwave Modules a.m. tx, 4ch, easily converted to fm, £20. G8HXD. Tel Bagshot 73896.

Shure 444T mic. Boxed pair 28·5MHz walkie talkies. QM70 high power transverter, quality made with built-in transformer, gone QRP. Sinclair fm tuner and decoder. 625 tv camera. 70cm 18-el aerial. G4DVE, QTHR. Tel 0384 55816.

Trio 9R59, in first class cond considering age, suit beginner or as standby rx, spkr inc, £38. Tel Leamington Spa 29361 evenings or weekends.

TCS12 rx, immac, £18. Ex-USAF valve tester by Supreme Instrument Co, manuals, charts etc, mint, £15. Both plus carr. QQVO6-40A, brand new, in carton, £5.50. QQVO7-50, new, £3.50. *Wanted:* R1475 with matching psu. G3GUU, QTHR.

Lowe 2m Monitor rx, xtalled S0, S20, S21, S22, R5, R6, as new, test use only, £30. Scott. Tel 0409 253550 daytime.

Heathkit HW8, psu and matchbox, £100. Signal/one CX-7A 160-10m tx/rx. G5BGM, QTHR.

8MHz xtals, £1 each. Sentinel 2m converter, 24–26MHz, £11. Unmod Hudson AM108 radiotelephone, £5. Shure 201 mic, £5. 6ft enclosed 19in rack, £5. LED swr bridge, £3. 240V ac blower, 3¼ by 1¾in aperture, £1.50. BC639 100–150MHz, just wkg, £5. All carr extra. G3NRU. Tel Maidstone 29292.

Mains transformer, 1,000V, 0–1,000V at 1A, £10. Diode bridge plus eight caps, in network to give 82μF at 1,800V, £5, p & p 10% extra. G3VNI, QTHR.

Magazines. Comp issues of both *RSGB Bulletin/RadCom* and *Short Wave Magazine*, 1961–74 inclusive, *VHF Communications* 1969-71 inclusive, 50p per year or offer for lot, plus carr. G8BJP, QTHR. Tel 0843 31069 evenings.

Liner 2, preamp with rf gain control, extra coverage 144·100–144·530, mic, manual, etc, exc cond, £115. P. Tyler, 48 Pauline Crescent, Whitton, Middx. Tel 01-894 5726 evenings.

Marconi CR100, good cond, with S-meter, £20. Microwave Modules 2m converter, 4–6MHz o/p, £12. Parmeko mains transformer, 6·4-0-6·4V o/p at 12A, £3. G8KAX, QTHR.

2m mosfet preamp, 3dB noise figure, 18dB gain, all coils screened, on pcb 1⅞ by 1½in, £3.50. Toneburst, cmos type, 1,750Hz, adjustable o/p and frequency, zener stabilized, reverse polarity protected, on pcb 1½ by 2in, £3. Both new. G4EBI, 99 St James Road, London SE16 4RA. Tel 01-231 0879 evenings.

Denshi Kyokuto, fm 144–105A, 8 out of 12ch fitted, £120 ono. Mohican, £20. BC221, with charts etc, £15. ¼λ car mount, £5. ¼λ ground plane, £7. The lot for £160. Can deliver Watford and Welling areas. G8KPX. Tel 01-407 1146 office hours.

KW Vanguard, 10–160m, £25. Heathkit RA1, £25. DA1 keyer, £10. Codar PR30 preselector, £6. Heath Cantenna, dummy load, £10. SSM Z-match, £20. Hughes, 67 Penlan Crescent, Uplands, Swansea SA2 0RL. Tel Swansea 41478 office hours.

G3ZVC tx/rx board, comp, wkg on 9MHz, £45 ono. TA31Jr trap dipole, £12 plus carr at cost. G4AZA, QTHR.

Sommerkamp FTDX505, with matching spkr and mic, 560W p.e.p., virtually unused in original packing, £285, delivered. 18AVT/WB, as new, plus 80ft RG213 coaxial, £40. Two 10ft masts plus sundry valves etc, £1 to first caller. G3PBR. Tel Burghfield Common 2572.

