

FEBRUARY 1973

RADIO COMMUNICATION

The Cable & Wireless satellite earth stations in Hong Kong sited on Stanley peninsula, southernmost point of Hong Kong Island.

Operating via space communications satellites over the Pacific and Indian Oceans, the stations looking east and west span the globe on a 24-hours basis.

*Hong Kong Government
photo*



1913 — 1973

Journal of the Radio Society of Great Britain

FM FOR 2 and 4

With crystals for 144.48 or 145.0.

FM19/2 TWO METRE TX RX 10 watt output, QV03-10 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 x 10 x 13, weight 15lbs. **£45**

FM39/4 FOUR METRE VERSION **£40**

FM13/2 TWO METRE TX/RX 10 watt output, QV03-10 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 x 10 x 18. Weight 30lb. **£30**

FM33/4 FOUR METRE VERSION 12 volt only **£30**

CRYSTALS 10XJ x 24 for 2 metres.

6010 6021 6026 6032 6037 6043 6048 6051 6054 6065 6076 6082kHz. **£1** each

CRYSTALS HC/6U New Stock.

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 8820 8837 8845 8854 8862 8871 8930 8953 8956 8978 9096 9266 9412 9413 9453 9519 9558 9781 9815 9837 9845
9871 10437kHz. Less 25% 10 or more. **£1** each

CRYSTAL CONTROL UNITS with 34 xtals 13.54 to 19.87MHz, 3 valves EF91 size 4 x 4 x 6" with circuit **£4**

LORAN R65/APN9 UNIT RX 1.7 to 2MHz, scope with 3BPI tube, 100kHz xtal standard with dividers, all in box size 20 x 9

x 12" WITH CIRCUIT **£10**

CRYSTALS TYPE HC/6U **£1** each

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 5379 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 8285 9293 9302 9310 9319 9327 9336 9344 9353 9370 9376 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 12000 14000 14250
31200 31225 31250 31275 31300 31325 31350 31375 31400 31425 31450 31475 31500 31525 31550 31575 31600 31625 31650 31673kHz.
£1 each. 25% qty discount 10 or more.

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

MARCONI ATU UNITS Roller coils 30 turns, 3 inch dia, 20 turns, 2" inch dia., capacitor turret, RF voltage and current sensing elements. Size 6 1/2 x 11 x 16, weight 27lb. **WITH CIRCUIT** **£6**

MARCONI MODULATORS 90 watt output, transformer to match 2,000 ohms and screen winding speech clipper audio AGC, switched metering for: PA grid, Buffer grid, PA anode, Mod anodes and screens, 500 and 1,000 volts HT. Valves 12AX7, 12AT7, 6AL5, 6AU6, 12AX7, push pull pair 829Bs, 6AQ5, 6AU6, OA2 etc. HT required, 600 volts, 275 volts DC, 250 volts AC, room for PSU inside case, Size 8 x 12 x 16. **WITH CIRCUIT**. Weight 32lbs **£10**

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PYE RANGER 15 2022 ready modified for 2m or 4m, AM, 12volt + or - earth, boot mounting with cables, control unit, mic and crystals for one channel (our choice). Carr. **£1.50**

100W MODULATORS PP Parallel min 807's 5 x 5 x 9. Circuit. **£10**

CRYSTALS type B7G, Q10, 4039, 10X etc. **£1** each 25% disc, 10 or more.

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7588 9166 9191 9800 10225 10684 10857 11033 11418 12183 12350 13175
13266 13300 14750 14975 15030 15340 15380
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 15567 15612 15637 15622 15687 15712
15737 15837 15887 15912 15937 15962 16987

2638 2854 2868 2875 2876 2889 2910 2931 2938 2945 2952 2954 2966 2980 2987 3008
3081 3203 3102 3105 3250 3255 3270 3285 3298 3302 3404 3411 3425 3432 3446 3453
3460 3467 3481 3495 3800 3805 3950 3955 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
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8930 8947 8953 8956 8961 8967 8971 8973 8983 322 324 329 338 339 342 kHz
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

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8967 8971 8983

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
12875 12962 12975 12987 13062 13087 13112 13137 13162 13187 13212 13237 13262
13272 13312 13337 13387 13412 13437 13462 13487 13540 13590 13640 13690 13740
13740 13790 13840 13890 13940 13990 14848 14898 14948 14998 15048 15098 15148
15198 15248 15298 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 7893 7900 7916 7933 7950 7966 7983 8118 8166 8150 8183 8216 8250 8266 8283
8300 8316 8333 8350 8366 8416 8433

2805 2354 2948 2889 2935 6611 6657 6696 6940 7552 7567 7664 7635 8953 9453 9871
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EDITOR

A. W. Hutchinson

ASSISTANT EDITOR

R. A. Staton

DRAUGHTSMAN

Derek E. Cole

EDITORIAL PANEL

J. P. Hawker, G3VA

G. R. Jessop, G6JP

R. F. Stevens, G2BVN

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CONTENTS

- 92 Current Comment. QTC
- 94 The G2DAF ssb transmitter Mark 3 (Part 1)—
G. R. B. Thornley, G2DAF
- 100 Technical Topics—Pat Hawker, G3VA
- 105 Product information
- 106 Microwaves—1,000MHz and up—Dain Evans, G3RPE
- 107 Presidential installation—1973
- 108 Four Metres and Down—Jack Hum, G5UM
- 112 The Month on the Air—John Allaway, G3FKM
- 116 Special event stations. Obituaries.
Raynet—S. W. Law, G3PAZ
- 117 Contest News
- 119 Contests calendar. Mobile rallies calendar
- 120 Club News
- 124 Members' Ads

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SPECIFICATIONS

Frequency	80m 3.5-4.0mc/s
Range	40m 7.0-7.5mc/s
	20m 14.0-14.5mc/s
	15m 21.0-21.5mc/s
	10m 28.0-29.2mc/s
	WWV 10.0-10.5mc/s
Sensitivity	CW/SSB Less than 0.5µV for 10dB S/N ratio
	AM Less than 1µV for 10dB S/N ratio
Selectivity	±1.8kHz at -6dB; ±5kHz at -50dB
Image Rejection	More than 50dB
Calibrator	100kHz (crystal optional)
Audio output	1.5W 4 ohm/600 ohm, speaker built-in
Power source	110; 117; 220; 234V AC
Dimensions	13" wide, 6" high, 10 1/2" deep
Weight	17 1/2 lbs approx.



NOW WITH TOP BAND AND 2M

Anybody can give you the above spec., because it is in the handbook. It is a good spec., but only tells part of the story. Rather than splash pretty pictures and sketchy descriptions which tell you nothing, we feel that today's Amateurs would prefer an indepth approach to technical specifications. We therefore begin a series on the Yaesu range starting with the FR50B.

The FR50B is without any shadow of doubt the best amateur band receiver you can buy at anywhere near the price. Take, for example the r.f. amplifier; for wide dynamic range it is true to say that a good valve will still beat a good transistor, and of the valves available, the 6BZ6 as used in the FR50B is probably the best for the purpose. This is followed by a 12AT7 triode mixer which shows its superiority over multi grid mixers in terms of lower noise while maintaining good conversion gain. Typical of the Yaesu thoroughness in design is the use of a tapped IF transformer, to provide correct impedance matching to the mixer.

In contrast to r.f. and mixer stages, the oscillator stage is one in which transistors can outperform valves. Stability is all important and the absence of heat and microphony in a transistor allied with its long-term gain and internal capacitance etc., stability, makes it an ideal choice for an oscillator. Needless to say Yaesu use transistor V.F.O.'s in all current equipment. Isolation of the VFO from following stages is essential to avoid oscillator pulling. Yaesu achieve this in the FR50B by use of an emitter follower stage.

In common with many receivers intended for use with a companion transmitter, a VFO output socket is provided on the rear chassis. I wonder how many people realise what a fruitful source of I.F. breakthrough such an output can be. The FR50B incorporates an I.F. trap in this output, thus neatly minimising breakthrough from this source. Another example of Yaesu attention to detail.

The 2nd oscillator is crystal controlled! or unconditional stability and is unusual in that a double tuned transformer is used in the feed to the mixer to prevent harmonic mixing.

Ceramic transistors are used for I.F. selectivity having the advantage of long term stability and ease of alignment using a minimum of test equipment.

For easy resolution of SSB, a product detector is essential and the FR50B 6BE6 product detector used with separate BFO injection gives excellent performance without overload. The tuneable BFO is a blessing for the CW man, allowing him to vary pitch without retuning the receiver.

A point which is often overlooked is the importance of isolating the BFO from the AGC system. Inadequate isolation allows the BFO signal to gen-

erate an a.g.c. voltage which of course reduces receiver gain. This problem does not occur in the FR50B due to the use of a separately excited 6BE6. An unusual feature for a receiver in this price class is the provision of both fast and slow a.g.c.

The A.F. amplifier section has overall negative feedback applied which results in a standard of audio quality not often found in a communications receiver.

When operating transceive with a companion transmitter, an adjustable monitor control allows a continuous check on the transmitted signal.

Easy resolution of SSB signals require a slow tuning rate and this is achieved by using the same high quality gearbox as on the wellknown FR100B with its 1 KHz readout.

Good though the FR50B undoubtedly is some of our Customers have commented that it would be nice to have both top band coverage and the whole of 10m for converter use. Therefore as part of our normal Customer service we have developed suitable modifications to provide both these facilities and will gladly supply details on request (s.a.e. please).

For Customers wishing to have their new FR50B modified by us, the price is as follows:

Standard FR50B	£59.00
Calibrator Crystal	2.50
160m coverage	5.00
28-30 MHz coverage	2.50
160m plus 28-30 MHz	6.50

We can, if you wish, fit the 2m converter for you, and have no hesitation in recommending the Weir Mostet Converter, which we can supply ready fitted for £20.

With these modifications, you have a receiver, which, at the price, is UNBEATABLE.

It should be fairly clear from the foregoing that Lowe Electronics give you a bit more than anyone else.

When it comes to Yaesu equipment Lowe Electronics have more knowhow than anyone else.

When it comes to Service, Lowe Electronics again give you more than anyone else.

Our Customers know this, expect it and get it, it is simply that every now and again we have to remind you that for some years now we have been the best, we are still the best, and we intend to continue to be the best.

Yaesu Equipment

FT101 160-10m	£255	FV50C VFO	£27.50
FV101 VFO	£38.00	FRdx400 SDL 160-10m fitted ALL factory extras including 4m	£160
SP101 Speaker	£10.00	SP400 Speaker	£10.00
FL2100 Linear	£148	FLdx400 60-10m	£146
FT200 80-10m	£134	FL2000B Linear	£148
FP200 AC psu/speaker	£38.00	YC355D 220MHz Counter	£111
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FT401 80-10m	£230	FR50B 80-10m	£59.00
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FV401 VFO	£38.00	FV50B VFO	£27.50
FT75 80-10m	£39.00	SP50B speaker	£5.00
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We have the best selection in the country of immaculate, fully tested and reconditioned second hand gear. We give a 3 month or more guarantee with all second hand stuff and in addition you have our normal money back guarantee if you're not happy. All you have to do is tell us you're not happy and we collect the gear by Securicor. You get your money back, less carriage, without question. Buying from us takes all the risk out of buying second hand. A S.A.E. will get you our latest second hand list and a large envelope with a 6p stamp on will get you our complete catalogue which runs to over 50 pages, and includes circuit diagrams of all gear.

Trade Ins

We are always happy to trade in used equipment if it is something we can recommend to another customer. We don't mind if it's faulty because we service all the second hand gear before resale anyway.

Equipment for Disposal

If you have gear for disposal—give us a yell, we are always interested in good quality equipment. Alternatively we can often sell it for you on commission.

Hire Purchase

We can arrange Hire Purchase terms on both new and second hand gear. The deposit is a mere 10% and repayment may be spread over 12, 18, 24 or 36 months. Your trade in gear is perfectly acceptable as a deposit.

Yaesu News

The YC355D counter which we have been selling for some weeks at £111 supersedes all previous Yaesu models and is a marked improvement over the obsolete YC305D at no increase in price.

The latest FRdx400 super deluxe has been fitted with the latest Murata FM and AM filters for several months now.

The latest FT-2FB and FT-2AUTO have modified front ends.

