JUNE 1973

RADIO COMMUNICATION

Scene at 19th VHF/UHF Convention

Left: (top) G3OSS (l) talks to G5UM; (below) G2BVN (l) and G3EDD examine G8AVB's receiver.

Right: (top) G3RPE lectures on microwaves with G3WJG's transmitter; (below) Standing room only at the lectures.

Below: G8CKN, winner of the Constructors' Contest.

RSGB Diamond Jubilee Year

1913 – 1973

Journal of the Radio Society of Great Britain

FM FOR 2

With crystals for 144·48 or 145·0.

FM19/2 TWO METRE TX RX 10 watt output, QQV03-10 PA, transistor IF, AF & 6 or 12 volt + or — PSU. Deviation, adjustable up to 5kHz. Fitted one channel, up to eight may be fitted. Circuit of tone unit and connections. Boot mount complete with mic. control speaker and cables. Power requirement, one amp RX, six amps TX. Size 4 × 10 × 13", weight 15lbs. **£45**

FM13/2 TWO METRE TX/RX 10 watt output, QQV03-10 PA, transistor 12 or 24 volt + or — PSU. Deviation adjustable up to 5kHz. Fitted one channel, up to six may be fitted. Boot mount, complete with mic, control, speaker and cables. Power requirement 3·5 amp RX 8·7 amp TX. Size 6 × 10 × 18". Weight 30lb. **£30**

NEW STOCK CRYSTALS. All tested. £1 each, 25% discount 10 or more.

TYPE HC/6U. 6087 6089 6110 6114 6121 6125 6126 6132 6137 6138 6143 6144 6145 6148 6149 6154 6165 6171 6182 6187 6193 6198 6210 6221 6232 6237 6243 6265 6276 6287 6310 6321 6332 6337 6343 6348 6354 6360 6365 6371 6376 6382 6387 6393 6410 6415 6421 6432 6443 6454 6461 6465 6470 6476 6480 6487 6498 6499 6516 6521 6532 6537 6543 6554 6565 6571 6581 6587 6598 6606 6610 6616 6619 6621 6626 6627 6632 6643 6652 6672 6675 6677 6680 6721 6732 6738 6743 6750 6776 6787 6900 6910 6920 6937 6956 6994 kHz.

TYPE 10X. 5150 5260 5690 5800 5910 5970 6110 6210 6243 6350 6440 6450 6510 6550 6594 6616 6650 6661 6720 6750 6783 6805 6990 7320 7550 7566 7600 7633 7683 7716 7750 7766 7883 7933 7950 8007 8133 8146 8161 8238 8266 8300 8350 8381 8423kHz.

TYPE 10XJ, X 24 for 2 Metres. 6100 *6015 6018* 6021 *6023* 6026 *6029* 6032 *6035* 6037 *6040* 6043 *6046* 6048 6051 6054 *6057 6060* 6065 *6068 6071* 6076 6082.

MARCONI 7092 RX 150kHz-2MHz in 4 bands, 5-1·5kHz. 400Hz selectivity, 10μV sensitivity, 450mW output, RF stage, 2 IF 110kHz crystal filter, needs 250V HT, 24 Volt, BFO, IF & AF gain control, size 8 × 5 × 12" circuit **£10**

CRYSTALS TYPE HC/6U £1 each kHz: All in stock in quantity

3232 3319 3333 3354 3375 3389 3403 3410 3431 3445 3452 3459 3466 3473 3876 3883 3897 3904 3911 3918 3925 3932 3939 3948 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 5328 5332 5337 5341 5345 5349 5354 5362 5366 5375 6379 5383 5388 5465 5910 5920 5934 5952 5956 5964 5971 5986 6084 6091 6106 6136 6488 6495 6502 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 9378 9395 9404 9412 9421 9863 9868 9873 9883 9893 10465 10486 10513 11859 13729 13739 13749 13769 13779 13789 13799 13809 13819 15465 18431kHz.

1820 1930 3766 3795 4002 6001 6054 6076 7002 7005 7017 7032 7047 7054 7077 7092 7099 7129 8081 (WAB) 11750 13227 13229 14000 14250 31200 31225 31250 31275 31300 31325 31350 31375 31400 31425 31450 31475 31500 31525 31550 31575 31600 31625 31650 2189 2194 2802 2805 2854 2905 2940 2945 2948 2951 2954 2957 2985 3023 3404 3411 3432 3467 3481 3495 4222 4404 4432 4467 4481 4654 4952 5506 5521 5524 5551 5589 5604 5611 5619 5649 5654 6480 6551 6552 6567 6589 6604 6611 6649 6657 6667 6677 6686 7171 7552 7567 7664 7685 8845 8854 8862 8871 8930 8953 8956 8978 9096 9266 9412 9413 9453 9461 9519 9558 9781 9815 9837 9845 9871 10437 12900kHz. Less 25% 10 or more. 31675. .. .. **£1** each

CRYSTAL CONTROL UNITS with 34 xtals 13·54 to 19·87MHz 3 valves EF91 size 4 × 4 × 6" with circuit .. **£4**

CRYSTALS ALL £1 ea.

MINIATURE 4039

9937 9962 10012 10037 10087 10112 10137 10162 10187 10212 10237 10262 12237 12250 12262 12287 12312 12337 12357 12362 12387 12412 12437 12462 12487 12512 12537 12562 12587 12612 12637 12662 12687 12712 12737 12762 12787 12837 13062 13087 13112 13137 13162 13187 13212 13237 13262 13272 13312 13337 13387 13412 13437 13462 13487 13540 13560 13640 13690 13740 13790 13840 13890 13940 13990 14848 14893 14948 14998 15048 15098 15148 15198 15248 15298 15311 15344 15377 15411 15444 15477 15511 15577 15611 18347 18372 18497 18662 18747 18872 18997 19122 19247 19372 19497 19662 19747 19872 7533 7550 7566 7583 7600 7616 7633 7650 7666 7683 7700 7716 7733 7750 7766 7866 7875 7883 7900 7916 7933 7950 7966 8118 8166 8150 8183 8216 8250 8266 8283 8300 8316 8333 8350 8366 8416 8433 7783 7800 7816 7833 7850

15012 15037 13062 15087 15112 15137 15162 15187 15212 15237 15262 15287 15337 15362 15437 15462 15475 15487 15512 15537 15562 15587 15612 15637 15687 15712 15737 15837 15887 15912 15937 15962 15987

FT243/ZCC/DC20. New stock. 5633 5655 5666 5677 5688 5700 5711 5722 5733 5744 5755 5766 5777

CRYSTAL PARCELS. 100 crystals, mixed types & frequencies, our selection **£5**

B7G

2638 2854 2868 2875 2876 2889 2910 2931 2938 2945 2952 2954 2966 2980 2987 3008 3081 2023 3102 3105 3250 3255 3270 3285 3298 3302 3404 3411 3425 3432 3446 3453 3460 3467 3481 3495 3800 3805 3950 3985 3993 3995 3997 4031 4195 4220 4516 4570 4575 4595 4654 4668 4675 4689 4703 4745 4781 4808 5010 5060 5105 5420 5480 5491 5499 5506 5514 5521 5548 5551 5566 5581 5584 5589 5604 5611 5619 5621 5625 5626 5630 5641 5642 5644 5649 5650 5659 5671 5680 5687 5690 5691 5692 5695 5697 5701 5710 5711 5714 5730 6210 6270 6337 6440 6500 6510 6537 6540 6552 6557 6563 6567 6577 6580 6582 6590 6597 6612 6627 6634 6637 6640 6642 6647 6649 6650 6652 6657 6659 6662 6667 6672 6677 6679 6720 6753 6810 7585 7770 7992 8160 8280 8364 8515 8545 8820 8837 8839 8841 8845 8854 8862 8864 8871 8879 8885 8888 8896 8913 8930 8947 8953 8956 8961 8967 8971 8973 8983 322 324 329 338 339 342 kHz

2XL (METAL 10X)

2184 2638 2844 2854 4868 2875 2889 2910 2924 2931 2938 2945 2950 2952 2966 2968 2980 2987 3008 3023 3072 3081 3102 3142 3278 3403 3411 3432 3446 3460 3467 3474 3881 3495 3841 3921 4140 4182 4257 4399 4410 4415 4417 4418 4420 4422 4427 4431 4435 4444 4465 4469 4473 4478 4654 4689 4703 4710 4724 4808 4860 4889 4966 5010 5491 5499 5506 5514 5521 5551 5566 5589 5599 5604 5611 5619 5626 5620 5641 5642 5649 5654 5659 5671 5680 5687 5692 5695 5697 6337 6537 6540 6552 6557 6559 6567 6582 6590 6597 6612 6627 6634 6637 6640 6642 6647 6649 6652 6657 6659 6662 6664 6667 6672 6677 6791 8364 8439 8837 8839 8854 8862 8864 8871 8888 8913 8953 8956 8967 8971 8983

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JUNE 1973

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CONTENTS

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SERVICE? THE BEST! WESTERN
OUR AESU MUSEN MAIN DISTRIBUTOR

YAESU

FL-50B TRANSMITTER (Ex Stock)

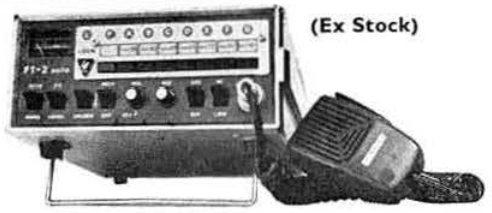
FR-50B RECEIVER (Ex Stock)

FV-50B VFO

The FR-50B RECEIVER:—Amateur bands only, AM/CW/SSB double conversion offers first class value for money, comes complete with built-in speaker, crystal calibrator and WWV at **£67** 100kHz cal cct, tuneable BFO, I.F. trap in r.f. cct, S-meter fitted, readout to better than 1kH, noise limiter, built in muting and monitoring cct for use with FL50B transmitter.
SPECIFICATION: Sensitivity: 0·5μV, 10dB SN ratio. Selectivity: 3·6kHz 6dB; 10kHz 50dB. Frequency coverage: 3·5-4·0, 7-7·5, 14-14·5, 21-12·5, 28·29·2MHz. Image ratio: better than —50dB.
The FL-50 SSB-CW TRANSMITTER operated on SSB/AM and CW Power i/p 50W p.e.p. 80-10m. Carrier suppression. Unwanted sideband and spurious radiation are all —40dB. The unit is VXO controlled or will transceive with FR50. With FV50 VFO control is possible.

(Ex stock)

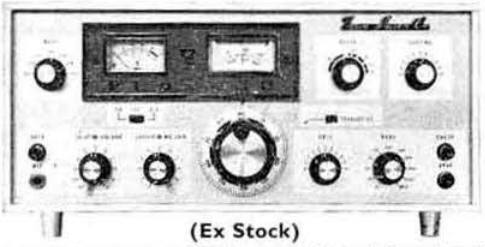
NEW:—FT2FB. Similar to FT2F but with more efficient transmitter, tone for repeater triggering and improved receiver filter. Takes less current.
The FT-2FB opens the door to noise-free broadcast quality two metre FM operation. It is a highly advanced all solid state unit complete with an automatic toneburnt signal. Channel capability of 12 simplex or duplex frequencies. Three channel frequencies included. Advanced cct design protects automatically from damage to transistors caused by antenna trouble or reverse connection power supply. Portable or home base operation can be achieved with the addition of the optional FP-2AC/B power pack which provides regulated DC power for the transceiver and charging voltage for the leak proof re-chargeable colloidal type batteries. Spec. frequency 144-148 MHz., 12 channels, Frequency modulated, power drain, Rx 0·5A Tx 2A. Dimensions 6½" × 2½" × 10", Weight 4lb. Standard accessories, Dynamic mic., and mobile mount. Transmitter RF power 10 or 1 w. o/p. Stability ± 0·001 per cent.



(Ex Stock)

NEW
2m. FT-2 AUTO SCANNING TRANSCEIVER

The receiver automatically scans the 8 channels and will indicate on which one there is a signal. Power output: DX 10w., Local, 1w. Frequency coverage: 144-146MHz. Weight: 4·2kg, Size: 210w. × 95h × 270d mm. Mode: F3. Power requirements: AC. 100, 110, 117, 200, 220, 230v. DC. 13·5.



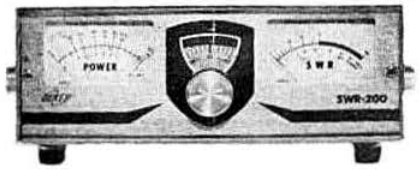
THE GREATEST VALUE SEPARATES ON THE MARKET fitted 4M + 160M–2M

(Ex Stock)

(Ex stock)

The FLDX400 Transmitter runs 240w. p.e.p. and is designed to transceive with FR100B or FR400. AM and "break-in" CW keying are fitted. SPECIFICATION: Frequency coverage 3·5-4·1, 6·9-7·5, 13·9-14·5, 20·9-21·5, 27·9-23·5, 23·5-29.1, 28·9-29·5MHz. Selectable U33 or LS3. Stability: less than 100Hz/½hr. after warm-up. Sideband suppression 50dB. Carrier suppression better than 50dB. Netting facilities for zero-testing will receive if not switched to "transceive". Provision for listening on transmit frequency as well as the frequency to which the receiver is tuned. ALC fitted to secure effective performance and a "clean" signal. VOX/PTT operation. Relays operate linear amplifier and receiver. Dial read-out to 1kHz.

OSKER POWER METER £18.50 + VAT



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

The FR400SDX (Super De Luxe) receiver is now available fitted with 4m. This model is only available from us and covers 160, 80, 40, 20, 15, 11, 10, 4 and 2m. 4 mechanical filters are fitted for SSB (2.4kHz), AM (5kHz), CW (0·6kHz) and FM 24kHz. Dial read-out to 1kHz from stable VFO. Rejection tuning to notch-out unwanted heterodynes. Clarifier control permits adjustment of SSB/CW received signals when working transceive. VFO select for internal VFO or 4 crystal frequencies. Monitor facility enables transmitted signal to be monitored at all times. Squelch circuit silences receiver for noise free AM/FM reception. FM discriminator fitted to SDX model, 25/100kHz calibrator. WWV band to check calibrated. 3 step AGC. Built-in noise limiter. Basic FR400 receiver from **£120.**

SWR METERS

ME-11N Power Meter, **£13.40** + VAT.

Asaki ME-11B, **£7.20** + VAT.

1973 CATALOGUE 20p

48 pages. Towers, Antennas, Rotors. 25 pages. Communications Equipment. 14 pages. Price List.

(No S.A.E. required.)

ELECTRONICS (UK) LTD.

SPARES? THE MOST!

YD-844 SP-400 (Ex Stock) FT-401 (Ex Stock) FV-401 (Ex Stock)

THE FT-401 offers a high power SSB/CW transceiver with many extra features at a minimum price.
SPECIFICATION: Power I/p 560w. p.e.p. Built-in CW filter, noise blanker and blower cooled pa. Complete coverage 80-10m. Plus WWV (10MHz) 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 0·57μV for 20dB S/S + N. Selectivity: 2·3kHz (6d,B) 3·7kHz (60dB). CW filter 600Hz. Clarifier 5kHz. Break-in CW with sidetone. Selectable USB/LSB.

FV-200
FT-200
FP-200

All Ex Stock

THE FT-200 is without doubt one of the "best-buys" available. Compare its features with similarly priced units and kits. SPECIFICATION: 260w. p.e.p I/p SSB/CW.; 75w. AM. 1kHz readout on all bands 3·5-4, 7-7·5, 14-14·4, 28·5-29MHz. (3 optional crystals available for 28-28·5, 29-29·5 and 29-5-30MHz. Stability: 100Hz 30 mins. after warm-up. Sensitivity: 0·5μV 10dBS/S + N. Selectivity 2·3kHz (6dB), 4kHz (60dB). Solid state FET VFO with excellent linearity (like all YAESU VFO's). 25/100 Calibrator. VOX/PTT. Separate DC supply available for mobile use. Clarifier ± 5kHz. Break-in CW keying.

THE SUPERB FT-101 (Ex Stock)

FT101 with one year guarantee. Remaining old stock only months old at **£229.** + VAT or fitted 160m. **£239.** + VAT

NEW:- FT101 - with 160m.

260w. p.e.p. SSB 180w. CW 80w. A.M. Improved cross modulation and newer blanker performance 160m. factory fitted, and improved inverter stage.
Selectivity: 2·4kHz (6dB down) 4·2kHz (60dB down). Sensitivity: 0·3 micro volt or 10dB signal to noise. Full amateur band coverage plus 27-27·5MHz.. Built-in AC P.S.U. or 110-234v. AC. Consumption 3 amps. max. Built-in DC P.S.U. for 12v. DC. 0·5 Tx standby, 5 amps. Tx standby, 20 amps. modulation peaks. Weight: 30lbs. Complete with noise blanker, 20dB attenuator, 25 and 100kHz calibrator. Vox. —5kHz clarifier. CW break in with side tone. 1kHz readout. Compatible AM and internal speaker. Microphone supplied as standard.

FT-75

The FT-75 at STILL ONLY **£99.00** + VAT while present stocks last, 10-80m transceiver with an output of 30 watts p.e.p. on any band. Equally suitable for mobile or fixed station. Operation could not be simpler! You simply select the band, press the channel button and talk! Microphone included. A VXO facility allows the Crystal frequencies to be moved slightly during crowded band conditions; FP75 for mains operation. FP75 and mobilemount for mobile.
Specification: Crystals fitted 3·760, 7060, 21·350, 28550 (14·200 optional extra £2.20) others available to order. VXO swing 3·5MHz, 3Kh; 7MHz, 6kHz; 14MHz, 3kHz; 21MHz, 20kHz; 28MHz, 12kHz. Size 21 × 8 × 30cm. Transmitter: Modes SSB or CW.

YAESU PRICES + VAT CARRIAGE FREE BY SECURICOR. MANUFACTURER'S 1 YEAR GUARANTEE

FR50B Receiver	£65.00	SP-101 Matching speaker	£11.00	FL400 Transmitter	£165.00	YC-355D 220MHz Counter	£120.00
FR-50B + Cal. + WWV	£67.00	FL-2100 1200W Linear	£165.00	SP-400 Speaker	£11.00	YD-844 Table Microphone	£13.00
FL-50 Transmitter	£75.00	FT-200 Transceiver	£145.00	FL-2000B Linear 120W p.e.p.	£165.00	YD-846 Hand Microphone	£5.00
FV-50 Remote VFO	£28.00	FP-200 AC PSU/spkr.	£45.00	FL-2500 Linear 2kW p.e.p. 160-10m	£130.00	FT-2FB 2m transceiver	£98.00
FT-75 Transceiver	£99.00	FV-200 Remote VFO	£42.00	FT-401 Transceiver S60W	£265.00	FT-2AUTO Scanning	£157.00
FP-75 AC PSU/SPKR	£22.50	DC-200DC PSU	£51.00	FV-401 Remove VFO	£42.00	FP-2AC AC PSU/speaker	£27.00
DC-75 DC PSU/SPKR/Mount	£22.50	FR-400DX Receiver 160-10m	£135.00	SP-401 Speaker	£11.00	FP-2ACB as above fitted batts.	£39.00
FT-101 Trans. fitted 160m	£280.00	FR-400SDX Receiver 160-10m, 4m, 2m	£175.00	YC-355MHz Counter	£97.00	F-50DX L.P. Filter	£8.00
FV-101 Remote VFO	£42.00						

AGENTS: MIDLANDS—Andy Martin, G3UDR. Tel.: Shipston-on-Stour 61839. BUCKS—Ian Partridge, G3PRR. Tel.: Chesham (02405) 4143

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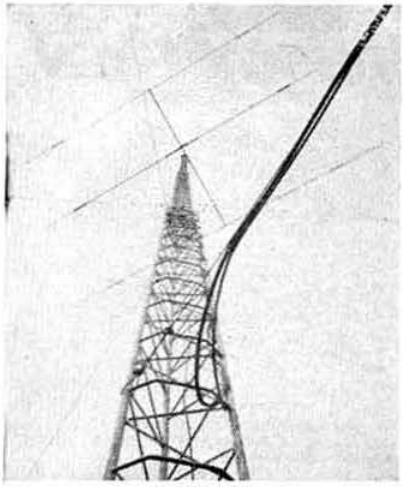

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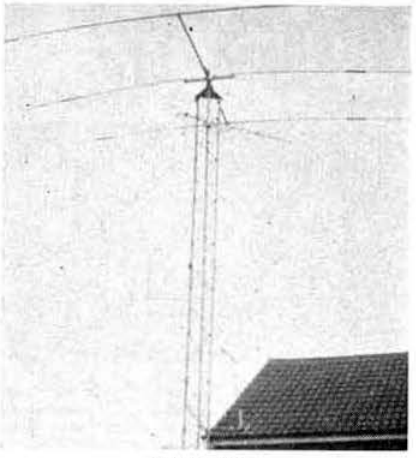
The finest value in guyed, galvanised steel towers which telescope down to 25'. Price (carriage paid):

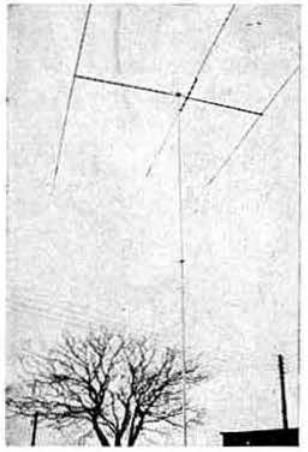
42' **£84.70** 57' **£117.00** 79' **£145.00** 101' **£185.00** + **VAT**



NAM-TOWER

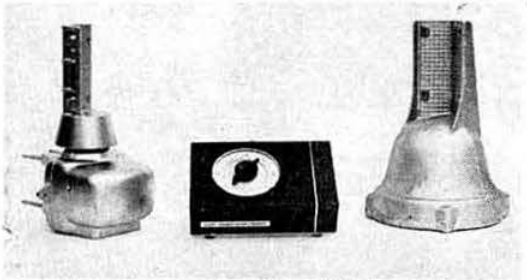
A self-supporting galvanised steel tower for IHF band beams. Each 10' side weighs only 22 lbs., so the tower can be erected single-handed.

Price: **£55.00** carriage paid. + VAT.



TELOMASTS

	Mast only	*Mast and rigging kit*
30'	**£16.50** + VAT	**£22.30** + VAT
40'	**£18.70** + VAT	**£29.70** + VAT
50'	**£22.00** + VAT	**£36.85** + VAT



We stock the best range of rotators. CDE and HY-GAIN and spares. Our stocks are good so you'll get fast delivery plus the after-sales service which counts.

AR20 This model replaces the old AR10 and is ideal for VHF beams. **£20** (40p).

AR22R This model will turn HF antenna of TA33 Jnr. size and can be mounted on the top of masts up to 2 1/16" diameter or onto a flat plate. It can carry a deadweight of 150 lbs. Requires a 4-wire cable. **£25** (65p).

TR44 This model is also for HF beams as the AR22R but carries a 500 lbs. load and has better braking. The control unit requires a 7-wire cable. **£45** (75p).

HAM-M The best of the CDE range. Carries 1,000 lbs. deadweight for large HF beams and employs a solenoid operated brake. Requires an 8-way cable, **£70** (80p).

HY-GAIN 400 It's a brute but takes masts up to 3" dia. and automatically rotates to the desired direction by setting the compass control knob points as required. Mounts to standard tower plate on Versatower, **£115** (£1).

Note—All above rotators are ex-stock and orders are despatched the same day.

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VERSATOWERS

Immediate delivery from our stock! Self-supporting tilt-over towers for 40', 60' and 85'.

P40' **£121.75,** P60' **£146.50** T85' **£275.00.**

Always a large stock, phone in for latest items some examples below.

Collins 75S1, very good	£175.00	Racal MA79g Drive Unit, mint	£485.00
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Heath HM102	£18.00	Tristao. 105ft. Telescopic tower	£225.00
Heath HW32 + HP23	£59.00	Trio TS510, mint	£140.00
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KW 2000A + AC PSU	£149.00	Yaesu FR50B, mint	£55.00
KW 2000B + AC PSU	£175.00	Yaesu FV400S. VFO	£30.00
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National NCX5	£170.00	Yaesu DC-200, unused	£40.00
National NCX500	£165.00		

HY-GAIN

(Ex Stock)

Hy tower, 10-80m. (self-sup.)	£110.00
18V, 10-80m. vertical	£12.85
12AVQ, 10-20m. vert.	£16.50
14AVQ, 10-40m. vert.	£24.50
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ANTENNAS + VAT

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203BA, 20m. 3 ele. beam	£72.00
153BA, 15m. 3 ele. beam	£36.50
103BA, 10m. 3 ele beam	£28.50
18TD, Reeltape portable dipole	£41.00
LA1 Lightning arrestor	£14.50
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MOSLEY (Carr. pd.) (Ex-Stock) from us for fast delivery + VAT

Mustang, 10-20m. 3 ele. 2kW	£45.50	TA33 Jnr., 10-20m. 3 ele,	£36.50	TA32 Jnr., 'E' for 2" mast	£26.50	SWL listeners dipole	£12.50
TA33 Jnr. 'E' for 2" mast	£37.00	TA32 Jnr. 1-20m. 2 ele.	£29.00	TA31 Jnr. Rotary dipole	£17.00		

BANTEX FIBREGLASS MOBILE ANTENNAS (Carr. 50p) including base (Ex Stock)

70/¼. 70MHz, ¼ wave	£3.00	BGA, 144MHz, ¼ wave	£6.15	Magnetic mount	£6.15	Note. Deduct 50p from price of aerial if base is not required.
144/¼. 144MHz, ¼ wave	£2.85	B5, 144MHz, ⅝ wave	£4.35	All aerials complete with base.		

G WHIPS (Carriage 50p Coils, 20p) THE FINEST MOBILES (Ex Stock) + VAT

Tribander 10, 15, 20m.	£9.45	LF160 160m. coil	£7.50	160 Ranger	£7.40	80m. coil	£4.00
LF40 40m. coil	£4.00	Whip for LF coils	£1.00	Multimobile '71' 10, 15, 20m.	£12.50	160m. coil	£4.00
LF80 80m. coil	£4.00	160/80m. Duobander	£9.00	40m, coil	£4.00		

J BEAM ANTENNAS (Carriage paid) (Ex Stock) + VAT

10/4Y 10m. 4 element array	£24.10	2/8Y 2m. 8 element folded	£4.20	2/8 2m. Double 4 slotted	£5.10	70/16 70 cms. Double 8 slot fed	£5.60
4/3Y 4m. ele. folded	£4.25	2/10Y 2m. 8 element folded	£9.00	2/12 2m. Double 6 slot fed	£6.75		
4/4Y 4m. 4 element folded	£5.60	2/14P 2m. element	£14.30	2/16 2m. Double 6 slot fed	£8.40	70/14Y 70 cms. 14 ele. folded	£7.10
2/4Y 2m. 4 element folded	£2.90	2/10XY. Cross polarised 10 ele.	£12.10	2/HO 2m. Halo mobile	£1.45	70/18P 70 cms. 18 ele.	£7.45
2/6Y 2m. 6 element folded	£3.50	2/0V Omni dipoles	£7.15	2/HM 2m. Halo mobile	£1.75	70/MBM/46 70 cms. 46 ele.	£10.50

RF COAXIAL CABLE AND PLUGS (Carriage extra) (Ex Stock) + VAT

50 ohm UR43 2" dia. *per m.*	15p	75 ohm UR57 4 dia. *per m.*	30p	50 ohm UR76. 2" dia. per m.	15pp	UHF in line coupling connectors	60p
50 ohm UR67 RG8AU	30p	75 ohm twin	5p	UHF Plugs 259A ·4" dia	37p	UHF 'L' angle connectors	90p
75 ohm ·22 dia. UR70	15p	150 ohm twin	5p	UHF Plugs 259A ·3" dia,	37p	UHF 'T' angle connectors	£1.20
75 ohm UR39 ·31" dia "	22p	300 ohm twin	5p	UHF Plugs 259A ·2" dia	37p	UHF panel sockets SO239	27p

AGENTS, G3UDR, Shipston-on-Stour 61839. **G3PRR,** Chesham (02405) 4143.

WESTERN ELECTRONICS (U.K.) LTD.

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MICROWAVE MODULES LIMITED

11 CRANMORE AVENUE, CROSBY, LIVERPOOL L23 0QD, Tel: 051-928 1610 9 a.m.–8 p.m.

OUR EXCELLENT VHF AND UHF EQUIPMENT IS USED EXTENSIVELY THROUGHOUT THE UK AND IS NOW GAINING POPULARITY IN EUROPE AND ALSO IN THE STATES. WE EMPHASISE QUALITY AND RELIABILITY, AND ARE THE ONLY COMPANY IN THIS FIELD OFFERING AN UNCONDITIONAL 12 MONTH GUARANTEE, AND RETURN-OF-POST SERVICE ON MOST REPAIRS.

PRICES DOWN!

This month we feel that we should make some effort to lessen the impact of VAT on the Radio Amateur. We are now manufacturing our 2 m and 70 cm converters in large quantities for our home and overseas markets. As a consequence we have been able to cut our manufacturing costs and are passing on these reductions to our customers. These new prices are shown below:

144MHz MOSFET CONVERTER
I.F.s available ex-stock: 14-16, 18-20, 24-26, 27·7-29·7, 28-30MHz.
Price inc VAT **£16.72**
This design has been optimised to obtain the best sensitivity possible with the latest diode-protected dual-gate mosfets. Both RF stage coupling and oscillator injection circuits use bandpass transformers to maximise performance across the band.

144MHz DOUBLE CONVERSION MOSFET CONVERTER
I.F.s available ex-stock: 2-4, 4-6MHz.
Price inc VAT **£16.72**
This unit was developed to meet the heavy demand for a converter suitable for use with receivers having better performance at lower frequencies. It uses two dual-gate mosfet mixers, both fed from the output of a 70 or 71MHz crystal oscillator. Selectivity is obtained at the first IF in the 74MHz range, thereby overcoming the usual problems associated with low-I.F. single conversion converters.

432MHz MOSFET CONVERTER
I.F.s available ex-stock: 14-16, 18-20, 24-26, 28-30MHz.
Price inc VAT **£19.91**
This unit uses a dual-gate mosfet mixer for excellent strong-signal performance preceded by two BFY90 transistor RF stages for high sensitivity. All UHF tuned circuits are printed using Microstrip technology, and a crystal in the 100MHz region is used in the oscillator chain to overcome unwanted beats in the tuning range.

ATK Transmitter, Modulator, and PSU Kits
These kits are now handled directly by G8ATK. Please send all orders and enquiries to: M. Hearsey, "Halcyon", Lawday Link, Upper Hale, FARNHAM, Surrey.

MM Leads Again!
1st Place in July 144MHz Open Contest 1972 was taken by F0LG/P using an MM 144MHz Mosfet Converter and MM 5 watt AM Transmitter driving a linear amplifier.
1st Place in VHF NFD 1972 (432MHz Section) was taken by GW3VXK/P using an MM 432MHz Mosfet Converter

144MHz 5 WATT AM TRANSMITTER (as reviewed in May edition of RadCom)
5 watts input, six channel crystal controlled. Supplied with microphone and crystal for 145MHz.
Price inc VAT **£35.75**

144MHz AM RECEIVER
Double Conversion, 6kHz Bandwidth. 2·8dB typical noise figure, 2 watts audio output.
Price inc VAT **£38.50**

VARACTOR TRIPLERS
We manufacture varactor triplers for 432 and 1296MHz. Both are highly stable, with low level harmonic output, and capable of AM operation at the 50% power level. These units are aligned using swept-frequency and swept-power drive sources, the output of each unit being monitored on one of our spectrum analysers. Great attention is paid to harmonic suppression and linearity. All harmonics are greater than 40dB down on the wanted output.

432MHz VARACTOR TRIPLER
Maximum input power at 144MHz: 20 watts. Typical output power (at maximum input): 14 watts.
Price inc VAT **£19.25**

1296MHz VARACTOR TRIPLER
Maximum input power at 432MHz: 24 watts. Typical output power (at maximum input): 14 watts.
Price inc VAT **£27.50**

For The Benefit Of Overseas Readers, We List Our Agents In The Following Countries:

Belgium: Entremat, Avenue Baron Robert de Vironlaan 138, 1710 Dilbeek, Belgium.
France: Vareduc-Comimex, 2 Rue Joseph-Riviere, 92400 Courbevoie, Paris, France.
U.S.A.: Spectrum International, P.O. Box 1084, Concord, Mass. 01742, USA.

ALL PRICES INCLUDE POSTAGE — SEND SAE FOR FURTHER DETAILS

LOWE ELECTRONICS

119 Cavendish Road, Matlock, Derbyshire, DE4 3HE

Tel: Matlock 2817 or 2430 9 a.m. - 9 p.m.

John: G3PCY Bill: G3UBO Alan: G3MME

MAIN DISTRIBUTOR FOR YAESU MUSEN EQUIPMENT

Hours: Tuesday to Saturday 9-5.30 (closed for lunch 1-2 and all day Monday)

SERVICE AND SALES (evenings and weekends only): John G3JYG, 16 Harvard Road, Ringmer, Lewes, Sussex. Tel: Ringmer 812071. Sim GM3SAN, 19 Ellismuir Road, Baillieston, Nr. Glasgow. Tel: 041-771 0364. Alan GW3YSA, 35 Pen y Waun, Efail Isaf, Nr. Pontypridd, Glam. Tel: Newton Llantwit 3809. Peter Ward, G3XWX, 47 Radstock Avenue, Ward End, Birmingham B36 8HD.

Sim, John, Alan and Peter will be happy to demonstrate New Yaesu Gear by appointment. They also have a pretty good selection of second-hand trade-ins at the right price.

YAESU NEWS

In Japan, the accepted modulation index for Amateur FM equipment is about 2 to 3.

$$\text{Modulation Index} = \frac{\text{Frequency Deviation}}{\text{Modulating Frequency}}$$

At this, and higher modulation indices, the very real benefits of FM are realised. It is for this reason that, as received from the factory, the deviation is set at about 6 to 8kHz. There is, however, an I.A.R.U. Region 1 recommendation that Amateur transmissions be limited to a modulation index of 1. Assuming that the highest modulating frequency is about 3·4kHz, this means that maximum deviation should also be about 3·4kHz. In view of this recommendation all FM equipment leaving Matlock will be set to about 3·4kHz deviation unless specifically requested otherwise.