Xtals. 5MHz, £1. HC6/U, 8MHz, £1. HC18/U, 8·95MHz, 50p. Send sae with remittance and order. Richard Bowell, 16 Margarite Way, Wickford, Essex SS12 0ER.

FR50B rx, covers 10–80m, plus WWV, with 100kHz xtal calibrator, spkr and manual, new and little used due to illness, in maker's original carton, £80. Tel Larbert 6594 after 6pm.

Mains transformer secondaries, 6·3V 7·0A 255–320 in 5V steps, sealed can construction. *Wanted:* For St Lawrence Hospital Club, diagrams and data, Marconi mf/hf comm rx AD94 (WR473), and B40 rx for copy and return. G3FVD, QTHR.

Pye Pocketphone rx, tx pcb assemblies, plus rx case and handbook, £9.50. Pye 2m base station, plus mic and handbook, £25. Stereo cassette mechanism, unused, £9. Rhode and Schwarz, Polyskop, £750. G3WUN. Tel Rochdale 57353.

Collins 51J-4 rx, recent £100 overhaul, £250 ono. Belcom AMR 104H 7m Monitor rx, R6-R7, S19, S20, 21, 22, £55. Hacker Black Night RP74 portable, as new, £45. R. C. Ebden, 2 Rolleston Close, Petts Wood, Kent. Tel 01-467 5908.

Cambridge LC10FM 10ch pushbutton, fitted S0, S20, S21, R5, R6, R7, £45. U10B fitted 433·2 and RB2 xtals. Offers. 2m 40W amp HA202, £28. *Wanted:* Microwave Modules 70cm transverter. G3NPZ, QTHR. Tel Titchfield 43894.

Yamaha B2, two manual electronic organ, roll top, stool, music, tuition books, as new cond, lovely tones, this is a full size console organ, truly a bargain, £160 ono. Buyer arranges transport. G3MZE, QTHR. Tel Stevenage 57803.

Yaesu FR101 digital deluxe 2m plus 4m, superb rx, brand new, boxed, £425. BC221 frequency meter, £20. New Parabeam, 2m, boxed, £17.50, carr extra. 5 Luther Road, Winton, Bournemouth. Tel Bournemouth 50400.

Europa B with valves, few months old and little used, snip at £80 post paid, first cheque secures. G3HS, QTHR.

Multi-tap transformer, swop only for 2m converter (not 28–30MHz or <3MHz), to get schoolboy on the air, weight 70–80lb, maximum 75V 6A by 2. Buyer collects. Andrew Sharpe, G8MLM, Hazel Dene, High Horse Close, Rowlands Gill, Tyne & Wear. Tel Rowlands Gill 2636.

KW trap dipole, new, never put up, £12. Jap bug key, £5. UMI, 50p. *Wanted:* Squeeze keyer. G4AEI, QTHR. Tel Reading 85123 ext 7614 office hours.

Standard C145B tx/rx, 5ch, 144·48, 144·6 fitted, £75. Price includes case, helical whip, external mic, Basemaster and manual. G8LZP, 9 Dinas Road, Cheltenham, Glos. Tel 0242 53368 after 5pm.

KW2000E and psu/spkr, £300. KW1000 rf amp, £100. KW107 vswr, £60. Inc handbook. Snip the lot, £450. G3RFP, QTHR. Tel 0223 93 50279.

Europa B, brand new and unused, £80. Eddystone 940 rx, exc cond, 0·5–30MHz in five bands, spkr, manual, £95. GM3NIG, QTHR. Tel 041-638 6766 after 10pm.

UHF FR5 Starphone base tx/rx, mains 12V mic, forward/reflected power meter, slim modern equipment wkg on 70cm, £60. 433·2 RB2 xtals, £10. Jaybeam 12XY/70 70cm crossed aerial, phasing harness, as new, £16. G8JAH, QTHR. Tel Rushden 4797.