The latest FRdx400 has much increased audio gain.

Our turnover is such that you are always assured of getting the latest in fresh factory stock. We don't make a big song and dance about it—just another of our fringe benefits. If you have any doubts when considering gear and want to avoid buying old stock—check with us. If you have already bought gear from us and want to know about latest modifications—check with us.

If you have bought an FR50B from us and want it to cover the whole of 10m for 2m converter use—check with us.

If you want a tune-up device which will allow you to run an FTdx401 or FTdx560 (or any SSB rig for that matter) at FULL INPUT for hours on end—check with us.

In fact, whatever you want, wherever you are, you would be well advised to check with us, because above all else, our customers come first and we look after them.

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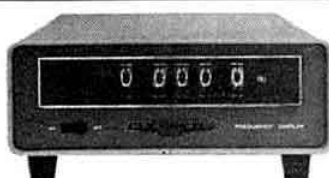
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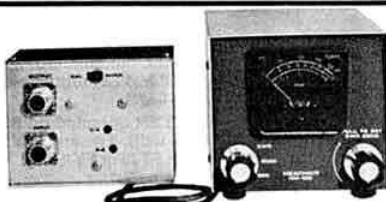


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SUPPLY KIT, HP-13B**
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WATTMETER/SWR BRIDGE KIT, HM-102
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IMPORTANT ANNOUNCEMENT

Since all amateur equipment is exempt from purchase tax, when VAT commences 1st April, all prices go up by probably 10% (the exact figure is yet to be announced). We have increased our large stocks, spares and service department and staff to assist the discerning customer to take advantage of the following scheme. By taking advantage of our H.P. facilities supplied by the Lloyds and Scottish banking group, which is even more competitive with the present bank rate, then providing you send a 10% deposit and we invoice before the 1st April, the rest of the payment may be made after without the VAT tax up to 3 years. Please don't forget we supply a 5 star service:

★ **GUARANTEE:** we maintain the Yaesu 12 month guarantee backed by ★ **SPARES:** We carry a full range of factory recommended spares and more besides. ★ **SERVICE:** We do all labour free on warranty claims. ★ **DELIVERY:** We deliver within 24 hours of receipts of order all items in stock providing they are less than 5ft. in length (boxed). This is the fastest delivery service in the country and costs £1 per parcel only! 48 hours' service to Scotland and remote parts. ★ **COLLECTION:** In the unlikely event of you having faulty equipment under warranty, all you have to do is phone/write and we will collect by Securicor at our expense and return the unit to you at our expense.

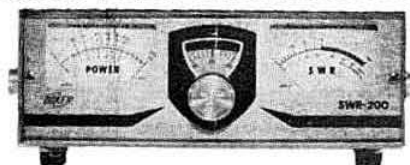
NEW YAESU FT-501

This is a 500w. p.e.p. 10-80m. transceiver modelled along the lines of the FT-401; i.e. mainly valved and using 2/6KD6 for o/p. It has digital readout and comes complete with matching separate PSU/Speaker unit (FP-501). Price Circa £300 (+10% VAT on orders placed after 1.4.73). Delivery: Not before late March; that's why we haven't mentioned the unit earlier!

NEW YAESU SIGMA-SIZER-200

A 200 Channel Frequency Synthesised FM Transceiver. Price Circa £150 (+10% VAT on orders after 1.4.73)

OSKER POWER METER (EX STOCK)



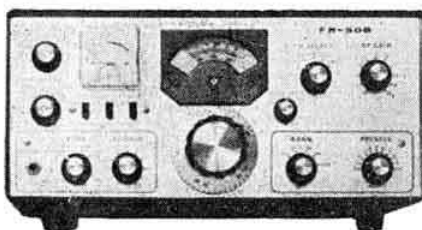
Features: Switchable for 52 or 75 ohm systems. Each instrument is individually calibrated. Four ranges: 0-2, 0-20, 0-200 and 0-2kW 3-200 MHz. Excellent styling.

PRICE: £18.50

FL-50B TRANSMITTER (Ex Stock) £68



FR-50B RECEIVER (Ex Stock) £59-£63



FV-50B VFO £27.50

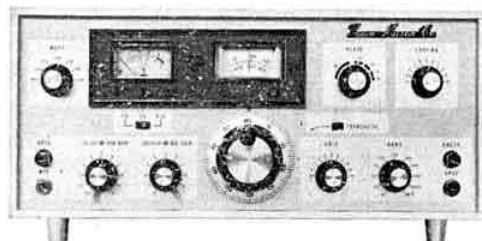


The **FR-50B RECEIVER:** Amateur bands only, AM/CW/SSB double conversion offers first class value for money, comes complete with built in speaker, crystal calibrator and WWV at £63 (less cal/WWV £59) 100kHz cal cct., Tuneable BFO, I.F. trap in r.f., cct, S-meter fitted, readout to better than 1kh. noise limiter, built in muting and monitoring cct for use with FL50B transmitter.

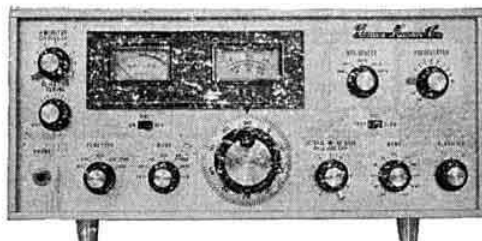
SPECIFICATION: Sensitivity: 0.5µV 10dB SN ratio, Selectivity: 3.6 kHz 6dB; 10kHz 50dB; Frequency coverage: 3.5-3.8, 7-7.5, 14-14.5, 21-21.5, 28-29.2MHz. Image ratio better than -50dB.

The **FL-50 SSB-CW TRANSMITTER** operated on SSB/AM and CW Power i/p 50w p.e.p. 80-10m. Carrier suppression. Unwanted side-band and spurious radiation are all -40dB. The unit is VXO controlled or will transceive with FR50. With FV50 VFO control is possible.

The **FV50B REMOTE VFO** for both FT75 or FT-50.



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



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, 27.9-28.5, 23.5-23.1, 28.9-29.5MHz. Selectable USB or LSB. Stability: less than 100Hz/jhr. after warm-up. Sideband suppression 50dB. Carrier suppression better than 50dB. Noting 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.

The **FR400SDX** (Super De Luxe) receiver is now available fitted with 4m. This mode 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.

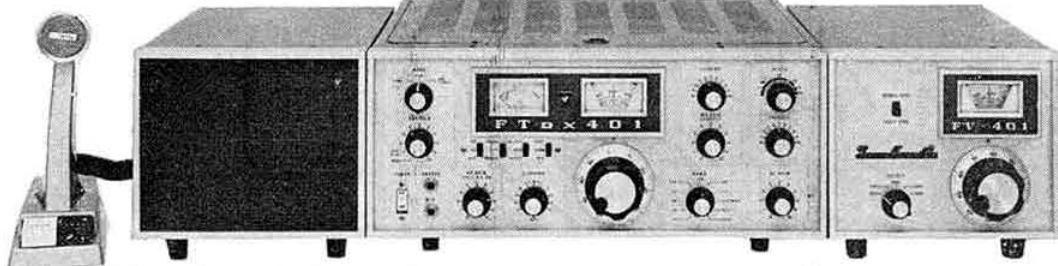
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YD-844

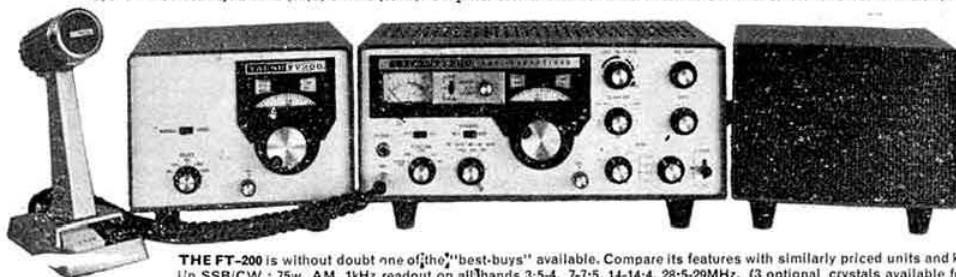
SP-400 (Ex Stock)

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 1/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 (6dB) 3.7kHz (60dB). CW filter 600Hz. Clarifier 5kHz. Break-in CW with sidetone. Selectable USB/LSB.



FV-200

FT-200

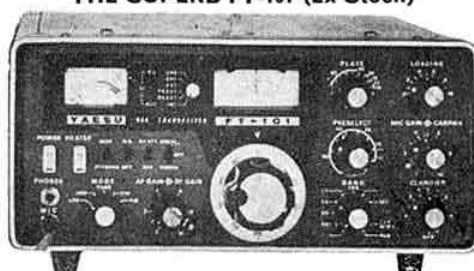
FP-200

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. 1/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 29-30MHz). Stability: 100Hz 30 mins. after warm-up. Sensitivity: 0.5µV 10dB S/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 ± 5 kHz. Break-in CW keying.

THE SUPERB FT-101 (Ex Stock)

MATCHING FL-2100 LINEAR (Ex Stock)



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



NEW — FT-101 — £249 or £255 with 160M

FOR BASE STATION OR MOBILE. This easy-to-service (with solid state plug-in modules) comes complete with built-in AC & DC PSU's, speaker and microphone. There is no better value let alone quality! Size 13 1/2" x 6" x 1 1/2"; wt. 30lb. SPECIFICATION: 1/p. 260w. p.e.p. SSB, 180w. CW, 80w. AM. Sensitivity 0.3 microvolt for 10dB S/S + N; selectivity 2.4kHz (6dB down) 4.2kHz (60dB down). CW filter (extra) 0.6kHz (6dB down), 1.2kHz (60dB). Freq. range 3-5.4, 7-7.5, 14-14.5, 21-21.5, 27-27.5, 28-30, 10-10.5 (WWV), plus 2 spare band positions (1 used for 160m). Freq. stability less than 100Hz/1hr. Antenna Z 50-100Ω, swr <2:1, audio o/p. 3w. 350-2200Hz. 4Ω. Noiseblanker, 25/100kHz. calibrator. VOX/PTT. Clarifier ± 5 kHz. 1kHz readout. Provision for 2 crystal controlled positions and external VFO. Linear, panasonic adaptor, transverter frequency counter.

The FL-2100 is designed to match the FT-101 and runs 1200w. p.e.p. If it's a linear you require for some other exciter, compare the FL-2100 with 2 fans. AC and HV safety interlock and fully screened input circuitry. You'll not find better value!

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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 toneburst 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 6 1/2" x 2 1/2" x 10". Weight 4lb. Standard accessories, Dynamic mic., and mobile mount. Transmitter RF power 10 or 1w. o/p Stability: ± 0.001 per cent.



(Ex Stock)
£146

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: 144-148 MHz. Weight: 4.2 kg. Size: 210w. x 95h x 270d mm. Mode: F3. Power requirements: AC 100, 110, 117, 200, 220, 230V DC, 13.5.

TEMPO TCP 12A

This unit offers the user continuous monitoring of the power output of his amplifier. Power is read directly in watts on the meter. This head is plugged into the control jack of any Tempo amplifier. It can be mounted in any convenient location, away from, or next to the amplifier. It then offers the user not only power output monitoring but also the ability to turn the amplifier off and on. The control head can also monitor the battery voltage. Power is detected in the amplifier by a printed circuit directional coupler which is built into all Tempo TPL VHF power amplifiers.

TEMPO 2 METER FM AMPLIFIERS.

MODEL	DRIVE POWER	OUTPUT POWER	CURRENT	PRICE
1002-3	5-25 watts	100-135 watts	17 amps	£119.97
802	5-12 watts	70-90 watts	12 amps	£98.90
502	5-15 watts	35-55 watts	5 amps	£57.95

TCP 12A CONTROL HEAD

All the amplifiers operate on 13.8V. dc.

YC-305D, 220 MHz. COUNTER, £111.