In all fairness, however, we should point out that in any communications system, for optimum performance, the band width of the Rx should be tailored to the band width of the transmitted signal. In the case of FM, this band width is a function not only of the modulating frequency but also of the modulation index. Most authorities on FM, notably Keller of Marconi, calculate FM band width from:

$$\text{Band width} = 1{\cdot}5\ (\text{fm}\ (\text{m} + 1))$$

where fm = highest modulating frequency
m = modulation index.

This formula assumes that any sidebands not included will be insignificant. Substituting the I.A.R.U. recommended m of 1, we find that the generated signal will occupy a band width of some 10kHz. This is, of course, less than the I.F. response of the FT-2FB or FT-2AUTO (typically 30kHz at 6 dB points.) A narrower filter could be fitted, but we urge caution as this starts to put stringent requirements on the crystal in terms of accuracy and both long-term and short-term stability which accounts for the widespread use of crystal ovens in commercial equipment. Also, crystals made for Amateur use do not have quite the same tight specification as those for professional use. However, as previously stated, we will set the equipment to the recommended 3.4kHz deviation unless specifically requested otherwise.

Of perhaps greater importance is the adjustment of the I.D.L. incorporated in Yaesu FM equipment. This will minimise over deviation by limiting voice peaks, but must be used with extreme caution—too little and voice peaks spread excessively, too much and distortion becomes intolerable. We set up these controls as follows:

Back off the limiter to zero, i.e. no limiting

Using a TF791 deviation meter, we set the mic gain control for an average deviation of 3·4kHz. Then we lower the limiting level until the occasional speech peaks are limited to 3–4kHz deviation.

We take great care in these adjustments and recommend that, unless you have laboratory test equipment, you leave well alone. If for some reason, you feel that your equipment requires adjustment, we suggest you bring it back to us and we will set it up to your requirements.

We realise that if we reduce your deviation you will scream that your Tx is not as "punchy" as Charlie's down the road. Equally of course, if we set it the same as Charlie's, you will scream "overdeviation". The simple fact is that we can't please everybody—all we can do is try our best! We hope the foregoing remarks will help towards a better understanding of FM.

Don't forget—if in doubt check your FM gear with us. We have a test rig all ready to check deviation, power, I.D.L. etc. and this service is of course free to our customers.

PRICE LIST APRIL 1973

Price including VAT in brackets

YAESU MUSEN

FR400SD	£175	(£192.50)	FV200	£42	(£46.20)
FL400	£165	(£181.50)	FL2000B	£165	(£181.50)
SP400	£11	(£12.10)	FL2100	£165	(£181.50)
FT401	£265	(£291.50)	FR50B	£65	(£71.50)
FV401	£42	(£46.20)	FL50B	£75	(£82.50)
SP401	£11	(£12.10)	FV50B	£28	(£30.80)
FT101	£280	(£308.00)	FT501D	£290	(£319.00)
FV101	£42	(£46.20)	FP501	£45	(£49.50)
SP101	£11	(£12.10)	Sigmasizer	£180	(£198.00)
FT75	£115	(£126.50)	YC355D	£120	(£132.00)
FP75	£25	(£27.50)	FT2FB	£98	(£107.80)
DC75	£25	(£27.50)	*FT2AUTO	£157	(£172.70)
VC75	£22	(£24.20)	FT101 FAN	£9	(£9.90)
FV50C	£28	(£30.80)	FT101 CW		
FT200	£145	(£159.50)	filter	£16	(£17.60)
FP200	£45	(£49.50)	YD844	£13	(£14.30)
DC200	£54	(£59.40)	TD846	£5	(£5.50)

*FT2AUTO fitted 5 channels. Extra channels **£3.20 (£3.52)**

FILTERS

Mechanical

Kokusai MF455 3AZ CW filter	£15.00
Kokusai MF455 10AZ SSB filter	£15.00
Carrier crystals for the above filters, each	£2.50

Remember that all prices *include* V.A.T. and postage, so you do not have to send extra.

ANTENNAS

2m 'J' Beams 50 or 75 ohms specify which)

2/4Y 4 element folded dipole Yagi with 1" boom	£3.74
2/6Y 6 element folded dipole Yagi with 1" boom	£4.40
2/8Y 8 element folded dipole Yagi with 1" boom	£5.17
2/10Y 10 element folded dipole Yagi with 1¼" boom and 45 Braces	£10.45
2/10XY Crossed 10 element Yagi with 1¼" boom	£13.86
2/14P 14 element Parabeam	£16.28
2/12 6 over 6 with 1" booms	£7.97
2/16 8 over 8 with 1" booms	£9.79

2m Mobile Whips

Diamond DP-2S gutter mounting ⅜ vertical	£11.55

G-Whips

Tribander (20, 15 and 10m)	£12.10
Multimobile 20, 15 and 10m	£14.30
160, 80 or 40m coils for above, each	£4.40
Top whip section for above	£1.10
Flexiwhip 10m with whip	£9.35
160, 80, 40, 20 or 15m coils, each	£4.67
Ranger 160m	£9.35
Duobander 160/80m	£10.45
Base section for all G-Wips	£1.60

The above are normally sent British Rail—should you require 24 hour Securicor delivery, please add an extra £1.50.

H.F. Beams

AS-203W wide spaced 3 element 20m beam	£72.60
AS-154W wide spaced 4 element 15m beam	£48.40
AS-153W wide spaced 3 element 15m beam	£38.50
AS-104W wide spaced 4 element 10m beam	£40.00
AS-103W wide spaced 3 element 10m beam	£22.00
Polygon 2 element glass fibre kit	£38.50

KARL BRAUN

SE600 DIG	£570	(£627.00)	SE600	£495	(£544.50)
SE280	£220	(£242.00)	DGTC 22	£22	(£24.20)
DGTC 1702	£39	(£42.90)	LVV 270	£38	(£41.80)
TTV 1270	£26.50	(£29.15)	Weir Mosfet		
Liner 2	£138	(£151.50)	Converter	£13.65	(£15.00)

Prices include carriage by Securicor except speakers and microphones which are mailed.

FILTERS

Crystal

S.E.I. QC1246AA 5·2MHz SSB filter	£17.82
S.E.I. QC1246AZ 9·0MHz CW filter	£15.40
S.E.I. QC1246AW 9·0MHz SSB filter 2.5kHz	£11.00
S.E.I. QC1246AY, 9·0MHz SSB filter 2·4MHz	£17.60
Yaesu FT101 CW filter	£17.60
S.E.I. FT101 AM filter	£19.80

ANTENNAS

Verticals

Diamond	DP-KB103 80 and 40m	£27.50
	DP-KB104 20, 15 and 10m	£20.90
	DP-KB105 80, 40, 20, 15 and 10m	£38.50
Asahi	Echo 8G 40, 20, 15 and 10m	£22.00

Antenna Accessories

Coax UR43 50 ohms	10p/m
Coax UR67 50 ohm	26p/m
Twin feeder 300 ohm	6p/m
Twin feeder 75 ohm	6p/m
Rotator cable 4 core (AR22)	18p/m
Rotator cable 12 core (TR44 and Ham-M)	35p/m
Baluns HZP (1:1 or 4:1)	£5.50
Rotators AR22R	£27.50
TR44	£49.50
Ham-M	£77.00
SWR Meters Hansen single meter	£5.50
Asahi twin meter	£8.80
Diamond SR435 (VHF/UHF)	£15.40
Dummy load/wattmeter (VHF/UHF)	£38.50
PL259 plugs 33p	Reducers 10p
Sockets 33p	Line Connectors 80p

Station Accessories

Plain brass morse keys	£1.35
Katsumi keyers EK-9X	£9.90
Katsumi keyers EK-108A (mains)	£29.70
Katsumi keyers EK-108D (battery)	£26.40
C.W. practice oscillators	£2.75
Headsets, low impedance, padded	£3.30
Microphones Yaesu YD844 table mike	£14.30
Yaesu YD846 hand mike	£5.50
DM501 hand mike	£3.75

Valves

6AH6, 6BZ6, 6CB6A, 6CL6, 6U8A, 6EW6, 6EW6, 6EH7, 6BM8, 12BY7A, each	66p
6GK6	£1.32
6JM6A	£1.65
6JS6C, 6KD6, each	£2.20
6146B	£3.30

SECOND HAND Prices include V.A.T.

RECEIVERS

National NC303	£99
Hammarlund HQ170	£82
Lafayette HA350	£55
Trio JR500S	£52
Yaesu FR400 SDX	£135
Drake R4	£165
Eddystone 770R	£99
Trio 9R59DE	£38.50
EC10	£44
Trio 9R59DS	£44
AR88D	£44
Heath GR78	£66
Eddystone 940	£96

TRANSMITTERS

FL200B Choice of two	£88
KW Vespa	£82
FL500	£115
Hallicrafters HT40	£15
KW Vanguard	£22
DX40 + VFO Choice of two	£22
Heath SB200	£95
Labgear Topbander	£15
KW Viceroy IV Mint	£77

TRANSCEIVERS All with p.s.u.'s unless clearly stated

KW2000A + AC p.s.u. Choice of two	£165	Heathkit HW12 and AC p.s.u.	£60	Swan 500	£165
Swan 350	£132	Drake TR3 + RV3 Remote VFO	£180	Heath SB101	£165

LOWE ELECTRONICS

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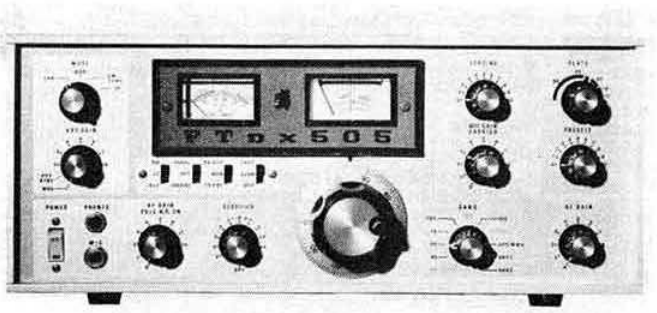

SOMMERKAMP FTDX-505

Price £265.00

Taking into account the recent revaluation of the Yen with the consequent increase in prices, the whole again being adversely affected by the introduction of VAT, there is still some excellent value-for-money items in the **YAESU/SOMMERKAMP** range, typical of which is the **SOMMERKAMP FTDX-505 TRANSCEIVER.** This is a fully equipped rig in all respects, its specification including fitted SSB and CW filters, improved noise blanker, 25kHz calibrator and installed PA cooling fan. Power input is 560 watts PEP and there is even an AM facility for the hardy individualist. Coming to think of it we know of no other current rig which has this feature.

Our used equipment stocks this month are excellent with many new interesting items to hand and as we pay particular attention to the Short Wave Listener fraternity we do our best to keep stocks of all types of general coverage Receivers. If you don't see what you want, let us have an S.A.E. and we will be pleased to let you have our latest used equipment list.

PLEASE NOTE: All prices shown include carriage but not VAT.

EDDYSTONE 730/4 GENERAL COVERAGE RECEIVERS. We are pleased to say that we have secured a quantity of these top quality sets, all in brand new and unused condition with only superficial case markings acquired during storage. Where necessary however we are refurbishing cases and this represents the opportunity to obtain a professional EDDYSTONE Receiver at a realistic price. A brief spec is: RF Gain, AF Gain, BFO, AVC, variable selectivity, xtal phasing, "S" Meter and Logging scale. Price **£81.50**

EDDYSTONE 840A RECEIVER. Good general condition and performance **£36.50**
EDDYSTONE 840A RECEIVER. Factory serviced and immaculate **£39.50**
EDDYSTONE 840C RECEIVER. Exceptional condition in all respects **£50.00**
EDDYSTONE 770/R RECEIVER. Superb performance and appearance **£120.00**
TRIO 9R59DS RECEIVER. Mint **£41.50**
TRIO 9R59DE RECEIVER. Unmarked and excellent **£36.50**
TRIO 9R59DE RECEIVER. Exactly as the day it was made **£38.00**
TRIO 9R59DE RECEIVER. Not original but excellent performance .. **£31.50**
HAMMARLUND SP600JX RECEIVER. A professional set too well-known to need description **£100.00**

CSE 2AR TOP BAND RECEIVER. Unmarked **25.50**
CSE 2A10 TOP BAND TRANSMITTER. As above **£25.50**
KW VESPA MARK I TRANSMITTER. with excellent home brew PSU **£80.00**
KW VESPA MARK I TRANSMITTER complete with matching PSU **£85.00**
KW 2000 TRANSCEIVER. Very good condition **£115.00**
TRIO TS500/PS500 TRANSCEIVER. Slight superficial marks, excellent performance **£117.50**
HEATH MONITORSCOPE SB610. Unmarked **£47.50**
KW E-Z MATCH. As new **£12.50**
KW-101 SWR/POWER METER **£6.25**

As our used equipment stocks are continually changing an S.A.E. will bring you the latest stock position.

Osker Block SWR200 Power Meters. The ultimate in SWR/Power Bridges **£19.25**
TCC SWR BRIDGES C3042 Single meter model **£5.00**
TCC SWR/Power Bridges C3005 Twin meter model **£7.85**
Sansei Miniature SWR/Power meter SE406 .. **£3.80**
Medco Filters. The best on the market. FL50A/FL75A 50 ohm Belling Connectors **£6.00**

FL50B & FL75B 75 ohm PL259 Connectors .. **£6.50**
FH40 High Pass **£2.35**
Copal clocks, now down in price. All types ex stock. Illustrated list by return.
Amphenol PL259 connectors .. .. .. **30p ea**
Belling coaxial connectors **10p ea**
50 ohm Heavy Duty coax .. **22p yd**
(Carriage extra)
J-Beam Antennas. Illustrated catalogue on receipt of S.A.E. Full range in stock.

G-Whip Antennas all ex stock. Catalogue by return.
Shure Microphones
Model 201 Hand **£5.75**
Model 444 Desk .. **£13.25**
Mosley Antennas
TA31 Jnr. **£15.50**
TA32 Jnr. E. **£25.00**
TA33 Jnr. E. **£35.50**
Hy-Gain Antennas
12 AVQ Vertical **£16.50**
14 AVQ Vertical **£24.50**
18 AVT/WB Vertical **£35.50**
LC-80Q Loading coil .. **£7.50**
TH3 Jnr 3 ele beam .. **£51.50**
TH3 Mk III 3 ele beam .. **£75.00**
TH6 DXX 6 ele beam .. **£97.00**
BN-86 Balun **£8.00**
(Carriage extra on Mosley/Hy-Gain)
Rotators. All post paid.
Stolle Memomatic 3001 .. **£22.40**
Stolle Automatic 201C .. **£28.00**
CDE AR20 .. .. .. **£20.40**
CDE AR22 .. .. .. **£26.65**
CDE TR44 .. .. .. **£45.75**
CDE HAM-M **£70.80**
Wightraps
Standard Pairs **£2.90**
High Power **£3.90**

An S.A.E. with all enquiries please. Don't forget to add 10% VAT on all prices shown.

HOME DEMONSTRATION SERVICE! As previously announced this is available on all new gear through our Northern and Southern representatives:

Northern: JOHN ROWLEY, G3KAE, Castle Rise, West Ayton, Scarborough. Tel: West Ayton 3039.
Southern: JEFF HARRIS, G3LWM, Cricketfield Lane, Bishop's Stortford, Herts. Tel: 0279-56347.

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£242.00 including VAT

THE NEW DRAKE R-4C RECEIVER

FEATURES—

- Solid State Linear permeability-tuned VFO with 1kHz dial divisions. Gear driven dual circular dials. High mechanical, electrical and temperature stability.
- Covers amateur bands with crystals furnished. Covers all of 80, 40, 20 and 15 metres, and 28.5-29.0MHz of 10 metres.
- Covers 160 metres with accessory crystal. In addition to the amateur bands, tunes any fifteen 500kHz ranges between 1.5 and 30MHz. 5.0-6.0MHz not recommended. Can be used for MARS, WWV, CB Marine and Shortwave Broadcasts.
- Superior selectivity: 2.4kHz 8-pole filter provided in SSB positions. 8.0kHz, 6-pole selectivity for AM. Optional filters of .25, .5, 1.5 and 6.0kHz bandwidth available.
- Smooth and precise passband tuning.
- Tunable notch filter attenuates carriers within passband.

Matching Transmitter T-4XC also available

- Transceiver capability. May be used to transceive with the T-4X, T-4XB, or T-4XC Transmitters. Illuminated dial shows which PTO is in use.
- USB, LSB, AM and CW on all bands.
- AGC with fast attack and two release times for SSB and AM, or fast release for break-in CW. AGC also may be switched off.
- New high efficiency accessory noise blanker that operates in all modes.
- Crystal lattice filter in first IF prevents cross-modulation and desensitization due to strong adjacent channel signals.
- Excellent overload and intermodulation characteristics.
- 25kHz calibrator permits working closer to band edges and segments.
- Scratch resistant epoxy paint finish.

FULL RANGE OF MATCHING TRANSMITTERS, LINEARS AND ACCESSORIES IN STOCK.
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NEW—HEATHKIT 2-METRE TRANSCEIVER HW-202

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*SINAD = $\frac{\text{Signal + noise + distortion}}{\text{Noise + distortion}}$

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QTC AMATEUR RADIO NEWS

Switzerland and Lichtenstein operation

A recent decision by the Swiss PTT has altered the method of allocating callsigns to visitors to Switzerland. Instead of the HB9X series used hitherto, visitors may now use their own callsign/HB9. In the past the Swiss PTT has reissued, after a short time, reciprocal callsigns. This has caused some confusion, particularly in connection with QSLs, and the new system will have a considerable advantage. The Swiss authorities have said that if there is evidence of operation without the necessary permission having first been obtained then they will revert to the former system.

For those persons wishing to operate from Lichtenstein it should be noted that the Swiss PTT require five days notice of the proposed operation.

Eclipse propagation experiment

The latest news concerning this experiment, preliminary details of which were given in the May issue of *Radio Communication*, is that two stations will operate during the eclipse with the callsign 5T5SOL.

One station will transmit on 14,050kHz using a KWM2. The second station will transmit on 21,050kHz using an FL200B. The period of transmission will be from 0930 to 1130gmt. Both stations will operate independently as beacons transmitting the callsign 5T5SOL every 20 seconds with a dash following the callsign.

In accordance with the request made in the May issue, reports on reception of these stations should be sent to S. Canivenc, F8SH.

Oscar 6

How is Oscar doing? Contrary to rumours, AMSAT says Oscar 6 is not near the end of its life. It is felt that Oscar will achieve the one-year design lifetime, but complete co-operation of users becomes an increasingly vital factor. The operating schedule has been modified, leaving the satellite on for Thursday, Saturday and Monday gmt each week, to provide more frequent battery recharge periods. Recharging cannot take place if amateurs use the repeater during the off days. If you find the repeater on when it should be off, please do not transmit in the 145·9 to 146MHz uplink band. Observance of the 100W effective radiated power limitation is another positive step to ensure continued good performance.

The following orbit predictions are advised by AMSAT. The figures refer to orbits within range of North America but subsequent orbits can be obtained by the addition of 115 minutes and 28·75° for each successive orbit. The weekly news bulletins on GB2RS carry orbit predictions provided by the Radio and Space Research Station.

S-N orbit No	Date	Time (gmt)	Longitude of equatorial crossing
2,872	2 June	0054	60·9°W
2,960	9 June	0133	70·8°W
3,047	16 June	0018	51·9°W
3,122	23 June	0057	61·8°W
3,223	30 June	0137	71·7°W
3,310	7 July	0022	52·8°W

Licensing conditions—callsigns

Members are reminded of the conditions of the amateur (sound) licence with regard to identification by means of callsigns. The relevant clause, which is Clause 9(2), states: "The callsign, which may be sent either by morse telegraphy at a speed not greater than 20 words per minute or by telephony, shall be sent for identification purposes at the beginning and at the end of each period of sending, and whenever the frequency is changed. When the period of use exceeds 15 minutes, the callsign shall be repeated (in the same manner) at the commencement of each succeeding period of 15 minutes."

It has been reported by the MPT that there is a growing tendency for amateurs using ssb in groups to ignore this licensing requirement, and continuous transmissions up to half an hour have been heard.

Members are therefore asked to ensure that proper identification by means of callsigns is given as required by the licence.

Licence figures

The Ministry of Posts and Telecommunications advises that the following numbers of amateur licences were in force at 28 February 1973.

Class A	14,558	Class B/M	884
Class B	3,853	Television	237
Class A/M	2,901		

ITU membership

Information has been received from the headquarters of the International Telecommunication Union in Geneva that Qatar and the German Democratic Republic have acceeded to the International Telecommunication Convention and have become members of the ITU. These two countries are the 144th and the 145th members of the ITU.

In the amateur radio context it seems likely that there will soon be steps to obtain recognition for the German Democratic Republic as a separate "country". The national society of the GDR has indicated that it will shortly apply for membership of the IARU.

Solar events in August 1972

Following the exceptional solar and geophysical events that occurred during the period 2–8 August 1972, the URSI have requested the collection and analysis of data obtained by observations during this period.

The International Amateur Radio Club (Geneva) invite contributions for a special CPR (Contributed to Propagation Research) Award to amateurs sending in log extracts for the period in question. Log extracts are requested for the following times and dates:

0000 26 July to 2359 1 August;
0000 9 August to 2359 14 August;
0000 2 August to 2359 8 August.

Logs should be sent to the International Amateur Radio Club, Box 6, 1211 Geneva 20, Switzerland. General conditions relating to the CPR Award are also obtainable from this address.

This is a unique opportunity for radio amateurs to make a worthwhile contribution and the results of the CPR Award will be evaluated from the point of view of propagation studies.

Area representatives

There is a need for area representatives in Region 12 (North Scotland) which comprises the counties of Aberdeen, Angus, Banff, Hebrides, Inverness, Kincardine, Moray and Nairn, Perth, Ross and Cromarty, Shetland, Sutherland and Orkneys.

Will any member who will act as representative for any area covered by these counties, combined if necessary where there is not already a representative, please notify RSGB headquarters.

GB2RS

At this time of year we frequently receive requests to include in GB2RS news bulletins long detailed particulars of forthcoming events—usually mobile rallies.

The time available for the news bulletins is only sufficient to allow inclusion of a summary of the arrangements for events, and it would assist the preparation of the news bulletins if organizers and PROs would keep this in mind.

The news bulletins are intended to supplement the information given in *Radio Communication* and to provide additional up-to-the-minute news. If a rally is several weeks ahead details should be sent to the editor of *Radio Communication*, as it is likely that only a reminder on probably the two Sundays before the event will be broadcast over GB2RS.

RSGB Awards Leaflet

The awards leaflet which had been in use for several years until the latest one was published at the end of the last year should not be used for claims submitted after 30 June 1973. The latest list, which includes the Countries List, can be obtained from RSGB headquarters on application with a large stamped addressed envelope.

Second BARTG Convention

At this second convention to be organized by the BARTG, a complete cross-section of teleprinter activities will be featured. As well as a working teleprinter station, using the callsign G4ATG around 14·090MHz, there will be lecture sessions, trade stands, bring-and-buy stall, demonstrations of usual and not so usual equipment, and a "teleprinter art" competition.

Among the lectures planned will be "Advice for beginners" by D. Goacher, G3LLZ, and "Operating an hf rtty station" by D. Beattie, G3OZF. Entries for the "art" competition are welcomed, and tapes should be sent to G3LLZ QTHR.

The address of the convention is: Meopham Village Hall, Meopham, near Gravesend, Kent, and the activities will begin at 11am, finishing at 6pm. Talk-in facilities will be available on 2 and 4m, full local signposting will be in operation, and trains arriving at Meopham station from London will be met (up to 1300hrs). For further details and maps contact G. Shirville, G3VZV, 2 Orchard Close, Toddington, Dunstable, Beds, tel Toddington 2470.

160m operation in Germany

Following the proposal from DARC, the German Bundepost has extended the frequencies available, at present 1,825–1,835 kHz, to 1815–1,835kHz. The former portion between 1,985 and 1,992kHz is no longer available. The sub-allocation for ssb remains 1,832–1,835kHz.

RSGB Diamond Jubilee—GB3RS

Between 30 June and 14 July, GB3RS will be operated from Tonbridge School, Kent, by members of Tonbridge School Radio Society, under the supervision of Tim Hughes, G3GVV, Immediate Past President of the RSGB (Director of Technology at Tonbridge). Operation will be on all bands from 3·5 to 28MHz, using A3J. A special QSL, sent via the bureau, will confirm all contacts.

Can you help?

The daughter of Jean Pauc, F3PJ, of 2/53 Allée Anatole France, 92220 Bagneux, France, would like to exchange letters with an English girl about 12 years of age.

Mr T. I. Jenkins, of 74 Rhos Road, Colwyn Bay, North Wales, is writing a book concerning the exploits of marine radio officers in the second world war which he intends to dedicate to the 1,500 radio officers who lost their lives in the war. Although he has already received much information, more is needed, especially concerning personal experiences, and members who can help are invited to write to him.

To assist in remounting a mobile exhibition of equipment used by the French Resistance during the second world war, and which was unfortunately lost by fire, Mr W. J. P. Hayes, G3CJQ, of 34 Old Farm Close, Hounslow TW4 7AB, would like to hear from anyone who has an old B2 transceiver, power pack and headphones, and an MCR1 or American equivalent not in working order. As long as they are presentable on the outside, even if gutted, he would be grateful—but please do not send any items in the first instance.

Pitcairn - rare dx

For some years Mrs Chris Kiddell, BRS25911, a member of RAIBC, has been tracking down rare dx stations and now at last she has heard Tom Christian, VR6TC, on Pitcairn Island and QSL cards have been exchanged. Chris sent a collection of postage stamps and in return VR6TC sent coloured slides, a documentary tape and other information on the mutiny on HMS *Bounty* and life on Pitcairn today.

Any school or club which would like to show these slides and listen to the documentary should contact Chris Kiddell at 79 Elfrida Crescent, Bellingham, Catford, London SE6 3EL. A donation of 25p to the RAIBC is requested and a projector and tape recorder (1⅞ips) are required.

The G2DAF ssb transmitter Mark 3

The author of this article advises us of a further circuit error Fig 2(*c*), page 161 of the March issue of *Radio Communication*, and apologises for any inconvenience caused.

This error is associated with V9. The rfc should connect to the cold end of all the coils L4 to L9. The pole of S7 should connect to the anode of V9 (pin 7).

G3OLM teleprinter unit

Intending constructors of this piece of equipment (see "A modern approach to radio teleprinting", *Radio Communication*, May 1973), should note that an error crept into the circuit diagram of Fig 3a.

Resistor R22 is incorrectly labelled as 680Ω—the correct value is 33kΩ. The parts list given on p318 shows the correct value.

ALTHOUGH enjoying the facilities of a kit-constructed frequency meter, the author felt he ought to try and overcome some of the deficiencies shown not only in the shack meter but also in published designs. The resulting design, to be described here, embodies portability, miniaturization, dc to 30MHz response, high sensivity and input impedance, and will operate from a mains supply or 12V battery. Indication of correct operation of the input Schmitt trigger is shown by light-emitting diodes (LEDs), and seven-segment filament indicators (Minitrons) are used instead of the usual Nixie tubes. The meter is more expensive than the Nixie-readout type, but by no more than £5, and, apart from the intricacy of the etched circuit boards (ECBs), is no more difficult to make.

Despite its modest size, the meter features dc to 30MHz response with good sensitivity, and has a built-in power supply

The G3XGP frequency meter

by W. H. BOND, G3XGP*

Circuitry

IC circuitry is such that close similarities will inevitably appear between one design and another, so that rather than set out on an individual design, published circuitry was freely raided for ideas, with improvements incorporated where the tested behaviour was unsatisfactory. The basic circuit of the meter is shown in Fig 1, the areas enclosed within the dashed lines indicating the circuit and functions of the three ECBs. No ecb is required for the power supply, which can be self-supporting or attached to the case.

Input amplifier and Schmitt trigger

The design provides good sensitivity and pulse-shaping, and requires a single +5V supply. The first stage uses a jugfet which, operating at 2-3mA, gives good gain when worked with a bypassed source resistor and low drain load. The input to the fet is protected by two OA200s, and the incoming signal levelled by R1/C1. TR2 and TR3, both pnp transistors, provide additional voltage and current gain, all resistors being of low value to keep the frequency response high. The exact operating point of TR3, the input to the Schmitt, is determined by very careful setting of the variable resistance in the source lead of the fet, until TR3 just switches on. R3a is included, if required, to meet the needs of any particular fet.

The application of rf to TR1 gate results in TR2 being switched harder on during positive excursions, thus raising the voltage of TR3 base to switch it off. This fires the Schmitt, TR4 going on, TR5 off and TR6 on, until the negative excursion at the input restores the Schmitt. The output is taken from the emitter of TR6, which is also connected to 0V through an l.e.d., with current restricted to 15mA by a series resistor. The l.e.d. illuminates when the Schmitt is operating and is extinguished when there is no rf input, and also allows the circuit to be set up without a meter.

The transistors employed are cheap—the GP25 costs around 10p, as does the ZTX300 and 500. Other FETs may be used if their Vp is about 3V, and the ubiquitous 2N3819 has been used. The 2N3823 or BFW10 will also work, with minor changes in source resistance value.

It must be emphasized that the input amplifier and the Schmitt are the only areas requiring care in layout and adjustment. A common and low impedance earth is required to all stages and it is recommended that the layout illustrated in Fig 3 be adopted. Furthermore, a very stable power supply

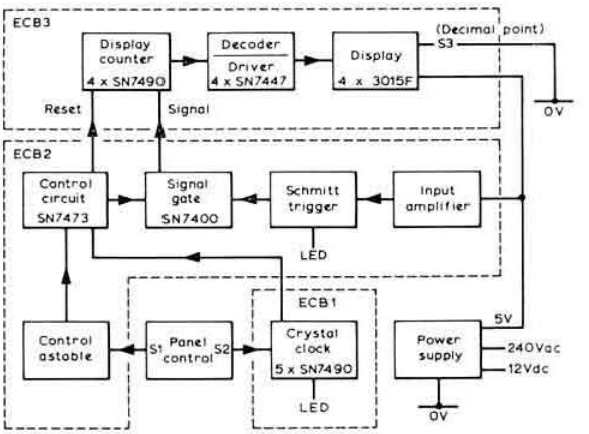


Fig 1. Block diagram of the complete frequency meter. The areas within the dashed lines indicate the portion of the circuit mounted on each ecb (etched circuit board)

* 23 Chantry Road, Moseley, Birmingham B13 8DL.

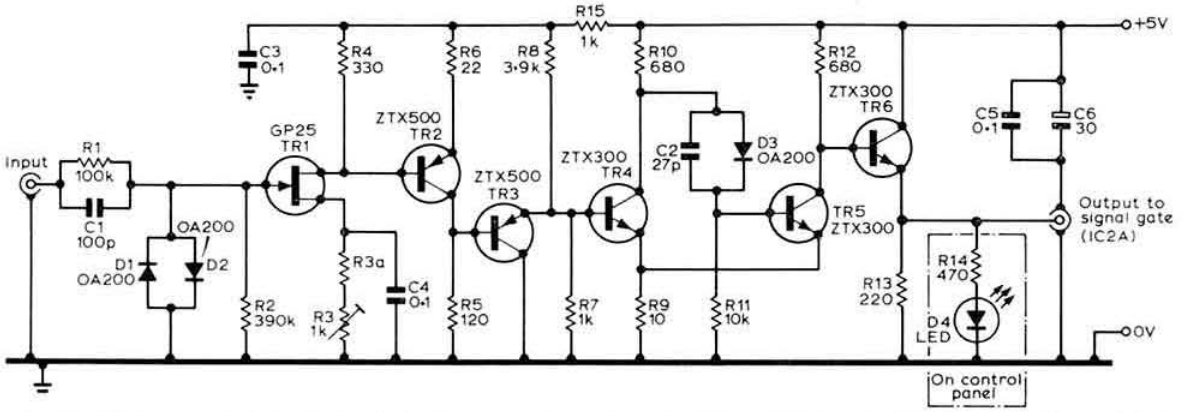


Fig 2. The input amplifier and Schmitt trigger. It is important that layout and setting-up of this portion of the circuit is done with care, preferably following the component layout shown in Fig 3. The +5V ht must be zener-stabilized, even when a battery supply is used for test purposes

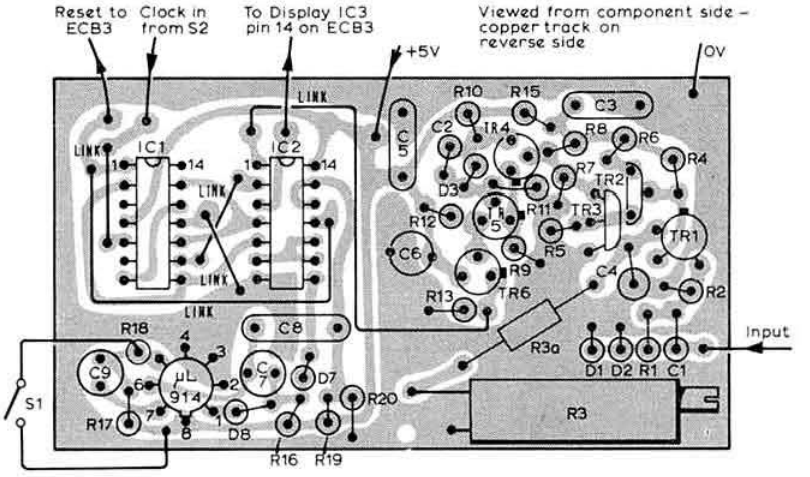


Fig 3. Component layout on the input amplifier, Schmitt trigger, signal gate and control circuit board (ECB2). The copper strip on the reverse side of the board is also shown

is essential, and even when tested on a battery, zener stabilization should be used.

The setting of the source resistor R3 is delicate if the very high frequency response expected is to be obtained, and R3 should be a multi-turn potentiometer, which may be placed on the panel as a sensitivity control. An increase in sensitivity at audio frequencies may be obtained by increasing the value of C4 to several microfarads, and at the higher frequencies by bypassing R6 with a 1,000pF capacitor.