Satellite 2000 with ssb unit, perf, best offer over £135. With handbooks, Heath RC bridge C-3U, rf generator IG100, gdo GGIU, tape amplifier TA15, 2m converter, Brunell tape deck, AVO model 7. Munro, Succoth Place, Edinburgh 12.

Eddystone 940 rx, exc cond, £90 ono. Jeff Pascoe, 19 Kiln Orchard, Newton Abbot, Devon. Tel Newton Abbot 66470.

FTDX401, with SP401 spkr, mic and manual, £250. FV401 vfo, £30. All leads and manual. Securicor delivery. GM3KCY, QTHR. Tel 041 73563.

Icom 21, £60. BC221, £15. OSI Heathkit oscillator, £15. Marconi TF801A 10–300MHz sig gen, £10 or offers, or lot for 7200G plus cash adjustment. MacGregor, 13 Elmstead Road, Erith, Kent.

Hallicrafters SX110 rx, ·538–34MHz, manual, £35 ono. Prefer buyer collects. G8JMF, QTHR. Tel Stowmarket 3870 evenings.

Heath HW17A tx/rx, mod for frequency modulation, in wkg order. Trio rx 9R59DS, as new, fitted stabilizer and xtal marker, 2m converter, 29MHz. The lot £77. G8MKA, 136 Hough Lane, Wombwell, Barnsley. Tel 0226 3526.

KP202 with all accessories, in immac cond and perf wkg order, comp with 7ch, six fitted, one spare, £120 ono or consider exchange for Trio 2200G, Reason, going mobile and portable. G4ANW, 16 Chestnut Drive, Broadstairs, Kent.

Trio JR310 amateur band rx, 80–10m, a.m./ssb/cw, vgc, manual, spkr, £68. G8LDU. Tel 01-455 9468.

H/B 2m rx, for mainly a.m./fm, mains psu, Telford TC9 type dial, £10. J. S. Roberts, G8FDJ, "Hamme House", Kings Mill Lane, South Nutfield, Surrey RH1 5NB.

Property of deceased amateur. KW Viceroy Mk4. Eddystone EA12. BC221, af, frequency meter. Hallicrafter TO keyer with Vibroplex key. Electrovoice dynamic mic. Lafayette grip dip meter. KW swr meter. KW p.e.p. meter, 0–300W. Three new 813s. Offers. GM3KSA, QTHR. Tel Motherwell 63732.

Icom IC210 tunable 2m fm tx/rx, fitted toneburst with handbook and accessories, £175. G8KER. Tel Rugby 832887 after 4pm.

Liner 2 with preamp, Pye mic insert, £110. G8GMF, QTHR. Tel 01-868 5002.

National NCX500, 80–10, 500W i/p, power pack and manual, £200. Clegg FM27B, 144–146, 40 in 25 out, mobile rig, £150. Buyer collects or can deliver reasonable distance. G3JBI, QTHR.

KW2000B ac psu, very little used, as new cond, £220. G3YNC, QTHR. Tel 01-521 3008.

Europa 28/70MHz, £55. Europa 28/144MHz, £55. AT5 and ac/dc PSUs, £25. FV401, £35. 70·48MHz 10W Storno base station, £5. G4ALG, QTHR. Tel Reading 345046.

Heathkit DX40U tx. Heathkit 0–12–U scope. Eddystone S640 rx. All with handbooks. Reasonable offers considered. Buyers collect. G8MIG. Tel Swanley 64486 evenings.

TS700, late model, well looked after, £310 ono. 2m 5/5 aerial, used, £5 ono. TV Multibeam, group A, £8 ono. Valve stabilized psu chassis, 300V each 100mA and 6·3V ac, £6 ono. G8IRL, QTHR. Tel Ashtead 73065.

Heathkit HW202 fm tx/rx, with HWA-202-1 psu, suitable mobile or base station, £125 ono. G8JBK, QTHR. Tel Colchester 230318.