This compact digital frequency counter which is equally suitable for laboratory, industrial or amateur applications has the following specifications: Compact design by advanced IC technique to count wide frequency range 5Hz-30 MHz. Dual range system provides 8 digit measurement with MHz and kHz indicators. 24V, AC/20DC dual power pack built-in; accuracy - time base stability ± 1 count, gate time 1 m.s. or 1 second; input 2MHz, low 55 Ω ; input capacity = less 20pF, max. i/p 60 v-p less than 10 sec. 20V, p-p continuous; time base frequency 1,000kHz crystal controlled; stability 0.0005 per cent at 25°C, 0.0025 at 40°C. Dimensions 8 1/2" x 3 1/2" x 10 1/2", Weight 8 lbs.

NEW CATALOGUE (10p).

"COMMUNICATIONS EQUIPMENT"

YAESU, OMEGA, AMECO, ROBOT, TEMPO OSKER, ASAHI, KATSUMI, CASLON, HONDA are all represented plus a price list of all our equipment including antennas, masts etc.



YC-305 FREQ. COUNTER (Ex Stock) £85.



FT75 10-80m. SSB TRANSCEIVER (Ex Stock)

The great new FT75 with an output power in excess of 30W p.e.p. on any band. Equally suitable for mobile or fixed station. Operation could not be easier! You simply select the band, press the channel button and talk. Microphone included.

The FT75 requires the FP75 for mains operation or the DC75 and mobile mount for mobile operation. A VXO facility allows the crystal frequencies to be moved slightly during crowded band conditions.

SPECIFICATION: Crystals fitted: 3.760, 7060, 21.350, 28.550 (14.200 optional extra £2.20) others available to order.

VXO Swing: 3.5MHz, 3kHz, 7MHz, 6kHz, 14MHz, 3kHz, 21MHz, 20kHz, 28MHz, 12kHz.

Size: 210 x 80 x 300 m.m. Weight: 3.8 kg.

RECEIVER: Sensitivity 0.5 μ V for 10dB S:S + N. Selectivity: 2.3kHz (-6dB) 4.5 (-60dB). Audio o/p 1.8W.

TRANSMITTER: Modes SSB or CW, Carrier suppression better than 40dB at 1kHz. Current drain DC standby 1.4A, Heaters of 3.5A, Transmit 5.5A.

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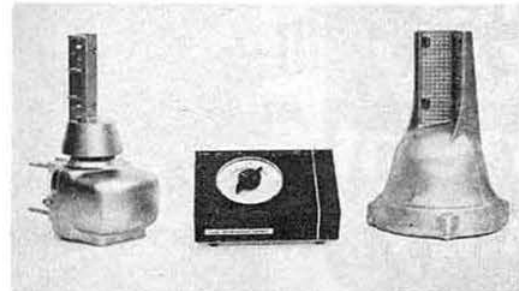


FL-2000B (Ex Stock)

The **FL-2000B** operates at a maximum i/p of 1,200W p.p. on SSB and covers 80-10m. All grid i/p circuitry is screened. Two cooling fans fitted, one for each rugged 572B carbon anode tube. Built-in SWR bridge functions when linear is "off" or "on". Safety interlock on lid switches AC supply off. Safety interlock on PA compartment lid bleeds residual HT to earth thus preventing shock from the storage capacitors. All in all the FL-2000B is quite a linear!

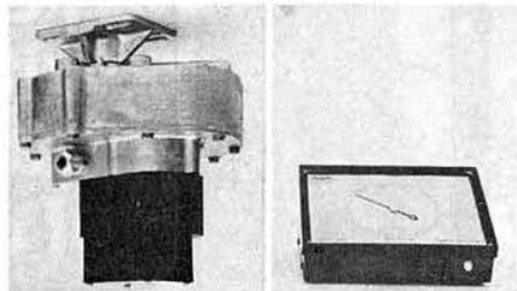
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Shown far left
AR20, left
AR22R, right
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We stock the best range of rotators, CDE and HY-GAIN and spares. Our stocks are good so you'll get fast delivery plus the after-sales service which counts.

AR20 This model replaces the old AR10 and is ideal for VHF beams. £29 (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-wire 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 (£11).

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

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Note. Deduct 50p from price of aerial if base is not required.

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VALUE ADDED TAX

No immediate alteration to subscriptions

Liability to pay VAT on subscription income from 1 April 1973, when this new tax starts, will seriously affect the Society's finances. Ways of alleviating this liability have been discussed at length in the Society—by the Finance & Staff Committee, by Council, and at the last AGM. Exploratory talks have also been held with HM Customs & Excise and with the Department of Trade & Industry.

But there appears to be no magic formula which will save members money and which, at the same time, will be workable.

At its meeting on 4 January 1973, Council therefore decided that for the time being the cost of VAT will be borne out of the Society's finances. However, in a whole year the cost of the tax will be approximately £5,000 and this can only be met by an eventual increase in subscriptions.

The date on which the increase will come into force and the amount of the increase has not yet been decided. In the meantime, therefore, despite the added burden on the Society's finances which VAT will impose, there will be no alteration in subscriptions and members will continue to pay at the existing rates.

G3DVF, Hon Treasurer

QTC

AMATEUR
RADIO NEWS

BOAC donates prizes for RSGB

Diamond Jubilee HF Contests

The British Overseas Airways Corporation has very kindly undertaken to provide prizes in connection with the special hf contests which the RSGB has organized to mark its Diamond Jubilee Year.

The winner of the cw transmitting contest and the winner of the telephony transmitting contest will each receive from BOAC an economy-class return ticket to one of the following cabotage points: Bermuda, Hong Kong, Seychelles, St Lucia, Antigua or Nassau. In addition, BOAC will provide an all-day airport visit for four entrants from each of these two contests.

The Society is very grateful to BOAC for making these excellent prizes available and is sure that there will be keen competition for them.

The rules for these contests are published in the Contest News section of this issue.

RAE course, Grantham

Commencing 5 February, beginners' classes for the RAE will be held at St Hugh's Evening Institute, Dysart Road, Grantham, Lincs. The instructor will be A. Ellis, G3PJR, and enrolment may take place at the class, or at the college (at any time). Classes begin at 6.45pm.

Affiliated societies

Please add the following two societies to the list given in the 1973 edition of the RSGB Amateur Radio Call Book: Otley Radio Society; hon. sec. D. G. Mott, G8BZY, 17 Newell Carr Road, Otley, Yorkshire.

Hereford Amateur Radio Society; hon sec. S. Jasson, 181 Kings Acre Road, Hereford.

"RSGB Amateur Radio Call Book"

The 1974 and subsequent editions of this book will be compiled by a semi-automatic process and printed by offset lithography, instead of the letterpress system previously used. This will necessitate the complete re-typing of existing unchanged entries for the first (1974) edition using the new system, in addition to the usual amendments and additions.

In order that no errors are carried forward into the new system, licensed members who have not already done so are asked to check that their entry in the 1973 edition is correct. Please send any amendments to the editor at RSGB headquarters.

Awards leaflet

The RSGB hf awards leaflet has been recently reprinted and combined with a countries list. Copies may be obtained from Society headquarters by sending a large sae.

As announced last month, applications for awards should be sent direct to the hf certificates manager, G5GH, Westbury End, Fimmere, Buckingham.

RSGB Exhibition & Mobile Committee

This committee arranges RSGB representation at exhibitions, rallies, etc. Organizers of functions at which RSGB representation would be desired should get in touch with the committee chairman, Norman Miller, G3MVF, c/o RSGB headquarters.

The committee is preparing a publication about the suppression of electrical interference in vehicles, including details as to techniques, suppression devices and details as to where these devices can be obtained. Manufacturers and members who wish to contribute information to this RSGB publication should get in touch with G3MVF.

Wireless in Wolverhampton

This is the title of a publication produced by the Wolverhampton Amateur Radio Society in 1972 which traces the growth of amateur radio in the area since 1922. It is fitting that such a record should be available in the golden jubilee year of the society. Comprising 70 pages, including several pages of photographs, the book records for posterity personalities and events which otherwise would have been obliterated by time. Credit is due to Bill Moorwood, G3CAQ, for an excellent production.

"CQ-DL"

Subscriptions to CQ-DL, the official magazine of the German National Society, DARC, are available at DM16 per year by surface mail. The present exchange rate is DM7.40 to the £. It is requested that DM2 be added to subscription remittances to cover banking charges. Requests should be sent to DARC, PO Box 1155, D-3501 Baunatal-1, Federal Republic of Germany.

Deputy RR, Region 7

Alan Foss, G8EAY, has been appointed Deputy Regional Representative for Region 7. He will assist Robin Hewes, G3TDR, Region 7 Representative, in providing liaison between the Society and its membership in the London area, principally in the north-east section of the region. Mr Foss, who resides in Chigwell, Essex, is chairman of the Barking Radio & Electronics Society.

Official Regional Meeting

It is proposed to hold a Region 7 ORM at "The Winning Post", Whitton, Middlesex, on Saturday 6 October 1973. Further details of the meeting will be announced later and in the meantime all correspondence concerning it should be addressed to Regional Representative R. S. Hewes, G3TDR, or to Deputy Regional Representative A. Foss, G8EAY.

International meeting

The Israel Amateur Radio Club is organizing an *International Symposium of Radio Hams in the Satellite Era* at Netanya between 24 and 29 June 1973. A programme covering all amateur radio interests has been drawn up and interested persons are invited to write to the following address for further information: The Organizing Committee, International Symposium, POB 16271, Tel Aviv, Israel.

EI QSL Bureau

Members should note that the only IARU-recognized QSL bureau in the Republic of Ireland is that run by the Irish Radio Transmitters' Society, and which has been in existence for many years. The address of this bureau is IRTS QSL Bureau, PO Box 462, Dublin 9.

Publicity has recently been circulated giving a QSL bureau address in Athlone. This bureau, according to its published application form, will cater for members of its own organization only. The leaflet goes on to state "all cards for non-members will be stamped 'non-member' and returned to the QSL bureau of origin".

The IRTS QSL Bureau, at the address given above, handles cards for all EI amateurs and short wave listeners.

The Puffmeter

We have been advised by the designer of this piece of test equipment (see *Radio Communication*, October 1972, p669), of the following point.

Some constructors of this instrument have found that control of the level of oscillation using RV1 is inadequate, that is, a more than full scale reading cannot be reduced to 100 on the meter. If this is the case the problem is most easily solved by shunting the meter with a variable resistance of 2 to 5k Ω , leaving RV1 fixed, and using the shunting resistance as a means of control.

Denby Dale and District Amateur Radio Society

The above-named club had its inaugural meeting on 24 November 1972. Meetings are to be held on the last Wednesday of each month, at Denby Dale Pie Hall, with visits to be arranged for various Wednesdays between the main meetings. Officials elected were: P. Bottom, G8DHD (chairman), J. Clegg, G3FQH (secretary), S. Nichols (treasurer), K. Lee, G3VSO, D. Marsden, G3ZHP, G.

"Radio Communication" circulation

The audited total average circulation of "Radio Communication" during 1972, as certified by the Audit Bureau of Circulations, was 17,313 copies per issue.

Edinburgh, G3SDY, and N.C.U. Beaumont, G8FUQ. Interested amateurs are invited to contact Mr J. Clegg, G3FQH QTHR.

SSTV

We have been advised by Richard Thurlow, G3WW, that the MPT will accept the USA manufactured ROBOT equipment as suitable for sstv transmissions from UK amateur stations. The manufacturers have made their equipment, particularly the camera model 80, acceptable for users having 50 or 60 cycle mains frequencies. Potential users are reminded that prior permission is required for transmission by this mode on the 7, 14, 21, 28 and 144MHz bands. Applications, together with details of the equipment to be used, should be sent to the MPT.

Transistors, 1948—1973

The IERE is marking the 25th anniversary of the invention of the transistor by devoting a specially enlarged issue of its journal—*The Radio and Electronic Engineer*—to a unique collection of nearly 20 papers on semiconductor subjects. Contributed by leading British scientists and engineers who have worked in this field during the past quarter of a century, the papers cover the historical, circuit and applications aspects of semiconductors generally, and of the transistor in particular.

This transistor issue of the *Radio and Electronic Engineer*, which will be dated January-February 1973, may be obtained from the IERE publications sales department, 9 Bedford Square, London, WC1B 3RG, price £2 per copy post free.

To celebrate the silver jubilee of the transistor, the Institution of Electrical Engineers, in conjunction with the Institution of Electronic and Radio Engineers, has arranged a number of events which will take place between 12 and 16 February 1973. The programme is as follows:

12-16 February. An exhibition at the IEE demonstrating the evolution from the point-contact transistor to complex integrated circuits.

