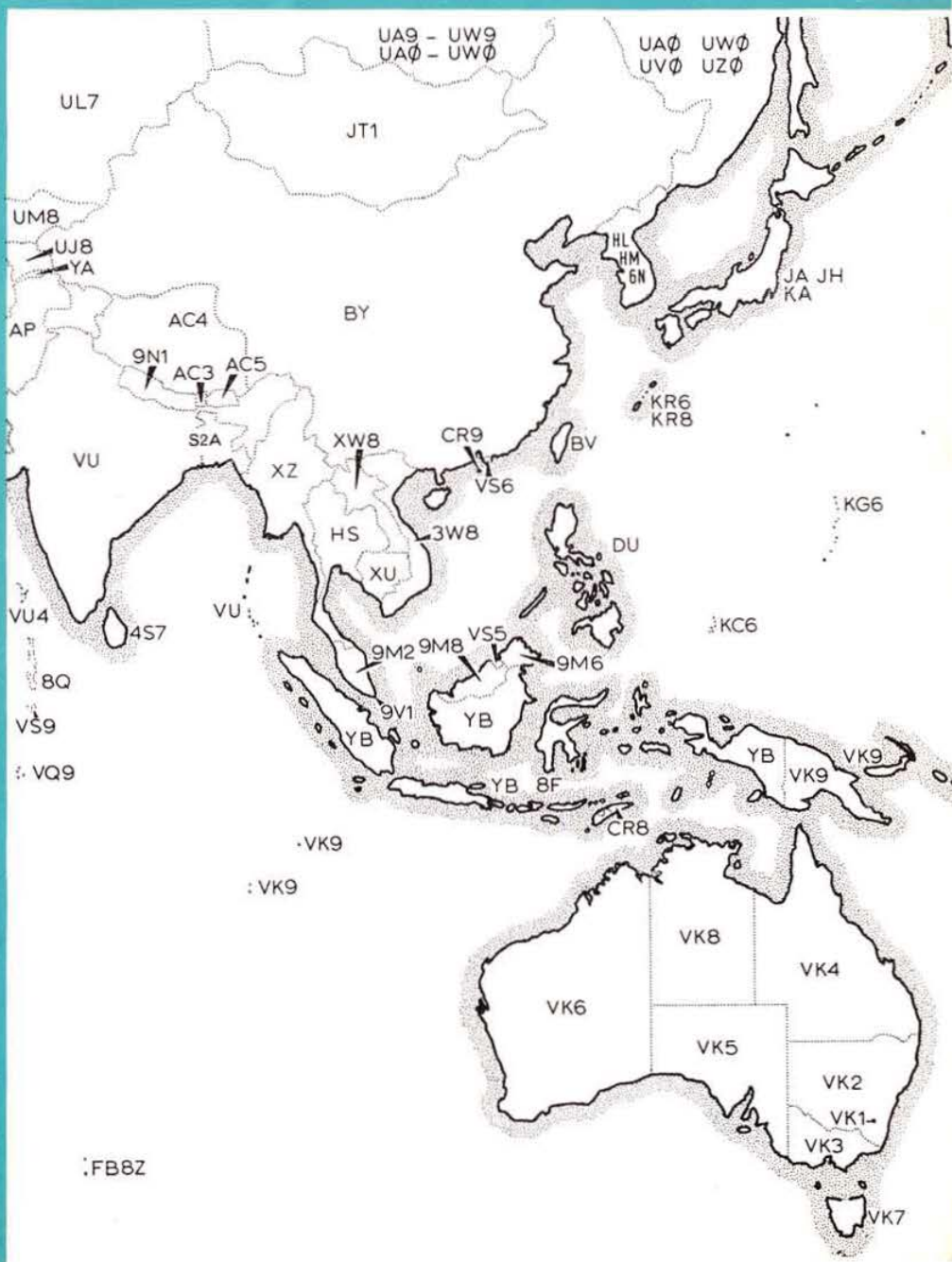
radio communication

October 1972

Journal of the Radio Society of Great Britain



October 1972

radio communication

Volume 48 No 10 Price 30p

CONTENTS

Radio Communication **is published by The Radio Society of Great Britain as its official journal on the first Tuesday of each month and is sent free and post paid to all members of the Society**

Contributions and all correspondence concerning the **content** of *Radio Communication* should be addressed to: The Editor, *Radio Communication*, 35 Doughty Street, London WC1N 2AE. Tel 01-837 8688.

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 01-837 8688 or 01-686 5839.

ABC
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

OUR WESTERN
YAESU MUSEN MAIN DISTRIBUTOR

When you buy YAESU from their U.K. main distributor you get the best engineering standards in the world and superb performance too. All items carry the YAESU 12 months guarantee. We also do free labour on warranty claims, and carry an excellent stock of spares. Remember, we were FIRST to offer YAESU on the UK market and FIRST to give you SECURICOR 24-hour delivery; a standard of service which cannot be surpassed.

SHE's A LITTLE BEAUTY! The FT-75 that is!
A 10-80m. SSB TRANSCEIVER for ONLY £99 (carriage paid)

FT-75

FP-75

This latest addition to the ever expanding YAESU range is a real winner! Having tested it we can say the receiver side is very good and output power was not less than 15w. *R.M.S.* on any band. Operation could not be easier! You simply select the band, press the channel button and talk!

SPECIFICATION:

Receiver: Sensitivity: 0·5V for 10μdB. S/S + N.
Selectivity: 2·3kHz(—6dB.), 4·5kHz (—60dB.).
Audio o/p: 1·8w.

Transmitter: Modes: SSB or CW. Power: 20w. p.e.p.
Carrier suppression: better than —40dB at 1,000Hz.
Unwanted sideband: better than —40dB.
Response: ± 3dB, 400–2,700Hz.

General: VXO swing: 3·5MHz, 3kHz; 7MHz, 6kHz; 14MHz, 3kHz; 21MHz, 20kHz; 28MHz, 12kHz.
Size: 210w. × 80h. × 300d. m.m. Weight: 3·8 kg.

Current drain:

	AC	DC
Standby	50w	1·4 amp.
Heaters on	50w	3·5 amp.
Transmit	80w	5·5 amp.

Microphone included and 4 crystals (3760, 7060, 21 350, 28 550kHz. Our FT-75s have a crystal on 14200 at £2 extra if required. Other frequencies stocked for our customers are 3737, 3780, 7050, 7090, 14140, 14275, 21240, 21300, 21400, 28490, 28660. Or we will obtain any frequency you wish from YAESU.

You are welcome to test the FT-75 at Totton

AND HERE's THE NEW 2m. FT-2 AUTO SCANNING TRANSCEIVER

TUNE 144 to 146MHz in HALF-A-SECOND!

No laborious "Tuning High to Low" or "Low to High"! This highly advanced and superbly engineered YAESU masterpiece automatically scans eight channels in half a second! It will "lock-on" to any channel where a signal is present or can be set to always "lock-on" to a **PRIORITY CHANNEL** (your favourite frequency) whenever a signal appears.
Controls are: **AUTO-MANUAL** which selects the scanning facility, DX-LOCAL for attenuation of strong local signals: **UNLOCK** which re-starts the scanning sequence; **PRIORITY** which overrides other channels when on: **VOLUME, SQUELCH, AFC** and **HI-LOW** power (10w or 1w) output.

Weight: 4·2 kg. Size: 210W. × 95H × 270D (m.m.)

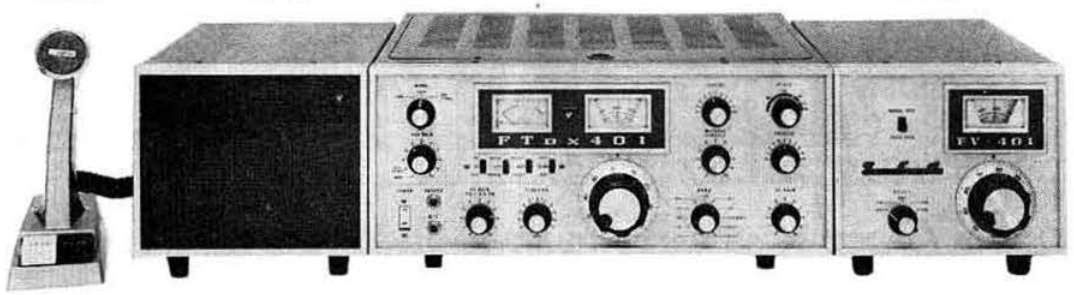
Mode: F3. Power requirements AC, 100, 110, 117, 200, 220. DC 12V

COST SAVING EXTRAS INCLUDED

- **BUILT IN AC AND DC PSU.**
- **BUILT IN SPEAKER.**
- **COMPLETE WITH MICROPHONE AND 5 CRYSTALS.**

PRICE: £146.00

YD-846 SP-400 FT-401 FV-401



THE FT401 offers a high power SSB/CW transceiver with many extra features a a minimum price.

SPECIFICATION: Power i/p 560w. p.e.p. Built-in CW filter, noiseblanker and blower cooled pa. Complete coverage 80–10m. Plus WWV(10 MHz) to check the 25/100kHz calibrator plus 3 spare band positions. VOX is built-in (not an extra). Dial readout to 1kHz on all bands. Sensitivity 0·5μV for 20dB S/S+N. Selectivity: 2·3kHz (6dB), 3·7kHz (60dB). CW filter 600Hz. Clarifier 5kHz. Break-in CW with sidetone. Selectable USB/LSB.

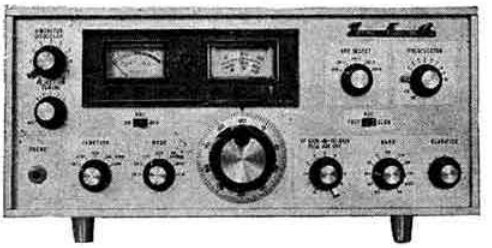
ELECTRONICS (UK) LTD

BUYING A RECEIVER?

THEN DON'T FORGET TO DO YOUR HOMEWORK FIRST! CHECK OUR ARITHMETIC AGAINST THE FACILITIES YOU GET FOR YOUR MONEY ELSEWHERE, ADD-IN THE FINEST ENGINEERING STANDARDS IN THE WORLD AND A HOST OF OTHER "PLUSSES" AND YOU'LL HAVE TO AGREE THE ANSWER IS... **THE FR400SDX**... FROM W.E.

HOPE WE'LL SEE YOU AT THE LEICESTER EXHIBITION!

FR400 SDX



160m.	√
80–10m.	√
Full coverage of 10m. 28-30MHz	√
70–72MHz (4m.)	√
144–146MHz (2m.)	√
REJECTION TUNING	√
AM/CW/SSB/FM FILTERS	√
FM discriminator	√
1 KHz Readout	√
TRANSCEIVES (with FL400)	√
SUPERB PERFORMANCE	√
(ALL ADDS UP TO)	FR400SDX

+ 1 YR. GUARANTEE
+ AFTER-SALES-SERVICE
+24/48 HR. SECURICOR DELIVERY
= YAESU FROM W.E.

YAESU PRICES—CARRIAGE PAID BY SECURICOR

HF TRANSCEIVERS	
FT-75. 50W p.e.p. 10–80m. 3 Ch. vxo	£99.00
FP-75. AC PSU and Speaker for above	£22.50
DC-75 DC PSU, SPEAKER and MOBILE MOUNT	£22.50
FT-200 240W. p.e.p. 10–80m.	£134.00
FP-200 AC PSU and SPEAKER for FT-200	£38.00
DC-200 DC PSU for FT-200	£46.50
FT-101. 10–80m. AC & DC PSU built-in	£249.00
FT-101 as above + 160m.	£255.00
FT-401. 560W. p.e.p. 10–80m.	£230.00
VHF TRANSCEIVERS	
FT-2F 2m. 12 Channel, 10W. O/P	£84.00
FP-2AC AC PSU and SPEAKER	£25.50
FP-2 ACB. AC PSU/Spkr. and Ni.cad batteries	£36.00
FT-2 AUTO. 2m. 8 Ch. Scanning	£146.00
HF TRANSMITTERS	
FL 50. 50W. p.e.p. 10–80m. VXO control	£68.00
FL 50 fitted VOX.	£72.00
FL400. 240W. 10–80m. Transceiver with matching FR400 receiver	£146.00
HF RECEIVERS	
FR50. Double conversion 10-80m.	£59.00
FR50 fitted WWV and xtal. Calibrator	£63.00
FR400DX. 160m. 80-10m. (28-29MHz)	£120.00
FR400SDX. 160–2m. 4 Mech. Filters	£160.00
MATCHING SPEAKERS	
SP101, SP400, SP401	£10.00
REMOTE VFO's	
FV-101 for FT-101, FV-200 for FT-200	£38.00
FV-401 for FT-401.	£38.00
FV-50 for FT-75 and FL50	£27.50
FREQUENCY COUNTERS	
YC-305, 35MHz. AC or 12V DC	£85.00
YC-305D. 220MHz. Built-in pre-scaler	£111.00
LINEAR AMPLIFIERS	
FL-2100, 1200 W p.e.p. 10–80m. (Matches FT-101)	£148.00
FL-2000B. As above. Matches FL400	£148.00
FL-2500 2kW p.e.p. 160–10m.	£122.00

NEW/USED EQUIPMENT (3 month guarantee, carr. £1).

Heath SB303 + CWF assbld. New	£238	Codar AT5 + PSO, mint	£18	KW Atlanta, new	£210
Heath SB200, excellent	£89	Digital 500, Dem. model	£225	KW Atlanta, excellent	£150
Heath GR78, few months old	£60	Eddystone, EB35, mint	£59	KW 2000A, excellent	£150
Heath HOP21 mic.	£10	Emsac TX2 + PSU, excellent	£35	KW 2000B, superb	£170
Heath HM102, SWR-Power meter	£14	Hallicrafters, SX117, good	£80	KW Victor, 150w A.M. "like new"	£49
Heath HW32, superb with HP23, SB600	£60	Hammarlund HQ170, very good	£65	SKW000 CX203, New, Gen. Gov. + B.S.	£28.5
		Hammarlund HQ180, very good	£80		

Sommerkamp, FT500, mint	£149
Sommerkamp FT277 (FT-101) mint	£205
Tristao, 105' Telescopic lower	£225
Trio 9R5905 New	£39
Trio 9R5909, mint	£49
Trio JR310, superb	£59
YAESU FT401, mint	£195

AGENTS. (Glos) **G3UDR**, Shipston-on-Stour 61839. (Bucks) G3PRR, Chesham (02405) 4143.
CATALOGUE: 15p please. NO SAE required.

Both will be pleased to demonstrate YAESU and provide service.
Hours of business: Monday-Friday 9-5.30 p.m. Saturday, 9-12.30 p.m.

WESTERN ELECTRONICS (U.K.) LTD.

OSBORNE ROAD . TOTTON . SOUTHAMPTON SO4 4DN

TEL: (04216) TOTTON 4930 or 2785 *(Member A.R.R.A.)* **CABLES: 'AERIAL, SOUTHAMPTON'**

YAESU

at the

NATIONAL AMATEUR RADIO AND ELECTRONICS EXHIBITION

GRANBY HALLS, LEICESTER, OCTOBER 26-28th

YAESU

THE SYMBOL OF QUALITY

New from ... another winner! ...

KW

A KW 2000B with 500khz VFO COVERAGE 10-16 meters

Complete with AC PSU **£265.00**
(carriage extra)

Includes the following features:

- TOP BAND with switch to legal limit.
- Reliable 6146's in PA.
- Built-in Calibrator 100 hz + WWV.
- IRT/ITT & VOX.
- 'Break-in' CW. All crystals supplied.
- 10 metres coverage 28·0-30·0Mhz.
- KW after sales service and spares for 5 years (possibly 10 years).
- New R.F. Stage. Smooth 2-speed.
- Slow-motion drive.

K.W. ELECTRONICS LTD.
1 Heath Street, Dartford, Kent. Tel: Dartford 25574/21919

The **KW2000B** continues in production as some customers still prefer the excellent "Bandspread" of the 200 Khz VFO.

ALSO—KW 'Atlanta' Transceiver.
KW 202 Receiver 10-160m.
KW 204 SSB/CW/AM Transmitter.
KW 107 SUPERMatch.
KW 103 SWR/RF Power Meter.
KW 101 SWR Meter (52 and 75 ohm).

Antennas - Beams - Dummy Load - Antenna Switch - Baluns, etc. COMING SHORTLY—KW MONITORSCOPE in matching 'G' Line Cabinet—KW 2000B/202/204/107, etc.

KW
ELECTRONICS LIMITED

All equipment available through accredited agents

EASY TERMS ON EQUIPMENT AVAILABLE OVER 12, 18 OR 24 MONTHS

Full station flexibility

The maximum receiver from the "Amateurs" at Heath

The Heathkit SB-303 has all the stability, selectivity and sensitivity you could look for in a solid-state receiver . . . plus an easy-assembly time of only a few evenings.

The Heathkit SB-303 delivers all the signal seeking capability you could possibly want, plus a complement of performance features most other receivers can only offer as a lengthy (and costly) list of options. The "303" brings you USB, LSB, AM, CW and RTTY, 80-10 metres; 15 MHz WWV reception; solid-state instant warmup, 100 Hz stability in 10 minutes, and superior tracking. The exclusive Heath LMO with 1 kHz dial readout is factory-assembled and aligned for peak performance and incredibly smooth linear tuning. And an RF attenuator lets you adjust sensitivity for optimum signal handling. Other standard features are complete SSB/CW transceive compatibility with the famous Heathkit "400" or "401"; three-position AGC (off, fast, slow); 25 kHz and 100 kHz crystal calibrator for spotting the new sub-bands; antenna and power connections for up to two VHF converters, with front panel switch eliminating need for changing cables–four spare sockets on rear panel for connecting a wide range of Heathkit station accessories. Compare the specs . . . then order your "303" today.

Kit K/SB-303
SBA-301-1, optional 3.75 kHz AM crystal filter
SBA-301-2, optional 400 Hz CW crystal filter

Heathkit SB-401 transmitter . . . perfect partner for the "303"

Operates USB/LSB & CW, "separate" or "transceive" . . . Covers 80-10 metres; USB, LSB & CW. Single front panel switch selects transceive or independent operation of "401" and 300-series receiver. Usable with any receiver when optional SBA-401-1 crystal group is installed. Built-in 240/120 VAC power supply. Modular sub-pack packaging and assembly procedure add to kit-building ease.

Kit K/SB-401
SBA-401-1, crystal pack

Heathkit SB-220. Power-up with 1200 watts on SSB, 1 kw on CW . . .

You can build this Heathkit linear amplifier in just five evenings. Provides 1200 W PEP SSB input, 1000 W CW. Built-in solid-state power supply with circuit breaker protection. Metering for SWR, grid current, plate current, relative power, plate voltage. ALC output. Shielded, fan-cooled amplifier compartment. Pre-tuned cathode input circuit for maximum efficiency and low distortion. The sturdy, yet lightweight construction is achieved with a heavy-gauge one-piece aluminium chassis partitioned for extra strength.

Kit K/SB-200

and new digital instruments

see them all in your FREE Heathkit catalogue

See all the gear in the world's leading ham equipment line plus all the instruments you need to make your hobby complete. Over 350 kits are shown including the famous Heathkit stereo, marine, automotive, shortwave, music amps., intercoms, R/C, portables, and more. Send for your FREE copy today.

New Heathkit 8-Digit Calculator —

Adds, subtracts, multiplies, divides, chain or mixed functions, and constant. Floating or selectable 7 position decimal point. Has plus, minus, and overflow indicators. Overflow protection of most significant 8 digits. Clear-display key erases last entry without losing problem. "Standard" keyboard configuration. American made LSI circuitry. Bright ½" red digits. 120 or 240 VAC operated. Desk-top black & white cab, 3½"×6"×10½"d.

Kit K/IC-2008.

NEW Heathkit 8-Digit 120 MHz Counter—

Measures from 1 Hz to over 120 MHz with 8-digit readout plus overrange, gate and two range indicators. Pre-assembled TCXO time base. 1 megohm FET input. Automatic triggering level. Sensitivity 50 mV or less to 100 MHz, 125 mV to 120 MHz. Uses latest ECL (emitter coupled logic). Assembles in 15 hours. All ICs mounted on plug-in connectors. Plug-in fiber-glass circuit boards. 120/240 VAC.

Kit K/IB-1102.

NEW Heathkit Digital Multimeter—

3½ digit readout, quality digital components and easy calibration ,give lab-grade accuracy. Measures 100 uV to 1000 VDC in 5 ranges; 100 uV to 500 VAC, 5 ranges; 10 current ranges, 100 nanoamps. to 2 amps, AC & DC; 6 resistance ranges, 0.1 ohm to 20 megohms. 1000 megohm input on 2 V range, 10 megs on others. Overload protection. Automatic decimal. Overrange indicator. Calibrator included.

Kit K/IM-102.

Heathkit Portable Solid-state FET VOM

Solid-state circuit-FET input, 4 silicon transistor, 1 diode, 4 AC voltage ranges, 4 DC voltage ranges, 4 ohm ranges. 11 M Ohm input on DC, 1 M Ohm input on AC, 4½", 200μA meter. Battery powered. Rugged polypropylene case with self cover and handle includes storage space for test leads. Easy to build circuit board construction.

Kit K/IM-17u (less batteries)

Open a Heath monthly budget account for continuous credit on all our products.

Write for full details and application form today! Existing attractive credit facilities are also available

Why not visit your Heathkit Electronics Centres . . . or contact our Gloucester Head Office.

London 233 Tottenham Court Road. Tel. 01 636 7349 Open hours: Monday—Saturday 9-6.00 p.m.

Birmingham 17-18 St. Martin's House, Bull Ring. Tel. 021 643 4386 Open hours: Friday—Saturday 10-5.30 p.m.

Gloucester Cole Avenue Roundabout, Bristol Road. Tel. 0452 29451 Open hours: Monday—Friday 9-5.00 p.m. Saturday 9-12.30 p.m.

Please address your enquiries to:
Dept. RC 10/72
HEATH (Gloucester) Ltd.,
Gloucester GL2 6EE

HEATHKIT
Schlumberger

Latest free catalogue will be sent to you.

We shall be displaying our complete range of everything for the Amateur.

This includes:

The complete Yaesu Range of Receivers, Transmitters, Transceivers and accessories. It is generally accepted that the Yaesu range offers by far and away the best value for money in the respective price classes. If you are still not convinced, come and have a close look and a chat with our technical lads.

In the second hand line we will have a good range of mint, fully tested items at attractive prices. These will all be guaranteed and, like everything else we sell, if you are not happy with it, you simply have to return it for full money-back without question or quibble. You simply cannot lose and the savings you can make by buying a little used, mint rig are well worth while.

AERIALS

We will be displaying our range of beams, verticals and mobile aerials. They will be erected for your close examination so as to let you see and compare the quality. In the case of beams, we'd like to show you ours which don't droop.

Along with the aerial display will be the associated accessories—rotators, cable, SWR meters etc. etc.

2m FM

Come and see the latest in the fast growing field of 2m FM, both fixed station and mobile. Check the Inoue VFO stability on a counter, check the power output on a proper wattmeter. Delve, prod and examine and find out what it's all about.

SUNDRIES

A complete range of accessories for the Amateur and SWL will be on our stand including,

SWR meters, microphones, keys, electronic keyers, headsets, monitors, L.P. filters, H.P. filters, crystal filters, mechanical filters, dummy load/wattmeters, counters, speakers, VFOs, power supplies, valves, connectors, coax, rotator cable, twin feeder etc. etc.

There is sure to be something to round off your station that you can't get at home.

SERVICE DEPARTMENT

If you need service just phone us—we have a contract with Securicor who will collect from any part of the country at a very cheap rate. We arrange collection, service your rig and deliver it back to you within average three days (excluding weekends). Our best is 48 hours (often) and worst so far five days. If you bought your gear elsewhere we'll certainly do our best for you, but please remember OUR customers MUST come first.

Have you got gear to sell? Give us a yell, we give good prices and again, our Securicor service will collect.

Look forward to seeing you at Leicester.

CRYSTALS TYPE HC/6U £1 each 10 or more ½ price. kHz: All in stock in quantity

3232 3319 3333 3354 3375 3389 3403 3410 3431 3445 3452 3459 3466 3473 3876 3883 3879 3904 3911 3918 3925 2932 3939 3946 4320 4674 4688 4709 4730 4744 4751 4758 4765 4786 4800 4807 4814 4821 4822 4843 5092 5119 5133 5140 5147 5154 5161 5224 5231 5238 5252 5259 5266 5273 5280 5287 5294 5301 5320 5324 5324 5328 5332 5337 5341 5345 5349 5354 5362 6366 5375 5379 8383 5388 5465 5910 5920 5934 5266 5273 5280 5287 5294 5301 5320 5324 5328 5332 5337 5341 5345 5349 5354 5362 5366 5375 5379 5383 5388 5465 5910 5920 5934 5952 5956 5964 5971 5986 6084 6091 6106 6136 6488 6495 6503 6509 6516 6559 6607 6820 7311 7319 7326 7329 7341 7356 7364 7371 7379 7386 7394 7401 7409 7424 7431 7439 7446 7461 7491 7500 7542 7547 7552 7557 7562 7567 7572 7577 7582 7587 8349 8357 8360 8387 8402 8409 8410 8417 8432 8447 8454 8484 9285 9293 9302 9310 9319 9327 9336 9344 9353 9370 9376 9395 9404 9412 9421 9863 9868 9873 9883 9893 10465 10486 10513 10549 11764 11859 13739 13729 13749 13769 13779 13789 13799 13809 13819 15465 18431 kHz.

1820 1930 3766 3795 4002 6001 6009 6016 6024 6031 6046 6054 6076 7002 7005 7010 7017 7032 7074 7054 7077 7092 7099 7129 8081 (WAB) 11750 12000 14000 14250 24000 24020 24120 24220 24320 31200 31225 31250 31275 31300 31325 31350 31375 31400 31425 31450 31475 31500 31525 31550 31575 31600 31625 31650 37675 kHz. £1 each. 25% qty discount.

MORE HC/6U CRYSTALS £1 each. 22 22·5 23 23·5 24·5 25 25·5 26 26·5 27·5 28 28·5 23·22 23·32 23·42 23·52 23·62 23·72 23·82 23·92 24·42 24·52 24·62 24·72 24·82 24·92 25·12 mHz 11·25 to 15·5 in 250kHz steps. 5000, 5012, 5025, 3625, 3675kHz.

CRYSTAL CONTROL UNITS with 34 xtals 13·54 to 19·87mHz, 3 valves EF91 size 4 × 4 × 6" **WITH CIRCUIT** **£4**

LORAN R65/APN9 UNIT RX 1·7 to 2mHz, scope with 3BP1 tube, 100kHz xtal standard with dividers, all in box size 20 × 9 × 12" **WITH CIRCUIT** **£10**

UHF RX with 2 3-section trough lines 4⅜" long, double superhet 54 and 6·9mHz, B7G, B9A valves, 20 way HC/6U xtal holder size 8 × 5 × 17" **£10**

70mHz AUTO ALARM RECEIVERS, flashing light and audio tone outputs, 3 tone filters in some for selective calling. Several types available from **£3.**

RX RF UNITS 2-24, MHz 4 BANDS. 6AK5 RF 6BE6 MIX 6AU6 xtal osc. 1·82MHz IF out also includes TX drive balanced modulator (2)6AU6 & oscl. 82MHz 6AU6, 6AU6 & 6AQ5 drivers. All inductive tuning with 5 tuned circuits at signal frequency. With circuit **£8**

RX IF UNITS 1·82MHz input, 110kHz 2nd IF, AF output with BFO. 6BA6 1·82MHz amp, 6BE6 mix, 6AU6 1·93MHz osc, 2 6BA6 IF 110kHz, 6BA6 BFO, 6AL6 det AGC, 12AT7 AF CV448 NL, OA2 Stabilizer **£10**

PLESSEY PTR61E 116-132MHZ TX/RX, 12 volt, 1¼ watt output, QVO4, 7PA size 6 × 8 × 11" **£16**

2202 TX/RX 15 watts output QQVO3-20A PA, vibrator psu 7 × 15 × 19" **£20**

VHF TRANSMITTERS 2 or 4 METRE VERSIONS
Up to 40 watts input with; Modulator, Microphone, Crystal (to our choice), Aerial change over relay, Metering points. Less case and power supply (300-400 volts 250mA HT 6·3 volts, 5A LT. Size 6 × 6 × 12".
4 METRE VERSION £20. 2 METRE VERSION £30.

MARCONI 1616 RECEIVERS 2-18·5MHz, single superhet, crystal controlled, fine tuning + or —9kHz, 2RF 2IF, BFO, CW filter, 2uV for 10db S/N, 8 × 8 × 13" with MAKER'S MANUAL, control unit and fine tuner **£20**

MARCONI TX UNIT 100 watt output, 2-24MHz 6AQ5 driver, 829B buffer, 2 × 829B PA, tuning 23 turn 2 inch dia. roller coil, 2 gang capacitor, coil and capacitor turret. Size 8 × 10 × 16", weight 26 lb. **WITH CIRCUIT** **£8**

MARCONI ATU UNITS. Roller coils 30 turns, 3 inch dia., 20 turns, 1½ inch dia., capacitor turret, RF voltage and current sensing elements. Size 6½ × 11 × 16", weight 27 lb. **WITH CIRCUIT** **£6**

MARCONI MODULATORS. 90 watt output, transformer to match 2000 ohms and screen winding, speech clipper, audio AGC, switched metering for; PA grid, Buffer grid, PA anode, Mod anodes and screens, 500 and 1000 volts HT. Valves 12AX7, 12AT7, 6AL5, 6AU6, 12AX7, push pull pair 829Bs, 6AQ5, 6AU6, OA2 etc. HT required, 600 volts, 275 volts DC, 250 volts AC, room for PSU inside case. Size 8 × 12 × 16". **WITH CIRCUIT.** Weight 32 lb. .. **£10**

MARCONI 7092 RX 150kHz-2MHz in 4 bands, 5-1·5kHz, 400Hz selectivity, 10 uV sensitivity, 450mW output, RF stage, 2 IF 110kHz, crystal filter, needs 250V HT, 24V lt, BFO, IF & AF gain control, DF provision (not supplied) size 8 × 5 × 12", circuit.. .. .. **£10**

STORNO CQM33C FM VHF TX/RX, 10 watt output, QQVO3-10 PA with circuit and component details for 2m conversion, mic, control, speaker, 12V transistor PSU **£11**

T1154 for SPARES £6 ea. **R1155 for SPARES £5 ea.** **ALL PRICES INCLUDE CARRIAGE**

BAGINTON ELECTRONICS (G3TFC)

MARKET CORNER, BAGINTON, COVENTRY, WARKS. CV8 3AP

Phone Coventry (0203) 302668

Also at COVENTRY AIRPORT, Phone (0203) 302449

RADIO SOCIETY OF GREAT BRITAIN

35 DOUGHTY STREET, LONDON WC1N 2AE

FOUNDED 1913 — MEMBER SOCIETY

INCORPORATED 1926 — INTERNATIONAL AMATEUR RADIO UNION

PATRON: HRH THE PRINCE PHILIP, DUKE OF EDINBURGH, KG

COUNCIL 1972

PRESIDENT	R. J. Hughes, TD, DLC, G3GVV
IMMEDIATE PAST-PRESIDENT	F. C. Ward, G2CVV
EXECUTIVE VICE-PRESIDENT and HONORARY TREASURER	J. O. Brown, LLB, FCA, G3DVV

MEMBERS

E. J. Allaway, MB, ChB, MRCS, LRCP, G3FKM
B. D. A. Armstrong, G3EDD
J. Bazley, G3HCT
W. J. Green, G3FBA
E. G. Ingram, GM6IZ
G. R. Jessop, CEng, MIERE, G6JP
W. F. McGonigle, GI3GXP
L. E. Newnham, BSc, G6NZ
C. H. Parsons, GW8NP
J. R. Petty, G4JW
W. A. Scarr, MA, FBIS, G2WS
A. W. Smith, GM3AEL
R. F. Stevens, G2BVN
G. M. C. Stone, CEng, MIEE, MIERE, G3FZL
E. W. Yeomanson, G3IIR

GENERAL MANAGER AND SECRETARY
D. A. Findlay, FCA, G3BZG

EDITOR
A. W. Hutchinson

REGIONAL REPRESENTATIVES

Region 1.—North Western	B. O'Brien, G2AMV, "Tanglewood", Anthony's Way, Heswall, Wirral, Cheshire.
Region 2.—North Eastern	J. E. Agar, G8AZA, 88 Rothbury Street, Scarborough, Yorks.
Region 3.—West Midlands	R. W. Fisher, G3PWJ, 47 Elmhurst Drive, Kingswinford, Brierley Hill, Staffs.
Region 4.—East Midlands	T. Darn, G3FGY, "Sandham Lodge", Sandham Lane, Ripley, Derbyshire.
Region 5.—Eastern	P. J. Simpson, G3GGK, The Beagles, Caldecote Highfield. Near Cambridge.
Region 6.—South Central	L. W. Lewis, G8ML, 34 Cleevelands Avenue, Cheltenham, Glos.
Region 7.—London	R. S. Hewes, G3TDR, 24 Brightside Avenue, Laleham-on-Thames, Middx.
Region 8.—South Eastern	D. N. T. Williams, G3MDO, "Seletar", New House Lane, Thanington, Canterbury, Kent.
Region 9.—South Western	H. W. Leonard, G4UZ, 4 Start Bay Park, Strete, Nr Dartmouth, S Devon.
Region 10.—South Wales	D. M. Thomas, GW3RWX, 88 Cefn Graig, Rhiwbina, Cardiff CF4 6JZ.
Region 11.—North Wales	P. H. Hudson, GW3IEQ, "Silhill", Dinas Dinlle, Llandwrog, Caernarvon.
Region 12.—North-East Scotland	A. J. Oliphant, GM3SFH, 17 Rockwell Crescent, Thurso, Caithness.
Region 13.—South-East Scotland	V. W. Stewart, GM3OWU, 9 Juniper Avenue, Juniper Green, Midlothian EH14 5EG.
Region 14.—West Scotland	M. A. Comrie, GM3YRK, 57 Dungoyne Drive, Bearsden, Glasgow.
Region 15.—Northern Ireland	J. Thompson, GI3ILV, "Albany", Newry Road, Armagh, N Ireland.
Region 16.—East Anglia	D. F. Beattie, G3OZF, "Mayerin", The Common, East Hanningfield, Essex.
Region 17.—Southern	L. N. G. Hawkyard, G3ZKR, 100 Shirley High Street, Southampton, Hants.

HONORARY OFFICERS

Awards Manager (hf)	C. R. Emary, G5GH, Westbury End, Finmere, Buckingham.
Awards Manager (vhf)	Jack Hum, G5UM, 27 Ingarsby Lane, Houghton-on-the-Hill, Leicester LE7 9JJ.
Intruder Watch Organizer	C. J. Thomas, G3PSM, 171 Kirkstall Lane, Leeds 6.
QSL Bureau Manager	A. O. Milne, G2MI, 29 Kechill Gardens, Bromley, Kent, BR2 7NH.
Recorded Lecture Library Curator	G. Milne, G3UMI, 23 Linacre Road, Eccleshall, Staffordshire.
Slow Morse Practice Transmissions Organizer	M. A. C. MacBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.
Society Historian	L. E. Newnham, G6NZ, 17 Washington Road, Emsworth, Hants.
Trophies Manager	P. Carey, G3UXH, 99 Bell's Lane, Hoo St Werbugh, Rochester, Kent.
VHF Manager	G. M. C. Stone, G3FZL, 11 Liphook Crescent, Forest Hill, London SE23.

QTC AMATEUR RADIO NEWS

Radio Amateurs' Examination

The next RAE will be held on Monday 4 December 1972 and applications to sit this examination should be made to the candidate's local examination centre.

The RSGB will provide an examination centre at University College, London WC1. Application forms to sit the examination at this centre are available from RSGB HQ. The fee is £2.10 for RSGB members and £2.60 for non-members. Completed application forms must reach the Society before Tuesday 31 October.

Changing polarity

For mobileers using cars with a positive earth system and wishing to use modern negative earth equipment, Frank Bennister, G3COX, offers the following method of changing the polarity.

It is first essential to disconnect or modify the connections to any polarity sensitive equipment such as an ammeter or car radio. Change over the battery leads and after removing the cover from the voltage regulator press the armature of the cut-out down for a second or two and then lift it back to normal. This should be done five or six times and will have the effect of re-polarizing the generator.

This can only be done with a car fitted with a generator and must not be attempted with a car using an alternator.

RAE instructor seminar

The RSGB Education Committee is investigating the possibility of arranging a seminar for instructors and lecturers of courses for the Radio Amateurs' Examination. The committee would welcome any comments which could help in providing a course to meet the specific needs of instructors and lecturers. Members who would be interested in attending such a course are invited to write to the chairman of the Education Committee, Mr D. M. Pratt, 30 Lyndale Road, Bingley, Yorkshire BD16 3HE.

Oscar 6

The launch date for Oscar 6 has been brought forward to the period 12-16 October 1972. When more definite information becomes available this will be included in the GB2RS news bulletins. It is hoped that orbital data will be available shortly after launch.

Reprints of the articles by W. Browning, G2AOX, under the title of *Keeping track of Oscar* are available from the Editor, *Radio Communication*, at a cost of 10p in stamps. Once the orbital parameters are known the information contained in these articles should enable members to prepare their own orbit predictions.

In addition to beacons operating in the 28 and 432MHz bands, Oscar 6 will carry a translator with the uplink between 145·9MHz and 146MHz and the downlink between 29·45 and 29·55MHz.

For further information readers are referred to the article by K3JTE on page 303 of the May 1972 issue of *Radio Communication*.

DIAMOND JUBILEE YEAR

Next year is the RSGB's sixtieth anniversary and to mark the occasion a large number of events are being planned which will take place in many parts of the country. A calendar of these events is being drawn up and this will be published at the beginning of 1973.

Secretaries of clubs and societies affiliated to the RSGB who are planning rallies, conventions, dinners and other activities for the Diamond Jubilee Year are asked to contact headquarters so that these events can be incorporated into the calendar. All correspondence relating to the Diamond Jubilee Year should be addressed to: The Secretary, RSGB Diamond Jubilee Committee, 35 Doughty Street, London WC1N 2AE.

The anniversary year will commence with the Presidential Installation on 5 January in London. Tickets will be on sale and full details will be published in *Radio Communication* next month.

70cm band

Restrictions on the 70cm allocation were announced by the then Director of Radio Technology at the 1971 VHF Convention. Since that time there have been continuing discussions with the MPT in an effort to improve the position as announced in 1971. Although the *London Gazette* notice has not yet been published, the MPT has advised the Society that the band 430 to 440MHz will be available, with some power and geographical restrictions applying to the 430-432MHz segment. It is anticipated that the new regulations will come into effect on 1 January 1973. The official announcement will be published directly it becomes available.

New clubs

Staffordshire

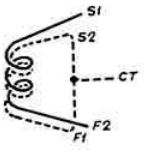
The formation of an amateur radio society in the Willenhall and district area of Staffordshire has been proposed. All those interested are invited to a meeting to be held at the Three Crowns Hotel, Stafford Street, Willenhall, Staffs, on Wednesday 11 October at 7.30pm. Further details available from Mr C. J. Pedley, G3YHN, and Mr B. J. Palin, G4AHK, QTHR.

Essex

Mr I. L. Bishop, 27 Stratton Way, Biggleswade, Beds, who is moving to the Grays/Orsett/Stanford area of Essex in October, would be pleased to hear from anyone interested in forming a club in the area. SAEs would be appreciated.

GW3XYW transistorized Top Band transmitter

The author of this article which appeared in the July issue wishes to point out that the secondary of T1 is *cross-connected* bifilar wound. The way this is done is shown in the diagram.



DL0IGI

This beacon station is now operating on 28,195kHz, switching to 28,200kHz between 15 to 20 and 45 to 50 minutes past each hour. The beacon is located about 12km southwest of Bad Reichenhall on the Bavarian–Austrian border at a height of 1,200m above sea level. The aerial is a vertical dipole and the transmitter output is about 100W. Reports will be appreciated and should be sent to T. Damboldt, DJ5DT, Kollwitzweg 1, D6100 Darmstadt, Federal Republic of Germany.

Together with GB3SX (28,185kHz) and 3B8MS (28,200 kHz) this station is operating as part of the WAB project of Region 1 IARU. It is anticipated that the frequency of 3B8MS will be altered in the near future to conform to the WAB plan.

25 per cent off BRS33615

Bob McPhee, reservations manager for Royal London Hotels has obtained for RSGB members a 25 per cent discount in any of the group's hotels between 1 November 1972 and 31 March 1973 on all types of accommodation, the special discount will also apply to members' families. Club AGMs, cocktail parties and other group facilities are also available. QTH for details: Bob McPhee, BRS33615, Royal London Hotels, Victory House, Leicester Square, London WC2H 7NE. Tel: 01-734 0197.