Crystal clock

The clock is entirely conventional, save for the use of a μL914 as the active element, which was only because of its ready availability. A pair of ZTX300s, BC108s, or 2N706s may be equally successfully substituted. Indication that the clock is operating is given by an l.e.d., driven from the 1Hz output via an npn transistor. The SN7490s are connected to divide by five and then by two, a configuration giving a sharper fall time than the alternative connection; the clock intervals of 1s, 0·01s and 0·0001s are selected by a switch, S2, and then applied to the control circuitry to give hertz, kilohertz and megahertz readouts respectively. The same switch also moves the decimal point appropriately. The only adjustment required is to the crystal series capacitor, which may be adjusted against a meter of known accuracy or by beating the second harmonic of the crystal against Droitwich through a receiver, see Figs 4, 5 & 6.

Control astable and signal gate

These are accommodated on ECB2 (Fig 3, 7 & 8) using a μL914 as the active element in the control astable, though again a pair of small-signal npn transistors may be substituted. If transistors are so used, as in the crystal clock, additional resistors will be required to substitute for those in the ic (Fig 7). The astable is arranged to give two differing periods of 0·5s and 3s, the former being used for the two high frequencies and the latter for the lower to provide comfortable readout times. This is achieved by a simple switched change of value of the bias resistor to TR4.

The only difficulties likely to arise in this stage lie in the choice of the SN7400, so it is worthwhile testing each gate by applying 5V to pin 14 and 0V to pin 7. The outputs are from pins 3, 6, 8 and 11, and any reasonable voltmeter should indicate 0·5V at these pins when the others are open. Shunting both pins of a gate to earth should change the reading to 4·5V, the output staying low if only one pin is

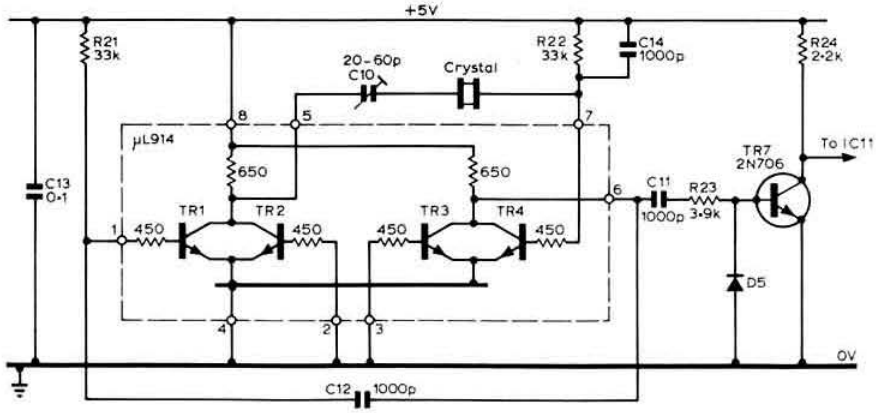


Fig 4. The crystal clock. The components within the dashed line represent the μL914, with pin numbering for the TO5 encapsulation

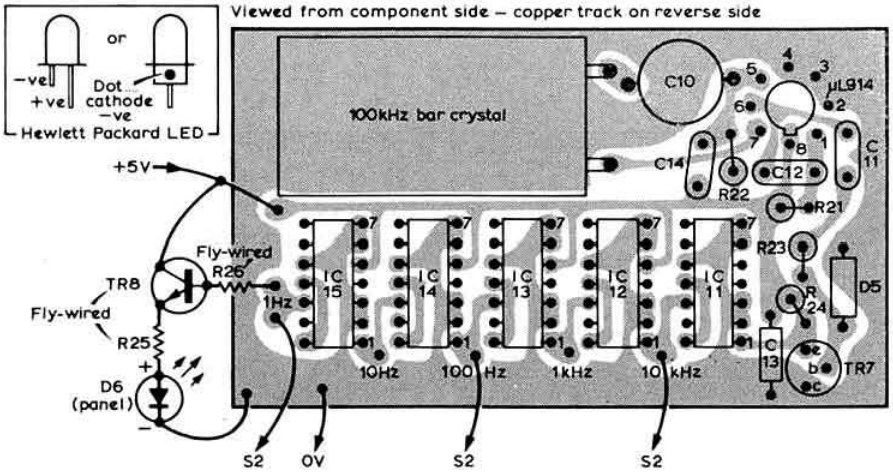


Fig 5. Component layout on the crystal clock board (ECB1), also showing the copper strip pattern on the reserve side

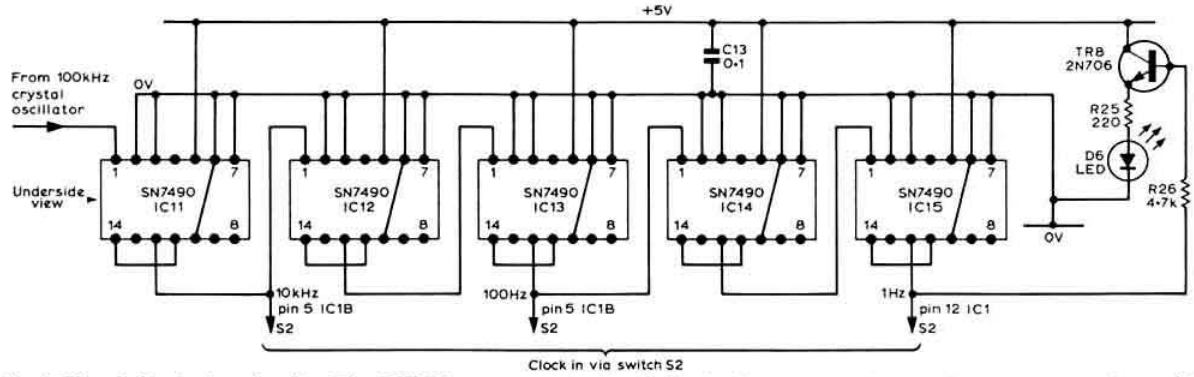


Fig 6. The divide-by-ten circuitry. The SN7490s are connected to divide by five and then two, which produces a sharper fall time than the alternative connection

shunted. Applying 4·5V to one or both gates should keep the reading low.

The astable is controlled from gate c, on IC2 (SN7400) via D7, and its period adjusts the readout time through S1, R17 and R18, and also operates through IC2 gate d to provide a positive-going reset pulse to ICs 3, 5, 7 and 9 on ECB3 and a negative start-count voltage to IC1a (Figs 7 and 8). The SN7473 is much more difficult to test, and the only advice offered is that the board should be made up, whereupon a scope or meter will show an intermittent signal on the display output pin 3 of IC2a if the SN7473 is operating correctly. Note that the J & K inputs of IC1 (Fig 10) are

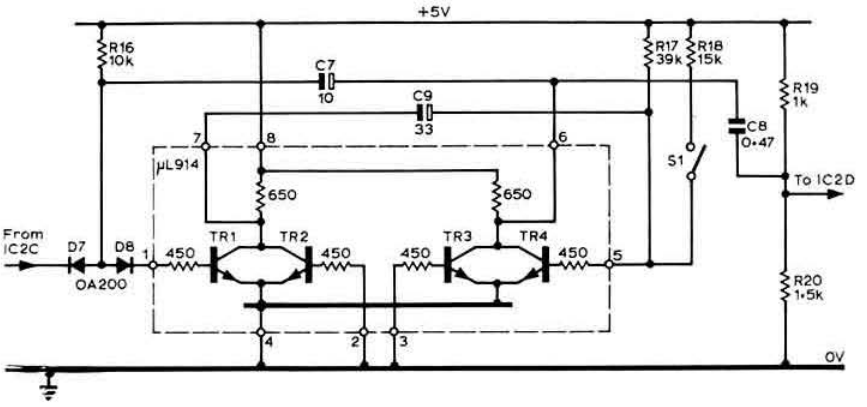


Fig 7. The control astable circuit. A μL914 is the active element, pin numberings are for the TO5 encapsulation

left open, though they may be taken to 5V through a 1kΩ resistor, following conventional practice. Details of the connections between the SN7400 and the SN7473 are shown in Figs 3, 6, 7 and 8.

Decoder, driver and display circuits

The output from the Schmitt trigger is a square-wave simulant of the input waveform, and is fed to the driver/display board ECB3, where SN7490s sequentially divide by 10 and feed the answer in binary code to the SN7447s (Fig 9). Each SN7447 feeds a decimal conversion to a single Minitron seven-segment display unit. Note that the SN7447s have open collector outputs, the circuit being completed through the common connection on the Minitrons, tied to 5V. The decimal point, however, has to be taken to 0V through the switch via pin 9. Since not all 7490s work up to 30MHz, a

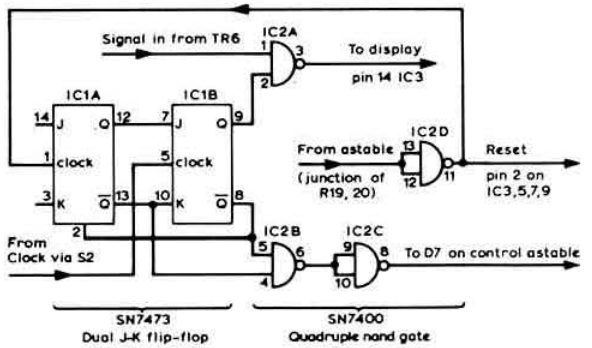


Fig 8. Control circuit and signal gate

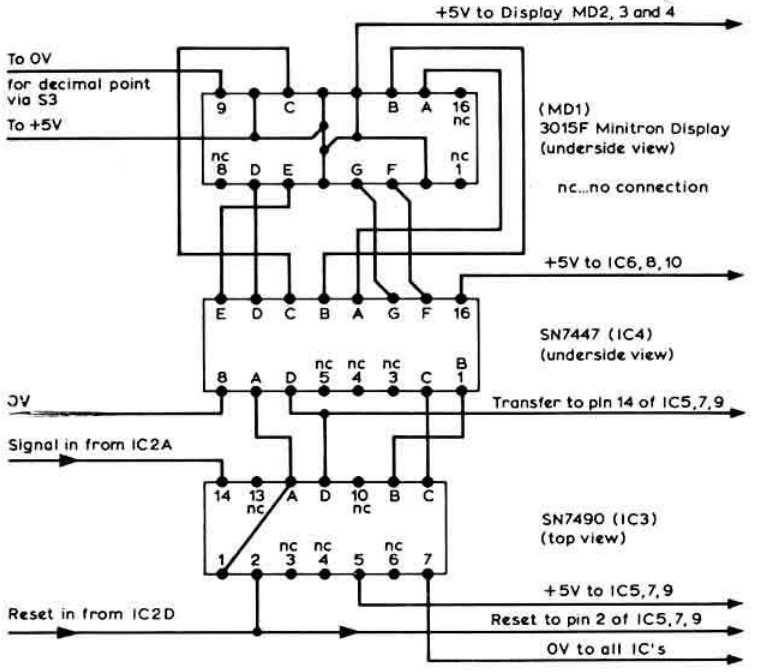


Fig 9. Display-board circuitry

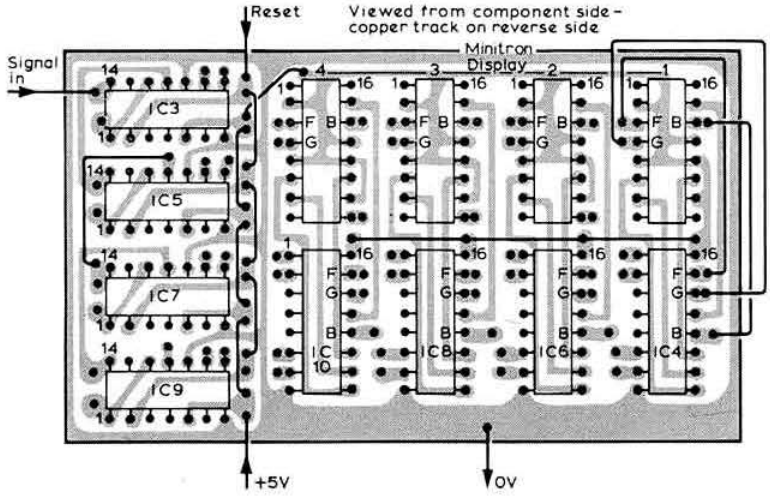


Fig 10. Display module (ECB3), showing fly links between the SN7447 and 3015F Minitron display units. The links between IC4 and Display 1 should be repeated between IC6 and Display 2, IC8 and Display 3, and IC10 and Display 4

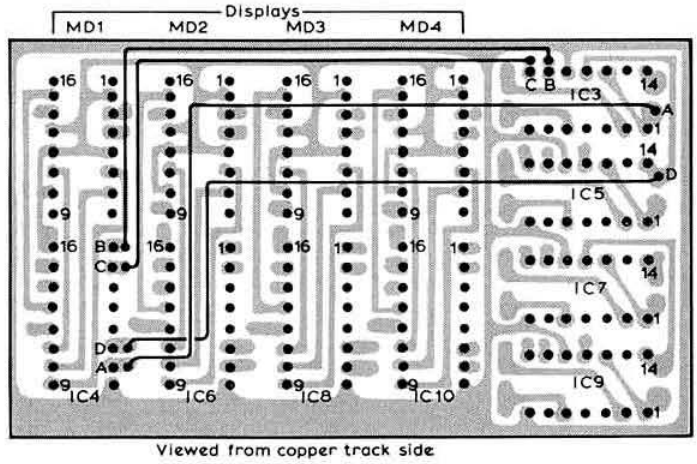


Fig 11. Reverse side of the display module, showing the fly links between the SN74905 and SN7447s. Links shown between IC3 and IC4 should be repeated between IC5 and IC6, IC7 and IC8, and IC9 and IC10

selected component should be chosen for the input, IC3. This may be done by temporarily fitting an ic holder on legs to the ecb, and trying all the 7490s in turn until the fastest is found. The only constructional difficulties arise from the complexity of the inter-ic wiring and the need for the interconnecting wiring to be virtually on the pins (Figs 9, 10, 11).

This board was planned to be placed on the front panel of a transceiver as a direct readout of transmit/receive frequency, for screening would be simple, and only three wires connect it to the control and input signal circuitry.

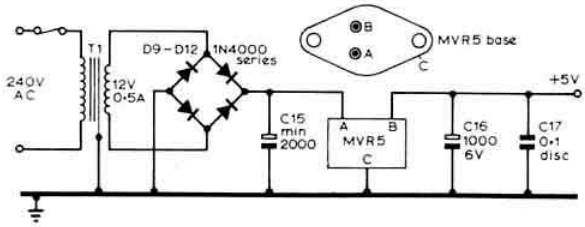


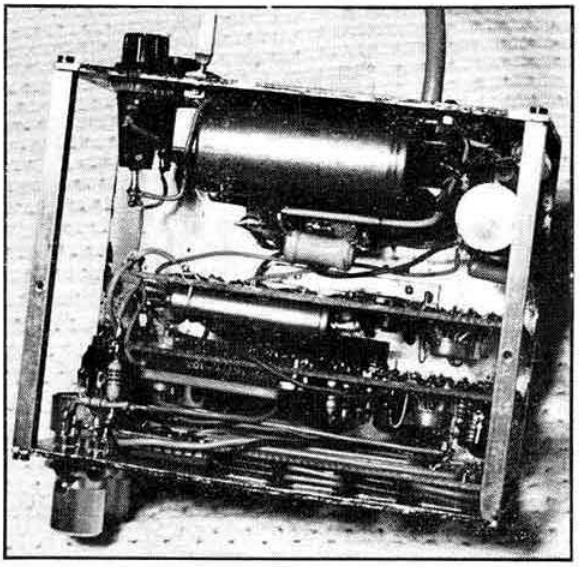
Fig 12. Power supply, and pin configuration for the MVR5 voltage regulator (C15–18V)

Power supply

A very stable source of 5V at 500mA is required, and in the prototype was provided by a standard zener-stabilized transistor circuit. However, now that the Radiospares series of voltage regulators is available, providing better than 1 per cent stabilization with internal foldback current limiting at 5V ± 0·25 and 600mA, this is the obvious choice. A small 12V transformer followed by a diode ring (1N4000 series) and two generous capacitors are all that is required, the voltage regulator, in its TO3 case, being bolted to the rear case to provide heat sinking (Fig 12). Provision for battery operation is easily met if power is supplied through a 10W, 10Ω wire-wound resistor connected to the input of the voltage regulator. This, of course, reverse biases the bridge, enabling mobile and portable licence requirements to be met.

Construction

The case is made of two pieces of 18swg aluminium. The base, carrying the power supply and the ECBs, is strengthened by two ¼in tie-rods of brass, to which the cover is attached by two 8BA screws. Spray painting is desirable, the black must



This view of the meter with the cover removed illustrates the positioning of the printed circuit boards. The large capacitor at the rear of the unit is part of the integral power supply

be acrylic and baked, followed by the usual wet and dry emery. Letraset transfers sealed with varnish complete the finish.

Preparation of the ECBs is a very delicate task to be attempted only by those with considerable experience. While the diagrams may be suitable for photocopying, etched though, undrilled boards may be made available by the author. The holes must be bored with a number 60 drill, or even finer: soldering is best done with 60/40 22swg using a fine iron or a piece of 16swg copper wire shaped to a bit and wrapped round the end of a larger iron. Apart from an extremely careful check of the inter-ic wiring, a final step should be to draw a scriber between each copper strip and soldered joint. Emphasis is laid on *scriber*, since a knife may well cut off a sliver of copper and short-circuit the board. An old tooth brush scrubbed hard over the board will make quite sure that any debris is removed.

Assembly and testing

It is recommended that the clock be made in the first place and its operation checked either by the l.e.d. in the output or by a dc voltmeter on the 1Hz output. The next step should be to prepare the decoder/display board, ECB3, so the clock then provides a suitable square wave for test purposes. Note that the Minitron/SN7447 combination is designed to count up to 15, and if weird configurations of filaments appear an error has been made in the wiring.

Next, prepare the Schmitt trigger, including TR3 and the l.e.d. in the output. Note that the base of TR3 is only 0·1V above ground and only a very low level of rf is required to fire the Schmitt. After satisfactory operation of the Schmitt has been obtained proceed to the input amplifier, adjusting R3 so that TR3 just goes on, as indicated by the l.e.d. extinguishing. Without the l.e.d. an ac meter or scope should be used with rf, though a dc meter will suffice for initial setting. If satisfactory results are not obtained, changes to R3 or R6 are advisable. If the l.e.d. will not illuminate, reduce the value of R6, first having checked that no more than 3mA are flowing through the fet, for this manoeuvre increases the voltage on TR3 base pulling it towards cut-off. If the l.e.d. will not extinguish, there is too much current through TR3, either because R3 is not high enough to reduce the current through the fet, or because TR2 has a particularly high gain, and an increase in the emitter resistor R6 is required.

Next, make up the control astable on ECB2, and with no control diode (D7), the circuit should oscillate at a slow rate, altered by bringing in R18 via S1. Having selected a good SN7400, complete ECB2, being especially careful about the flying interconnections. Finally, assemble the meter, and, assuming that the power supply is stable and the SN7473 is a good one, any failure to operate must be due to an interboard wiring fault.

The only further adjustment required is to adjust R3 to achieve maximum sensitivity at the highest possible frequency.

New publications . . . . . .

"Transistors—the first 25 years 1948-1973"

The twenty-fifth anniversary of the invention of the transistor at Bell Telephone Laboratories in 1948 was celebrated by devoting the January and February issues of the *Radio and Electronic Engineer* to papers on the historical, circuit and applications aspects of transistors. There are more than 20 articles covering semiconductor physics, semiconductor circuits, the influence of semiconductors on systems and general reviews. Authors are drawn from industry, research and government departments.

Obtainable from Publications Sales Department, IERE, 9 Bedford Square, London WC1B 3RG. Size 21 by 29·5cm, 176 pages. Price £2 post free.

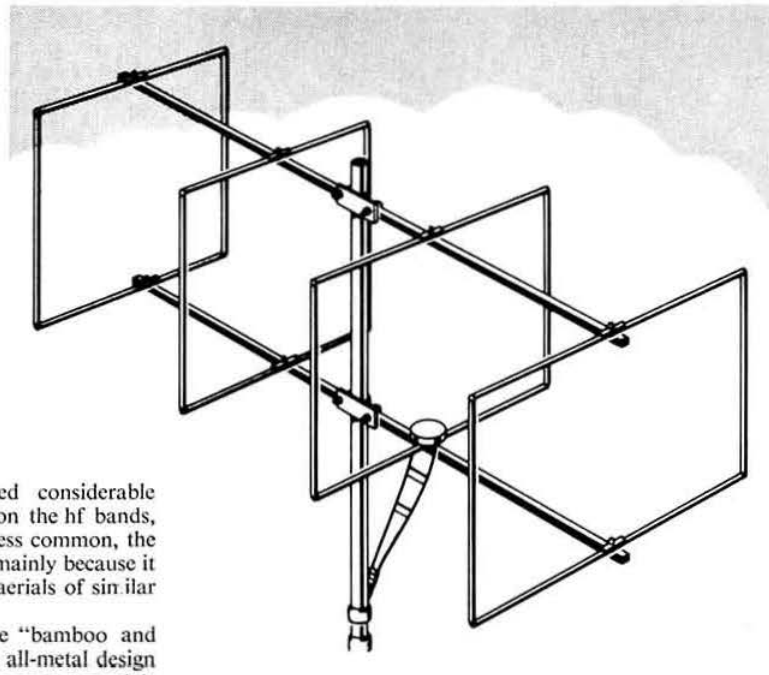
"The Semicon Index"

The *International Transistor Data Manual* is the first volume in a series designed to provide comprehensive information on discrete circuit elements in the semiconductor field. The manual contains data on some 18,000 transistors listed in alpha-numeric sequence. Each entry is on a single line and identifies the device followed by the characteristics. A separate section provides information on terminations. All transistors are listed in the main section and are additionally shown in separate sections giving information on field effect transistors and CV numbered devices. The manual provides valuable and accessible information for both the professional and radio amateur users.

Semicon Index Vol 1, *International Transistor Data Manual*, 1973 edition. Size 18·5 by 25·5cm, 355 pages. Obtainable from Semicon Indexes Ltd, 29 Denmark Street, Wokingham, Berks, RG11 2AY. The UK price is £5·25 plus 35p postage and packing.

Quad aerials at vhf

by D. UNWIN, G8CKU*



THE cubical quad aerial has enjoyed considerable popularity for many years, particularly on the hf bands, and although its use at vhf has been much less common, the author became interested in it at 145MHz, mainly because it always seemed to look smaller than other aerials of sin ilar gain.

The usual method of construction is the "bamboo and wire" approach, but it was decided that an all-metal design would be preferable, particularly as the necessary materials could readily be obtained in the form of discarded Band 3 television aerials.

How it developed

The first aerial to be built was a three-element type based on dimensions given to the author by G2XV, who had used it with great success for some years. It worked quite well, but the swr was poor and this was assumed to be the result of using metal tubes in place of the wires used by G2XV.

At this time an excellent article [1] was discovered describing an all-metal two-element quad and this was built. The dimensions were not exactly as described in the article, but the total distance round the loops was kept the same. The results were good and agreed closely with those in the article mentioned.

The next aerial to be tried was a three-element type using the two loops of the previous aerial together with a director of the usual shorter length than the driven element. The first spacings tried were those of the G2XV design and this worked so well that no further development was attempted on this aerial; it was fitted to the mast and gave excellent results for about two years.

The four-element quad

When the aerial eventually had to be moved, it was decided to attempt to extend it to four elements using the existing elements with a second director in front. When the element spacings were determined they turned out to be similar to the author's commercial four-over-four slot-fed aerial, which is really not too surprising since one could consider the quad to be made from a pair of four-element Yagis mounted one above the other, with the ends of the elements bent towards each other and joined.

* 11 Carlton Rise, Melbourn, Royston, Herts.

The next experiment was to assemble the quad on the booms of the four-over-four and try exactly the same spacing. This resulted in an aerial with a gain of 10·5dB and an swr of 1·2, which made it slightly better than the four-over-four.

Construction

For all three aerials the method of construction is the same. The quad loops are of constant height and look like a pair of Yagi aerials mounted one above the other, the bottom one being fed with a balun at the centre of its driven element. The ends of the elements are flattened and drilled. The vertical members also have their ends flattened and drilled and are bolted between the ends of the horizontal elements of the two "Yagis" thus forming complete loops.

Table 1

	2-el	3-el	4-el
Height (inches)	21	21	21
Width (inches)			
Reflector	24½	24½	24½
Driven	20½	20½	20½
Director 1		18	18
Director 2			16
Spacing (inches)			
Reflector to Driven	7	19	20
Driven to Director 1		12	14½
Director 1 to Director 2			14½
Gain	5dB	7·5dB	10·5dB

The dimensions given in Table 1 are the centre-to-centre distances of the completed aerial, which is the same thing as the distances between hole centres. The diameter of the elements is ⅜in and the feed impedance in all cases is 75Ω.

Future development

At 10·5dB the gain of the four-element quad is in no way remarkable, being about the same as a four-over-four or an eight-element Yagi. However, it does look a lot smaller than other aerials of similar gain and has the additional advantage of being much more robust. Could the quad perhaps be extended to five or more elements? The problem here is that the height of the loops is necessarily constant with this type of construction, so that the directors become rapidly narrower as the aerial is made longer. For example, the last director of a six-element quad would be only 12in wide and that of an eight-element only 8in, assuming the usual rate of taper. In the opinion of the author, four or five elements are probably the optimum number, and extra gain could best be obtained by stacking two aerials.

Reference

[1] "A cubical quad array for the 144Mc/s band", R. C. Hills, G3HRH, and P. M. Elton, G3GOZ, *RSGB Bulletin* April 1959.

NEW PRODUCT

TVI filter

Waters Electronics announce the availability of their HP1A television interference filter. This filter is designed to remove interference from hf signals often far removed in frequency from the television uhf band. The rapid growth of business radio and local broadcast stations has brought to light the low standard of immunity possessed by many domestic receivers to out of band signals. In many cases the rf energy causing the interference is picked up on the outer sheathing of the coaxial feeder and conventional filtering of the inner conductor will frequently not remedy this interference. The manufacturer states that the HP1A filter will reject currents flowing in both inner and outer conductors.

An extremely low insertion loss is claimed for the filter, of which the physical dimensions are diameter 1¼in, length 2¼in. As will be seen from the accompanying photograph the filter terminations are standard Belling-Lee coaxial plug and socket. The retail price of the filter is £1.20 plus 12p VAT, and is obtainable from Waters Electronics, 8 Gay Bowers, Hockley, Essex.

RSGB QSL BUREAU SUB-MANAGERS

(At 1 May 1973)

G2:	J. W. Russell, G2ZR, 45 Shakespeare Avenue, Bath.
G3, 4 and 5 two-letter calls and GC:	E. G. Allen, G3DRN, 30 Bodnant Gardens, London SW20.
G6 two and three-letter calls; G8 two-letter calls:	A. J. Mathews, G6QM, 62 Ashlands Road, Hesters Way, Cheltenham, GL51 0DE.
G3AAA-DZZ:	C. A. Bradbury, BRS1066, 13 Salisbury Avenue, Cheltenham, GL51 5BT.
G3EAA-HZZ	W. J. Green, G3FBA, 29 Oaklands, Old Buckenham, Attleborough, Norfolk.
G3IAA-KZZ:	G. L. V. Butler, G2BUL, 9 The Heath, Chaldon, Caterham, Surrey, CR3 5DJ.
G3LAA-NZZ:	C. A. P. Henderson, 76c The Avenue, Beckenham, Kent.
G3OAA-PZZ:	J. H. Brazzill, G3WP, 43 Forest Drive, Chelmsford, Essex CM1 2TT.
G3RAA-RZZ:	D. Dell, G3PQF, 6 Rye Close, Cove, Farnborough, Hants.
G3SAA-TZZ:	E. G. Allen, G3DRN, 30 Bodnant Gardens, London SW20.
G3UAA-VZZ:	D. Dell, G3PQF, 6 Rye Close, Cove, Farnborough, Hants.
G3WAA-XZZ:	F. G. Rylands, G2VF, 39 Parkside Avenue. Millbrook, Southampton, Hants, SO1 9AF.
G3YAA-ZZZ:	F. G. Hoare, G2DP, 63 Mill Road, Three Bridges, Crawley, Sussex.
G4AAA-AZZ:	R. I. Buckby, G3VGW, 23 Hazel Drive, Spondon, Derby, DE2 7DS.
G4BAA-CZZ:	R. F. Rawlings, G3WBV, 74 The Lindens, Field Way, New Addington, Surrey.
G5AAA series, all prefixes:	E. G. Allen, G3DRN, 30 Bodnant Gardens, London, SW20.
G8AAA-EZZ:	A. J. Mathews, G6QM, 62 Ashlands Road, Hesters Way, Cheltenham, GL51 0DE.
G8FAA-GZZ:	R. E. Parkes, G3REP, 94 Canterbury Walk, Cheltenham, Glos, GL51 5HF.
G8HAA series:	Mrs A. J. Mathews, 62 Ashlands Road, Hesters Way, Cheltenham, GL51 0DE.
GB series:	C. Turner, G8NL, 56 Sunny Bower, Tottington, Bury, Lancs, BL8 3HL.
GD:	T. R. Moore, GD3ENK, "Glyn Moar," St John's, Isle of Man.
GI:	R. R. Parsons, GI3HXV, 45 Erinvale Avenue, Finaghy, Belfast.
GM:	D. Macadie, GM6MD, 154 Kingsacre Road, Glasgow, G44 4LY.
GW:	J. L. Reid, GW3ANU, 28 Waterston Road, Gabalfa, Cardiff.
BRS and A numbers:	J. W. Garrett, G3YOU, 201 Bishops Oak Ride, Tonbridge, Kent.

MICROWAVES—1,000MHz and up

by DAIN EVANS, G3RPE*

New UK microwave records

Perhaps to celebrate their receiving the Fraser Shepherd Award at the VHF Convention, G3BNL and G3EEZ took trips respectively to Dartmoor and the Prescelly Mountains on Easter Monday. Using the narrow-band equipment as described in the January column, they covered this now well-trodden 98-mile path on 13, 9, 6 and 3cm, all at S9. In doing this, they broke their own UK records on 9cm and 6cm and now can claim Microwave Awards for 3cm. A good morning's work.

Propagation studies on the microwave bands

Several people mentioned at the recent VHF Convention that they were interested in doing some worthwhile studies on propagation at microwave frequencies—worthwhile in the sense of being of direct value to professionals. A problem is to determine the gaps in our knowledge which we could usefully fill, and to do this we will have to look towards the more professional amateurs who are familiar with the field. Presumably there are areas where professional and amateur approaches are complementary. One can foresee that much ingenuity will be necessary in the design of experiments so that useful information will be obtained despite the limited facilities of most amateurs.

It is likely that there are other amateurs who would be interested in joining in this activity, especially if they can receive some guidance in producing and handling the results. The writer will be pleased to hear from them. If there is sufficient interest, it might be worthwhile organizing a meeting to discuss ideas in more detail.

Injection locking

The exhibition of an injection locked Gunn diode oscillator for 10GHz at the VHF Convention, by G8APP, prompts a look into this potentially most useful technique. Its main feature is that it offers a relatively simple method for converting wide-band equipment to crystal-controlled standards, and goes a long way towards avoiding the need for a high powered chain of multipliers necessary to generate rf directly.

The principle of injection locking is delightfully simple. A low power crystal-controlled signal is injected into a free-running oscillator. As the oscillator is tuned to within the locking range of the system, it will jump in frequency to that of the signal and remain locked onto it. In this respect it is similar to the more familiar automatic frequency control system. A second feature is that the noise bandwidth of the oscillator, typically a few hundred kilohertz at 10GHz, falls to that of the injected signal which is usually measured in kilohertz: in this respect, injection locking is superior to afc systems. If the injection signal is frequency modulated, then the oscillator will follow this modulation.

In G8APP's equipment the injection signal is generated by a 400MHz 200mW driver feeding a snap varactor diode which then produces a few hundred microwatts of rf at 10GHz. This output is then cleaned up in a band-pass filter and injected into a 10mW Gunn oscillator via a three-port circulator. In the sense that a much increased "crystal-controlled" output is obtained from the input, the system has a most useful gain. Of course, if the injection source is switched out then the oscillator can be tuned in the normal way.

The relationship between the factors involved is given by the equation:

$$\frac{p_i}{p_o} = \left(\frac{2Q\ \Delta f}{f}\right)^2$$

where p_i = power of the injected signal
p_o = oscillator power
Q = loaded Q of the oscillator cavity
Δf = locking range
f = frequency of oscillator

From a practical point of view, the locking range is set by the likely drift of the oscillator. Experience suggests that for well-built equipment, well warmed up and protected from draughts, $\Delta f/f$ is in the region of one part in 2,000. Assuming a loaded Q of 100, then the effective gain of the system is in the region of 20dB. Thus, to lock a 1W oscillator, the injected power should be 10mW.

"Bending" circulators

Another feature of G8APP's injection locked 3cm equipment is the use of a circulator which he "bent" to operate within the amateur band. Circulators are another example if those rather magical devices common on microwaves which enable one, for example, to connect a transmitter and a receiver permanently to a common aerial without the receiver being damaged on transmit. However, they are expensive by amateur standards. As they usually operate only over a narrow band of frequencies, typically 5 per cent, it is unlikely that the so-called X-band radar circulators becoming more readily available on the surplus market can be used at amateur frequencies without modification.

G8APP has shown that some at least of these circulators can be modified very successfully. Firstly, the existing tuning screws are carefully drilled out and the holes re-tapped perhaps with a slightly larger thread. New screws are inserted and used to tune the circulator to the new frequency. The degree of isolation between the ports, which is probably poor at this stage, is then adjusted by altering the degree of magnetization of the magnet. A few turns of heavy insulated wire are wound around the magnet and energized by repeatedly discharging a large capacitor (say, 10,000μF) charged to 2–20V. The polarity required is determined by experiment.

Wavemeter calibration

The calibration of wavemeters can be quite a problem for those without access to suitable test equipment. Recognizing this, G3KSU (IoW) has generously offered to calibrate wavemeters for any of the microwave bands for the cost of the return postage. A most welcome service.

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

Progress report on the GB3PI repeater experiment

by RICHARD BAKER, G3USB*

THIS report is not intended to be an exhaustive analysis of the technical results of the GB3PI repeater experiment but is intended as a synopsis of the operation of the repeater to date. It is felt to be particularly relevant at this time since there is now only about two months of the licence period left to run. Now is the time that the UK amateur fraternity has to decide whether it wishes the RSGB to back the continuation of the experiment or whether the operation of GB3PI has shown that repeaters in the UK are not required or are undesirable.