13 February at 10am. A colloquium "The 25th anniversary of the transistor" at the Royal Society.

14 February at 5.30pm. A lecture by Dr William Shockley, "The invention of the transistor; an example of creative-failure methodology" at the IEE.

15 February at 10.30am. A half-day discussion meeting "What next in semiconductors" at the IEE. Following this (at the IEE) there will be a lecture by Dr W. E. J. Farvis, "The influence of the transistor in our society and economy".

WAMRAC—change of address

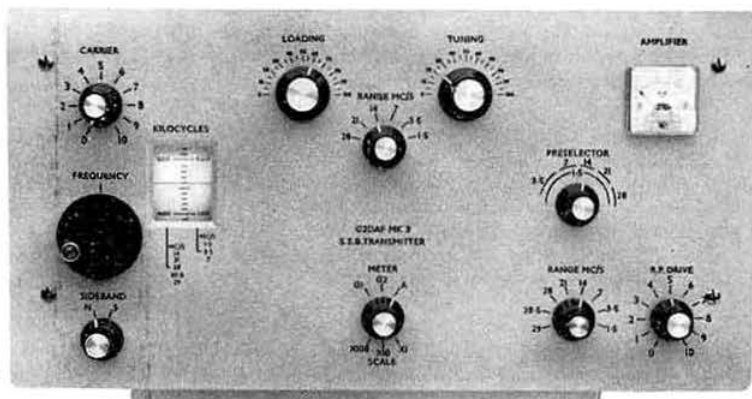
Please note that the new address of WAMRAC (World Association of Methodist Radio Amateurs and Clubs) is: WAMRAC HQ, (G3NJB), "Lawn House", West Felton, Oswestry, Salop. Tel Queens Head (069-188) 366.

The G2DAF ssb transmitter Mark 3

Six amateur bands
with simplified
conversion.

180W p.e.p. input

by G. R. B. THORNLEY, G2DAF*



Part 1

AFTER the publication of the article on the G2DAF Mark 2 ssb transmitter [1] it was a natural step for the author to plan the development of a further six-band 180W transmitter; but this time with the emphasis on simplicity of basic design and mechanical construction—provided this was possible without degrading the original performance in any way.

It was considered of importance to avoid crystal manipulation and the difficulty (to some) of half-lattice filter alignment, so the decision was made to have the initial sideband generation at 455kHz using a low-cost, easily-obtainable mechanical filter. As six-band coverage was required, the next important step was to evaluate the practicability of relatively simple frequency translation to the required 180–10m amateur bands, using *two* conversion processes only.

The G2DAF receiver worked very well with 5–5.5MHz as the tunable i.f., followed by a 455kHz mechanical filter; so why not try this method in reverse, in a transmitter? Initial experimental work was undertaken during 1965–6 and proved to be so satisfactory that it was decided to go ahead with the construction of a complete unit.

The Mark 3 transmitter was completed in July 1967 and used almost daily by G2DAF for the following two years. This gave ample opportunity to prove the reliability, ease of control, and long-term stability of the design.

Design considerations

The basic requirements for the Mark 3 transmitter may be summarized as follows.

1. Reduction of frequency translation processes to two, in order to simplify the construction and present a design that would appeal to the relative newcomer to ssb.
2. A reduction in the total number of valves used, and simplification of the circuitry wherever this was possible

without compromising the overall performance in any way.

3. Straightforward setting up and alignment procedure.
4. First-class carrier, sideband and intermodulation product suppression, together with natural speech quality.
5. No complicated constructional methods.
6. The use of push-pull frequency conversion throughout, giving a high discrimination against breakthrough of the heterodyning frequency, and a clean output with a low order of distortion products.
7. Wherever possible, standard production easily obtainable valves and components, avoiding high-cost items.

Constructional features considered to be desirable were also itemized.

1. Unit construction.
2. Home-made coils using standard, readily available coil formers, dust cores and screening cans.
3. Simple press-to-talk control.
4. Clean layout with good accessibility and professional appearance.
5. Separate power supply.

A block diagram of the Mark 3 transmitter is shown in Fig 1 and the complete circuit diagram in Fig 2 (a–c) next month. Various aspects of the design in detail follow.

Audio amplifier

Any residual hum modulation from the audio amplifier would unbalance the diode modulator and impair the carrier suppression. A common source of hum leakage is via the cathode heater insulation of the first amplifying stage. Accordingly an EF86, a valve specifically designed for the input stage of a low-noise audio amplifier and intended to be used with a crystal microphone, was chosen for V1.

The second audio stage, V2, uses a 12AT7 with one half as a voltage amplifier and the second half as a cathode follower, to give a low-impedance output to drive the OA7 diode balanced modulator.

* 5 Janice Drive, Fulwood, Preston, Lancashire

Both valves have cathode resistors without bypass capacitors giving negative current feedback to each amplifying stage, and it will be noted that the coupling capacitors have a low value of 0.005 μ F, giving a low frequency roll-off to further improve the unwanted sideband suppression.

Carrier oscillator

Because the final conversion process uses a heterodyning frequency above the 160, 80 and 40m bands, and below the 20, 15 and 10m bands, the transmitter automatically gives the correct sideband output for each of the six bands in use.[†] It is, however, an operating convenience to be able to switch sidebands to obtain suppression reports and on occasions to temporarily dodge interference.

The carrier oscillator uses the first half of a 12AT7 valve in a modified Colpitts circuit, chosen to allow the cathode to be earthed to rf. This avoids any possibility of carrier leakage along the common heater wiring impairing the carrier suppression in the balanced modulator. This oscillator does not require a tuned anode circuit, and the customary 455kHz i.f. transformer that requires modification in order to provide a low-impedance balanced output is not required. Switch S1 is operated by a panel-mounted control knob and selects the required carrier crystal X1 or X2. The second half of the 12AT7 is used as a phase splitter to provide the push-pull rf drive to the diode balanced modulator. This method has proved in practice to have very good stability—an important requirement if the diode modulator is to hold its balance setting.

A proportion of the carrier oscillator output is taken via a coaxial cable coupling link to a panel-mounted carrier injection control (CARRIER). This control enables a predetermined amount of carrier to be fed round the mechanical sideband filter, for tuning up and netting purposes.

Balanced modulator

There are many types of balanced modulators using either low-impedance semiconductor diodes, or high-impedance thermionic valves. The two-diode modulator using a pair of

OA7 diodes has been chosen for its simplicity, long-term stability and proven performance. The diodes receive audio in parallel and rf in push-pull, the rf being balanced by the potentiometer RV2 and the 50pF preset phasing capacitor. The modulator can be balanced to obtain a carrier suppression of better than 40dB, and this together with the 20 to 25dB suppression in the following sideband filter gives an overall suppression of not less than 60dB. This figure represents a very acceptable amateur transmitter performance.

Sideband filter

The major design requirement for the Mark 3 transmitter was simplicity of construction, with the less experienced amateur constructor very much in mind. Accordingly, crystal etching and grinding and the relatively highly-skilled half-lattice filter alignment and response curve plotting have been avoided by the choice of a mechanical filter on a nominal frequency of 455kHz, for unwanted sideband suppression. At the current market price the Kokusai MF455-15K filter represents excellent value for money, gives very acceptable performance and has proven long-term stability.

In regard to filter bandwidth (6dB points) the author is firmly of the opinion that 2.2kHz is too narrow, giving an unnatural "boxy" speech quality, and that a much more natural and pleasing transmission is obtained by a filter that will pass all voice frequencies up to 3kHz.

The Kokusai filter also has the advantage, compared to a two half-lattice crystal filter, of compact construction and uncomplicated mounting, enabling a simpler and smaller chassis layout to be adopted. The nominal centre passband frequency is 455kHz, but because of manufacturing tolerances the actual centre-frequency may vary ± 0.8 kHz. For this reason, each filter is packed with a data sheet giving the filter serial number and the measured bandwidth at the 6dB and 60dB points for the filter concerned. Each bandwidth is given as $\pm X$ kilohertz relative to the design centre-frequency of 455kHz—not relative to the actual filter centre-frequency. As an example, the data sheet may quote, "bandwidth at 6dB attenuation, ± 2 kHz and ± 1.2 kHz".

For good speech quality it is desired to pass all audio frequencies down to 0.3kHz. It therefore follows that the two carrier crystal frequencies should be 0.3kHz outside the 6dB points. They would then be at ± 2.3 kHz and ± 1.5 kHz

[†] It has become an accepted convention adhered to by all ssb stations, to transmit low sideband below 10MHz and high sideband above 10MHz as the result of a CCIR (International Radio Consultative Committee) recommendation.

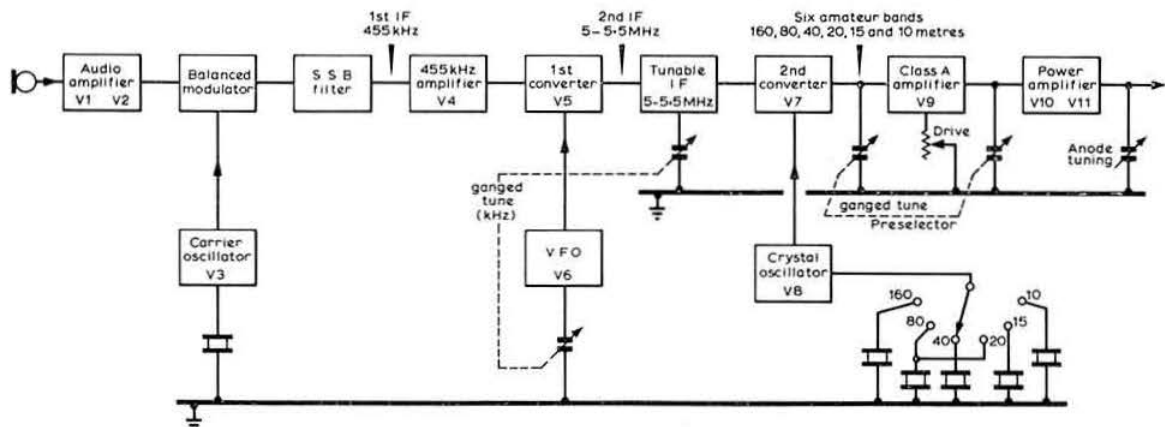
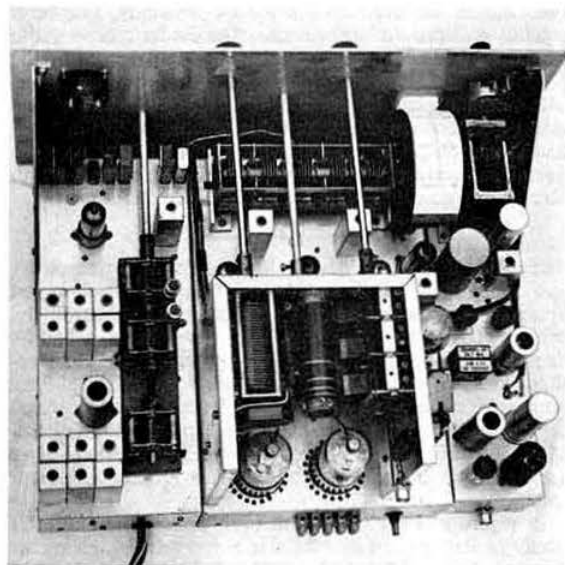


Fig 1. Block diagram of the frequency conversion processes and the stages in the G2DAF Mark 3 transmitter



Top side of the transmitter

relative to 455kHz, giving actual frequencies of 457.3kHz and 453.5kHz for the example quoted.

When the correct carrier frequencies have been determined for the Kokusai filter that has been purchased, crystals should be ordered quoting the actual frequencies required, and stating that operation is required on the parallel resonant frequency with 30pF shunt capacitance. More detailed information on this topic can be found in one of the standard text-books, eg [2].

Filter amplifier

Owing to the low output from the diode modulator, and the insertion loss of the filter, the filter amplifier is required to give a high order of amplification. It must, however, do this with a high degree of stability—not only under static conditions but under speech conditions as well. Any tendency towards self-oscillation will completely ruin the sideband signal and must be avoided at all cost.