Metalwork service

Many members who would like to build their own equipment are prevented from doing so by lack of facilities for producing the metalwork so often necessary.

Mark Equipment are offering a service to produce any metalwork either as "one-offs" or small batch quantities. Facilities are available for machining of metals and plastics, soldering, brazing and sheet metalwork. Finished items can be silver plated, if required.

They can quote and produce articles from a sketch giving the relevant information and any important points, or from the page reference in the *Radio Communication Handbook* or *VHF/UHF Manual*. If necessary they will advise on the most economical way to produce the final shape required.

For quotations send details to Mark Equipment, 35 Lidford Tor Avenue, Roseland Park, Paignton, Devon.

RAE Courses 1972-3

Extensive lists of RAE courses at present available have already appeared in the August and September issues of *Radio Communication*. Although most of the courses have started, if, for some reason, you missed the advance notice, contact your local course centre—it may still be possible to enrol.

Bedford. Westfield School, Bedford. Course commences 3 October, for 20 weeks, under the tuition of E. Elsley, G3YUQ. Fees: OAPs and under-18s, £1.50, all others £4.50. For further details contact the headmaster, Mr Hodgson, at the above address, tel Bedford 56116.

Bridgend Glam. Bridgend Technical College, Bridgend Glam. Classes held each Thursday evening, 6.30-9pm, instructor: Brian Jones, GW3WRE.

Carlisle. Carlisle Technical College, under the auspices of Carlisle and District Amateur Radio Society. Classes held every Monday, 1700-2100 hrs. Fee: £2 plus 75p enrolment fee, juniors (under 18) pay only the enrolment fee. Further details from A. R. Harper, 23 Roman Way, Stanwix, Carlisle CA3 9DL.

Fife. Fife Education Department, Cupar Technical College, Cupar, Fife. Lectures are given in the Department of Physics, at the University of St Andrews, by GM3ZCQ and two others.

Leith, Edinburgh. The Leith Nautical College, 59 Commercial Street, Leith, Edinburgh. Course now running, every Tuesday at 1900hrs. Further details may be obtained from the Head of the Department of Marine Electronics, at the above address.

Liverpool. Riversdale College of Technology, Riversdale Road, Liverpool L19 3QR. Both the RAE and morse will be covered, on Monday and Thursday evenings, 7-9.30pm. Fee: £6.60 plus 55p registration. The course will use the facilities provided for the marine radio course, and the amateur station G3VXY.

London Borough of Islington. De Beauvoir Evening Institute, Tottenham Road, Balls Pond Road, London N1. The course is run every Tuesday and Thursday, at 7.30pm, by Fred J. Barns, G3AGP. *Note—this is intended as a booster course for those who have unsuccessfully taken the examination and do not want to start again from scratch.*

RSGB - IEE JOINT LECTURE

To mark the 50th anniversary of the BBC

Friday 3 November 1972

Institution of Electrical Engineers
Savoy Place, London WC2

The first five years of wireless, 1896-1901

by G. R. M. Garratt, G5CS

The lecture will review the period from the spring of 1896, when Marconi first arrived in England, to December 1901 when he received the first transatlantic morse transmission.

Mr Garratt retired recently after 35 years on the staff of the Science Museum where his special responsibility was telecommunications history. He has accumulated a large number of historical documents over the past 20 years and much of the material has never been published.

All members are invited to attend what promises to be a fascinating and interesting lecture. Light refreshments will be served at 5pm and the lecture will commence at 5.30pm.

This lecture is one of a series which the IEE is presenting in November as part of the activities to commemorate the golden jubilee of the British Broadcasting Corporation (formerly the British Broadcasting Company) on 1 November 1972.

Consumer integrated circuits in amateur design

by J. R. HEY, Tech (CEI), MSERT, G3TDZ*

Part 3. Audio power

IN the field of audio, the transistor, transformerless, Class B amplifier (Class AB for the purists) rules the roost. It has much to offer in that large powers can be obtained comparatively cheaply with low overall current drain.

Except for the best of hi-fi equipment, where efficiency is low in order of importance and Class A amplifiers seem the only real answer, the Class B transformerless circuit can meet most, if not all, applications, thus establishing itself as the almost universal system.

Before looking at the integrated circuit approach, some elementary discrete device circuitry will be examined. It has been said that to have seen one is to have seen them all. A beginner may find this over-simplification confusing when examining published circuits, but even though a variety of basic configurations do exist, it is true to say they all work broadly alike.

The output stage

For powers lower than about 4W, the simple complementary push-pull output stage of Fig 16(a) is easily the most popular, still making use of germanium transistors such as the AC128/176. Above this power, by far the commonest circuit of all is the quasi-complementary output configuration shown in Fig 16(b).

With germanium the one weak link was the npn transistor; now with silicon the pnp device is the more costly and likely to fail in service. Because of this, full complementary circuits like those of Fig 16(c) and Fig 16(d) are only now becoming common as more reliable devices become available.

Input circuits

From early days, working point stabilization of the whole amplifier has been achieved by enclosing most, if not all of the transistors within the same dc-connected loop.

Three basic input stage methods are found, variations on these being recognizable when examined closely. The parallel-input stage of Fig 17(a) has the advantage of simplicity and good stability but suffers from the disadvantage of lower gain and very low input resistance due to the parallel feedback. This system still seems popular with Japanese hi-fi equipment makers.

The series circuit of Fig 17(b) is perhaps the most popular in this country, being found in many pa and hi-fi applications. Its advantages are: high gain, higher input impedance and more effective nfb, with perhaps the only disadvantage being the cost of a less popularly polarized input device.

With transistor prices now down to attractive levels, other components can be advantageously replaced by additional active devices. The input network of Fig 17(c) is now becoming very popular in power amplifiers. A similarity will be observed with operational amplifier technique where inverting and non-inverting inputs are provided; these would be the bases of TR1 and TR2. By making R1 equal in value to R4, and using a split ht supply, the mid point or centre line will follow earth or zero potential, without pre-set adjustments being necessary as in other input systems. No output capacitor is required to prevent direct current flow through the load. This differential or long-tail-pair input is found in most of the ic amplifiers to be seen.

It is not always convenient, however, to provide two ht supplies of opposing poles, in this case the centre line must be established by a potential divider across the supply; an isolating capacitor is then essential.

Practical circuits

The circuits of Figs 16 and 17 are incomplete and cannot be employed as they are. A fairly up-to-date 100W audio amplifier based on an RCA design is illustrated in Fig 18 to show what some of the additional components are for. The

* Armley Grange Crescent, Leeds LS12 3QL.

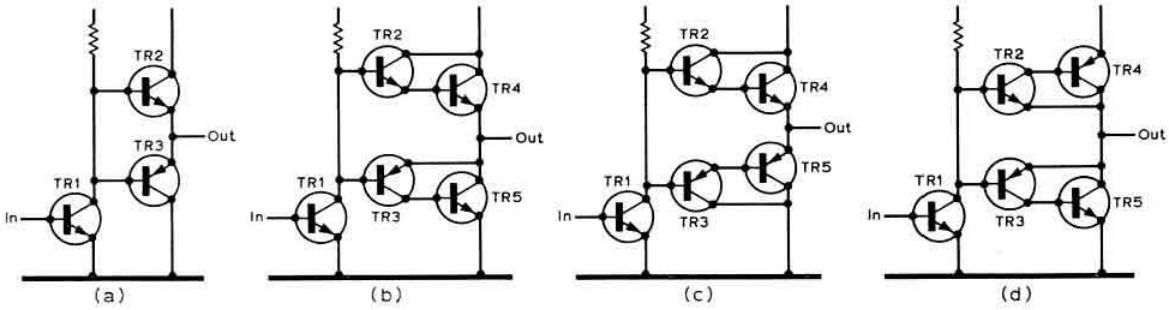


Fig 16. Various forms of complementary and quasi-complementary output stages

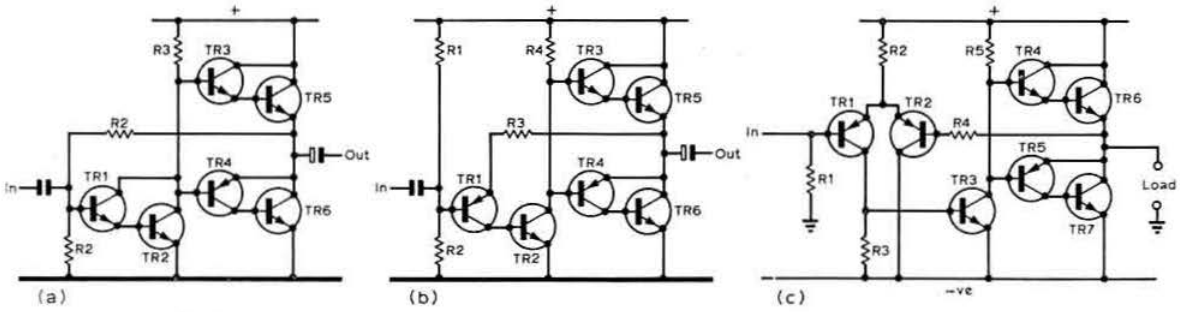


Fig 17. Input methods showing dc feedback paths; (a) parallel, (b) series, (c) differential

overload protection or safety circuit is shown separately for simplification.

As silicon transistors require about 0·6V between base and emitter before conduction can take place, to avoid a most unpleasant cross-over distortion, some forward bias is applied to the drivers TR4 and TR5. The voltage drop across D2, D3, R11 and the pre-set is adjusted so that the output devices are just turned on to a small quiescent current. R12 and R15 clamp down the bases of the output devices to control leakage current, especially when hot.

A surge limiter, R8, protects TR3 under fault conditions; likewise R13 and R14 only take effect when load current becomes excessive. An overload protection circuit senses the voltage developed across these resistors, and when it is too high causes TR8 and TR9 to conduct thus lowering the drive to TR4 and TR5. Clamped to true earth by D5 and D6, the safety circuit is both current and power limiting.

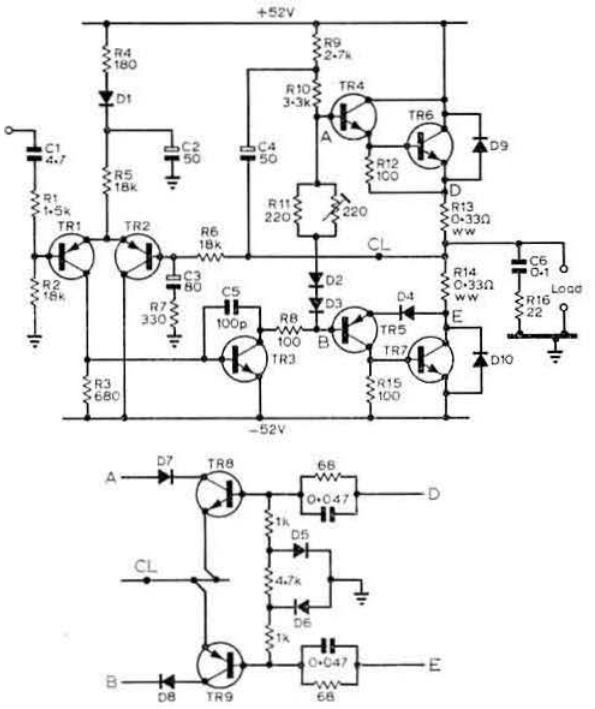


Fig 18. Theoretical circuit of modern 100W power amplifier showing protection circuit

Without C3 and R7, (R2 and R6 being equal for dc reasons), the gain would be unity. The amplifier's gain therefore can readily be set to any desired value by selection of the ratio of R6 to R7.

The load to TR3 is split in two by R9/R10, with C4 forming a bootstrap circuit to prevent current starvation of TR4. Without C4, on positive half cycles when the base of TR4 rises to almost ht value, insufficient voltage would exist to force the required current into TR4 base. C4 then acts as a store and effectively lifts the ht higher at this point, preventing a rounding-off of the upper half cycle.

Across the pre-driver or voltage amplifier, TR3, is connected a small capacitor, C5, which prevents hf instability. Likewise a step network, C6/R16, across the output maintains stability under varying load conditions.

D4 is to equalize the two halves of the output, helping to make a smoother crossover region. In most cases this may be left out without any noticeable change in performance.

Not wishing to dwell any longer on this subject, it is suggested this circuit would modulate a full legal limit pa more economically than any similarly powered thermionic circuit. Here the inductive load makes the inclusion of the two small power rectifiers across TRs 6 and 7, ie D9 and D10, advisable to absorb back-emf spikes, preventing damage to the output transistors.

—And now for the miniature stuff

If the theorectical circuits of most of the ICs listed in Table 1 are examined, a similarity with Fig 18 will be noticed. Sometimes a whole string of transistors is found in the output sections, often in unequal quantities, which looks rather odd.

Pre-drive load resistors are occasionally replaced by a constant current source, that is, another transistor. Bias and voltage references are frequently provided by groups of transistors and diodes with few resistors to be seen. If all these extras are swept from view, Fig 17(c) will be seen winking out from the electronic jungle of that tiny chip.

An idea of typical powers will be grasped from Table 1. One snag, however, with almost all af power ICs is the maximum output current possible—typically 1A. This limits their usefulness when required to work into low impedance loads such as 3 to 4Ω. Makers specify recommended loads varying from 4 to 22Ω, 16Ω being the most popular, followed by 8Ω. Very few openly recommend 4Ω, one of the exceptions being the ATES TBA810 illustrated in Figs 19, 20 and 21. This ic will deliver 6·5W at 16V supply

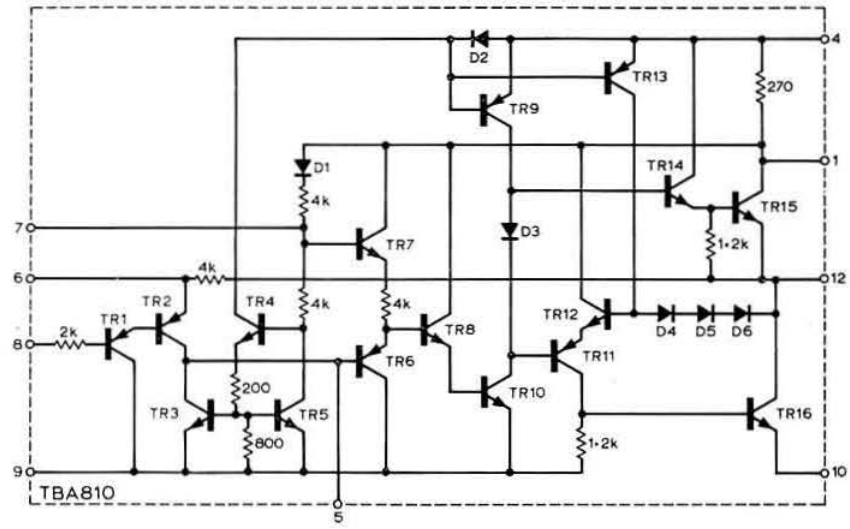


Fig 19. Theoretical circuit o TBA810

into 4Ω; 5·5W at 14·4V into 4Ω; 2·3W at 9V, again into 4Ω; 1W at 6V into 4Ω, and can work with voltages between 3·5 and 20V. A maximum current of 2·2A is quoted with peak non-repetitive current of 3A.

A simple receiver audio circuit is shown in Fig 20 and would be ideal to follow, say, the TBA651, TA7046P, or CA3088E described in Part 1 of this series.

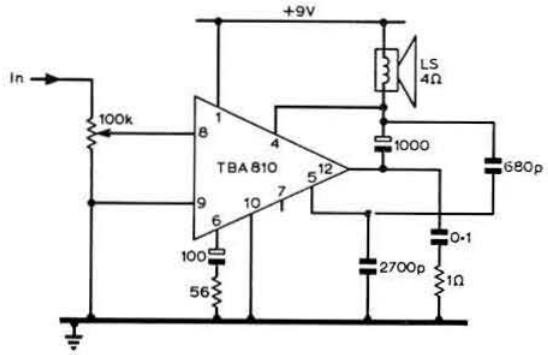


Fig 20. Simple audio circuit suitable for low voltages

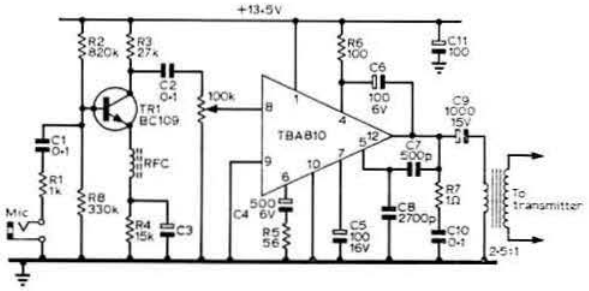


Fig 21. Modulator using TBA810 for portable or mobile transmitter

A modulator suitable for a /P or /M transmitter up to 2·5W is shown in Fig 21. If R5 is made 12Ω, the resulting 15mV sensitivity of the ic alone might be sufficient for many microphones, TR1 then not being necessary.

Another beefy device capable of delivering 8W at a Vcc of 24V into 8Ω is the Texas SN76013; circuit connections for either a receiver audio section or a transmitter modulator are illustrated in Fig 22.

One more snag found with earlier ICs was the gaggle of peripheral components seemingly necessary just to make the ic work. Many of these extras were simply to keep the ic stable, and these frequently had to be changed in value with different loads, making modulator service impossibly complicated. The cost of the ic plus all the extra components

Table 1. A selection of audio ICs, showing power handling ability, together with load and ht requirements

Maker and type number		Power (Watts)	Voltage (Volts)	Load res (Ohms)
Motorola	MFC4000	0·25	12	16
	MFC6000	0·25	12	16
General Electric				
	PA222	1	18–24	—
	PA234	1	9–25	22
Motorola	MFC8010	1	16	16
Plessey	SL402A	2	14	8
SGS	TAA621	2	18	8
Toshiba	TA7091P	2	24	16
Motorola	MFC9010	2	19	16
General Electric				
	PA237	2	9–27	16
Plessey	SL403A	3	18	8
SGS	TAA621	3	24	16
Motorola	MFC9000	4	21	16
ATES	TBA810	4	12	4
General Electric				
	PA246	5	34	—
ATES	TBA800	5	24	16
			18	8
Texas	SN76013	6	24	8/15
ATES	TBA810A	6	16	4
Toshiba	TH9013P	20	45	8
(Thick-film hybrid)				

Addendum: Toshiba have recently introduced another thick-film hybrid integrated circuit, the TH9019P. This delivers 10W into 8Ω with a 32V supply rail.

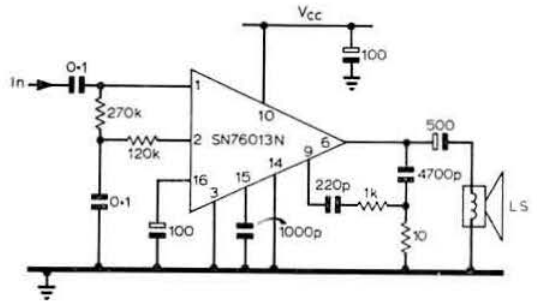


Fig 22. Receiver audio power stage using Texas SN76013N

meant that a circuit employing traditional discrete devices would be a better choice, and cheaper. Three early ICs tested by 'TDZ were not only difficult to stabilize but performed well below expectations of output and distortion.

Things have now improved, later ICs are more business-like and require few extra components. In this category are the two devices already mentioned plus the SGS TAA621. This latter one is offered in a package on a board with the various parts necessary, and called the EA1000.

Before concluding, the Toshiba TH9013P is well worth mentioning. This is not a monolithic ic but a thick-film hybrid in a flat aluminium can 2·9in × 2in and $\frac{1}{2}$in thick; it delivers a thumping 20W, following the basic Fig 17(c) idea.

Conclusion

For mobile or hand portable equipment, these ICs must surely satisfy a demand most elegantly. It must be stated that the list given is only a representative selection and others are appearing all the time. (The General Electric range is no longer manufactured).

Besides complete af power ICs, there are several support devices such as pre-amps and Class A and Class B drivers.

Next in this series: a 2m and a Top Band transmitter circuit will be described which will go well with the modulator of Figs 21 and 22, making /P a practical possibility for many readers.

References

[1] D. A. Tong, "The TAD100 as a tunable i.f. system", *Radio Communication*, February 1972.

[2] J. R. Hey, "A personal portable for 2m", *Short Wave Magazine*, October, November 1971, and June 1972.

An audio filter

by A. LANGTON*

THE necessity for the minimum usable bandwidth of a transmitted signal is well known; indeed, it is part of the licence conditions that signals should be as narrow as possible, and with today's crowded bands it is essential. The only transmission system to employ limited bandwidth is filter-derived ssb—it is inherent in the system, while very few designs of a.m. or fm transmitters use any audio filtering.

The filter described here can be used with any transmitter, a.m., fm or ssb to restrict the audio signal to between 300Hz and 3,200Hz, and thereby reduce excessive sidebands, and can also be used to improve signal to noise ratio in a receiver. It consists of two sections, one high-pass and one low-pass, and each may be used separately. (See Fig 1). Many users may feel that the high-pass section is not really needed, but the whole unit was designed as part of a speech processing unit, the intention being to increase "talk power", and frequencies below 300Hz are not needed for communication.

The most significant feature is that the circuit uses no coils. Winding coils of about 80mH can be rather a chore and

* 28 Orchard Road, Aberdeen.

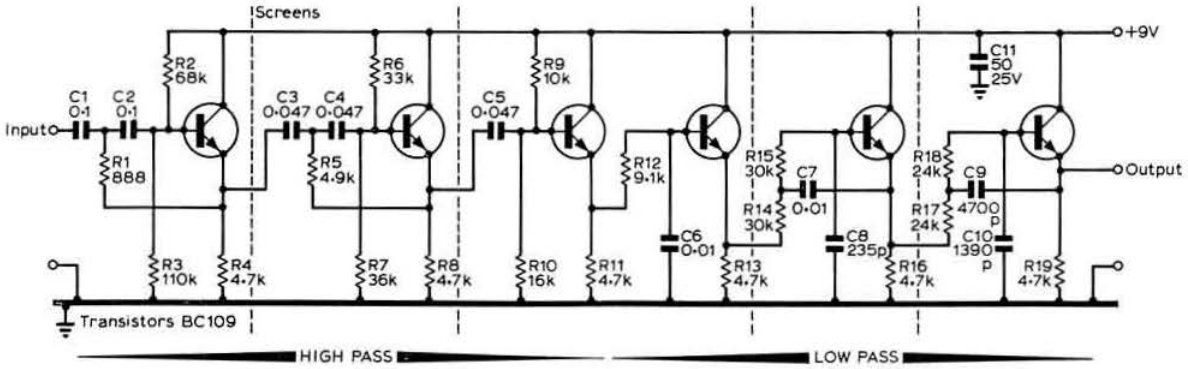
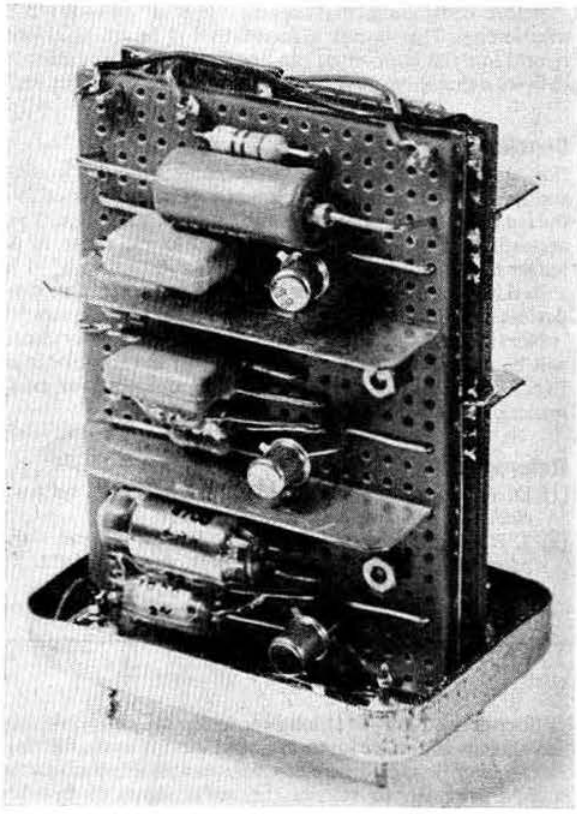


Fig 1. Circuit diagram



Low-pass side of the complete filter

repeatability of design cannot be guaranteed, as the inductance, which is quite critical in a good filter, depends to a great extent on the core used. Coils of this inductance also tend to be rather large.

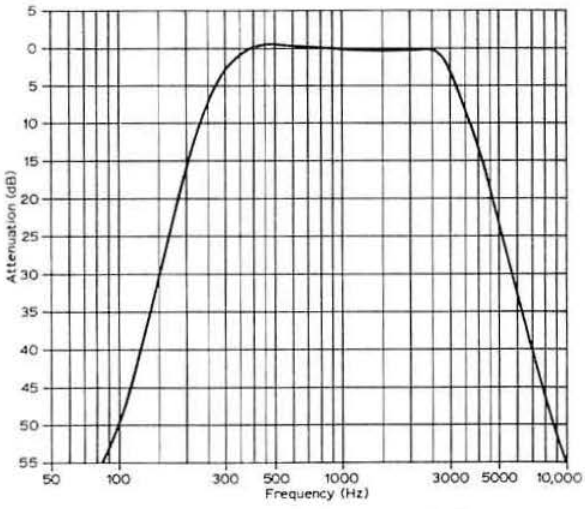


Fig 2. Response normalized to 1kHz

Components

Resistors

R4, 8, 11, 13, 16, 19	4·7kΩ	± 10 per cent ½W
R1	888Ω (820 + 68)	± 2 per cent ½W
R2	68kΩ	± 2 per cent ½W
R3	110kΩ	± 2 per cent ½W
R5	4·9kΩ (4·7k + 220)	± 2 per cent ½W
R6	33kΩ	± 2 per cent ½W
R7	36kΩ	± 2 per cent ½W
R9	10kΩ	± 2 per cent ½W
R10	16kΩ	± 2 per cent ½W
R12	9·1kΩ	± 2 per cent ½W
R14, 15	30kΩ	± 2 per cent ½W
R17, 18	24kΩ	± 2 per cent ½W

Capacitors

C1, 2	0·1 μF 250V
C3, 4, 5	0·047 μF 250V
C6, 7	0·01 μF 250V
C8	235 pF (220 + 15) 2½ per cent
C9	4700 pF 2½ per cent
C10	1390 pF (1000 + 390) 2½ per cent
C11	50 μF 25V

Transistors

BC109

Each filter consists of two Sallen and Key elements. The Sallen and Key element is a simple circuit using two resistors, two capacitors, and a non-inverting unity gain amplifier. Plenty of data is available for this design, and although the theory uses amplifiers of unity gain and high input/low output impedances, a BC109 emitter follower works very well, approximating to the ideal quite closely. The values of components given here produce a very small ripple in the pass band, about 0·2dB. This was a deliberate design feature, because the speech processor referred to earlier uses two low-pass filters in series, so ripple could be excessive, should the ripples of each filter be "in phase". The slope of the skirts is about 35dB per octave: a figure which could only be increased at the expense of ripple (see Fig 2). The shape factor (6 to 60dB ratio) is about 3·3 to 1. This may seem high to users of crystal filters, but for audio work it is adequate; in fact for a filter using neither coils nor crystals, this figure is quite respectable. The insertion loss is almost 2dB, ie 20 per cent.

Construction

Each filter is built on a piece of Veroboard, and fitted either side of a tinplate screen in a small can; individual sections of each filter are separated by screens. Connections are made by feed-through connectors mounted in the lid. All filter resistors should be 2 per cent, and capacitors in the low-pass sections 2·5 per cent polystyrene types. Resistor values in the high-pass sections were calculated after choosing the capacitors, which can vary in value by as much as 20 per cent, but the effect on the filter is not too great, being only to move the "corner" and vary the overshoot ripple by a few tenths of a decibel.

The filter can handle a maximum input of 5V peak to peak when working from a 9V supply. It should be fed from a low source impedance and the load impedance should be as high as possible, at least 10kΩ. The decoupling capacitor is essential.

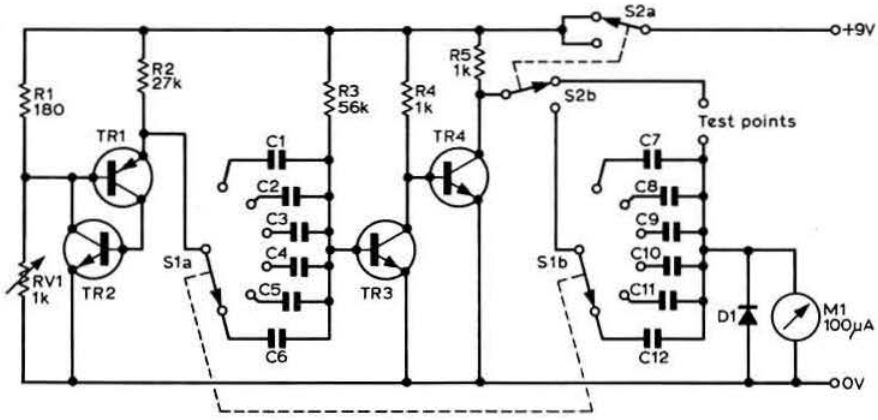
The Puffmeter

by W. H. BOND, G3XGP*

ALMOST inevitably any shack accumulates numerous capacitors which have been in and out of so many circuits that they lose their identification marks. The solution in 'XGP's shack used to be a long session with a bridge meter, but construction of the "puffmeter", giving a direct readout of any value from a few picofarads to one microfarad, provided the complete answer, enabling the value of an unknown capacitor to be compared with a built-in standard by simple operation of a slide switch.

Operation

The circuit diagram shows a ramp generator, square waver, differentiator and integrator. The ramp generator comprises TR1 and TR2, R1 and RV1, R2, the selected capacitor and the base emitter junction of TR3. When switched on, the selected capacitor charges through R2 until the emitter of TR1 rises to about 0·5V above the base, the latter voltage being determined by the setting of RV1. When this point is reached, TR1 conducts, switching on TR2 which regeneratively switches on TR1 even harder, rapidly discharging the capacitor, dropping the voltage on TR1 emitter to about 1·0V, (that is, V_{CE}sat of TR1 plus the V_{BE} of TR2).



When TR2 conducts, current also flows through R1, and if too high, TR1 base could fall well below TR1 emitter voltage thus maintaining current flow, and regenerative switch off action will not occur. For this reason it is important to select a high gain transistor for TR1 and a low gain device for TR2 to ensure that oscillation readily occurs. The alternative is to reduce the value of R1 though this will increase the already heavy current drain of the circuit. TR3 and TR4 amplify and square the output taken from TR1 emitter, and via S2 this is applied first to a selected standard capacitor and then to the unknown. The combination of the capacitor and D1 converts the square wave into a sharp positive spike whose height will depend on the capacitor value only. Current flow through the diode, however, will depend on frequency and the capacitance employed. The meter integrates these values, so that if the frequency is varied by RV1 to give full scale deflection on the meter with a standard capacitor, the unknown (whether higher or lower) will be shown as a direct proportion of the meter reading.

Construction and calibration

The meter is constructed on a small etched board, layout being immaterial, and the capacitor banks are carried on the switch. Choice of "test" or "calibrate" is made by a three position slide switch, which also switches the battery on simultaneously to avoid waste, for the current consumption is quite high at about 20mA. To select capacitors for the calibration range C7 to C12, since each range is related by a factor of 10, start with a 1,000pF mica for C10. The remaining capacitors may be selected from the junk box, the 0·01μF capacitor being chosen by setting the meter on the 10 per cent figure with the 1,000pF using RV1 and picking a capacitor which in the test position gives a reading of 100 per cent, and so on.

Use

To use the instrument, S1 is adjusted to the probable value of the capacitor to be tested, S2 closed and RV1 adjusted to give full scale deflection. S2 is then reversed and the meter deflection shows the unknown as a direct percentage of the value of the calibration capacitor.

Similar circuits have previously been published, but the particular merit of this instrument is calibration prior to testing so that accuracy is independent of ambient temperature or the state of the battery.

List of components

R1	180Ω	**C1, 7**	1·0μF
R2	27kΩ	**C2, 8**	0·1μF
R3	56kΩ	**C3, 9**	0·01μF
R4, 5	1kΩ	**C4, 10**	1,000pF
RV1	1kΩ	**C5, 11**	100pF
		C6, 12	10pF
TR1	2N4125, 2N4288, ZTX 500		
TR2	2N3493 low gain 2N706		
TR3, 4	2N706 or any small signal npn		
D1	Any germanium diode		
M1	100μA meter		
S1a, b	2 pole 6 way		
S2a, b	2 pole 3 position		

* 23 Chantry Road, Moseley, Birmingham 13.

Using the Plessey SL600 series integrated circuits in transceivers

by J. M. BRYANT, G8FNT, linear applications engineer, Plessey Semiconductors

Part 1

THE SL600 series comprises rf and i.f. amplifiers with low cross-modulation and good agc; af amplifiers with and without agc; high performance balanced modulators; speech agc generators; and a complex circuit containing a.m. and ssb detectors and a cw operated agc system. This article describes some transmitters and receivers that can be built from SL600 devices but does not cover either the audio sections (except as they may affect the operation of the rest) or, in the case of transmitters, the high power rf amplifiers. It is divided into two sections, the first describes a variety of systems using the circuits, the second gives circuit details and comments on some potential causes of trouble. A printed circuit layout of one system is illustrated as an example.

Receiver systems

The synchrodyne

The simplest receiver that can be built from SL600 devices is shown in Fig 1(a). It is not the most common, being a synchrodyne, or direct-conversion, receiver. Such receivers may be used for the reception of a.m., ssb and cw. The vfo is tuned to the carrier frequency in the case of a.m. and ssb, and to a few hundred hertz away in the case of cw, this results in the demodulation of the a.m. and ssb and an audible beat with the cw. Upper and lower sidebands are equally well detected by this receiver and, if the audio passband is limited, it is very selective. If, however, it is used to receive, say, an upper sideband ssb signal with a carrier frequency f kilohertz, another such signal with carrier frequency of (f — 2 or 3)kHz will, if present, be detected, though not intelligibly, and cause interference. Such interference may be removed, and one sideband only detected, by use of the phasing system in Fig (1c).

The system in Fig 1(a) is, of course, only a detector and as such is not very sensitive, and has no agc. A more complete system, illustrated in Fig 1(b), has rf filters to minimize cross modulation, an rf amplifier (or rf amplifiers), agc and perhaps an S-meter. Depending on the sensitivity required and the af gain available, one or two rf amplifiers can be used. The SL610 has a gain of 20dB and frequency response of at least 146MHz (nb, this performance, which exceeds that of the data sheet, depends on very careful layout, very short leads, and very great attention to coupling and decoupling of supplies and agc; however, radio amateurs who use these devices on the 2m (144—146MHz) band find their performance at these frequencies satisfactory). The figures for the SL611 and SL612 are 26dB and 80MHz, and 34dB and 15MHz respectively. Which amplifier is used, here as in all the other systems to be described, depends on the frequency and gain required. The SL612 has the extra advantage of a lower current consumption and slightly lower noise figure.

Fig 1(c) shows a more complex direct-conversion receiver which employs rf and af phasing to cancel one sideband so that it is a truly single-sideband receiver. It is necessary to have accurate phasing of the signals and well-matched gain in the two audio channels before the summing stage. Upper or lower sideband may be selected by reversing the phasing of the audio (or the rf, but audio is easier). The system illustrated detects lsb when the upper channel phase shift is positive.

The conventional superhet

A much more conventional superhet receiver is shown in Fig 2(a). It consists of an rf stage with agc (which would probably be an SL610), an SL640 (or 641) mixer, an i.f. filter which could be LC, crystal, or ceramic, an i.f. amplifier with agc and a detector. The i.f. amplifier could be one or two stage, depending on the sensitivity required, but would normally have agc applied to one stage only. For the ssb and cw detector, an SL640 (or 641) with a beat frequency oscillator would be suitable followed by an SL621 to provide audio agc; for a.m. an SL623 is used which also generates carrier agc and, with a bfo, detects cw or ssb. An SL432 or SAA570 will detect fm, but a separate carrier detector is required to provide agc.

A more complete superhet, with front-end tuning and both a.m. and ssb detection, is shown in Fig 2(b). The input

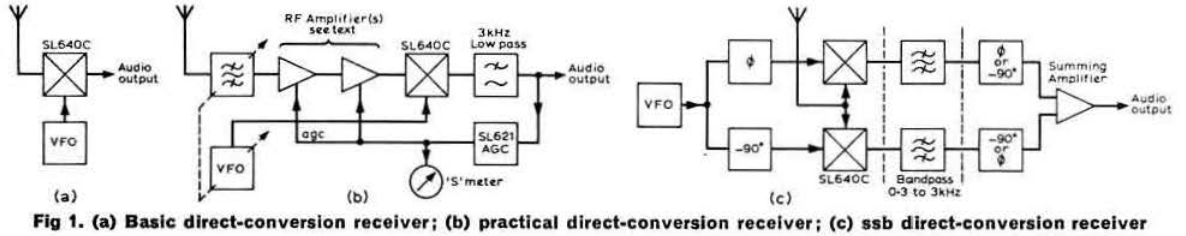


Fig 1. (a) Basic direct-conversion receiver; (b) practical direct-conversion receiver; (c) ssb direct-conversion receiver

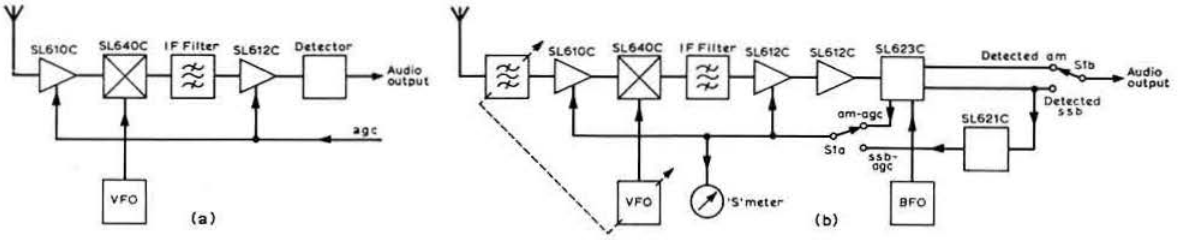


Fig 2. (a) Basic superhet receiver; (b) complete a.m./ssb superhet receiver

to the audio stage is switched between the outputs of the two detectors of the SL623. The agc line, which also drives an S-meter, is switched between the cw agc output of the SL623 and the audio derived agc of an SL621 connected to the ssb output of the SL623. The i.f. filter may also be switched, a narrow bandwidth one being used for ssb, a wider one for a.m. To detect nbfm, a detector such as the SL432 or the SAA570 is connected to the output of the second SL612C. During nbfm reception, agc should be taken from the SL623.

Double superhets

Double superhets may also be designed using SL600 devices but with modern filters double superhets are rarely needed except at uhf or where complex tuning systems are used. Inasmuch as the same techniques are used as in single superhets, no such systems will be described, but it should be noticed that SL600 devices have high gains, and too many amplifying stages should be avoided.

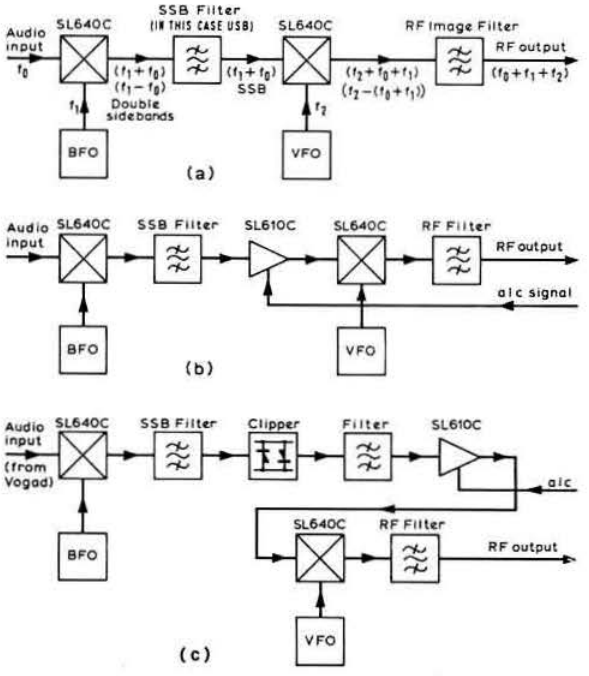


Fig 3. (a) Basic filter type ssb transmitter; (b) ssb transmitter with alc; (c) ssb transmitter with rf clipping

Transmitter systems

Filter type ssb exciters

There are two types of ssb generators commonly used: filter systems and phasing systems. A basic filter system is shown in Fig 3(a). The audio and a low radio frequency from an oscillator (the bfo if the system is part of a transceiver) are mixed in an SL640 which, as a result of its good carrier rejection, gives as output a clean dsb suppressed carrier signal. This is passed through a narrow bandpass filter to remove one sideband, in this case the lower. The ssb (in this case usb) remaining is converted to the final frequency by another SL640 and the image is removed by a filter. The output goes to the transmitter linear amplifier.