The GB3PI repeater experiment was conceived in the autumn of 1971 by Barry Doel, G3SXK, and Bob Thornton, G3WKW. Dissatisfaction with a.m. mobile operation and a listen-in to the Cuxhaven repeater in Germany during an opening provided the spur. Some initial investigation was done using a mobile modified to work duplex (simultaneous transmit and receive) at 1·6MHz channel spacing. Using two aerials, this gave very satisfactory results with very little receiver degradation caused by the transmitter signal. On the bench the audio output of the receiver was fed into the transmitter modulator and the embryo GB3PI was created. Considerable mechanical work and technical sophistication followed in the ensuing weeks until the repeater in almost its present form was completed.

This work was not being done in the blind hope that a licence to operate it would automatically appear. Discussions earlier with VHF Manager Geoff Stone had suggested that the MPT would be prepared to consider a repeater experiment if it could be shown that it could be of real benefit; that is, in terms of technical advancement and self-training of those involved in the experiment and those using it. As a result a short paper was produced as a joint effort of several of the Pye Telecom Amateur Radio Group. This set out the objectives and practical implementation of the experiment and was sent to the RSGB for submission to the MPT. After several months of deliberation a licence valid for one year was granted on 11 August 1972.

Between the time of submission of the proposals and the granting of the licence, the Scheveningen Conference of IARU Region 1 took place in May 1972. At this, the West German repeater frequency plan was rejected and the Finnish plan for a 600kHz-spacing system was chosen. Apart from this, there were no other significant changes to be made and the main points of the licence were:

(1) **Callsign:** GB3PI (The suffix was requested for obvious reasons).
(2) **Licensee:** The RSGB. This is similar to beacon licences.
(3) **Location:** Pye Telecommunications Ltd, Newmarket Road, Cambridge.
(4) **Frequencies:** Transmit, 145·75MHz.
Receive, 145·15MHz.
(5) **Classes of emission:** A1, A2, A3, A3A, A3H, A3J, F1, F2, F3.
(6) **Maximum dc input power:** 150W.
(7) **Maximum rf output p.e.p.:** 400W. Most of the other clauses are as the standard licence.

The repeater was commissioned in due course on 14 September 1972. Initially there were only about six mobiles suitably equipped to use the repeater, but this rapidly increased during the ensuing months. A certain amount of local opposition was encountered but this was amicably overcome. Almost without exception, those initially opposed to the repeater experiment found that their preconceived fears were usually based on misunderstanding or misinformation.

From the Cambridge site, where the aerials were about 70ft above ground level and 100ft above sea level, coverage extended about 25 miles in all directions, except south where a range of hills diminished the range. Fixed stations with beams, and sometimes unnecessarily high power, were able to use the repeater at greater distances—those on the limit only when propagation permitted. It was even heard in the Pye executive aircraft at 15,000ft over Paris; on a portable receiver using its integral whip aerial!

Apart from the site being poor from a coverage point of view, it had other disadvantages. Close by was a large housing estate and the main A45 trunk road, both of which were the source of much electrical interference which made it difficult at times to copy weak signals. Ideally, a good site in the country was required, and fortunately because of its connection with a company owning a number of commercial communal radio sites the group had the use of a 200ft tower one mile west of Barkway in north Hertfordshire. The MPT's permission to move the repeater to this site was requested, and on this being granted early in April the repeater was relocated on the 14th of that month.

First tests showed that the site was going to be good. From the platform at 150ft London stations were worked on 144·48MHz using a hand portable, and first contacts through the relocated repeater confirmed the good results. With the aerials now about 700ft asl, coverage is about 45 miles for mobiles in all directions except north where the good take-off gives mobile ranges in excess of 60 miles. Mobiles in Lincolnshire can now work mobiles on the high ground of north London. During the first few days after the relocation, occupancy of the repeater was phenomenal; now that the novelty has worn off a little there are occasional times during the day when it is not being used!

Subject to the approval of the MPT, where do we go after the GB3PI experiment?

Do we apply for licences for one or two more repeaters in other areas?

Do we try a uhf repeater?

Do we want repeaters at all?

Now is the time for all interested RSGB members to make their feelings known so that the Council of the Society can gauge the wishes of the membership.

* Pye Telecom Amateur Radio Group

The solar events of 5 August 1972†

by R. A. HAM, FRAS, BRS15744*

The prime object of this article is to show the sequence of solar activity which led to the two auroral manifestations which took place on 5 August 1972. The International Union of Radio Science (URSI) has declared the period from 26 July to 14 August 1972 to be a special interval, stressing in particular the dates from 2 to 8 August.

THE appearance of a large sunspot, the occurrence of an associated solar flare, coupled with strong metre-wave radio noise from the sun, and the stage is set for an aurora to appear within the earth's polar atmosphere. Aurora borealis, (Aurora australis in the southern hemisphere) or the northern lights as it is frequently called, is caused by complex solar particles colliding with the equally complex gases which make up the earth's atmosphere.

Visual observation of an auroral event is limited to the hours of darkness, and then overcast skies can sometimes spoil the view. The presence of aurora, despite daylight and overcast skies, can be detected by observing the behaviour of the radio signal from a suitable terrestrial transmitter. Radio signals which are influenced by the ionized gases of the aurora are easily identified by their burbling or rasping tone. Several radio journals have already published reports about vhf radio signals which have been deflected for hundreds of miles during an auroral event.

To create a better understanding, and to provide a useful account of any natural event, the need for co-operation between a variety of observers using different instruments is essential. Gone are the days when different aspects of a subject were limited to a few specialists; now, through the advent of mass communication, we can all share the many contributions toward the common end.

It is not essential for the observer to know the precise size of a particular sunspot, or to know the exact calibration of any associated radio noise. The very existence of a large sunspot, coupled with the fact that it is emitting strong radio noise, is enough evidence to expect some form of atmospheric disturbance.

One of nature's spectacular events was the aurora borealis which appeared about 0030bst on 5 August 1972, and gave a display of beauty which is rarely seen from the south of England. Reference to Fig 3 will show that this auroral event followed the climax of the prevailing metre-wave radio noise associated with the large sunspot which was visible between 1 and 9 August.

The progress of sunspots is normally followed by projecting the sun's image on to a pre-calibrated white card on which the position and size of the individual spots are traced with a pencil. Unfortunately visual observation of the sun is sometimes hampered by overcast skies; however, it was possible to obtain sunspot drawings for 1, 3 and 5 August, and from which the diagrams in Fig 1 were prepared.

While visual observers have built up a catalogue of sunspots over hundreds of years, radio observation of solar events can only claim a few decades. Fortunately, metre-wave radio noise from the sun is not affected by overcast skies, therefore regular diurnal observation can take place and the solar noise can be recorded on a paper chart. Thunderstorms can be a menace during a solar observation, because each burst of static draws an unwanted spike on the recording chart. Although thunderstorms are relatively few during the year, there were considerable localized static discharges on 1 August. These static discharges were affecting the midday solar observation on both 95 and 136MHz, as will be seen by the large number of spikes above the receiver noise level shown in Fig 2.

The main feature of Fig 2 is the eight-minute solar burst which was recorded on both radio frequencies, the strength of this burst is emphasized by the way in which it overpowered the prevailing static. It is interesting to note that the static had originated within a few miles of the telescope aerials, whereas the radio waves from the solar burst had travelled 93 million miles.

The author's two radio telescopes observe the sun for two hours daily (1130 to 1330ut) on 95 and 136MHz. The recording chart speed is 30in/h which makes it easy to distinguish between the individual solar burst and the continuous noise storm. During a noise storm which may

† Originally published in *ITU Telecommunication Journal*, April 1973.

* Faraday, Greyfriars, Storrington, Sussex.

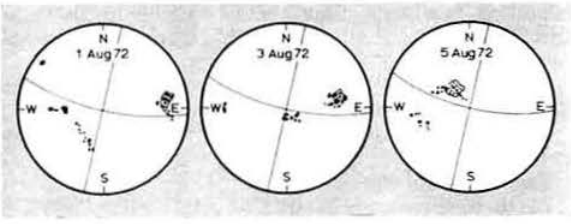


Fig 1. Copy of the original sunspot drawings which were made by A. Mackenzie at Dover. The apparent travel of the sunspot from east to west is due to the normal rotation of the sun

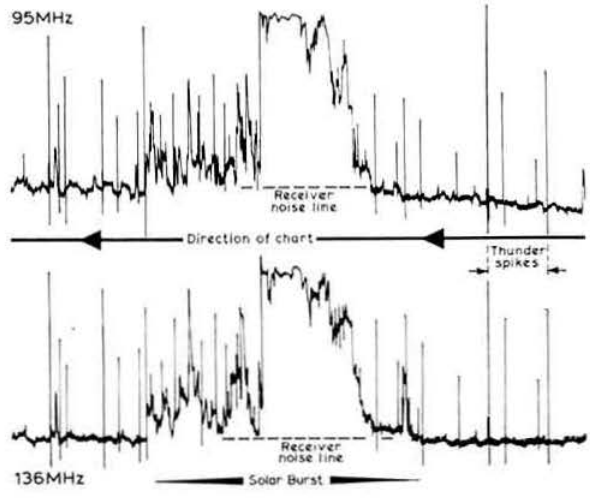


Fig 2. A solar burst of 8min duration recorded on 95 and 136MHz, at 1146ut on 1 August 1972. The spikes showing above the receiver noise line on both frequencies were caused by local thunder static

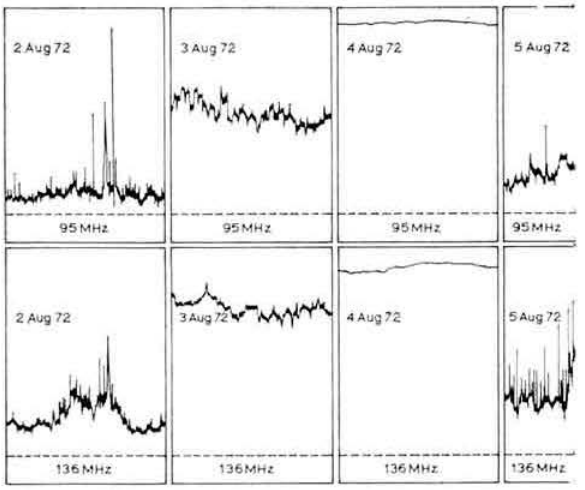


Fig 3. Samples of the pen recording chart showing the peak level of the solar radio noise during each day's observation. The individual samples are approximately 4min long. The dotted line is the receiver noise level without signal

last for several days, the radio noise level will rise and many individual events will be seen above this mean level. The output from both radio telescopes is fed to a combined pen recorder which has two pens, each on separate tracks of the chart, which in turn is driven by a common motor. Results from this system are shown by the samples of pen chart illustrated in Figs 2 and 3.

The burst shown in Fig 2 heralded the start of the period of solar activity which is associated with the large sunspot group illustrated in Fig 1. The daily progress of the activity of this particular sunspot is indicated by the level of solar radio noise which is the subject of Fig 3.

Fig 3 clearly illustrates how the solar noise level increased daily until it reached its peak on 4 August and then declined on the next day. From sunrise on the 4th, the solar radio noise was so strong that a communication receiver which is in daily use on the 70MHz band was inoperative for several hours. By midday on the 4th it was obvious that this solar storm had reached mammoth proportions and that an aurora must be expected to follow in the immediate future.

Many auroral displays have been seen by people living in the north of Europe and by people who have been in the right place at the right time to actually see it for themselves. Fortunately, the author was viewing the Milky Way around midnight local time on 4 August when the "seeing" was magnificent. (See *Radio Communication* Sept 1972, p577.)

Later in the day of the 5th at about 1500 another aurora manifested, but this time it was during the hours of daylight and could not be seen. However, on this occasion the aurora was observed by M. Walters, G3JVL, using his radio equipment. During this event two-way communication was established with Scotland and Wales by auroral reflection from the south of England.

telecommunication journal

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TECHNICAL TOPICS

by PAT HAWKER, G3VA

Once upon a time, when integrated circuits were first emerging, it used to be said that they would eliminate the need for circuit designers. Truly they do take a lot of the routine effort out of design and construction; but in practice there still seem to be a lot of people working out novel ways of using new devices and components. So this month we concentrate on some of the circuit ideas which have come to our notice recently.

IC crystal calibrator—with a difference

In recent years many descriptions have appeared of crystal calibrators and frequency meters using decade ic dividers and other digital-type integrated circuits. A rather different approach which could be attractive for those who want an add-on general purpose calibrator which is simple to build and can be operated economically from a 9V battery has been described by Paul Franson in *Radio-Electronics* (April 1973). The novelty is its use of a new type of small four-lead consumer ic developed primarily as a frequency divider for electronic organs. Unlike most integrated circuits these devices incorporate quite high value resistors—up to 20kΩ—resulting in an unusually low power consumption. These ic devices are also a good deal smaller than dual-in-line type devices. As indicated in Fig 1, the 2:1 divider units require no external components when used in this application: one just feeds in a sine-wave rf signal and obtains a harmonic-rich square wave signal at half the frequency. In the USA these MFC4040 devices cost 77 cents in small quantities and there is also a dual MFC4040 marketed as the MFC6020 at $1.76. Despite the "black box" simplicity of Fig 1, each MFC4040 incorporates over a dozen transistors and resistors, triggers to over 5MHz and operates with a supply potential anywhere between about 4 and 16V. The unit shown consumes about 14mA at 9V, so making it attractive with quite small transistor-radio batteries. It is claimed to provide markers up to at least 60MHz.

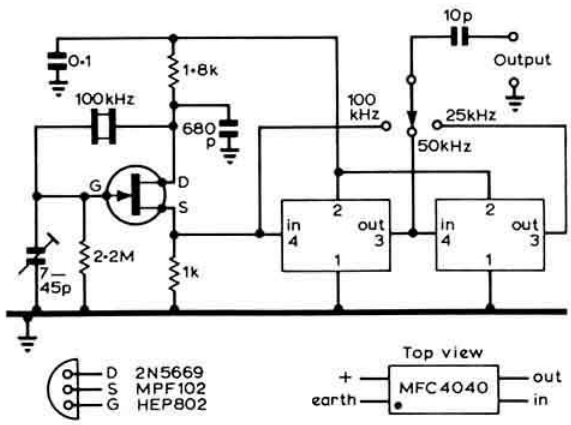


Fig 1. Crystal calibrator using electronic organ frequency divider integrated circuits suitable for battery operation and providing 100, 50 and 25kHz markers up to the vhf range

For more ambitious frequency meters with built-in power supplies the ttl decade-divider is undoubtedly very attractive, but as mentioned above, one can see that these electronic-organ 2:1 dividers will have their uses.

Series-stabilized power supply

Some interesting solid-state ssb/cw transceiver designs based largely on integrated circuits are beginning to appear in the journals. An attractive looking and very compact design—the Moonshine Mark V—has been described by Kjell Karlsen, LA2NI (*Amator Radio*, No 12, 1972) primarily for 3·5MHz. This makes use of the Plessey SL600 series of devices, a 9MHz crystal filter, a CA3046 rf clipper (but using dsb rf clipping) and TBA641 af amplifier, with the transmitter amplifier based on discrete devices including two BD230s and two BDY92s in push-pull in the linear power amplifier; the 5 to 5·5MHz vfo uses two BF244 FETs.

James M. Bryant, G8FNT, whose articles and application notes have done so much to indicate the uses of the SL600 devices, has sent along details of a useful series-stabilized regulator for power supplies for use with semiconductors.

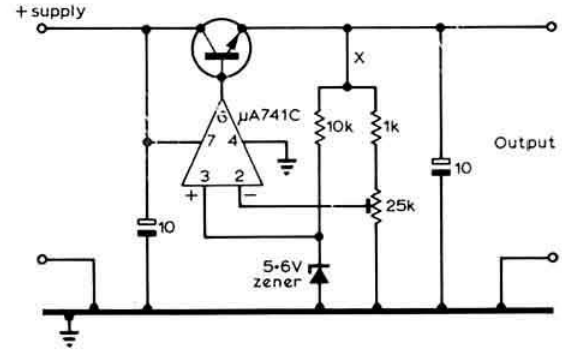


Fig 2. Simple high-stability series voltage stabilizer recommended by James Bryant, G8FNT. Note the transistor is not needed where the output current is not greater than 10mA—in this case the op-amp output (pin 6) is connected directly to point X. The pin numbers refer to eight-lead TO5 or dual-in-line packages

He notes that usually when, for example, a stabilized supply is needed for use with electronic tuning diodes or other applications needing a fairly high stability, the average amateur tends to use two zener diodes in cascade. Such a system has little to recommend it (as we indicated a couple of months back, a better scheme for low-current supplies is to use a fet as a constant current diode). Zener diodes in cascade have an output impedance in the order of 30Ω and the supply sensitivity is in the order of 150μV/V.

The series stabilized arrangement shown in Fig 2 costs little more, uses few more components, and is almost as simple to understand, suggests G8FNT. Yet it provides a variable output voltage, an ampere current capability if a power Darlington transistor is used, and its supply sensitivity is around 15nV/V. Its temperature performance depends on the zener diode used; the capacitors are necessary in order to prevent hf instability.

He points out that a supply with this form of regulator can run not only varicap diodes, but also the vfo or indeed a complete SL600-type receiver other than the audio output stages—and with far better stability than is possible with cascaded zeners. The basic reason for this stability is that the zener diode is supplied with current from the stabilized supply, so that the reference voltage is not supply sensitive.

An output impedance of 100$\mu\Omega$ applies only at node "X" since normal wire resistances forming part of the circuit will usually be higher than this! The μA741 integrated op-amp is widely available and very cheap.

Solid-state transmitter hints

A long and interesting letter from Hans-Joachim Brandt, DJ1ZB, reports on his experiences of solid-state transmitters—he began experimenting with them almost as soon as suitable transistors were available. Currently he is using a QRP (2W output) rig for 3·5 to 28MHz cw with a 2N3553 power amplifier, powered by 18V from dry cells (described in *DL/QTC* March 1971). But in addition he has tried many different higher power devices using a 24V supply. With a maximum drive of 1W types such as BD107 (ITT), BD124 (Philips/Mullard), BD117 (SGS), BDY13 (Siemens) and 2N3878/79 (RCA) all provide some 4–5W output at 28MHz, rising to about 10W at 3·5MHz. He feels that the BDY61 (mentioned in an earlier *TT*), although it gives about the same power output, has a rather narrow safe operating area for this application and is liable to be destroyed at the lower frequencies. The BDY90–92 family seems to be good at frequencies up to 14MHz using 24V or to 7MHz using 12V, providing up to 15W output with suitable drive (3W maximum). For 1·8MHz, DJ1ZB uses a 2N5068 (Motorola, f_T about 4MHz minimum at 1A) driven by a BSY85 or 2N2102 Class A driver.

DJ1ZB's preferred transistor amplifier circuit is shown in Fig 3 and it will be noticed that this differs from that recommended in the March *TT* by G3BAC as he does *not* use series tuning. He has found that the capacitor C_p, from collector to ground, is necessary to avoid excessively high rf voltages at the collector when the pa is tuned. He suggests that a good starting value for C_p is Q1, or in other words the reactance of C_p should be equal to the transistor load resistance ($R_L = V_{ce}^2/2P_o$). On the higher frequency bands and when the efficiency of the amplifier becomes low (especially where transistors with high internal capacitances are used) the value for C_p can be reduced until optimum efficiency has been reached—but protection against the effect of mismatches must be maintained so that a compromise may be necessary.

In order to avoid low-frequency parasitic oscillations the collector choke RFC2 is only just as high a value inductance as necessary, usually 20 to 80μH; the base choke RFC1 should have a much higher value, 300 to 2,000μH. This results in the parasitic resonances of the output and input circuit being very different in frequency and so avoids possible oscillations of the "tptg" (tuned-plate tuned-grid)

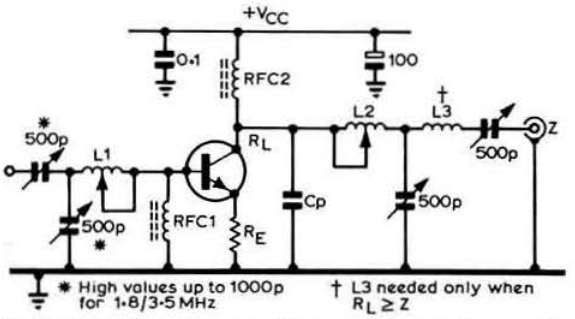


Fig 3. Transistor power amplifier arrangement favoured by Hans-Joachim Brandt, DJ1ZB. For discussion of transistor types and emitter resistor R_E see text

type. To achieve high inductance and low dc resistance he has often used a pot core for the base choke; for the collector choke, RFC2, rfi-suppressor type ferrite chokes have proved satisfactory.

When transistors are used which have no or very low internal emitter resistors, DJ1ZB recommends the use of a low-value external resistor; the dc voltage drop should be about 0·5V on the lower-frequency bands where the current is high. It is not advisable to bypass this resistor: the improvement in gain is low, and another form of parasitic oscillation, of the grounded-base type, may develop.

These experiments have been concerned mainly with cw operation; with low-cost transistors, without internal emitter resistors, the intermodulation distortion products of a linear amplifier tend to be about 20dB below the desired power.

For safe operation under all conditions of mismatch at full drive of low-cost power transistors not specifically designed to be used as hf power amplifiers, DJ1ZB has found the following three rules to be helpful:

(1) The supply voltage should be lower than $\frac{1}{2}$ VCEosus.

(2) The transistor dissipation rating and the heat sink should be designed to handle the full dc input power.

(3) If possible the operating point of the transistor even when detuned should lie within the dc safe operating area.

Although a great enthusiast for transistor operation, DJ1ZB points out that there are problems in building practical rigs for serious NFD participation—and this he feels is emphasized by the RSGB rules (which are due to be adopted throughout IARU Region 1 next year). In practice he has found that his 2W transmitter and fet-type 0-v-2 receiver (2N4416 detector) gives as much enjoyment and achieved similar results as when he used a 15W rig in accordance with DARC power limits, since raised to 25W which involves problems for low-cost transistors. Basically he feels that the safety margin with a 10W dc input is very different between the 13·5W plate dissipation in the rules and the maximum dissipation of 20W for transistors, particularly when, for example, vhf type transistors are used with lower voltages at hf. His detailed analysis of why he feels the rules need amendment will be passed to the Contest Committee. Meanwhile his hints on solid-state low power amplifiers are likely to be much appreciated by readers. For higher powers he mentions the BLY91A, BLY87A (Philips, Valvo, Mullard) and 2N5641 (Motorola, Solitron or Solid State Scientific); for even higher powers the RCA 2N5038/39/6354 family gives up to 70W output at 3·5MHz with 36V supply and 4-8W drive.

Attenuators for receivers

The value of even a very simple attenuator placed at the input of a receiver (particularly those using semiconductors in the front-end) has become very widely recognized since Dick Halls, G3EIW (then 9V1LK), first reported the value of this approach in *TT* (October 1968). It was, for example, interesting to note that Ray Moore included this idea (Fig 4(a)) in his excellent survey "Designing communications receivers for good strong signal performance" (*Ham Radio* February 1973) along with many other useful suggestions.

But the purist is unlikely to approve of an attenuator which does not provide at all settings a reasonably constant impedance to the aerial and to the receiver. Two alternative, but still quite simple, arrangements have been described recently in *Electronics Australia*.

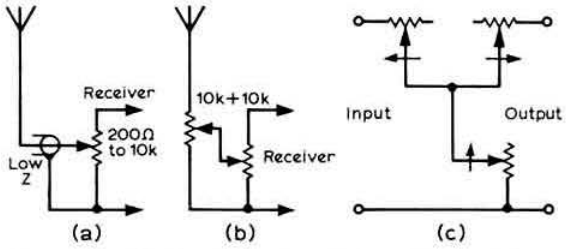


Fig 4. Manually operated attenuators for reducing cross-modulation and blocking in the presence of strong signals: (a) simplest arrangement suggested in 1968 by G3EIW; (b) improved results are claimed for this arrangement using dual-pot by Ian Pogson; (c) arrangement providing true constant impedance suitable for many attenuator applications.

Ian Pogson, VK2AZN/T, believes that the simple potentiometer has the disadvantage of leaving the user the problem of deciding whether to connect the rotor to the set or to the aerial (he opts for connecting the rotor to the aerial) and also may result in a very noticeable "hop on" effect. He therefore uses an alternative system which he says can provide a controlled attenuation up to 80dB using a dual-gang pot: see Fig 4(b). By using resistances of the order of 10kΩ the attenuator has little effect on circuit Q and the variation of presented resistance is limited to a factor of 2:1 (eg 10kΩ with maximum attenuation to 5kΩ with minimum attenuation). This idea certainly looks like a useful improvement on the single-track pot control.

The publication of Ian Pogson's idea reminded P. J. Grigg of a potentiometer arrangement that provides a true constant impedance: Fig 4(c). This uses a three-gang linear potentiometer (for a method of making a three-gang pot see *TT* July 1970). While we doubt if this would give any practical improvement as an rf front-end attenuator it might well be useful for other purposes.

Vertically polarized loop elements

L. V. Mayhead, G3AQC, was interested in the recent notes on vertically polarized loop elements (*TT* April) since he has been investigating various forms of loop aerials using scale models on 500 and 144MHz. Among many interesting items which this has shown up (and which G3AQC hopes to write up before long) is a delta loop which gives predominately vertical polarization with much the same current distribution as the Kraus arrangement given in Fig 3(c) in the

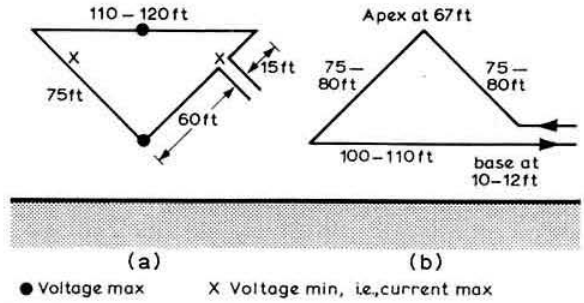


Fig 5. Loop configurations providing predominantly vertical polarization: (a) arrangement used by G3AQC and (b) arrangement used by G3TZH. Dimensions refer to 3·5MHz but aerials are basically multi-band

April notes, yet with current feed which is usually more convenient for amateurs. The G3AQC arrangement is outlined in Fig 5(a) with the dimensions given for 3·5MHz operation where his supporting masts are 55 to 60ft high and the apex some 6ft from the ground: the aerial has an affinity to two sloping verticals in phase. His own location is not really suitable for low-angle propagation but he mentions that G3TZH, much more favourably located above more conductive earth, has had great success with the variant shown in Fig 5(b). As I do not want to pre-empt a chance of reading a full-length article on loop configurations—about which it is certain that there is a lot more to be found out—I will refrain from further details.

Reed contact protection

H. S. Brown, G3RFG, draws attention to an item in *Electronic Equipment News* (March 1973) on the protection of reed contacts. This notes that the life of reed contacts can be significantly reduced by excessive current or voltage surges.

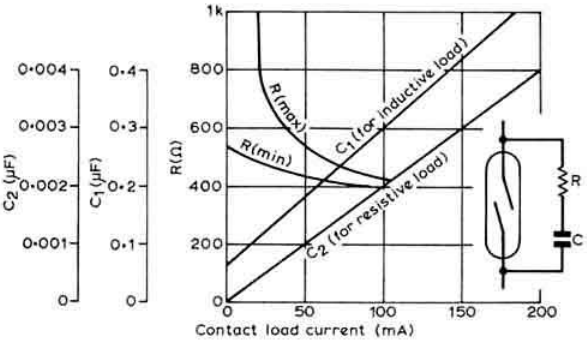


Fig 6. Use of series RC network to provide protection for reed relay contacts

One way to protect reed switches is to connect a series CR network in parallel with the contacts—see Fig 6—to form a combination familiar to amateurs in connection with key-click filters. The diagram which apparently stems from Elliott Relays shows also the optimum values of the capacitive and resistive elements for various switched loads.

Long delay echoes

Recently there seems to have been a flurry in the media about long delay echoes (see *TT* August 1969 and November 1969) though personally I remain highly sceptical of the idea that these rare and curious echoes result from extra-terrestrial intelligences attempting to communicate with Earth (though quite prepared to accept that there are almost certainly intelligent beings elsewhere in the cosmos).

Jack W. Herbstreit, Director of CCIR, recently sent (via Roy Stevens, G2BVN) a reprint of the original *Nature* report on this strange phenomenon by his predecessor Dr Balthazar Van der Pol. This gave details of the echoes (up to almost 30s) received by him at Eindhoven and by Professor Stormer at Oslo during October 1928. Van der Pol, in reporting these echoes, put forward a possible explanation which, as Mr Herbstreit points out, seems quite possible even today when so much more is known about the ionosphere.

Van der Pol wrote, almost 45 years ago: "Wireless waves, even short waves, do *not* penetrate the Kennelly-Heaviside layer, otherwise long-distance communication would be impossible, and an (alternative) explanation for these long interval echoes may be found in the fact that the waves may penetrate *well into but not through* the layer. Usually, as Prof Appleton has shown, the layer has a relatively well-marked lower boundary against which waves travelling nearly vertically are sharply reflected. Now the apparent dielectric constant diminishes with the density of electrons and even becomes zero for waves of 31·4m (the frequency used by PCGG for these experiments) and a density of circa 10^6 electrons per cc . . . at the places where the electron density is near the critical one, the phase velocity becomes infinite, *but at the same time the group velocity approaches zero*. When it now happens that the relative variation of the electron density with height over a distance of a wave-length is small, then the waves may penetrate and soak well into the Kennelly-Heaviside layer and travel in regions where the group velocity is small: they will therefore be reflected at the region where the dielectric constant approaches zero. It is obvious that in these circumstances a considerable time may elapse before echo is received though the waves have never travelled outside the earth's atmosphere . . . the phenomenon being wholly governed by the gradient of the electron density. This fits in well with the fact that the time interval between signal and echo is extremely variable . . . Our view is that the group is compressed and bottled for some time in those regions where the group velocity approaches zero." (*Nature*, 8 December 1928, slightly simplified.)

Some features of this explanation may not survive exactly, but the main theme of waves being trapped in certain regions still seems a lot more likely than the efforts of the little green men.

Active filters using op-amps

Although quite a number of active af filter circuits—suitable for such applications as cw filters and the like—have already been presented in *TT*, new and attractive ideas continue to appear, many of the recent ones based on the use of low-cost op-amp (operational amplifier) ic devices such as the 741.

Richard J. Harris, G3OTK, draws attention to a tunable notch filter which he has developed for use as part of a comprehensive audio filtering assembly in a direct-conversion receiver. The notch filter, although not yet used in its receiver application, has already been shown to attenuate an unwanted signal by 30-40dB with respect to a wanted signal only a hundred or so hertz away. G3OTK has described this filter (Fig 7) in *Wireless World* ("Circuit Ideas", May 1973). Unlike many filters, which can be tuned only by ganged pots, this one is tuned over a wide range with a simple, single-track variable resistor, while another resistor provides a preset null control to adjust the notch rejection. With the values

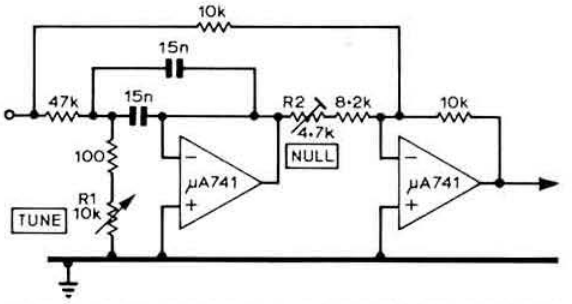


Fig 7. Tunable notch filter developed by G3OTK and described originally in *Wireless World*

indicated the filter tunes from about 170Hz to 3kHz with a bandwidth (to 3dB points) of 230Hz and a notch rejection better than 40dB over the entire range. If required, a voltage controlled filter can be made by replacing the tuning resistor with a fet operated as a voltage-variable resistor. The circuit comprises a bandpass filter followed by a virtual earth summing circuit that adds the filter output with the input signal.

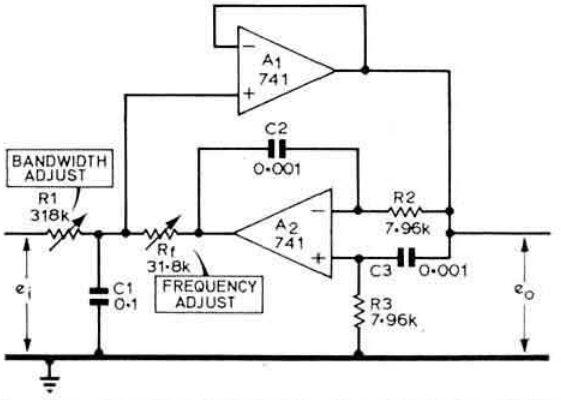


Fig 8. Active bandpass filter with independent bandwidth and centre frequency controls as described in *Electronics*

About five years ago G3OTK became interested in active notch filters while doing post-graduate work at Bristol University, and developed a filter published in *Proc IEEE* (October 1968) and one finds echoes of his ideas in many of the filters which are currently appearing.

Useful looking tunable active filters using 741 op-amps have been published in *Electronics* (11 September 1972 and

4 January 1973). Fig 8 shows the first of these, providing a filter with independently adjustable bandwidth and frequency; the values shown are those for 1kHz with 5Hz bandwidth. The other unit is unusual in providing switch selectable low-pass or high-pass response.

Basic active filters formed the subject of Series 1 of the *Wireless World* "Circard" series; these cards contained basic design and reference material on 12 different main forms of active filters, plus many different variants and indicating possible circuit modifications for specific applications.

Simplest morse practice oscillator?

J. A. Share, G3OKA, sends along a simple audio oscillator (Fig 9) which he feels will prove of particular interest to newcomers and beginners—and so help restore the balance which in presenting new ideas must inevitably usually tip the scales in favour of the more experienced. Although this generator was originally designed and built "in nothing flat" for an entirely different application, G3OKA considers that it represents just about the simplest ever audio oscillator that "can't fail to oscillate". The only warning: since the output is near square wave it must never be fed into the mic socket of a transmitter.