The amplifier valve for the filter is an EF85 with a medium g_m , and as a further aid to stability the grid resistor is reduced in value to 22k Ω . Because of the greater dynamic resistance of the anode tuned circuit at 455kHz there is adequate stage gain, and high slope valves of the EF80 or EF183 class should not be used.

Coupling to the following converter valve is by a standard Denco Type IFT11-465 i.f. transformer. The secondary is required to provide a push-pull output to the double-triode valve V5, and in order to avoid the difficulty of rewinding the secondary pi, the centre tap is obtained by a capacitance divider made up with two silver mica capacitors of double the original value—the grid returns of V5 being by suitable value resistors.

First conversion

A sideband signal—initially generated at the low frequency of 455kHz—has to be raised in frequency to the required amateur band by a process of heterodyning. Unfortunately

the converter output contains not only the wanted sum or difference frequency, but also the strong heterodyning input, together with the image frequency and many other unwanted spurious frequency combinations. See [3] for detailed analysis. The problem of obtaining a clean output from the converter can be greatly eased by bringing the ssb signal on to the required amateur band in a series of steps. This is the reason why the original G2DAF transmitter used three conversion processes with an intermediate i.f. of 2MHz.

In the Mark 3 transmitter the intermediate i.f. has been omitted in the interest of simplicity and to make the final alignment easier. This means that the initial sideband generated on 455kHz is translated to the first i.f. of 5-5.5MHz in one step—a frequency ratio of approximately 11:1. The strong vfo heterodyning frequency is only 455kHz removed from the wanted converter output—less than 10 per cent away. It is therefore much more important to ensure that there is no vfo breakthrough, and to this end the design of the first converter stage and the discrimination in the tunable converter output circuits is the keystone of the Mark 3 transmitter design.

As the initial sideband generation is on 455kHz and this frequency is less than the required tuning range of 500kHz, a wideband coupler cannot be used. The i.f. circuits will require to be continuously tuned. Two tuned circuits—coupled for optimum selectivity—will be required.

In order to obtain an output waveform in linear relationship to the sideband input waveform it is necessary to have an injection level to the converter valve of approximately 10 times (20dB) greater. Assuming the use of two tuned circuits at the converter output frequency of 5-5.5MHz and normal loaded-Q values, the attenuation to the heterodyning frequency 455kHz removed would not be sufficient to prevent vfo breakthrough. It is then vitally important to obtain additional rejection to the vfo output by a process of balancing in the double-triode converter valve.

It will be noted that the converter is operated in push-pull, balance in the anode circuit being obtained by a split-stator tuning capacitor, with the centre tap of the anode coil not bypassed for rf but being allowed to "float". The wanted signal input is applied to the two grids in push-pull, but the vfo to the two cathodes strapped in parallel. The injection rf currents will flow in opposite directions in the push-pull anode tank circuit and cancel out, so that there will be almost no coupling of the vfo frequency into the secondary winding.

Cathode injection was adopted after a series of experiments had shown that this method gave a high conversion efficiency, good long-term stability, an inherent balance of better than 30dB, and did not require an embarrassingly high vfo output level. The converter stage is further simplified because the customary cathode-balancing potentiometer was found not to be necessary.

The two tuned circuits cover a range 5-5.5MHz, and they are gang-tuned to the vfo operating on the high side—5.455 to 5.955MHz. As the tuning range of 500kHz is less than 10 per cent of the tunable i.f. centre-frequency (5.25MHz) there is no tracking problem. In practice the vfo is adjusted to tune correctly at either end of the range by setting the core of L2 at the low end and the 50pF trimmer at the high end. Finally the vfo is set by the main tuning control to mid-frequency (5.705MHz) and the two dust cores of T2 and T3 adjusted to resonate at 5.25MHz. It will be found that the three-tuned circuits hold tracking quite satisfactorily throughout the 500kHz tuning range.

Because the converter is a push-pull triode and it is also required to feed a second push-pull triode in the final converter stage, the whole of the tunable i.f. is balanced to earth, and this, together with the single ended vfo coil, necessitates a five-gang variable capacitor of 5-40pF each section. The five-gang capacitor used by the author was purchased many years ago from surplus sources and measures 6in long (excluding the spindle) by 2½in high by 1½in wide. The assembly screws have BA threads, indicating that the unit was made by a British manufacturer. Unfortunately the maker's name is not known, and five-gang capacitors are not shown in any of the current catalogues in the author's possession.

This should not, however, deter a prospective constructor, because there are at least three alternatives open:

1. Jackson Bros Ltd are able to supply the Type ME or Type E gang capacitor with a spindle extending through the back plate. This would enable standard two- and three-gang units to be coupled together, in line, to make up a five-gang tuning capacitor.
2. Many of the standard three-gang variable capacitors lying around in amateur junk boxes are of approximately 100pF maximum and have the stator plates supported by two ceramic pillars on each side. It is a relatively simple job to saw through the centre of each stator bar—in between the ceramic pillars—with a model-maker's saw. This procedure converts a three-gang into a six-gang of slightly less than half the original maximum capacity. (The sawing process "loses" the odd number stator plate.) If the original capacitance is more than 100pF—provided the value is known—it will be necessary to count the number of air gaps in each section and by simple division determine the capacitance per air gap. From this one can determine the number of air gaps for 40pF maximum per "half section" and saw out additional stator plates as necessary.
3. Wingrove & Rogers Ltd currently list the C28-141 (one-section) and the C28-142 (two section) obtainable with 18 air gaps per section, giving a capacitance range of 7-80pF. The one-section capacitor has ½in spindles at both ends and may be ganged to the two-section capacitor in line. These tuning capacitors are of compact construction and would occupy a chassis space approximately 5in long, including the shaft coupler. The stator sections are supported by two ceramic pillars on each side and can be split with a model-maker's saw as already described. This procedure will result in a six-gang having 4-40pF (approximately) capacitance swing. Five sections will be wired up in the transmitter and one section left unused. (The Polar C28 type units were used in the surplus RF27 units, familiar to a large number of RSGB members.)

The capacitor manufacturer would no doubt be horrified to contemplate his precision tuning unit being operated on with a metal saw. Nevertheless, in practice variable capacitors modified in this manner continue to work very well with apparently no adverse distortion of the frame. The author has used successfully a Polar type C28-142 (75pF two-gang), modified with a saw to a 30pF four-gang, in an experimental push-pull Mark 3 receiver for more than five years.

The two tuned circuits are inductively coupled for optimum selectivity by low-impedance link windings positioned centrally round each coil in order to offer additional attenuation to higher frequency products.

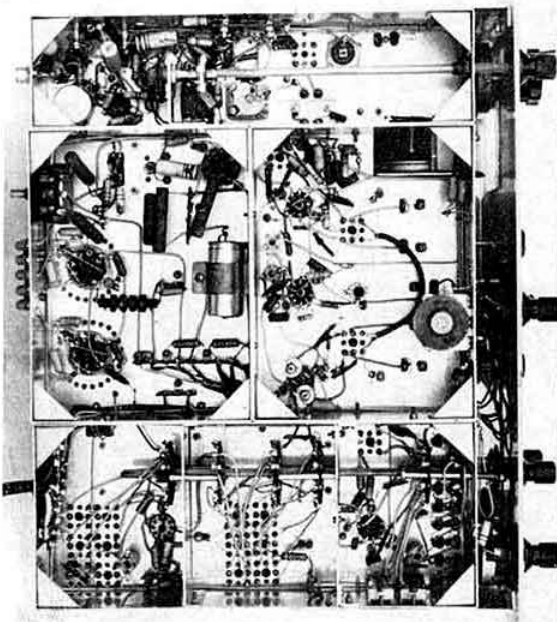
It will be appreciated that the major function of the tunable i.f. is to pass the required ssb signal in the range 5-5.5MHz,

and greatly attenuate all other signals, including the strong vfo injection. The rejection of these two tuned circuits must not be degraded by vfo leakage across the wiring. For this reason the coupling link between T2 and T3 is by a short length of ⅜in outside diameter 75Ω coaxial cable, with the outer screening effectively bonded to chassis earth. The unscreened vfo coil L2 must be positioned as near to the gang tuning capacitor as practicable, and the rfc and L2 positioned as far away from T3 and V7 as is practicable.

Variable frequency oscillator

Regarding vfo stability it should be clearly understood that, notwithstanding the many claims that have been made by the authors of various "ultimate" circuits published in the past, there is no such thing as a driftless LC oscillator. A quartz crystal has a high degree of frequency stability because quartz is a material with a low temperature coefficient. Replacing the crystal by building an equivalent series-tuned circuit using L and C—as for instance in the so-called Clapp or Tesla/Vackar vfo—does not give the same standard of stability as a crystal, since it is not possible to manufacture standard coils and variable capacitors with the temperature coefficient of natural quartz.

In practice the major annoyance is the long-term drift taking place continuously over the transmitting period of a couple of hours or so. This slow drift is caused by the changing temperature of the two components that make up the frequency-determining resonant circuit, i.e. the inductor and capacitor. Apart from the temperature rise of the air in the cabinet and the air in the transmitting room, a considerable amount of heat from the valves—through the valveholders, the screening cans and skirts—warms up the chassis and this



Underside view showing chassis box sections and component wiring

in turn warms up the vfo tank coil and tuning capacitor. Stability can be materially improved by omitting the screening cans of those valves in close proximity to the vfo resonant circuit, and in this design the valveholders of V5, V6 and V7 are standard B9G types without skirts. Additionally the holders are positioned in the chassis as far removed from the vfo coil, L2, as practicable. The variable capacitor is largely protected from conducted chassis heat by its positioning and by its physical size.

The vfo is an EF80 pentode, V6, arranged as a Colpitts parallel-tuned oscillator with capacitive swamping across the grid input, tuning being effected by one section of the five-gang main tuning capacitor. A small amount of temperature compensation is provided by the NTC capacitor (nominal value 15pF) mounted close to, and across, the coil L2.

White noise from the oscillator is reduced by incorporating an inductive anode load, L3. This has the further advantage of holding the valve anode voltage constant, unaffected by cathode current, and also increases the available drive to the converter V5.

For good vfo stability it is most important that the coil L2 can be adjusted initially to the precise inductance value required and that it will hold its setting over a long period of time. The dust core should be held in position by a screwed brass rod, running through the mounting bush of the coil former, and capable of being locked in position by either a spring-loaded clutch, or alternatively a locking nut, so that there is neither end- or side-float of the core within the winding. Ideally the vfo coil-former should be ceramic, with the coil winding put on under tension. Should difficulty be experienced in obtaining a suitable $\frac{3}{8}$ in diameter ceramic former, the next best substitute is the baked-paper type of former as used in the coil-pack of the CR100 receiver. As this former is $\frac{1}{2}$ in outside diameter and has a larger dust core, the winding turns will have to be reduced by about 25 per cent using a larger gauge of wire—22 or 24swg enamelled would be suitable.

Second conversion

The second and final conversion process translates the 5–5.5MHz ssb signal into the required amateur band. It will be noted that this stage, V7, is also operated as a balanced converter with push-pull input and output circuits, and parallel cathode injection from the crystal-controlled heterodyne oscillator V8.

Switch banks S4 and S5 select the required coil for each band. As optimum performance is required, no attempt has been made to make one coil tune more than one band. There are, in fact, six separate coils—each with its own secondary winding—in order to control the optimum level of rf output into the following Class A stage.

When the 80m or the 40m band coils are selected, the swing of the preselector tuning capacitor (PRESELECTOR) of 75pF each section is sufficient to tune across the incoming 5–5.5MHz i.f. signal. When this happens the converter valve momentarily becomes a tuned-grid/tuned-anode triode amplifier with sufficient feedback across the grid anode capacitance to behave as a Class C oscillator. In order to prevent this possibility of unwanted regeneration, the valve is cross-neutralised by the two 2–8pF trimmer capacitors.

The anode circuit is balanced by the split-stator tuning capacitor—two Polar Type C28-142 of 75pF each section, with the common centre-tap of each coil not bypassed to rf and allowed to float, it being fed via the 10k Ω resistor.