Fig 3(b) shows a more complete filter system. It has an internal amplifier which is controlled by an alc (automatic level control) signal which, in most cases, will be derived from the final linear amplifier—either by a threshold detection system or by grid current detection in the output valve.

RF clipping

The envelope of an ssb signal does not resemble the audio producing it. Therefore audio limiting and clipping are not useful techniques for increasing the average-to-peak power ratio of an ssb transmitter, although audio agc (derived, perhaps, from an SL622 vogad circuit) is. If clipping is carried out it must be performed on the sideband signal itself in the transmitter, and furthermore, the sideband must be filtered afterwards to remove splatter. Such a system, illustrated in Fig 3(c), needs careful initial adjustment but yields remarkably good results.

The input audio, which should be controlled by agc, is converted to ssb as in the basic system and is then clipped by a symmetrical peak clipper. The signal is then refiltered to remove splatter at 2f, 3f etc, and passes through an alc amplifier, followed by conversion to the final transmitted frequency. The level of the audio input or the clipping level must be adjusted so that the received audio is of adequate quality—ie clipping must not be excessive (but see below for a fully clipped system).

If the clipper is replaced by a Schmitt trigger and the audio input given 12dB/octave pre-emphasis above 1kHz, the output may be fed to a Class C rather than a linear amplifier, and the signal received as ssb, though with slight distortion. This gives a peak power equal to mean power during speech and, if carrier leak is allowed to occur during pauses, so that the transmitter is always delivering the same power

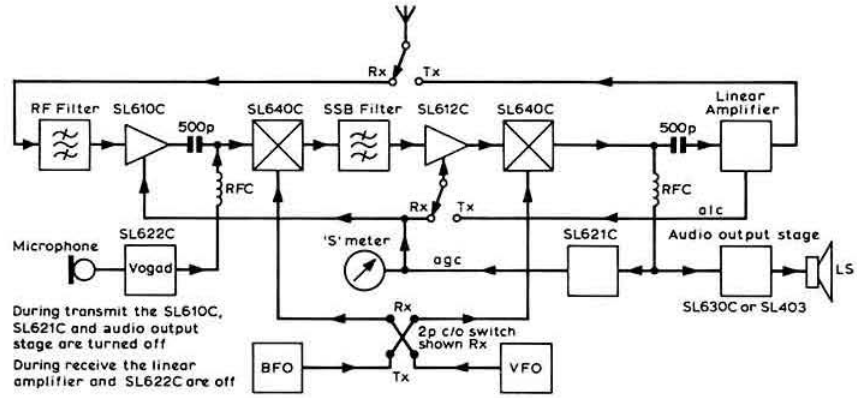


Fig 6. SSB transceiver

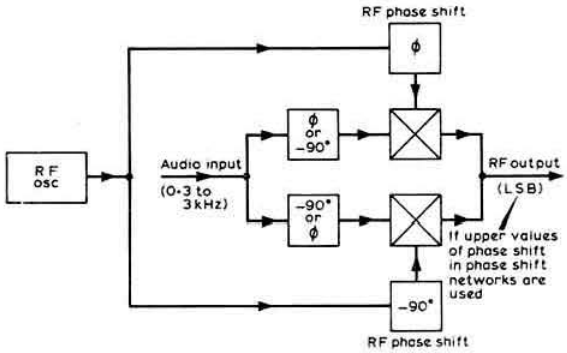


Fig 4. Phasing exciter for ssb

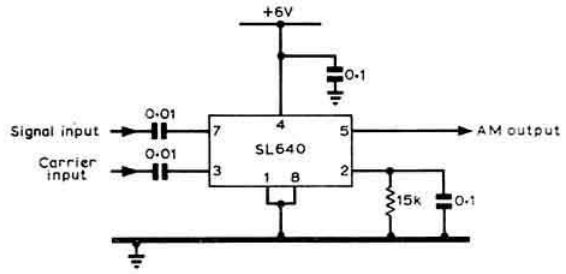


Fig 5. Amplitude modulator

to the aerial, tvi is much reduced. In this case alc—and hence the SL610C—is not needed.

SSB phasing exciters

A phasing system is shown in Fig 4. Audio, which must normally be of limited bandwidth, is phase shifted so that two audio lines of equal amplitude but 90° phase shift are obtained. These audio signals are applied to the signal inputs of two SL640s, and rf reference and quadrature signals are applied to the carrier inputs. The two outputs are summed. If the audio ref and carrier ref signals are applied to one modulator, and the audio and carrier quads to the other, the lsb outputs are in phase and add, while the usb is out of phase and cancels—thus lsb is obtained. Similarly if audio ref and carrier quad are applied to one, and audio quad and carrier ref to the other, usb is obtained.

This method appears attractive in many respects, having the advantages that no expensive filters are used and that the carrier frequency may be varied so that further conversion may not be necessary. It is compatible with the direct-conversion ssb receiver illustrated in Fig 1(c), and a very simple transceiver can be built using the two systems. The drawback is that to keep the second sideband 40dB below the desired sideband, the phasing, both audio and rf, must be very accurate—in fact within 2°. Also, the amplitude of the carrier applied to one modulator must be adjusted to minimize second sideband generation. Carrier leak must be minimized on both the modulators.

Despite the adjustment problems this method of ssb generation is very popular—probably because of the saving of expensive filters.

Amplitude modulation

Since a.m. is merely dsb with carrier, an SL640 may be used as an amplitude modulator if its carrier leak is increased. If a 15kΩ resistor is connected between pin 2 of the SL640 and earth (as in Fig 5), there will be sufficient carrier leak for the output of the SL640 to be a.m. By switching in or out the resistor, a.m. or dsb may be produced—if the filters following the SL640 are also switched, a.m., dsb or ssb may be obtained from the one SL640 with the same inputs. This enables a multi-mode transmitter to be made with very few components.

Transceiver systems

As is evident if Fig 2(b) and Fig 3(b), or Fig 1(c) and Fig 4 are studied together, ssb transmitters and ssb receivers of the same type are very similar. Therefore, by a little signal switching, it is possible to make one set of SL600 devices perform both as a transmitter and as a receiver—ie as a transceiver. This, of course, saves both on SL600 integrated circuits—which in any case are quite cheap—and on filters, which are not. Fig 6 shows the block diagram of an ssb transceiver. Similarly a phasing transceiver uses far less parts than a phasing transmitter plus a phasing receiver.

To be continued

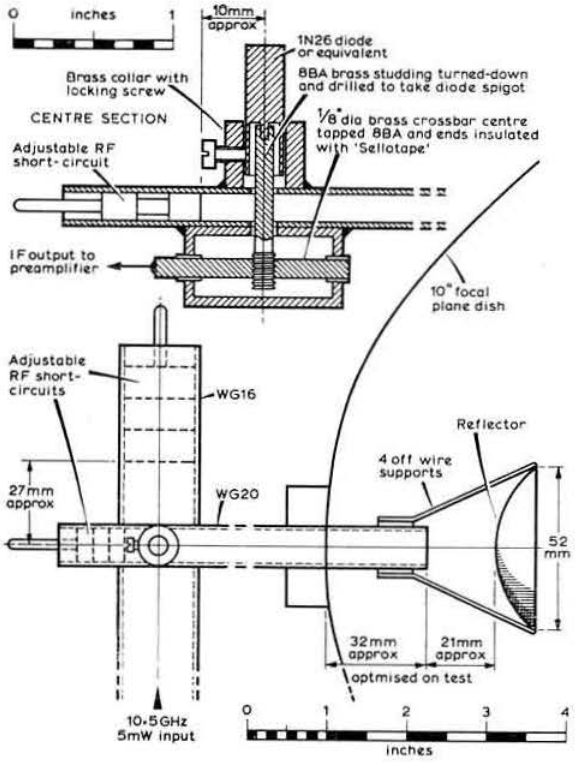
MICROWAVES—1,000MHz and up

by DAIN EVANS, G3RPE*

A simple transceiver for the 15mm band

If design information for the microwave bands in general is short, that for our "top" band appears to be virtually non-existent: the following information from G8DEK on the type of equipment that he, G3WDG and G8ADP have been using during the last few months is therefore welcome. It was shown at the last VHF/UHF Convention, and has since been used to establish the current UK record of seven miles.

One of its virtues is that it can be made a simple add-on unit to existing 3cm gear, retuned to 10·5GHz, which will normally have frequency measurement and modulating facilities already built in. This source is used to drive a 1N26 type mixer diode which acts as a doubler to 21GHz, an output of about 100μW being obtained for a drive of 5mW. The mixer diode also acts as a harmonic mixer. This differs from a conventional mixer in that it is driven into non-linearity not by a normal local oscillator differing from signal frequency by the i.f., but by a sub-harmonic. So this single diode absorbs 10·5GHz, generates 21GHz, receives 21GHz signals and produces the i.f., in this case at 30MHz.



Practical configuration of a simple 15mm transceiver

The practical configuration is shown in the diagram. The 10·5GHz drive is fed into a length of WG16 (1in by $\frac{1}{2}$in od), the far end of which is closed by an adjustable rf short circuit. A length of WG20 ($\frac{1}{2}$in by $\frac{1}{4}$in od) is soldered across to provide a common wall, the short end of which is also closed by a short circuit. The mixer diode is coupled through a hole in this wall by the method shown in the section so that it feeds, and is fed from, both waveguides. The i.f. is taken from the decoupled output as is shown. The 8BA brass studding is made to be a tight fit on the spigot of the diode centre pin so that the length of the line can be adjusted by rotating the diode. This adjustment is quite critical, the positions of the two rf shorts being relatively non-critical. For an input of 5mW, a diode current of about 4mA should be observed. The input should not be increased above 10mW as the diode may be damaged.

G8DEK also supplied details of the aerial used. This is of interest in that it demonstrates how by using a shaped reflector the more common focal plane dish can be fed from a horn. In this case, the "horn" is the open end of the waveguide, and the reflector the bottom of a standard aerosol tin. Without a shaped reflector, a horn feed can only feed a dish effectively when this has a focal length/diameter ratio exceeding about 0·32.

For testing the equipment, enough output can be obtained as the second harmonic of an oscillator on 10·5GHz. A simple filter can consist of a taper from WG16 to WG20 approximately 5cm in length.

Progress on 3cm

G3ZKR (Southampton) has sent the following necessarily brief account of his 3cm activity:

22 July: started building equipment.
13 August: two-way contact with G8DEK over a 5km path.
16 August: two-way contact with GW3ZGO/P over a 155km path.

G3ZGO operated from the Prescelly Mountains in Pembrokeshire, and G3ZKR together with G3WDG from Dartmoor. The latter pair will now be able to claim Microwave Awards Nos 4 and 5; G3ZGO having already received his a year ago when operating over the same path but from the Dartmoor end. The equipment used was as follows:

G3WDG: 2K25 klystron to a 2$\frac{1}{2}$ft dish. 30MHz i.f. as described in his article in the July issue of *Radio Communication*.

G3ZKR: KS9-20D klystron to a tinplate 25dB horn, with a standard 12$\frac{1}{2}$p Birkett SIM2 mixer diode. The 30MHz i.f. used an MPF122 in the rf stage, and one also as the mixer to the 10·7MHz second i.f. which employed a CA3013 integrated circuit as the limiter/detector. A BF194 was used as the second local oscillator.

G3ZGO: Gunn diode of 4mW output to a 2ft dish, the 30MHz i.f. being a retuned tv i.f. strip with a BF180 pre-amplifier. A feature of this equipment is the use of a circulator connected to the aerial, the transmitter port and the receiver port to enable full duplex operation.

* 4 Upper Sales, Chaulden, Hemel Hempstead, Herts.

TECHNICAL TOPICS

by PAT HAWKER, G3VA

IN trying to introduce readers to new ideas and new techniques, I am acutely aware of the danger of encouraging amateurs to produce what may be only poor imitations of complex units far more suited to professional applications. There is also the risk (as Bill Scarr, G2WS, pointed out in his letter to the editor last month) that amateur radio could too easily gain the reputation (unjustified in my opinion) of being inherently a high-cost hobby beyond the budgets of youngsters or the less well-heeled. One cannot too often emphasize that you do not need to use a CX7A costing $2,000 plus, to enjoy working on the bands! A modern hf communications receiver may cost £200 or more—but a study of *Members' Ads* will show that plenty of good basic chassis can be acquired for a tenth of this figure, and then modified to take advantage of recent techniques.

So this month we would like to deliver a few words of warning about frequency synthesizers. From our post-bag it is clear that quite a few amateurs, particularly those in close contact with professional designs, are increasingly attracted to frequency synthesis for receivers and transmitters, to provide a frequency stability and frequency read-out of an order not readily achieved with straightforward vfo systems. To some extent we must plead guilty to encouraging this trend by (for example) drawing attention to the attractions of digital mixing (*TT*, April 1972).

Barry Priestley, G3JGO, believes that the original article on digital mixing was misleading on the question of the mixing of two non-coherent sources. He feels that in describing the results achieved, the Motorola engineers have fallen into a common fallacy about simplified frequency synthesis. By feeding the output to a frequency counter it is all too easy to convince oneself that one has achieved the desired result—a good stable output on the right frequency. Unfortunately this represents only part of the story. Equally important (as noted in *TT*, May 1968) is the purity of the output signal. This will not show up on a counter: it needs a good spectrum analyser or even more complex measurement techniques to determine (a) if there are significant spurii, and (b) the noise sidebands and/or jitter or warble of the output signal. G3JGO believes that non-coherent digital mixing is almost bound to result in a mish-mash of spurii; and that unless one is very careful, even quite good phase-lock-loop systems will have a good deal of jitter and warble. This is not intended to put people off experimenting with frequency synthesis—but only to emphasize that simple designs may end up rather less satisfactory than the vfo techniques they are intended to replace. Synthesizers are still for the specialist.

It has often been pointed out that for amateur operation, where we do not work the channel system, long-term stability is not all that important. Does it really matter that you cannot switch your transmitter or receiver immediately to 21,149·7kHz and be sure that it will stay there day after day? The really important requirement for ssb and narrow-band cw is that neither receiver nor transmitter will allow the signals to drift out of the passband during "overs" or during the contact (though an occasional touch on the controls can give the user the not unpleasant feeling that he really is *operating* equipment).

From the viewpoint of spurii and reciprocal mixing, a conventional vfo, such as the highly stable G3PDM Vackar unit (*TT*, December 1969, or *ART3* and *ART4*) still has many attractions. If, increasingly, we do turn our thoughts towards frequency synthesizers, let us make sure that they really solve problems rather than add to them.

Five-band VS1AA/Windom

Some 43 years ago (*QST*, September 1929), L. Windom, W8GZ, described the original single-wire-feeder Windom aerial. This utilized the fact that when an aerial is resonant, the impedance at any point along its length is a pure resistance—which in practice varies from under 50Ω to about 5,000Ω. There is thus always some tapping point at which the radiator can be matched to a transmission line—which can take the form of a single wire. In these conditions the wire no longer radiates or has pronounced standing waves on it, but acts as though it were a conventional transmission line.

The original Windom was essentially a one-band aerial and sometimes proved pretty critical to adjust (usually by running a neon along the feeder to see if there were pronounced standing waves). Soon afterwards, G2BI showed that by cutting the feeder carefully so that the whole system provided resonance on a lower frequency band, it was possible to use a Windom quite effectively on, say, 7 and 14MHz. Then Jim MacIntosh, VS1AA (now GM3IAA), in his classic "Some experimental work with aerials", (*The T & R Bulletin*, November 1936), introduced an important new idea—the "one-third" tap: "During the course of experiments with a 264ft Windom, it occurred to the writer that there must be an arithmetical relation between these somewhat mythical tapping points, and after a little juggling with pencil and paper, the fraction one-sixth was evolved" (ie one sixth from the centre). He added: "This one-sixth business sounds too good to be true, but it at least has the merit—if such it may be termed—of being geometrically correct." And so was born the multi-band VS1AA which is still going strong, particularly in some parts of Europe. Actually, since the original work was carried out by GM3IAA while he was VS2AF I suppose to be strictly accurate it should be known as the VS2AF. By using the one-third tap on a 138ft wire (and using thinner-gauge wire for the feeder) one still has a very useful four-band aerial for 3·5, 7, 14 and 28MHz.

In recent years, the VS1AA has been given a new lease of life in its twin-wire form, using a conventional 300Ω balanced feeder instead of the slightly more critical single-wire. Theoretically the impedance at the one-third tap is of the order of 500Ω (or rather less, due to the presence of ground etc) on 3·5, 7, 14 and 28MHz. Unfortunately this is not the case on 21MHz where the point is at high impedance. One method of coping with 21MHz, suggested some years ago by W9GJY, is to add two shorted quarter-wave stubs at

76ft and 38ft from the feed point—but stubs are never very popular.

An alternative technique is described by F. Spillner, DJ2KY, in *QRV Amateur Radio*, Nr 8, August 1972. He uses a 1:6 balun with 60Ω coaxial cable for the feeder, but 300Ω or open-wire line, or single wire feeder could be substituted. His basic idea is to make use of the well-known multi-wire dipole technique adding two wires, 4·5m and 2·25m as shown in Fig 1. This seems a usefully simple approach to five-band operation.

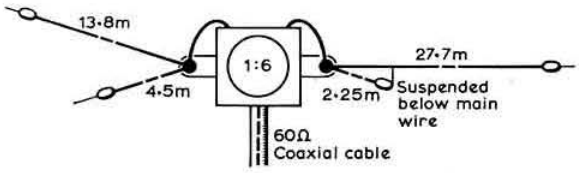


Fig 1. DJ2KY's five-band Windom. 300Ω twin line could be used instead of the coaxial cable plus 1: 6 balun transformer

The ddrr aerial again

In *TT* (August 1971), John Pegler, G3ENI, questioned the results sometimes claimed for the ddrr low-profile aerial and called for comparative results. None came forward at the time but now in *QST* (July 1972), Robert Dome, W2WAM (of ssb phasing-rig fame), provides an interesting analysis of quarter-wave ddrr aerials. He suggests that efficiency will usually be very low compared with a half-wave dipole suspended well above earth, and bandwidth will be narrow. These are because of the extremely low radiation resistance (typically 0·095Ω), so that (as in the small transmitting loop) conductor ohmic losses consume most of the power.

The original ddrr (as described by J. M. Boyer, W6UYH), had an electrical height of only 2·5°, representing about 1ft for a 7MHz aerial. Now W2WAM suggests that a modest increase in vertical height could improve the efficiency very appreciably because the radiation resistance for short vertical heights varies as the *square* of the height. He believes that increasing height to 3½ft instead of 1ft would raise the radiation resistance to 1·16Ω which, with typical conductors etc, would increase efficiency from around 2·75 per cent to 25·8 per cent, or a 9·8dB improvement—and a 25 per cent efficiency for a vertical radiator should give quite useful results. Of course, I suppose if one carried this to a logical conclusion one would be saying in effect that a top-loaded vertical can be very effective! But the W2WAM article clearly points the way to achieving a useful ddrr aerial provided one remembers the ohmic losses etc and avoids unsuitable thin wire construction. And may I put in a plea for more investigation into the ½-wave closed-loop version (*ART3* or *4*) which seems to have significant advantages?

Long wires—some hints

The 132ft long-wire remains deservedly a popular multi-band aerial—but it can produce arguments about just how long it should be—132ft, 136ft, 138ft etc are all commonly recommended figures. The theoretical length (which can be affected by height above ground, "bends" and near-by objects) varies quite significantly with the bands, due to the "end-effect" which need be taken from only one half-wave.

Table 1—Resonant lengths

3,500kHz	133·7ft	14,300kHz	135·9ft
3,600kHz	130·0ft	21,000kHz	139·4ft
3,700kHz	126·5ft	21,450kHz	136·5ft
7,000kHz	137·0ft	28,000kHz	139·7ft
7,300kHz	131·0ft	29,700kHz	131·7ft
14,000kHz	138·8ft		

In *QST* (July 1972), Howard Hanson, W7MRX, lists the theoretical lengths for various frequencies (see Table 1) spanning from about 126 to 139·7ft. While we are not too sure that this matters much in practice, for those who like to feel their aerial really is resonant, he comes up with a solution: a "stretcher" comprising two No 12 copper wires running the length of a 7ft board, about 2½in apart, rather like the old Lecher wires, with a sliding short-circuit (see Fig 2(a)). The slider consists of two springy copper plates clamped centrally to a plastic pill bottle which acts as a handle. This can be readily moved along to provide up to 14ft of extra wire in the aerial (though because the wires are close together the effective length will be rather less).

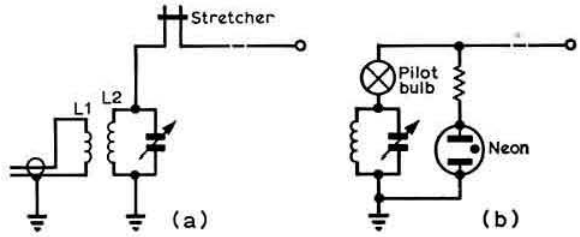


Fig 2. (a) Use of stretcher with 130ft long wire. Typical atu would be: 3·5MHz—L1 44 turns, L2 7 turns on 2in diameter; 7MHz—L1 22 turns, L2 6 turns on 2in; 14MHz—L1 14 turns, L2 5 turns on 1½in; 21-28MHz—L1 9 turns, L3 3 turns on 1½in; (b) Use of simultaneous voltage/current indicators to show state of resonance of long-wire aerial as suggested by G2ALM

This idea brings to mind another dodge intended to provide a clear visual indication of just what is happening to long-wire resonance. It stems from Roy Wilkins, G2ALM, and consists simply of connecting a small pilot bulb between tuner and aerial *and* a neon bulb through a suitable resistor down to earth, as in Fig 2(b). If the aerial is exactly resonant, there will be virtually no current to light the bulb, but as it goes off resonance the bulb will begin to light up and voltage drops slightly. Most amateurs have long used bulbs and neons to check aerials but the novelty of G2ALM's arrangement is to have them both connected permanently and simultaneously.

Remote field strength indicator

F. N. F. Bewley, G8HX, reports that for some time he has used a field strength meter located alongside the transmitter. In practice the only real purpose it has served has been to indicate that there is rf around, but was virtually useless in showing up how much of it was being radiated. So he felt that to be effective it must be located at a remote point—now he is only sorry that he did not try it sooner. Results have been better than expected.

His arrangement (Fig 3) has a detector unit comprising the usual broadband rf choke and diode, built on a tag strip with lead-out wires for the meter, aerial and earth.

The whole unit was then put into a plastic pill box which was filled with melted candle wax and fastened to the fence about half-way down his garden. From this he ran plastic-covered flex to a 100μA meter in the shack. He now finds that even slight mis-tuning of the transmitter power amplifier shows up clearly, and reduction of power input by half results in the meter reading dropping by half (whereas when the unit was in the shack it just seemed to give a steady reading come what may). Although an earth is shown in the diagram, G8HX finds it works just as well without one, since the meter leads form a counterpoise.

For anyone feeling like giving the idea a try, G8HX points out that construction is easy and the tag strip superfluous: "wire the parts, squeeze them together, making sure the bare leads are not touching, and place them in the pill box. Melt a candle, putting the wax to one side to cool—then as soon as it shows signs of setting pour in into the pill box—it will set more easily if stood in a bowl of cold water."

He admits that his 100μA meter is really too good for the job and that a less sensitive unit could be used by adjusting the length of "aerial" which is about 6ft long.

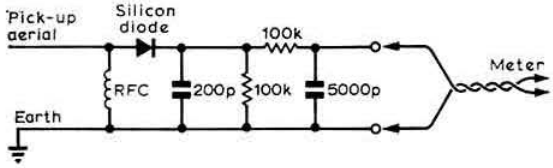


Fig 3. G8HX's remote field strength indicator

G8HX sounds very enthusiastic about the result., though he expects to get variations in the readings due to rain affecting the fence, etc. The main point is that it is proving very sensitive to transmitter adjustment, and he feels it would be a useful device to anyone using a long wire or untuned aerial with an atu. The diode is a silicon type which should be less affected by temperature than a germanium device.

The limitations of an indicator close to the ground and still relatively close to the aerial have to be recognized—still it is pleasant to have at least some indication that all is working as it should be.

A product detector—and dual-gate mosfets

Dual-gate MOSFETS have been featured several times in *TT* as product detectors both for superhet and direct-conversion receivers. Our excuse for including Fig 4 is that this comes from a long and critical review of product detectors by Glaus Sondhauss, DJ2LI, (*QRV amateur radio*, Nr 8, 1972). This article goes in some detail into the problem of intermodulation in this stage. The suggested circuit provides adjustment of both bias and gate two potential.

Elsewhere, a strong plea on behalf of dual-gate, diode-protected MOSFETS ("the best of the solid-state devices for small-signal circuit designs") for use up to 500MHz is put forward by Maurice Johnstone, W3TRR, in *Ham Radio*, July 1972. He notes: "I am presently involved with a receiver design using RCA dual-gate 40822 MOSFETS, and we have used some 4,000 devices on the assembly floor without a failure due to electrostatic problems. I am using this type for rf, mixer, i.f., audio and oscillator stages and find it admirably suited to all applications. The inherent cascode internal connection of the dual-gate mosfet makes it ideally suitable for cascode pre-amplifiers."

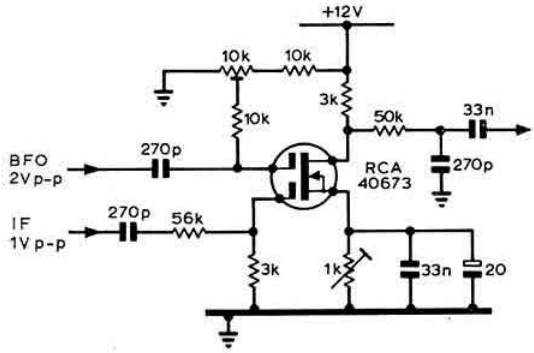


Fig 4. Dual-gate mosfet product detector

The versatility of "turns cancellation" frequency modulation

In *TT*, August 1972, Brian Bradshaw, GW3JNA, reported on the success he had achieved using a "turns cancellation" technique in a voltage controlled oscillator. He than acknowledged that this had been described for mf applications in *Wireless World*, February 1965, by K. C. Johnson. This resulted in interesting letters from A. H. Bower, G3COJ, and also from the original author.

Brian Bower, of BBC Research, mentions that the "turns cancellation" vco technique is in fact the principle used in the variable inductance frequency modulator developed by the BBC and which was referred to very briefly in *TT* (April 1969). Its use in this application has been described in detail in *BBC Engineering Division Monograph No 76* where it is shown that its linear characteristics make it suitable for modulating a 24MHz Wien bridge oscillator directly with stereo signals to full broadcast standards. G3COJ recalls the modulator was developed around 1963 and culminated in Patent No 1076831, following earlier work with valves and transistors by Ken Johnson. He also recalls, in passing, that Ken Johnson, J. B. Gunn (of Gunn diode fame) and D. A. V. Williams (formerly G3CCO and now chief engineer, BBC External Services) and he were all members of the Cambridge University Wireless Society (G6UW) at the same time!

Ken Johnson confirms that the original idea was published, in a valve context, in *Wireless World* as long ago as 1949. The 1965 article described a wide-range wobbulator covering 0·480–1·13MHz and using three OC170 transistors, (see Fig 5). He comments that the idea "has never caught on, and I suspect that most people just do not believe it"—a comment that unfortunately we have heard echoed all too often in connection with really original ideas developed in the UK! In the 1965 article he noted several advantages that accrue from using variable inductance rather than variable capacitance in frequency modulation. He also noted that "the range of variation obtainable suggests that it might be used for a voltage-tuned radio receiver operating over the whole medium-wave band . . . it is clearly possible to make a tunable selective amplifier." He corrects the basic formulae for L_{ef}. This should be $L_{ef} = Ll - Mx$

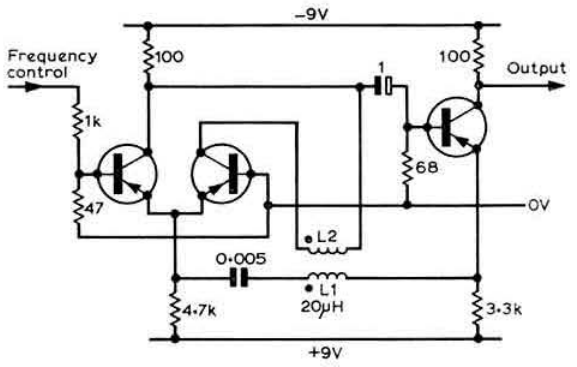


Fig 5. The original 0·48 to 1·13MHz wobbulator designed by Ken Johnson (*Wireless World*, February 1965). L1 50 turns on ⅜in diameter former; L2 45 turns

(where x is the fraction of the total emitter current carried by the right-hand transistor of the pair). He writes:

"Notice that the right-hand ends of the two windings of the mutual inductance carry virtually the same voltage swing. It does not, therefore, matter if there is an appreciable capacitance between them and they can perfectly well be bifilar wound so as to get a reasonably large coupling without the need for a ferrite core.

"With modern transistors I would expect operation at 28MHz to be no problem at all, but experiments are needed to find just how the linearity compares with a vvc diode for any particular range of swing. The higher the coupling the better the linearity and the greater the range, but the worse the uncertainty of the centre frequency.

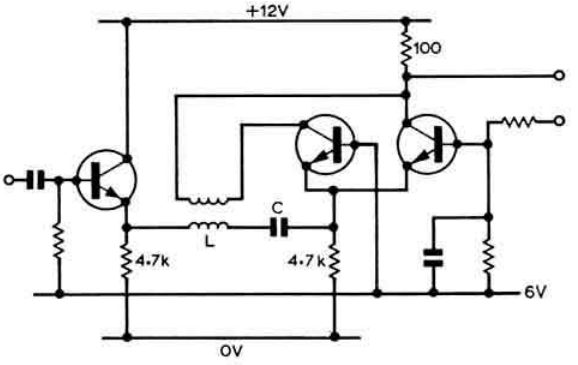


Fig 6. Possible configuration for tunable filter stage using turns-cancellation principle

"I have certainly tried circuits with M > L, but they do not oscillate at frequencies below zero! The action stops at the bottom end for one of a number of reasons. The waveform might be improved if the currents on the two sides were more equal, with perhaps even a greater current on the right. The oscillation is limited by cutting-off the transistors when the current through L1 is peaking at the dc value determined by the tail resistors; it is better if this does not happen in the buffer stage. At high frequencies an rf bypass capacitor on the left-hand base might be a good idea.

"There is obviously no difficulty in making a tunable filter stage using the same principle along the lines of Fig 6. The gain falls when the series resonant impedance of L_{et} and C becomes large compared with the 20Ω or so of the $1/g_m$ of the right-hand transistor."

Clearly this is a most interesting technique which could yield useful results to those prepared to take it seriously.

Variable notch and peak filters

What looks as though it could be a useful way of inserting a deep tunable notch at almost any frequency from sub-audio to some hundreds of kilohertz (for example at af or i.f. below about 470kHz) is indicated in *Electronics*, 28 August 1972, by Donald DeKold. The basic arrangement is shown in Fig 7 and consists of a modified phase splitter and Wien bridge network. The values of R and C shown are for about 174Hz but these can be varied between wide limits provided R, R′ and C, C′ are the same. It is claimed that it can provide a 60dB notch when carefully set up for a single frequency, or better than about 45dB over a fairly wide band, if tuned with a dual gang capacitor (standard gang capacitor is said to be able to tune it over 8 to 200kHz). The series 1kΩ resistor in the collector circuit is adjusted for maximum notch. Because the filter operates at a fairly

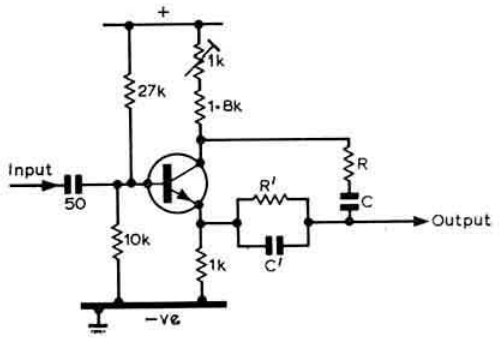


Fig 7. Notch filter capable of providing 60dB notch over wide range of frequencies

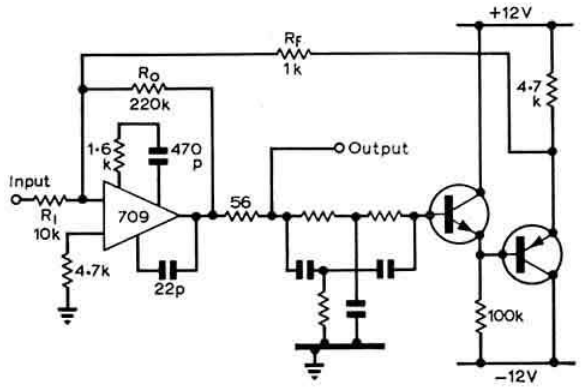


Fig 8. Active audio filter with adjustable gain and Q

high impedance level it may have to be shielded to avoid noise pick up.

For some time we have been waiting an opportunity to slip in a useful active audio filter circuit, shown in Fig 8, and sent along by Barry Priestley, G3JGO. This can provide independent gain and selectivity, and stems from *Electronic Design*, 15 February 1969, p126. The gain depends on the ratio $R_o/R1$ while Q depends on $R_o/(4R_F)$. G3JGO points out that the original source gives Q as dependent on $R_o/(8R_F)$ but this seems to be an error.

Bandpass filter

The July *TT* included a design by OH2CD for a Cohn minimum-loss bandpass filter suitable for receiver or transmitter applications. Another form of bandpass filter that seems to be turning up quite frequently these days is that shown in Fig 9, which is a further circuit from *QRV* (Nr 6, 1972). This is capable of putting a good symmetrical bandpass characteristic into a 60Ω cable with useful rejection outside the band. The values shown are for 3·5MHz with an indication of how this can be realized with low stray coupling between the sections.

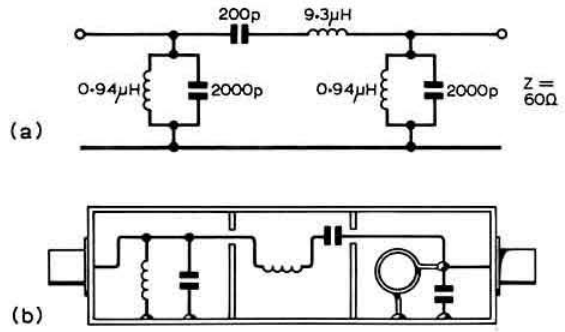


Fig 9. 3·5MHz filter for receiver or transmitter applications

Optimists all

The simple fixed-channel "Optimist" transceiver (*TT*, August) brought several comments. Fraser Robertson, A6736, notes that the transmitter section of the Optimist can form the basis of a useful QRP, 3·5MHz, cw transmitter. The arrangement shown in Fig 10 can run up to about 2·5W input and draws no current in the key-up position.

Bert Hammett, G3VWK, writes to say that for some time he used a basically similar unit but for a.m. speech. This facility was provided by feeding the output of the audio amplifier into the switch position where the key is connected, with audio derived from the output transformer which has a low-impedance headphone winding. Contacts of over 100 miles were achieved on 1·8MHz, but the project suffered the fate of the successful: "it was dropped when it was found to work".

Another of his projects has been an active aerial for low power dsb on 1·8MHz: the resonant aerial having an ic hung in the centre to provide a few milliwatts of dsb. The crystal, other components and battery were all suspended from the T-insulator, with the only lead descending from the aerial being that from the microphone. He reports contacts over 100 miles with some 20mW power and suggests that a more modern SL640 might be an even more elegant

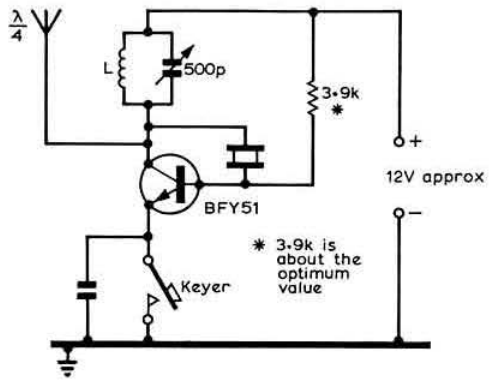


Fig 10. QRP 3·5MHz cw transmitter

way of doing this. G3VWK, who is particularly interested in QRP operation, would be glad to hear from anyone trying such a project.

Modified 300Ω ribbon—mark III

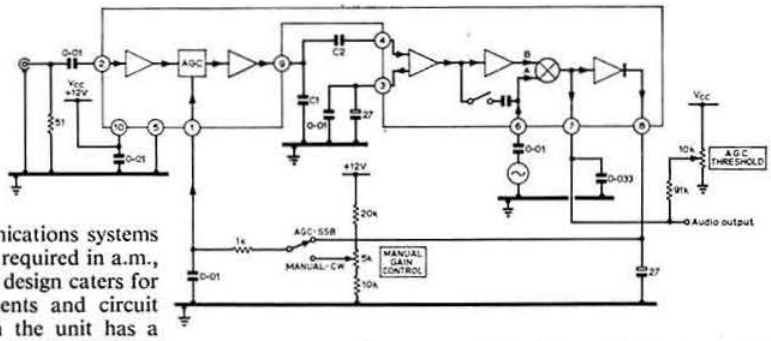
Kjell Ström, SM6CPI, adds another chapter to what is developing into the saga of low-loss ribbon feeders (*TT*, July and February). When he read the item in July, it stirred a memory of having seen such a ribbon offered commercially, and by coincidence he came across the reference again a few days later. The ribbon, looking very much like the K8ANV version, is manufactured by Borens Fabriks AB (Bofa) of Kungsbacka, Sweden, both in 240Ω (GMP-10) and 300Ω (GMP-6) versions, at prices very much the same as for conventional ribbon feeders, which they also manufacture. The GMP-6 has a loss of only 2·1dB/100m at 50MHz, 4·6dB at 200MHz and 7·8dB at 500MHz, well below typical figures for high-grade coaxial cable (though one must expect the ribbon to be more affected by weather). Looking through the Bofa booklet which SM6CPI sent along it is clear that this is a firm which specializes in very high grade cables. The British agent is Guest International Ltd, Brigstock Road, Thornton Heath, Surrey, CR4 7JA, though it is not known if they will supply in small quantities.

Here and there

G3VWK also comments on the general purpose power meter/dummy load suggested by G3EIW/ON8KM (*TT*, August). He has used a basically similar arrangement but incorporates a modification which he believes is useful. This consists simply of tapping his diode circuit down the Morganite resistor, the connection being made to a single turn of 16swg wire wrapped tightly around the main resistor, bound in and soldered. The tap removes the diodes from being directly connected to the transmitter, which he considers not only reduces the size of the diodes but is a good safety measure from the viewpoint of an external scope and/or meter. It also reduces the effect of the meter on calibration at the higher frequencies, linearizing the load with frequency.

In presenting the ZL2AMJ rf noise bridge last month, we omitted to give any suggested transistor types in the noise amplifier section. In fact these are fairly non-critical, but for the record ZL2AMJ used two BC108s which he happened to have available. WB2EBZ recommended 2N918, 2N3563 or HEP56.

National LM373H semiconductor sub-system



This device is intended for use in communications systems and is capable of performing the functions required in a.m., fm and ssb receivers and transmitters. The design caters for the minimum usage of external components and circuit switching. When used for a.m. operation the unit has a high-gain i.f. amplifier and a self-contained detector and agc system. For fm there are three limiting stages and a quadrature detector, while for ssb use there is a double balanced product detector and a self-contained audio peak agc system. The device is housed in a TO-5 can.

Athena Semiconductors are offering these devices at a special price of £2.42 for quantities up to 24, and a matching 2W audio amplifier, the LM380N, is available for £1.30. Data sheets for both devices are available and the accompanying diagram shows the connections and circuitry for an ssb and cw i.f. application.

The LM373H may be obtained direct from Athena Semiconductor Marketing Co Ltd, 140 High Street, Egham, Surrey.

Equipment Information

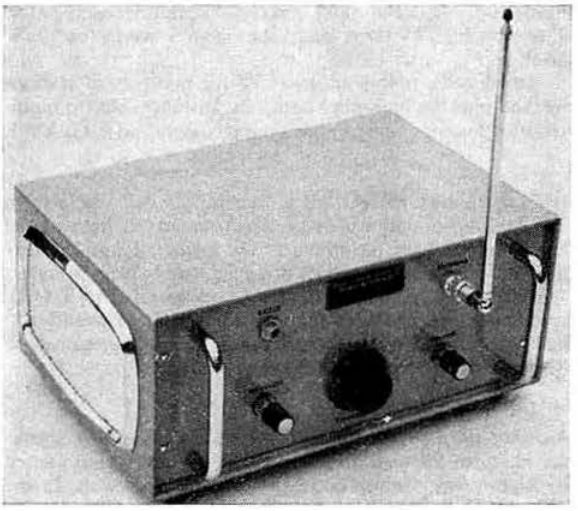
Telecomm vhf monitor receiver

This instrument is an all-transistor portable receiver for the reception of fm transmissions on one to 13 close-spaced channels in the frequency range 50 to 220MHz.