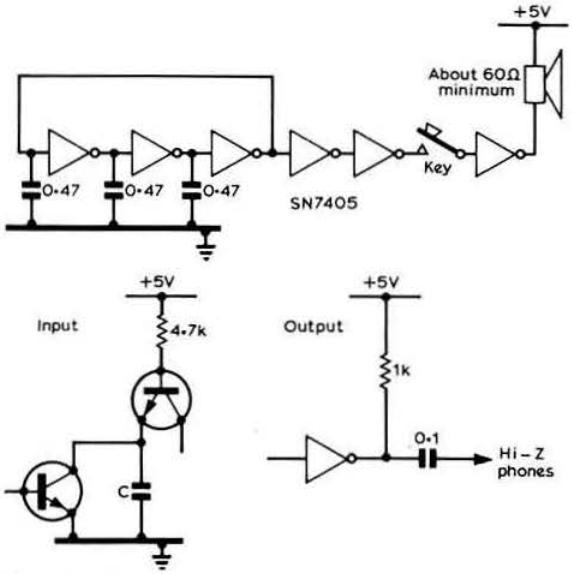


Fig 9. Simple audio oscillator suitable for morse practice as developed by G3OKA using SN7405 ic open collector hex inverter. Output frequency is approximately 3CR or 4·7kΩ × 3C. With 0·47 μF capacitors the output will be a little below 1,000Hz and suitable for morse practice

G3OKA adds: "The frequency is approximately three times the time constant of each inverter; the charging current for the capacitor is from the base resistor in the inverter. The output of the unstable loop is passed through two inverters which buffer the oscillator and restore the pulse rise-time. The signal is then passed through the morse key to the output inverter which functions as a crude audio amplifier suitable for feeding a high-impedance loudspeaker such as those which can often be salvaged from an old transistor radio. Alternatively the output may be fed to a pair of low impedance headphones, or as indicated to a resistor and then capacitance coupled to high-impedance headphones. The current drawn by the output must not exceed 30mA."

AF square wave generator

The use of complementary pairs of transistors to provide the equivalent of a silicon controlled rectifier has been a feature of a number of ideas in *TT* in recent years. It turns up again in a unit developed by P. J. Ball, G3HQT, for testing hi-fi amplifiers, providing an af square wave generator with fast rise and fall times (measured in his unit as 200ns): Fig 10.

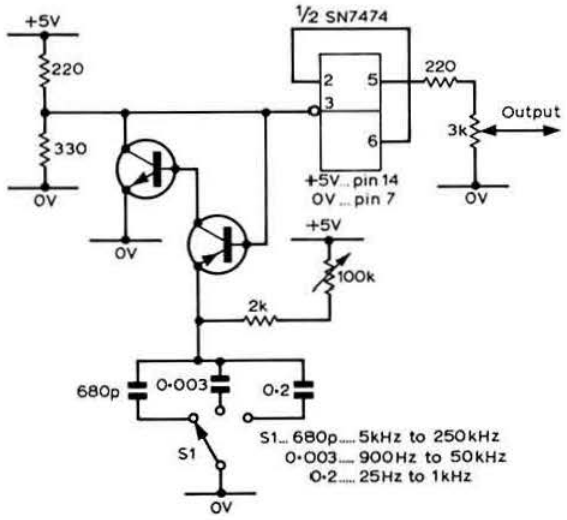


Fig 10. AF square wave generator developed by G3HQT providing fast rise and fall times

While G3HQT admits that this form of two-transistor oscillator is not new, he thinks this application may be original. His transistors are low-voltage switching types but he feels that almost any devices would work, provided that one was npn and the other pnp. The oscillator generates a fast negative-going, short-duration pulse which is used to trigger the SN7474 bistable, which divides by two, and produces the near perfect square wave. This might also prove another application for the electronic organ frequency dividers mentioned in the receiver calibrator item.

Visual zero-beat indicator

A novel circuit technique which can be used to provide a visual indication of zero beat for measurement or calibration purposes appeared in *Electronics* (15 March 1973). This uses two light-emitting-diodes (LEDs) connected in reverse polarity with a current limiting resistor: Fig 11. When the input is an audio frequency of the order of 1kHz both LEDs appear to be on all the time, but they begin to flicker as the input frequency approaches zero; both diodes go out completely only over a range of about ±5Hz of zero beat, it is claimed.

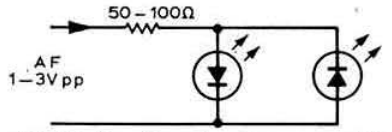


Fig 11. Visual indication of zero-beat by means of two reverse polarity light-emitting-diodes (*Electronics*)

G4ABS multiband aerial for limited spaces

D. Bedford, G4ABS, sends along an ingenious multiband aerial which he says works "quite happily" in conjunction with an aerial tuning unit or Z-match. He reports that the performance is at least equal to half-wave dipoles for each band, and he believes that with further experimentation it might prove ideal for amateurs with limited space. Lowering the centre or raising the sides appeared to give broadside bi-directional properties, but this would require further investigation.

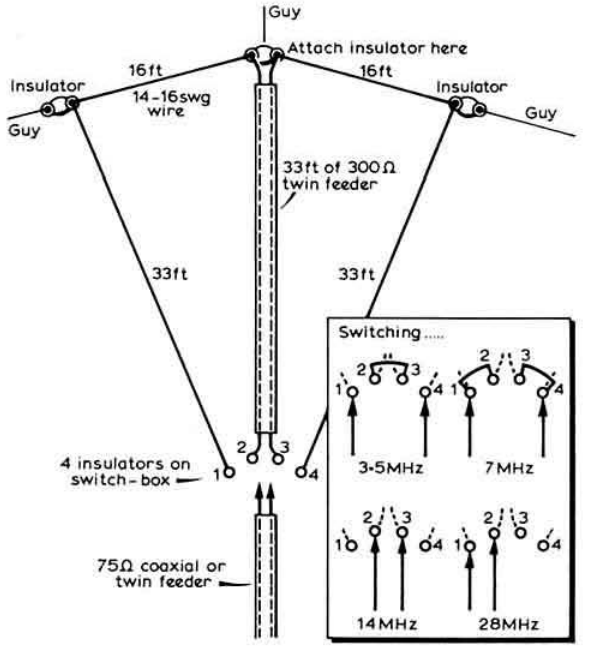


Fig 12. G4ABS multiband aerial for use in limited space

He explains the operation of the aerial as follows:

3·5MHz: Switch-points 2 and 3 are shorted, and the aerial is fed via points 1 and 4. This provides a compressed form of delta loop containing 164ft of wire.

7MHz and 21MHz: Short points 1 and 2 and also 3 and 4, feed at points 1 and 4 to provide a broad-band dipole.

14MHz: Feed at points 2 and 3, leaving 1 and 4 open. Performance is then that of a 3 by $\frac{1}{2}\lambda$.

28MHz: Feed at points 1 and 2, or alternatively 3 and 4, to provide a delta loop aerial.

This appears to be one of many possible forms making use of the loop and delta configuration; G4ABS does not give any indication of the swr he achieves on the low-impedance feeder.

Touch-to-talk switch

From Mike O'Donnell, VS6CV/G8CVV, comes details of a touch switch which takes the push out of microphone ptt switching.

He notes that many of the ptt switches on microphones have quite strong return springs which can be inconvenient when used over a considerable period of time. As a result he devised a simple transistor touch switch which needs only the skin resistance of a thumb or finger to cause it to operate: see Fig 13.

The touch "plates" can be drawing pins or any similar arrangement; the npn transistor must be capable of passing the full relay current which may be up to about 100mA; almost any high-gain pnp device can be used as the other part of what forms a type of "silicon-controlled-rectifier substitute" as described before in *TT* for other applications. Maximum current flow between the touch plates is only a few microamperes and it will operate when any resistance up to about 1MΩ is across the touch plates.

VS6CV uses this device in conjunction with his FT101 transceiver and reports that his thumb is no longer strained from extended rag chews.

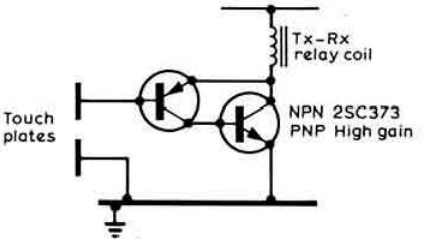


Fig 13. Touch-button control for changeover switching used by VS6CV

Incidental intelligence

Two hints and tips from *Radio-Electronics*. A useful puller to remove transistors from their sockets can be made from a crocodile clip and a 3in-long thin screw or bolt. The lower jaw of the clip is turned up so that it will catch the case of the transistor; then the screw or bolt is fitted into the shank of the clip and securely fastened (for example by solder).

An extension handle can be made for tweezers by means of a spring-type clothes line peg. Attach the tweezers to one jaw of the peg with a strip of tape, positioning the tweezers carefully so that the pinced ends are held closed by the spring action of the clothes peg. When the jaws of the peg are opened, the tweezer jaws will also open providing useful additional length for inserting screws, bolts etc into crowded areas.

H. S. Brown, G3RFG, draws the attention of those of us who have mixed feelings about metrification to two aids available from British Standards Institute: the "BSI conversion slide" (£1.25) which converts units of length, area, volume, mass, pressure and stress, capacity, force, temperature, UK and USA wire gauges; and the "Readimetric Converter" (70p) offering quick conversions for length, weight, volume, and area in pocket size. G3FRG says they should prove well worth the price and of great value for converting aerial lengths, wire diameters etc. Available (postage 10p) from British Standards Institute (Sales Branch), 101 Pentonville Road, London N1 9ND.

FOUR METRES AND DOWN

by JACK HUM, G5UM*

Facts about 4m

Anything you can do on 2m you can do better on 4m: the generalization is true if you add "so long as the erp is the same".

There are two reasons why 4m erp rarely equals 2m erp: there is the 50W input limit on the lower frequency band, and secondly aerial gain is less because skyhooks, though larger mechanically, are smaller electrically than those current on 2m (try scaling up a 6-over-6 from 145 to 70MHz and the thing looks like a bedstead).

In spite of these disadvantages, and in spite of tvi problems (which abate daily as uhf video spreads), the 4m band breeds its own brand of specialist. One of the many in Essex is G3ZRH, whose excellent site helps him to obtain a good conspectus of band conditions at all times. He writes, "Here in Brentwood the 150-mile distant GB3SU is nearly always audible by tropo, and on m-s it typically gives about 50 bursts an hour in spite of the small aerial and low power. During the big aurora of 1 April it was RS55A at times, and the GI and GM men were only a little less strong than the 50kW Continental broadcasters."

Apart from the broadcasters, other Continental activity nearer to Anthony Stokes's listening post in Essex includes point-to-point traffic in France on a.m. and in Belgium on pm, vertically polarized and spaced at exact multiples of 25kHz. But what interests him more than anything else is forward-scatter and its potential for dx: G3ZRH adds, "It would appear that 50W transmitters and aerials with as little as 20dB gain can give solid cw communication across more than 1,000 miles any day." Of course, the snag is finding anyone at that range in a country where 70MHz operation is permitted.

From G3ZRH it is 300° and 135 miles to the eyrie of G3HVI, overlooking Stoke on Trent: Sam Baskeyfield is another "427" man to whom 4m holds a special appeal. Most Sunday mornings he is audible far to the south off the rear of his aerial working Lancashire stations, who themselves are not audible at a distance by reason of poor take-off or poor aerials or both. By "poor aerials" we mean dipoles in lofts, all too common simply because they give results of a sort and tend to stay put once erected. The standard commercial 3-el beam for 70MHz will swing without hitting rafters in most roof spaces and is an infinitely better bet than a dipole—and an even better one if placed outdoors well in the clear.

Back to G3HVI: a tip on how to expand the band-spreading of the rather narrow 70·025 to 70·7 allocation is *put your i.f. in the broadcast band.* At a recent rally he picked up a 34·65MHz crystal, put it in a CO-with-doubler to realize 69·3MHz, and now tunes 700-1,400kHz. Sceptics said bc station breakthrough would be excessive. With "coaxified" receiver input at G3HVI there is none. On a typical receiver 700-1,400 is 4·1in long in contrast to 1·1in for the commonly used 5 to 5·7MHz tuning range.

G3HVI is one of a dozen stations in central England who participate in Wednesday night activity night, 9pm onwards. Most listen on 2m to give crossband contacts to unfortunates unable to use 4m during television hours. Stations in remoter areas please copy.

Another regular 4m spot is the Tuesday lunchtime net 1230-1300 first session and 1300 onwards second session, all started because G3XWO happened to acquire a B44 six months ago, tried it out one lunchtime and initiated a snowball effect which is still rolling. It is said that if anyone bleeps 70·26MHz from 1pm onwards the squelch will open at G8PY, G3PLL or others and a contact will automatically ensue.

Dynamic bandplanning

One of the charms about the UK metre-wave bandplan is its capability for modification-in-detail to be applied to it when circumstances suggest. It has others, eg a self-regulating sense of order that makes life on "427" so enjoyable.

Two mods-in-detail which are looming ahead were discussed at the last meeting of the Society's VHF Committee. One of them is the wisdom (or otherwise) of putting beacons at the top end of 2m in accordance with IARU fiat when Oscar 6, 7 and who-knows-how-many Oscars beyond are and will be in the same frequency area. High-power beacons can capture Oscar and clobber it for other potential users.

No decision yet: but as RSGB is charged with organizing a European metre-wave beacon plan the subject has urgency.

* * *

Now single sideband on 2m: historically it started on 145·1, a heavily occupied spot at a zone junction, then moved to 145·41MHz. Lately there has been considerable discussion—and indeed a specific proposal from a leading 2m sideband er—that it should move to 144·15-144·25MHz, in line with several European countries which have already anticipated IARU proposals and moved down.

By this reckoning A3J would be adjacent to the other on-off mode, A1 (144·0-144·15). The two do mix. And with 100kHz to play with, much more elbow room would result. A spot calling frequency would be needed, maybe 144·2, bang in the middle of the segment. If not, where? Comments, please, sidebanders, about the proposal as a whole.

Flashback to the Ar

From the thousands of words which flowed in to *FMD* about the 1 April auroral opening it is possible, because of space limitations, to distil no more than the barest summary. No report was made in vain, however; everything sent in has been forwarded to the RSGB Scientific Studies Committee (two of its members are VHF Committee members).

Was this aurora so good because it was so far south? Certainly it was visible in the UK. "A very extensive visual display was recorded on 1 April with streamers reaching the zenith and beyond, from west to east right across the sky" (GM3UAG). Jim Davidson adds that the manifestation

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

recurred on 2 April, 1727-1900gmt. Others earlier this year he noted were on 4-5 January; 21-22, 23, 24, 25 February; 1-2, 19-20 and 24-25 March. All produced dx on 2m.

On 70cm DK1KO was 55A with GM3UAG but one-way only. The German was worked on 70cm by G3LTF as early as 1615 on 1 April both cw and sideband. Peter Blair has four 11-el Yagis on 432MHz in a two-wavelengths square. Back on 2m a broad area of reception was noted, some beam headings being as much as 50° east, which may tie in with the aurora's proximity. Three UR2s fell to the 'LTF key during the course of more than 40 Ar contacts. Visiting the USA shortly afterwards, Peter Blair learned that there, too, the Ar exerted its effect: W0EYE added four new states *on 432MHz*. Even farther east than UR2 some notable dx came to PA0JMV: in this once-in-a-lifetime aurora, "and no April joke" he exchanged 59A with UA1WW in locator OR12B.

Another comment on beam headings: G3WSN (also of Chelmsford—he was alerted to the aurora by a call from neighbour G3LTF) noted UR2BU well round to the NE, giving a contact early in the proceedings ("Another example of long distance QSOs taking place early on," reports Keith Fisher). He uses a pair of 10-el widespaced at 12ft, ". . . a bit sharp but in an area with such a large amateur population it is a good thing."

"Fairly broad between N and NE," says G3NHE of Sheffield, whose span of contacts embraced LA5UG north and DJ5BV farthest south, with local G telegraphists all Tone A.

Like GM3UAG (above), Alan Mills of Anglesey noted a good Ar on 19 March, putting the GW3NNF morse into G,GM,GW and SM between 1531 and 1612gmt. All the time, the GI beacon across the water was audible, drifting down to RS52A as the aurora collapsed. On 1 April the 10-over-10 and 120W produced 40 telegraphy QSOs in two phases of intense operating activity, and—especially interesting—there was the aurora again next day at teatime to produce GM2DRD and G3LKK at rather lower strengths than on 1 April.

How did the phenomenon sound on the continent of Europe well to the south of us? At Darmstadt DJ5DT first detected it when at 1550gmt ". . . I heard DK1KO Hamburg with a humming or hissing note." Many countries were heard or worked in the next 2½ hours. The several phases reported by more northerly stations were not noted: the only station heard later was SM6CYZ at 2050gmt. Aurora or not, Thomas Damboldt urges more cw activity on 2m, and will welcome skeds (61 Darmstadt, Kollwitzweg 1).

A point for consideration: could Oscar 6 emissions be aurora-affected? See comment below by G8AFN.

After Oscar 6, what next?

To answer this question: "Well, obviously Oscar 7". Yes, and in addition a digestion of all the scientific information thrown up by Oscar 6. What, for example, did the great auroral opening of 1 April do (if anything) to Oscar 6-translated QSOs? On this particular point G8AFN of Maldon in Essex asks the following questions:

1. Were signal characteristics or AOS/LOS times affected on 1 April?
2. Apart from Ar, has sporadic-E had any detectable effect on Oscar performance?

Peter Cleall wishes to compile a list of all people in the UK who have been following Oscar's progress in a scientific way, and have predicted or confirmed orbital parameters. He offers on receipt of an sae to answer any general enquiries about satellites, equipment requirements and predictions of the tracks of satellites other than Oscar (eg weather devices). QTH is 32 Granger Ave, Maldon, Essex.

Finally, G8AFN wonders if a co-ordinated space group could be built up in the UK from scientifically orientated observers, in anticipation of the advent of future Oscars.

Question: has anyone *seen* Oscar 6 in orbit? Three little Norwich girls, taught about satellites by G3IOR, decided to look out for Oscar 6 on 26 March, kept a special watch and claimed to have spotted it. The details they gave to G3IOR tallied with Orbit 2,030 between 1920-1925gmt that day.

As for G3IOR himself, he has earned the distinction of being the first G station to qualify for the ARRL Satellite 1000 Award. Pat Gowen sent proof of 1,000 through-Oscar contacts to 225 Main St, Newington, Conn 06111, and was awarded Certificate No 58, dated 9 April, by the ARRL.

That hf-bands rarity, Alaska, has been pounding through Oscar 6. At Anchorage, KL7MF has worked four continents and 16 countries, with GW3FSP his only UK catch at the time of writing, this with an 8-el Yagi out on 2m and a 4-el in on 10m.

Another rare one awaiting consistent through-Oscar contacts is W6. Any claims yet?

A licence point: if you search 10m for your translated signal do not forget that you must at the same time be capable of listening on your own frequency on 2m (a point which deserves notice by *any* cross-band duplex practitioners, and not only the Oscar ones.)

Know your spot frequencies

MHz	Service
70·26	National calling frequency*.
70·56	Radio teleprinter.
144·48	National fm calling channel.*
144·6	Radio teleprinter (south UK).
145	National calling channel, all modes.*
145·15	GB3PI repeater input.*
145·3	Radio teleprinter (north UK and international).
145·41	SSB calling channel, international.
145·75	GB3PI repeater output.
432·1	SSB calling channel, international.
432·6	Radio teleprinter (south UK).
433	National calling channel, all modes.*
433·2	National calling channel, fixed stations.
433·3	Radio teleprinter (north UK)

* Mobiles have priority. Fixed stations may call but should QSY when contact is established.

Over-deviation

Enough has been said in vhf columns these last two or three years to persuade everybody intending to try frequency modulation that over-deviation is the mode's worst enemy. Good work has been done, both by private voice and by enthusiast fm groups, to assist newcomers to F3 to keep their spread to no more—preferably less—than that customary with a.m.

As fm use increases it becomes clear that the warnings need repeating fairly often. In Lancashire, for example, with its big 2m population, people are coming on to the band with commercial rigs set to deviations completely unacceptable for UK use, according to G3VNQ of Southport. Malcolm Pritchard adds the wise words that all operators welcome new activity on their bands, whether it be Al, a.m., sideband, or nbfm (and he underlines the significant initials

"nb"), but not ". . . if the new station occupies five to 10 times as much of the band as they do."

One of the problems as we see it is that not enough effective test gear is available to the individual amateur to enable him to set up his new talk-box to a social level of spread. As G3VNQ observes: "The method of setting up deviation by asking another station with an fm receiver when it 'sounds right' is liable to produce excessive deviation with commercial receiver bandwidths as they are."

Often in Lancashire the spread from the 144·48MHz fm calling channel is such as to obliterate GB3VHF on 144·5 MHz.

More about modes

A plea for more use of radio teleprinter at narrow shift is made by G8BTU/G8CJA. John and Monica Dowson point out that as the mode has largely taken over from telegraphy in commercial practice there could well be more of it in amateur point-to-point.

"Signals can be recovered from noise, interference and fading using relatively inexpensive equipment (admittedly not as cheap as ears) with more success than with cw," they say. Current availability for less than £4 of a tone decoder, the heart of an rtty terminal unit, and capable of recovering signals from 6dB below noise, lends additional appeal to the mode.

To this should be added the small cost of the crystal or vfo required to put you in the right place whichever metre-wave band you propose to use for rtty. On 2m the international calling channel is 145·3 (also for UK north), with 144·6MHz for UK south (both in zone, you will notice). These are in decimal relationship with the calling channels on 70cm, which are 433·3 international and UK north, and 432·6 for UK south. On the 4m band the keyboard spot is 70·56MHz.

* * *

When signals are deathly weak, that highly complicated apparatus called the human hearing system plus a simple on-off switch called a morse key will sustain communication when all else fails. A valid point of view is that this kind of QSO, especially at vhf/uhf, has no appeal, so why submit to the chore of learning morse while there are so many other paths to follow in the metre-wave world that do not require it? Radio teleprinter is one of them. Learning by doing is another—and it is arguable that more sheer experimentation goes on in the spectrum from 70·025MHz up than anywhere else.

Swindon's G8GMV makes the point that he is interested in vhf only, and pertinently asks, "Why does the morse test make you a better operator/designer/constructor?" And judging from the large number of G8-plus-3 men who have been in the RSGB *Callbook* since the beginning (five columns of the original G8A class of 1964 are still there) his viewpoint carries weighty support.

E-M-E news

The world-wide moonbounce listening test organized to commemorate the 50th anniversary of America's Naval Research Laboratory, NRL, brought 20 cw stations in seven countries through the 150ft dish at NRL, with our own G3LTF prominent on both 1,296 and 432MHz, the most favoured bands for e-m-e. Good signals were also received from the Dutch E-M-E Group's station PA6MB, which has a 1kW licence for 23cm. The star turn appears to have been OZ3FYN: his home built 26ft dish put an S8 signal on 23cm into the USA.

The tests have sparked off world wide e-m-e activity, much improvement of equipment by noted participants, and a fair influx of new ones. A systematic 2½min sending sequence on 432MHz by G3LTF, F8DO, VE7BBG (who has already heard 'LTF), W9WCD and K2UYH was arranged for a number of days at the beginning of last month. Results are awaited with interest.

For the record (continued)

More microwave successes by the Sharrock-Wakeman partnership—on St George's Day they upped two UK records (their own), on 3·4 and 5·6GHz, to 98 miles, with G3BNL/P on Dartmoor and GW3EEZ/P on the Prescellies. While they were about it they also hooked up on 2·3 and 10GHz. As this was their first contact beyond 150km on 10GHz, each will receive a Four Metres and Down Certificate, which prompts us to repeat the microwave regulations for such claims.

An award may be applied for in respect of a *first* contact made on 2·3GHz over a distance greater than 500km; on 3·4GHz over a distance of 400km, on 5·6GHz over 300km, and on 10GHz and 24GHz over 150km. So far, the first contacts have been made only in the 10GHz band, and those by 'BNL and 'EEZ are numbered 6 and 7 respectively.

* * *

Last month's G3BLP reminiscence about the great 2m opening on 4 July 1965 has brought to *FMD* so many comments that only a brief summary can be given.

On that memorable day G3IMV of Bletchley raised not only the YUs that everybody was working, but also YO7VS/P, and on phone to boot, the QRB coming out at 30 miles shorter than that to YU1IW/P. On the Rumanian's card: "First G-YO QSO on 144MHz".

From Eastbourne, G3DIV worked a different Rumanian that day—YO9KPB/P, at 1,250 miles. Like several other correspondents he recollects that G3MPS (then at Bridgwater) also worked YO at even greater QRB. No claims have yet come in from GW, but it could be that a record is lurking there somewhere.

All this is in respect of the UK record; the European record is still held by EI2W-YU1EXY at 1,387 miles. The overall picture on that memorable day is being filled in for IARU by F8SH, who is preparing an analytical study.

Five years later almost to the day (5 July 1970) sporadic-E showed up again: G3IMV had a report from YU, and G8BPN worked Italy. So watch out next month!

Meanwhile, that 144MHz records box had better remain unfilled lest further claims and evidence should come forward.

Scoring on 70cm

Suggestions to revise 70cm contest scoring rules to suit the average-sited operator (*FMD* April) made a good debating subject but earned no plaudits. Among many comments received, two from opposite directions (G8CKZ of Southampton and G3NHE of Sheffield) offer the unanimous thought that making a contest too easy debases the state of the art: no incentive exists to improve upon existing equipment and ". . . .a dearth of aluminium in the air", as 'CKZ puts it, is one result.

"Up power, up aerials and increase flat-band dx capabilities... I often feel my 30W input is not enough," thus G3NHE.

But not everybody can do that. Even fewer can move house to improve their metre wave potential. Most of us must put up with the site we have, equated with funds available for amateur radio and equally important, man-hours available. So most of us are never going to stand a chance of winning a contest. But we still go in for them in the sure knowledge that there will be one winner and 49 losers.

Let G8CKZ have the last word, which sums up a widely-held contest philosophy: "When I'm in Wales with GW8ERP/P, '4BUC or '3UCB we're out to win, obtaining pleasure from doing well, giving lots of points away, new country/county to some (who seem very pleased to work us), and seeing the immense amount of work involved bearing fruit. But when I'm out with the local club it's a picnic. We always hope to do well but never do (it's getting better). Knowing the relative amount of effort involved, we get our just deserts."

Gold leaf for 'ZYC

At its April meeting the VHF Committee had the rare privilege of endorsing another claim for the Four Metres and Down Supreme Award. The application had come from Derbyshire, where G3ZYC won the 432MHz Senior Transmitting Award three years ago, and, upon moving QTH, won it again last October. All he needed then to claim a "Supreme" was either a Standard 23cm Certificate or a further Senior on 2m or 4m. He went flat-out to secure the Senior on 2m, and collected the needful QSLs by the beginning of April.

A check of these by the VHF Certificates Manager showed that of the 15 plus 60 which Ian Sneap submitted, no fewer than 42 were for ssb contacts. There was a sprinkling of fm and cw and the rest were a.m.

Now the FMD Supreme Certificate No 3 with its gold endorsement sticker, together with 144MHz Senior No 46, join the several other FMD parchments which are on the wall at Pentrich.

For the record, Supreme No 1 was secured by G3MCS more than three years ago, and No 2 by G5NU last June.

Another operator who put in for a 144MHz Senior was G3NHE of Sheffield. He now has No 45, and here again sideband paid off by producing most of the more dx-ish contacts, with cw providing the rest. Which brings us to...

G3ZRH of Brentwood in Essex: Anthony Stokes put in a unique double entry for his 70MHz claim, three plus 20 on cw and another three plus 20 on phone. His certificate No 99 has been appropriately endorsed.

The 2m ratifications included No 320 to G8AOB/M (which of course is a different station from G8AOB/P to whom No 317 went the previous month); 321 to GW8DUP and 322 to G8FRX, now G4BSW.

"Up the airy mountains..."

A salutary experience which befell G8EPA while he was out portable on 2m suggests that not as much has been said as *should* be said about the hazards of charged rain—or in his case, hail—to operators on exposed hilltops.

Ten minutes after a hailstorm at the summit of the Long Mynd in Shropshire, Steve Carter heard the characteristic ticking from within the converter that suggested discharge from aerial to innards. Exit one BF180 rf stage. Indications were that charged conditions hung around for many hours after the hailstorm. "Before I go out portable again I intend to fit a couple of back-to-back diodes across the input to the BF180 preamp. Tests suggest that a couple of silicon diodes (eg 1N914s) have no effect on the signal," observes 'EPA. These precautions are worth observing at the home station as well, we might add.

Right upon us now is the 70MHz Open, which will no doubt see many 4m men out on the high spots. A month later in the Diamond Jubilee VHF "special" contest operators who complain of "... no GMs on 2m" will have a chance to look for the Heriot Watt University ARS visit to Lowther Hill in Lanarkshire on 6, 8 and 9 July. The aim will be dx on cw, but a.m. on 4m and 70cm will be available as well as on 2m.

Even more exotic will be the chance to work Andorra on 2m (and even 70cm). To coincide with the Diamond Jubilee VHF Contest an expedition to that rare state will be mounted by G4BIA, G8DNF and G8FFG. It is hoped to get a Landrover and trailer to the top of the Pic de la Serrera (at about 9,000ft). Talkback to UK will be on 80m via G3XFA of Sussex, who will obtain daily reports from the camp. For 2m and 70cm skeds send sae to G8DNF, Chris Eley, 101 St Mary Abbott's Court, Warwick Gardens, London W14 8RD.

Plans to put GM3FEC/P into Arran for the Diamond Jubilee VHF Contest have fallen through—though some readers may have been lucky enough to meet the team last month in Luxembourg.

So here is another GM-expedition: starting on 6 August, G(GM)8EWF travels via the Lake District to Ullapool, and offers 40W of fm on 145 and 145·8MHz, inviting evening schedules. Send Bernard Gilbert, 27 Cromwell Ave, Aylesbury, Bucks, an sae and your proposed QTR and QRG.

And a rare chance to work EI on 4m this coming weekend: the G3WOS team will be operating during the 70MHz Open Contest from a fine site south of Dublin on ssb, a.m. and cw. Callsign is not known at the time of writing, but no doubt it will be an EI2V-for-visitor one.

You could call it "FB"

... and in this context it means "French balloons". The season of launches is here again. Two were scheduled for 20 and 31 May, others are due on 4 July, 29 July, 26 August and 23 September. Note these dates now, and proceed as follows to initiate the transponder:

Transmit between 432·2 and 432·3MHz beaming towards Angers in the Loire Valley, and listen for replies between 145·6 and 145·9MHz. Also look for the telemetry and tracking beacon on 145·2MHz. It has 1W and a horizontal dipole and could be within horizon range of the UK if the balloons reach full height.

25 YEARS BACK

"The B.B.C. announces that work on the first high power European F.M. station has already begun near Wrotham, Kent ... this 25KW transmitter will be the forerunner of a number of F.M. stations to be erected throughout the country ... the frequency will be in the region of 100Mc/s. Construction has also begun on the new television station at Sutton Coldfield ..."
RSGB Bulletin, June, 1948.

THE MONTH ON THE AIR

by JOHN ALLAWAY, G3FKM*

"MOTA—how can we get info to you for *MOTA* by April 2nd when *Radio Communication* is not out until April 2nd, let alone received by post until a couple of days later? For goodness sake give the dates for 12 months in advance if anyone on the RSGB knows what is happening that far in advance." Thus reads an anonymous note received by your scribe. It would appear that the writer does not receive *Radio Communication* as, had he read the March issue, he would have noted the closing date for the May issue and also the correct way to spell G3FKM's name!

It may not be generally realized that printer's deadlines have to be met and may even have to be changed from time to time, or that *MOTA* is compiled by G3FKM in his spare time and at no cost to the Society. It is, therefore, quite impossible for purely personal reasons to underline definite closing dates more than a couple of months in advance. The anonymous note writer is fortunate indeed if he knows what *will* be happening in 12 months' time. . . .

(*The anonymous note writer is also unaware that* Radio Communication *is posted on the Friday before publication date and is frequently delivered before that date*—Editor).

A number of readers have kindly written in to report the safe arrival of their ZB2RE awards and compliment the sponsors on its appearance.

ZB2BL has confirmed that the last batch of certificates were posted on 20 April, and invites anyone who has not received his to contact him before 31 July (J. Bruzon, PO Box 292, Gibraltar).

Top band news

VK3CZ's latest letter reports a further contact with 4W1AE, and also with G3RPB and G3SZA on 27 January. G3s TR, LIQ, YMH, YRO and YUV were also heard during the same month. G3RPB was heard in VK3 on 17 February, and on 17, 23 and 26 March. DHJ has been heard on all but two mornings during the period, sometimes as well as RST 589. Arthur intends to construct a vertical aerial to see what more he can achieve.

A list of the most recently issued 160m WACs has been kindly supplied by W4WFL/1 (IARU Assistant Secretary). Between 17 November 1972 and 6 April 1973, GM3WDF, WA4PXP, EP2BQ, OL1AOH, W4BRB, K4BHG, WB4JFK and W4QCW joined the select group of dxers who have achieved this most difficult distinction.

The **160m DX Activity Period,** organized by PY1DVG and EI9J, will take place from 0000 to 0030 daily during the whole of June. Transequatorial paths are at their best at this time of year and stations north of the equator should call "CQ" during the first 2½min of each 5min period, stations in the south using the rest of the time. European and Asian stations are asked to operate in the "dx window" (1,825–1,830kHz) and others to use 1,800–1,807kHz. Participants are asked to check near their transmitting frequency as well as in the other part of the band. CP1EU, LU5FHI, LU5EVM,

All the ex G-holders of amateur calls on Ascension Is in January 1973: l to r (standing) Keith, ZD8KO; Trevor, ZD8TS; Ron, ZD8RR; and Mike, ZD8MH. (seated) Anne, ZD8AW and husband Bob, ZD8RW

YV5CKR, ZS1MH (on about 1,935kHz), 9J2XZ and 9J2LF may be on in addition to ZP, VP8, CX, PY and ZD9. Please send reports to Rolf Rasp, PO Box 51-ZC-00, Rio de Janeiro, Brazil, and to your scribe.

DX news

FO8DF is located at Puka Puka in the Tuamotu Archipelago and will be there until the end of the year. ZK1MA keeps a regular schedule with W6KNH at 1700 on Tuesdays on 14,240kHz and sometimes moves to 14,070kHz cw later. VR6TC has resumed his regular Tuesday evening operating session and may be found on 21,350kHz from 2100. KJ6BZ is said to appear on 14,293kHz between 0600 and 0730 on Fridays and Saturdays.