Trio 2m converter TV502 for the TS520, 100% clean, only 20hrs use, £102. Buyer collects. G3CCX, 117 Sea Lane, Rustington. Tel Rustington 3953 between 10-3.

Hallicrafters Skyrider, £25. No 19 set, £10. Class D wavemeter, £5. Tx/rx, 160m twin, £20. H/B 160m tx, ssb, £5. Multimeter, £3. HD transformer, 240–75V, £2. Ex Pye video rack, stabilizer, psu, 285V, 500mA plus, £15. Other units, some with valves, relays, £5 each. React/RES bridge, may be collector's item, £20. Various other units, £1. Take £100 the lot. Eves, G3JES, 168 Downs Road, Canterbury, Kent. Tel 51441.

Drake R4C rx, comp with MS4 spkr and 250Hz cw filter, immac cond, only six months old, £375. Reason for sale, going vhf. MM converter, 28–30MHz, £10. G4ENV. Tel 01-205 9172.

BC221, charts, mains psu, phones, £20. Pair 6JS6C, new, boxed, £3. Xtals 72·5, 72·7MHz, £1 each. RF ammeters, 350mA, 2·5A, £1 each. H/B 7MHz to 160m tx, transverter plugs into FL400, £10. Thornes TD150AB turntable unit, £10. G8OO cartridge, £2.50. 9TAHC cartridge, £1. Stylus, microscope and pressure gauge, £1.50. Parastat dust bug and preener, £1.50. G4AED, QTHR. Tel 0953 882187.

Pye 50W fm tx, xtals, four Simplex, three repeater, £25. Transistor pa in diecast box, switched fm, ssb, 1W in, 10+ out, rf sensed, £20. G3XGZ, QTHR. Tel Wantage 4004.

KEN KP202, 2W fm, handheld, fitted 6ch and two spare sets, four Simplex, four repeater, complete with nicads, charger, xtal toneburst, helical whip, leather case etc, £90. G8LHD, New House, Water Lane, Barnardiston, Haverhill, Suffolk CB9 7TH.

Free Liner 2, with power supply, mic, mobile mount, to anyone giving me KW2000 or similar hf bands tx/rx in good cond. Will sell Liner 2 plus accessories, £125. G4ATW, QTHR. Tel Wymondham 602474.

Drake R4C, 10–160m, N13 500Hz filter, £300. SSM Z-match, £20. DA1 keyer, £10. Tech TE15 gdo, £10. Pair unused 3-500Z inc chimneys, sockets and all linear components. Offers. Hughes, 67 Penlan Crescent, Uplands, Swansea. Tel Swansea 41478 office hours.

Stretched UEL Cub 6ch 2m fm tx/rx, fitted 145·2, R7, S20, S21, S22, S23, comp with leather case, whip and helical aerials, charger and spare nicads, £70 ono. Buyer pays carr. G8DOD, 4 Beagle Lane, Cranwell, Sleaford NG34 8EG.

TS700 2m tx/rx, in original and superb cond, £300. Hannes Bickel, 11 Belton Road, Camberley, Surrey. Tel Camberley 23803 after 6pm.

100ft wire, £11,750. Will throw in modern three-bedroom (one fitted) semi, north Luton, good vhf QTH, 480ft asl, fitted kitchen, diner, lounge, bathroom, wc, all carpets inc, garage, shed, greenhouse, overlooks countryside, nearby access M1 (No 11) or mainline trains. G3TYR, QTHR.

FT2F, fully xtalled, comp, £100. Heathkit 10–102 5in scope, unused, £80. Burns wavemeter, £27. Xtal calibrator, £32. Both unused. HC6U xtals, 8·06388, 8·081MHz, 50p. *RadCom* 1971–75 inclusive, with binders. Offers. 2m bandpass filter, £3. Phipps. Tel Hinckley 36811.