The equipment is self-contained, incorporating a built-in speaker, telescopic aerial, and 12V dry or rechargeable battery; an optional extra is a signal strength meter. Operation is also possible from an external 50Ω aerial and/or external 12V dc source.

Sensitivity is 20dB of noise quieting for 1μV emf input. Selectivity is not less than 70dB adjacent channel rejection, and the af output is 1·5W.

Further information can be obtained from Radio Communications (Guernsey) Ltd, Rue des Monts, St Sampson's, Guernsey, Channel Islands.



BOOK REVIEW

The Origins of Maritime Radio by R. F. Pocock and G. R. M. Garratt, G5CS. A Science Museum Survey. HMSO, pp viii + 60. £1.

Admiral Sir Henry Jackson was President of the Society during 1922—the year in which the fateful decision was taken to change the name from the Wireless Society of London to the RSGB. Guglielmo Marconi was one of the first two Honorary Members of the Society and is on record as having said: "You know I have always considered myself an amateur".

So members have a special and committed interest in the two main *dramatis personae* of this definitive unravelling of what has long been a scientific mystery, surrounded by much controversy.

Did Admiral (then Commander) Jackson achieve effective radio communication in advance of Marconi—as some have suggested—only to have his discoveries suppressed by a secretive Admiralty? There has always been an argument that Jackson developed radio communication. What was the nature of the relationship between the two pioneers?

Here at last the mystery is authoritatively punctured—thanks to the discovery by the two authors of all the original Admiralty files relating to the period 1896 to 1900 in the vaults of the Public Record Office. A good story should not be spoilt by disclosing just what these records show—except to say that both Marconi and Jackson emerge with great credit and with reputations enhanced rather than diminished. Perhaps less so the Admiralty which effectively deprived the Fleet of essential wireless communication for 10 months at a time of great international tension because of an argument over the payment of modest royalties.

Here in these pages we are back in the days of coherers and contact breakers, jiggers and spark gaps, the naval manoeuvres of 1899 and 1900, and a Director of Naval Contracts who believed that a £100 royalty was "a preposterous" condition!

G3VA

FOUR METRES AND DOWN

by JACK HUM, G5UM*

Enough to do the job

To do justice to the weight of mail received on the subject of "less power on 2m" would require all of this month's *FMD* space. Keeping everything as brief as possible, then, let us describe a picnic to Savernake Forest organized by the Swindon & District ARC that showed what can be done in this context.

They held a competition called "Who can still hear G8AVG?", during which G8AVG about 20 miles away gradually reduced his 2m output from a starting level of 5W, monitored with his own instruments and cross-checked by G8ETD a few streets away. Eight members still read G8AVG at RS33 when his power was reduced to −58dB; in fact, nearby G8ETD measured it as −62dB. "This power level is 5μW into the aerial," remarks G8AVG. His aerial was a Parabeam, while the most successful searchers used halos. Two who had $\frac{5}{8}\lambda$ whips heard the signal down to the 50μW level.

"In contests, points are awarded for numbers of stations worked plus the multiplier bonus for distance, but no multiplier for low power—so no encouragement," adds G8AVG.

* * *

In Hartlepool G8DKU has a transmitter switchable from 2W to 20W output which in some contests is held at the higher power level, in others at the lower. "I noticed very little difference in the results obtained," says Neil Douglas: "I'd like to support the G8BQX suggestion for a QRP contest and think 5W dc input is about right. I would also be interested in a milliwatt QRP contest". And there will be "Hear hear!" from Swindon for this one.

* * *

Another northern operator, Cumberland's G8DVD, speaks for many in his region by lamenting the clobbering caused by high-power visiting occupants of succulent sites. In the 1971 NFD the locals reckoned to lose about 30 contacts from the blanketing effects of these visitants (even so, 'DVD with 2½W of nbfm still managed 33 exchanges on 2m during NFD '71).

Both G8DKU and G8DVD express concern at the increasing shortage of good portable sites, a factor which, when station proximity is inevitable, surely means that QRO is not. Could not *FMD*, adds 'DVD, compile a list of sites from information furnished by locals so that visitors could draw on it before they set out—"The Good Site Guide", as he calls it? Well, we would be willing to have a try. Maybe Regional Reps could help, too, as the men on the spots.

A variation on the theme is provided by G2CUZ: "There is no need for QRP if contest stations are properly checked and monitored. Too many portable operators seem to think that the louder they shout the better they get out." The result heard in nearby receivers is known to most of us. But are the receivers themselves as good as they should be?

Dain Evans, G3RPE, comments: "In principle I am against limiting the power of vhf transmitters. The problem is a receiver problem, not a transmitter one. Until receiver design is considerably improved there is no valid case. And by improved I mean single-conversion, a bomb-proof mixer, switchable rf stage, attenuated input and more sophisticated aerial design and operation, all of which are known arts."

Another member not too keen on a stringent power limitation is G4AZQ of Horsham. His view is that the extra 7dB provided by 25W as against 5W represents the difference between getting the dx and not getting it, a fact borne in on him by VHF NFD: "I don't think we would have worked GM on phone this year with 5W. It was tough enough with 25W."

With G3NHE of Sheffield there is merit in the G8BQX "five watt scheme", but, adds Martin Dann: "What worries me is: How do you prevent the well-sited high-power fixed station coming on and wreaking havoc with the lower powered signals?"

The potency of A3J

Sidebanders who enjoyed the fine four-hour fling of the 144MHz contest will agree that the star turn was the GD3-ZBE/P and GD8FFX/P team on their 1,400ft site at the SW corner of the Isle of Man. The two Aberdonians managed 68 contacts during the event.

In all, 400 different stations were worked by them during the 14-day stay, with HB9XMJ/P as the best dx on 2m and F9FT on 70cm, both believed-firsts from GD-land. More than 40 Scottish stations were worked, including GM3EOJ back home in Aberdeen every night the two were on the island—and that is a QRB of 240 miles.

Altogether, a convincing demonstration of the potency of the single sideband mode.

Comment is widespread on the increase in ssb during VHF NFD, its points-getting capability from effective co-channelling, and the admirable operating of those employing the mode. A typical comment: "Congrats to G3PYE/P for keeping their ssb splatter to an absolute minimum and for their good manners around 145·41", this from fellow sidebander GW3ZTH just across the Bristol Channel from the G3PYE/P site.

The big break for sidebanders came the Monday after Field Day, when 2m lifted to long range. GW3ZTH again: "Now know what it's like to be at the receiving end of a pile-up. Had everyone in Germany and Holland calling me at the same time. Should have tried getting them to call 5-up or 5-down."

Similarly in Sheffield G3NHE (". . . don't think I've ever been called by so many German sidebanders at the same time") observed the 4 September lift to start in France, move up through Germany and finish on the Danish border.

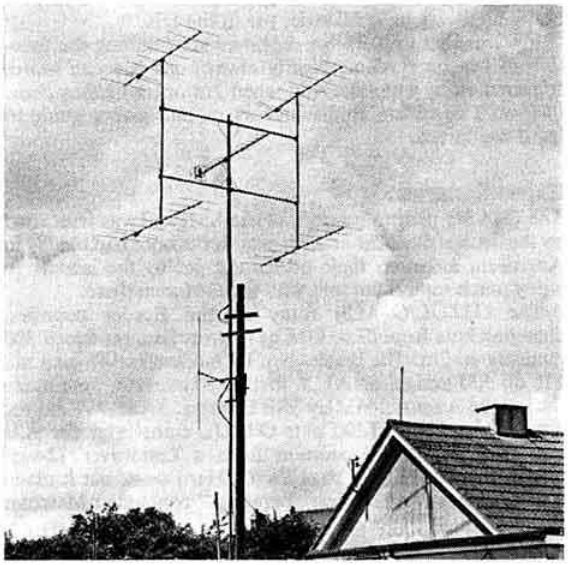
*Houghton-on-the-Hill, Leicester LE7 9JJ

Out on a limb

It is not only Britain's roads and rails that run along a seemingly natural south-east—north-west axis: vhf radio does the same too Most people who work 2m within the broad "London Midland and Scottish" swathe of population tend to align their beams north-west or south-east, where most of the signals come from, including in particular GB3VHF, the most used beacon of them all, shooting north-west from London (like the roads and the rails).

In these circumstances big areas of metre wave activity remain out on a limb because not enough people for enough of the time beam their way. East Anglia is one. West Wales is another, where the screening effects of local topography blank off 2m regulars like GW5YI, 8AIB and 8BPG from contact with the east.

In the far south-west both topography and sheer distance exert their attenuating effects. In an attempt to overcome them, G3XC at St Columb in Cornwall has put up the 32-el unit shown in the accompanying picture, complete with a "you never know" 70cm Yagi in the middle, at a good site (550ft asl) with a fair take-off in most directions. Says Bill Colclough: "As most contacts other than local ones from this neck of the woods must be over the 150 mile mark, cw would seem to offer the best chance, though I may change my mind when the ssb rig now under construction is complete". Meanwhile, G3XC would welcome reports on his 20W a.m. and 60W cw transmissions from anywhere beyond the 300 mile radius; he will willingly arrange schedules with anyone wishing to collect Cornwall on 144 or 432MHz . . . and that means most of us who habitually align along that "LMS" axis.



Parchment piece

Our summary of the rules about VHF Operating Awards (*FMD*, July) prompted many people who might not otherwise have bothered, to check their QSL files to see if enough cards had been amassed to warrant making a claim. Result: quite a spate of applications to your VHF Awards Manager.

Another result: a few requests for elucidation of the rules, eg:

Q—*If I change my callsign from G8 to G4 do I have to start all over again collecting cards?* Answer—No; but when making a claim, say whether you wish the certificate to be made out to your new callsign or the old one (or both, as cards will have come in for both).

Q—*Claiming for portable operation: must it be done from one site only?* Answer—No, operate where you like. If you holiday on the south coast you can get yourself a few Continentals, if the north a few GM, GI and GD. Changing your own prefix when portable does not matter. So when G4XYZ/P does a 2m foray into Wales as GW4XYZ/P the cards collected all go towards the five plus 30.

Q—*Do Irish counties count?* Answer—Cards from GI yes, as it is part of the UK. From EI no, as the Irish Republic is a separate country.

Q—*Can I get a copy of the regulations?* Yes, from the VHF Awards Manager, if you send him an sae.

Deprivation

Of the therapeutic potential of this recreation of ours, the RAIBC stands as the prime example of how amateur radio has given deprived people quite literally a new lease of life. Most of us know of institutions in our own particular county where a cheerful radio amateur has suddenly appeared, operating in physical circumstances which can only make the rest of us marvel at his fortitude.

Down in Sussex Arthur Campbell, G3PEQ, Bob Street, G8BNO, and one or two other local radio amateurs connected with the Mid Sussex ARS have lately been seeing for themselves at the Chailey Heritage Craft Schools just what radio can do for deprived children in the 10-16 age group. A regular series of visits to the school has been maintained in order to let the lads see amateur radio in actual operation both on 2m and 4m, with G8BNO setting up as /A and G3PEQ as a 4m mobile link with other operators in the district.

Backed by the enthusiastic help of the occupational therapist and the chaplain-warden, it was not long before the youngsters were building two-transistor receivers for themselves, each doing a share, using much appreciated gifts of bits and pieces from various radio amateurs.

This exercise in "radio therapy", started last April, has been so successful that plans are being made to carry it on in the autumn term which begins this month. It would not surprise us if, as their expertise increases, the youngsters graduate to building vhf converters so that in due time they will be able to hear some of the big signals which come out of the Crawley area on 2m and 4m. Many of these will belong to people they themselves can identify, from having seen them as visitors to the schools.

How are your hazards?

Recent comment here has touched on how to keep whole when mobile, eg hands-off rigs and hands-on steering wheel, likewise switch off before filling up. While the danger of damaging others outdoors may be obvious, the danger of damaging oneself at home is perhaps less so. No, this is not in respect of electrocution (adequately covered in the text books) but of radiation from QRO rigs. With vhf QRO rigs this can be particularly potent (microwave cooking is done at uhf, not hf).

Noting that 20W of rf from his 70cm transmitter damaged transistorized equipment, not switched on, some 10ft away, GW8BPG of Barmouth began to interest himself more actively in the subject of radiation hazards. Radiation levels from exposed 4X150s and associated lines could in his estimation approach those experienced by standing in front of a high erp dish or multi-element aerial.

Brian Viney adds that a useful leaflet may be had from Eimac on valve hazards in general. It is 2416 R7/70 and is called *Operating Hazards*. Eimac are at 301 Industrial Way, San Carlos, Calif 94070, USA.

Mode effectiveness

Noting the opinions expressed about the relative efficacy of A1, A3 and A3J, Arthur Breese of Laxey, in the Isle of Man, observes that statistics can be made to prove anything, and offers by way of example a few of those he compiled from operating GD2HDZ in the July contest. Here is his breakdown:

	percentage of total QSOs	percentage of total points	average points per QSO
A3J	33⅓	34·6	10·6
A3	66⅔	65·4	10·0

Says 'HDZ: "This would appear to indicate that a.m. is very nearly as effective as ssb, which of course it is not—so what?"

Some mode-statistics have been unearthed also by Bert Allen from a year's cw operation with the 50W transmitter at G2UJ from the 500ft site in SE Kent, a new QTH where only a fixed dipole was used to start with. This raised 63 different stations on the key. When the 6 over 6 was erected a further 48 were added to the telegraphy tally, making a total of 111 spread over eight countries. In all, July to July produced 177 contacts on the key, including a goodly clutch of G4 plus threes.

Which vfo?

Recognizing that ". . . the sooner the vfo becomes commonplace on 2m, and more stable than some I have heard, the better the band will be for all of us", to quote his own words, G3OGD of Stoke on Trent has decided that his major constructional project for the coming indoor months will be a 2m transmitter with full variable frequency oscillator control.

But what vfo?—That is the question. As Alf Frost himself adds, so many different "best circuits" pop up in these columns in the course of a year that it is difficult for the ordinary amateur to decide which one to adopt. He therefore asks those who have gone the vfo route by their own home constructional efforts to contribute some of their ideas to this page and in particular to point out the pitfalls likely to be encountered in the search for a vfo signal "as good as crystal" even under keyed conditions.

Anti-QRN measures

Another portable season draws to a close free from any fatalities in the field. But remember the sad case of the two Scouts killed in August when lightning struck their tent. It could happen to an amateur radio station camped out on an exposed site.

Southport's G3VNQ tells us that there is a BSI Code of Practice which might be of interest to /P men. We have just been along to our central library to take a look at it. It is called "The protection of structures against lightning", and is the BS Code of Practice booklet CP326, giving 64 pages of practical info worth applying at the home station as well as to the portable one.

Club secretaries might care to seek it out in their own libraries to see if a copy should be added to the club book collection. It costs only £1·25 if you buy one in from BSI, 101 Pentonville Road, London N1.

A G looks at the W repeater scene

One time G8BTB, latterly G3ZCZ, Joe Kasser now finds himself in W3, a situation which has allowed him to form several opinions about the vhf repeater set-up in the USA, usefully to complement what was said here on the same subject by W4PZA in July.

In the UK many people have misgivings about possible misuse of any future repeaters which may be established here; on this point Joe Kasser says that in the USA long-winded QSOs do take place via repeaters, but it is rare for an operator to refuse to give way if someone else pips in for a specific request to call, say, G3ZCZ/W3. And deliberate jamming? There is some of that, too, says Joe ". . . by people who are sick in mind or don't like what is being said". The remedy is short and sweet: catch them on the input channel by a df hunt with directive aerials.

More positively, operating vhf via repeater is to many people denied outside aerials, either by law or lease, the only amateur radio activity they can indulge. And the value to emergency communications prompts 'ZCZ to anticipate useful applications for Raynet use in the UK.

It seems that in the USA repeaters are fulfilling the function of beacon stations. Nearly always one is to be heard, triggered off by a mobile. And when 2m opens up they come in from a considerable distance away, and give a guide to band conditions.

Expeditionaries

The G4AZQ plan to go portable on Shetland was frustrated by the dock strike. Car and 2m gear in the boot had to stay in Aberdeen, although their owner did get to the islands to enjoy much topical 2m talk with the GM men there.

The G3ZUL/G8ACB foray to the Border counties, changing hats from G to GM as appropriate, produced 300 contacts on 2m. The breakdown by mode was 147 on a.m., 118 on A3J and 35 on A1. A further 20 contacts were made during the August 144MHz SSB Contest. An HW17 did the a.m. job and an FT200 plus G3ZUL transverter for A3J and telegraphy, all operation from a Landrover 12-seat wagon topped off by a 10-el Yagi. "Hard work but it made a nice change from contest operating," concluded Malcolm Sparrow.

Peter Lennard's August Bank Holiday excursion to West Wales gave CA, CR and PK to many 4m-men who had never collected them. But on the Prescellies GW3VPS/P was "bee-devilled"; after humping batteries, tents and electronics on to a knoll this was discovered to be a bees' nest. As Peter Lennard says: "Exit 'VPS, and real fast." Contretemps apart, 30 stations were worked on 4m every evening during the week's expedition—and GB3SX boomed through at every stop.

Oscar 6 goes up this month

As we were closing for press, news came that Oscar 6 will go into orbit at some time between 12 and 16 October; the launch of the American Nimbus rocket, which will carry it, having been brought forward.

A 2m translator on board will accept between 145·9 and 146MHz and re-radiate between 29·45 and 29·55MHz. Beacons will radiate on 435·1 and 29·45MHz. Monitor these frequencies to alert yourself to Oscar's approach.

For details of on-board systems planned see page 303 of *Radio Communication*, May 1972. For tracking information see the G2AOX article of last April.

Above all, watch GB2RS for latest news and orbital predictions.

OTs' 4-meeting

"So you're retired, are you? So am I. Well, why the heck do we QSO only on Sunday mornings? We can meet *any* day of the week. Why don't we?"

Thus (more or less) one old timer to another while in contact on the 4m band a few weeks back. From this conversation sprang the thought that it would be an excellent thing if senior citizens equipped for 70MHz should foregather on the band on weekday mornings and see how many others similarly situated they could rustle up.

This arrangement would activate the band at off-peak hours conveniently when the tvi hazard is at a minimum in those sensitive Channel 4 and 5 areas.

Times? Put out a call on the hour throughout each morning.

Frequency? Clearly the national calling frequency of 70·26MHz so that each OT's receiver may be left on channel while he goes about any other business. Then when a contact is initiated a QSY to an agreed spot will keep "two-six" clear for its intended purpose.

Contest currencies

More big clubs organize metre-wave contests. Grafton's was an intensive three-hour concentrate on 16 September. Dunstable Downs's is spread over 9, 17 and 25 October and 2, 11 and 19 November, 2030-2130 clock time each evening. Use RSGB log sheets but get a copy of the rules by sending an sae to G3WBC. Winners earn a free ticket to the DDRC dinner next 19 January—and though you may not get one for free by contest the dinner is still well worth spending £2 on; reservations to G8CGX.

Not to forget the Colchester Club contest midnight-midnight 14-15 October, 144, 432 and 1,296MHz. Rules: p.624 last month.

As for the ever popular Ainsdale affair, the Region 1 VHF Contest, for the third time GD2HDZ won first place using 4m, 2m and 70cm. Fewer portables than usual were out (bad weather) but activity from home sites was intense in the north-west—and a special watch was kept for operators with sub-standard signals.

* * *

Immediately, the October "ultra high", part of Europe's IARU contest: rules last April, points per kilometre. Unlike the June event, this does include 70cm.

Further to IARU events, it should be pointed out that the November telegraphy contest is an all-night one by international agreement—this for the information of members who have expressed distaste for "all nighters". Consolation: there should be plenty of Continental night-owls to work.

Another instance of international agreement: next year's closing hour for the big portable events will be 1600gmt, which will be welcomed by vhf field day men who felt this year that a QRT-time of 7pm was a bit too late.

What they say

"Several G counties had to be worked several times before one received the courtesy of a card in return for one sent . . . 41 counties, despatched cards to all, but struggled for the last several months to get the 30 required for an FMD Award claim. The first QSO with each of 10 overseas countries worked resulted in cards in a very short time, often before my card could have reached the senders"—G3GBH.

". . . grateful to all who QSLd promptly. My QSLing direct with SAEs produced almost 100 per cent return rate"—A6657 of Willenhall (now holder of FMD Receiving Award No 22).

Here and there

If the PA0PKN beacon, 145·950MHz, drops sharply in strength do not kick your converter. It sends four long dashes, each 6dB down on the previous one starting at a level of 500mW out. Aerial is a dipole firing N-S. Operating times 1900-0630gmt. Thanks, G2UJ, for this news.

Tom Griffin of Darlington tells us his callsign G3GUV may be pirated on 2m by someone calling himself "Tim", who can be sure that TIM is not on his side.

The millionth meteor-ping from Radio Gdansk was recorded by BRS15744 on 19 August (you may have seen Ron Ham's note about it in *Electronics Weekly*), who has now devoted 4,571 hours to collecting m-s data from this 70·31MHz marker.

Nigel Hydes, G8FDC, invites any members interested to play chess with him over the air to write him at 9 Marsham Grove, Darwen, Lancs, BB3 3JN. He is not immediately asking for skeds or regular games, just wishes to sound out opinion.

Two PI-men, G3SXK and G3GGK, visit Leicestershire VHF Group on 19 October to tell all about the GB3PI repeater system. *Place:* Leicester Polytechnic, Room HO8. *Time:* 7.30pm. All vhf people welcomed. Only charge is 5p per person to help defray costs.

On 8-9 October the tail of the Giacobinids meteor shower should flick past the UK and give radio returns for about six hours. The centre line of the shower is likely to be over Siberia. This is a rare one. Less rare: the Orionids of 15-25 October, radio rate of 30.

Microwave Operating Awards

A member will be entitled to claim a Four Metres and Down Operating Certificate for the first contact he makes on any of the five microwave bands as follows:

13cm	500	kilometres or farther
9cm	400	" " "
6cm	300	" " "
3cm	150	" " "
15mm	150	" " "

Claims, supported by a verification card, to G5UM, VHF Awards Manager.

THE MONTH ON THE AIR

by JOHN ALLAWAY, G3FKM*

LAST month's opening remarks concerning the voluntary band plans have drawn forth comment on another matter which is at present rather worrring. This concerns the increase in bad manners, rudeness and deliberate interference, which seems to be particularly noticeable on the vhf frequencies although by no means restricted to them. Some microphone scratchers and record players have already been dealt with by the authorities but many are still at large and unless some self-policing of the bands takes place we are likely to be faced with a situation where the law will be applied so strictly that even the well-behaved majority will suffer. There are many services pressing for the use of "our" frequencies (which are most certainly *not* ours by right and for all time—which seems to be the view taken by so many) and this kind of abuse could result in loss of some of them. Many wrongdoers are known to their nearest amateur "neighbours" who should make every effort to persuade them to behave.

News from overseas

John Oliver, 9J2RO (G3EJS), closed down on 22 May and left Zambia on 30 June for the UK where he was due to stay until the end of August before moving on to South Africa. He hopes to get on the air with a ZS5 call but will need to take the RAE examination in December. Previous to that he may be active as G3EJS/ZS5. John says that all contacts are QSLd, either direct or via the bureau, and that anyone needing his card urgently may apply to WA1HAA. In conclusion he wishes to thank all his good friends in the UK who kept in touch with him while he was in Zambia.

G5BB recently received a shock when a visitor announced that he was one of the operators of VK9XI from Christmas Island. It seems that Frank was on a two-months visit to the UK with his family and would be returning to his home in Victoria before going back to VK9XI. There are at present six operators of the club station and UK contacts are particularly sought after, VK9XI being in operation mostly on Mondays, Wednesdays and Fridays. The island is located 1,630 miles NW of Perth and is 12 miles from N to S and 11 from E to W. The only industry is phosphate production, and the FT200, FL100 and HQ170 have all had to be given special protection against the dust which is so troublesome. The aerial farm consists of a ground plane for 7MHz, dipoles for 7 and 14MHz, a three-element tri-band Yagi beam for 14, 21 and 28MHz, and an inverted-V for 3·5MHz.

DXCC

ARRL has announced the addition of Mellish Reef (17°25'S, 155°52'E) to the Countries List. Mellish Reef belongs to Australia and is eligible under Point 2(a) of the criteria being followed for such additions. QSL cards may be submitted for credit after 1 November.

* 10 Knightlow Road, Birmingham B178QB.

DX news

The expected dxpedition operation from Aves Is (YV0CCA) did not materialize, as the Venezuelan Ministry of Communications has made a decree which says that in future only Venezuelan nationals will be granted licences to operate from the island. This move appears to have come as a result of a request by RCV, and in a world where reciprocity is increasing it is to be deplored.

RESI has obtained permission from the Indian authorities for Indian amateurs to celebrate their country's 25th independence anniversary by using the VU25 prefix. This will be in effect between 15 August and 31 December 1972 and suitable awards will be issued to those who contact specified numbers of VU25 stations. Details are not available at time of going to press.

W6BHY should be back in the British Phoenix Is by now and may be heard using his VR1W and KB6DA calls on all bands 1·8 to 28MHz. He hopes to be active during the phone section of the CQ WW DX contest. QSLs should be sent to W6CUF (as previously) as should requests for schedules. It is reported that in future new licences in the British Phoenix Is will be issued in the series VR1PA, VR1PB etc.

SM2AGD expected to commence a three-month stay on Easter Is during August and was hoping to acquire a CE0 call. He will probably be found around 14,025, 14,195 and 21,295kHz, and his QSL manager will be SM3CXS.

Activity from the Andaman Is in the shape of VU2FBZ (VU25FBZ) has been noted on 14MHz cw at around 1600. JT0AE has been very active on both 14 and 21MHz ssb, and another Mongolian station, JT0SAM, is reported in *Long Skip*—this is said to be UK0SAB to whom QSLs should be sent.

HS5ABD has now returned to the USA and his W9SZR call. He has also been on the air as HS3AL, HI8XAL and XV5AC, and his next callsign may be Argentinian. 5H3LV is back in Canada and has the call VE3EUP.

Alex Mootoo, 3B8DA, has written to say that he expects to be active most days on 14,040kHz cw for about 15 minutes starting at 1500, 1600, 1700 and 1800. All QSLs for contacts with Alex at 3B7DA (1970), and 3B9DA (1972) should go to 39 Brown Sequard Av, Vacoas.

FL8HM is due to be visiting Kuwait and Jordan during October and hopes to have the callsigns 9K2HM and JY9HM. His favourite operating times are on Fridays, Saturdays and Sundays at 0300 and he often uses 14,300kHz. QSLs go to K4SKI.

Fresh activity from the Comoro Is has been noted in the shape of FH0DL who has been heard on 21 and 14MHz ssb and cw. The operator is DK2SI. ZL3KK/C should be on the air by now from Chatham Is—QSLs should be sent via ZL4CR.

KC0KCI will be active from Kansas City from 14 to 23 October on all bands 3·5 to 28MHz. The special callsign is being used in connection with the opening of a new airport.

The ITU has allocated the prefix block A6A–A6Z to the United Arab Emirates (formerly Trucial States).

BRS17567 has been asked by HV3SJ to state that he is **not** 9N1MM's QSL manager.

Dxpeditions

There is a possibility that Andre, 5Z4KL, may visit Aldabra (as VQ9KL/A) or Juan de Nova. The former depends on transportation being available and a decision as to whether Astove Is counts as Aldabra for DXCC purposes as this is one of the group which could be reached reasonably easily by air. It seems that December is the most likely time for either of these operations.

KA2DX is planning to be on the air as KA1DX from Minami Torishima (formerly Marcus Is) for one week commencing 26 October. This will include the weekend of the CQ WW DX contest (phone).

It is said that the French Government has emphatically stated that no amateur operation will be allowed from Clipperton Is at present. A similar message is also believed to have been put out by the Iraqi authorities concerning possible YI activity. Rasheed, YK1AA, is interested in a period of operation from Iraq if he can obtain permission.

There are rumours that 3D2AN may visit Wallis Is and be on the air with an FW0 call.

From 9 to 21 October, HB9NL and HB9AIC will be in Liechtenstein as HB0NL and HB0AIC respectively. They will use cw and ssb on all bands from 1·8 to 28MHz. Schedules (especially for 1·8MHz) can be made via HB9NL, Acklin Frank, CH 6233 Bueron, Switzerland. All QSLs will be answered, either direct or via the bureaux.

A group of Finnish amateurs, including OH2BH and OH2MM, hopes to be in Gambia by 22 October and to be very active during the CQ WW DX Contest (phone). Some investigation into the possibility of operation from Guinea and/or Mali may be carried out when they leave ZD3.

A group of amateurs led by KZ5PW and KZ5ZF hopes to operate from Serrana Bank between 26 and 31 October. They will be active on all bands and their callsign is likely to be KS4KZ.

W3HNK is reported to be going to be on the air from French St Martin Is during the period 17 to 30 October. All bands will be used and the callsign will be FS0DX.

VK2BQQ will be signing /VK2 from Lord Howe Is between 12 and 18 October. He will use 3,502, 7,002, 7,045, 14,002, 14,095, 21,045, and 28,045kHz for cw and 14,110kHz for ssb. He will be on 3,502kHz from 1600 to 1800 looking for Europeans.

G5RV round world dxpedition

Louis completed his round the world voyage at the end of July 1972 when his wife and he returned to the UK after spending nearly two years in Oceania. Apart from considerable activity during 18 months in Papua as VK9LV, operation took place from EP2RV, G5RV/VS6, VK9LV/VK2/VK3/VK4/VK5, YJ8RV, FO0RV, G5RV/CE3, G5RV/LU, CX5RV, PY1ZAR and G5RV/ON5. QSL situation—a large number of QSL cards for contacts with Louis awaited him on his return and all will be answered as soon as cards are received from the printers. However, there will be some delay due to his recent motor accident, and he asks for patience. All QSLs should be sent via RSGB (marked "via G5RV") and will be answered 100 per cent. Cards received direct will be answered direct if accompanied by three IRCs and a self-addressed envelope. Outstanding contacts were with G6ZO (who contacted Louis in all areas), and with G8PB who missed him in EP, VS6, and YJ8, but with whom weekly schedules were kept during the VK9LV episode. Hospitality and help with the loan of stations or equipment was willingly and most generously offered by fellow amateurs and their families in all countries visited and Louis and Nelida wish to record their sincere thanks to those many good friends. G5RV has now operated from 45 different countries during his 43 years on the air.

JOTA

The 15th Jamboree-on-the-Air takes place on 21 and 22 October—*local time* throughout the world. World Scout frequencies are as follows: 3,590, 3,740 (3,940 in USA), 7,030, 7,090 (7,290 in USA), 14,070, 14,290, 21,140, 21,360, 28,190 and 28,990kHz. These are suggested calling frequencies only. Local licensing regulations must be observed and those taking part are reminded that this is not a contest. Special stations taking part include ZS6JAM, on the air from Mafeking, and HB9S, which will be operating from Mt Chasseron for the whole 48-hour period, with three complete stations.

The Gozo Amateur Radio Society

As mentioned in last month's *MOTA*, amateurs on the island of Gozo are now using the 9H4 prefix. All callsigns have been changed and wef 1 August new callsigns have been issued as follows: 9H4A (formerly 9H1T), 9H4B (9H1M), 9H4C (9H1CZ), 9H4D (9H1DA), 9H4E (9H1DB), 9H4F (9H1DF), 9H4G (9H1DG), 9H4H (9H1DH), 9H4I (9H1DI), 9H4J (9H1DM). QSL cards for Gozo stations may continue to be sent via the 9H1 bureau (9H1E) or to 9H4H, QSL manager for the Gozo society. 9H4H is George Gauci, 32 Xaghra Rd, Victoria, Gozo, Malta.

Contests

The Welsh 80m Contest

0900-1100 and 1700-1900 22 October.

Only one section may be entered for scoring although operation may be in both parts. All modes but no cross-mode contacts. Exchange RST plus serial number beginning at 001 in each section. Each contact counts one point unless with Wales when it is worth three points. Logs should show time, call of station worked, report out, report in, mode, points claimed, and be sent not later than 22 November to: G. Maggs, 3 Throley Close, Cyncoed, Cardiff. Listeners may enter and should log stations taking part in the contest and note numbers sent and received.

The CQ WW DX Contests

0000 28 October to 2400 29 October (phone).

0000 25 November to 2400 26 November (cw).

All bands 1·8 to 28MHz. Exchanges consist of RST plus zone number (the UK is in zone 14). Contacts between stations in the same continent count one point, in different continents three points. Stations in one's own country may be worked for country/zone credit but do *not* count for QSO points. There are four classes of entry: single-operator, single- or multi-band; and multi-operator single transmitter and multi-transmitter (the last two are multi-band only). In the multi-transmitter section only one signal per band at

QTH Corner

C31EG	EA3QS, Escaletas 5, Mataro, Barcelona, Spain.
C31FO	F3BW, Yves Prat, Ecole Preparatoire de Gendarmerie, 86 Chatellerault, France.
CR3AB	CT2BA, Jorge Costa, Canada Nova-S Carlos, Terceira, Azores.
DJ0BJ	via G3YHG, 12 Assisi Road, Pauls Dene, Salisbury, Wilts.
FH0DL	DK2SI, Rothenburger Str 23, 741 Reutlingen, Germany.
FO0CS	K6CWM, Nick Bruno, 37 Montego Key, Novato, Cal. 94947, USA.
FP0CG	K1BCG, D. Higgins, 54 Milwaukee Av, Bethel, Conn, 06801, USA.
FP0MB	F6BFH, A. Duchauchoy, 10 R. Meridienne, 76 Rouen, France.
HC1WK/8	Bill Kart, Santa Cruz Is, Galapagos Is.
HS3AET	R. Caspari, 12321 Walker, Wichita, Kansas, 67235, USA.
JD1ACH, JD1ACK, JD1ACM, JD1AFE, JD1AFF	JA3GZN, Masanobu Katsusai, PO Box 29, Amagasaki, Hyogo 660, Japan.
KC0KCI	Bob Dyson, 5142 Nall, Shawnee Mission, Kansas, 66202, USA.
K5QFH/VQ9	(new QSL m'gr) K4CEF, 370 NW 46th Av, Plantation, Fla, 33313, USA.
SV1EN/P	PO Box 1442, Athens, Greece.
SV1GA/P	DJ6TK, W. Graeper, Kaiser-Friedrichstr 20, 53 Bonn, Germany.
SV1GN/P	PO Box 1442, Athens, Greece.
SV1FT	PO Box 15, Chania, Crete
VK2BCV/VK9	Golden Gate QSL Bureau, 71 Surrey St, San Francisco, Cal, 94131, USA.
VK2BQQ/VK2	Karol Nad, GPO Box 3209, Sydney, NSW, 2001, Australia.
VP2GBI	VE3BMV, PO Box 292, Don Mills, Ont, Canada.
VP2GBL	W4YHB, A. G. Waack, Box 1909-Hebron Rd, Hendersonville, NC, 28739, USA.
VP2SAU	W3SF, T. A. Graul, 564 Austin Av, Pittsburgh 16, Pa, 15243, USA.
VP2VAR	PO Box 328, Tortola, British Virgin Is.
VU25FBZ	via K6TWT, 643 Cedar St, Vallejo, Cal, 95493, USA.
YN1FV	(via F6BFH—see FP0MB).
ZL3KK/3	via ZL4CR, 36 Green St, Mosgiel, New Zealand.
5U7AX	DJ9KR, U. Bihlmayer, Schulweg 16, 7451 Rangendingen, Germany.
7P8AC	W2LGU, M. B. Stagg, 484 Valley Pl, Englewood, NJ, 07631, USA.
7P8AD	VE2JH, L. Walker, 8844 E Rue Notre Dame, Montreal 430, Que, Canada.

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

---

any time is permitted. Total score is QSO points multiplied by the total number of zones, and ARRL (and WAE) countries worked on each band added together. Separate log sheets should be used for each band and should indicate zones/countries the first time they are contacted. They should list 40 QSOs per sheet and show date, time, station worked, number sent, number received, points claimed, name of new country or zone (if appropriate). Total QSO points and multipliers should be shown at the foot of each sheet. Log sheets may be obtained from *CQ* (sae and IRCs should be sent). A *few* summary and log sheets *only* are available from G3FKM. Logs go to: CQ WW DX Contest Committee, 14 Vanderventer Avenue, Port Washington, LI, NY, 11050, USA. Phone logs must be posted before 1 December and cw logs before 15 January.

The VK/ZL/Oceania Contests

1000 7 October to 1000 8 October (phone).
1000 14 October to 1000 15 October (cw).

Two points for contacts with VK/ZL, one for those with other countries in Oceania. Final score is total QSO points multiplied by the sum of VK/ZL call areas worked on all bands (same area can be counted on each band). Exchanges consist of RS/T plus serial contact number starting from 001. Logs should indicate date, time, station contacted, number sent, number received. Each new call area worked should be underlined and separate sheets must be used for each band. Entries may be single or multi-band. A summary sheet should give details of equipment, and show how score has been worked out. It should contain a declaration that all rules and regulations have been observed. Listeners may enter and should log VK/ZL stations *only* giving date, time (gmt), station heard, callsign of station being worked, RST of the VK/ZL station, and the serial number being sent. Scoring is the same and the summary sheet should be similarly set out. Send logs to reach NZART Contest Manager, Box 489, Wellington, NZ, no later than 24 January 1973. Very attractive certificates are awarded for winners of this contest.

The WADM Contest

1500 21 October to 1500 22 October.

CW only. 3·5 to 28MHz. Send RST plus serial QSO number (DMs send RST and the number of their *Kreiskenner*). Work only DMs—once per band—each contact counts three points. Each DM district on each band is multiplier. The district is indicated by the last letter of the call (A to O) and DM7, DM8 and DM0 may be counted in place of a missing district on the bands on which they are worked. Separate logs for each band accompanied by summary sheet showing scoring and address should be sent to: DM Contest Manager DM2ATL, DDR 1055 Berlin, PO Box 30, German Democratic Republic, within 30 days of the contest. Listeners may enter and should log DM stations and the numbers they send, each logging counts one point. Applications for WADM, DMCA, DMDXC and DMKK may be made with logs, separate applications should be made out for each.

The **OZ-CCA Contest 1971** results have been delayed and EDR wishes to apologize to those who took part. Top score was UK2BBB (253,500 points). UK totals were **G3NSY** (48,372 points), G2DC (41,704), GW3SYL (25,912), and G3ESF (13,992).

Although the Radio Society of Bermuda has not sent the RSGB the result of the 1972 Bermuda contest it is understood that **G3KTJ** and **G3KMO** were the winners in the phone and cw sections respectively. Congratulations to both who will, no doubt, be heard as G3KTJ/VP9 and G3KMO/VP9 during late October.

BBC World Radio Club

World Radio Club is broadcast in the BBC World Service on Thursdays at 1245, Fridays at 2345, and Sundays at 0815. Membership is free and is gained by writing to WRC, BBC, Bush House, London WC2B 4PH. The club is running a monthly quiz and 25 of the winners will be awarded a handsome pink and purple pennant. The programme includes dx news and items of all kinds of interest to amateurs and listeners, and members who write for help with practical listening problems will be answered by post or over the air.

Odds and ends

Don Gray, G3YPL, is emigrating to New Zealand early in October and hopes to be on the air with a ZL call within three months. He has operated mainly /M in this country and sends his best wishes to all his friends in the UK, with the hope that he will contact them again soon. His new home will be in Auckland.

JA3OMB is at present in the UK on business and will be back in Japan early in 1973. He will be specially looking for British contacts after his return and has a kilowatt of ssb available on 14MHz.

Readers of the *West Coast Bulletin* are anxious to discover how to obtain QSL cards for contacts with VP2AHA (1970), VP2KC (1970) and VS9AWR (1965). Any information would be gratefully received.

Band reports

Quite a good time seems to have been had during the past month with signals from all continents having been reported on all bands above 1·8MHz. Pacific dx has been good on 14MHz, especially in the mornings.

Many thanks to the following for sending along logs from which the callsigns below were noted: G2HKU, G3HB, G5JL, G6GH, G3AAE, G3GVV, G3HCT, G3IFB, G3KMO, G3UKH, GM3UMW, G3UYM, G3VBL, G3YHB, BRS17567, BRS2098, BRS25901, BRS30231, A7056, A7545, A7681, A7785 and A7951.

Callsigns listed in italics were those heard on cw, all others were on ssb.

3·5MHz. 0000 W1, 2, 3, and 4, PJ2CW. **0100** PY0DVG, YV1YC/5, *5R8BD*. **0500** *PY5CEG*, *ZL4IE*. **0600** *CX1AA*, *ZL3FZ*. **2000** *ZS6ARS*. **2100** C31BL, VS6DO. **2200** EL2CB, PY7BLV, *UV9AX*, *VK6CT*. **2300** CE8AA, LU7AAC, PYs, VE/VOs.