VU7GV was VU2GV who had been given special permission to use the VU7 prefix from the Andaman Is until the end of April. VU2FBX is said to have asked for permission from the Indian authorities for the prefix to be allocated to the islands and hopes to become VU7AN himself; he will be there until the end of 1973.

Opinion was tested at the 1973 Fresno convention (in California) on a number of matters. On the question of USA power levels the voting was six to one against reducing the input level to 150W, and five to one against increasing it to 10kW! The list of the top 10 most wanted "countries" for DXCC was as follows: Clipperton Is, Iraq, Mt Athos, Sikkim, Bouvet Is, Albania, Tibet, China, S Sandwich and Congo (TN8). Although this applied to Californian dxers your scribe would think that this list could be correct for most Europeans (the poll was taken before the recent SV1DB/A operation).

W6ANN has received no logs from or replies to letters sent to YJ8GH and has given up trying to act as his QSL manager. He still sends out cards for 4Z4LI, KD6USA,

* 10 Knightlow Road, Birmingham B17 8QB.

WO6BSH and WA6GLD/6Y5. VE6AYU (A. Michaud, 4416 Bulyea Road NW, Calgary 48, A1, Canada) is QSL manager for FP0DX, FP8DH, FP8YL, VP7BL and ZF1JA.

ZD7FT is a recent newcomer from St Helena and has been worked on 14MHz. ZD7SD (Bill) and ZD7SS (Sylvia) are a husband and wife team. ZD9GC is said to look for European contacts between 7,060 and 7,080kHz on Saturdays between 1900 and 2300.

The Sultan of Oman is reported to have ordered a complete amateur radio station, including a log periodic aerial. SV0WUU is going to Yemen and hopes to receive a 4W1 call. SU1MA keeps a schedule with F6BNQ at 1500 between 14,225 and 14,235kHz.

QSLs for ZF1FOC should be sent to the address given in *QTH Corner*—that given in the April issue was incorrect. The ZF1JA who has been on 14MHz cw is a pirate as the real owner of the call does not use that mode.

VA5WCC was on the air until 31 May and was a special station celebrating the World Curling Championships, likewise VA8BW and VA8BM commemorated the 75th anniversary of the Yukon Gold Rush.

As the A4F prefix is being used by aircraft, amateur stations in Oman are using A4X. It is rumoured that stations in Bahrain will soon change to A7. Some stations in East Germany will use the prefix DT until the end of the year to celebrate the 20th year of amateur radio in the country.

Contests

The Worked All Mass Cities and Towns Contest

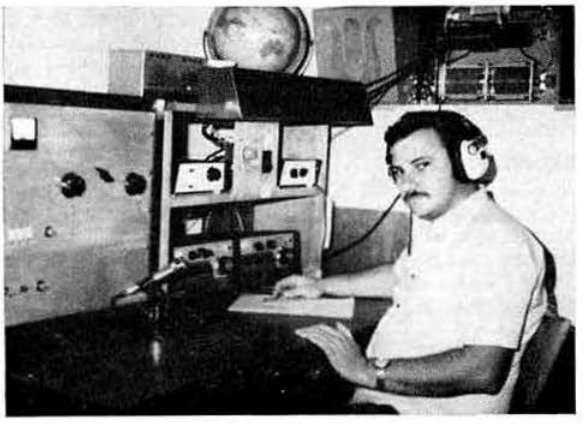
0001 10 June to 0004 14 June.

Exchange reports and location. One point is scored for each contact with a Massachusetts station and the multiplier is the number of cities and towns worked (maximum 351). Send logs to Nina Robbins, 30 Prospect Street, Bridgwater, Mass, 02324, USA, to arrive no later than 31 July.

The Berlin Radio Exhibition Contest 1973

0000 9 June to 2400 22 June.

Open to all amateurs in the "WAE" countries. All bands 1·8 (if permission granted) to 28MHz, but no cross-band QSOs. All modes. Participants should work as many stations



PY1DVG, Rolf Rasp, South America's organizer (with the help of E19J) of annual transequatorial 160m tests. Equipment consists of the Drake 4 line with inverted-V and Beverage aerials. *(W1BB print)*

Author of a Japanese 160m manual, Isaji Shima, JA3AA, works a great deal of dx on 1,910kHz using this 1kw set up. *(W1BB print)*

in West Berlin as possible. Each station may be contacted once daily on each band. No serial number need be exchanged but report, name and QTH must be given in each QSO. In order to give every participant a chance to win a prize the result will be declared by ballot and each 20 QSOs logged will give an entrant one ticket in the draw (eg a station who has made 200 QSOs will have 10 chances). First prize will be a trip to Berlin with a three-day stay during the Radio Exhibition (31 August-9 September). Other prizes include a wattmeter and a clock. Logs should be sent before 10 July to: DARC District Berlin, Schwaebische Str 24, 1 Berlin 30, Germany.

Dxpeditions

W6GQU, K6GUY, KH6HIF, 5W1AU and KS6DY are planning an expedition to Tongareva Is to commence on 30 June. News at the time of writing is that this will count as Manihiki for DXCC purposes, but attempts are being made to provide information which could enable it to count as a "new" country. Equipment will include FT101s, delta-loop aerials and a TH3Jr beam.

Japanese "Field Day" is the first weekend in August and JARL is said to be planning an expedition of some 200 amateurs to Ogasawara Is! As *West Coast DX Bulletin* remarks—this is *really* supplying the demand. . . .

News from overseas

Allan Papworth, G3WUW, returned from his tour in the Far East early in April. He left Sarawak on 24 March and travelled home via Singapore, Malaysia, Sri Lanka, the Seychelles and Kenya. A licence—VQ9AP—was available for use from Mahé but equipment trouble caused a severe reduction in the number of contacts made from there. Allan apologises for the paucity of contacts from VS5AP, due to a poor aerial system; he understands that VS5BY is currently active and that a W5 will be arriving in Brunei later this year. QSL cards for VS5AP, 9M8WUW, 9M6AB and VQ9AP should have been sent out via JA2KLT but some are still available from G3WUW (see *QTH Corner*).

Leslie Cooper is now ZL2BKC in Wellington and may be reached at the address in *QTH Corner*. He may be on the air by now.

Richard Limebear, 8P6DR, will close down in July and return to the UK in September. He asks that all QSLs be sent via G3JUL and not via the 8P6 bureau at this late stage. After Richard's return to his G3RWL address he will deal with QSL requests himself and promises replies to all cards by the same route by which they arrived (no sae/irc will go via the bureau). VP2AGA cards are also still available.

4U1ITU

A get-together of amateurs to discuss further contributions to propagation research and to evaluate the "CPR-Special" competition will be organized in Geneva from 9 to 11 June. Visitors will be able to operate from 4U1ITU and a meeting of IARC will take place at 2000 on Monday 11 June. IARC may be reached at 1211 Geneva 20 (tel 34 70 00).

Awards

The GI6YM Golden Jubilee and Marconi-Kemp 75th Anniversary Award

1973 is the Golden Jubilee of the Belfast YMCA Radio Club, GI6YM, and the 75th anniversary of the first wireless link between Ballycastle and Rathlin Is—the first "public service" by radio. The certificate will be awarded for contacts made between 1 June 1973 and 31 May 1974 with GI6YM and GB3MKB (which will be active from 30 June to 7 July 1973 from Ballycastle). Requirements are as follows (for contacts on 1·8 to 28MHz): One QSO with GI6YM or GB3MKB (if with both a gold seal is awarded) together with 10 Italian, 10 English, and 10 N Irish stations. UK Class B licence holders *only* require a contact with GI6YM/P and with five English and five N Irish stations. Send certified list of log entries plus 25p or 8 IRCs to "Golden Jubilee Award", YMCA Radio Club, 12 Wellington Place, Belfast 1. Listeners may apply by sending a log certified by a licensed amateur or radio club official. Look for the special stations on: 3,520, 3,775, 7,010, 7,070, 14,050, 14,150, 14,190, 14,300, 21,020, 21,250, 28,050 and 28,600kHz.

Massachusetts Amateur Radio Week

Certificates will be awarded to amateurs who participate in this event which takes place from 0001 10 June to 2400 16 June. Stations outside the USA must contact two Massachusetts stations and should exchange signal reports, county and country. Logs must show date, time and frequency. Certificates will be endorsed for band/mode if requested. The certificates will be signed by the state governor Applicants should send a large sae and one irc to reach WA1EZA, W. C. Holliday, 22 Trudy Terrace, Canton, Mass, 02021, USA, no later than 31 July.

The Afghanistan Radio Award.

For confirmed contacts or reports from Afghanistan stations on at least two bands since 1 January 1966. YAs require six, other Asians four, African and European applicants three and the rest of the world two contacts. Apply to W. Renner, D—3400 Goettingen, Friedensstr 25, Germany enclosing 10 IRCs.

Canadian trip by G3CXE

In order to raise funds for a number of charities (Cancer Research, Diabetes Assn, RAIBC, Cheshire Homes and the NSPCC) Douglas Brabner, G3CXE, is organizing a sponsored cycle trip across Canada. He hopes to leave St John's in late June and cover 100/150 miles each day along the Trans-Canada Highway until he reaches Kelsey Bay, BC, some 5,000 miles away. Sponsors are invited to nominate the charity of their own choice and to undertake to pay the sum of their choice for each 1,000 miles of the journey completed. Forms may be obtained from 33 Peashill Close, Sileby, Leics LE12 7PT, before 15 June, and from 1,429 Williams Ave, N Vancouver, BC, Canada, after that date. Douglas is paying his own expenses and may carry a small portable hf transmitter. It is pointed out that he is not a professional cyclist so that this will be quite a difficult undertaking for him.

QTH Corner

A6XB	via K1DRN, V. Dameron Jr, 265 Davis Rd, Bedford, Mass, 01730, USA.
A6XP	PO Box 1057, Sharjah, United Arab Emirates.
CQ6LF	via W3HNK, Box 14, Norwood, Pa, 19074, USA.
FG0RX	via DJ9ZB, F. Langner, C-Kistner-Str 19, D-7800, Freiburg i Br, Germany.
G3WUW	A. Papworth, 25 Station Rd, Over, Cambridge, CB4 5NJ
WA4MEH/HC8	PO Box 120, Miami Beach, Fla, 33139, USA.
JD1AHI	JA1BA, PO Box 1, Funabashi-Higashi, Chiba, Japan.
JD1YAF	JH1ARJ, M.Inami, 5-6-2- Oji, Kita, Tokyo, Japan.
KC6CF	G. I. Ngirarsol, Box 18, Koror, Palau, W Caroline Is, 96940.
KC6HC	H. M. Chamberlain, Box 514, Koror, Palau, W Caroline Is, 96940.
SV1DB/A	(*Mt Athos*) C.Psiloyannes, PO Box 1442, Athens, Greece.
SV1DB/A (CW	QSOs) via DJ6SI, B.Drobnica, Alte Str 28, 5021 Widdersdorf/Kin, Germany.
VP2MQB	J. Johnson, 2508 Big Horn Lane, Richardson, Texas, 75080, USA.
VP2MYA	(25-26 March) via K5RWK, PO Box 232, Richardson, Texas, 75080, USA.
VP2MYA	(after 26 March) W5MYA, 1505 Cedar Ridge Terrace, Euless, Texas, 76036, USA.
VP8JE	via WA5FWC, 2013 Melissa, Arlington, Texas, 76010, USA.
VP8KF	J. Wright, Box 59, Port Stanley, Falkland Is.
WB6VGI/VQ9	(*Chagos*) L. R. Minnis, 2415 Bates Drive, Davis, Calif, 95616, USA.
VU7GV	G. Venkatasulu, c/o ISPW, Port Blair, Andaman Is.
YJ8WS	via W6ZLB, 59 Chilton Av, San Carlos, Calif, 94070, USA.
ZD3M	Fr M. J. Cleary, PO Box 463, Bathurst, Gambia.
ZF1FOC	M. Carter, Box 845, Mims, Fla, 32754, USA.
ZF1KW	via WA2BCK, 96 Fiarhaven Dr, Cheektowaga, NY, 14225, USA.
ZF1RR	
ZL2BKC	L. Cooper, c/o GEC (NZ), PO Box 50244, Elsdon, Porirua, New Zealand.
4A4AA/1	via W2GHK, DOTM, Box 7388, Newark, NJ, 07107, USA.
6Y5ED	28 Elizabeth Av, Kingston 10, Jamaica.
9G1AR	c/o US Embassy, PO Box 194, Accra, Ghana.
9G1HO	

RSGB QSL Bureau, Bromley, Kent, BR2 7NH

Eclipse of the sun

Readers may have noted on page 324 of May *Radio Communication* that there will be a total eclipse of the sun on 30 June. G2WS will be off the coast of Mauritania on board the *Monte Umbe* which has been chartered by the British Astronomical Association and he has suggested that as many amateurs as possible operate on the bands before, during and after the eclipse so that effects on propagation may be observed. The time of totality is about 1030.

Expedition

G3VLX and G3XMD plan to operate GW3VLX/P from Merioneth, Montgomery and Cardigan on 15, 16 and 17 June. They expect to be on about 1,862kHz using ssb from a different county each evening. In the daytime, operation on 7 and 3·5MHz will take place with some /M working from the rarer WAB areas.

Odds and ends

GM4QK would like to apologize to the WAB chasers for his non-appearance from any unusual locations this year but has been preoccupied with a visit to France and the heaviness of his portable generator.

GM3WKM hopes to be active from Benbecula in the Outer Hebrides from early June for about two years. He

has an Anglian transceiver and linear and will operate on all bands. Special efforts will be made to contact members of the Royal Signals ARS, and his WAB area will be NF75.

GC3YIZ will be in Alderney during the weekend 9-10 June. He will join the WAB Net and will also operate on 160m.

Band reports

Another rather poor month with a larger number of sunspots appearing and causing disturbed conditions on several occasions towards the end of the period.

Many thanks to the following for the information contained in this section: G2WS, G3HB, G5JL, G6GH, G3s GVV, NKQ, RFG, UOL, URX, VBL, ZEN, GW4BLE, BRSs 2098, 17567, 31301, 32799, 34075, As 7511, 7785 and 8113.

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

3·5MHz. 0500 ZL4KF, 8R1J. **0600** *DK5WL/HB0* (QSL to DARC), *K6AUC*, *KV4AM*, *VK4NH*. **2200** KP4AN, ZB2CF. **2300** EL7D, VP9HH.

7MHz. 0500 LU7FDZ, *PYs*, *YVs*, *ZLs*. **0600** HC2TV, *KH6CA*, *KZ5s*, *W7YTN*, *XE1BL*, *ZL3BH*. **0700** VKs. **1900** CR4BS. **2100** UA0TO, *VK3MR*, *5B4PW*. **2200** *TA1MB*. **2300** *4X25JU*.

14MHz. 0000 OA6BK. **0700** *JT0AE*, TU2DL, VK0WW. **0800** *EA9EJ*, KC6, KH6, KL7, KS6s DH, DY, *SU1MI*, *TU2DQ* (QSL to WB4SPG), VS6FB, ZK2BD. **0900** *A35FX*, *HV3SJ*, ZD3M. **1100** M1D, VE8RCS. **1200** MP4BJS. **1300** *SV1DB/A*. **1400** C29ED, ZS4AF. **1500** SU1MA, 4W1BC. **1600** *JT1AO*, *KG6AAY*, VQ9RK, ZD7s SD, SS, 3D6AU. **1700** HL9VJ (QSL to WA3EJL), JY9FOC, VS5BY, *VU7GV*, *YB3CW*, 3B6CF, 4S7s. **1800** CR3AB, XT2AK (QSL to F6AXP). **1900** *HS3AHL* (QSL to WB8-GWB), KL7BJW, SP5ATV/MM (yacht *Polonez* in South Atlantic with lone round the world sailor expected at Plymouth in June. 1930 daily on 14,125kHz) VP8s JV, KF, ZD7SD, 9X5JC. **2000** CR5AJ, 9K2CA, 9Y4s. **2100** FG7XL, OX3EA, VKs, VP2KH. **2200** *FY7AI*, WA4MEH/HC8, HH2CS, SP9VU/OA4, TR8VE, VP2s AA, DAI, MW, VAW, XT2AA, ZD8US. **2300** *CE0AD* (QSL to WA2RZT), *VA3TJ*, VR1Q.

21MHz. 0800 YAs, ZS3AK. **1000** A6XP, CR3KD, YK1AA. **1100** JD1AHQ, *XW8EV*. **1200** JY6AS (QSL to WA3HUP), KG4CB, VK9EM, ZD3M, 5H3MT (QSL to LA9PF). **1300** A4XFE, DU8BA, FR7AL, *KG6AAY*, *5T5DY*, 9V1QZ. **1400** CR7CH (QSL to W7VRO), EL0N/MM (off W Africa, QSL to G3UOF), ST2SA, SU1MI, TT8AC (QSL via DJ1LP), WB6VGI/VQ9 (Chagos), *VR1X*, 5Y4XDV. **1500** PZ1DR, SV1DB/A, TG9YN (QSL via DL8DF), 5N2ESH, F2ZZ/5VZ, *5R8AG* (BP 60, Ivato Airport), *9L1GC*, 9M2BO. **1600** A2CCY, EL8G (QSL to OZ6HS), 3B6CF, 5U7IZ, *8P6DR*, *9G1HE*. **1700** CR4BS, WB0DRB/HK6, KC4USP, TR8AF, *VQ9M*, *W7RM*, ZD7FT, ZD9GC. **1800** TL8ET, VP8KF, W9JFE/VQ9 (Chagos), VQ9HCS, ZD3D, 9X5VA. **2000** CE3IC, OA4AHC. **2100** CP6EB.

28MHz. 0900 9G1HO. **1000** ZS3HF. **1100** 5U7AL. **1200** OD5CS. **1300** *ZD4CY*, *3B8MS*, *5R8AG*. **1400** CE8AO, LUs, 9G1AR. **1500** FL8HM, LUs, PYs, ZD7FT, 9J2s. **1600** VPs IAA, 2VAM, 8KF, 5B4ES. **2100** HK3CPW.

Many thanks to all correspondents, and especially to the following for information extracted: the **Ex-G Radio Club Bulletin** (*W3HQO*), **DX'press** (*PA0INA/PA0TO*), **DX News Sheet** (*Geoff Watts*), the **29 DX Club Newsletter** (*George Allen*), **QUAX** (*G3DME*), the **DX'ers Magazine** (*W4BPD*), **NARS Newsletter** (*5N2ABG*), **Long Skip** (*Nick Sawchuk*), and the **West Coast DX Bulletin** (*WA6AUD*).

Please send all items for **July** issue **to reach G3FKM** no later than **6 June,** and for **August** issue by **4 July.**

Propagation Predictions

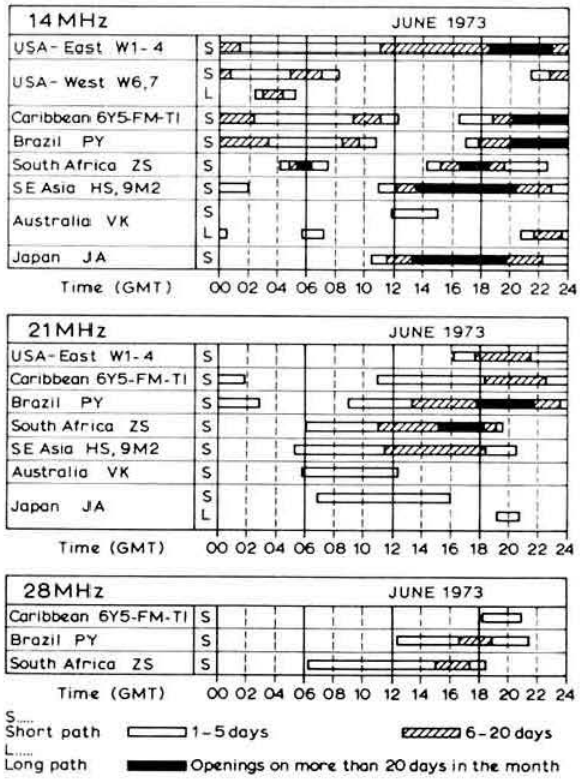
The high summer conditions in the ionosphere will continue throughout June, July and August. This means that conditions on the hf bands, specially **28MHz**, will continue to be poor. On favourable days only South Africa and South America will be heard on **28MHz**. On **21MHz** Africa and South America will be heard with certainty, and the east cost of North America only on days with above average F2 MUFs. Short skip conditions could possibly liven up both bands over distances of 500-2,000km.

Again, **14MHz** will be the main carrier of dx traffic; short summer nights allow the band to remain open all night on favourable days. Summer conditions also mean a possibility of communication on the indirect path. Special mention is made of indirect path to western North America, Japan, Australia and South America, and under exceptional circumstances to South-East Asia and Central America. On favourable days contacts with Hawaii should be possible via the direct path between about 0530 and 0930gmt.

Daytime traffic on **7MHz** will be possible over distances of about 1,000km. Local traffic will be interrupted frequently by the dead zone, as the daytime F2 MUFs often lie below 6MHz during the present phase of the sunspot cycle.

It will be possible to use **3·5MHz** for local traffic during night and day without interruption by the dead zone at night. DX traffic on 7 and 3·5MHz will only be possible during the summer months if the greatest part of the path lies in darkness and the level of atmospheric disturbances is below average.

The provisional sunspot number for April 1973 provided by the Swiss Federal Observatory was 57·6 with solar activity evenly distributed throughout the month. The predicted smoothed sunspot numbers for August, September and October are 38, 36 and 34 respectively.



COUNCIL PROCEEDINGS

A brief report of the Council meeting held on 5 March 1973

Present: *Dr J. A. Saxton (President, chairman), Dr E. J. Allaway Messrs J. O. Brown, R. W. Fisher, W. J. Green, R. J. Hughes, E. G Ingram, G. R. Jessop, W. F. McGonigle, L. E. Newham, C. H. Parsons, J. R. Petty, W. A. Scarr, A. W. Smith, R. F. Stevens, G. M. C. Stone, F. C. Ward (Council members), D. A. Findlay (General manager).*

The President welcomed Mr R. W. Fisher, G3PWJ, Council member for Zone B, and introduced him to the members.

Apologies for absence had been received from Messrs B. D. A. Armstrong, G3EDD, and A.W. Hutchinson, editor.

Finance report

The Honorary Treasurer submitted a report on the financial results for the six months to 31 December 1972. Mr Brown explained that although the Income and Expenditure Account showed a surplus of £2,232 at 31 December 1972, this was some £1,200 less than the budget surplus.

It is estimated that the expenses for 1973-74 after allowing for a profit on sale of publications, will be about £80,000, which is approximately £5 per member. In these circumstances it was agreed that the subscription rates would have to be increased.

After discussion it was agreed that the subscription for Corporate Members should be £5, to which must be added 50p for VAT (providing the rate is 10%). There would be no addition for VAT for Overseas members. The rate for associate members would be £2 (including VAT).

1·8MHz and 3·5MHz bands—ssb

Council had agreed at the last meeting to encourage the use of the ssb mode in preference to a.m. on 1·8 and 3·5MHz. It was agreed that a statement setting out the background to Council's decision should be published in *Radio Communication*.

Science Museum display

Mr W. K. Geddes, Assistant Keeper, Radio Collection, Science Museum, had offered to the Society the use of a display area in the vicinity of the communication exhibit in the Science Museum. Mr Geddes had suggested a display of photographs and small items of equipment depicting the contribution by amateurs to the advancement of the use of the short-wave bands during the 1920s up to, say, 1938.

Council gratefully accepted the offer and agreed that detailed plans should be drawn up.

Mr Ward suggested that a tape-slide commentary on amateur radio should be made available to the Science Museum for use during intervals of transmission by GB2SM.

Membership and affiliation

It was resolved:

(i) to elect 456 members;
(ii) to accept reduced subscriptions from six members;
(iii) to waive the subscriptions for 1973-74 of 17 members;
(iv) to grant affiliation to the Amateur Radio Association, Bahrain; Sheffield Polytechnic Radio Society; TACT Students Union Amateur Radio Society, Hull.

Regional and area representatives

Council confirmed the appointment of Mr B. Kennedy, G3ZUL, as regional representative, Region 3, in place of Mr R. W. Fisher, G3PWJ, who had been appointed Zonal Manager, Zone B.

Council also approved the appointment of Mr C. Parry as area representative for the Rhondda Valley.

Policy

Mr Jessop suggested that Council should consider policy regarding ssb on vhf/uhf bands, slow-scan television, mobile operation on vhf/uhf, space communication and propagation studies.

It was agreed that all these matters should be considered by the appropriate committees but it was felt that efforts should be made to encourage members to submit articles covering these items. Mr Scarr urged that there should be more information in *Radio Communication* on original work that is being carried out by members.

Committee minutes and recommendations

Council received the minutes of the following committees:

Raynet (25.11.72), Diamond Jubilee (30.11.72), Technical & Publications (5.12.72 and 23.1.73), HF Contests (7.12.72), MPT Liaison (7.12.72), Finance & Staff (11.12.72 and 6.2.73), Interference (15.12.72 and 26.1.73), Scientific Studies (18.12.72 and 8.2.73), Education (30.12.72 and 27.1.73), VHF Contests (4.1.73 and 29.1.73), Membership and Representation (4.1.73 and 5.2.73), Mobile & Exhibition (23.1.73), VHF (24.1.73).

Raynet. Mr R. W. Fisher accepted Council's invitation to serve on this committee.

MPT Liaison. Mr Stevens commented that there would be a discussion with the MPT on the UK/Alien Licence conditions and in particular the clause requiring the exclusive use of English. Mr Stevens pointed out that the condition as to the use of English was contrary to the EEC requirements.

Gift from Mrs A. Allen

The President reported that he had received from the widow of W. H. Allen, G2UJ, a cheque for £100 with a request that the amount should be used to purchase equipment for the headquarters station. The President had replied appropriately.

Official Regional Meetings

Mr Parsons reported that the Region 10 ORM in Cardiff would be on Saturday 22 September 1973. Council agreed that Mr Jessop and Mr Stevens should attend the ORM.

It was reported that the date of the Region 13 ORM and Scottish VHF Convention had been changed to 22 September 1973. Mr Hughes agreed to attend the meeting on behalf of the Council.

OBITUARIES

Major J. L. Drudge Coates, G2DC

Jack Coates, of Ringwood, Hants, died on 21 February at the age of 78. His reputation as dx man was world-wide, and he had operated from many parts of the globe. Since his retirement from the Royal Corps of Signals he had been associated with the Lymington (Hants) Radio Society.

Mr F. Hinton, G3AS

Fred Hinton died on 12 April after a lifetime of radio activity in Dorset. He was latterly a keen hf mobileer, and shortly before his death had his 1,667th sked with ZS60F.

Mr M. Margolis, G3NMR

Maurice Margolis, known to many for his activities on the mobile scene, died on 9 April. From 1959 to 1969 he, together with his wife Sylvia, edited and produced the monthly *ARMS News Letter* (later to become *Mobile News*), while at the same time he was an enthusiastic ARMS committee member—a post he filled until his death. The G3NMR caravan was a familiar sight at rallies, and made many forays into Europe once reciprocal licensing was a reality.

Mr J. A. Ogg, G3REX

Mr J. Ogg died on 27 March, aged 77, after a short illness. His prowess on the morse key was well known, his interest in radio dating back to his PMG Certificate of 1914.

Mr F. A. Robb, GI6TK

Frank Robb died on 7 May, in his early fifties. A blind amateur, his licence dated from before the war, and he was a founder member of Bangor and District ARS, which owed much to his enthusiasm and encouragement.

Mr L. Smith, G3WQN

Leslie Smith died suddenly on 4 May. He was active on 80/40m cw and 2m phone, and well known for his enthusiasm for cw contest operating with the Tyneside ARS.

Mr H. Staff, G4KO
Henry Staff, of Norwich, died on 29 April at the age of 77 years. He was one of the first people to activate the 2m band in East Anglia, and was well known for the encouragement he gave to the younger amateurs, in terms of tuition, guidance and practice.

We have also been notified of the death of
Mr I. P. Griffiths, G8FVA, of London, who died on 7 March.

RAYNET

by S. W. LAW, G3PAZ*

Members of long standing will have realized that a certain degree of circumspection has to be observed when this column is written, but those who read between the lines will have little trouble with such premises as they may infer. Often have we quoted the old saw about the inevitability of gradualness; may we now hint that there would appear to be a faint glimmer of light at the end of a long, dark tunnel. Newer members may rest assured that the wheels still turn.

Reminder
It is not too early for volunteers to proffer assistance for the Raynet stand and exhibits at Woburn. Time passes all too quickly and procrastination is to be avoided at all costs. Remember, even one hour of your time can provide a great relief to the steadfast few who carry the main burden. Incidentally we are very sorry that no claimant has ever appeared for the one raffle prize still remaining from last year. Never fear, it will be offered again this year.

Raynet Committee
The meeting, deferred earlier due to transport difficulties, was held at RSGB HQ on 28 April. There were few apologies for absence, and a very welcome visitor was an extremely well-informed representative from the Voluntary Civil Aid Service who proved a positive mine of information in connection with the activities and aims of this energetic body, which has a paper membership of some 15,000 and can provide a working turnout of about 5,000 if required at any one time. Naturally a great deal of the matter put forward was outside the province of Raynet but gave a remarkable insight into the overall picture of disaster preparedness on a national basis. Much of the discussion was of immense interest to the committee members, but unfortunately outside the sphere of reportage in this column.

One point of interest emerged, however, which concerns the subsidary use of field telephone systems. Some groups using caravans are already equipped with outlets for this and other purposes, but we would put it to those contemplating the use or construction of mobile units to bear the thought in mind. We have previously noted the use of rapidly installable field telephones by certain units of the Red Cross, and we feel that technical liaison where such facilities are available would be much appreciated by our user service.

The chairman thanks all those who have sent newsletters, correspondence and reports of exercises. The latter have been passed to G3MBQ for record purposes. Some concern was expressed over the apparent demise of certain groups, notably Hertford. The Rugby area also came in for some comment; as the song might have it "Where have all the members gone?" Controller-designate G8FCG would very much like to know! There is news of a new group in Colchester, and G3PED is gathering members for NE Essex. In the Leamington Spa area G8FRA is looking both for members and a suitable group title. Cannock Chase also has G8EHY well ahead with liaison work. By all accounts Bedford may soon be up and doing.

There have been 47 new registrations and 141 re-registrations (including one dated 1957!). Have *you* got an up-to-date card?

No comment?
There was this old bridge; it had to be felled. Something went wrong and all services were cut. No less than 17 different organizations were called out—but not Raynet!

* 130 Alexandra Road, Croydon, Surrey, CR0 6EW

YOUR OPINION

The Editor,
Radio Communication
Sir—I feel I must back up A. Renwick's, G3JIC, remarks about British manufacturers of communication equipment. I too have suffered, albeit to a lesser extent, at their hands.

During the first week of February I ordered a preselector from a firm that advertises in *Radio Communication*. I received a prompt reply that the item was out of stock, but one would be sent as soon as possible. By the end of March I had written again only to receive a reply that the advertiser had been in direct contact with a director of the company that made the preselector promising delivery in two weeks. On 21 April the preselector still had not arrived so I cancelled the order.

A week later I enquired about a Japanese item from another of your advertisers. I received a reply by return post telling me all I wanted to know about the item. I duly ordered and the item was to be delivered within 10 days. This includes the time the firm had for the Easter break. How's that for service?

G3JIC is right, no wonder the country is in a bad way. From now on I'm buying "foreign."

A. J. Wills, BRS33042.

The Editor
Radio Communication.
Sir—I have just read the rules for the 70MHz Open Contest on 9—10 June. Once again we are to have a full 24 hours for this event, in which time the leading stations will make perhaps 100 contacts and the operators who draw the 2-6am shift will be lucky to make any at all in this period.

Last year there was a stretch of several hours during which the only signals audible in northern Radnorshire (GW4ABR/P) were GW3ITZ/P, GW3UCB/P, GB3SU and GB3SX.

The final result was so close that even one contact made during this time would have meant a different winner—so we all stuck it out. But what a lot of effort for nothing!

Can we now have a sensible break during the night (say 2-6am), at least until activity on the band increases to a level where a few fixed stations are *likely* to be active all night? As it is obviously too late to alter this year's timing I have no doubt that one or two of us will once again develop sore throats and stiff wrists calling CQ to little avail—or will someone take pity and stay up with us?

J. Phillipson, G4BEZ
(one of the crazy crew at GW4ABR/P)

The Editor,
Radio Communication

Top band ssb transceiver

Sir—Having spent some considerable time researching various publications, without success, for a suitable design for a top band only ssb/cw transceiver I wonder if any of our members have designed and built such a rig?

Having discussed this topic with a number of amateurs I feel sure that the publication of such a design would fulfill a significant need, more particularly in view of the new regulations on the use of ssb on this band.

M. F. McDonald, G3RZM

The Editor
Radio Communication
Sir—While looking back through some QSL cards the other day I came across one from a certain G8C—in Staffs who had sent not only a card but also a letter even though I had misheard the call and had not heard him. As if this was not enough he also enclosed a list of stations that had been operating in and around his area at the time of my report.

This for me sums up the spirit of amateur radio. To him and the many other amateurs that have replied to my reception reports, THANKS.

D. "Sam" Noakes, BRS34009

The Editor
Radio Communication
Sir—I would like to make known to you some feelings, which I share with many of my friends, on the subject of subscriptions.

I would first say that we fully appreciate the need for an increase

in the Society's income to meet rising costs. The proposed changes, however, seem to be strongly biased against those younger members having a transmitting licence. Council is reported as feeling that every encouragement should be given to younger members, and yet many people like myself, who have had sufficient enthusiasm to obtain the qualifications for a licence at an early age, are faced with the prospect of having to pay a subscription of £5.50, while others of a similar age are paying £2 for virtually the same benefits.

This would seem a very inconsistent attitude on behalf of the RSGB, and since many student members are attempting to live on the limited resources of a student grant I would appeal to Council to reconsider the case of those corporate members who are still undergoing full-time education.

D. B. Gething, G3XZK

Rhondda Radio Society's RSGB Diamond Jubilee Dinner Dance

Over 80 amateurs and their ladies from all parts of South Wales attended the celebration of the RSGB Diamond Jubilee organized by the Rhondda Radio Society on 26 April at the RAFA Club, Treorchy. It was unfortunate that the guest of honour, Alderman Jayne, Deputy Mayor of the Rhondda, was taken seriously ill on the afternoon of the event, and in consequence neither he nor the Mayoress were able to be present. Through family illness David Thomas, GW3RWX, Regional Representative, was also prevented from attending.