Five crystals are required in the heterodyne oscillator to cover the six amateur bands from 160m to 10m inclusive, and provision is made to select two additional crystals to give 10m band coverage in two more steps up to 29.5MHz, by the use of eight-way switch wafers. The lowest injection frequency is 7MHz for the 160m band and the highest 24.0MHz for the top of the 10m band—a frequency ratio of approximately 3.5 : 1. Additionally it will be appreciated that the crystal output will be greater on the lower frequency bands and less on the higher frequency bands. For these two reasons it is permissible to use a single anode coil, with the band-change switch S2 selecting the right value of capacitance to tune the output circuit to the required heterodyning frequency. With this arrangement the L:C ratio is lower on the low ranges and therefore the dynamic resistance of the tuned circuit and the oscillator voltage developed will also be lower. This is compensated by the greater output with the lower-frequency crystals used on the fundamental, and the smaller output with the 15m and 10m band crystals used on the second harmonic, and should result in a reasonably constant amplitude of output voltage throughout the six bands required.

The serious shortcoming of the single-ended converter lies in its inability to discriminate against the unwanted energy from the heterodyning oscillator if the ssb signal is to be raised in frequency by a ratio of more than approximately 4:1. For instance, when operating on the 10m band the heterodyning input will be 23MHz. A single-tuned circuit of high Q, tuned to 28MHz, will present approximately 10 times the impedance to the wanted signal as it will to the steady off-tune oscillator signal. However, the oscillator input voltage will be five to 10 times the amplitude of the peak ssb input (this is necessary to prevent distortion of the modulating waveform) so despite the selective effect of the output tank circuit, the steady oscillator voltage across it will be just about the same as the peak ssb voltage. Under these conditions it would be quite easy to tune up the following pa grid and anode circuits to the 23MHz output frequency instead of the required 28MHz ssb signal. Even if care were taken to ensure that all signal frequency circuits were correctly resonant in the 10m band, enough energy at 23MHz could leak through to produce a spurious signal outside the amateur band.

This, in fact, is the basic reason for accepting the additional complication of a balanced-converter anode circuit, and in order to obtain optimum performance at any frequency within the amateur band in use, continuous tuning right across the 500kHz range is needed. In practice, in order to avoid an additional panel control, the converter anode-tuning capacitor is ganged to the following Class A amplifier/pa grid input tuning capacitor. This is the preselector tuning control and after setting the required transmitting frequency on the calibrated tuning scale, is used in much the same way as the preselector tune control on an amateur band double-superhet receiver.

Output stages

A perfect single sideband transmitter would do exactly what the title describes and radiate a single sideband containing only the required voice modulating frequencies. The attenuation of the carrier and the unwanted sideband would be infinitely great. In fact, the transmitter output signal would be truly a single sideband signal. In practice this ideal state of affairs is not obtainable, and an amateur ssb transmitter is considered to be in the top class if the carrier suppression

approaches 60dB and all signals in the vestigial sideband are 40dB down or better.

Most prospective constructors of ssb equipment will have sufficient knowledge to be aware that non-linearity in the final Class A amplifier and Class AB output stages produces intermodulation distortion products that appear close in on either side of the nominal carrier frequency and are not attenuated by the selectivity of the tuned circuits. Under correct operating conditions the distortion products on the wanted sideband are masked by the output signal. However, on the other side of the suppressed carrier they appear to the receiving station as a distorted (completely unintelligible) sideband that is much greater in amplitude than the true (clean and readable) remnant sideband that has not been completely suppressed in the mechanical bandpass filter.

Obviously there is no point whatsoever in using a filter that will attenuate the unwanted sideband to a level 45dB down, and then allowing this sideband to be put back again in the following stages in the form of distortion, and at a much higher level.

The Class A amplifier stage V9 is required to provide an output of 50V peak to drive fully the pa valves. It is most important that while it is doing this it is operating in the most linear manner, over the straight part of its characteristic curve. However, the achievement of good linearity is made difficult in practice because it is also necessary to be able to control the total voltage amplification from this valve. In general, control of gain by alteration of bias or screen potential shifts the operating point and this is not compatible with a high order of linearity. A simple solution would be to put the RF DRIVE control in some other part of the transmitter circuit. There are, however, good reasons for controlling the amplification of the ssb signal in the band-switched circuits following the final conversion process. These will now be considered in detail.

All amateurs with past constructional or transmitting experience know that it is much more difficult to get voltage amplification and sufficient drive to the pa on 10m than it is on 160 or 80m. This occurs because the circuit losses become greater as the frequency goes higher. These losses are due to a number of factors:

1. the reduction in dynamic resistance of the tuned circuits;
2. greater losses due to absorption by stray coupling;
3. lower conversion efficiency of the converter valve;
4. increased input damping losses in the pa valves.

These losses add up to quite an appreciable amount, and taking the drive into the pa on 80m as a reference level, switching to the 10m band will show a drop of approximately 20dB. It follows that the total gain requirement in the transmitter—from the microphone input to the pa grids—can vary over a ratio of 10:1. Therefore, when changing bands it is necessary to have some manual control to set the total amplification to a value that will give the correct drive into the pa grids. This is the RF DRIVE control, and as the variation in circuit loss is taking place in the band-switched stages, a logical place for a drive control is in the circuitry associated with the Class A amplifier stage following the final conversion process.

It is important to remember that in an ssb transmitter all stages in front of the final converter are running with a constant-peak sideband input and with a constant heterodyning input that is not affected by the position of the band-change switch. A good design will provide the optimum

operating conditions to obtain the best signal to distortion ratio in the balanced modulator and the following converter stages. The audio gain control should never—repeat *never*—be used as a drive control. Its function is to enable the operator to set the audio level to suit the microphone in use and the characteristics of his voice to obtain optimum working conditions in the balanced modulator. Too much audio gain will cause over-modulation, and too little will impair the ratio of peak signal to resting carrier in the modulator, and the available carrier suppression will suffer. Once the audio gain control has been set correctly, it should not be touched again.

In the Mark 3 transmitter, linearity in the Class A stage is improved by negative current feedback across the unby-passed cathode resistor, gain being controlled by varying the screen potential of the EF80 valve by means of a 25kΩ RF DRIVE control.

The 180W p.e.p. input pa stage comprises two 6146 valves operated without grid current in Class AB1, using a conventional pi tank output circuit, switched for six bands. The intermodulation distortion product level in the pa stage is kept to the lowest practicable level by:

1. a "stiff" bias supply;
2. generous stabilization of the screen voltage;
3. correct choice of L:C ratio in the pi tank circuit giving the optimum value of anode load;
4. a "stiff" ht supply with good *dynamic* regulation.

Under these conditions, with the pa correctly loaded, (ie a maximum signal—under single-tone conditions—screen current of 15mA for both valves) on-the-air reports indicate that the overall distortion product level from the transmitter is 40 to 45dB below the wanted sideband level. Note that this figure can only be obtained with correct driving of the pa—that is, strictly in Class AB1. Overdriving is fatal to a clean signal, and 6146 valves have been specifically designed to be driven without grid current.

Muting

In addition to muting the filter amplifier valve, it is necessary to mute at least one stage in the output side of the transmitter to prevent feedback into the receiver. Accordingly, the muting bias is taken to the bottom end of the bias setting potentiometer in the pa bias supply. The two 6146 valves are therefore held at cut-off during transmitter standby periods, and allowed to take normal standing current when the press-to-talk button is depressed for transmit.

To be concluded

The final part of this article gives:

Full constructional details
Complete circuit diagrams
Component lists
Coil winding data
Power supply information
Alignment procedure
Voltage check tables

TECHNICAL TOPICS

by PAT HAWKER, G3VA

"THE information explosion" has become one of the clichés of recent years. The printing presses of the world pour out an ever-growing stream of specialized information: more and more books and periodicals and application notes and brochures describe new developments in electronics and radio communication. Amateur radio reflects this explosion, though fortunately less spectacularly than professional electronics. But there are at least four publishing concerns in the USA dedicated to amateur radio; three in West Germany; two in the UK, and I suppose some 20 or 30 society journals in other parts of the world that all aim at providing in their pages reports of new and significant technical developments in amateur radio. It sometimes seems a toss-up whether we become more and more knowledgeable about less and less, or less and less knowledgeable about more and more.

But more seriously it does mean that a great deal of useful information and interesting ideas receive a brief airing in one of the many journals and then, unless they later become incorporated into one or more of the main handbooks, they quickly tend to be forgotten. And the handbooks, if they are not to grow to unmanageable proportions, have to engage in a constant process of editing down the existing material to make room for the new, and so may lose some of the finer and often very useful details.

So it is that a lot of sound and carefully researched ideas either reach only a tiny proportion of amateurs in the first place, or may vanish until the same ideas are later rediscovered by someone else, and so get a further brief airing before once again getting buried in the back issues of the journals.

A notable example of this process forms our opening item this month: multi-band loops and inverted quads in cubic or triangular form, originally described over a decade ago, yet with much of the basic information still seldom appreciated—so losing out on a very convenient aerial technique which can be significantly less difficult to implement than the conventional triple loop quad or the monster multi-element quad.

Multiband loops and quads

Recently we have included information in *TT* on multi-resonance quad and dipole elements incorporating traps (*TT* December 1972 and January 1973). But this is not the only approach. Just as, say, a 132ft long-wire aerial will resonate on all hf bands from 3.5 to 28MHz without any special loading, so can loops be used on more than one band without alteration.

A pioneer in this field was Les Moxon, G6XN, and before adding a few comments of my own, I want to reproduce a recent letter from him:

"You may remember the *TT* note on the 'Levy quad' (*TT* January 1972) and my subsequent suggestion (*TT* March 1972) that it should be turned the other way up in order to increase effective height.

"I have unearthed an odd variation on the same theme and feel the issues involved are important. The Levy quad used

just $\frac{1}{2}\lambda$ of wire, but imagine building one with $1\frac{1}{2}\lambda$ wire in the loop: Fig 1(a). Now according to W6SAI's book (*Cubical quad antennas*, Radio Publications Inc, 2nd edn, page 105) this arrangement has even more gain than the standard quad; for reasons that will appear, I fully agree. But I consider that the argument applied to the Levy quad applies equally—turning the loop 'upside down' to put a voltage maximum point at the bottom increases the height of the current loops and hence the effective height of the aerial. Fig 1(b) shows the current distribution.

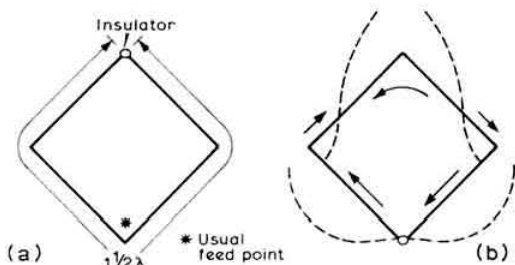
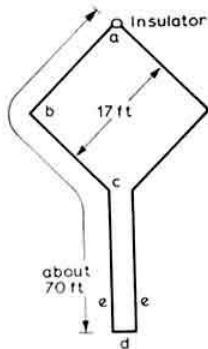


Fig 1. (a) $1\frac{1}{2}\lambda$ version of the "Levy Quad". (b) Current distribution of an inverted $1\frac{1}{2}\lambda$ element (current distribution shown dotted, direction indicated by arrows)

"However, W6SAI (caption to Fig 7, page 105) says that this is no good and that the insulator must go at the top, so if we follow his advice we would be stuck with Fig 1(a) for reasons which, to put it mildly, are less than obvious. Free space has no vertical reference and spinning a loop around on its axis should make no difference!