7MHz. 0000 *FP0BG*, *HP1AC*, *VU2AAA*, 9Y4VT (QSL to W3DJZ). **0400** *W6IUV/HK0*, *HV3SJ*, *KH6RS*, *VP9BL*, *ZM1AYG*, *9G1HE*. **0500** CE4ME, *F0AHY/FC*, *LU1ACD*, PYs, VKs, *VR1AA*. **0600** *VE7TT*. **1900** *ZS6ARS*, *5X5NK*. **2000** *JA0BCO*, VK2s/VK3s. **2100** *TN8AG*, *8P6BU*, 9Q5BG (BP 5202 Kinshasha), *9V1MS*. **2200** *CX1RY*, ZC4s AK, *BI*, *KJ*, ZP5AR, ZS1MH. **2300** *CR7IZ*, TR8VE, *UA1KAE/1* (Antarctica).

14MHz. 0400 *FM7WB*, *HK0BKX*. **0600** CE3AOF/CE0, FK8BK, FO8AA, UA1GZ/M, VK9ZB, VQ9R, YK1AA, ZK1s *AA*, AJ, MA, *5T5AG*, 5W1AU. **0700** C21TL, FO0JS, KL7s, KS6CC, VK3AM/9, VR4EE, YJ8s BD, BL. **0900** YJ8DS. **1100** KX6HK. **1200** KL7HAQ, VK9ZB. **1300** EA9EO. **1400** C21TL. **1500** C29ED (QSL via C21TL), YJ8GH. **1600** *FB8ZA*, VK9XW (X-mas Is), VS6DA. **1700** JT0AE, VQ9NLB, ZS2MI, 5N2ABG. **1800** KG6GDE, XV5AC. **1900** VKs, VQ9DC, ZD7SD, 5R8CS. **2000** G3MUL/CE3, VP2s, VP8s, ZD3M, WB4VKH/8R1 (PO Box 596, Georgetown). **2100** FG7XC, KA6RN, PY0DVG, VR4EE. **2200** CR4BS, JY9VO, VS6AE, ZD3M, ZF1GC, 5VZYH. **2300** FP0VX, FY7AI, VP1BH, VP2DAI, YB1TAW.

21MHz. 0700 *TU2DD*. **0800** FL8DJ, *HM5EE*, SV1FT, *YA1OS*, *3D2EK*, 3D6AX, *5W1AK*. **1000** CR5SP, *KX6BB*, VK9ZB, YJ8GH, ZS2MI. **1100** KG6JBO (QSL via K1JHX), KX6BU, VR4EE, 9G1DY. **1200** FR7AB, W8DPC/KG6, M1B, VK9GO (Bougainville). **1300** KC4USP (Palmer Base, QSL to K2BPP), VK9JV, YJ8BL. **1400** *FL8AG*, *9M6AW*. **1500** HS4AGZ, K5QFH/VQ9 (Chagos), ZD9BM, 5H3MT. **1600** XV5AC, ZD3s D, M, 9M2CW. **1700** *FY7AE*, KC4USP, W6s. **1800** *CR5AJ*, EA9AI, *KL7MF*, 9X5VA (QSL to W2PPG). **1900** A2CAB, ZD7BB (QSL to WA0WKW). **2000** FY0RU (BP 336, Cayenne), TR8VE, *ZM3IS*, 9L1JT. **2100** FP0AA, OA6BW.

28MHz. 0900 *VK6SA*, *VU2AAA*. **1200** WA6HBF. **1300** *DJ7ST/OH0*, PYs, ZEs, ZSs, 9Js. **1400** FL8DJ, YB3AAY (QSL to W3BRB), ZD8RW, ZSs. **1500** G3MUL/CE3, *PJ2VD*. **1700** VP8ME. **1800** 9Q5RH. **1900** 5B4KP. **2000** CX, LU, W7TML/1.

Very many thanks once again to all correspondents, and to the writers of the following for items taken from their publications: **DX'press** (*PA0INA/PA0TO*), **DX News Sheet** (*Geoff Watts*), the **29 DX Club Newsletter** (*VK6JR*), **QUAX** (*G3DME*), the **DXers Magazine** (*W4BPD*), **NARS Newsletter** (*5N2ABG*), **Long Skip** (*Nick Sawchuk*), the **West Coast DX Bulletin** (*WA6AUD*), and the **Ex-G Radio Club Bulletin** (*W3HQO*).

Propagation Predictions

Conditions on the hf bands (28 and 21MHz) will be at their best during October and November. Therefore **28MHz** will be much improved compared to the previous months. On favourable days (days with above average F2 MUFs) traffic with Central America and South-East Asia should be possible. In some instances with Australia also. Conditions from southern Europe should be more favourable than from countries further north. Occasionally it might be possible to make contact with the southern regions of the east coast of the USA, perhaps between the times of 1530 and 1730.

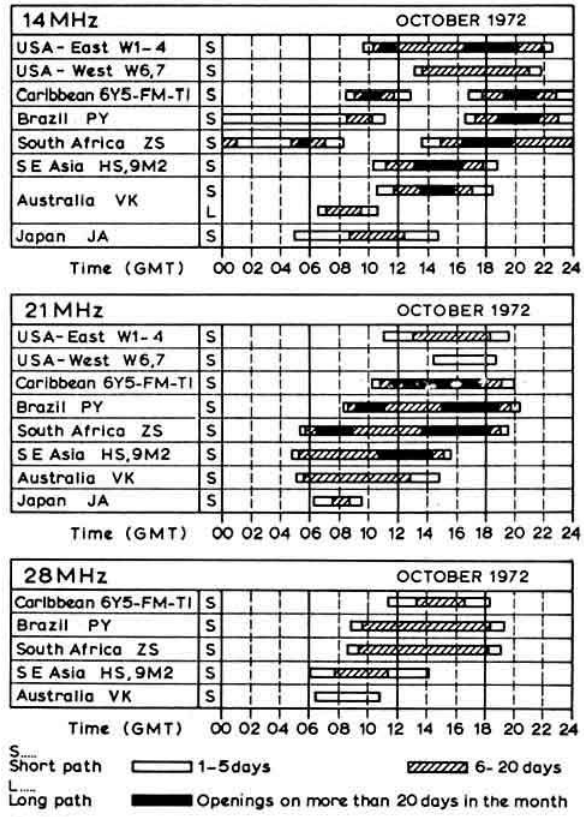
On **21MHz**, traffic with North America will be considerably improved. Here also the improvement will be more marked in countries further south. Further improvement on this band compared to the previous months will be in dx traffic to Central America, South-East Asia, Japan and Australia.

There will be little change compared to the previous month in dx conditions on **14MHz**. On favourable days it might be possible to reach Australia on the indirect path (from Europe in a south-westerly direction).

No change is expected on **7** and **3·5MHz** compared to last month. Daytime distances will be further compared to the summer months. **3·5MHz** will be interrupted repeatedly by the dead zone in the latter half of the night.

The provisional sunspot number for August 1972 from the Swiss Federal Observatory was 73·8 with solar activity evenly distributed throughout the month except for a short period of intense activity during the period 28 to 31 August. On 29 August the daily number rose to 147.

The predicted smoothed monthly sunspot numbers for December, January and February 1973 are 51, 48 and 45 respectively.



Please send all items for **November** issue to reach G3FKM **no later than 5 October,** and for **December** issue by **8 November.**

YOUR OPINION

The Editor
Radio Communication
Sir—The professional communications engineer certainly has a valuable tool in his ability to choose a frequency suiting distance and path conditions, and I envy him this as amateur allocations do not extend unbroken from 1·6 to 30MHz.

I refer to the letter from G6KD belittling the achievements of certain patient and competent operators on Top Band. These stations, with a pitifully inadequate 10W, succeed in their intercontinental contacts because of another tool of the engineer, an aerial system suited to the path length. The 1·8 to 2MHz band was chosen to accommodate Loran because reliable ground wave signals were possible for 24 hours over great distances.

What does more justice to one's pride as an amateur; battling through the QRM on 20m with half a kilowatt of ssb and a beam; or a dx QSO on Top Band with 10W and a relatively simple antenna, and the difficulty being natural, not a man-made cacophony.

Incidentally, how often have those who class Top Band as a noise band tuned the 1,800 to 1,850kHz segment after midnight? Or perhaps they cannot read cw.

Yours faithfully,
J. D. Fellows, G3YRZ

The Editor
Radio Communication
Sir—I have no quarrel with G2WS regarding the points made in his letter—but comments about home-brewing transmitters or receivers bring out the changing trends of amateur radio. How long will it be before the term homebrew will only apply to things like swr indicators, FSMs, noise-bridges etc?

Many, now, consider it not worth the time or effort to construct any major piece of equipment. And many valid arguments will support this. Could it be that in, say, another 10 years there will be no new amateur designs of transmitters, receivers or transceivers worth publishing—either because of lack of design or because no one will be interested in building them? Already, receivers are in this category. (It could be true that this does not apply to vhf at present—but vhf only interests a percentage of radio amateurs).

So—where do we go from here? How long before the homebrewer will be looked upon as an ececntric or a "poor relation"!

Yours faithfully,
Hector Cole, G3OHK

The Editor
Radio Communication
Sir—I feel bound to disagree with much of Mr Scarr's letter, in the September issue. While many students and younger newcomers are unable to afford new, commercial ssb gear, there are always numerous bargains to be had, secondhand, as a glance at "Members' Ads" will reveal. Also many reputable dealers offer such equipment and hire purchase terms.

Even so, it is surprising how many students at the local Croydon Technical College, for example, can somehow afford to run cars. While many have "old bangers" they still have to pay the same for parking, petrol and road fund licences as do Mr. Scarr's millionaires.

Far from being "... both difficult and expensive for the less experienced amateur to copy", it would seem to me to be very much simpler today to build complicated equipment at reasonable cost than it was some years ago—think of a PLL detector with valves! Pat Hawker's excellent "Technical Topics" features abound with state-of-the-art ideas and circuits to do complex functions with cheap integrated circuits requiring few extra components. With such information to hand an enthusiastic radio amateur should be able to concoct a satisfactory receiver at modest cost, for instance.

As to those who "... shout with the loudest possible voice at similar 'broadcasters' in remote parts of the world", so what? If they wish to spend hundreds of pounds on expensive equipment that is their business. If it gives them pleasure, why should Mr Scarr criticize them? It was happening upon "broadcasters", such as LU6AJ, soon after the second world war on the short wave band of the domestic receiver that introduced me to this fascinating hobby.

Yours faithfully,
Norman A. S. Fitch, G3FPK

The Editor
Radio Communication
Sir—The article "A natural event" in the September issue was of great interest.

The truly remarkable conditions on 14MHz on 24 August were, no doubt, another result of the solar storm in question.

In 35 years of amateur radio, I for one, have never heard 14MHz behaving like 28MHz at its very best—solitary signals from S9 dx with no QRM!

According to the 31 August issue of *New Scientist*, the storm produced the highest energy solar radiation ever recorded.

I mentioned above 24 August—it would be interesting to know the experiences of other operators over the relevant period.

Yours faithfully,
F. L. Firth, G8JD, BSc(Eng), MIEE

The Editor
Radio Communication
Sir—I feel compelled to express in your column opinions built up over several years of attending mobile rallies. I refer to the talk-in facilities provided (in particular on the 160m band).

As is well known, the vast majority of mobiles use a base or centre loaded whip aerial.Why is it, therefore, that most talk-in stations use long wires? Is it that the sight of open ground and two conveniently spaced trees overrides all other practical considerations? It has been demonstrated many times that a simple 30 or 40ft loaded vertical is capable of working mobiles *all round* over a wide radius—effectively out-performing long wires—and such aerials are very easily constructed.

Secondly, the talk-in station should occupy *one* previously advertised frequency, so that mobiles wishing to work the talk-in know where to find it. (I and other mobiles had to QSY twice in 10 minutes while approaching Woburn to move clear of the talk-in which had "taken-over" the frequency.)

Thirdly, if *real* talk-in is to be provided (not an easy thing), then the operator must have good local knowledge, be provided with adequately scaled maps, and be capable of giving concise instructions when required.

Finally (a point which should not need mentioning), the callsign of the station must be given slowly and phonetically—I heard GB3RS called as GB2RS, GB3RF and GB3RAF by various mobiles in the space of a quarter of an hour.

Hoping these comments may be of interest to organizers of future rallies.

Yours faithfully,
A. M. B. Holloway, G3VUQ

OBITUARIES

Mr R. T. Dealey, G6DT
Mr Dealey died suddenly on 30 August, at his home, 41 Queens Crescent, Horndean, Hants.

Mr W. E. Benson, G3EGN
Walter Benson, of Heckmondwike and Huddersfield, died suddenly on 24 August, aged 60. He had held a license since 1949 and was active on 80m and 160m mobile. His enthusiasm for the hobby was shared by his son, G3TQI.

Mr J. V. Rushton, GC2JZ
Jack Rushton died in Jersey on 12 August 1972. He was a founder member, and president for many years, of the Wolverhampton Amateur Radio Society, and will be sadly missed by all his friends on the air.

Mr J. L. de Leeuw, G2BDX
John Lacey de Leeuw died on 1 September after a long illness. His interest in electronics extended to the audio field—during, and immediately after the war, he gave concerts in local hospitals, demonstrating quality radio and gramophone reproduction, as it was then known. At the same time, Lacey was a member of the Civilian Wireless Reserve, providing morse instruction to the ATC. Sympathy and condolences are extended to his widow, Trilby.

Contests calendar

7–8 October—21/28MHz (Rules in May issue)
7–8 October—IARU UHF (Rules in April issue)
7–8 October—VK/ZL/Oceania DX (phone)
14–15 October—VK/ZL/Oceania DX (cw)
14–15 October—Colchester ARC VHF/UHF
21–22 October—7MHz CW (Rules in June issue)
28–29 October—CQ WW DX Phone
4–5 November—7MHz Phone (Rules in June issue)
5 November—144/432MHz CW (Rules in August issue)
11–12 November—Second 1·8MHz
12 November—Czechoslovakian
25–26 November—CQ WW DX CW
November-December—70MHz Cumulative
9–10 December—Tops CW Club
27–28 January—CQ WW DX 160

SPECIAL EVENT STATIONS

Watford, October
GB3WGJ will be activated by Watford amateurs, throughout the month, but with special activity during the week commencing 14 October. The main objective will be to establish contact with twin towns—Vanterne in France, and Mainz in Germany—to celebrate the Jubilee Year of Watford's charter. The station will operate from the town hall, using Heathkit equipment kindly loaned by the manufacturers. Bands will be 80–15m, and all contacts will receive special QSL cards.

JOTA '72, 21-22 October
GB2GMT will be operated, during this event, on behalf of the Greenwich District Scouts, by G2HFD. Any scouts wishing to help make the project a success are invited to contact Alison Reeves, PRO of the Blackheath Ranger Venture Service, at 20 Lock Chase, Blackheath, London SE3.

Chichester DARC, 8 October
Chichester & DARC are holding a get-together on Sunday 8 October, in the grounds of the late Gerald Marceuse, G2NM, by kind courtesy of his widow.

The club has applied for the special callsign GB2NM, and hope to be working on 80m during the day.

Gerald Marceuse was involved with amateur radio from its early days, and was well known round the south coast. It is hoped to have a selection of his original equipment on show at the event. The club invites anybody who is interested, or who knew Gerald, to attend. The address is: Tidewaters, Bosham, near Chichester. Further information may be obtained from G3TYD, QTHR.

Saltash Festival, 23 September-8 October
GB3SF will be operated by the Saltash and District Amateur Radio Club during the Festival period, using all bands 160m to 2m. All contacts will be confirmed with special QSL cards. Information from G3XCS, 5 Frith Road, Saltash, Cornwall.

Sheffield Telecommunications Exhibition

On 3-4 November, a wide-ranging type of radio event will take place in Sheffield. To be known as the Sheffield Telecommunications Exhibition, it will incorporate a mobile rally and a special event station.

The exhibition will be held at Yewlands School, Creswick Lane, Grenoside, Sheffield S30 3NN, as will the two-day mobile rally. It will be open daily from 9am to 9pm and talk-in stations on 145MHz and Top Band will use the callsigns GB3TEL and G3YLS. GB3TEL will also be the call of the special events station which will use all bands and issue special QSL cards.

Attractions will include demonstrations by the Armed Forces, West Yorkshire Police, Sheffield University, Automobile Association and radio taxis. BBC Radio Sheffield hope to have their radio car on display and there will be complete exhibition coverage by closed-circuit television.

Amateur radio will be demonstrated by Sheffield ARC who will be providing the talk-in and special call stations.

Further information from Mr P. Avill, G3TPX, 7 Moorland Crescent, Mapplewell, Barnsley S75 6NS. Telephone: Darton 2517

RAYNET

by S. W. LAW, G3PAZ*

WOBURN RSGB Rally this year will probably have created a few records, if not the type we have been following in the sporting field. Certainly one of the wettest, probably one of the best attended in the conditions, certainly with the biggest marquee yet (and what a blessing!) but definitely one of the busiest days for the Raynet stand at this function. Indeed the stand ran out of stock of several items and a rapid foray had to be made for renewals. The Raynet raffle even ran out of tickets and more had to be obtained to satisfy the demand; but the first prize has up to now remained unclaimed. Will the lucky holder of ticket number 851 please send in a claim to Mrs Balestrini (address in panel below).

New groups
As mentioned last month there are a number of new groups in the process of formation. We have been asked in particular by Mr N. K. Read, G8CXL, if any lone or prospective members in Warwickshire would contact him with reference to the formation of a proposed Mid-Warwickshire group. Since G8CXL is not only chairman of the Mid-Warks ARS but is also the RSGB representative for the area, we feel that there is a good prospect here for the formation of a first-class group. G8CXL is of course QTHR and is also on the landline.

The Raynet Committee has now ratified new groups in Chester, N Buckinghamshire and Leicestershire. These will be added to the amended lists issued to controllers in due course.

At the time of writing there is no further information on the proposed Teesside group, but we have no doubt that this will be forthcoming in a few weeks and will help to fill in that particular area.

Lectures
We are pleased to report that requests for lectures on Raynet are still coming in ready for the autumn and winter months, and we tender our apologies to those who are still awaiting confirmation in order to arrange their programmes. There is a shortage at the moment of available lecturers, and the committee would be glad to hear from any Raynet members who could find the time to act in this capacity in and around their area in order to ease the burden on the few and help to speed up the procedure. The chairman, G3BPT (QTHR or as panel below), will be only too pleased to receive offers and provide advice and help to volunteers.

Glasgow
Those who attended the VHF Convention in Glasgow will have noted that Raynet controller Terry Darke, GM3VQJ, had not let the heather grow under his feet when the flag needed to be shown. We shall no doubt be hearing a report in the course of time from this lively part of the country.

Time; the leveller
It is with sorrow that we hear of the passing of one of our well known members. Mr G. Courteny Price, GW20P, had been for so long a pillar of strength in South Wales that his loss will be felt in that area for a considerable time. Raynet was represented as this grand old-timer was laid to rest and all of us extend our sincerest condolences to those who were his nearest and dearest.

Honorary registrations secretary: **Mrs Jane Balestrini, "Merrivale", Willow Walk, Culverstone, Gravesend, Kent.**

* 130 Alexandra Road, Croydon, Surrey CRO 6EW

CONTEST NEWS

Beru 1972 results

"Gentlemen—your 24-hour rule has just about killed BERU."—G5WP.
"Like 24-hour system very much indeed."—VP9BK.
"New form—big improvement."—G3LPS.
"If they can't take 48 hours, they should go on ssb!"—G2AJB.
"If my memory serves me correctly, the 1931 contest was run over *14 days*."—VK2NS.

Just a few of the varied observations on the new BERU rules. Comments were fairly evenly divided between those in favour of and those against the 24-hour duration replacing the previous 48. We were very pleased to receive a better entry this year than in the previous few years. It is hoped that our increased efforts in the publicity field will further increase this in future contests.

The overall winner of this year's BERU is Ernie Welling, VP2MU, perhaps better known in recent years as VE2YU. In second place is John Beck, VP2AAA. David Courtier-Dutton, G3FPQ, first won the Colonel Thomas Rose Bowl, which is awarded to the leading UK entrant, in 1965, and has won it every year since then, except in 1967 when he was second. This year's win makes seven out of eight and congratulations are due for a most consistent performance.

On the receiving side, another stalwart of this contest, Eric Howell, BRS24775, notches up his sixth successive capture of the Receiving Rose Bowl.

The only band attracting any number of single-band entrants was 14MHz where VE1TG won this award with 213 contacts.

Conditions this year were generally on the poor side and in marked contrast with the excellent conditions evident during the ARRL contest the previous weekend. Particularly disappointing, from the UK point of view, were the very poor paths to SE Asia. Although there were a few stations active, there were very few contacts recorded in logs. Again from the UK angle, we were sorry not to be able to make more contacts with VK/ZL on the lf bands. The logs show quite a high level of activity from that part of the world but the usual difficulties of QRM (BC and WSEM) proved too much, except for those with exceptional receiving set-ups. Canadian stations seem to have fared much better in this respect and their short path to VK/ZL proved quite lucrative on both lf bands.

It was a pity that the contest clashed yet again with a USSR contest. However, the Russian Society is taking an increasing interest in IARU activities and we hope that it will not be too long before we can schedule our respective contests more effectively.

Overall, the reasonably high level of activity from Australasia, Canada and the Caribbean, coupled with the shorter duration, kept things moving at a reasonable pace right to the end of the contest.

More comments

"Would prefer 36 hours out of 48 with 12-hour rest period."—G2DC.
"Found 24 hours with no rest a grind. Think all that band awards did was to reduce activity."—G3FXB.
"Not in favour of single-band awards."—G3KMA.
"Suppose 24 hours good, though prefer 48."—VK3ZC.
"Like 24 hours. Gives opportunity to those of us who have to go to work on Monday."—ZL2CD.
"Worked ZL3GQ five bands."—VE7HQ.
"Highlight—A UA calling CQ BERU ONLY!"—VK2NS. (You always get *one!*)

A word on logs

A few stations commented on the requirement of separate band logs. We ask for this so that the checking can be split up between the various and scattered members of the HF Contests Committee, thus ensuring that the results are published within a reasonable time after the contest. It is for this same consideration that we draw a deadline on the receipt of logs. We realize that the sending of a big log by airmail is quite expensive. However, eight weeks are allowed for logs to arrive and if they are prepared promptly after the event they should arrive by surface mail within that time.

D. J. A.

Equipment used by leading stations

Call	Transmitter	Receiver	Aerials
VP2MU	FTDX560+SB200	FTDX560	Trap dipole. TA33 @ 50ft
VP2AAA	32S3+Alpha 70	75S3	Vert. 7MHz Hygain 2-el. TH6DX.
VE3KZ	32S1+30L1	75S1	Inv.-V. Dipole. TH6.
VE2NV	32S3+Linear	75S3. Drake 2B	Dipole. GP. TH4.
G3FPQ	FT101	FT101	Vert. 7/14/21/28MHz Quad.
VP9BK	32S3	75S3	Dipoles. 7MHz 2-el. TH6.
G3HCT	T4XB	R4XB	GPs. Quad.
G3FXB	FLDX500	FRDX400	Inv-Vs. Quad.

BERU call areas active on each band

3·5MHz
VE1 VE2 VE3 VE4 VE7 [VK2 VK3 VK4 VK6 VK7] VP2A VP2L VP2M VP5(2) VP9 VO [ZL1(5) ZL2(2)] ZL3(2) ZL4(2) ZC4 8P6 9H1

7MHz
VE1 VE2 VE3 VE4 [VE5 VE6] VE7(9) [VK1] VK2(9) VK3(10) [VK4] VK6(3) [VK7(4)] VO VP2A VP2L VP2M VP5(2) VP9 [VR1] ZL1(6) [ZL2] ZL3(2) ZC4 6Y5 8P6 9H1

14MHz
VE1 VE2 VE3 VE4 VE5 VE6 VE7 [VE8] VK2(11) VK3(6) VK4(4) VK5(2) [VK6(4)] [VK7(2) VK9 VR5 YJ8] VP2A [VP2G] VP2L VP2M VP5(2) VP9 VO VS6 VU2 ZC4 ZE(2) ZLI(5) ZL2(2) ZL3(2) ZL4(2) 5H3 5Z4 [7Q7] 8P6 9HI 9J2(2)

21MHz
VE1 VE2 VE3 VE4 VE5 VE6 VE7 VE8 VO VK2(8) VK3(2) [VK4] VK6(3) VK7 VP2A VP2L VP2M VP5 VP8 VP9 VS6 [YJ8] ZL1(5) ZL2(2) ZL3 ZC4 ZE 3B8 3D6 5H3 5Z4 7Q7(3) 8P6 9H1(4) 9J2(3) [9V1 9M2]

28MHz
VE1 VE2 VE3 [VE4 VE7] VO [VK2 VK3 VK4] VK6(3) VP2A [VP2G] VP2M VP8 VP9 ZC4 ZE [ZL1 ZL2 ZL3] 5H3 5Z4 7Q7 8P6 9H1 9J2

(2) Number of stations active from call area.
[9V1] Call area not contacted by UK contestants.

TRANSMITTING SECTION

Posn overall	Band posn if single-band	Callsign	Points	Posn overall	Band posn if single-band	Callsign	Points
1*		VP2MU	5,461	45		G3RZP	1,398
2*		VP2AAA	5,268	46		9J2GE	1,395
3*		VE3KZ	4,713	47		GM3RFH	1,368
4		VE2NV	4,502	48*	1/21MHz	3B8RS	1,301
5*		G3FPQ	4,015	49		G3APN	1,300
6		VP9BK	3,911	50*	3/14MHz	G3PVA	1,255
7*		G3HCT	3,751	51		VE1ATJ	1,253
8*		G3FXB	3,553	52		G3GGS	1,245
9		VE7UZ	3,461			G3WSL	1,245
10		8P6DR	3,428	54		G3ZEN	1,190
11		VE2WA	3,335	55		ZE3JO	1,150
12		G5RI	3,181	56		GW2DPD	1,115
13		9H1CH	3,156	57		G3KAA	1,110
14		G3HZP	3,035	58		VP8HJ	1,095
		VE2AYY	3,035	59	4/14MHz	VE4XJ	1,090
16		5Z4KL	2,941	60		VK3ZC	1,085
17		G5WP	2,918	61	2/21MHz	3D6AX	1,078
18		VO1AW	2,914	62		ZL1HV	1,005
19		G2DC	2,854	63		VK3KS	995
20		VE2LY	2,540	64		G5OJ	975
21		GM3CFS	2,530	65		G3KSH	965
22		G6CJ	2,478	66		GW3SB	960
23		VE4MF	2,449	67		G3JFF	913
24		ZC4CB	2,413	68	5/14MHz	G3PTO	890
25		G2QT	2,360	69		VK6WO	873
26		G3KMA	2,265	70	3/21MHz	9H1CV	819
27		VE7HQ	2,200	71		G3ZDD	808
28		VK2BPN	2,145	72	6/14MHz	G3XGY	665
29		G5YC	2,140	73*	4/21MHz	G8KU	660
30		ZL2CD	2,128	74		G3RJB	635
31		G6XL	2,115	75	7/14MHz	GW3MPB	625
32		G3SJE	1,985	76*	1/7MHz	G3LPS	553
33		G6RC	1,840	77		G2AJB	505
34		G3VW	1,755	78		G2KK	430
35		G5VU	1,740	79	8/14MHz	VK2NS	403
36		G3EBH	1,735	80*	1/3·5MHz	VK3RJ	400
37		G2FYT	1,685	81	9/14MHz	VE1AE	395
		G8QZ	1,685	82	2/3·5MHz	VE3BMB	301
39*	1/14MHz	VE1TG	1,650	83*	1/28MHz	G3JKY	250
40	2/14MHz	VK3MR	1,602	84		G3CWL	225
41		VK2GW	1,600	85		G2BLA	210
42		G3MXJ	1,550	86	10/14MHz	VK2OW	155
43		G3VDL	1,520	87		G3MGL/A	100
44		G3GNS	1,460				

* Certificate winners.

RECEIVING SECTION

Posn	Listener No	Points	Posn	Listener No	Points
1*	BRS24775	3,247	4	BRS18461	1,596
2*	BRS6604	2,251	5*	BCRS195	1,570
3	BRS15882	1,688	6	A7082	1,335

* Certificate winner.

Summer 1·8MHz Contest results

This contest has been won again by G. F. Gray, G3ZPC, narrowly beating C. I. B. Trusson, G3RVM, into second position. Comparison of the logs shows that the two stations were neck and neck throughout, G3ZPC claiming one more contact overall than G3RVM. Third position was even more closely fought, ending in a tie between P. F. Linsley, G3PDL, and H. J. Box, G6BQ; after checking and re-checking it was finally impossible to separate them. A. B. Givens, GM3YOR/A, fifth, also closely contended the position.

The standard of log presentation was good but some of the log-copying and/or operating left much to be desired. Only four logs did not lose points. It was clear also that on occasion an old Call-book was used to check county letters; even contest operators move QTH sometimes.

DX worked came from South America, PY1DVG by G6BQ and ZP9AY by G3IGW. Quite a few Europeans were also worked, mainly from OK. Unfortunately only four entries were received from overseas, OK2PAW narrowly beating OL1API.

Comments were few, everybody seemingly enjoying the contest despite QRN troubles for some. G3MCX had the misfortune to have a transmitter failure in mid-contest. The HF Contests Committee thanks G4APM for his check log.

Posn	Callsign	Points
1	G3ZPC	562*
2	G3RVM	548*
3	G3PDL	491*
	G6BQ	491*
5	GM3YOR/A	484
6	G3TIR	469
7	G3ORY/A	458
8	G3IGW	447
9	G3SQX	445
10	G3BFP	443
11	G3TXF	431
12	G3YMH	428
13	GW3HGL/P	417
14	G3CSG	404
15	G3RZP	402
16	G3VDW	383
17	G4BGG/P	381
18	G3WGV	371
19	G3XSA	356
	G3XWZ	356
21	G4AMH	344
22	G3TAA	339
	G4ADP	339
24	GW3JI	337
25	G3CAR/A	329
26	G3VLX	297
27	G4AAL	294
28	G3IRS	290
29	G3LCH	284
30	G8QZ	281
31	G3WZR	274
	G3ZUJ	274
33	G3ASJ	269
34	G3ATF	266
35	G3LLK	261
	G3TLF	261
37	G3FJE/A	260
38	G3MFJ	256
39	G3MCX	240
40	G4ALG	206
41	GM3SFH	201
42	G3BUF	162
43	G3LHN	129

OVERSEAS SECTION

1	OK2PAW	129*
2	OL1API	124*
3	OK1FIM	105*
4	OL4AQA	75

* Certificate winners

RSGB HF Contests Championship 1972-73 rules

1. RSGB General Rules for HF Contests do not apply.
2. No entries for the championship are required.
3. The championship will be decided on the basis of RSGB hf single-operator contests held between 1 October 1972 and 31 March 1973.
4. Points will be awarded to the leading 10 UK stations in the results tables published in *Radio Communication* as follows:

	Position									
Contest	1	2	3	4	5	6	7	8	9	10
21/28MHz Phone	80	70	60	50	40	30	20	15	10	5
7MHz CW	70	60	50	40	30	25	20	15	10	5
7MHz Phone	70	60	50	40	30	25	20	15	10	5
2nd 1·8MHz 1972	60	50	40	35	30	25	20	15	10	5
1st 1·8MHz 1973	60	50	40	35	30	25	20	15	10	5
BERU 1973	100	90	80	70	60	50	40	30	20	10

5. Points gained by stations using the same callsign entering two or more of the six individual contests will be totalled and a table published in *Radio Communication*.
6. **AWARDS.** The winner will receive the G2QT Trophy. A certificate will be awarded to the runner-up.

Stratford-upon-Avon DF Qualifying Event results

This event on 30 July attracted an entry of 15 teams and started in the Cotswold Water Park near South Cerney, Gloucestershire.

The competitors found it difficult to estimate the locations of the two stations from their initial bearings, and most set off in pursuit of Station "A", G3ORI/P, located some 10¼ miles away to the south-west on an overgrown railway track. An obstruction encountered here was the M4 motorway, not yet shown on the maps, but this provided little difficulty for M. P. Hawkins who found a narrow culvert through which he was able to crawl to reach the transmitter a few hundred yards on the other side.

Access to Station "B", G3RPJ/P, 7¾ miles eastwards from the start, was complicated by its situation amid water-filled gravel pits. Rank foliage concealed the transmitter, and a lengthy aerial of fine wire produced a radiation pattern which diverted the competitors to an area some distance from the station.

The winner, T. C. Gage, was closely followed by W. North and R. Pearce Boby. Since T. C. Gage was the only competitor, apart from those previously qualified, to find both stations, subject to confirmation, he became eligible to compete in the National Final.

Posn	Name	Club	Time of arrival Station "A"	Station "B"
1	T. C. Gage	Oxford	1545	1446
2	W. North	Chiltern	1546	1446½
3	R. Pearce Boby	Oxford	1547	1447
4	M. P. Hawkins	Chelmsford	1459	1612
5	D. Newman	Rugby	1500	
6	G. Whenham	Coventry	1522	
7	D. Nasey	Newport	1534	
8	A. C. A. Newman	Salisbury	1536	
	P. Woollett	Dartford Heath		1536
10	A. Simmons	Oxford	1541	
11	I. Butson	Chelmsford	1608	
12	F. Edmundson	Mid-Midlands VHF	1616	
13	Three competitors failed to locate either station.			
14				
15				

RSGB HF Contests Championship 1971-72 results

The first HF Contests Championship, decided on the basis of points awarded for placings in a group of contests held between October 1971 and March 1972, was won by George Gray, G3ZPC, with Peter Lamb, G3VRW, in second place. Both leaders obtained their points by placings in the two 1·8MHz contests.

G3ZPC wins the G2QT Trophy, a new cup generously donated to the Society by Frank Cooper, whose callsign has been very familiar on the contest scene for many years.

This year's championship will run with unchanged rules and on the basis of two years' experience, the points table may be adjusted. Comments on this would be very welcome.

Posn	Callsign	1	2	3	4	5	6	Total
1	G3ZPC	—	—	—	35	60	—	95
2	G3VRW	—	—	—	50	40	—	90
	G3RPB	—	60	—	—	30	—	90
4	G5YC	60	25	—	—	—	0	85
5	G2QT	30	0	40	—	—	10	80
	GM3SSB	—	—	—	30	50	—	80
7	G3TR	—	—	60	0	0	—	60
8	G6BQ	—	—	—	20*	35	—	55
9	G2FNK	0	—	50	—	—	—	50
	G3KMA	20	0	30	—	—	0	50
	GM3CFS	—	20	—	—	—	30	50
12	G2DC	—	0	—	0	—	40	40
	G3WDF	—	—	—	25	15	—	40
14	GM3FXM	—	—	—	20*	10	—	30
	GW3JI	—	30	—	0	—	—	30
16	G3WHK	0	—	25	—	—	—	25
17	G3HZL	—	0	—	0	20	—	20
	G3PDL	—	15	—	5	—	—	20
	G6CJ	—	0	—	—	—	20	20
20	G3JEQ	—	—	—	10	0	—	10
	GD5DZ	—	—	10	—	0	—	10

* Points allocation adjusted due to shared position.

Contests
1 21/28MHz Telephony Contest 1971.
2 7MHz CW Contest 1971.
3 7MHz Telephony Contest 1971.
4 Second 1·8MHz Contest 1971.
5 First 1·8MHz Contest 1972.
6 BERU 1972.

July 432MHz Contest results

A total of 33 stations entered for this contest, with the number almost being split evenly between both sections. There were quite a few requests to include the early morning or maybe late evening, when conditions could be right for dx. Remarks on conditions were varied. Some were able to work the dx. The winner of the fixed

station section was G3NEO with PA0EZ as runner-up. The winner of the portable section was G8APZ/P, who has done a lot to keep the band active; the runner-up for this section being G8ACB/P.

L.V.G.T.

FIXED STATIONS

Posn	Station	QSOs	Score	Cnty	Best dx—km	Feet asl	Ae
1	G3NEO	36	152	YS	PA0EZ —430	380	M
2	PA0EZ	17	139	*PA*	G3NEO —430	30	27E
3	G3OXD/A	44	128	WR	G3DAH —250	?	P
4	G2RD	42	108	SY	G4AGE/P —231	625	M
5	G8BIL	35	107	WK	G3KEQ —164	450	M
6	G8ARM	37	93	LD	G8APZ/P —278	150	2 × M
7	G4AJW	33	91	WK	G3KEQ —172	450	P
8	G8CIT	27	88	MX	G8APZ/P —262	53	P
9	G4AHN	27	78	DY	PA0EZ —455	350	P
10	G3EHM	26	71	SD	G8ACB/P —110	800	2 × M
11	G8DAW	30	56	BD	G8ACB/P —105	530	M
12	G8AKT	20	44	BD	G3NEO —153	180	M
13	G8CGN	13	27	GR	G8APZ/P —130	250	M
14	PA0JHN	3	23	*PA*	G4BEL —310	?	27E
15	G8BKR	11	19	GR	G3EEZ/P — 97	190	M
16	G8VN	12	16	DY	G5UM/P — 60	?	2 × P
17	G8BDO	9	13	NM	G3EHM — 60	220	8S
18	G3ZOD	3	3	CH	G8FDJ/P — 6	150	15E

PORTABLE SECTION

Posn	Station	QSOs	Score	Cnty	Best dx—km	Feet asl	Ae
1	G8APZ/P	34	256	DN	G8ATS —356	1700	P
2	G8ACB/P	55	239	GR	G3DAH —230	1000	2 × P
3	G3WDG/P	50	204	WE	G3NEO —235	870	2 × 14E
4	G8DGR/P	47	161	BE	G3NEO —230	974	M
5	G3ONP/P	35	149	HD	G3KEQ —220	1583	14E
6	G3EEZ/P	38	136	SE	G3KEQ —210	1530	11E
7	G3FEC/P	32	100	WE	G8APZ/P —181	900	M
	G3WOS/P	37	100	BD	G8APZ/P —275	614	2 × M
9	G8DLX/P	32	86	NR	G3KEQ —130	690	8s
10	G3UHF/P	20	60	DY	G4BEL —170	1700	8s
11	G3RQZ/P	27	58	KT	F3LP —195	?	M
12	G5UM/P	14	46	RD	G3UHF —105	580	6s
13	G4ALE/P	21	35	ST	G4BEL —278	?	M
14	G2WS/P	16	34	ST	G3EEZ/P —120	900	11E
15	G8ADP/P	17	33	GR	G3APZ/P —142	600	9E
16	G8CLY/P	8	8	BS	G2RD — 75	857	P

Aerials: P = Parabeam, M = Multibeam, S = Slot Yagi, E = Yagi.

Second 1·8MHz Contest 1972

1. The General Rules for RSGB HF Contests, published in the January 1972 edition of *Radio Communication*, will apply.

2. When. 2100gmt on Saturday 11 November 1972 to 0200gmt Sunday 12 November 1972.

3. Contacts. CW (A1) only in the 1·8-2MHz band. County code letters, as published on page 41 of the January 1972 issue of *Radio Communication*, must be sent after the report/serial number group; eg for a contact from Surrey, 579001 SY.

4. Scoring. Six points for each of the first six contacts with stations in any one country; three points for the seventh and subsequent contacts; six points for each contact with a station outside the British Isles.

5. Logs. Column (5) should be headed "County Code Letters Received". Entries should be addressed to: The HF Contests Committee, c/o A. V. H. Davis, G3MGL, 41 Gainsborough Road, Tilgate, Crawley, Sussex.

6. Awards. The Victor Desmond Trophy will be awarded to the winning station. The Maitland Trophy will be awarded to the Scottish member with the highest aggregate number of points in this contest combined with the First 1·8MHz Contest 1973.

A certificate of merit will be awarded to the leading entrant whose 18th birthday falls on or after 15 November 1972. Entrants wishing to compete for this award should state their date of birth on the contest cover sheet and mark clearly at the TOP of the cover sheet "UNDER 18". Entries will only be eligible for this award where operation has taken place under the entrant's own callsign and from the "main address" as stated on the station licence.

July 144MHz Open Contest results

This year, the contest attracted 15 more contestants than in 1971, and there were the usual small number of motley 427s and log sheets. The adjudicator was amused by the overall winners' nom-de-plume—*Les Clochards*, "The Tramps", F0LG/P, operated by G3PSH, G3VXK, G3SKT and G3TPF, who will receive the Mitchell-Milling Trophy. GW4ABR/P, GW4AYK/P, GD2HDZ and G4BEL will receive certificates of merit. As a point of interest, G2AVC was using an HW30.

The propagation path was confirmed by many to be N-S but there were variable signal strengths with dx into the fringes of the Continent. Conditions were reported to be above average and activity was high. Operating standards and manners were described by many as good. Splatter and bad signals were reported but did not appear to be too troublesome.