KW2000B, ac psu, Shure 201 mic, extra xtals for 28·2–4MHz and 29·4–6MHz, KW E-zee match, all mint cond, £210 or exchange for FT101 with cash adjustment. G3ZLJ, QTHR. Tel Wolverhampton 761339.

KW2000, G-line, ac/dc psu, recent revalve inc 6146B, full 10m xtals, handbook, mic, £130. G3USE, QTHR. Tel Luton 20312.

Trio 9R59D, exc cond, £35. Liner 2, one month old, £110. *Wanted:* Oskerblok power meter. Tel Sheffield 303758 after 8pm.

Cintel cctv monitor, 17in, total front control, fitted loudspkr, £17. APT psu, 500V 500mA (twice) regulated and variable, 250V variable plus 6·3V 5A, £10. 7·5A Variac, £3. G3MHS, QTHR. Tel Sedgley 73465.

Versatower SP60, four months old. Hy-gain TH3 Mk3 SNR beam with BN86 balun, two months old. TR44 rotator, 120ft of RG8U HD coaxial and rotor cable. All as new with original packaging. Offers. Tel Nottingham 54047.

Hammarlund HQ170, 160-10m, amateur bands only rx, vgc, £100 ono. G3ZVC board with YF90F filter, wkg order. Offers. G8ILB, QTHR. Tel Stockton on Tees 561452 after 6pm.

"SWM" 1962-71. *Radio Constructor* 1962-69. *Practical Electronics* from No 1, 1964-71. *Practical Wireless* from 1962. Offers. G3HYJ, QTHR. Tel Norwich 37393.

Emigrating. AR88LF, £30. Pye PTC7042 vhf rx, 240V, £8. 19 set, rx only, 240V, £5. All ono. Good junk, meters, relays, semiconductors etc. Bailey 30W amp, £5. Free third edition *Handbook* to swl. *Wanted:* gdo, G3HBW or GDIU. Tel 051 625 8702.

CT436 scope, double beam dc to 7MHz, good cond, handbook, £65 ono. Buyer to collect or arrange carr. *Wanted:* FL50 tx, HQ170 rx. G3NXC, QTHR. Tel 021 706 3109 after 7.30pm.

Skywood CX203 solid state comms rx, a.m./cw/ssb, five bands 200kHz-30MHz, S-meter, bandspread, avc, anl, mains/battery, mint, boxed, instruction sheet, £28 ono. Spreckley, 48 Carisbrooke Drive, Mapperley Park, Nottingham. Tel Nottingham 604274 after 6.15pm.

Are you having difficulty making that 10GHz wavemeter, contact me, metalwork done to special order. One 10GHz wavemeter available, self calibrating, 1¼in diameter micrometer head, Q of 2000, £15 plus postage. G8DPB, QTHR. Tel 01-592 8536.

Heathkit HA201 2m amp, 1W in, 8W out, £16.50 ono. G3RHP. Tel 0473 642708 day, 0473 39403 evening.

KW2000E, as new, £300. Trio 9R-59DE, vgc, £40. Trio 7200G, as new, fitted R6, R7, S20, S21, S22, S23, £150. G4AHO, QTHR. Tel Milton Keynes 315566.

JR500SE rx, with matching spkr and headphones, good cond, £50. Halls shack, 6 by 8ft, good cond, £45. Microwave Modules 2m converter, 2-4MHz, £10. 46-el 70cm Multibeam, good cond, £12. TTC C3005 dual meter swr bridge, as new, £8. Tel Formby 77920.

FT220, with preamp, £230. Liner 2 with extra coverage, offers around £120. Pye Cambridge tx on 145·000 and 145·500. Write first. G8LKF, 180 Victoria Street, Hartshill, Stoke-on-Trent, Staffs ST4 6HD.

Top band station, AT5 with psu and T28 rx, audio tuner, £28. G3MTX, QTHR.

AR88D, good cond, plus spkr and manual, £40 ono. S27, wkg but requires attn, £6 ono. Rooney. Tel 01-579 1286.