"The practical importance of getting this matter cleared up becomes rather more obvious when one appreciates that Fig 1(b) is in effect a 14MHz quad fed with 21MHz power—and if we wish to use it on 28MHz one needs only a trap at the top corner to turn it into a bi-square array (termed the X-Q array by W6SAI). Thus we now have all the ingredients

Fig 2. Multiband loop and stub arrangement that resonates at 7, 14, 21 and 28-MHz and suitable as a beam element for 14 and 21MHz. Can be fed with low-impedance feeders at point d, or with 600Ω-line at about point e



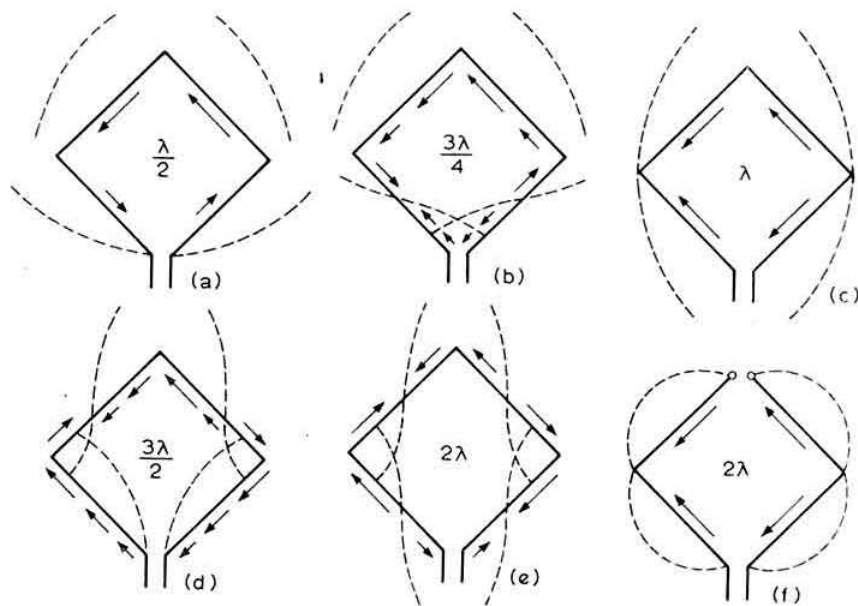


Fig 3. Current distribution in loops of various sizes at different frequencies. The arrow lengths represent different field strengths, the smallest being 8, the next 29 and the longest 92

for a triband quad but with *increased gain* on the higher frequencies and *without the usual spider's web* configuration to support three independent loops.

"This brings me to what I feel is a rather sad story. I have built several beams along these lines, including a 14/21MHz version in constant use since 1955. On 21MHz the front-back ratio is good and it outperforms more conventional aerials: on 14MHz it is, as might be expected, a conventional quad and performs as such.

"I first mentioned the idea in *Wireless World* (March 1959) and wrote it up in more detail and covering a lot of variations in *CQ* (November 1962). It was rediscovered a few years ago by others, but there seems to be no trace of it in current reference literature. Admittedly, by amalgamating pages 99 and 105 of the W6SAI handbook one could obtain a 'triband beam' identical with mine on 28 and 21MHz (except for being the other way up) but unless one is prepared to close the top of the loop or transfer the feeder to the top it would *not* (although W6SAI implies the contrary) work as a beam on 14MHz!

"Multiband operation requires resonant feeders which are perhaps a nuisance for rotary beams, but not too much of a problem if the beam is made reversible so that rotation can be restricted to say 120° or 150°.

"This brings me to another major advantage of quad loops for multiband operation. As shown in my 1962 *CQ* article, the loop arrangement shown in Fig 2 is simultaneously resonant (or nearly so) on all bands from 7 to 28MHz, though only suitable as a beam element on 14 and 21MHz. Even so, I have worked the USA on 28MHz with 0.5W ssb, and Australia on 7MHz ssb though this time with higher power.

"Yet another important property of quads has now apparently disappeared from the standard literature. Early descriptions of the quad aerial usually mentioned that considerably less gain resulted from tuning the parasitic element as a director rather than as a reflector. But both

W6SAI's book and the current edition of ARRL's *The Radio Amateur's Handbook* suggest that either form can be used. From my own experience, I fail to see how anyone can tune up a quad without noticing the large decrease in front-to-back ratio when the parasitic element forms a director (unless of course the range of adjustment does not allow this possibility). This experience is readily explained theoretically by the relatively wide spacing between the top of the radiator and the bottom of the reflector, or vice versa, introducing a negative reactance term into the mutual impedance. By quite simple algebra, one can show that this increases the current in a reflector and decreases it in a director. Working out a few examples, I find the calculated depth of nulls in the back direction is some 20-30dB for reflector operation but only 5-10dB for director operation.

"As pointed out in my article 'Supergain aerials' (*Radio Communication* September 1972) it is difficult to get extra gain out of additional elements, even without the 'negative reactance' handicap. I suspect that much money and effort is being wasted in the construction of 'monster' quads with one or more directors."

It seems to me well worth underlining one or two of the points made by G6XN, particularly the potential use of the 7-28MHz "loop plus stub" arrangement not only as part of a "driven element plus reflector" arrangement but as a multiband aerial in its own right, easily put up in "quad" or even more so in "triangular loop" form. And this brings me to yet another feature of the original article that was largely overlooked for a number of years until rediscovered and written up in many articles from 1969 onwards: the triangular loop. G6XN wrote in 1962: "We also discovered that loops can be distorted into a wide variety of shapes, such as triangular, without noticeably affecting their radiating properties."

John Brodzky, G3HGX, has brought to my attention the fact that G6XN's 1962 *CQ* article was later incorporated into *Antenna Roundup* (Vol 2) edited by Tom Kneitel, K2AES,

(Cowan Publishing Corp), obtainable from RSGB at £1.65 inc p & p. Certainly it is well worth looking up in either publication since it contains a great deal of practical information on designing, constructing and tuning up various forms of multi-band quads all based on energizing the same loop on different bands. We have extracted a further diagram (Fig 3) providing a useful summary of current distribution in resonant loops.

It is thus a pertinent reflection on the information explosion that 14 years after G6XN showed clearly that quad and loop aerials can be used most effectively for multiband operation without reverting to individual loops for each band, the standard designs still ignore this and concentrate on the more mechanically complex arrangement which actually throws away available gain on the higher frequencies!

Constant-current fet regulation

In *TT* (December 1972) attention was drawn to the use of field effect transistors as constant-current diodes to provide improved voltage regulation for such applications as feeding a vhf vfo. This item stimulated M. J. Cooper, BRS33780, to provide rather more detail on such systems, including some measured results which show beyond doubt that this approach can be a really excellent method of achieving good voltage regulation not greatly affected by temperature.

BRS33780 writes: "The advantage of a fet over a resistor is to give constant current through the zener diode. If the drain/source voltage is twice the pinch-off voltage or more, the fet acts as a constant current source (with gate connected to source). Variation of voltage between twice the pinch-off voltage and the breakdown voltage of the fet has no effect on the drain/source current. The zener current can be set by the inclusion of a resistor as shown in Fig 4.

The choice of a zener diode having a temperature coefficient of near zero gives better regulation. The arrangement shown in Fig 4 has a temperature coefficient of zero at 10°C increasing to -0.003 per cent/°C at 60°C. At 20°C the output voltage varied by only 0.02 per cent for an input

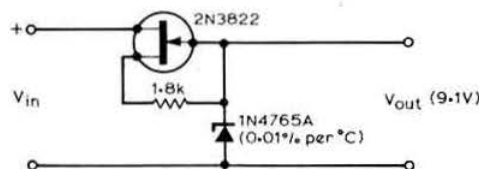


Fig 4. Constant-current fet regulation as investigated by BRS33780

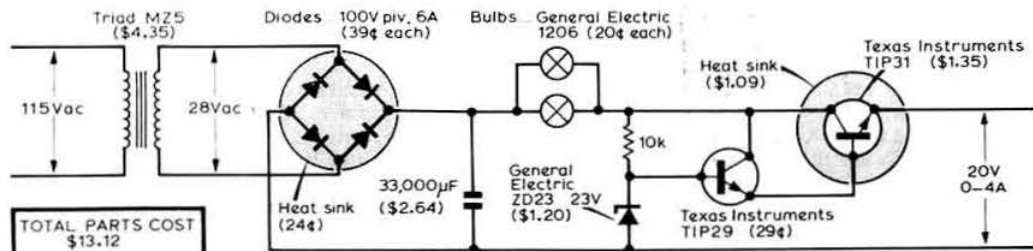


Fig 5. Low-cost high-current power supply described in *Electronics* featuring use of very high capacitance reservoir capacitor. Prices refer to component costs in the USA

variation from 15 to 40V. In practice a power supply is going to give an output dependent on mains input fluctuations which would be very small compared with the voltage swing indicated above. This means in effect that the actual variation of the output voltage can be much less than 0.02 per cent, making the system excellent for such applications as a 144MHz vfo."

Low-cost high-current power supply

For anyone interested in developing audio amplifiers, transistorized transmitters and the like, a standard requirement is a regulated power supply capable of delivering high peak currents. The usual technique is to build this round a fairly substantial transformer and not to attempt to take advantage of the short duty cycle of the current peaks. A more economical approach—which applies also to high-voltage supplies for ssb linears etc—is to use a very large reservoir capacitor, so allowing a substantial reduction in the transformer "iron".

A good example of this technique is given by J. Ennis in *Electronics* (4 December 1972) in the form of a power supply able to provide 0 to 4A at 20V with regulation better than five per cent at a total cost (USA prices in the States) of \$13.12: Fig 5. The key feature is the 32,000µF reservoir capacitor permitting the use of a low-cost and lossy transformer. Again, to save costs, two car bulbs are used for short-circuit protection rather than the more conventional system of current foldback; the bulbs not only act as a fuse but also reduce the voltage drop across the regulator transistor, thus reducing its power dissipation.

To change the supply's output voltage to 15V it is possible just to use a 17V zener, but for lower voltage outputs it is better to use a lower voltage transformer and appropriate zener. Output peak currents of more than 4A could be controlled with more heat sinking of the regulator transistor but this can result in the heat sink costing more than the transistor.

The purpose of including this item is to draw attention to the techniques rather than to suggest carbon copy construction, but the original USA component prices have been left on the diagram as it is felt that price comparisons with local supplies are always of some interest.

A comment on the DJ4BG speech processor

As a quick follow-up to the remarks of G3OJV on his experiences with the DJ4BG speech processor (*Radio Communication* May 1972) a further comment has come in from Michael Faulkner, G3IZJ. He writes:

"I agree it is a most effective circuit and on the air contacts have produced immediate interest. I spent a long time calibrating it in conjunction with my microphone (always speaking 3in from the microphone). First I calibrated the gain control in decibels and then spent considerable time with a tape recorder listening to the results.

"With 0dB clipping the pre-emphasis frequency shaping produced a highly intelligible crisp speech; 6dB clipping produced very little detectable distortion; 12dB seemed to produce a reasonable quality without objectionable deterioration, certainly not enough to degrade the increased level, and this degree of clipping I judged to be optimum; 18dB was the maximum level that could be obtained with my microphone and produced a noticeable harshness of speech although the result was still highly intelligible.

"Armed with this information, I put the unit on 3.5MHz for some inter-G reports on quality. Even using 18dB of clipping (which seemed harsh on the tape recorder) the general reaction was that the quality was perfectly ok and the station did not know, unless told, that a clipper was in use!

"I feel that the modification to the frequency response made by G3OJV negates some of its low distortion capability. The low frequencies will reach a much higher clipping level, for example a 400Hz tone producing more harmonics within the audio band such as 1,200 and 2,000Hz, so increasing the distortion that the original frequency response was designed to keep to a minimum. After all, once the shaped response is put through the clipper the frequency response will be levelled out to a considerable extent. If you listen on medium wave broadcasts with bass boom there will be loss of intelligibility. So personally I do not think anyone should be worried at the apparent lack of bass which might be suggested by the response curve. Certainly on a tape recorder the response indicated by DJ4BG sounds very good, even under no noise conditions.

"My reason for building the DJ4BG unit in the first place was largely as an anti-tvi device so that I could talk up transmitter power without hitting grid current out of the alc system, but in all respects I am absolutely delighted with it and have no reservations about recommending it to others."

G3LZJ is still hoping to build a more advanced speech processor based on rf clipping but is waiting for someone to come up with a suitable design.

Preventing overmodulation

Several years ago we included in *TT* some items making use of the combination of a bulb and a light dependent resistor but it is some time since we have noted any new applications of this technique. However, Harry Burton, ZL2APC, has drawn our attention to an interesting variation, in the form of a peak limiter, which he described in *Break-In* (May 1965), and which is suitable for amplitude-modulated vhf or hf transmitters: Fig 6.