F. M.

FIXED SECTION

Posn	Points	Callsign	QSOs	County	Best dx	Km
1	1,716	GD2HDZ	168	IM	F1AGY/P	560
2	1,456	G4BEL	223	CE	DL8GP/P	555
3	923	G3NHE	141	YS	PA0CKV/P	440
4	832	GW8EQH	156	CH	G4AAR	348
5	830	G3RAF	140	ST	GM8CHR/P	447
6	688	G3ZYC	102	DY	F1BRM/P	615
7	661	G8CUT	104	EX	GM8CHR/P	—
8	543	G3RXK	128	SD	GM8CHR/P	345
9	491	G4AJW	105	WK	GM8CHR/P	352
10	490	G4AGQ/A	118	YS	F6BEG/P	359
11	489	G8CRN	85	CE	GD2HDZ	368
12	445	GW3NNF	59	AG	G3DAH	440
13	438	G4AAR	108	KT	G3YKK/P	400
14	403	G3AYC	96	LD	GD2HDZ	412
15	398	G8ERW	112	HF	GD2HDZ	377
16	392	G8CUO	91	NM	GM8CHR/P	252
17	377	G8DWT	71	BE	G3JYP	320
18	371	G3WHK	123	SY	G8BXF/P	396
19	363	G3BTK	75	NM	GC3ZXR/P	375
20	323	G4BFT	73	SD	GM8CHR/P	342
21	318	G3WKZ/A	80	NM	G3KDG	310
22	302	G8DHA	72	GR	GM3XHY/P	395
	302	G8FBL	87	SD	F0LG/P	346
24	295	G5VU	45	NM	—	—
	295	G5DF	40	BE	GM3XHY/P	510
26	288	G8BKR	72	GR	GD2HDZ	330
27	254	G8DMU	92	YS	G3KMI/P	400
28	250	G3FIJ	44	EX	GW3FEC/P	362
29	235	G4BBR	33	GR	PA0ZAZ/P	475
30	234	G8FVZ	49	HF	G8BXF/P	330
31	221	G8CTT	85	KT	G3VGX/P	305
32	218	G3WKS	78	SX	GW4ALE/P	305
33	210	G4AJE	26	NR	GM8CHR/P	410
34	196	G3YZH	38	LE	GM8CHR/P	340
	196	G3TDR	65	MX	—	—
36	194	G8FDW	72	LD	G3UGF/P	265
37	177	G8DKG	31	SF	—	—
38	153	G3ZKE	65	LD	GC2FZC	280
39	148	G3ZHJ	36	BD	F0LG/P	280
40	134	G3YGR	51	LD	GC3ZXR/P	245
41	127	G3WJG	51	MX	PA0DMT	310
42	112	G3WWT	38	MX	G3YKK/P	315
43	110	G8FDL	44	LE	GW3OXD/P	153
44	103	G8FCB	47	NM	G8CUT	180
45	94	G3ZOD	24	CH	G3KEQ	—
46	82	G8GBH	40	NM	GW3FEC/P	240
47	80	G8CDW	32	MX	F0LG/P	235
48	73	G8FHM	39	SY	GC3ZXR/P	150
49	71	G8DOT	33	EX	F0LG/P	290
50	52	G8FBH	30	MX	F0LG/P	220
51	48	G3LCH	28	LD	G3UGF/P	275
52	41	G8AUM	17	HF	G8BQX/P	112
53	40	GM3IDU	14	PH	G8DXS/P	205
54	28	G8CAT	18	DT	GC3ZXR/P	—
55	5	G2AVC	5	MX	—	—

PORTABLE SECTION

Posn	Points	Callsign	QSOs	County	Best dx	Km
1	2,426	F0LG	258	50	GD2HDZ	510
2	2,285	GW4ABR	317	RN	ON4PB/P	540
3	2,139	GW4AYK	316	BR	—	—
4	1,907	G8BHH	264	HD	ON5EW/A	665
5	1,730	GW3FEC	218	CV	PA0ZAZ/P	582
6	1,724	GC3ZXR	189	AD	GM3XHY/P	625
7	1,684	GW3FBI	234	RN	F1BJB	455
8	1,682	GM8CHR	166	SK	G4BCO/P	581
9	1,491	GM3XHY	147	LK	GC3ZXR/P	626
10	1,418	GW4ALE	235	MR	—	—
11	1,406	GW3OXD	218	RN	PA0FHV	576
12	1,381	G8BQX	203	XS	F1AYH/P	645
13	1,306	G4AJC	171	KT	FZQZ/P	550
14	1,184	G3BA	173	NK	GM8FFX/P	603
15	1,126	G4ACU	243	WR	PA0DMT	423
16	1,078	G3PIA	216	BE	GM3XHY	440
17	1,034	G3KMI	180	DT	—	—
18	989	G8DML	152	CD	G8BCH	410
19	985	GW3ITZ	198	DB	PA0DMT	506
20	943	G3YZN	165	SX	GM8CHR/P	545
21	917	G8BXF	126	DH	G2DSP/P	425
22	811	G8FNS	176	BE	GM3XHY/P	470

Posn	Points	Callsign	QSOs	County	Best dx	Km
23	775	G4ARN	112	NK	GC3ZXR/P	410
24	749	G8FAB	140	HE	GM8CHR/P	490
25	704	G3WAS	157	SD	GM8CHR/P	425
26	695	G3JYP	191	WD	G3YZN/P	445
27	684	G3WIR	164	OX	GM8CHR/P	562
28	659	G8DDW	178	SY	GD2HDZ	425
29	654	G8DXQ	104	YS	G8DJW/P	373
30	650	G8CUB	84	KT	F1BRR/P	530
31	647	G8EDK	123	LN	G3KMI/P	320
32	642	G8GCP	141	SX	F6BXY	480
33	599	G3YKK	91	YS	G3YZN	330
34	596	G3XED	113	YS	G4BCO/P	—
35	565	G8GCC	147	SD	GM8CHR/P	342
36	550	G8DHT	132	SD	F0LG/P	385
37	536	G3ZPT	121	HE	G2HH	320
38	520	G4BCO	89	SX	—	—
39	509	G3ZME/A	113	SE	F0LG/P	355
40	392	G3KUE	108	LE	G3YZN	370
41	351	G2DSP	89	SX	G8BXF/P	422
	351	G3WCB	145	SY	G8FEP	250
43	347	GW8CLY	50	MR	F1AGY/P	440
44	317	G3ZLQ	81	DX	G8BXF/P	353
45	310	G3YPP/A	85	BD	GD2HDZ	352
46	299	G8DTQ	42	NK	GM8CHR/P	430
47	250	G8FRA	68	WK	GM3YHY/P	400
48	193	G3REI	93	SY	G8DNK	280
49	173	GW5UM	35	MH	G3BW	325
50	155	G3VPR	35	RD	F0LG/P	—
51	150	G8ENK	52	GR	G3XEP/P	230
52	144	G8DJE/A	50	EX	GC3ZXR/P	275
53	121	G8EDG	49	WR	G3XC	285
54	119	G8EAB	41	ST	G3WIR/P	—
55	103	G3ZXD	35	DT	GW4ABR/P	196
56	92	G8FBQ	30	DH	GW8FBI	300
57	29	G3XFW	17	DT	GW4AYK	133

Check logs from G2HH, G6CJ, G3BPM and G8CQM/P acknowledged with thanks. Also BRS15822, BRS28005, A7417 and A7783 whose scores will be credited for the Listeners Championship.

Erratum, May 144MHz Contest results

In the tabulation on p540 of the August issue the callsign in position 48 should read G8FMG/A. Our apologies to the Bedford and District ARC.

CLUB NEWS

Items for inclusion in this section should be sent to regional representatives before the first of each month for inclusion in the following month's issue. They should not be sent direct to the editor.

The date of publication of the following month's issue, first Tuesday in the month, should be borne in mind so that events are not, in fact, history when the details are published. While regional representatives are pleased to receive clubs' events calendars for several months ahead, they still require monthly events lists so that entries can be confirmed or amended.

REGION 1 — RR B. O'Brien, G2AMV

Ainsdale (ARC)—Members should contact N. Horrocks, G2CUZ, for details of meetings.

Blackburn (ELARC)—First Thursday each month. 7.30pm, Edinburgh House, Shearbank Road, Blackburn. Secretary: W. E. Baxendale, G8FDG, "Juverna", Westland Avenue, Darwen, Lancs.

Blackpool (B & DARS)—Mondays, 8pm, Pontins Holiday Camp, Squires Gate. Morse tuition 7.30pm.

Bolton (B & DARS)—First & 3rd Wednesdays, Bolton Recreation Club, Kensington Place. Morse tuition at every meeting. Further details from G3XUM.

Bury (B & RRS)—Second Tuesday each month at 8pm, George Hotel, Market Street, Bury. 9 October ("TVI and bci oddities" by G2BTO), 14 November (Surplus equipment sale). Secretary: G3RSM, 13 Rhiwlas Drive, Bury BL9 9DD.

Carlisle (C & DARS)—Mondays, 7.30pm, Currock House, Lediard Avenue, Currock. Secretary: A. R. Harper, 23 Roman Way, Stanwix.

Cheshire (Mid Cheshire ARC)—Wednesdays 7pm, Technical Activities Centre, Winsford Verdin Comprehensive School, Grange Lane, Winsford. Nets on 160m 7pm Mondays, on 2m 7pm Tuesdays. Details from G3JWK.

Chester (C & DARS)—Tuesdays, 8pm, except 1st Tuesday in month which is net night. YMCA, Chester. Details from G8AYW.

Douglas IOM (D & DARS)—Secretary, GD3YUM, will be pleased to hear from any member who intends to visit the island.

Eccles (E & DRC)—Tuesdays, 8pm, Bridgwater School, Worsley, Manchester. Club 2m net 11a.m. on Sundays on 145·65. All visitors and prospective members welcome. Secretary: G4AEQ, QTHR.

Lancaster University (UOLARS)—Prospective members should write to Phil Jones, Department of Environmental Sciences. The society's vhf station, G8DOU, is operational on 144MHz rtty and would welcome enquiries about skeds.

Leyland Hundred Amateur Radio Group—Second Monday each month, 7.30pm, Rose & Crown, Ulnes Walton, Leyland. Net night Saturdays, 1900bst on 145·8MHz. Details from F. Harrison, 78 Lancaster Lane, Leyland, Lancs.

Liverpool (L & DARS)—Tuesdays, 8pm, Conservative Association Rooms, Church Road, Wavertree. Secretary G3WCS.

Liverpool (NLRC)—Tuesdays, 8.30pm, informal meeting at the "Nags Head" Thornton, Crosby, Liverpool 23. Visitors welcome. Secretary: G3XMG.

Liverpool University (ARS)—Prospective members should contact G4AXA through the Students Union or via his home QTH which is 234 Derby Road, Chesterfield, Derbyshire S40 ZEP.

Manchester (M & DARS)—Wednesdays, 7.30pm. All meetings include morse classes. 203 Droylesden Road, Newton Heath, Manchester 10. Secretary: G3IOA.

Manchester (SMRC)—The club meets on Fridays at 8pm at the Sale Moor Community Centre, Norris Road, Sale, Cheshire. The vhf section meet on Mondays at 8pm at the club shack, Greeba, Shady Lane, Manchester 23. The club's Annual Dinner is provisionally fixed for 10 November. The October programme: 6 October ("Uses of oscilloscope" by T. Winter, G4AOK), 13 October (Three films, 1. Cleaning electronics the better way, 2. Use of radiotelementry in medicine—an introduction, 3. Electrostatics), 20 October ("Construction and use of a gate dip oscillator" by P. Torry, G3SMT), 27 October (To be arranged). Visitors welcome on both Mondays and Fridays. Secretary: G3WFT, QTHR.

Manchester University (ARS)—G3VUM is active on all hf bands. The society continues with its programme of lectures, visits and tuition for the RAE and morse test. Details from G8BVF, G3ZNS or GM3YOK at the University Union, Oxford Road, Manchester.

Preston (PARS)—12 & 26 October, 7.30pm, Windsor Castle (private room) St Paul's Square, Preston. Secretary: G. Earnshaw, G3ZXC. Morse practice 7.30pm, main feature 8pm.

Stockport (SRS)—Second Wednesday each month is a discussion night, 4th Wednesday is a lecture night. 8pm, Blossoms Hotel. Buxton Road, Stockport. Secretary: G8BCG.

Thornton Cleveleys (ARS)—First & 3rd Wednesdays, 8pm, St John Ambulance Brigade HQ ,off Fleetwood Road North (behind Police Station), Thornton, Lancs. 4 October (WIBB tape and slide lecture Mark 2 Courtesy of Northern Heights ARS), 18 October AGM). Project group now meets on Fridays, 7.15–9pm at the Project Laboratory, Rossall School, Fleetwood. Work in hand includes 160 and 2m tramsitters and receivers. Further details from G3ZYE.

Warrington (W & DARS)—First & 3rd Tuesdays, 8pm, Thames Board Mills Social Club, Alford Hall, Manchester Road, Warrington.

Westmorland (WRA)—First Monday each month at New Allen Technical College. Acting secretary is N. Stanley, G3UEC, 9 Castle View, Sedgwick, Westmorland.

Wirral (WARS)—First & 3rd Wednesdays each month, 7.45pm, Sports & Recreation Centre, (Old Drill Hall), Grange Road West, Claughton, Birkenhead. Secretary: G3WSD.

Wirral (Wirral DX Association)—Last Thursday each month at members' homes. Secretary: M. Davidson, G3YSM, 43 Stuart Avenue, Moreton, Wirrall. Visitors welcome, please inform secretary beforehand.

Merseyside—RSGB members have discontinued the monthly luncheon meetings, as HMS *Landfall* has moved. A further announcement will be made when it has been possible to find a new venue. Local RSGB members in *Crewe* meet at the home of R. Owen, 10 Circle Avenue, Willaston, Nantwich, from whom further details may be obtained.

REGION 2 — RR J. E. Agar, G8AZA

Barnsley (B & DRC)—Meets at King George Hotel, Peel Street, Barnsley, on Fridays at 7.30pm. Details from G3LRP, QTHR.

Bradford (BRS)—Meets at Club HQ, 10 Southbrook Terrace, Bradford 7. Hon Sec: R. Harker, A7585, 65 Whitby Road, Bradford BD8 9JN, tel Bradford 43971.

Easington (EAR & EC)—Meets Tuesdays, 7.30pm, at Easington Village Working Men's Club, and Sunday mornings for activity on the air. Visitors are always welcome. Details from G3VSS, QTHR.

Fulford (FARS)—Meets Tuesdays, 7.30pm, at Scout HQ, 31 George Street, York. Hon sec: G5KC, QTHR.

Halifax (NHARS)—4 October (Committee meeting), 14/15 October (Scout Jamboree on the air). Hon sec: G3MDW, QTHR.

Harrogate & Knaresborough (H & KRS)—Meets 2nd & 3rd Mondays each month. Hon sec: R. Troughton, G8CRH/G4AZJ, QTHR.

Hull (H & DARS)—6 October ("Microwaves" by G8EAH), 13 October ("Semiconductors part 11" by G3SSA), 20 October (Open night), 27 October (Photographic club, speaker Mr Green). Classes for RAE commenced 8 September. Hon sec: Mary Longson, 4 Chester Road, Hull.

North Riding (NRARG)—Meets fortnightly at "Alma Inn", Scarborough. Hon sec: J. E. Agar, G8AZA, QTHR.

Northumberland, Morpeth (NRC)—Northumbria Radio Club meets at 3 Wheatsheaf Yard, Morpeth. Details from G3XAI, QTHR.

Otley (ORS)—10 October (First aid lecture), 24 October (Annual open night, trade stand, pie & pea bar & raffle). Details from Hon sec: D. G. Mott, G8BZY, 17 Newall Carr Road, Otley.

Scarborough (SARS)—No information to hand. Hon sec: G3VAN, QTHR.

South Shields (SS & DARC)—Fridays, 8pm, Trinity House Social Centre, Laygate, South Shields.

Spen Valley (SVARS)—HQ, Grammar School, High Street, Heckmondwike, 7.30pm. Hon sec: G8DSB, QTHR.

Sunderland (SARS)—Meets at Sunderland Polytechnic, hon sec: G3XID, QTHR.

Tyneside (TARS)—Meets Monday, 7.30pm, Community Centre, Vine Street, Wallsend-upon-Tyne, visitors welcome. Hon sec: G. Lowden, 21 Winefred Gdns, Wallsend, NE28 6EF, tel Wallsend 627878.

Wakefield (WRS)—Meets alternate Tuesdays, 7.30pm, at Youth Centre, Ings Road, Wakefield. Details from G3XVU, QTHR.

York (YARS)—Thursdays, 7.30pm, G3HWW, 61 Micklegate, York. RAE course in progress. 27 October (Annual dinner), details of this event at the Ashcroft Hotel from hon sec: J. A. Rainbow, 14 Temple Road, Bishopthorpe, York.

REGION 3 — RR R. W. Fisher, G3PWJ

Birmingham (MARS)—17 October (AGM, all members are urged to attend and make their views known). 8pm, The Birmingham & Midland Institute, Margaret Street, Birmingham 2. *G8BHE.*

(University RS(BURS))—The club is active on hf and vhf. RAE and morse tuition organized if demand is sufficient, licensed and SWLs joining the university, contact Students Union, Birmingham University, or visit the society's stall on Freshers' Day.

(Slade)—6 October (Display of members' apparatus), 20 October ("Knight of the round table", bring your questions, ideas and bits and pieces), 3 November (Social Events), 8pm, The Church House, House St, Erdington, Birmingham. *G8EYL.*

Coventry (CARS)—6 October (AGM), 13 October (Night on the air), 20 October (Beginners night), 27 October (Visit to Enterprise Bakeries.) 8pm, at 121 St Nicholas Street, Radford Road, Coventry.

Dudley (DARC)—3, 17, 31 October, 8pm, Central Library, St James's Street, Dudley, G3PWJ.

Hereford (HARS)—First and third Friday of each month, 7.30pm, Civil Defence HQ, Gaol Street, Hereford.

Lichfield (LARS)—17 October (Bring and buy night), 8.30pm, Swan Hotel. Meetings held first Monday and third Tuesday of every month. *G8EID.*

Leamington Spa (MWARS)—Every Monday, 8pm, 28 Hamilton Terrace. A Raynet group is being formed to cover the whole of Warwickshire, all interested parties contact G8CXL.

Solihull (SARS)—17 October (AGM), 7.30pm, Manor House, High Street, 7 November (Informal), 9pm, Malt Shovel, High Street.

Stourbridge (STARS)—3 October (Informal), 8pm, Shrubbery Cottage, 16 October (Natternite) in the cellar at G8DZQ.

Sutton Coldfield (SCRS)—9 October ("VHF operating techniques" by G3BA), 8pm, Clubhouse, Sutton Town Football Club, Coles Lane. *G8AVH.*

Wolverhampton (WARS)—2 October (AGM), 16 October (Film show and members' slides), 8pm, Neachells Cottage, Stockwell End, Tettenhall.

Worcester (W & DARC)—2 October, Crown Hotel, Broad Street, Worcester. *G8ASO.*

REGION 4 — RR T. Darn, G3FGY

Derby (DADARS)—4 October (Surplus sale), 11 October ("Life on Ascension Island" by R. Buckby, G3VGW, ex ZB8RB), 18 October (DF practice night), 25 October ("Transistorized receivers and test gear", talk/dem by N. Richens, G3VKR), 28 October (Visit to trade show and exhibition at Granby Halls, Leicester), 29 October (DF Contest for president's trophy). All meetings are held at the society's club room, 119 Green Lane, Derby, commencing at 7.30pm. Visitors always welcome. *G2CVV.*

Nottingham (ARCON)—5 October (Forum), 12 October ("Amateur radio receivers" by G. Dover, G4AFJ), 19 October (Activity night), 26 October (Junk sale). All meetings are held at the Sherwood Community Centre, Mansfield Road, Nottingham and commence at 7.30pm. The club station is on the air on 2m now that the receiver has been modified to cover all the 2m band. *G4AFJ.*

REGION 5 — RR P. J. Simpson, G3GGK

Bedford (B&DARC)—Meetings Thursdays at 7.30pm at The Dolphin, The Broadway, Bedford. Hon Sec: John Bennett, G3FWA, 47 Ibbett Close, Kempston, Beds.

Bishops Stortford (BS & DARC)—Third Monday each month at 8pm in the British Legion Club, Windhill, Bishops Stortford, Herts. Hon sec: Arthur Stanley, G3WUR, 42 Havers Lane, Bishops Stortford, Herts.

Cambridge (C & DARC)—Meetings 7.30pm at HQ each Friday, Corporation Yard, Victoria Road, Cambridge. Hon Sec: J. Hern, 5 Acheson Road, Brampton, Hunts.

Cambridge University (CUWS)—Meetings fortnightly commencing 10 October. Speakers during the new session will include Bill Lowe and Dud Charman, G6CJ. The Society meets at 8.15pm at Kings College. Hon sec: Martin Atherton, G3ZAY, Emmanuel College, Cambridge.

Dunstable Downs (DDRC)—6 October (Idiots construction contest), 13 October (Between week), 20 October (RSGB—G3GGK, RR), 27 October (Between week), 3 November ("Add 'scope' to your shack" by G3VVS). Meetings 8pm, Chews House, 77 High Street South, Dunstable. Hon sec: C. G. Powell, G8BPK, 1 Wenwell Close, Buckland Wharf, Aston Clinton, Aylesbury, Bucks.

Ely (EARS)—Meetings alternate Thursdays, 7.30pm, at Ely Adult Education Centre, St Mary's Street, Ely. Hon sec: P. Brown, A6775, 59 Fieldside, Ely.

March (M & DARS)—Tuesdays, 7.30pm, 88B High Street, March. Hon sec: R. E. Ludman, 7 Elwyndene, March PE15 9BL, Cambs.

Peterborough (PR & ES)—Meetings start 6 October at Peterborough Technical College. Persons interested in taking the RAE should contact hon sec: Alf Jackson, 57 Peterborough Road, Castor, Peterborough, tel Castor 353.

Shefford (S & DRS)—5 October ("Astronomy" by J. Davies), 12 October ("Radio Valve Technology" by G2DGF), 19 October (Annual dinner planning), 21 October (Annual dinner), 26 October ("Lasers" by Dr D. Tyte). Meetings at Church Hall, Ampthill Road, Shefford, Beds. Hon sec: A. Sullivan, G2DGF, 12 Glebe Road, Letchworth, Herts.

Stevenage (S & DARS)—19 October (G. Jessop, G6JP, talking on various topics). Meetings first and third Thursdays each month at 7.30pm in Senior Staff Canteen, Hawker Siddeley Dynamics Ltd, Gunnels Wood Road, Stevenage, Herts. Hon sec: F. Collett, G3OVT, 8 Silam Road, Stevenage.

REGION 6 — RR L. W. Lewis, G8ML

Banbury (BRS)—Meetings at Woodgreen Hall, Banbury. 1930–2200 hrs, 27 October and 17 November. Details from G3LTN, tel Banbury 710623.

Cheltenham (RSGB Group)—First Thursday of each month, 8pm. 5 October (Junk sale), Royal Crescent Hotel, Clarence Street, Cheltenham. *G2FWA.*

South Bucks VHF Club—Meetings on the first Tuesday of each month at Bassetbury Manor, High Wycombe. *G8BBM.*

REGION 7 — RR R. S. Hewes, G3TDR

Acton, Brentford & Chiswick (ABCRC)—17 October (Film show), 7.30pm, Chiswick Trades & Social Club, 66 High Road, Chiswick W4. Hon sec: W. G. Dyer, G3GEH, QTHR.

Ashford, Middlesex (Echelford ARS)—9 October (Film & slide show on club activities by John Horne, G3YCQ), 26 October (Surplus equipment sale). 7.30 for 8pm, St Martins Court, Kingston Crescent, Ashford, Middx. All visitors welcome. Hon sec: Vic Higgs, G3WVJ, QTHR.

Barking (BR & ES)—12 October (No details received). 7.45pm, Gascoigne Recreation Centre, Gascoigne School, Morley Road, Barking, Essex. All visitors welcome. Hon sec: H. Davidson, G3FZP, QTHR.

Bexley Heath (North Kent) RS—12 October (No details received), 28 October (No details received). 7.30pm for 8pm, Congregational Church Hall, Chapel Road, Bexley Heath. Hon sec: Maurice Lee, G4BAL, QTHR.

Burnham Beeches (BB ARC)—5 October (Construction contest), 19 October (Film Show). All visitors welcome. 8pm, Hedgerley Scout Hut, Hedgerley, Nr Slough, Bucks. Hon sec: Nina Appleby, G8ENX, QTHR.

Cheshunt (CDRC)—6 October (No details received), 8pm, Methodist Church Hall opposite Theobalds Station, Cheshunt. Hon sec: Richard Ludwell, G3ZZQ, QTHR.

Chingford (Silverthorne) RC—Every Friday, 7.30pm, Friday Hill House, Simmonds Lane, Chingford E4. Hon sec: K. S. Arnold, G3XNP, QTHR.

Cray Valley (CVRS)—5 October ("1ARU and Region 7" by R. F. Stevens, G2BVN), 19 October (Natter nite). 8pm, Congregational Church Hall, Court Road, Eltham SE9. Hon sec: P. F. Vella, G3WVP, QTHR.

Croydon (Surrey Radio Contest Club)—17 October (Ron Ham, FRAS, BRS15744, talking on "The cause and effect"). 8pm, "Swan & Sugarloaf", Brighton Road, South Croydon. Hon sec: Sid Morley, G3FWR, QTHR.

Crystal Palace (CP & DRC)—21 October ("Working dx" by John Graham, G3TR). 8pm, Emmanuel Church Hall, Barry Road, SE22. Hon sec: Geoff Stone, G3FZL, QTHR, tel 799 6940.

Dartford Heath (DF Club)—1 October (Vange invitation hunt—details later). Until further notice all club events start at Denton Road, adjacent to the footbridge on the Grayford Side of the new A2, owing to excavations at our usual start. Hon sec: Maureen Worbey, G3XVC, QTHR.

Dorking (DR & DRS)—10, 24 October (No details received), 8pm, "Surrey Yeoman", Dorking. Hon sec: P. B. Gilby, 6 Hawkwood Rise, Great Bookham, Surrey.

Ealing (E & DRS)—Every Tuesday, 7.30pm, Northfields Community Centre, Northcroft Road, Ealing W13. Details from Hon sec: J. E. Alban, G3JEA, QTHR.

East London RSGB Group—15 October (Tape lecture—vhf practice), 3pm, Wanstead House, The Green, Wanstead E11. Further details from Ron Broadbent, G3AAJ, QTHR.
Edgware (E & DRS)—12 October (No details), 26 October (Informal meeting). 8pm, Watling Community Association, 145 Orange Hill Road, Edgware. Hon sec: Alan Masson, G3PSP, QTHR.
Gravesend RSGB Group—Mondays at 7.30pm,"Windmill Tavern", Shrubbery Road, Gravesend, Kent. Area representative: P. F. Jobson, G3HLF, QTHR.
Guildford (G & DRS)—13, 27 October (No details received). 8pm, Model Engineering HQ, Stoke Park, Guildford, Surrey. Hon sec: Peter Hopwood, G8CQM, QTHR.
Hampton Court (Thames Valley ARTS)—4 October ("Test gear" conducted by G3BPM). 8pm, "The Three Pigeons", Portsmouth Road, Long Ditton, Surrey. PRO: Rob Muir, G3LHN, QTHR.
Harlow (DRS)—Every Tuesday, 8pm, Mark Hall Barn, First Avenue, Harlow. Club station now operative on 80-10m ssb/cw. Club net Sunday mornings 10.30 on 28·8MHz, members use frequency most nights at 2100gmt. Hon sec: V. Heard, 106 Vicarage Wood, Harlow, Essex.
Harrow (RHS)—Every Friday, 8pm, Harrow County School for Boys, Sheepcote Road, Harrow. Further details from Hon sec: Les Light, G3KDL, QTHR.
Havering (H & DARC)—11 October (No details received), 25 October (No details received). 8pm, British Light House, Western Road, Romford. Hon sec: S. J. Hobday, G3SKV, QTHR.
Holloway (Grafton RS)—Mondays (RAE), Fridays (Morse & club night). 7.30pm, Archway School Annexe, Whittington School, Highgate Hill, N19. Hon sec: Tom Coleman, G8EEI, QTHR.
Ilford (ARS)—Every Thursday, 8pm, 50 Mortlake Road (off Ilford Lane), Ilford. Hon sec: F. G. Jarvis, G3HIW, QTHR.
Kingston (K & DARS)—11 October (To be announced). 8pm, Penguin Lounge, 37 Brighton Road, Surbiton, Surrey. Hon sec: Dick Bubbs, G3GVU, QTHR.
Loughton (L & DRS)—13 October (Informal), 27 October ("How transistors work" by G8DZH). 8pm, Loughton Hall, Near Debden Station. Hon sec: David Bowers, 12 Theydon Park Road, Theydon Bois, Essex.
New Cross (Clifton ARS)—Every Friday, 8pm, 225 New Cross Road, London SE14. Details from Hon sec: R. A. Hinton, 38 Camilla Road, Bermondsey, SE18.
Northolt (BEAARS)—First Wednesday in the month, BEA Trident Club, Western Avenue, Northolt, Middx. (This club is open to non-BEA employees by invitation. Contact David Evans, G3OUF, tel Amersham 3257, for details).
Paddington (P & DRS)—Every Wednesday, 8pm, Beauchamp Lodge, Warwick Crescent, W2. Further details from hon sec: Mike Pawley, G8AWV, QTHR.
Purley (P & DRS)—10 October (Natter nite), 24 October (Autumn junk sale). 8pm, Lansdowne Hall, Landsdowne Road, Purley. Hon sec: Alan Frost, G3FTQ, QTHR.
Reigate (RATS)—4 October (Talk and demonstration by Western Electronics (UK) Ltd.), 8pm, Nutley Hall, Nutley Lane, Reigate, Surrey. Hon sec: F. H. Mundy, G3XSX, QTHR.
Scouts (Baden Powell House ARG)—19 October (Completing the JOTA station). 8pm, Baden Powell House, Queensgate, South Kensington, SW7. Hon sec: Alf Watts, G3FXC, QTHR.
Southgate (SRC)—12 October (No details received). 8pm, Civil Defence Hut, Bowes Road, N11 (Near Arnos Grove underground station). All visitors welcome. PRO: Steve White, G3ZVW, QTHR.
St Albans (Verulam)—18 October (Talk and demonstration by Heath (Gloucester) Ltd, covering the whole Heathkit range of amateur radio, hi-fi and test equipment). 7.30 for 8pm, Civil Defence Hall (in the Chequer Street car park), St Albans, Herts. All visitors welcome. Hon sec: Hugh Young, G3YHY, QTHR.
Sutton & Cheam (SCRS)—17 October ("Varicaps" by Robin Hewes, G3TDR). 8pm, "The Harrow Inn", Cheam, Surrey. Hon sec: Jack Korndorffer, G2DMR, QTHR.
UK FM Group (London)—17 October (Junk sale). 8pm, Scout Hut, Hayes Road, Southall, Middx. PRO: Mike Tooley, G8CKT, QTHR.
Welwyn (Mid Herts ARS)—12 October (AGM). 8pm, Welwyn Civic Centre, Welwyn, Herts. Hon sec: Peter Wilcocks, G8AIE, QTHR.
Wembley (GECARS)—Every Thursday, 7pm, Sports Club, Preston Road, North Wembley. (This club is open to non-GEC employees by invitation. Tel Dain Evans, G3RPE, at 01-904 1262 during business hours, for details).
West Middlesex ARC—Meets at Greenford Community Centre, Oldfield Lane, Greenford, Middx. (No details received).
Wimbledon (W & DRS)—13, 27 October (No details received). 8pm, St John Ambulance HQ, 124 Kingston Road, Wimbledon, SW19. Hon sec: F. W. Hill, G3WDO, QTHR.
Woolwich—This society is being reformed. Contact B. C. Corper G3ZOJ, QTHR, for details.

REGION 8 — RR D. N. T. Williams, G3MDO

Brighton (BTCARC)—Details of future meetings from hon sec: G2CMH, 35 Willington Way, Brighton.
Canterbury (EKRS)—19 October (Lecture to be arranged), 16 November (Film show). Further details of meetings from G3MDO, QTHR.
Canterbury University (UKCRC)—Details of club meetings and activities for the coming Session from G3XUE, K. Beesley, Eliot College, University of Kent, at Canterbury, Kent.
Crawley (CARC)—Monthly meetings held at Trinity Congregational Church Hall, Ifield, Crawley.
Eastbourne (SARS)—Monthly meetings held first Monday in the month at Victoria Hotel, Latimer Road, Eastbourne. PRO: G3JFM.
Horsham (HARC)—3 October (Junk sale), Guide Hall, Denne Road, Horsham, 7.30pm.
Maidstone (MYMCAARS)—All meetings at "Y" Sports Centre, first and third Fridays devoted primarily to the beginners.
Medway (MARTS)—26 November (Golden Jubilee Dinner Dance). RAE classes from late October. Club meetings held every Friday at the Aurora Club, Gillingham, 7.30pm. Further details of meetings from hon sec: H. E. Willis, 111 Laburnum Road, Strood, Kent.
Mid-Sussex (M—SARS)—21 & 5 October (To be arranged), 19 October (RAENET by Griff Rockwood & Arthur Cambell). Hon sec: G3RXJ.
Tunbridge Wells (WKARS)—6 October (Discussion on audio by G3TXS and G3ZYP), 20 October (Open night—this is to attract more people to amateur radio, presenting a working station and talks on how to get started.) Further details from hon sec: H. F. Richards, 17 Reynolds Lane, Tunbridge Wells.
Worthing (W & DARC)—Meetings held every Tuesday at Rose Wilmot Youth Centre, Littlehampton Road, Worthing.

REGION 9 — RR H. W. Leonard, G4UZ

Bristol (City & County RSGB Group)—30 October (Potted lectures by G3YRN, G8AON, G3VBH), 7.30pm. Becket Hill, St Thomas Street, Bristol 1. *G3ULJ.*
Bristol (BARC)—Every Tuesday, 7.45pm, 24 Bright Street, Barton Hill, Bristol 5. *G8BIR.*
Bristol (University ARS)—Every Saturday, 2.30pm, Dept of Physics, Royal Fort, Tyndalls Park Road, Bristol 8. *G8CVS.*
Burnham on Sea (BoSRC)—Contact J. Robertson, G3ZOR, for details. Tel Bos 2333.
Cornish (CRAC)—First Thursday in month. 5 October ("Radio & major disasters" by G3FWG), 2 November (Closed circuit tv or military radio), 7.30pm, SWEB Social Centre, Pool, Camborne. Visitors most welcome. *G3VWK.*
Newquay Group (CRAC)—Alternate Tuesdays. Further information from G3THT, Newquay 4512. Details of Cornish and Newquay Group gladly supplied by G3NKE.
Exeter (EARS)—Every Tuesday. 10 October (Annual general meeting), 7.30pm, Community Centre, St Davids Hill, Exeter. Hon sec: A. W. Bawden, 232 Exwick Road, Exeter, EX4 2BA.
North Devon (NDRC)—Second and fourth Wednesdays of month, 7.30pm, "Grinnis", High Wall, Sticklepath, Barnstaple. RAE session at 7pm each meeting. *G4CG.*
Plymouth (PRC)—First and third Tuesdays of month, 7.30pm, Virginia House, Bretonside, Plymouth. Hon sec: S. E. Martin, 32 East Park Avenue, Plymouth PL4 6PF.
Saltash (S & DARC)—First and third Fridays of month, 7.30pm, Burraton Toc H, Saltash. Hon sec: G4AJU, 302 St Peters Road Plymouth PL5 3DU.
South Dorset (SDRS)—First Friday of month. 6 October ("Digital instruments" by G3VPF), 7.30pm, Alma Road Section of Weymouth Technical College. *G3VPF.*
Taunton (T & DARS)—Fridays, 7.30pm, Jelalabad Barracks, The Mount, Taunton.
Torbay (TARS)—Every Tuesday and last Saturday of month. 28 October ("Regulated power supplies" by G3ABU), 7.30pm, Rear of 94 Belgrave Road, Torquay. Visitors always welcome. *G3NQD.*
Weston-super-Mare (WsMRS)—Second Friday each month. Details from G8FNL at WsM 29327. *G3GNS.*
Yeovil (YARS)—Every Thursday. 26 October (RSGB tape lecture), 7.30pm, The Youth Centre, 31 The Park, Yeovil. *G3NOF.*

REGION 10 **RR D. M. Thomas, GW3RWX**

Blackwood (ARC)—Fridays, 7.30pm, at Oakdale Community Centre, Oakdale, Mon. *GW3TUG.*
Barry College of Further Education (ARS)—Thursdays, 7pm, at the college, Colcot Road, Barry, Glam. *GW3WKL.*

The Marconi-Kemp 75th Commemoration celebrations concluded with a further operating period from Flatholm Island from 9 to 16 September, under the callsign GB3BCT.A reception was held by the MPT at Sully House Restaurant, combined with the BBC 50th anniversary celebrations, on 13 September, at which messages were passed from Sir Julian Hodge to various notabilities via the Flatholm link. These coincided with the franking of the Marconi-Kemp first day covers on Flatholm.

Cardiff (RSGB Group)—Monday 9 October, 7.30pm, (AGM and home-built equipment contest.) BBC Club, Llandaff, nr Cardiff. *GW3GHC.*
Glamorgan Raynet Group—Details from GW3ZFG, QTHR, tel Cardiff 62411.
Haverfordwest (ARS)—Tuesdays, 7.30pm, at HQ, Rosemary Lane, Haverfordwest, Pembs. *GW3YBB.*
Hoover (ARC)—Mondays, 7.30pm, at Hoover Social Club, Hoover Works, Pentrebach, nr Merthyr, Glam. Mr F. E. Tribe, c/o Hoover Works.
Pembroke & District (RSGB Group)—Last Friday in each month at the Defensible Barracks, Pembroke Dock. *GW3LXI.*
Pontypool (RSGB Group)—Tuesdays, 7pm, at the Educational Settlement, Rockhill Road, Pontypool, Mon. *GW3JBH.*
Port Talbot (ARC)—Meets second Tuesday of each month, 7.30pm, at the Rail and Transport Club, Station Road, Port Talbot. *GW5VX.*
Sully & District Short-wave Club—Tuesdays, 7pm, at the Annexe Sully Bowls and Social Club, 59 South Road, Sully, Glam. *GW3ZSV.*
Rhondda (ARS)—Meets at Rhondda Transport Employees Club & Institute, Porth, Rhondda, Glam. *GW3PHH.*
Swansea Radio Society—Meets on first and third Tuesdays of each month, 7pm, at the Palace Bar, High St, Swansea. Meetings are also held on the second and fourth Tuesdays of each month, when an RAE course is held, morse practice also being available at these meetings. October meetings: 10 October ("Propagation & antennas 2"). 24 October (Revision). Secretary: Mr M. D. E. Connor, 54 Talley Road, Penlan, Swansea SA5 7EU.
University College, Cardiff (ARS)—At the moment of writing, it looks as if this society may suffer a serious, but it is hoped, temporary setback. The admirably sited shack and workshop is needed for urgent college research projects, so a new location will need to be found. Secretary: Mr Simon Northeast, c/o Students Union, Dumfries Place, Cardiff.
University College of Wales, Aberystwyth Radio & Electronics Society—All enquiries to the secretary, c/o Students Union, University College of Wales, Aberystwyth. Club callsign: *GW4BGG.*

REGION 12 **RR A. J. Oliphant, GM3SFH**

Aberdeen (AARS)—Fridays, 7.30pm, 8 Blenheim Lane, Aberdeen. *GM3HGA,* tel Aberdeen 33838.
Dundee (Kingsway Technical College ARC)—Wednesdays 7pm (Morse practice—6.30pm), Kingsway Technical College, Old Glamis Road, Dundee. Visitors always welcome.
Inverness (IRS)—Fortnightly on Fridays at 7.30pm. Next meeting 6 October. Cameron Highlander's Memorial Youth Club, Planefield Road, Inverness. Mr L. Bell, 114 Glenurquhart Road, Inverness.
Lerwick (LRS)—Every Tuesday at 7pm, Clubrooms, Abbsbrae House, Lerwick. *GM4BBL,* tel Lerwick 1238.
Lhanbryde (MFARS)—Wednesdays, 7.45pm, St Andrews School, nr Lhanbryde, Elgin, Morayshire. *GM3UKG,* tel Clochan 225.
Queen's Own Cameron Highlander's Memorial Youth Club Radio Section—Tuesdays, 7.30pm, Planefield Road, Inverness. Section caters for all young people from 13 years interested in learning, and obtaining practice in, the elements of radio technique. Mr Bill Begg, 68 Tomnahurich Street, Inverness.
Thurso (CARS)—Second Tuesday in each month, 7.30pm, Scapa House, Thurso. *GM3JUD.* All visitors welcome.