The society chairman, Mr Clive Davies, BSc, presided, and the master of ceremonies was a member of the committee, Mr Ivor Williams. It will come as no surprise to regular users of the band to know that both received encouragement from time to time from the ebullient society president, Mr Garfield Williams, GW2FOF!

In reply to the toast "The Radio Society of Great Britain" Cyril Parsons GW8NP, conveyed the thanks of the President and Council of the RSGB to the Rhondda Radio Society for their excellent work in organizing the event. He then gave a short review, the theme being the unique character of amateur radio as compared with other hobbies. He pointed out that even the term "amateur" was something of a misnomer when applied to amateur radio, since its members were in many cases professional scientists and engineers and ranged from this level to schoolboys and even schoolgirls! There could be no doubt, however, that its great asset was its international character, since neither iron nor bamboo curtains prevented contact with amateurs of other nations, and even the problem of languages was overcome by the combined use of morse and Q codes. From this it followed that if the great philosophers were right, and the future of mankind in harmony depended on education and communication, then indeed the radio amateur was well in the forefront of human progress.

Mrs Jean Parsons deputized for the Mayoress in the ceremony of cutting the magnificant birthday cake, and on behalf of the Rhondda Radio Society Cyril Parsons presented to Mr Ivor Williams

Mrs Jean Parsons cuts the cake

Ivor Williams, committee member; Cyril and Jean Parsons; Garfield Williams, GW2FOF, president; Ivor Davies, BSc, chairman; and Cyril Parry, GW3PHH, secretary, at the dinner

a copy of *The World at their Fingertips* signed by the President of the RSGB, Dr Saxton, for onward transmission to Alderman Jayne, with regrets that he could not be present and hopes for a speedy recovery.

In the midst of the festivities, the meeting was eloquently reminded by Mr Sam Weaver, GW3ITQ, of the less fortunate members of the amateur community, and in various ways a substantial contribution to the funds of the Radio Amateur Invalid and Bedfast Club was raised.

Concurrent with the dance which followed, and indicative of the manner in which all tastes were catered for, there was a display of commercial amateur equipment by Mr Alan Bartlett, GW3YSA, and a range of aerials by Mr Tony Blackmore, GW3FKO.

The Rhondda Radio Society is to be congratulated on organizing an outstanding function and, if it is possible to single out individuals, the energy and enthusiasm of the secretary, Mr Cyril Parry, GW3PHH, deserves special mention.

C.H.P.

SPECIAL EVENT STATIONS

Dorset Scouts Jamboree, 28 July-4 August
A station using the callsign GB3BSI will be active from Brownsea Island, Poole Harbour, Dorset, on 10-8m ssb and 2 and 4m a.m./fm.

Finchley Carnival, 12-14 July
GB3SFG will be operated by the Southgate Radio Club at Victoria Park, Vallards Lane, London N3. Bands in use will be 160-2m. For further information contact G3MBL or G3XMV, QTHR.

Mather and Platt "Gala Day", 14 July
The Manchester and District ARS are putting a special event station on the air from the Park Works, Newton Heath, Manchester M10 6BA. Frequencies in use will be 160-80m a.m./ssb, 2m a.m. and 70cm a.m. Further information can be obtained from G3HOX or G8EUO QTHR.

Naturist Federation 25th Anniversary, 23/24 June
GB3SUN will be put on the air by the Naturist Federation (formerly N Kent Sun Club) from their grounds at "Brocklehurst" in Orpington, Kent. Operation will be on ssb and all hf bands, and a special QSL card will be issued.

Patshull Rehabilitation Centre, 16 June
GB3PRC will be put on the air during the annual Garden Party at Patshull, near Wolverhampton, between 1400 and 1800.

Stowmarket Carnival, 19-21 July
To coincide with the Carnival Week, Stowmarket District Amateur Radio Society are putting GB2SCW on the air from the Recreation Ground, Stowmarket, Suffolk. Operation will be on 160-20m, 2m and 70cm, cw and telephony.

Stratford-upon-Avon, 8-10 June
GB2HF will be on the air between the above dates, to coincide with a house party being arranged by the Holiday Fellowship, entitled "The birth of broadcasting, 1922-72". Operation is expected to be mainly on 80m.

CONTEST NEWS

RSGB 7MHz DX Contests 1973 rules

Radio amateurs and short-wave listeners throughout the world are invited to take part in the 12th RSGB 7MHz contests for single-operator stations. Suitable contest log and cover sheets for this and other RSGB contests may be obtained from: The General Manager, Radio Society of Great Britain, 35 Doughty Street, London WC1N 2AE. UK members should enclose a large sae.

TRANSMITTING SECTION

1. The General Rules for RSGB HF Contests, published in the January 1973 issue of *Radio Communication*, will apply.
2. **When.**
   CW Contest. From 1800gmt Saturday 20 October 1973 to 1800gmt Sunday 21 October 1973.
   Phone Contest. From 1800gmt Saturday 3 November 1973 to 1800gmt Sunday 4 November 1973.
3. **Eligible entrants.** Licensed amateurs in all parts of the world. British Isles entrants must be members of the RSGB.
4. **Contacts.**
   CW Contest—CW (A1) only.
   Phone Contest—AM or SSB.
   Serial numbers must start at 001 for each contest.
5. **Scoring.** British Isles stations may not work each other for points. Overseas stations may only claim points for contacts with British Isles stations (G, GC, GD, GI, GM and GW).
   Each contact between a British Isles station and an overseas station will score as follows:

Location of overseas station	*Points*
Continent of Europe	5
Continent of North America	15
Continents of S America, Asia and Africa	25
Continent of Oceania	50

   Bonus points
   British Isles stations may claim a bonus of 20 points for the first contact with each country. For the purpose of scoring the RSGB Countries List will apply with the exception that VE, VK, W/K, ZL and ZS call areas will each count as separate countries.
   Overseas stations may claim a bonus of 50 points for the first contact with each British Isles country-numerical prefix, ie. G2, G3, G4, G5, G6, G8, GC2, GC3, GC4, GC5, GC6, GC8, GD2, GD3, GD4, GD5, GD6, GD8, GI2, GI3, GI4, GI5, GI6, GI8, GM2, GM3, GM4, GM5, GM6, GM8, GW2, GW3, GW4, GW5, GW6, GW8. Contacts with stations using GB prefixes will not score bonus points.
6. **Entries.** Must be addressed to: The HF Contests Committee, c/o J. Bazley, G3HCT, Brooklands, Ullenhall, Solihull, Warwickshire, England. Overseas logs must be posted to arrive not later than Monday 17 December 1973 for the cw contest and Monday 31 December 1973 for the phone contest. British Isles logs must be postmarked within 15 days of the contest. Logs must include a check list showing the areas for which bonus points are claimed.
7. **Awards.** The Thomas (G6QB) Memorial Trophy will be awarded to the leading British Isles entrant in the cw contest. Certificates will be awarded to the continental leaders in both contests.

RECEIVING SECTION

These rules should be read in conjunction with the General Rules for RSGB HF Receiving Contests published in the January 1973 issue of *Radio Communication*.

1. **When.** As transmitting section.
2. **Eligible entrants.** All short-wave listeners throughout the world. British Isles entrants must be members of the RSGB.
3. **Entries.** As transmitting section.
4. **Scoring.** British Isles entrants may only log overseas stations working British Isles stations during the contest. Overseas entrants may only log British Isles stations in contact with overseas stations in the contest.
   For British Isles entrants, each complete log entry of a contact between a station in the following continents and a station in the British Isles will score as indicated:

Location	*Points*
Continent of Europe	5
Continent of North America	15
Continents of S America, Asia, and Africa	25
Continent of Oceania	50

   For overseas entrants, each complete log entry of a contact between a British Isles station and any station in the contest will score as follows:

Location of listener	*Points*
Continent of Europe	5
Continent of North America	15
Continents of S America, Asia, and Africa	25
Continent of Oceania	50

   Bonus points. British Isles entrants may claim a bonus of 20 points for the first station logged in each country-numerical prefix (see transmitting section). Overseas entrants may claim a bonus of 50 points for the first station logged in each British Isles country-numerical prefix (see transmitting section).
5. **Awards.** A certificate of merit will be awarded to the leading entrant in each of the British Isles countries and to the Continental leaders outside the British Isles in each contest.

It is extremely important that entries are sent only to the address given in paragraph 6—those sent elsewhere may suffer delay or disqualification.

March 144MHz Fixed Contest results

Although conditions were reported by some as generally poor to average, the winner, G3VZI/A, made several contacts into the Continent on ssb. The N-S path, especially from the Midlands, was found by many to be poor, improving to average to the SE—GM8GPF heard nothing from the south and his log shows not a single G-station. One contestant gave full marks to QSB which was troublesome, and the timing of the contest was generally well received although many stations complained of a lack of activity despite the parallel 144/432MHz contest.

Once again G2AVC appears with an entry; check logs from G8DCL, A7424 and A7680 are acknowledged. F.M.

Posn	Callsign	Points	QSOs	Cnty	Best dx	Km
1	G3VZI/A	652	110	WR	DC1EK/P	700
2	G3MOT	552	120	OX	—	—
3	G3NHE	538	94	YS	DC1EK/P	625
4	G8DNK	548	88	YS	DC1EK/P	570
5	G3USF	421	99	SD	G8BQX/P	280
6	G4APL	336	71	SY	GD2HDZ	440
7	G8GNE	314	64	CE	F1BHL/P	370
8	G8FAY	262	60	SX	G8DNK	330
9	G6XM	261	61	WE	G3ZBY	265
10	G4AJW	240	64	WK	F1BHL/P	387
11	G3OJZ	237	43	KT	F1BXO	257
12	G4BRT	233	60	WK	F1BHL/P	395
13	G3UOE	224	52	EX	F1BHL/P	340
14	G3UER	211	63	YS	G8BQX/P	305
15	G3XBY	203	53	WK	F1AGY	360
16	G4ANS	200	48	NM	G8BQX/P	245
17	G8FVZ	198	52	HF	GW8FDW/P	252
18	G4AZQ	169	47	SX	G8AVW/P	306
19	G8DHA	154	46	GR	G8EWK	205
20	G8DMU	152	52	YS	G8FIK	225
21	G8FBL	145	50	SD	G8GTD/P	192
22	G3WHK	141	69	SY	F1BHL/P	270
	G3ZBY	141	51	LE	—	—
24	G8GLV	137	47	BS	F1BHL/P	295
25	G4BWG	124	64	LD	G4BEM/P	230
26	G8GVA	119	29	LR	F1BHL/P	410
27	G8BGP	117	63	KT	GW8ERP/P	252
28	G8GPR	111	41	LE	GW8WAS/P	165
29	G8FXD	103	47	SD	GW3FEC/P	155
30	G4AVV	102	76	LD	G8FAB/P	105
31	G8GJN	91	46	YS	G3YCQ/P	250
32	G4BWH	90	42	KT	G4BRT	210
33	G4AEZ	88	42	MX	G3OHH	215
34	G3YZQ	85	41	WK	G8DNK	163
	G8GHZ/A	85	37	NR	GW8ERP/P	170
36	G8GBX	82	40	YS	GW8ERP/P	211
37	G8FUR	73	47	LD	G8BHH/P	230
38	G8DZK	62	38	MX	GW8ERP/P	260
39	G4AUR	54	36	LE	G8GEM/P	96
	GM8GFF	54	28	MN	GM8BRM/P	183
41	G8GBN	51	38	LD	—..	—
42	G8FSL	46	34	LD	F1CCP	220
43	GM8EWQ	45	25	MN	GM8BBA/P	118
44	G4BOW	39	17	LD	G8BHH/P	—
45	G8GDM/A	28	20	LE	G4BRY/P	95
46	G8DVA	22	18	GR	G8BHH/P	75
47	G2AVC	19	15	MX	—	—

Entry from G4BEL not accepted.

432MHz Open Contest results

The 70cm enthusiasts endured poor weather and conditions for this contest; one by-product was the considerable number of comments and suggestions received with the entries and at the VHF Convention.

The event was convincingly won by G8AWS/P with G4BEL, the leading fixed station, second. G8AWS/P receives the "Council Cup", and a certificate of merit goes to G8AZU/P, whose effort from Dartmoor provided the best dx and also the best dx for one third of the entrants.

Finally, a word of thanks to G8BKR for his entry, perhaps some of the hundred odd other stations on during the contest will, in future, follow his example and send in an entry. L.H.

Posn	Callsign	Score	QSOs	Best dx (km)	Station	Cnty
1	G8AWS/P	300	72	230	G8CTT	DBY
2	G4BEL	226	64	335	G8AZU/P	CE
3	G8AZU/P	171	22	335	G4BEL	DN
4	G8DDC/P	163	71	175	G8AWS/P	BD
5	G8BGQ	148	70	260	G8AZU/P	HF
6	G8EPC/P	137	37	187	G8EOP	WR
7	G3WSC	112	46	305	G8AZU/P	SX
8	G8ATO/P	108	48	280	G8AZU/P	BD
9	G8ARM	103	43	285	G8AZU/P	LD
10	G8ERW	93	55	202	G8AWS/P	HF
11	G8FBG	87	43	280	G8AZU/P	LD
12	G8CTT	82	38	190	G8AWS/P	KT
13	G4AJW	74	26	172	G8CUT	WK
14	G3NHE	65	25	225	G8CTT	YS
15	G5UM	55	21	142	G3UHF/P	LR
16	G8AVX	49	21	148	G3UHF/P	WK
17	G3COJ	48	20	245	G8AZU/P	BS
18	G3ORL/A	39	19	100	G3WSC	EX
19	G8CIT	38	26	182	G8EPC/P	MX
20	GW8DLX/P	36	12	95	G3UHF/P	DB
21	G3WFM	32	26	95	G8DWX/A	HF
22	GW8ADP/P	31	13	185	G8AWS/P	MH
23	G4ALE/P	28	14	180	G8AWS/P	CE
24	G3WYT/P	25	8	205	G8AZU/P	HE
25	G2WS/P	23	13	135	G8FUI	ST
26	G8BKR	5	5	38	GW8ADP/P	GR

July 432MHz Portable Contest rules

Date: 22 July.
Times: 0900-1700gmt.
All entries and checklogs to: VHF Contests Committee, c/o "Maple Leaf", Great Braxted, Witham, Essex CM8 3EJ.

The following General Rules, published in January *Radio Communication*, will apply: 1, 2, 3, 4b, 5a, 6a, 7a, 8d, 9a, 10a, 11-24.

August 144MHz QRP Contest rules

Date: 18 August.
Times: 1700-2100gmt.
All entries and checklogs to: VHF Contests Committee, c/o "Easedale", Woodway, Merrow, Guildford, Surrey.

The following General Rules, published in January *Radio Communication*, will apply: 1, 2, 3, 4b, 5a, 6a, 7a, 8b, 9a, 10a, 11-24, 25. Power shall not exceed 1W dc input, as defined by the terms of the licence.

DF Qualifying Round—Coventry

Date: 15 July 1973.
Map: OS Sheet 132 (Coventry and Rugby).
Assembly: 1300bst for start at 1320bst.
Location: West end of Stockton Locks, approximately one mile east of Long Itchington, NGR 427648. Frequencies and callsigns will be announced at the start.

Intending competitors are asked to notify Mr G. A. Whenham, Lavernock, Chapel Street, Bishops Itchington, Leamington Spa, Warwickshire, of the numbers in their parties requiring tea as soon as possible and not later than 8 July.

March 144/432MHz Open Contest results

Weather conditions were unkind again this year, but did not deter the many portables who braved the high winds and rain. Many of these, and particularly those contestants equipped with ssb, were subsequently rewarded when the propagation improved during the late evening and early morning, allowing signals to penetrate far into Europe on 2m. The best dx recorded was between GW8ERP/P and HB9MDM/P at 1,074km, but little Continental activity was evident on 70cm.

Certificates go to the UCNWARS, the overall winner with an impressive score, and to the runner-up, Roger Taylor, who submitted a well-balanced score on both bands.

Check logs are gratefully acknowledged from: A7484, BRS33623, GC2FZC, G4BRO, G4BWP, G8ECT, G8FAT, G8GCA, G8GCC/P and G8HCG.

W.J.M.

			144MHz		432MHz		
Posn	Callsign	Cnty	QSOs	Points	QSOs	Points	Total Points
1	GW8ERP/P	DB	413	2,900	25	576	3,476
2	G4BEL	CE	160	1,102	48	1,092	2,194
3	G8BQX/P	SX	220	1,458	32	612	2,070
4	G3YCQ/P	HE	143	889	56	1,032	1,921
5	G8BHH/P	HD	200	1,476	10	228	1,704
6	G8CLY/P	EX	157	1,304	27	342	1,646
7	G3WKS/P	RD	217	1,102	28	516	1,618
8	GW3WAS/P	MG	230	1,491	—	—	1,491
9	G3PIA/P	BE	163	705	33	666	1,371
10	G3KMI	HE	127	899	11	174	1,073
11	GW4BBP/P	MG	143	743	12	312	1,055
12	GW3FEC/P	CV	135	778	12	276	1,054
13	G8DDC/P	BD	147	380	52	648	1,028
14	G8GNZ/P	SY	160	820	19	186	1,006
15	G8GPK/P	EX	201	976	—	—	976
16	G3WOR/P	SX	102	508	30	432	940
17	G8BXX/P	SY	200	938	—	—	938
18	G3WSC	SX	96	305	37	510	815
19	G8FCD	SX	130	753	—	—	753
20	G3OUL	LE	103	529	13	210	739
21	G8EJB/P	LE	102	320	18	384	704
22	G4BEM/P	SD	152	639	—	—	639
23	G3MDG	BS	118	611	—	—	611
24	G8GHN/P	KT	57	250	31	336	586
25	G4AGE	DY	22	83	23	498	581
26	G8DJW/P	DT	111	538	—	—	538
27	G8AHK	SY	104	358	16	168	526
28	G8ERW	HF	68	164	34	360	524
29	GI8AYZ/P	AM	44	311	5	294	505
30	G8ARM	LD	—	—	42	504	504
31	G8GQD	BD	110	458	7	42	500
32	G8FCV/A	KT	123	249	24	228	477
33	G8DWC/P	BD	84	462	—	—	462
34	G8FMK	OX	30	76	25	354	430
35	G3XZW/P	ST	100	415	—	—	415
36	G4ARN	NK	59	400	—	—	400
37	G3WCB/P	SY	131	399	—	—	399
38	G8FWC/P	YS	112	398	—	—	398
39	G3MRZ/P	NR	—	—	20	372	372
40	G8EWK	LN	87	370	—	—	370
41	G3XEP/P	YS	98	366	—	—	366
42	G4ARE/P	DN	71	357	—	—	357
43	G3ZKE	LD	93	181	19	150	331
44	G8FAB/P	WE	77	276	—	—	276
45	G8ATD/P	BS	—	—	20	264	264
46	G3WOA/P	HF	90	262	—	—	262
47	G8ELO/P	NR	78	252	—	—	252
48	G8CIT	MX	2	2	26	228	230
49	G8GPO/P	YS	69	218	—	—	218
50	G8DOT	EX	56	217	—	—	217
51	G8FBG/P	OX	69	197	—	—	197
52	G3ZOD	CH	18	46	9	150	196
53	G4BHZ/P	ST	50	186	—	—	186
54	G8CDL/P	BD	56	176	—	—	176
55	G3KIN/P	SY	77	161	—	—	161
56	G8DXS	YS	66	149	—	—	149
57	G8BKR	GR	39	123	2	24	147
58	G5UM	LR	17	77	3	54	131
59	G8AFN/P	EX	46	125	—	—	125
60	G8DCL/P	KT	63	113	—	—	113
61	G8FDJ/P	LE	40	105	1	6	111
62	G8BXF/P	ND	46	110	—	—	110
63	G8GXA	HF	45	86	—	—	86
64	G8FDL	LE	38	76	1	6	82
65	G3ECO/P	SY	32	80	—	—	80
66	G8GFL	LN	25	79	—	—	79
67	G8FFI	HE	30	72	—	—	72
68	G8FRJ	YS	50	71	—	—	71
69	G8FUL	SY	39	65	—	—	65
70	G3IPV	NK	5	57	—	—	57
71	G8HBA	LD	45	55	—	—	55
72	GM3ZVL/P	KS	30	42	2	12	54
73	G3GOX	MX	22	50	—	—	50
74	G8EQK	LD	44	46	—	—	46
75	G8GAT/P	DT	23	43	—	—	43
76	G3HOX	LE	28	40	—	—	40
77	G2AVC	MX	15	19	—	—	

British Amateur Television Club 432MHz Amateur Television Cumulative Activity Contest 1973 results

Posn	Callsign	Points	QSOs	Best dx	Dist
Section A					
1	G6KQJ/T	854	22	G4AHH	93km
2	G6ACR/T	715	14	G6AGE/T G6AFK/T	110km
3	G6AGT/T	299	14	G6KQJ/T	32km
Section B					
1	G3YQC	296	5	G6KQJ/T	73km
2	G8CTT	85	3	G6AFK/T	65km
3	G8DXD/A	61	4	G6KQJ/T	37km

Stations active during the contest included 17 /T stations plus 31 sound only stations.

MJS/BK

Contests calendar

9-10 June	—70MHz Open (Rules in May issue)
10 June	—DF Qualifying High Wycombe (Rules in May issue)
16-17 June	—Microwave FD (Rules in May issue)
17 June	—WAB VHF Phone
23-24 June	—Summer 1·8MHz (Rules in May issue)
24 June	—DF Qualifying, Chelmsford (Rules in May issue)
7-8 July	—Jubilee VHF/UHF (Rules in April issue)
14-15 July	—SSB FD (Rules in March issue)
15 July	—DF Qualifying, Coventry (Rules in this issue)
22 July	—432MHz Portable (Rules in this issue)
4-5 August	—YO DX CW/Phone
5 August	—DF Qualifying, Slade
5 August	—RSGB Region 1 VHF
11-13 August	—WAE DX CW
12 August	—70MHz Fixed and Portable
18 August	—144MHz QRP (Rules in this issue)
19 August	—144MHz SSB Open
1-2 September	—LZ DX CW/Phone
1-2 September	—VHF NFD (Rules in March issue)
1-2 September	—IARU 144MHz (Rules in May issue)
9 September	—80m FD
9 September	—DF Qualifying, Dartford Heath
8-9 September	—WAE DX Phone
15-16 September	—SAC CW
22-23 September	—SAC Phone
23 September	—DF Final, to be organized by Stratford Group
6-7 October	—VK-ZL-Oceania Phone
6-7 October	—UHF NFD
6-7 October	—IARU 423/1,296MHz (Rules in May issue)
13-14 October	—VK-ZL-Oceania CW
13-14 October	—21/28MHz (Rules in May issue)
20-21 October	—WADM CW
20-21 October	—7MHz CW (Rules in this issue)
3-4 November	—7MHz Phone (Rules in this issue)
3-4 November	—144/432MHz CW
10-11 November	—OK DX CW/Phone
10-11 November	—2nd 1·8MHz
11 November	—70MHz Cumulative
9 December	—144MHz Fixed

MOBILE RALLY NEWS

Bangor Mobile Rally and Picnic, 24 June
The Bangor and District ARS will be holding their Golden Jubilee Mobile Rally and Picnic at Castlewellan, Forest Park. Talk-in will be available on 145·8 and 70·26. Further information from E. Sandys, GI2FHN QTHR.

16th Longleat Mobile Rally, 24 June
Organized by the City and County of Bristol RSGB Group, the Longleat Rally will feature over 20 trade stands, a mini df hunt (1500 on 160m), and talk-in stations on 160 and 2m. These will commence at 1000bst, with G3TAD/P on 1,920kHz, and G8FQC/P on 144·250, 144·300, 144·480 and 145·000MHz, fm/a.m. In addition, of course, there are the attractions of Longleat Park itself, displays by the PO and the Police, plus an exhibition of Brunel's SS *Great Britain*. Overnight camping facilities will be available from 1800 on 23 June—contact rally organizer Tony Williams, G8CKJ QTHR.

Pembroke and District RSGB Group "Bucket and spade party", 10 June
This annual event is being held this year at the Regency Hall, Saundersfoot, on Sunday 10 June. Talk-in stations will be operating on 28·55MHz, 144·35MHz and 145·41MHz ssb. Intending visitors are asked to notify the club secretary, J. Hogg, GW4AKO, at 2 Pembroke Road, Pembroke Dock, Pembs, in advance. Those requiring lunch can book with GW3TUD, Coles Cafe, Saundersfoot.

South Shields Mobile Rally, 1 July
The rally site will be the same as last year—Redwell County Secondary School, Prince Edward Road (A1300), South Shields—and can be reached either from Seaburn (along the A183 coast road, turning left at Marsden roundabout onto the A1300) or from the A1(M) (via the A194(M), then onto the A1055, and at the town boundary roundabout onto the A1300). Talk-in stations will be on 160m and 145·8MHz, attractions include trade stands, competitions, prize draw and refreshments. For further details contact Frank Harrison, G3SFL, 42 Woodlands Road, Cleadon, Sunderland.

Torbay ARS Mobile Rally, 12 August
Venue for the rally is Newton Abbot Rugby Ground, Newton Abbot, Devon, with talk-in on 1,867MHz (G3NJA) and 2m, from 1030am onwards. Apart from the usual features of trade stands, competitions, refreshments and bar, there will be a special display of formation model aircraft radio-controlled flying by Plymouth MFC.

Upton Mobile Rally, 8 July
The Worcester and District Amateur Radio Club will be organizing the Upton rally at the Hill Secondary School, Tunnel Hill, Upton-on-Severn. There will be trade stands, fancy dress competition and sports for children, model aircraft display, and junk stall (bring your surplus gear). Talk-in stations will be on 1,910kHz (G8JC/A), 145MHz a.m./fm (G3GJL/A) and 145·41MHz ssb (G3GJL/A). For further information contact G8ASO QTHR, tel Worcester 29208.

Wessex ARG Mobile Rally, 29 June
The Wessex Amateur Radio Group of Bournemouth will be running this rally at Breamore House, near Fordingbridge, Hants. There will be the usual attractions, plus talk-in on 160, 80, 4 and 2m.

Mobile Rallies Calendar

10 June	Elvaston Castle, Elvaston Castle Countryside Park, Nr Derby.
10 June	Pembroke and District RSGB Group "Bucket and spade party", Regency Hall, Saundersfoot.
17 June	ARMS, RAF Cosford, Shropshire.
24 June	Bristol City and County RSGB Group, at Longleat, Warminster, Wilts.
24 June	Bangor Mobile Rally and Picnic, Castlewellan, Forest Park.
29 June	Wessex ARG, Breamore House, near Fordingbridge, Hants.
1 July	South Shields and DARC, at Redwell School, Prince Edward Road, South Shields.
7 July	There will not now be a rally at Hanworth Carnival. See March issue p203 for details of Special Event Station.
8 July	Cornish, Treviglas County Secondary School, Newquay, Cornwall.
8 July	Upton Hill Secondary School, Tunnel Hill, Upton-on-Severn.
15 July	Scarborough ARS, Burniston Road Barracks, Scarborough.
22 July	Anglian, Suffolk Showground, Bucklesham Road, Ipswich.
22 July	Southdown, Polegate,Wilmington.
5 August	RSGB Woburn Abbey Rally.
12 August	Torbay ARS, Newton Abbot Rugby Ground, Newton Abbot, Devon.
12 August	Derby, Rykneld School, Bedford Street, Derby.
19 August	Bristol Mobile Picnic, Ashton Court, Bristol.
19 August	Preston ARS, Kimberley Barracks, Deepdale Road, Preston, Lancs. (New date).
23 Sept	Harlow & District, Netteswell Comprehensive School, Harlow.

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.

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

FOR SALE

Pye Westminster fm with extra a.m. i.f., 144·48, 145·0, £70 ono; Sentinel 2m/mf cnvrtr, new, £13; BC221 with charts, psu, £15; Garex 70cm, 28-30MHz cnvrtr, £8; Minox camera £40. Plummer, 57 Hillshaw Cres, Strood, Kent. Tel Erith 33000, ext 268.

DX40U and VF1U, gd cond, £15 the pr, ono; four brand new 0-9 Nixie tubes £2. G3WGV, QTHR. Tel 0202 741278.

National battery/mains vox rcrdr, whispering 20ft away triggers vox, suitable surveillance or monitoring frequency, mic, tapes, hndbk, £33; RAF aircraft compass, E2A, suitable car, boat, £3.50 pp; alternator 12V 35A £8. G3IES, QTHR. Tel Bristol (0272) 622544.

Trio JR310 rx, as new, plus 8Ω spkr, £60. D. R. Tanswell, 5 Cavendish Close, Hayes End, Hayes, Middx. Tel 01-561 7205.

Lafayette KT340 rx, exc cond, 0·55-30MHz bndsprd, amateur bands, £16 ono. Brind. Tel 01-977 8888, ext 32 (work).

Pye base stn tx/rx, 2m, £15; HRO rx, 7 gen cov coils, BS coil, £9; type 106 sig gen, 5·5-55MHz, £5. G8BGJ, QTHR. Tel Burgh Heath 56464.

UR1A rx, gen cov, 550kHz to 30MHz, good on lf bands and as i.f. for 2m converter, modified and realigned, mint cond, £18; PR30X, perf, £3, the pair for £20. Russell, 13 New Road, Bolter End, High Wycombe, Bucks, HP14 3NA.

Trio JR65 rx, 160m-2m, £20; tech 15, gdo, £10; Handi-Ranger 4m, £7; Vibrator Ranger, 2m, £5; Magnetic base /m whip 2m £5; Tavasu whip with 160m coil, £2.50. J. Barkway, 10 Beaumont Vale, Haverhill, Suffolk. Tel 0440 3644.

2m cnvrtr, i.f. 14-16MHz, £9; ditto 4m cnvrtr; 2m tx (mod req att) mic, swr bridge, + halo, £7; mic pre-amp OC71 × 2, 50p; metered pu, 300V × 2, 6·3V 5A × 2, 5V 2·5A × 2, £6; trnsfmr, 350-0-350V, 100mA 6·3V, 5V + 20H choke, £1.50; 12V reg transistor 700mA supply £2; 50μA mtr £1; slow-motion drive and dial £1; qty 2 coaxial 75Ω c/o relay, 24V dc, 75p ea; dynamic hand mic, 50kΩ, £1. G4AWJ, QTHR. Tel Heathfield, Sussex 2454.

HRO, 12 coils, 10kHz-50MHz, fb cond, £20 plus carr; vintage Marconi 352 rx, collectors mem, Eddystone coils for 358 rx, vhf wvmtr APX6 for 1,296MHz; CR150/2 rx, other misc items, sae details, G3WSH, QTHR.

DC 12V psu for KW2000, £15 plus carr. G3TYX, QTHR. Tel Southwater 730240.

R107 rx, 1-17·5MHz in 3 bands, bfo, noise limiter, S-mtr, broad/narrow selectivity, modified o/p stage 3W6V6, mint cond, £15, del up to 15m. G8ERR, QTHR.

B40A rx, exc wkg order, with BR1617 hndbk, £20. 78 Ackers Hall Ave, Liverpool L14 2EA or tel 051-220 5470, after 6pm or w/ends.

BC221, orig charts, mains-reg psu, £16. G8DTA, QTHR. Tel Cheltenham 32434.

R209 mkII £12; CR100 with mtr, clbrtr and stab osc, £15; boomless quad, alloy spider, £5; Cumfifolda deluxe pram, pram seat, canopy, harness, immac, £14. G3LNP, QTHR. Tel Tring 4402.

RA1, Q-mult, X-cal, mtchng spkr, £18; B40(b), manual, set spare valves, £12, both sets wkg but need slight attn, buyers to coll. G8EWZ, QTHR. Tel 01-727 6837.

Prop deceased member: LG300, psu, £25; HRO, 8 coils, psu, £20; Labgear Topbander £13; TCS 12, CMX 46159, 1·5/12MHz, £10; Avo 8 £15; Class D wvmtr £5; Acton Sig gen £10. E. Palmer, tel 01-935 7733, office hrs.

DC psu for KW2000A, neg earth, hb from qual components, with cct diag, £12.50. G3VNI, QTHR. Tel Maidstone 53729.

88 set £1.50; Pye vhf rx £1.50; Leyland audio osc £10; Avo wide-range sig gen £7; pr var caps for Z-match 50p, buyer coll or carr extra. Other items, sae list. G3WBT, QTHR.

Cintel wide-range cap bridge £15; Marconi TF340 audio pwr mtr £5; 12in b/w /p 625 tv, vgc, £40; trnsrmr, 2,400V ct 120mA, htrs, £2.50; two Tektronix scope tubes £5 ea, £8 pr. G8AYM, QTHR. Tel 01-572 0921.

New Mullard Numicators, ZM 1080, £1.50 ea, ex-eqpt 75p ea; sae for quantity quote on ex-eqpt tubes; sig gen, 100kHz-25MHz in 6 ranges; 1MHz xtal cal, 400Hz o/p. M. S. Turner, 25 Roland Drive, Hempnal, Norfolk. Tel Swainsthorpe 748.

Pye base stn 704, pa valve, available offer or pt exch for AR88 or why; BC624 £4; PCR3 Hallicrafters R19 4m rx, audio amp, 8-10W, mw, fm, vhf, offers. 91 Gallows Hill Lane, Abbots Langley, Watford, Herts. Tel Kings Langley 64172.

For quick disposal, non-rust dish aerial, 51in dia, 12in deep, ex-radar. G3NXD, QTHR. Tel 0562 850570.

EMI sig gen, compact, 85kHz-100MHz, 1μV-1V, metered, manual, £15; W1649 wvmtr and sig gen, 140MHz-240MHz, mains, xtal ref, manual, £10, buyer coll. Tel Cobham (Surrey) 3117 evng.

KW Vanguard tx, 50-60W a.m./cw, 160-10m, int psu, fair cond, buyer coll; pr brand new walkie-talkies, xtal-controlled. P. I. Martin, 41 Ottoline Drive, Troon, Ayrshire KA10 7AN.

V1191 wvmtr; tape rcrdr (needs attn); 38 set, gd int cond, 7·3-9MHz, pa valve available, psu 0-20V dc at 1A, cassette tape rcrdr, perf, offers. **Wanted** 2m preamp, 2m cnvrtr, why, or 28-30MHz. 91 Gallows Hill Lane, Abbots Langley, Watford, Herts. Tel Kings Langley 64172.