Comp station FTDX401, matching spkr, 18AVT/WB vertical, twin meter swr, electronic and hand keys, headphones, YD844 desk mic, lpf, all cables/connectors, first class cond, £300. D. J. Sloss, 65 Tedder Avenue, Henlow, Beds. Tel Hitchin 811943.

Pye PTC300 100W vhf tx, £35. Mobiles: Pye PTC114, £4. Elliott VM1002A, £4. Murphy TR807/50, £2. All a.m. low band. VHF R1132A rx, £7. QQVO3/20, £1.50. A. Hogg, GM8LKL, 124 Muirwood Road, Currie, Midlothian, Scotland. Tel 031 449 2096.

Pair 4CX250B sockets and chimneys, vhf/uhf, brand new. Offers. Europa transverter with preamp and Amphenol coaxial relay, £65. Trio 9R59DS, £45. BC221AH frequency meter, charts and psu, £22. GM4DQX, QTHR. Tel 041 638 3386.

FT243 xtals, 5600 every 25kHz to 8650, unused, £1 each. BRT400 gear drive, £2.50. *QST* mags, 1940-59. Meters, Command rx, spares, valves, sae list. *Wanted:* Highband fm Westminster. 6ch xtal switch for a.m. 10D. G3LHA, QTHR. Tel 0203 414333.

Viceroy Mk3, perf, £70. Few new 4CX250B, £5, and 4X150A, £4 inc postage. *Wanted:* Europa, must be perf. Parker, 133 Station Road, Cropston, Leicester LE7 7HH.

Ferrograph Deck 2A h/b amp, to original specification, manual, 15 tapes, £25. Phillips cassette recorder EL3302A, £10. Telequipment D55A, double beam, 15MHz, twin time bases, delay, vgc, £75. Black and Decker single speed ¼ drill, £5. Buyer collects. Tel Woking 73620.

6-el Hy-gain beam aerial TH6DXX, used only three times, now too big for new QTH, £100 or will swop for newish TH3 Mk3 or similar. Buyer collects or arranges carr. G3KWT. Tel 0532 688821.

Marine vhf vertical dipole, C&S Antennas Ltd type GMD, 156-164MHz, £10. Valves in cartons—RCA 1625, £1.25. 6HF5, £1.50. Brimar 6146, £2.50. Sylvania 6DQ5, £2.25. Eimac 4CX250B, £5.50. All carr paid. G3JMJ, QTHR. Tel 073 271 3467.

WANTED

Rotator CD44, Ham 2 or anything similar. GM8HSY, QTHR. Tel Falkirk 23860.

Marconi TF2330 wave analyser. TF2700 bridge. TF2002 sig gen. H2310 rx. Plessey TDMS70. CT471C multimeter. Levell TG66 oscillator. Modern frequency counter. Modern lf rx. Passfield, 30 Greenleaf Close, Tulse Hill, London SW2. Tel 01-674 5825.

HRO bandspread coils, except 80m, reasonable price. T. Southwell, G4FEU. Tel Upholland 622006 evenings, Wigan 39821 day.

Cossor Commando CC300, CC302 or CC303 high band equipment. Rx front end board, vhf head type 80362/1 for same. 1in crt type 1CP1 or 1CP31. Rycroft, G8IGZ, 31 Baker Avenue, Benson, Oxon. Tel Wallingford 39022.

Schoolboy requires rx. AR88D, HRO-5T, Skyrider. Kind father may collect or will arrange transport, even if London. Mike Shannon, Rowany, Lakeside, Ulverston, Cumbria. Tel Newby Bridge 521.

TS323/UR handbook, loan or purchase. Bandspread coils for HRO on 7, 21 and 28. G. Everett, 10 Brier Lane, Galashiels TD1 2LT.

One or two active xtals, FT243 or similar, 8,273·33kHz. Manual Grundig 865. G3OEI, QTHR.