REGION 13 **RR V. W. Stewart, GM3OWU**

Berwick (BARS)—Last Sunday in each month, 3pm, Tweed View Hotel. Further details from C. H. Crook, G3YOG, 19 Hatters Lane, Berwick on Tweed or from the AR, G. Shankie, GM3WIG, 8 Ettrick Terrace, Hawick, Roxburghshire.
Dumfermline (DRS)—Second Wednesday in each month 7.30pm, Abbot House, Dumfermline. Further details from G. Martin, GM3NVQ, 42 Rose Street, Dumfermline.
Edinburgh (LRS)—Second and fourth Thursdays, 7.30pm, 66 Hanover Street, Edinburgh. Further details from K. C. Henderson, 97 Ganton Road, EH5 3NH. (Phone 552 2147).
Glenrothes (GDARC)—First Sunday in each month, 7.30pm, Old Nursery Buildings, Leslie, Fife. Details from A. B. Givens, GM3YOR, 41 Veronica Crescent, Kirkcaldy, Fife.
St Andrews (USt AARS)—6 October (Fair), 12 October ("Introduction to amateur radio"), 18 October (Open day), 25 October ("World-wide TV"), 8 November ("History of radio"), 5pm, Department of Physics, North Haugh, St Andrews. Further details from R. Marchant, GM3ZCQ, at the above address.

REGION 14 **RR M. A. Comrie, GM3YRK**

Ayrshire (AARG)—8 and 22 October, 7.30pm, YMCA, Howard Street, Kilmarnock.
Falkirk & District RSGB Group—13 October at the Temperance Cafe, Lint Riggs, Falkirk. For further information contact, J. Ramsay, 78 Wheatlands Ave, Bonnybridge, Stirlingshire.
West of Scotland (ARS)—6, 13, 20 and 27 October, 81 Virginia Street, Glasgow.

REGION 16 **RR D. F. Beattie, G3OZF**

Chelmsford (CARS)—First Tuesday of the month, 7.30pm, at Marconi College, Arbour Lane, Springfield, Chelmsford. 7 November ("Amateur television" by G8DAO). Details from G3VPK.
Colchester (NEETCARS)—Wednesdays, 7.30pm, North-East Essex Technical College, Sheepen Road, Colchester. Details from E. T. Jacobs, 26 Pondfield Road, Colchester.
Gt Yarmouth (GYRC)—Last Tuesday of the month, 7.30pm, at the Central Library, Gt Yarmouth. Details from A. D. Besford, 49 Blake Road, Gt Yarmouth.
Ipswich (IRC)—Where possible, two meetings each month. Only one meeting this month—11 October—at Handford House, corner of Ranelagh Road and the main London road (A12), at 7.30pm. Details from G3YWM.
Norfolk (NARC)—Every Wednesday, 7.45pm, at Crome Community Centre, Telegraph Lane East, Norwich. Details from G8BLD, The Rectory, Framingham Pigot, Norwich, Norfolk NOR 45W.
Southend (S & DRS)—Every other Thursday, 7.30pm, at the Flarepath Canteen, Southend Airport. Next meetings, 5 and 19 October. Details from G3AXN.

REGION 17 **RR L. N. G. Hawkyard, G3ZKR**

Basingstoke (BARC)—First and 3rd Saturdays in each month. 21 October (Constructors competition), 7.30pm, clubroom, Chineham House, Popley. *G3CBU.*
Reading (RARC)—10 and 24 October, at the White Horse, Kidmore End Road, Emmer Green, Reading. *G3ULT.*
Southampton (RSGB)—Saturday 14 October (AGM and talk by G3OB), at Lanchester Building, Southampton University. Every Wednesday evening at the clubroom, Kent Road. *G3ZKR,* tel 73378.
Harwell (AEREARC)—Third Tuesday of each month, also informal gatherings and junk sales every Friday lunch time. 7.30pm, Social Club, AERE, Harwell, Berks. *G3NNG.*
Maidenhead (MARDC)—7.30pm, at Victory Hall, Coxgreen, Maidenhead. *G3VMR.*

Looking ahead

3 November—RSGB-IEE Joint Lecture at IEE.

1 December—RSGB AGM, Royal Society of Arts, John Adam St, London WC2.

MEMBERS' ADS

These low-cost flat-rate advertisements are accepted as a service to members of RSGB. They must be submitted on the Members' Ads order form printed on the last page of each issue 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 25p (stamps not accepted). They will not be acknowledged. Those not clearly worded or punctuated will be returned. No other correspondence concerning this service can be entered into.

The closing date for each issue is the 4th 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. 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.

Members are advised to enclose a stamped addressed envelope when replying to advertisements.

See the current order form on the last page for further details.

FOR SALE

51J4, rack mtg, all filters and xtals, prod det, exc cond, manual, offers? 144MHz JXK conv, 28MHz i.f., as new, £8. G2BVN, QTHR.

Exch two Midland 3-chann cb walkie-talkies with squelch, call sig, steel case, for low bnd a.m. Pye base stn, or Pye Vanguard. G3XGZ, tel Wantage 4004.

Heathkit rf sig gen, RF-IU, £14; Heathkit audio gen AO-IU, £13; two 15,000μF capacitors 63VW 50p ea; two meters, 560-0-500, 100mA, £1.50 pair; two QVO3-10s, £1.50 pair; various valves, Octal B7G etc, over 100, £3.50 the lot, coll or p extra. G8BI, QTHR, R.A. Butterworth, tel Welwyn Garden 23676.

KW Victor tx and Trio 9R59 rx, both gd cond, £50 ono for both, will split. G3YNW, QTHR, tel Checkendon 464.

HW17A, mint cond, no mods, assembly to DEF standards, with hndbk £65 ono; Marconi CR150, 1-30MHz double cnvrtr, £20. G8CZK, QTHR, tel Willenhall 67293.

TV tuner 405 vhf to 625 uhf, £4; approx 30yds heavy mains flex 75p; 9yds 3 core mains lead, 5A 72p; Eddystone geared slow-motion drive 898, 110 to 1, new, £4. H. H. Seymour, 6 Chichester Buildings, Swan Mead, London SE1 4RY.

Heathkit DX60, built, unused, exc cond with vfo IU, owner at sea, £45 ono; Command rx, BC453, 12V heaters, £3. G3ZON, QTHR, tel 01-546 3447.

New and unused Command set, 6·9·1MHz, £4; also Lafayette HA230 rx, 500kHz-30MHz, bfo, bndsprd, £20 ono, inc manual. A. Rawlings, 37 Kingswood Avenue, London NW6, tel 01-969 4455.

Eddystone 888A, gd, £80; Codar AT5 mkII, psu, brand new, £25, or both items for £95, no offers. G4AYG, J. Elsworth, 2a Steele House, High Street, Dovercourt, Essex.

Vespa mk11, 6LQ6 pa, ac psu, vgc, £80. G3ZYS, QTHR.

Pye Cambridge/M r/t on 174MHz, suit conv for 2m, perfect, offers, or exch AT5 tx, KW160, + cash or part exch for Yaesu FT75 tx/rx; also Trio 9R59DE rx for sale, offers. P. Jenkins, 30 Gainsborough Road, North Finchley, N12 8AG, tel 445-8722.

Leak TL12 main amp £5; B44 II, mod 4m, mains psu, £6; Murphy r/t 821, 25kHz, vib, psu, low bnd, £8; B44 II rx, mod 4m, 21V dc, £6.50; TR2002 tx unit sockets AE relay, £3.50; TR2002 complete £8; Taylor 45C valve tester £15 (not ex-WD). G8EYI, QTHR, tel 079-17 3448.

Solartron CD711. S2 double beam scope, exc instr, dc to 7MHz X, Y, Z modulation, xtal cal, sensitivity down to 3mV/cm, time base 300 nanosecs/cm to 3 secs/cm, continuously variable gd wkng order, offers. Robinson, 45 Maisemore Gdns, Emsworth, Hants PO10 7JX.

Pair Goodmans ME2203 spkrs, 12in bass, 1in tweeter, bnd new, boxed, walnut, £45; or exch pair Arena HT20 mkII 10W teak enclosure, with spkrs bass 8in tweeter 2½in, all letters answered or exch mains radio, mint. Mr L. D. Ireland, Carnhell Green, Camborne, Cornwall, tel Praze 236.

Collins S-line 75S3, 32S3, 312B4, £500; package deal inc spare tubes, auto trnsfmr (500W) trnsfmrless 516F2, brand new Heath HP23A. Will del radius of 150 miles, no offers. G3MRP, J. S. Butlin, 10 Mosquito Road, Upwood, Huntingdon PE17 1PZ.

New HW32A, 3hrs use only, aligned by Heathkit, no mic or psu, £45; 2m transistor trnsvtr, new 6/40 needed in pa, reqs cab, 14MHz i.f., £17; callers strictly by app. G8CZZ, tel 01-318 3595.

Heath SB500 trnsvrtr with Sommerkamp FL200B tx, ssb a.m. and cw on 2 and 10-80m, £160; Hallicrafters communications rx, SX117, £90. G3WMO, QTHR, tel 01-363 5814.

G2DAF ssb tx with built-in psu, £25; capacitors, 4μF 5kV £2, 8μF 2·5kV £1; 53 set vfo unit £3; Multicore cable, various types. G30QT, QTHR, tel Medway 361567.

Eagle SE28 stereophns with 3-way jnctn box £8; 9V 500mA power unit £2.25. **Wanted** Calrad DM58HL mic and aerial rotator for vhf, also pair mic floor stands. Pickering, 19 Park Court Rd, Bridgend, Glam CF31 4BP, tel Bridgend 4251.

HW12A, hb, ac psu, spkr, 201 mic, £50; 4X150A £5; 4CX250B £9; TY2-125 £10; 829B £1; CV293, CVZ2198 £2; 807, 6V6G, 524GT, 5U4G, 6K6GT, 6X5G, 5Y3GT, 35p; field tel £5 pair; Collins atu £25; post paid. GM3BQA, QTHR, tel North Berwick 2519.

40290 vhf power transistors, equiv BLY33, £1.25 ea; p & p 5p, with brief data and circuit ideas. W. S. Poel, Littlecroft, Mill Hill, Brentwood, Essex.

BC624-C, 100-156MHz £8; rx R1147A £4; osc unit 76 £2.50; valve tstr type 4 £7.50; RF27 4m cnvrtr £2.50; scope CD568 £20; **Wanted** B44 and 12V dc at 20A psu. 91 Gallows Hill Lane, Abbots Langley, Watford, Herts, tel Kings Langley 64172.

HRO M 9 coils psu £19; fet rx, solid state, 550kHz-30MHz, UR-1A, £20; as new 240V/12V dc Garex 2m fet cnvrtr xtal & box £10, i.f. 28-30MHz; Eddystone 940 mint cond £100; **Wanted** Panda cub tx, G3FK, QTHR, 4 Brownsea Avenue, Corfe Mullen, Wimborne, Dorset, tel Broadstone 2631.

Penultimatic keyer with Vibroplex paddle £5; 30ft aluminium mast with fittings £3; electronic ign unit £4; folding 4m beam £1; *WW* from 1966, *Radio Communication* from 1954, few missing, offers. G3KAD, QTHR, tel Uxbridge 38467.

HW17A, 2m tx/rx, dc psu, £45 ono. **Wanted** KW2000 with psu, price around £100, or offer above rig in part exch. Johnston, Cliff Walls, Marine Parade, Penarth, Glam, tel Cardiff 709322 after 6pm.

Tx/rx No 62 (ex army) 1·5-10MHz, bfo, avc, int atu, and 12V dc pu, hdphns and mic, £8 inc carr. R. Mickleburgh, 25 St Mary's Street, Bungay, Suffolk.

Avo trnsistr analyzer, type TA, £25 ono; Taylor 100A test mtr, exc cond, £22. Misc valves E180F E88CC etc, sae for list. G8CMG, QTHR.

G2DAF tx plus similar rx in blue, Philpotts cabs, exc performance and appearance, both using Eddystone dials, mech fltrs and new xtals, also mtchg psu with speaker, nearest offer £90. G3UCE, QTHR, tel Heysham 51760.

Qubical quad, 3 bnd, £15; gd cond, ready for erection. G2MF, QTHR, tel Sheffield 360210.

Sphinx tx ssb 20, 80, 160 and delta control in gd order, £35. Tel evenings, 01-353 2620.

Electroniques HB166T mk II £12; 1·6 ssb, mkIII, £7; Avo model 40 £10; B41 rx £8; BC221, charts, psu, £12; TCS 12 tx £5. All working and in gd cond. G3ZER, QTHR, tel Northwood 22085, evenings.

Heathkit RAI, factory-built £25, buyer coll. R. G. Drennan, 214 Rochester Way, Bexley, Kent, tel 01-303 2492, after 7pm.

2m QQVO7-50 pa, 2xKT88 modulator with speech processor, in cab; Mains Variac 8A rated 4ft fibreglass dish; any rsnble offers accptd. **Wanted** Hi-Power 23cm varactor. Allen, "Rosswan" Dimmocks Lane, Sarratt, Rickmansworth, Herts, tel Kings Langley 62438.

HW30, no mods, £17.50; BC358Q rx not wkng, cct & spare valves, £3; record player amp new £3; **Wanted** HRO 28-30 bndsprd coil, sig gnrtr, GDO etc or other test gear. G8EHU, QTHR, tel 0283 790454.

Linear 10-80m full legal pair QVO8-100 £35; Jap Nuvistor GDO, new, £6; Pair bookshelf hi-fi spkrs £6; Stereo tape rcrdr, 4 track, transistorised, new, (cost £100), accept £35, buyer coll. Toby, 13 Wood Lane, Isleworth, Middx TW7EF, tel 01-727 5641.

Gonset all bands fixed stn or /M tx and rx, mic etc, perf cond, buyer coll, £40 for quick sale. Mr D. A. Austin, 46 Lane Walk, Clacton-on-Sea, Essex.

HRO with stab psu, spkr, £25; EC10 Mk I £35. G8ATA, QTHR.

KW Valiant, 160-10, 50W psu, wkg, needs some attn, £14 ono; one Codar Q-mult, new, without psu, £5. G3ZMT, QTHR, tel 021-327 0606.

TA33 Jr with 30ft h/d coax, weather-proofed, £20; FE3500 linear amp less than 1hr's use, rx in makers carton, 1500W. Offers. Both in perf cond, buyer coll or carr extra. GM3VXR, QTHR, tel Motherwell 65443.

R210 rx, cov 2 to 16MHz, 7 bands approx 2MHz ea, film-strip dial S-mtr, mech filter, a.m./ssb detectors, solid state cio, switched valve/semiconductor internal psu, £28, buyer coll. Smith, tel 01-778 3217.

B40C rx modified, B7G valves, silicon psu, aerial attenuator, S-mtr, ssb/a.m./cw, avc fast/slow, £25; Solartron CD568 5MHz scope £22; Heathkit V7A vvmtr £7; buyer coll. Smith, 01-778 3217, Sydenham, South London.

2 Solartron stab PSUs, 240V ac, 250/300V dc, 100mA + 6·3V ac o/p, £5 ea, pref buyer coll; 6 new ICP31 1¼in CRTs £2 ea, post free. Full data 25p. Quantity other elect comps, sae list. R. J. Caston, 22 Pentrepoeth Road, Bassaleg, Newport, Mon NP1 9LL.

ICS RAE Course £7; G3HSC morse course £2; TMK Model 200 multimeter £2; 4th ed *Radio Communication Handbook* £2; 3rd ed *Amateur Radio Techniques* 50p; also some good comps. Write for info, J. M. Scott, Howe Farm, Harray, Orkney, Scotland.

Eddystone 940 gen cov rx, 2 rf stages, S-mtr, mint, cond, £90; AR88LF, wrks well, £25. G3YBG, QTHR, tel Exeter 74607.

Inoue IC700 tx + rx + psu/spkr £100 ono. G3SZG, QTHR, tel Cricket Hill 025-123 6350 after 6pm or wknds.

R1155, not wkng, psu, £3; TE20 rf sig gnrtr £10; RF40 fld indctr £1; TMK 500 mltmtr £3; 10W amp £2; resistors, capacitors, knobs, swtchs, amps etc, £1 the lot, carr extra. J. Keymer, Kevockbank House, Lasswade, Midlothian, tel Lasswade 3205.

GEC RC410/R digital rx, open to offers; 2m tx psu, test equip including digital vmtr, tv monitors and much more must be sold to clear shack. Tel Baker, Yoxall 315 (nr Burton-on-Trent), Eastfields, Kings Bromley, Staffs.

Shack clearance Hallicrafters S27, Heath vtvm, sig gnrtr and other test equip, lots of bits & pieces including crt units for callers, but tel Yoxall 315 for appntmt. G8DLP, QTHR.

Sommerkamp FR200B & FL200B; Heathkit HW12A, complete ac & dc PSUs, /M whips etc. G3TUO, QTHR, tel Letchworth 71020 evng.

160m tx, 10W a.m./cw rough but wkg, £2; 17in tv, 405 lines, wkg, £2; above items buyer coll. Two ZM1020 num ind tubes, 80p ea G3ZMD, QTHR.

4m Nuvistor cnvrtr, tunes 29·0-29·7MHz, needs psu, £4.50; /M cnvrtr, amateur bands only, 80-10m, slide rule dial, o/p 1525kHz, 6 or 12V, valved, USA made, £8. G3NSM, 2 Park Town, Oxford.

Eddystone 840C £40; Pye Base F27 2m, mint, £35; Marconi Sig gnrtr Q/D051A 30kHz-100MHz, £20; Heathkit resistance capacity bridge £20; GDO GDIU coils £10; scope OS2, manual, £20; R1457 psu £10. G3KTA, QTHR.

Creed 7B teleprinter reperforator and tape reader with tapes and paper. G8BHD, QTHR, tel Dartford 20712.

Tiger TR100 a.m., cw, 120W, £30; Pye PTC 723-724 minus xtals for conv 4m, hndbk, tuning key, £20. G3ZSR, QTHR, tel Roxton 739.

RTTY Creed 7B 250V ac, many items also reperforator, power pack, rolls paper and tape service hndbk, all good gear £10 ono, buyer coll or will del by arrangement. G3PBU, 9 Hollin Drive, Chapel en le Frith, via Stockport, Cheshire.

Geloso 207DR double conversion rx, best offer over £10, will del by arrangement. G3PBU, 9 Hollin Drive, Chapel en le Frith, via Stockport, Cheshire.

100 pkts Silica Gel or Sorbsil, 2oz 6p, 4oz 10p, 8oz 15p, post 6p, absorbs moisture from atmosphere keeps eqpmnt dry. G3PBU, 9 Hollin Drive, Chapel en le Frith, via Stockport, Cheshire.

Pye Cambridge /M fully modified for 2m (rx tuneable over entire band), sae for details. G. A. Jeapes, 165 Cambridge Road, Great Shelford, Cambridge.

New Trio 9R59DS xtal calib, vltge stab, mtchg spkr, used under 4hrs, owner gone vhf, £38; Philips 4308, 4 track tape rcdr, mic, large spare reel tape, used once only, £40. Mansell, "The Jays", Glen Road, Oadby, Leics.

Eddystone 888A rx £60; Cannonball 160m ssb tx, with psu, £20; homebrew 10-80m tx, 100W cw, £10. Buyer coll. G3VWH, tel Shrewsbury 54683.

Hammarlund HQ180 £90; Emsac 2m cnvrtr £10; Trio hdphns £3; Nombrex 29X gnrtr with 898 dial, £12; RCA hdphns £1; 4 sets hdphns 50p ea; Copal 24hr clock £12; BC221 £10; homebrew prslctr £2; atu 50p; TA33 £20; 2m 6-el £1.50; auto rotator £15; Lafayette lab test mtr £15; Triplet sig gnrtr 100kHz-120MHz, £35; Codar PR30 £5; Heathkit VV17 £7; TF144G £10; AEI trnsstr tester £4; *Radio Communication Handbook* £2; *ARRL Hndbk* 50p; *Foundations of Wireless* 50p. Write to G8CZZ, QTHR, or tel 01-318 3595, evenings only. Callers strictly by appntmnt, or visit 14 Manor Park Parade, (Lee Radio), Lewisham, Saturday 0900-1600 only.

Marconi 1018 Electra, 250kHz-25MHz in five ranges, psu, Jap Stereo phns, manual. Offers welcome, del 30 miles, buyer must inspect at 66 Manor Ave, SE4.

Minimitter MR37 rx, gd cond, 80-10m, £15 ono; G3FIF/M aerial, 80/160m, £5; Airflow Developments blower, 240V ac, ideal lin etc, new, £3.50. GW3TMP, QTHR.

BC639A vhf rx £20; JXK mosfet 2m cnvrtr, 28-30 i.f., £12; JAP 2 stroke engine, suitable for gnrtr, £5; Pye Westminster, damaged, offers; Pye base stn, low band, offers. G3TON, QTHR, tel 021-354 8914.

Heathkit RA1 rx with homebrew xtal calbrtr, QPM16 Q-mult and manuals, vgc, £30. Buyer coll, (Chessington, Surrey). G3IMK, QTHR, tel 01-397 6924.

Panda Cub tx, 160-10, mods as per *SWM*, new vfo bias supply, extra smoothing. Offers, G2DGW, QTHR.

HRO complete with 14 coils bndsprd, 80, 40, 20, 10, also psu and Codar prslctr, £20, no offers. R. Gorton, 10 Ashley Drive South, St Ives, Ringwood, Hants, tel Ringwood 2273.

AR88D, hdphns, manual, spare valves, £35, buyer coll. 3 Vale View, Cefn Coed, Merthyr Tydfil, Glam, tel Merthyr 4508.

BRT400 comm rx, 150kHz to 33MHz, a.m. and fm dets, spare valves and hndbk, also Sentinel 2m cnvtr, i.f. 4-6MHz, buyer coll, £30. G8CGA, QTHR, tel Faulkland 432.

HP13A psu, factory tested but never used, mint cond, £25 inc carr. Hndbk provided. G3BNI, QTHR, tel 079-376 2703.

AR88D, trimming tools, manual, reqs attn, also spare valves-too heavy to lift for me; PR32 Town and Country rx, 3 bnds, suitable for spares. Buyers insp and coll, or pay carr, "Eleven" Swanton Drive, East Dereham, Norfolk.

Variac 8A, 230V, £5.50; Radiospares 500W double-wound isolating trnsfrmr, multi-tapped prim and sec, £5.50, both as new; 8μF, 2·5kV, oil filled capacitor, £1.50, carr extr. GM3JHL, QTHR, tel Fauldhouse 433.

Heathkit HW17A, A1 cond, i.f. amp added, rx exc, tx needs adjust. Offers or exch gd rx-888A, 750, AR88D etc or WHY. G8ESK, QTHR, tel Bradford 45611.

Codar AT5 mk2, £20; GEC xtal calbrtr £4, pref buyer coll. G3FZP, QTHR, tel 01-594 7874.

KW2000A, ac psu, mint, £140 ono, evenings, w/end. G3XRV, QTHR, 34 Stradling Ave, Weston-s-Mare.

Nombrex model 42 rf sig gen, 150kHz to 300MHz, perfect, £14 ono. **Wanted** cowlgill or prop pitch for TA33. G3UCQ, QTHR.

Absolutely everything needed for Super 2 × 813 lin, and psu, inc prof made cab, 4 new mtrs, silicon rectifiers, valves, high vltg comps etc; buyer coll this gift for £15. G3XER, QTHR, tel 658568.

R209 £15; No 19 sets £8, buyers coll; psu, 250V output, £4.50, carr extra; ICS school gear-sig gnrtr £4, mw valve rx £5; last 3 items homebrew, carr extra. Mr O.Walker, 63 Harbridge Ave, Rosehampton, London SW15 4HA, tel 789 0706.

Minimitter mobile tx, a.m./cw, 1·8/3·5/7, £12; B44 tx/rx, needs attntn, £2; 12V vibrator £3; 4m beam £3; all carr extra, offers for *CQ* 1965/8, *SWM* 1965/71, *Radio Communication* 1964/71. G3MWZ, 31 Fiskerton Road, Cherry Willingham, Lincoln, tel Lincoln 50530.

Pye base stn tx/rx, both six channel switching, tx modded 2m, in cab with control panel, exc cond, best offer secures. G3LDI, QTHR, tel Wymondham 3463.

Eddystone EA12, recently aligned by makers, electronically and mech to new specification, with manual, £125 ono; Squire Electronics 2m cnvtr, little used, i.f. 4–6MHz, £9; Sentinel 2m pre-amp, little used, £4.50. G3UKM, QTHR, tel 061-439 5756.

Mid-band boot mounting Pye 2207, will modify to 2m or 4m, 6–40 pa, with handbk but no control cables, £8; G4AEZ, QTHR, Oughton, 48 Morley Hill, Enfield, Middx.

Trio 9R59DS, absolutely as new, boxed with manual £40; can del rsnble dist. Boothroyd, 38 Ascot Ave, Cantley, Doncaster, tel 55756.

B & O mono tape recorder type 1100, mint cond, £45 ono, del arranged. G8CLH, QTHR, tel daytime Littlehampton, Sussex, 6161 ext 55.

Miniscope, GEC, £5; tx, R1154, £5; tx, 5AH(Navy), 1·5-12MHz, £5; psu (double), variable 0-300V, £5; rx, R209, £10; psu, (7B)GPO, 80-0-80, £2; psu teletype 2X115V ac/dc £5; rx APR-4, rf units, 38-90MHz, 300-1,000MHz, £54. J. Barry, 30 Tullimore Road, Mossley Hill, Liverpool L18 4PR, tel 051-724 4446.

9R59D + SP5D, various mods, 1m Cambridge, high band, ws sets + junk, PSUs RXs etc, **Wanted** in exch for above, KW 160m tx, AT5 tx, Osker power mtr, transistor gdo, Codar PR30X, rf preselector, why. P. Jenkins, 30 Gainsborough Road, North Finchley, London N12 8AG.

AR88D £36; Advance J1 osc £10; both exc with manual; Cintel television waveform monitor £8; VCR138 with screen £1.25; **Wanted** *Radio Laboratory Hndbk* 1 and 6, *Radio Cnstrctor* December 1962. Meek, 39 Horsebrook Lane, Brewood, Stafford, tel Brewood 850760.

CR100/2, gd cond but needs attention, £8; Pye Ranger 2107, boot mounting, with control box, £10; Pye Ranger 2007, dash mounting, £10; Cossor 6V tx/rx £3, buyer coll. Mr D. Pollington, 27 Stoke Ave, Hainault, Essex, tel 01-500 6922.

Codar mobile installation, AT5 tx, T28 rx, 12 M/S remote control unit, spkr, all mounted in wooden carrying box, F1F whip minus base, £29. G3XNN, QTHR. tel Luton 54594.

40W a.m./cw tx, 160-10m, £15; rtty perf type 44, £5; Creed 3X tape t/p 160V dc £7; **Wanted** auto tx. G3YKR, QTHR, tel Emsworth 5612.

Labgear design multi-band cw/tx, 80-10m, pa 2x807, with psu, any offers? Pye Ranger 2002 rx/tx for 4m conversion, gd cond, £5, buyers coll. G3XFB, QTHR.

WANTED

G2DAF amateur band rx, must be in rsnbl cond, please state price. Also exch Sentinel 2m cnvrtr, i.f. 4-5MHz, for same with i.f. 28-30MHz. Mr D. Johnson, 29 Chatburn Road, Clitheroe, Lancashire BB7 2AW.

TA33 & rotator in exch for 35mm slr camera, 500TL2 Mamiya Sekor with erc, elect flash, in orgnl packg, instrctns, new last Xmas, cost £75. G3MLP, QTHR.

R216 rx with psu, must be good wkg order, good but not unrealistic price paid. Ewert, Timber Stones, 35 Chisleshurst Road, Bickley, Bromley, Kent, tel 01-467 2156.

Urgently wanted SX28 cct or manual, good price paid. G8AHH, QTHR, tel 0803 27898 (reverse charges).

Pye Bantam, high band a.m. type, suitable for convrsn to 2m. GM8BKE, QTHR, tel 031 332 5913.

Manual or cct for Solartron D300 scope, circa 1952, also info on 1155 & mods. Will buy or borrow for photocopying. Thompson, 2 Seymour Close, East Molesey, Surrey, tel 01-979 5867.

Joymatch 4RF or LZ tuner. Exch Heath sig monitor for mint Hy-Gain 18AVT vertical. G3YYI, QTHR.

Manual for B41 rx, buy or borrow; also m/coil assembly for Weston Analyzer type E772. G2KJ, QTHR, tel Ashford 23619.

Buy, borrow manual and circ, also wanted dc psu, for KW2000. G4AED/G8D11, QTHR.

Several TU5 switches. GM3JHL, QTHR, tel Fauldhouse 433.

Newnes *Radio and TV Servicing*. G3KYM, QTHR, tel Henlow Camp 298.

Buy or borrow, hndbk for Drake 2B rx. Mr K. Long, YWCA, Fourth Ave, Harlow, Essex, tel Harlow 31146/7.

Absorption wvmtr Marconi 680A/4, handbk/diag, purchase/loan much appreciated. G8CLG, QTHR, tel 01-778 2739.

RAE correspondence course, also morse tuition records and morse key for swl to study for exam. E. W. Simpson, 2 Longmarsh View, Sutton-at-Hone, Dartford, Kent DA4 9DY, tel Farningham 2012.

Crystals, ¼in pin spacing, lf end 40 and 80m. G8UA, QTHR.

New licencee req rotator for 8-el Yagi swr and pwr mtr, also 2m tx/rx mains/batt. W. Edwards, 31 Marbles Way, Tadworth, Surrey, tel Burgh Heath 56495.

Home built Cornishman ssb 160-10m tx, full details pse, particularly regarding cond, and xtal freq, also Eddystone late EC10 mk1 in gd cond, all letters answered. GM3JHL, QTHR, tel Fauldhouse 433.

TW2 tx, twomobile rx, psu (mobile 12V, pos earth) or self-contained TW Twomobile tx/rx. G3IXO, 13 Beech Rd, Shipham, Winscombe, Somerset, tel Winscombe 2360.

High bnd base stn for club use, a.m. or fm, 30W plus, wkng cond; also similar f.m. eqpmnt suitable 2m Beacon service, local or remote control. Des Walsh, EISCD, Ballylynch, Carrick-on-Suir, Eire.

Your help urgently, manual/circuit/info on Admiralty rx 100339 made by Rees Mace Marine Ltd, your price paid. G3ESB, QTHR, tel Derby 671536.

B2 tx with or without coils. G3LYU, QTHR.

Urgent, manuals for Pye Westminster tx/rx, both fm and a.m. types. R. Perzyna, 26 Cranbrook Road, London SE8 4EH.

1,000-2,000μH and 500-1,000μH slug-tuned coils for Q-mult, from ARRL hndbk 1965. M. Bolton, 6 Waterford Common, Waterford, Nr Hertford, Herts, tel Hertford 4327.

Breadboard radio comps of early 1930s, partic by Telsen, rsnble price paid for comps or complete sets in good cond. Pse write with details, all letters answered. GW8AMJ, QTHR.

Graticule assembly for Solartron CD523-S scope; video eqpt esp videcons; 4CX250Bs and blower assembly to suit; cheap eg Japanese mltmtr; cassette rcrdr in gd cond. G4AQR, Oscar, Dorian Grove, Alresford, Hants.

Buy or borrow manual for Solartron scope CD568. G. Mailer, 22 Manland Ave, Harpenden, Herts, tel Harpenden 60375.

Hndbk for FT-100 or info and cct for re-alignment. G3TBS, QTHR.

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.

SOLID STATE MODULES

63 Woodhead Road, Solid, Lockwood, Huddersfield, HD4 6ER. *Telephone 23991*

SEE YOU AT GRANBY HALLS, LEICESTER

SPECIFICATION COVERING ALL OUR V.H.F. CONVERTERS

★ Noise figure 2dB. Gain 30dB.
★ Dual gate MOSFETS in RF and mixers for excellent overload and cross modulation characteristics.
★ All housed in aluminium cases, stove enamelled silver hammer with black trim.

THE SENTINEL M.F.

Primarily for mobile use with a car radio but ideal for use with any B.C. receiver with an aerial socket. I.F. output 0·5–1·5MHz it covers 144MHz to 146MHz in two switched bands with a third position for "OFF" with the MW aerial switched straight through. Double conversion design with no oscillator multiplication. Size 5" × 1½" front panel 4" deep. 12V operation polarity unimportant. Price: **£18.75**

THE SENTINEL 2 METRE AND 4 METRE DUAL GATE MOSFET CONVERTERS

By far the most popular converter, stock IFs for 2 metres:
2-4MHz, 4-6MHz, 9-11MHz, 14-16MHz, 18-20MHz, 23-25MHz, 24-26MHz, 28-30MHz, 27·7-29·7MHz, for receivers that only tune up to 29·7MHz.
4 metre IFs: 4-4·7MHz, 25-25.7MHz, 28-28·7MHz.
PLEASE NOTE that we have started using the circuit we developed for the Sentinel M.F. in our low IF Sentinels (2-4MHz and 4-6MHz) i.e. they are now double conversion.
Size: 2½" × 3" × 1½" except 2-4MHz and 4-6MHz, 2½" × 4" × 1½".
Price: **£13.75.**

THE SENTINEL X DUAL GATE MOSFET 2 METRE CONVERTER

This new 2 metre converter is a de luxe version of our well established Sentinel converter. Contains internal mains power supplier but can be used with external batteries. It features an RF gain control to reduce cross modulation and overload of the main receiver and may be switched between mains and battery. Size 5" × 1½", front panel 4½" deep. It uses fundamental crystals on the required frequency i.e. no multiplication. IFs from stock 28-30MHz and 4-6MHz. Price **£19.50** including P.S.U

Want to pep up your present 2 metre receiver?

THE SENTINEL LOW NOISE FET 2 METRE PRE-AMPLIFIER

★ Low noise figure 1dB. Transistors selected for low noise figure.
★ Gain 18dB. 12V D.C. at 5mA. Isolated supply lines.
★ Very good for bringing converted Business gear up to scratch. Also helps with I.F. breakthrough by increasing the wanted 2 metre signals. Price: **£6.50.**

Want to receive 70cms cheaply but well?

SM70 70CM FET CONVERTER

★ Low noise figure 4·5dB.
★ IF output 144-146MHz. By using the 70cm converter with a 2 metre converter you can have a high performance 70cm unit at a low price—**£13.75.**

THE SPITFIRE 2 METRE A.M. TRANSMITTER AND MODULATOR

★ 5 watts input. At least 2 watts output. 12 volts operation.
★ Modulation wave shaping gives good, clean 100% audio.
★ Audio monitoring point for headphones.
★ Size: 4½" × 2½" × 5½".
★ Front panel meter indicates RF output and modulation. Price: **£22.00.**
★ The Spitfire Modulator is the same size and appearance as the transmitter.
★ 100% modulates our transmitter. Price: **£10.00.**

SOLID STATE 9MHZ SSB GENERATOR

★ Selectable USB, LSB and CW.
★ 0·2 volts into 80 Ohms.
★ Sideband suppression 45dB. Carrier suppression 50dB.
★ A sound basis for your SSB transmitter.
★ Price: **£11.00** less filter and carrier crystals.

KVG 9MHz crystal filters. XF-9A SSB **£11.00**. XF-9B SSB **£15.00**. XF-9C 3·75KHz AM **£15.00**. XF-9D 5KHz AM **£15.00**. XF-9M 0·5KHz **£11.50**. XF-9E FM **£15.00**. Carrier crystals **£1.50** each.

T.B.C.1. CONVERTS TOP BAND TO MEDIUM WAVE

★ Internal battery—switches straight through when OFF. Ideal for car radio use when mobile. Price: **£7.50.**

YAESU MUSEN FROM STOCK

FT101 **£249**, plus top band **£255**. FT200 Transceiver **£134**. AC supply **£38**. FT401. Transceiver **£230**. FR400 Super de Luxe receiver **£160**. Loudspeaker unti **£10.00.** This we offer with service facilities at our premises—often carried out whilst you wait as we do with our own equipment.

SECONDHAND GEAR

KW202 as new, **£115**. KW2000 plus AC and DC PSU, **£125.00.**
ICs and other components listed below:
SL610, 11, 12, **£1.85**. SL620, 21 **£2.55**. SL630 **£1.70**. SL640, 41, **£3.40**. Erie discoidal feed throughs, **6p** each, 55p per doz. Tubular ceramic trimmers 6pF, **12p** each, **£1.20** per doz. 18pF. **17.5p** each, **£1.80** per doz.

We believe that all units and components advertised will be ex-stock, but you can always ring for confirmation.

GAREX

TWOMOBILE AM/FM Tx-Rx

TX. Transistor crystal osc & multipliers. YL1080 driver YL1080 P.A., output. No standby current. FM or AM at a flick of a switch. 3 position crystal selection. Spot check facility.

RX. Fully transistorized Tuneable covering 144 to 146MHz. Sensitivity 1.0 microvolt emf in. for 500mw audio out. S/noise ratio 10dB or greater for 1 microvolt input. Audio output stage to drive external speaker. Double superhet 2 RF amplifiers. FET first mixer. 1st IF 10.7 MHz. 2nd IF 455kHz. Crystal controlled second FET mixer stage. 6kHz bandwidth. 29 Transistors plus 6 diodes. Neg. or pos. earth. Directly calibrated dial. Squelch. Size 12 × 4½ × 8" deep.

Delivery 7-10 days. Price **£105.45** complete, inc. 1 crystal, & PSU built in, for 12V DC input.

TWOMETRE TRANSMITTER RECEIVER AM

Complete with 12V DC mobile power supply unit built into one case 12"w × 4½"h × 8" deep. *Rx* Fully transistorized covering the full 2 metre band. Built in noise limiter. Bandwidth 6kHz.

Tx 8MHz 6BH6-6BH6-QQVO3-10-QQVO3-10. Fully transistorized modulator with compression.

Complete with P.T.T. mike, 28 Transistors, 10 diodes 4 valve. **£88**
Four metre Model **£88**

MARINE BAND. VHF radiotelephones, complete with battery and microphone/speaker. Crystals extra and subject to normal delivery periods. Size 4 × 13 × 21cm. Weight 1.4 kg. nom. Model GX1 type approved **£88** ex stock. Credit facilities now available on Transmitter receivers etc.

CHINNOR, OXON 0X9 4BT
Telephone Kingston Blount 51476 (0844)

BURNS ELECTRONICS

TONE BURST GENERATOR TBG-1

Featured in July 72 RADCOM (p. 422) this unit provides a keyed AF tone for modulating an FM Tx to gain access to a repeater system. Kit includes all components, fibre-glass PC board with layout ident and an instruction manual.

Kit **£4.70**
Assembled and tested **£5.70**

MOSFET CONVERTER FS2/FS4 144/70 MHz

New design converter with MOSFET RF stage and Schottky Barrier diode mixer provides low noise figure and good strong signal handling performance. Noise figure typically 3/5dB and gain 15dB. DC supply is 9-12v DC and is internally isolated from converter base. *Price* **£18.00**

MULTIVERTER MC3

A package of VHF/UHF converters with a common IF output for 432/144/70MHz or HF bands as required. 1-3 converters may be fitted. Direct "thro" facility fitted as standard. Basic unit is for 9-12v DC operation but an optional internal mains PSU is available.

Price Basic frame is **£6.50** plus "less case" cost of each converter. Mains PSU **£3.00** extra.

Plus of course our well established range of test equipment and communications modules:

Crystal Calibrator CC-10 Mk III	**£25.30**
Wavemeter TC-101	**£18.30**
Frequency Standard SD-11	**£78.00**
FET Converter FC2/FC4	**£16.20**
Low Pass Filter FL2/FL4	**£6.20**
Test Oscillator TO-701	**£10.00**
FM Detector FMD-1	Kit **£6.70**
	Made and tested **£8.20**

For further details on these equipments and our new comprehensive component catalogue send 10p or cash with order to:

BURNS ELECTRONICS
THE COTTAGE, 35 BEULAH HILL, LONDON, SE19 3LR

MARKHAM ELECTRONICS

Technical G3FPQ

YAESU TRANSCEIVERS

Sales XYL

All brand new — and available ex. stock — Delivery by Securicor £3.00— 12 months guarantee (excluding valves and semi-conductors) — unbeatable value — our prices and H.P. Terms are the lowest available.

All units fully checked out prior to Sale

COMPARE OUR PRICES!