Minimitter tx, 150W, a.m., cw, £15; Trio 9R59DS rx £40; Joystick vfa with mtchg Lo-Z atu and indoor earth unit, £10, buyer coll. G4AJM, QTHR.

4m tx/rx, BCC 69D/E transistor psu, 3-chann, 70·26, 70·375, 70·45, manual, all cables, £25 ono. C. W. Turner, 6 Bede Haven Close, Bude. Tel Bude 3612.

Trio JR310 rx, very gd cond, in orig packing etc, £55. **Wanted** RSGB Handbook. A. Giannecchini, 9 Coxwold Rd, Fairfield, Stockton, Teeside.

Heathkit SW717 rx, built but needs aligning, with manual, in wkg order, £25 carr pd. G4AXW, 112 Highwood Ave, Solihull, Warks. Tel 021-7423972.

Collins ATUs, 180L3A, £25; Collins Master osc £10; Collins spkr, 75A series, £6; Pye Westminster W15 a.m., 6-chann, 12·5kHz, high band, £65; Murphy Rovers, dash mntng, with mic, spkr and leads, £13. GM3BQA, QTHR. Tel North Berwick 2519.

Heathkit OS1 scope and manual £10, buyer coll. **Wanted** Trio SP5D spkr unit. G3YRW, QTHR.

Good 7B printer, no cover, CV89A/URA-8A term, with 110V auto trnsfrmr, HB-DM Ranger, vib psu, Lo boot Ranger, control less mic, Solartron, 250V stab PSUs, 813 (PR) htr trf and other large hv TFRs, all very cheap, buyer coll big/heavy bits. G3ZOE, QTHR. Tel Wickham 2173.

Codar CR70A rx, spkr and manual, £17; exc Hamgear PMII, £6, perf wkg order, buyer coll. L. Aldridge, 60 Lichfield Ave, Evesham, Worcs. Tel Evesham 6307.

Exchange 62 set tx/rx, 160/80/40m, for 2m gear. Sherlock, 8 Tudor Rd, Canvey Island. Tel Canvey 63004.

Yaesu FT101, only 6 mths old, in maker's box, with instrctns, mint cond, first offer over £190 secures. G3ZZJ, QTHR. Tel 051-722 1693.

Heath HP23A psu, assembled and tested but not used, £20, plus carr. G3VEJ, QTHR. Tel Burntwood 2340.

Kokusai MF455-15K fltr, £7; KVG XF9C fltr, £9. **Wanted** 250pF split-stator capacitor for Z-match. G3PMJ, 9 Brackenhill, Osbaldwick, York. Tel 55624.

BC221 freq mtr with stab psu, tone modulation and correct charts, £15, carr 75p. C. A. Collins, 60 Alexandra Rd, Skegness, Lincs.

Heath GR78 rx, immac, aligned by Heath, £60. **Wanted** KW Ezee-match, rsnble. G8DUH, QTHR.

Copies of *SWM*, all in perf cond, Jan '69 to April '73, any offers? bench lamp, mains operated, 3ft hinged arm, £1.50. G3YMH, QTHR.

FL200B tx, 240W p.e.p, vgc, pref buyer coll, £80. Tel 0843 57836. (Ramsgate, Kent).

B40C rx, spare valves and manual, £17; 62 set tx/rx with clbrtr, mains psu, manual, £12, all gd cond. G4BCN, QTHR.

Two No 19 sets, £4.50 ea; power pack, No 19, 12V, £1.50; transformer, 12V 2A, 25p; tv valves 5p; transformers-15V, 1¼in × 1in, 25p, 0-9-12V 1A 25p, 0-14-17V, 0-14V, 0-13·2, 0-8-13·2, 25p ea; two 3in tubes, Electronic DEF type MGSB 1312, £1 ea. D. A. Griggs, Collingwood Ave, Muswell Hill, London, N10 3EH.

RTTY 7TR reperf, 6S tape tx, 7B page printer, 110V, DX100U tx, table and cover, £50 ono; vhf Storno Viscounts, hi-band fm, complete, £12; Pye 4m base, £10 ono. G3UGJ, QTHR. Tel Evenlode 229.

Vanguards AM25B, with cables and control panel, £20; Cambridge 12·5kHz, £35; Varley inverter 115/230V 120VA, 24V, i/p, £10; trnsfmr, 500W, isolating R/Spares, £10, new; cnvrtr, rtty, DL6EQ, only few comps needed, £5. G3CXI, QTHR. Tel Bishops Cleeve 3834.

Telomast, 40ft with rigging kit, £18; EC10 battery psu, mains psu, JXK, 2m cnvrtr, £40, buyer coll. **Wanted** Heath SB640 vfo, 2m trnsvrtr, carr pd. Taylor, 8 Heythrop Drive, Middlesbrough.

RTTY gear, FAE(1) with CRM1, Lorenz LO15 printer, Creed 75R, all with manuals, offers. G2BVN, QTHR.

Leak TL12 Variscope 3 £7.50; UM3 driver, 250 choke, £3.50; Katsumi elec keyer, new, £3.75; G. Watts LS module, unused, £8 ono, plus carr. G6LC, QTHR. Tel Leigh 4736.

Codar AT5 tx, 12V /m psu, £15. G3ZPI, QTHR.

Heath SB100 tx/rx, sim SB101 less cw fltr, with SB600 spkr, psu, mic, hndbk, exc order, £125 ono; 80m vfo, 5W i/p, multipliers and 50W pa thrown in, £3, buyers coll. Tel 01-648 5895.

Sphinx tx £45 ono; Trio rx, 9R59DE, £25. GW3RVF, QTHR. Tel Cardiff 68166.

Vibroplex el bug keyer £3; UNR 30 rx £7.50 only; TW 2m vfo, offers. G2ATM, QTHR.

KW Viceroy, recent m/facturers overhaul, £60, buyer coll. **Wanted** Geloso vfo 4/102 or sim. G3MCA, QTHR. Tel Orpington 28790.

Trio 9R59DE rx £30; Labgear sig gen £5; Windsor Trident tape rcrdr £10; Multitone 60W 27MHz tx £5; *PW, PE, RC*, 1967-1972, £5, all good cond, buyer coll. C. E. Cox, 279 London Road, Reading, Berks. Tel Reading 61950.

Superb custom-engineered /m ssb tx/rx, 160/80m, 50W p.e.p., same size as HW12A, with dc psu, interconn cables, mic, £65 ono; KW Ezee match £10 high power lin amp, two 572Bs, fully metered, £60 ono. G3MSL, QTHR. Tel Fleet 21446.

KW202 with spkr £110; KW204 £120, hardly used. Richardson, 25 Constance Crescent, Bromley BR2 7QH.

Complete stn-Tiger 200 a.m./cw tx, 150W; AR88D rx; both vgc, key, phones, spkr, coax aerial, relay, spares, £55, will del rsnbl dist, going ssb. G3LTI, Sandalwood, Atwick road, Hornsea, Yorks. Tel Hornsea 2588.

Microwave Modules 2m tx, all-transistor, 5W i/p, ideal /m tx, with 145MHz xtal and mic, £20 ono. G8BNX, QTHR. Tel 540 1479.

Moving QTH, Pye base tx, 2m, EL34 mdltr, £25; BC48Q S-mtr with built-in psu, no case, £12; Solartron CD513 £15; 2m QRO tx, reqs attn, £15, buyers coll. D. T. Price, 5 Capulet Close, Bilton, Rugby, Warwickshire.

Taylor valve tester, model 45C; xtal clbrtr No 10, with mains supply; h/brew vtvm, offers. GW3NUO, 27 Mynydd Garnlwyd Rd, Morriston, Swansea. Tel Swansea 74012.

SB401, prof built, £130; exch for FT75 or TF995; sig gens, EMI, 30kHz-100MHz, 8 ranges, 50Ω, £25; Cossor, 8-100MHz, 4 ranges, 75Ω, £20; carrier mtrs, accurate clbrtn, callers welcome. G3GYE, QTHR.

Cowl Gill motor, Dessyn ind unit, trnsfrmr, etc, £8; Eddystone S640, S-mtr, EF183 rf, int spkr, £18, buyer coll. G3FNV, QTHR. Tel Chester 35357.

Electroniques trnsstr Quoilpax, HB166T, gd cond, £10. G8BMJ, QTHR.

B40B, photocopy manual, £15, buyer coll, or swap for R209 Mk1. Fenwick, 28 Gimble Way, Pembury, Tunbridge Wells. Tel Pembury 2836.

Property late G3REX: FT75, DC75, FV50B, little used, £135; NCX3, hb psu, £75; Panda Explorer £35; BC348, hb psu, £12; Class D wvmtr £5; KW swr bridge, 50/75Ω, £5, buyers coll or carr extra. G3TBT, QTHR. Tel Lyndhurst 2127.

Kokusai mech fltr, MF455-15CK, plus xtals, £8; 70cm 320A tripler, amp and psu, £10; 23cm 2C39A tripler and psu £8; 70cm 4CX250B amp and valve £13; 70cm Parabeam; 70cm fet cnvrtr £8; 2m 6-40A amp £8. G3WKZ, QTHR. Tel Nott'm 56101 ext 3253.

Heathkit HW32A 20m ssb tx/rx, Heath ceramic mic, £40. G3ZJF, QTHR. Tel Windsor 68364.

KW Vanguard, 160-10m, a.m./cw, integral psu £20. G3ZEP, QTHR. Tel Wetherby 2099.

Pye Westminster, dash mntng, as new, modified and wkg, with 145MHz xtals, £45. G3VOF, QTHR. Tel Swavesey 30588.

Hy Gain quad, unused, in orig packing, £50. G3FKM, QTHR. Tel 021-429 3200.

Pye "handy" Cambridge S-mtr, complete with xtals for 145·8, solid state up to driver and pa, which are quick-heat 3-10s, no stand-by current, offers over £25. W. Sherriffs, 10 Glen Gdns, Dyce, Aberdeen. Tel Dyce 2675.

FM in SM: a.m. mdltr, mains, two EL34s, 35W lf out, 4kΩ only, never used, £7, carr extra; trnsstr 145MHz a.m. tx, 300mW out, with mdltr and trnsfrmr, £5. Erland Belrup, Hjortshog 4540, S-260, 34 Morarp, Sweden.

Solartron scope type CD523S2 £35 or exch for complete Codar /m in gd cond, or Eddystone EC10 comm rx or sim. G3ZDO, QTHR.

TV cam, 405/625, electrnc viewfinder, ccu scope, all built into cam, with cable and psu; 405 trnsstr pg with tripod, two Pye 14 precision monitors, scope, the lot £40 or offers. Johnson, 38 Kynaston Wood, Harrow Weald, Middx. Tel 954 6326.

B28/CR100 rx, spare valves, gd cond, £16. Brind. Tel 01-977 8888, ext 32.

KW204 180W p.e.p., 160-10m, perf order, with ptt mic and manual, £95, will del 30-mile rad. G3BIA, QTHR. Tel 01-977 6705.

4CX250B prof 145MHz lin amp £40; xtal-contr 8W 145MHz a.m./fm tx £7, both carr extra; new 4CX250B £10; 4X150A £1.50. J. C. Lythgoe, 14 Hadley Grove, Barnet, Herts. Tel 01-449 5190.

HW17A 2m tx/rx, military, tantalum caps, cord-driven tuning, plug-in relays, manual, £50 ono; 0-260V 2·5A Troidac £4; 230V 11-pin plug-in relays 40p ea; new valves: 13E1 £6 pr, 6HF5 50p, 5R4G 50p, carr extra. GM3JHL, 128 Sheephousehill, Fauldhouse, West Lothian EH47 9EL, Scotland. Tel Fauldhouse 433.

Heathkit GR54 swl rx, mint, £18; Heathkit SRP-1 stereo record player, new, in factory-sealed boxes, £15; General Radio 606B sig gen, magnificent, in wooden box, brass trimmings, works perfectly, £10. G3UML, QTHR. Tel 01-550 0882.

KW Viceroy Mk3A ssb tx, extra half-lattice fltr, 6146Bs, manual, cct diag, exc cond, £70 ono. G4AEM, QTHR. 01-950 3245.

Old timer, London area, wishes to donate h/brew a.m. valve tx and commercial rx and components to boys' club. No dealers or individuals, pse write. G2RX, QTHR. Tel 693 5512.

Dual-chann ssb rx, 2-30MHz, in two cases, 7ft high, 4ft wide, 2ft deep, wkg order, manuals, some spares, make splendid fixed stn for teletype, or spares. Offers. G3III, QTHR. Tel 0608 61882.

AR88LF in exc cond, with S-mtr and hndbk, £25. G. Rackham, 49 Lukes Rd, Southend-on-Sea, Essex. Tel Southend 64472.

Ranger PTC2007N on 145MHz, dash-mount, fb cond, £12; h/brew CPI AT5, Codar parts, Codar mains psu, £10; Trio TR2200 walkie-talkie on 2m, Ni-Cad batteries, £50 (cost £72); QQVO6-40A £2, with base. G4AQY. Tel 01-858 1448.

FTdx400 560W tx/rx, 80-10m, hndbk, spare valves, £135, Securicor del or coll, prof checked in 1972. G3UKV, 10 Woodhouse Road, Broseley, Salop.

Redifon GR286 28-chann 10W fm base stn, with valves, xtals, cab, £25; Command rx, RAX-1, less psu, 7-27MHz, compact, ideal vhf rear end, £18; Bantex 160m helical whip, very robust, £9. G3JMJ, QTHR. Tel 073-271 3467.

National NCX-5 Mk2 tx/rx, NCX/A psu, as new, orig cartons, £165; BC454 £3.50; BC455 £3; RF24/26/27 £1 ea; Knight fltr usb/lsb carrier xtals, full 10m coverage, £20. G3MOE, QTHR. Tel Cheltenham (0242) 24217.

Heathkit sig gen, RF-1U, £7; Minimitter tx, 80-10m, 150W, a.m. and cw, £18; Nova Pal trnsstr df rx, 180kHz-4·6MHz, £14; Mullard 5-10 amp and pre-amp £10. G3KAG, QTHR. Tel Ellastone 393.

AR88LF, gd order, £24; Truvox stereo tape rcrdr, R54, 4-track, perf, £30; Rosedale electric organ, as new, £12. G8DVZ, QTHR. Tel Beckett 6635.

Eddystone 770R £55; Pye AM25B Vanguard, gd cond, xtals for 145MHz, £25; Twomobile, tunable i.f. 4-6MHz, £15; Sentinel 2m cnvrtr, 4-6 i.f., as new, £10; G8AEV 2m cnvrtr £6. **Wanted** AM10B, FM10B, FT2F, why? G4AFY, QTHR. Tel Kidderminster 61752.

150W a.m./cw 10-80m tx, rack mntg, free to collector; nine 2C39As £6; Ranger 2107, trnsstr psu, near 4m, £4; Cambridge AM10D, wkg, around 169MHz, £28; Creed 75-T-K4-5W teleprinter, offers. G3YLQ, QTHR. Tel Luton 25595.

Pye Vanguard, AM25B control box, mic, spkr, cableform h/b, low band, unmod, £15. G3WPI, QTHR. Tel 01-303 6681.

R209 rx with manual, fm/a.m./cw, needs 6F0 module and vol control replacing, will work, £6 ono. **Wanted** 2m Ranger with variable rx, will exch for above. Paul Kelly, 30B Roughdale Ave, Southdene, Kirkby, near Liverpool L32 7QW.

Mains trnsfrmrs: 275-0-275V 350mA, 6·3V 3A, 5V 2A, all twice, £3; 450-0-450V 250mA, 6·3V 2·2A, 12·6V 3A, 12·6V 1A, £2; 250-0-250V 120mA, 6·3V 5A, £1.50; Woden UM1 mod trnsfrmr £2; 10W mod trnsfrmr £1; Repanco TT23 and TT24, £2.50 pr, all post paid. D. H. Church, 8 Merlyn Avenue, Didsbury, Manchester M20 0EA. Tel 061-445 4998.

40ft super low-loss 70Ω uhf coax, ¾in od, solid alum, solid copper inner, helical membrane, stored some years, unused, in 4ft 6in coil, £5.50, buyer coll; several mA mtrs, cheap. G2DD, QTHR. Tel 01-907 3860.

2m 10W fm multichann 12V /Ms £25; 4m 12W Stornophone fm base stn £20; tx/rxs ready aligned but without xtals. Buyer coll or may del Reading/Basingstoke/Bournemouth. G8AKA, QTHR. Tel Reading 332582.

RTTY—RCA fsk tx driver, 1-6·7MHz, FSC1 vfo xtal in, 5W out, manual, spares, £15 ono; Redifon rtty tu, CFS, cct, £12; compact PSUs, 800-900V 200mA with 6·3V, 300V, bargain, £2.50. G8BMQ, QTHR. 01-653 8489 after 6pm.

Kendon SB150 ssb tx, 80-10m, 600W i/p, remote vfo, pa TT21s, £30 ono or exch for why, buyer coll or del 50m rad. G3ZBM, QTHR. Tel Crewe 68693.

HRO Jnr, psu, 8 coils, £14; BC221, orig charts, as new, £12.50; small gp scope £8.50; Avo sig gen £4.50; Avo CR bridge £3.50, coll or carr extra. G2HCV, QTHR. Tel 01-954 2960.

Eddystone vhf rx, 770R/1, 19MHz-165MHz, best offer over £85. G3LSD QTHR. Tel 0752 51245.

Heathkit RA1, int spkr, £10, buyer coll or carr extra. N. B. Henbrey, 1 Perrymans Cottages, Northiam, Rye, Sussex TN31 6HX. Tel Northiam 2437 (evngs).

Heath RA1, exc cond, with xtal cal, cab, spkr, £25 lot, buyer insp and coll. G3ARU, QTHR. Tel 01-989 3196 after 7pm.

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Microwave Modules 2m tx kit (unfinished) with valves and xtal £7; KW pi-tank coil and switch assy with JB tuning cpctr £3. G3LBT, QTHR. Tel 0268 412177.

HRO, 6 coils, psu, hndbk, £18.50; Sentinel 2m cnvrtr, 4-6, £10.50; HW30 £17.50; Ranger xtals, IU5, hndbk, £10.50, all vgc, offers cnsdrd; 522, 2 xtals, mic, £5; psu suitable above £5, buyers must coll. G8EHU, QTHR. Tel 0283 790454.

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2N3866 50p; 2,200μF 100V 10A 60p; 5,000μF 50V 15p; xtals 11,155, 2,098, 15,800 10p; 43,300, 72,200, 72,280 50p; QQVO3/20, base and o/p tuned cct etc, sim Pye base stn, £1.50. G8CXK, QTHR. Tel Southwell 3418.

30 used standard 1in Vidicons, exch 16mm cine camera for single shot use, or why. G3UUW, QTHR. Tel Ashby-de-la Zouch 2542, evngs only.

Telescopic steel tower, 40ft, 2-section, new, never erected, £65, buyer coll or carr extra, pt exch welcome. Evans, 4 Gower Crescent, Baglan, Port Talbot, Glam SA12 8BT. Tel Briton Ferry 812376.

CR150 Mk6, min valve version, with hndbk, £25; Murphy 821 hndbk 50p. **Wanted** German RV2P800 valves, also any Storno 600 modules or components. G3VVB, QTHR. Tel Slough 28014.

Eagle vvmtr £10; Eagle Minilab testmtr £5; Avo sig gen £6; Pye Ranger Hi-Band rx, complete, £4; vhf fm tuner, not wkg, £2. P. Elms, Troed-y-Rhiw, Gwernoghty, Carms, S. Wales.

Going QRT: Apache SB10 trnsfrmr £50, manual; Avo valve characteristic mtr £20; type D Mk3 wvmtr £7.70; vhf R62H £6.50; 62 set, tr psu and hl mod, £12.50; 150W mod Labgear osc and wvbnd coupler, 80-10m, £10 the lot. Other gear, sae list. GM3NEF, QTHR.

KW Vanguard tx, 160-10m, a.m./cw, vgc, £22, buyer coll. GW3MPP, Daleside, 41 Gwernrhuddi Road, Cyncoed, Cardiff CF2 6PR. Tel 0222 755425.

Teleprinter, 7B with silence cover, DL6EQ tu with valves and comps but not finished, 80-0-80 psu for signalling, £25; Mains trnsfrmr 490-0-490 250mA, 450-0-450 150mA £2, can del rsnbl dist. G4ADE, 5 Oxford Close, Gomersal, Cleckheaton, Yorkshire BD19 4RU. Tel 0274 24258 (8 to 4.45).

Hy-Gain TH3 Jnr beam, 10/15/20m, £20 buyer coll. Roberts, G3AQX, Cottage Farm, Wessington, Derbyshire. Tel Alfreton 2943.

Eddystone S750 rx, gen cov to 32MHz, £36; Avo 8 MkIII, reqs attn on ac ranges, movement perfect, £8.50; auto morse sender, 10-45wpm, programmed with diode matrix 256-bit memory, £22.50. G4AZQ, QTHR. Tel Southwater 730725.

HRO, gd cond, with gc coils, psu, spkr, £15; KW2000B, little used, £170. G8CLH, QTHR. Tel Littlehampton 6161, ext 55.

G2DAF rx, 2·4kHz mech fltr, 898 dial, grey stove-enam cab, mtchng psu, pref buyer coll, £45. G4AMI, QTHR. Tel 021-705 4337.

Heathkit IO12 scope, prof-built, £35 ono; 405/625 colour tv cross-hatch gen, £20 ono, both in perf order. Mr. Edgecock, 1 High Street North, West Mersea, Essex. Tel West Mersea 2184, after 6pm.

Pye Cambridge AM10D, modified 2m, tunable rx, £15; 2m TXs: fm, QQVO320 pa, £5, a.m., QQVO640 pa, KT 88 mod, needs UM3, £15; commercial 70cm tripler, QQVO320, £5, pref buyers coll. G8BIS, Tel Dartford 29799.

Valves, boxed, unused, 5B/254M (3) £1.30 ea, EF91 (3), 6X4 (2), X78 (2), 6V6GT, 6C4, 25p ea; *Bulletin*, vols 36/37, £1; Shure M44-7, needs new stylus, £1; manuals, 1154, Cossor 339, offers. G3KZC, QTHR. Tel 0272 673026.

No 19 Mk3, A and B sets, complete, should work, £6, no psu, spare 807s. New transistors: TIP3054s with data, 4 for £1, 2N2369s, 600MHz, 5p ea, BC109s, 3 for 10p, 5MHz xtal 50p. R. A. Beament, "Ladram", York Road, Camberley, Surrey, GU15 4HS. Tel 0276 23265.

888A £70; Burns FC2 2m cnvrtr £12; 6ft rack £12; HW17A, dc psu, £25; gdo, 2-420MHz (110V) £15; pwr mtr, TF1152, 500MHz, £20. G8DGR, 11 Wilmot Walk, Wash Common, Newbury, Berks.

Microwave Mods 70cm cnvrtr, boxed, new, £17; 8/8 slot 70cm aerial, boxed, new, £4, buyer coll. G8GRA, Keepers Cottage, Hangersley Hill, Ringwood, Hampshire. Tel Ringwood 2739.

RCA 21in colour tube, in cab, scanning cnvrgnce yokes, also Mullard delay lines on chrominance board, will sep, buyer coll. G2FVA. Tel Shoeburyness 2642.

HW32A xtal mod, covers all 20m, £45; h/brew psu, fits in Heath spkr, £10; accessory xtal cal £5; or £55 the lot. Tel 01-554 9457, evngs only.

4CX250B, base, chimney, clips etc, new, £7; 2 813s, bases, £3; 475-0-475 and 6·3V at 8·2A, other taps, oil-cooled, 5½ by 5 by 6in, ok for lin, £3; Tel 01-554 9457, evngs only.

AM10B Cambridge 2m, with xtals and hndbk, £25; Sentinel 2m cnvrtr, 4-6MHz i.f., £10; 2m tx, rf section 3-20 pa, psu, £10. S. Camm, 25 Sunnyhurst Lane, Darwen, Lancs. Tel 71690, after 6.30pm.

G2DAF type part-built tx/rx, 898 dial drive, Plessey valve ssb unit with Collins fltr bandswitch, all chassis-mounted, carrier xtal etc, Mullard 5-10 amp, pr 807s, pr KT66s, offer or exch for EC10. Reynolds 224 Station Road, Rolleston, Burton-on-Trent. Tel Tutbury 3393.

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HRO with Collins mech fltr, set coils, min valves, and National psu, £20; Perdio /p 8in tv, 405-line, all-trnsstr, 12V or mains, £12. G3TCU, QTHR. Tel Guildford 65607.

FL1000 lin, spare valves, as new, £70, carr extra; PMII prslctr £5; ETM-2 keyer, mint, £16. GW3TMP, QTHR.

Mains trnsfrmrs, ex-eqpt, 500-450-0-450-500V 250mA, three 6·3V 5A, 6·3V 4A, 6·3V 0·6A 4-5-6·3V 3A, £3; new 250-0-250V 150mA, 6·3V 5A, 5V 2A, £2; dash Ranger, 6-chann, tx on 2m, mic, less xtal, trnsstr psu, £10, carr extra. G8FUI, QTHR.

IC-20 2m fm tx/rx £75; Trio TR7100 2m fm tx/rx £70; Ten-Tec Squeeze keyer, KR40, £25; Racal 9502 10MHz, freq/period counter £80; Solartron 1240 dvm £65; Coutant 0-24V 5A and 2A stab psus, £25 and £15; Sony ¼in vtr, CV2100ACE £180; Taylor vtvm 172A, with rf probe, £25; Uher 4200 semi-prof stereo /p tape rcrdr £110; Heathkit RF-1U sig gen £12; Heathkit gdo £10; Shure hand mic £3; solid-state 2m pwr amps, 10W in 100W out, £80. Phone/write J. Yu, 8 Basing Street, London W11. Tel 01-221 6067.

WANTED

Wavechange switch for AR88D, part No M253097.1, must be gd cond, pref new. G4APG, QTHR. Tel 01-399 8113.

All-band ssb tx/rx inc power supply. Yorkshire Television Amateur Radio Society, Yorkshire Television Limited, Leeds LS3 1JS. Tel Leeds 38283, ext 338.

HW32A reqd for club stn. **For sale** large stock of untested Zener diodes, sim BZY88, 35p for 100, post free. PO Amateur Radio Club, 200 Marton Rd, Middlesbrough, Teesside.

Details of how to modify a Murphy MR900 base stn rx to make it tune the 2m band. G8FUT, QTHR.

Magnetron 2M66 or microwave oven, also wide-range rx, 50-200MHz. G3VMR, QTHR. Tel Maidenhead 24929.

North Kent G8 wishes personal tuition to pass morse test, fee by arrangement. Shepherd, "Woodfield", Priory Close, Chislehurst. Tel 01-467 2023.

Tiltover tower, pref Strumech 40ft, galvanized, also h/duty rotator, Ham-M etc. **For sale** TY2-125, £2.50 ea, £4 pr; new 4CX250B, £3; TY4-500 £3, new BAY96, £2.50, prefer buyers coll. G3RNV, QTHR. Tel 061-483 0011 weekdays only, 4.45pm.

Any df eqpmnt, RXs for mw and 160m and any other freq; aerials, WS18 and 68 sets, and B2 tx/rx. P. Jenkins, 30 Gainsborough Rd, North Finchley, London, N12 8AG.

Rotator suitable 2m beam. G8FSS, QTHR.

Splined armature (coded 19771) for 7in Black and Decker circular saw, serial A160250, or rewind offer; exch or sell worm-wheel armatures for sim machines coded 23530, 33716, 33799. Bonner, 104 The Drive, Feltham, TW14 OAL. Tel 890 4577.

Plug-in coil units for BC358X rx, state price all replies. Ronald Smith, 209 King Ave, Bootle, Lancs.

Electroniques HB166T Coilpack or complete rx incorp same. G8FLC, QTHR. Tel Chelmsford 421031.

Swap 1971 *VHF/UHF Manual* for *Amateur Radio Techniques*, any recent edn, also any unwanted radio mags, coll up to 40 miles. R. Kell, 38 North Lane, Seahouses, Northumberland NE68 7UQ.

CCT and gen on BC453 (R-23/ARC-5) rx, buy or loan. G3JIC, QTHR. Tel St Helens 23916.

4m TW Communicator; any model Vibroplex in gd cond; BAY96 or sim; B8F base and/or chimney for 4CX250B. Pse write to G4AQR, Cordingley, The Gables, Up Hatherley, Cheltenham, Glos.

Fifteen-year old schoolboy with £10 reqs rx for vhf, 4m and/or 2m, will coll rsnbl dist. D. Bainbridge, 2 Downs Way, Alton, Hants GU34 1PR. Tel Alton 84571.

G3HSC morse lessons, pref complete set. M. J. Price, 184 Woolton Road, Liverpool L19 5NF. Tel 051-427 1931.

Drake 4 LF low freq cnvrtr, new or used, in wkg cond. Erland Belrup, Hjortshog 4540, S-260 34-Morarp, Sweden.

BFO coil, 85kHz, for G2DAF rx. Tel Salisbury 46185, or 38136 (8 to 11pm).

CCT diag or manual for RDO 75-1,000MHz American vhf/uhf rx, buy or borrow. P. Stonebridge, 4 Chelsworth Way, Stowmarket, Suffolk IP14 2BT. Tel Stowmarket 3419.

70cm cnvrtr, trnsstr type in screening can, to work from 12V -ve earth supply, pref i.f. 22-24MHz or 12-14MHz. G2AHY, QTHR. Tel Crowthorne 2839.

901B xtal fltr, your rsnbl price paid. G8FRR, QTHR. Tel Whitehaven 3548.

Unserviceable BC221 needed for drive and tuning contr. G3AMF, QTHR. Tel 01-989 9224.

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Buy or borrow manual or handbk for contamination mtr number 1, Govt surplus type, also manual for HRO-M. H. Bullock, "The Frith", Far Oakridge, Stroud, Glos. Tel Frampton Mansell 204.

Ssb xtal fltr, 3MHz region, set cnvrsn xtals for Heathkit SB401 atc, FT101 or sim tx/rx.

Borrow cct diag for Low Band Pye Reporter, cct returned quickly as poss after copying. T. Weekes, 36 Roseholme, Maidstone, Kent.

Four UX4 ceramic valveholders for 811A valves. G3NXM, 10 Ashfield Drive, Baildon, Shipley, Yorkshire BD17 6JA.

Mains trnsfrmr and three 4μF 400V capacitors for AR88D. G. Viner, Hazleglen, Edenbridge, Kent. Tel 073-271 2555.

Hallicrafters S27, S36 or other comm rx with sim coverage, must be first class wkg cond. Pse state price excl freight—packing, freight and insurance paid by me. L. H. Spence, 1 Ashley Close, Newry Road, Armagh, N Ireland. Tel Armagh 7554, day.

19in rack, 4ft high approx. Mr P. Knight, 75 Ashcroft Road, Luton, LU2 9AX.

Polaroid model 230 print copier; clip-on vhf aerial, base mount, suitable front boot 1600 VW saloon. Thurlow, 2 Church Street, Wimblington, March, Cambs. Tel Doddington (Cambs) 255.

Urgently, Electroniques 1·6MHz i.f. unit. GW3ZEQ, QTHR.

HRO 80 and 40m bndsprd coils. A. Pobjoy, 199 Linden Road, Gloucester GL1 5DU.

Ham Radio, Oct 1971—Dec 1972 inc, gd cond, 100% QSL all letters. G3RPJ, 184 Lowley Road, Stratford on Avon.

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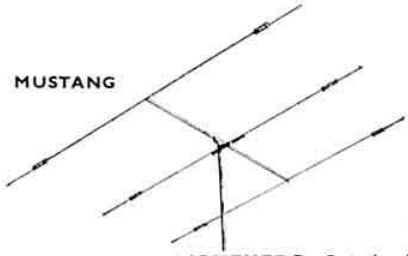

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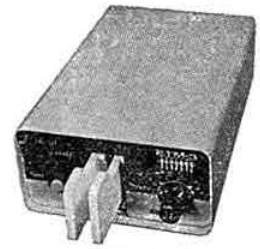

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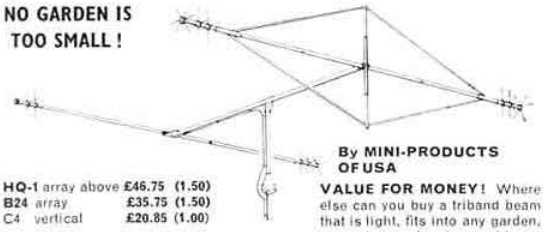

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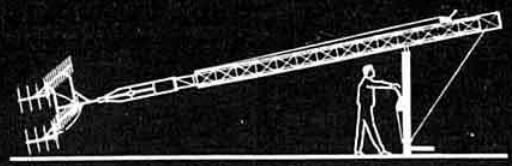

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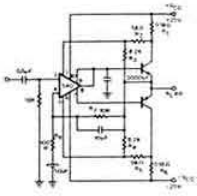

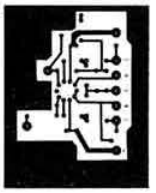

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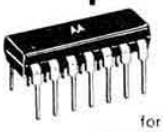

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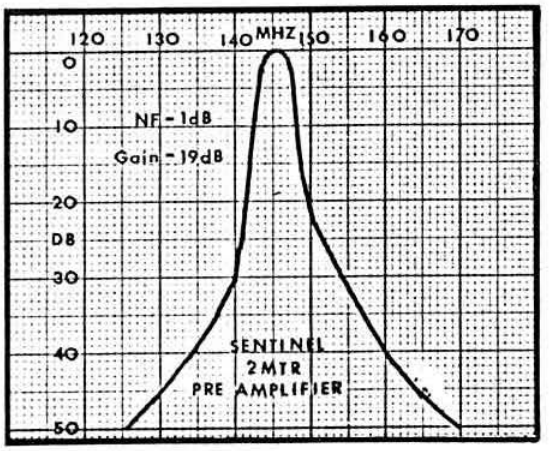

The above plot shows the typical frequency/amplitude response of our Sentinel FET pre-amplifier. Most people use our pre-amplifier because of the 1dB noise factor and the 18dB gain, but as you can see, you also have a very effective 145MHz filter. Supply required is 12V at 5mA with isolated supply lines so that it is compatible with either + ve or —ve earthed equipment. Size 2½" × 3" × 1½". The transistors are selected and each unit carefully adjusted for optimum noise figure. Price: **£7.15.**

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