Dial for Eddystone 888 rx. G3JBU, QTHR. Tel 0604 43020.

Multi-channel hi-band fm Cambridge, with quick-heat pa, dash or boot mount, latter with cables and box. Regency HR440. G6AGC/T G8AXC, QTHR. Tel 072 385 252.

SSB or fm 2m tx/rx box, wanted by schoolboy with small pocket. I. C. H. Prescott, GM8KRL, 64 St Albans Road, Edinburgh EH9 2PG. Tel 031667 2475.

Rx and tx in fb cond, to cover hf bands, no mods, a.m., ssb, cw, would consider comp station. Cash waiting. This is a private purchase. All letters answered. G3WXT, QTHR.

Pauper awaiting G8 wants a.m./fm conversion details, inc tunable rx, for highband Pye Cambridge 6AM10DV. Construction details for mains psu for same and *Radio Communication Handbook*. A. E. Jeffreys, 196 Hollywood Avenue, Newcastle upon Tyne NE3 5BU.

GDO for vhf and hf bands. Rx unit for Pye base station valved type PTC 6/3004XV, power chassis not required, single channel and wider bandwidth acceptable, high band preferable. GM8JMN, QTHR. Tel 031 445 1343.

Xtals for TS700G. Buy, borrow or hire manual for Trio VOX-3. *For sale:* Several years *Wireless World, Short Wave Magazine* etc.

Some meters and various other components, send for list. G8IYK, 13 Hodge Bower, Ironbridge, Telford, Salop.
Pre-1935 components and magazines etc. P. G. Morgan, c/o 93 Malmesbury Road, Shirley, Southampton, Hants.
Heathkit Mohican rx. G3TEP, QTHR.
For KW Vespa, KW psu type PP187 or PP121, good wkg cond. G5LZ, QTHR.
Rx R1155, must be original and comp. CR300 or similar. *For sale:* 250 valves, many early types, as one lot, buyer inspects and collects. BRS33673, Ridgeway, New Hall Lodge, Station Road, Ardleigh, Colchester, Essex.
Trio TS700G or TS700. TS520 and TR2200G. Please state age, cond and price. G3XFB, QTHR. Tel Brewood 850033.
FT101B or similar in good order. G3VLX, QTHR. Tel Orpington 26584.
Old wirelesses wanted by collector-enthusiast, especially GEC before 1932, Murphy up to model 30, Pye, McMichael up to 1936, BTH spkrs, amps, radios, Ekcos, books etc before 1932. Valves. C. Sawyer, 210 Gordon Avenue, Camberley, Surrey. Tel 0276 29460.
For intended school radio club, a comms rx. Any information from anyone doing likewise. G3ZTR, QTHR.
Urgently wanted, Trio TX599, must be in wkg order, preferably with manual and cables. State price. R. J. Napper, 22 Rydal Drive, Hale Barns, Altrincham, Cheshire WA15 8TE. Tel 061 980 4252.
Ultra manual, or any data on Ultra portable tx/rx, model 3A4-AC3. Will pay. GM4AJV, QTHR.
Atlas 180 or 215X. G3GMN, QTHR. Tel Gloucester 31365.
Pye Lynx camera, prefer with lens. Borrow circuit diagram fm Cambridge for photocopy. HF band mobile aerial for all/any bands. HF bands atu. G8GRF/G4BNV, QTHR. Tel Ottery St Mary 3390.
Pye Cambridge, student so not over £30, cheapest and best cond accepted, must be on 2m. Tel 01-508 1862 evenings.
V-3J or Atlas trap vertical. Redman, Ploughman's Piece, Thornham, Norfolk. Tel Thornham 322.
B2 tx/rx or parts. Will collect. Roberts, 23 Pine Drive, Ingatestone, Essex. Tel 02775 3442.