FT101:—Ultra modern complete station—260w P.E.P 10–80 metres input. Fully transistorised save for driver and P.A. complete with microphone and built-in speaker **£230**

FT200:—(Less P.S.U.) 260w P.E.P input. All usual operating facilities such as selectable USB/LSB, VOX, 100kHz calibrator, clarifier ± 5kHz are included. A modern transceiver with YAESU quality. Only **£120**

FP200:—A/C power supply and speaker unit for FT200 **£38**

FTDX400:—560w P.E.P. input. Similar to FTDX560 but no W.W.V. band and no provision for C.W. filter. Limited number only. **£160**

FTDX560:—560w P.E.P. input. W.W.V. band and provision for installing C.W. filter, selectable USB/LSB, VOX, 25/100kHz calibrator, clarifier ± 5kHz, A.N.L. and A/C power supply all built in. **£180**

FTDX401:—As FTDX560 plus built in P.A. cooling fan, C.W. filter and sensational new noise blanker unit. **£215**

FTDX400, FTDX560 and FTDX401 are all variations on the same basic design and represent unbeatable value for a high quality 560w P.E.P. transceiver with built in A/C P.S.U.

Equipment may be viewed by appointment

MARKHAM OAK, BUCKS HORN OAK, FARNHAM, SURREY

Tel. Bentley (Hants) 3168 (evenings)

G2CTV G3ZY

J. & A. TWEEDY (ELECTRONIC SUPPLIES) LTD.

Member Amateur Radio Retailers Association

YAESU MUSEN: FT101 latest model factory fitted top band, **£255**. FT200 with ac supply **£172**; FT401 **£230**; FRdx400 **£160**; FLdx400 **£146**; FL2000B **£148**; FR50B **£59**; FL50B **£58**; FT75 **£99**; FP75 **£22.50**; DC75 **£22.50**; YC305D **£111**; FT2F **£84**; FT-2 AUTO **£146**.

TRIO 9R59DS **£49.50**; JR310 **£75**; JR599 **£185**; TX599 **£185**; TS/PS 515 **£210**; TL911 **£140**; TR2200 **£62.50**; SP5D Loudspeakers **£4.50**.

KW KW107 **£40**; KW Eezee Match **£15**; Baluns **£1.95**; KW trap dipole **£15**; Trap dipole with twin feeder **£14**.

AERIALS: Mosley, J-Beam, Hy-Gain verticals, Tavasu mobile, G Whips. Telomasts.

Caslon clocks: Copal 601 **£13.75**; Copal 222 **£6.65**; Copal 101 **£8.80**; Copal 602 **£10.50** post free.

Boom mikes Model C Ceramics **£4.95**. Model X Crystal **£4.60**.

USED EQUIPMENT KW2000 B mint £170; KW500 linear **£48**; FT150 **£160**; AR88D **£35**.

OPEN TUESDAY TO SATURDAY, 9am to 5.30pm.

H.P. terms available *Part exchanges*

64 LORDSMILL STREET,
CHESTERFIELD, DERBYS S41 7RS

Tel: Chesterfield 4982 or 68005 Evenings

G. W. M. RADIO LTD.

METERS. Square 2½" 0-1ma scaled 0-50, £1 post paid. Marconi CRO Acceptor units ED7/544ED. A 2·5 to 25 Mc/s in four ranges. CRO input capacity 7–80pF. £1 post paid. New handsets with press to talk switch, £1.50 post paid. 2½" brown ceramic aerial insulators, 4 for 65p post paid. **DUBILIER NITROGOL** 2uF, 5000V at 70 degrees C, £2 post paid. **NEW VALVE KITS.** 1S5, 2 × 1T4, 6C4, 6BW6, £1.10 post paid. **NIXIE** tube bases, 13 pin, 6 for 35p post paid. Moving coil microphones No. 13 with Plessey plug for B44, 60p post paid.

Labgear LTA6 remote tuned Aerials. 11' 6" whip, for 24v DC operation. Complete with control box. Covers 2-15 Mc/s. Made for LSM100P TxRx. Has very solid base with springs and shock absorbers. £27.50 carriage paid.

New **SPEAKERS** 3½" 15 ohm, 75p post paid. High Wattage dummy load resistors Le Carbonne 50 ohms, 75p post paid.

METERS. 500 microamp calibrated 0–1·4 kilowatts. Oblong 1½" × 1½". Ernest Turner. Also same make and specification but just over 3" square, either type, new and boxed, £1.25 post paid.

RESLOSOUND Broadcasting Ribbon Microphones type VRT/M. 300ohms. As new, **£12.50 post paid. AVO meters model 7, fully tested all ranges, £14.50 post paid.**

REED RELAY INSERTS. Overall length 1·85" (body length 1·1"), Diameter 0·14", single pole normally off. To switch up to 500ma at up to 250V. D.C. 63p per doz., £3.75 per 100, £27.50 per 1000, all post paid.

MINIATURE OSCILLOSCOPES CT52. 200/250V A.C. Time base 10 C/s to 50 K/cs. Complete in steel carrying case, £21 carriage paid.

PYE MARINE Ship Transmitters. 1.5 to 16 M/cs. VFO or crystal. 40W RT or CW. Valves, PA 35B/254M in parallel, MOD pair 5B/254M. Two panel meters. Size 13" × 15" × 14" Calibrated dial. Complete and clean, not tested. No power supply. £11 carriage paid. Similar unit by Murphy, 13" × 13" × 14" has vernier dial same price.

All receivers and Test Equipment are in working order at time of despatch. Carriage charges are for England and Wales only.

Telephone 34897

Terms: Cash with order. Early closing Wednesday

G. W. M. RADIO LTD.

40-42 PORTLAND ROAD, WORTHING, SUSSEX

THE SENATOR CRYSTAL BANK

G3UGY **CRYSTALS FROM STOCK AT KEEN PRICES** **Phone 01-769 1639**

SENATOR CRYSTALS: the first place to contact when you need good crystals quickly.

Here are just a few of the popular frequencies actually in STOCK now:

kHz		MHz	
100 in HC13/U	£2·50	25·000 in HC6/U	£1·60
454 in HC6/U	£1·75	26·500 in HC18/U *	£1·60
455 in HC6/U	£1·75	28·045 in HC25/U	£1·60
456 in HC6/U	£1·75	28·500 in HC25/U	£1·60
500 in HC6/U	£1·75	30·000 in HC6/U	£1·60
		32·500 in HC18/U *	£1·60
		34·000 in HC18/U *	£1·60
MHz		34·500 in HC18/U *	£1·60
1·000 in HC6/U	£1·75	35·000 in HC18/U *	£1·75
2·000 in HC6/U	£1·60	35·500 in HC18/U *	£1·75
3·500 in HC6/U	£1·75	38·666 in HC18/U *	£1·35
5·000 in HC25/U *	£1·60	40·000 in HC18/U *	£1·60
7·000 in HC6/U	£1·50	42·000 in HC18/U *	£1·60
7·520 in HC25/U	£1.80	70·000 in HC18/U *	£2·00
7·755 in HC6/U	£1.80	71·000 in HC18/U *	£2·00
9·000 in HC6/U	£1·50	72·050 in HC18/U *	£1·75
10·000 in HC6/U	£1·50	72·425 in HC18/U *	£1·75
10·245 in HC25/U	£1.60	72·500 in HC25/U *	£1·75
11·000 in HC6/U	£1·50	72·525 in HC18/U *	£1·75
19·500 in HC6/U	£1·60	96·000 in HC6/U	£2.00
24·500 in HC18/U	£1·60	116.000 in HC18/U	£2.80

*= Also in HC6/U

And here's our STOCK range of BRAND NEW HC6/U 8 MHz for 2M:
8·002 8·007 8·012 8·018 8·021 8·0266 8·032 8·041 8·043 8·047 8·048 8·0555 8·058 8·061 8·070 8·081 8·092 8·100 8·104 8·107

All at **£1·25** each, post free.

The following frequencies may be suitable for your PYE Cambridge, Ranger, Vanguard, etc., etc. Check up with crystal multiplication data and crystal spec., in equipment manuals for suitability.

8·0555 MHz in HC6/U for TX × 18 = 145·000 MHz 2M Mobile **£1·25**
44·7666 MHz in HC6/U for RX × 3 + 10·7 MHz = 145·000 MHz 2M Mobile **£1·80**
8·100 MHz in HC6/U for TX × 18 = 145·800 MHz for RAEN **£1·25**
45·0333 MHz in HC6/U for RX × 3 + 10·7 MHz = 145·800 MHz for RAEN **£1·80**
12·975 MHz in HC6/U for RX × 12 — 10·7 MHz = 145·000 MHz 2M Mobile **£1·60**
11·1916 MHz in HC6/U for RX × 12 + 10·7 MHz = 145·000 MHz 2M Mobile **£1·60**
12·0833 MHz in HC6/U for TX × 12 = 145·000 MHz 2M Mobile **£1·60**
8·7825 MHz in HC6/U for TX × 8 = 70·260 MHz 4M Mobile **£1·60**
29·780 MHz in HC6/U for RX × 2 + 10·7 MHz = 70·260 MHz 4M Mobile **£1·65**
6·74666 MHz in HC6/U for RX × 12 — 10·7MHz = 70·260 MHz 4M Mobile **£1·60**
11·710 MHz in HC6/U or TX × 6 = 70·260 MHz 4M Mobile **£1·60**

NEW FREQUENCIES FOR POPULAR CHANNELS:

44·593333 MHz in HC6/U for RX × 3 + 10·7 MHz = 144·480 MHz F.M. Channel **£1·80**
45·016667 MHz in HC6/U for RX × 3 + 10·7 MHz = 145·750 MHz Repeater out **£1·80**
8·063888 MHz in HC6/U for TX × 18 = 145·150 MHz Repeater In **£1·65**
4·031944 MHz in HC6/U for TX × 36 = 145·150 MHz Repeater In **£1·65**
4·027777 MHz in HC6/U for TX × 36 = 145·000 MHz Mobile **£1·65**
4·013333 MHz in HC6/U for TX × 36 = 144·480 MHz F.M. Channel **£1·65**

NEW FREQUENCIES now available:

1·6202 MHz and 1·6184 MHz in HC6/U (spacing 1·8 kHz) at .. **£1·80** each.
33·6666 MHz in HC6/U .. **£1.60**
43·3333 MHz in HC18/U .. **£1.70**
46·6666 MHz in HC18/U .. **£1.70**
47·3333 MHz in HC18/U .. **£1.70**
48·3333 MHz in HC18/U .. **£1.70**
58·000 MHz in HC18/U .. **£1.70**
10·866667 MHz and 9·975 MHz in HC6/U (TX/RX crystals for glider channel 130·400 MHz at .. .. *each* **£1.70**

Prices for specially manufactured SENATOR Crystals are as follows (made to Ministry of Defence Standards):

50—149·9	kHz in HC13/U	£4·60
150—499	kHz in HC6/U	£3·85
450—500	kHz in HC6/U	£3·50
501—999	kHz in HC1/U	£4·50
1·000— 1·39	MHz in HC6/U	£3·20
1·40 — 20·00	MHz in HC6/U (18/U & 25/U over 5 MHz)	£2·00
20·00 — 59·99	MHz in HC6/U; HC18/U; HC25/U	£2·25
60.00 — 79·99	MHz in HC6/U; HC18/U; HC25/U	£2·50
80·00 —114·00	MHz in HC6/U; HC18/U HC25/U	£3·00
114·00 —140·99	MHz in HC6/U; HC18/U; HC25/U	£7·00
141·00 —175·99	MHz in HC6/U; HC18/U; HC25/U	£8·75
176·00 —200·00	MHz in HC6/U; HC18/U; HC25/U	£12·00

Mail Order SENATOR CRYSTALS Dept. Q.C., 36 Valleyfield Road, SW16 2HR

VHF/UHF POWER TRANSISTORS!

All devices Top grade, Brand new, Fully guaranteed

	Price	Po(min)	Pin	Freq.	Supply	Case
ZTX327	£0.40	350mW	80mW	400MHz	12V	E-Line
2N3375	£4.61	3W	1W	400MHz	28V	TO-60
		7·5W	1W	100MHz	28V	
2N3553	£1.10	2·5W	0·25W	175MHz	28V	TO–39
2N3632	£5.57	13·5W	3·5W	175MHz	28V	TO–60
2N3733	£6.73	14·5W	4W	260MHz	28V	TO-60
		10W	4W	400MHz	28V	
2N3866	£0.60	1W	0·1W	400MHz	28V	TO-39
2N4040	£9.33	8W	3W	400MHz	28V	Capstan Stripline
2N4041	£5.33	3·3W	1W	400MHz	28V	
2N4127	£8.00	13·5W	2·5W	175MHz	28V	
2N4128	£12.00	24W	6W	175MHz	28V	
2N4427	£0.75	1W	0·1W	175MHz	12V	TO–39

Postage & packing 10p. Free over £2.00. Data sheet with every device. Full range of FERRANTI semiconductors available. SAE for list.
Ferranti R.F. power Transistor Application Report 10p each post free.

DAVIAN ELECTRONICS, P.O BOX 38, OLDHAM, LANCS.

TRAMPUS ELECTRONIX (VHF)

ALL BRAND NEW, MONEY BACK GUARANTEED, DISCOUNT 10 + 10%
DIODES—ZENERS 400mW 12p. 1A RECTIFIERS 50V 5p. 400V 9p. IN 914/916 7p. OA200/202 7p. OA81/91 7p. **ULTRASONIC TRANSDUCERS,** transmit/receive **£2**
NUMERICAL INDICATORS. 5V 0-9DP & Socket **£1.49** NIXIE type **£1.15**
TRANSISTORS—FET 2N3819 **29p.** BC107, BC108, BC109 NPN 150MHz all **8p.** AF139 **45p.** BC177/8 PNP 200MHz **12p.** BCY70 **18p.** OC35 **59p.** OC171 **31p.** ZTX 108 350MHz **15p.** ZTX320 NPN 600MHz **49p.** 2N706A **12p.** 2N708 **23p.** 2N918 **45p.** 2N2369 500MHz **21p.** 2N3053 **19p.** 2N3055 **44p.** 2N3826 **29p.** Antex 15W Solder Iron **£1.70.**
VHF/UHF RF POWER TRANSISTORS with data. V = VCE. W = PO.
2N3866 1W 30V 450MHz **68p.** 2N4427 1W 20V 200MHz **68p.**
2N3553 2·5W 40V 350MHz **£1.40** 2N3375 3W/500MHz, 6W/145MHz **£5.49**
2N3924 4W 18V 250MHz **£3.99.** 2N3632 13·5W 40V 250MHz **£6.99.**
Resistors ¼W 5% **1½p.** Capacitors 15V, 5, 10, 30, 50, 100uf **6p.** 1000uf 18V **25p.**
INTEGRATED CIRCUITS. TTL 74N range, data booklet **12p.** DIL SOCKETS **12p.** 7400 gates etc **16p.** Flipflops from **29p.** 7441 Driver **87p.** 7490/92 Counters **73p.** Freq Counter circuit **15p.** Digital Clock Circuit 8p. TAD 100/110 IC Rx **£1.75.** Booklet **15p.** 703 RF amp **65p.** 3·5W AF amp **£1.49.** OP AMPS 709 **25p.** 710 **45p.** 741 **35p.** 748 **59p** SL600 available, data **9p** ea. Telescopic Aerials **80p.** Vernie, Dial **97p.** Meter 1mA **£2.** Red Neons 240V **18p.** Wire 25yd **16p.** DIN connectors Plugs **13p.** Sockets **11p.** Knobs **6p.** Coilformers ½"/⅝" **7p.** Trimmers **30pf** or **50pf 9p.**
TEST METERS. DVM **£44.** SANWA JP5D **£6.30.** C1000 **£1.69**
C.W.O. Post & P. 7p. CATA LIST FREE SAE. DATA SHEETS 6p. each.
P.O. BOX 29, BRACKNELL, BERKS.

P. & P. DEVELOPMENTS

Tel: Havant 72657 — Tel: Cosham 74695

Shop hours — Eve/Weekends

PYE CAMBRIDGE High Band AM good condition .... **£35** carr. £1

PYE CAMBRIDGE BASE STATION standard high band AM10D but fitted with detachable mains psu .... **£45** carr. £1

STORNO high band FM mobile tx/rx ideal for marine use. Complete with all accessories. Size 13" × 8" × 3".. **£22.50** carr. £1.25

COSSOR low band AM base station convertible to 12½kHz good condition ..... **£27.50** carr. £2

COSSOR low band AM mobiles QQVO3-20A in final similar construction to Pye Vanguard, all accessories, few only to clear bargain at ..... **£20** carr. £1.50

GEC COURIERS low band FM personal RT's ..... **£18** carr. 75p

GEC LOW BAND BASE STATION brand new FM tx/rx complete with internal psu. QQVO3-20A in final bargain ..... **£30** carr. £2

PYE high band FM tx/rx base station 16 channel. Ideal for new FM calling channels. QQVO6-40A in final .... **£32** carr. £2

HUDSON low band AM base station complete ..... **£25** carr. £1.75

STORNO CQM13C 12 volt FM mobiles complete with cables and accessories. High band size 18" × 11" × 5" approx. ..... **£17.75** carr. £1.25

REDIFON QR286A this unit contains two separate tx/rx's. High band AM, and 28 channel high band FM. The unit comes complete with all accessories, including control box for remote operation if required. Good working order. **£45** carr. £2

TRANSMITTER INVERTER PSU's

24V dc input 425V dc @ 125 watts output ..... **£4.25** carr. 50p
24V dc input 600V dc @ 125 watts output ..... **£4.50** carr. 50p
12V dc input 600V dc @ 125 watts output ..... **£4.50** carr. 50p

MICROPHONES, INSERTS, RELAYS as per previous advertisement.

VHF FIBRE GLASS WHIP AERIALS ideal for cutting to ¼ wave on 2m.

MARCONI ELECTRA up to 24MHz with bandspread etc. Mains psu included ..... **£25** carr. £2

HF VFO/PA 2 × 4 × 150A 2.1—18MHz complete with chimney and blower ..... **£12** carr. £1.50

HAZARD WARNING LIGHTS amber rotating 12-24V.. **£5** carr. 50p

Eagle equipment send large SAE for cat. Trade enquiries welcome. Terms of business: Mail order only, CWO, min order **25p.** Carriage prices for delivery outside England and Wales will be extra. Viewing of equipment by appointment.

P. & P. DEVELOPMENTS

19 LONE VALLEY, WIDLEY, PORTSMOUTH, HANTS.

LM373/380 ICs for RECEIVERS

Type LM373—AM/FM/SSB IF AMP/DETECTOR

★ Applications—IF/Detector/AGC strip for AM, SSB/CW or FM receivers; synchronous detectors; double conversion IF strips; balanced modulators. Frequency range up to 30MHz.
★ Minimum number of external components. ★ Single +12 volt supply.
★ Audio output compatible with LM380 (see below)

Type LM380—2 WATT AUDIO POWER AMPLIFIER

★ A complete AF output stage with as few as two external components.
★ 8Ω output and 150kΩ input impedances. ★ +8 to +22 volt supply.
★ Low quiescent power drain.

These devices are brand new, marked types from National Semiconductor Corp. Data and application sheets available.
Reviews are appearing currently in the Amateur Press.

Prices: LM373 £1.90 each; LM380 £1.30 each.
10% off 10 or more units.

IAN S. PARTRIDGE, G3PRR
71 Eskdale Ave, Chesham, Buckinghamshire

Q MULTIPLIER COILS

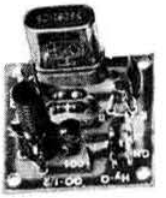
HIGH EFFICIENCY POT CORES. Any frequency in the range 50KHz-2mHz. Other frequencies to order. **50p** each plus 5p p & p. State frequency and whether printed circuit or single hole mounting required. Overseas Enquiries invited.

R. STOREY, G3LBT
145 THE KNARES, BASILDON, ESSEX

Hy-Q Electronics

CRYSTAL OSCILLATORS & FREQUENCY MARKER KITS

for the Amateur and Professional . . .



OSCILLATOR KITS

QO-1: 3MHz to 20MHz.
QO-2: 20MHz to 60MHz.

Input: 4V to 9V DC, 20 mA.
Output: 200mV on 50 ohms.

KITLESS CRYSTAL: £2.80 including Reg. Airmail.

20ppm CRYSTALS if ordered with Kit:
Fundamental (QO-1) £2.10
3rd O/T (QO-2) £2.50

FREQUENCY MARKER KIT QO-3

Output: 1 MHz., 500 kHz., 100 kHz., 25 kHz. } 1V.P/P.
Input: 9V. DC, 25 mA.
Stability: Typically within 3 ppm.
Accuracy: Adjustable against WWV to within 1 ppm.

KIT INCL. CRYSTAL: £7.50 incl. Reg. Airmail
ASSEMBLED UNIT: £8.50 incl. Reg. Airmail

AGENT ENQUIRIES INVITED

Hy-Q **Electronics Pty. Ltd.**

Hy-Q Electronics Pty. Ltd
P.O. Box 256, Frankston, Vic., Aust., 3199.
Telex: AA31630. Cables: Hyque Melbourne.

Hy-Q Electronics International (Pte.) Ltd.,
P.O. Box 29, Pasir, Panjang. Singapore, 5.

CLASSIFIED ADVERTISEMENTS

RATES: Display: £4 single column inch.
Private advertisements: 5p per word, minimum charge £1.
Trade advertisements: 10p per word, minimum charge £1.
Box number fee 15p extra.
Please write clearly. No responsibility can be accepted for errors.
Last date for acceptance - 10th of preceeding month.

Post (With Remittance) to;
RADIO SOCIETY of GREAT BRITAIN,
35 DOUGHTY STREET, LONDON WC1N 2AE.

FOR SALE

COLLINS KWM-2 TRANSCEIVER, with matching 516F-2 PSU, plus 62S-1 VHF Transceiver for 2 (and 6) metres. The 62S-1 (which is mint and virtually unused) provides 1-2 microvolt receiver sensitivity and 160 watts input SSB or CW, when used with any transceiver or TX/RX combination covering 14·0 to 14·2 Mc/s. Package deal, with all cables and manuals, £600—might split. Contact G3HCM, 14 Compton Court, Long Compton, Warwickshire (Tel: 669).

QSL CARDS. Good selection TX and SWL. SAE samples. Bailey & Co., 35 Whitecross Road Rear, Weston-super-Mare.

QSL CARDS. GPO approved log books, prompt delivery. Sample 4p stamp Atkinson Bros., Printers, Looe, Cornwall, PL13 1LA.

QSL CARDS: 1,000 from £2.98. SAE samples. Ara Press, 46 Moat Avenue, Coventry.

QSL CARDS: for TX, G8, SWL. One to four colour designs. Large SAE for samples. Good selection. Printon Printers (R/Rose) 105, Fleetwood Street, Preston, Lancs.

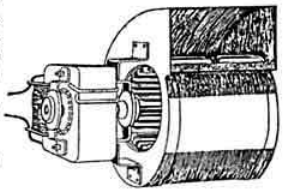
CRYSTALS FT243. 5750—6900, 7150—7900—8625 in 25kHz steps. **25p** each. 5 for **£1.12** post 7p. As stocks are getting low please state alternatives.

40 ASSORTED CRYSTALS including 241A types. **£1.00,** post and packing 27p.

R.F. METERS. 2" round, in following range 250, 350, MA and 1 amp, **62p** each, post 15p. 4 Meters for **£2.20,** post and packing, 30p.

BLOWERS: 240 volt AC shaded pole "Mycalex" motor, continuous rated very silent. Double air intake, single output of about 45 C.F.M. overall size 4¼" × 4¼" × 5¼". Ideal for cooling equipment. etc. Brand new. Our price owing to large purchase. **£2.25.** post 28p. 2 for **£4.25.** post. 40p.

OSCILLATOR UNIT No 784 for R1933A receiver. 3 valves EF91. 7 miniature wire ended crystals, 2 ceramic yaxley switches, microswitch, variable condenser about 17PF, with slow motion dial, 2½" centre zero meter, 50 micro amps cons res. plugs, sockets. In Aluminium case. Brand new **£1.50,** post 38p. Circuit diagram **15p.**



CATALOGUE No 18, 23p post free.

ARTHUR SALLIS RADIO CONTROL LTD
28 Gardner Street, Brighton, Sussex

GAREX

We will be at the National Amateur Radio & Electronics Exhibition. Granby Halls, Leicester. October 26-28th.

In addition to our normal range of equipment we will have many items of Test gear, RT's and Components at special prices.
Why not call and see us?

New. (similar to original de luxe model)

Modulation kit. OC35/NKT4 04 pp. to QQVO3-20a 15 watts 2RB P.C. boards: Transformers & transistors etc. 12vdc. Neg or pos earth. Instructions & CCT. Postage 40p **£5.25**

As above with loudhailer winding. Post 40p **£6.10**

Rx Transistor FM squelch board: with cct. inc. postage 55p

Chinnor, Oxon. OX9 4BT Tel. Kingston Blount 51476 (0844)

BEAM 10M AERIAL with 30ft mast, £7.50.—J. J. Eacott, 22 Ellison Road, Streatham Common Station. Phone: 01-764 9474.

G3LLL's CORNER

TRIO REDUCE PRICES

We were wrong—or were we? (See last month's ad.) JR. 310 de Luxe £79.90. We think the JR.310 takes some beating, especially at its new low price of £75.00 for a top class receiver that will hold its own against any (large SAE for copy of R.S.G.B. Test report). If bought from us it's even better—top band crystal calibrator, general check over, plus 12 months guarantee and assured after sales service only **£79.90.** With extra narrow band mechanical filter fitted **£95.00.** Full 10 metre coverage for 2 metre converter use £2.00 extra. Carriage £1.00 to nearest main line station (please advise). Securicor to door £3.00.

HOLDINGS **PHOTO AUDIO CENTRE**

39/41 MINCING LANE, BLACKBURN, BB2 2AF.
Tel. Blackburn 59595 (2 lines) (7 miles from M6—closed on Thursdays)

GM3BQA—BARGAINS

Honda E40, 230 AC, £20. Petrol Electric generator, 12V 1,260W out, £30. New 10ft triangular mast sections (USA), £7. New 60ft tubular telescopic masts in crate (USA), £20. New 30ft tubular sectional masts with guys, £15. Collins ATU (lovely jobs), £25. Val-Radio PSU (transistorized), 24V DC in 220V AC and DC out at 180W, £15. Marconi SSB Diversity RX type HR24, 3-28MHz, 230V AC crated, untested, £60. VHF RX (USA) R361/GR, 225-400MHz, 230V AC with circuit, very clean, £16. Marconi TX/RX low band mobile TPV 401 with PSU, cables, speaker, mic., £10. AVO Multiminor in case, £6. Voltmeter 0-5, 0-100V DC with leads in case, £1. New ground plane ant., 100-150MHz calibrated with radials, £1.50. Teleprinter 7B with AC PSU, £10. New boxed valves, SAE list, i.e. 832 829B 4X150A TY2-125 4CX250B 807 U19 OD3 6V6 VU 120 CV293 CV2198 plus RX types. Carriage extra.

FORTH MOTOR CO.,
Cockenzie, East Lothian
Telephone : PORT SETON 331

F.T. 101 TRANSCEIVERS

and full range of Japanese equipment from stock
Checked by K.W. Engineers

Usual K.W. courtesy and service

EASY TERMS AVAILABLE
K.W. DEVELOPMENTS LIMITED
1 Heath Street
Dartford . Kent
Dartford 25574

THE AMATEUR RADIO SHOP G4MH

13 CHAPEL HILL, HUDDERSFIELD

Tel: (0484) 20774

(MEMBER OF AMATEUR RADIO RETAILERS ASSOCIATION)

Agents for : Eddystone, Yaesu Musen, K.W., Trio, Codar, J.-Beam, Solid State Modules, also Rotators, I.O.W. Quads and Traps.

H.P. and Barclay Card service available.

Reduced Trio Prices:

9R59DS Receiver gen. cov.	£49.50
JR310 receiver Ham Band	£75.00
Top Band	£79.00
JR599 receiver Ham Band Inc. 2 mtrs	£185.00
TX599 Transmitter	£185.00
SP5D Loud Speaker	£4.50
TS-PS 515 transceiver	£210.00
Second to none	
TL 911 Linear amplifier	£140.00
TR 2200 2 mtr transceiver	£62.50

EXTRAS: C.W. Filter, 25 kHz, 100kHz markers, OA2 stabilizer, hand mics, S.w.r. ind. S.a.e. for any gen. Good range of KW and Yaesu equipment.

Second Hand:

Eddystone, 770R mint	£100
Eddystone, EC10, Mk II	£62.00
Eddystone 840C	£40.00
Eddystone 680X	£65.00
KW 2000A	£140.00
KW 201 Rx	£70.00
Trio 9R59 DE	£32.00
HRO complete	£25.00
Minimitter MR 44/11	£28.00
AR88D	£40.00
HA 350	£55.00
SR 200	£35.00
R107	£8.00

Shure Mics: 201, 401, 444, 444T.

Components:

800 PIV 500 MA Diodes **£1** per doz inc. post.

200 PIV 100 MA diodes **25p** per doz. inc. post.

Belling Lee coax plugs. **65p** doz. post 5p.

J Beam Coax sockets **60p** doz. inc. post.

5 pin din plugs **75p** doz. post paid.

375ma 1¼ fuses **10p** doz. post 5p.

Full range J-Beam aerials inc. Omnivee's, Halo's, portable masts.

WANTED GEAR FOR CASH!

We will be at the ARRA Trade Show, Leicester, October 26-28

GM2FHH L. HARDIE GM3BCL

542 George Street Tel. Aberdeen 20113.

KW 202 Rx with cal	£140.00
KW 202 matching L/S	£8.00
KW Filters Lo-pass	£5.70
KW Baluns	£2.10
KW Traps, per pair	£4.75
KW Trap dipole	£15.45
KW Antenna switch	£3.95
KW 101 SWR bridge	£9.55
Trio reduced prices:	
Trio 9R-59DS Rx	£49.50
Trio JR-310 Rx	£75.00
Trio SP-5DS L/S	£4.50
Trio TS/PS-515 transcvr.	£210.00
Trio VFO-5S remote VFO	£40.00
Medco FL50 Lo-Pass filter	£6.50
TTC C.3005 SWRB 52 ohms	£7.25
TTC C.3042 SWRB 52 ohms	£4.25
Eddystone EC.10 Rx	£86.00
Eddystone 830/7 Rx	£389.00
Eddystone 1000 Rx	£210.00
Eddystone 924 AC/PSU	£7.75
Eddystone 902 GDO	£29.50
Eddystone 3301 Phones	£9.50
Eddystone 3242 Phones	£7.50
Used gear	
Swan 400 Transceiver	£190.00
Swan VX-1 vox unit	£15.00
Swan 14X DC module	£25.00
KW Vanguard	£19.50
KW Filter Lo-pass 75/4/BL	£4.00
KW-Match 52/75 ohms	£7.00
BC221D with charts & AC PSU (less case) fb cndx	£15.00

Stockists for Eagle, Copal clocks, Jackson, Joysticks, Radiospares, Yaesu, Shure, Rotors & Antennas by J-Beams, RSGB publications.

Agents for all leading British & Foreign brands. S.A.E. all enquiries please.

G3ZKS YORK PHOTO AUDIO CENTRE G3ZKS

YAESU

FT101 Transceiver	£249.00
FT101 with 160m	£255.00
FL2100 Linear	£148.00
FT200 Transceiver	£172.00
FL2000B Linear	£148.00
FT401 Transceiver	£230.00
FR400DX Receiver	£120.00
FT75 Mobile Transceiver	£99.00

TRIO

TS510 Transceiver	£180.00
TS515 Transceiver	£210.00
JR310 Receiver	£75.00
9R59DS Receiver	£49.50
TR2200 2m Transceiver	£62.50
TL911 Linear	£140.00

Full range of microphones, cables Filters & Accessories.

CODAR — HAMGEAR — Hy-GAIN ANTENNAS — J BEAMS — G WHIPS etc.

RSGB & Bernard Radio Books. A 3p stamp will bring full lists.

CREDIT TERMS AND PERSONAL LOAN SCHEME with little or no deposit.

YOUR CAMERA EQUIPMENT TAKEN IN PART EXCHANGE.

YOUR USED EQUIPMENT EXCHANGED FOR CAMERAS OR Hi Fi.

We stock all the best Cameras, Photo Equipment & Hi Fi.

51, FOSSGATE, YORK YO1 2TF **Tel 56176** (After hours 25798)

G3LRB STEPHENS-JAMES LTD. G3MCN

70 Priory Road, Anfield, Liverpool L4 2RZ. Tel 051-263 7829

YAESU

FT401 Transceiver	£230.00
FT101 Transceiver	£249.00
FT101 with 160m	£260.00
FT200 Transceiver	£172.00
FT75 Transceiver	£99.00
FT2F 2m Transceiver	£84.00
External VFOs	£38.00
FR500 Receiver	£120/£160
FR50B Receiver	£59.00
FL50B Transmitter	£68.00
FL500 Transmitter	£140.00
Yaesu, YD844 Mic	£12.00
Yaesu, YD846 Mic	£6.00

Full range of speakers, filters, plugs, etc.

TRIO

9R59DS Receiver	£57.50
TS515 Transceiver	£235.00
TR710 2M FM Transceiver	£95.00
JR310 Receiver	£83.50
SP5D Loudspeaker	£4.50
JR599 Receiver	£185.00

KW Electronics

KW 202 Receiver	£140.00
KW 204 Transmitter	£160.00
KW Atlanta Transceiver	£210.00
KW 2000B Transceiver	£240.00
KW 105 Matching unit	£37.00
KW 107 Matching unit	£40.00
KW 101 SWR meter	£9.50
KW 103 SWR/Power meter	£15.00
KW 3 way antenna switch	£3.75
KW E-Z Match	£15.00
KW Trapped Dipoles from	£14.00
KW Dummy Loads	£7.00
KW Baluns	£1.95

EDDYSTONE

EB37 Receiver	£98.00
EC10 Mk2 Receiver	£86.00
AC PSU	£7.75
898 SM Dials	£9.50

FAYETTE

fayette HA 600A Receiver	£50.00

J Beam

Full range in stock including masts, lashing, kits, etc.

R.S.G.B.

All R.S.G.B. publications stocked at current prices.

Hy-GAIN Antenna Range

12AVQ Vertical	£16.50
14AVQ/WB Vertical	£24.50
18AVQ/WB Vertical	£35.50
TH3MKS Tribander Beam	£75.50
TH2 Mk3 Tribander Beam	£55.00
TH3 Jnr Tribander Beam	£55.00
LC80Q Loading Coil	£7.50
BN86 Balun	£10.00

G-WHIP Antenna Range

Full range in stock with the new 5/8th 2m mobile whip.

Codar

CR70A Receiver	£27.50
PR40 Preselector	£8.50
AC PSU	£12.50
Codar Receiver Kit	£11.50

Test Equipment

TE16A Transistor Sig. Gen.	£7.95
TE20 Sig. Gen.	£15.00
Tech 15 GDO	£12.50
Hansen SWR Bridge	£4.50
Dummy Load/Wattmeter	£32.00
Osker Power meter	£18.00
Omega Noise Antenna Bridge	£13.75
Omega Noise Bridge TE.702	£19.50
Semi Auto Bug Keys	£4.50
Antenna Rotators	£20-£25-£40-£70
Sentinel 2m and 4m Converters	£13.75
Shure 201 Microphones	£5.75
Shure 444 Microphones	£14.00
TTC PTT Microphones	£3.25
Copal 24 Hour Clocks	£7.50
Copal 24 Hour Calendar Clock	£14.50
Copal 227 24 Hour Alarm	£8.75
Battery 24 Hour Clock Wall Mounting	£22.00

Dipole "T" Pieces **13p**, Egg insulators **4p**, PL259 Plugs **30p**, Sockets **30p**, 75 ohm Twin Feeder **5p** yd, Cable reducers **10p**, 300 ohm Ribbon feeder **5p** yd, 50 ohm co-ax **12p** yd, Panel Meter, Cabinets, Chassis, Panels, Paxolin panels, Diecast boxes, Plugs sockets, Valves.

QQVO-320A	£1.75
QQVO-3-10	£0.75

Secondhand Equipment

Heathkit SB300 Rx	£80.00
Eddystone EB3B Rx	£55.00
Lafayette HA500 Rx	£35.00
Panda Cub Tx	£22.00
Lafayette HA350 Rx	£50.00
Trio 9R59DE Rx	£40.00
Trio TS500-VFO	£15.00
KW Atlanta VFO	£22.00
Trio JR310	£60.00
Heathkit RAI Rx	£28.00
Sommerkamp FL2000 Linear	£100.00
Collins 75SI Receiver	£165.00
Collins 75SI RX	£170.00

S.A.E. with all enquiries please. All items in stock despatched same day. Large S.A.E. will bring all information on equipment stocked. Equipment bought for cash. After sales service and all items carry normal guarantee. Part exchanges welcome and HP terms arranged on all orders over **£35.** Postage/Carriage extra.

Half day Wednesday. We shall be exhibiting at the Amateur Radio Retailers' Association Trade Show, Granby Hall, Leicester, 26th-28th October.

The above premises will be closed during this period.

CHC ELECTRONICS [MAIL ORDER]

75 ohm Coax Cable. Loss = 1.64dB/10m at 200MHz only **6p**/yd or **£5.55**/100yd.

Mains Cable. Black, 3 core, 2A rating, **7p**/yd.

Type 'N' coax plugs, 50Ω straight or elbow. **30p.**

Rectifier diodes—Similar to BY100, **10p** each **£1**/doz.

Die-Cast Boxes. 90 × 30 × 35mm, **54p** p.p. 5p.
114 × 30 × 64mm, **63p** p.p. 5p.
114 × 55 × 89mm, **78p** p.p. 5p.

Small 24V DC Blowers, 40p each p.p. 12p.

Professional P.A.P.S.T. equipment fans, 4½", 115V ac **£3** each or 2 for **£5.50.**

Tape Cassettes—Low Noise—5 year guarantee. C60—**50p**, C90—**65p**, C120—**80p**, p.p. 6p/cassette.

Transistor Radios. MW + VHF 88-108 and 108-174MHz with Batteries and internal mains P.S.U./charger, as sold at Rallies, only **£12** p.p. 50p.

Always include postage with your order.

35 WOLSEY WAY, CHERRY HINTON, CAMBRIDGE

WANTED

OLD MAGAZINE Radio copies (pre-1930 dates preferred). Please state condition—need not be perfect.—Wilco Corporation, 4030 West 10th Street, Indianapolis, Ind. 46222, USA.

GLENN MILLER

Private recordings wanted of

his Army Air-Force Orchestra from BBC wartime broadcasts: Swing Shift, Strings with Wings, Soldier & a Song, etc. plus 16" Transcriptions, air checks, Victory Discs, & complete broadcasts or the civilian band or what have you. Commercial LPs etc. NOT required. up to **£10** offered for complete ½ hour B/casts (or tape copies) by collector. All letters answered. A. J. Hibberd, 59 Waverley Road, The Kent, Rugby, Warks.

MISCELLANEOUS

PATENTS and TRADE MARKS.—Booklet on request. Kings Patent Agency Ltd (B. T. King, Mem RSGB, Reg Pat Agent).—146A Queen Victoria Street, London, EC4. Tel 01-248 6161. 60 years' refs.

YOUR CALL SIGN ENGRAVED white letters black plate, 6 × 1½ inch, 28p. 2 × ½ inch, Badge pin, 21p—post free—C.W.O. Workshops for the Disabled, Northern Road, Cosham, Portsmouth PO6 3EP.

NAME YOUR FAVOURITE ROOM. "Self-Adhesive" Black, Red or White Plate, 4 inch × 2½ inch engraved up to 20 Letters, 35p. Post free. C.W.O. Ideal Gift.—Workshops for the Disabled, Northern Road, Cosham, Portsmouth PO6 3EP.

WELDING SERVICE: Do you want some welding done? If so, contact GW3UCS M. J. P. Evans, 4, Gower Crescent, Baglan, Port Talbot, Glam. Phone Briton Ferry 812376—All enquiries welcome.

PROTOTYPE or short run turning/milling etc., and sheet metal work capacity available.—C. G. James Electronics (G3VVB). Staines Road, Feltham, Middx. 01-570-3127.

INDEX TO ADVERTISERS

Please mention
RADIO COMMUNICATION
when replying to advertisements

MEMBERS' 25p ADS ORDER FORM

Please type or print in block letters

Tick classification

For Sale ☐

Wanted ☐

Callsign	**QTHR**
or Name and address	
Telephone number	

enclose a postal order/cheque for 25p as payment for this advertisement.

Date..... *Signed*..... *Callsign, BRS or A No*.....

The number of words in each advertisement must not exceed 32 not including name and address or callsign and QTHR or telephone number Four pages of each issue are allocated to Members' Ads at present, and in order to include as many advertisements as possible licensed members are requested to give their callsign and QTHR instead of their name and address. (QTHR means: "My address in the current call book is correct"). Also to conserve space, please keep advertisements as brief as possible. They will be edited to conform to a set style of abbreviations, so it is unnecessary to submit them in abbreviated form. Any which are not clear will be returned.

Conditions under which Members' 25p Ads are accepted are published on the first Members' 25p Ads page of each issue. Do not forget to enclose a wrapper as proof of membership.

POST TO MEMBERS' ADS, "RADIO COMMUNICATION", 35 DOUGHTY STREET, LONDON WC1N 2AE