Mobile rallies calendar

3 April	White Rose Rally, Lawnswood School, Leeds.
17 April	North Midlands Mobile Rally, Drayton Manor Park.
12 June	Longleat Mobile Rally. Details nearer the date.
19 June	Royal Naval ARS Mobile Rally, HMS *Mercury*. Organizer: M. Puttick, G3LIK, 21 Sandyfield Crescent, Cowplain, Portsmouth, Hants PO8 8SQ.
17 July	Cornish RAC Mobile Rally, Truro Rugby Club Ground. Details from G3NKE, QTHR.

The proposed RSGB National Mobile Rally on 7 August has been cancelled.

Looking ahead

22 January—RSGB Presidential Installation, House of Commons, London SW1.
24 April—NRSA Convention, Belle Vue, Manchester.
6-8 May—RSGB International Radio Communication Exhibition and Convention, Alexandra Palace, London.
17-18 September—NW Amateur Radio Convention, University of Lancaster

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144·030 ..	b	b	b	b	b	b	b	b	b	b	b	b	b	b
144·4/433·2 ..	a	b	a	b	b	c	b	c	b	b	b	b	b	b
144·480 ..	b	b	b	b	b	b	b	b	b	b	b	b	b	b
144·600 ..	b	b	b	b	b	b	b	b	b	b	b	b	b	b
144·700 ..	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145·000/SO ..	a	a	a	a	a	a	a	a	a	a	a	a	a	c
145·050/R2T ..	a	a	a	b	b	a	b	a	b	b	b	b	b	b
145·075/R3T ..	a	a	a	b	b	a	b	a	b	b	b	b	b	b
145·100/R4T ..	a	a	a	b	b	a	b	a	b	b	b	b	b	b
145·125/R5T ..	a	a	a	b	b	a	b	a	b	b	b	b	b	b
145·150/R6T ..	a	a	a	b	b	a	b	a	b	b	b	b	b	b
145·175/R7T ..	a	a	a	b	b	a	b	a	b	b	b	b	b	b
145·200/R8T ..	a	a	a	b	b	a	b	a	b	a	a	b	a	b
145·300/S12 ..	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145·350/S14 ..	b	b	c	b	b	b	b	b	b	c	b	b	b	b
145·400/S16 ..	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145·500/S20 ..	a	a	a	a	a	a	a	a	a	a	a	a	a	c
145·525/S21 ..	a	a	a	a	c	a	a	a	b	a	a	b	a	b
145·550/S22 ..	a	a	a	a	c	a	a	a	b	a	a	b	a	b
145·575/S23 ..	a	a	a	a	c	a	a	a	b	a	a	b	a	b
145·600/S24 ..	a	a	a	a	c	a	a	a	b	a	a	b	a	b
145·650/R2R ..	b	b	b	a	b	b	a	b	b	a	a	b	a	b
145·675R/3R ..	b	b	b	a	b	b	a	b	b	a	a	b	a	b
145·700R/4R ..	b	b	b	a	b	b	a	b	b	a	a	b	a	b
145·725/R5R ..	b	b	b	a	b	b	a	b	b	a	a	b	a	b
145·750/R6R ..	b	b	b	a	b	b	a	b	b	a	a	b	a	b
145·775/R7R ..	b	b	b	a	b	b	a	b	b	a	a	b	a	b
145·800/R8R ..	a	a	a	a	a	a	a	a	b	a	a	b	a	c
145·950 ..	a	b	a	a	b	b	b	b	b	a	b	b	b	b

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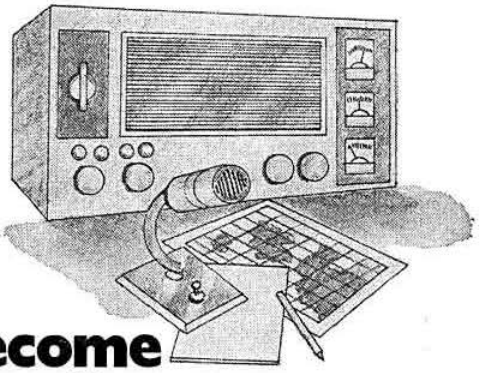

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