The two active components are a neon bulb and the ldr which are housed in a light-tight container with the neon bulb arranged to illuminate the ldr. The neon bulb is set to ignite at say 95 per cent modulation. In its dark state the ldr (of the type developed originally for automatic contrast control in tv sets although seldom used in current models, eg B8 731 03) has a resistance of about 10M Ω . As soon as the neon ignites, the resistance of the ldr drops very sharply and when connected as shown reduces the gain of the speech amplifier. Since neons strike at a fairly constant voltage, the

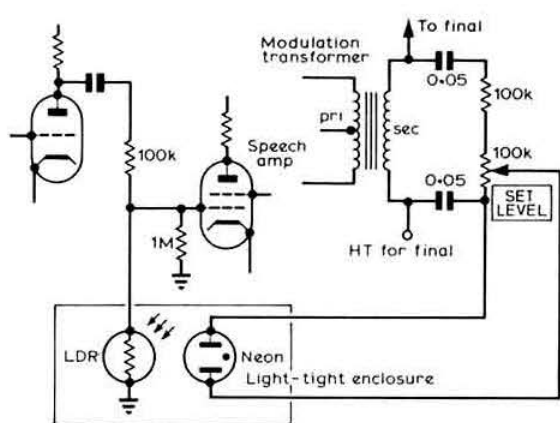


Fig 6. ZL2APC's method of preventing overmodulation of an a.m. transmitter

whole arrangement establishes a constant limiting level. It will be noted that the neon can be isolated from the dc potentials, and the response of the ldr is such that audio frequency variations are not fed back; recovery of the ldr is quoted as about 200,000 Ω /s.

ZL2APC used the system with a modulator using push-pull EL84s driven by a 6BA6 phase splitter and pair of 6BA6s as speech amplifiers, and it was arranged to limit at a level of about 10W. Tests showed very effective limiting with no observable deterioration of wave shape, forming a limiter with sharp onset and constant output thereafter.

Transistorized power amplifiers

Another short item on component supplies: W. S. Poel, G8CYK, of Little Croft, Mill Hill, Brentford, Essex, has gone to a good deal of trouble to obtain a supply of the Toko ceramic i.f. filters described in G3TDZ's article on consumer integrated circuits in amateur design (*Radio Communication* August 1972). He is also able to supply vhf power transistors of the 40290/BLY33 type; a pair of these will provide, he says, a genuine 3.2W output at 144MHz, and are also very effective at 70MHz, and output can be raised still further on nbm. He is able to supply these at £1.05 each or five for £5 (post 5p) for anyone anxious to build transistorized vhf gear.

On the subject of transistor transmitters, though this time at hf, T. N. Lloyd, G3SL, mentions that he is deep in the construction of a solid-state ssb transmitter. For output stage he has been trying two BDY60s, BD121s etc on 50V, though admits to a rather rapid failure rate, proving once again that high-power rf transistors are about the fastest acting fuses known to man! He draws attention to the latest device by Mullard, the BLX15, each of which is capable of putting out 150W p.e.p. A published design for a 300W p.e.p. broad-band hf amplifier uses two BLX15s driven by a BLX13, and the complete amplifier provides about 33dB over the band 1.6 to 30MHz with intermodulation products better than -26dB, from a 50V supply. But, of course, such devices are still very costly, and at present many of the professional all-semiconductor transmitters use large numbers of low-power modules assembled to provide up to 1kW output. Such transmitters have considerable value for professional applications (for example Diplomatic Wireless is

re-equipping its many outstations with Racal transistorized power amplifiers), but in terms of cost-effectiveness we still would not recommend this approach for amateur stations generally, although clearly high-power semiconductor rigs are interesting experimental projects.

Pill-boxes and Cataloy

Stirred by the description of G8HX's wax-filled pill-box remote field strength indicator (*TT* October 1972), Norman McIntosh, GM3RKO (VS1LJ and 9M4LJ), recalls another technique which he has found useful for items located out-of-doors.

He has used pill-boxes loaded with Cataloy for dipole tee pieces on 144 and 14MHz. The 144MHz version uses tubing and has been on the roof throughout the winter without any sign of deterioration. It is not only water proof but even hammer proof! And there is no question, as might conceivably occur when using candle-wax, of the birds having a free lunch. GM3RKO believes that Cataloy has the advantage of mechanical rigidity and no other means of locking tubing or coaxial cable in the box is used. It does not attack coaxial cable, but cheaper plastics may distort due to chemical reactions causing heat, and he uses polythene or nylon. The idea was found especially handy in the Far East during monsoons. For the "non-banger owner" he mentions that Cataloy is contained in glass-fibre kits and can be moulded into a box in the first instance.

Wide-range crystal checker

Some time ago (*TT* February 1971 and *ART4*) details were given of a simple "go/no-go" crystal checker intended for quickly checking crystals from about 3.5MHz upwards. Despite its limitations when used for checking overtone crystals (which when used in oscillators not having LC tuned circuits tend to oscillate at their fundamental) this unit has proved popular.

A rather more complex—but still quite low-cost—crystal checker, but this time suitable for crystals right down to about 50kHz, has been described by F. Hure, F3RH, in *Radio REF* (November 1972) and is shown in Fig 7. This unit incorporates a "high/low" switch which, for low frequency crystals, converts the oscillator arrangement into a two-transistor Butler oscillator. The tester uses a 200µA

microammeter as output indicator, allowing direct comparisons to be made between the "activity" of different crystals of similar frequency range, but alternatively the unit might be adapted to use a low-cost dc amplifier-plus-pilot bulb similar to the arrangement of the earlier unit.

24V relays on 12V supplies

There are plenty of ex-equipment and surplus relays around which would be suitable for transmit/receive switching in mobile and other applications if only they could be persuaded to operate reliably from 12V instead of their rated 24V. An item in *Electronics Australia* (August 1972) and stemming originally from VK6ZAF and the *West Australian VHF Group News Bulletin* indicates one method by which this can be achieved effectively.

It is pointed out that all relays have three significant ratings: the nominal operating voltage (in this case 24V); the pull-in voltage (usually between 15 and 20V for a 24V relay); and the drop-out voltage (about 3 to 8V for a 24V dc relay). By applying over 20V for just a brief period (say 20ms), it is usually possible to pull-in a 24V relay, which will then be held in for as long as a potential of about 12V is applied continuously. VK6ZAF notes that it is possible to obtain the required pull-in voltage from a 12V supply by first charging a capacitor to 12V and then adding this to the 12V supply. This can be done by switches (for example relay contacts with another relay) as in Fig 8(a), though this is often not convenient for mobile push-to-talk applications where there may only be one available contact with one side earthed. But by adding a transistor, a diode and a resistor the idea can be readily adapted to this application: see Fig 8(b). This eliminates the need for the double-pole, double-throw switching. D2 can be a computer board type diode or even a working junction of a dud transistor. D1 has only 12V piv and must carry the relay current: it should not be a silicon type when the switching transistor is a germanium type, since Miller effect would then delay recharging of the capacitor. When used in this way, the relay takes only one-quarter of its rated coil power, and drops out more quickly. It should be noted that there will be a delay of a quarter of a second before the relay can be pulled in after dropping out; the arrangement also results in reduced contact pressure in reed relays where the magnetic field passes through the contacts. In conventional relays the armature moves against a

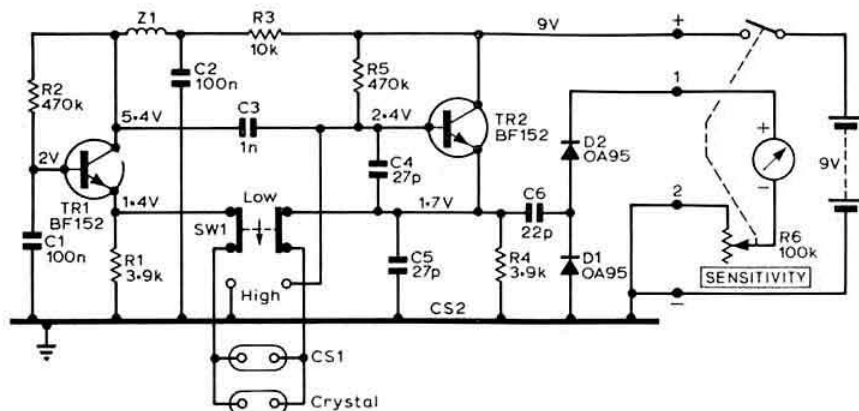


Fig 7. F3RH's wide-range crystal checker suitable for crystals down to about 50kHz

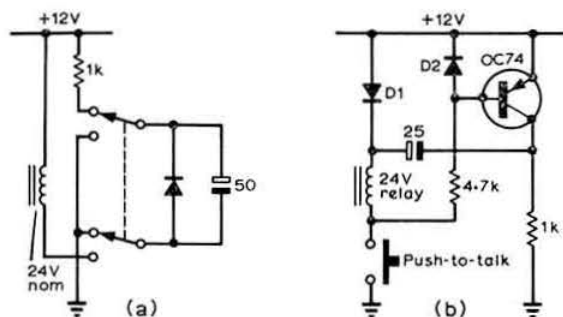


Fig 8. Techniques for using 24V relays on 12V supplies: (a) requires dpdt switching; (b) with single set of push-to-talk contacts

stop giving more or less constant contact pressure regardless of the coil current, once closed.

More on metal oxide varistors

In *TT* (December 1972) we drew attention to a new method of protecting equipment—particularly semiconductor equipment—against voltage transients due, for example, to mains spikes or switch-on surges. Since then Brian Le Grys, G3GOT, who is British distribution manager for Electronic Component Sales of International General Electric Company of New York Ltd, Lincoln House, 296-302 High Holborn, London WC1, has confirmed that these devices are available in the UK. He also sent along some interesting publications on these devices, including *How to protect against voltage transients* (Publication 431.94) and application note *GE-MOV varistors voltage transient suppressors* (Publication 200.60). As we mentioned in December these are voltage dependent, symmetrical resistors which perform in a manner similar to back-to-back zener diodes. When exposed to high-energy voltage transients, the varistor impedance changes from a very high standby value to a very low conducting value thus clamping the line voltage to a safe level. Devices are produced suitable for use with ac rms inputs from 130V to 1,000V, having very high discharge current capability of over 1,000A for short periods. Sterling prices in small quantities range from 88p (VP130A10) to £11.76 for the VP1000B160. Typically for 250V mains, the VP250A15 is £1.43 in quantities of 1 to 24.

Here and there

Some corrections to recent items need including this month. For example some errors crept into the diagram (Fig 5, December 1972) of the G3RWW Nixie decade board in the connections to the 7490 ic. Fig 9 shows the relevant section of the amended diagram. On the 7490, pins 4, 11 are linked for convenience only, output being derived from pin 11.

Also in December, we referred to Bill Burton as G4ANQ; this should have been G8ANQ as the callsign G4ANQ is held by Peter Clayton of Selsdon, Surrey.

And to set the record straight, the simple squelch arrangement (*TT* September 1972, Fig 7) which we found in *Radio-ZS* was originally described by Harry Burton, ZL2APC, in *Break-In* December 1966, although it has since been going the rounds. ZL2APC, who is a principal patent examiner,

even had to process an application (received after his *Break-In* article) from a large European company for a very similar arrangement—though there were sufficient differences for the patent to be awarded!

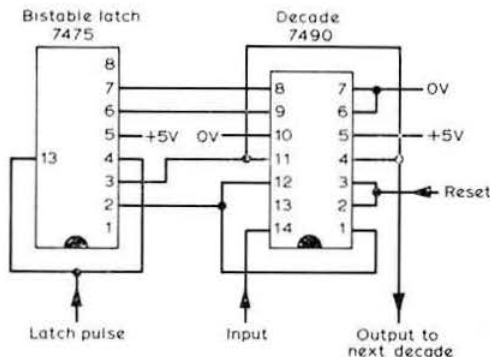


Fig 9. Correction to the G3RWW Nixie decade board described in December *TT*

Plessey Semiconductors, Cheney Manor, Swindon, Wiltshire have recently published a 56-page booklet: *Plessey Semiconductors SL600 series integrated circuits for radio communications applications manual* which puts together in one source a lot of the information on these devices which are now so well known to radio amateurs. Section 1 gives circuit data; Section 2 system design (receiver systems, transmitter systems and typical transceiver system); Section 3 technical data on the SL600 series.

Product Information



Galaxy solid-state receiver

The new Galaxy R530 solid-state communications receiver made by Galaxy Electronics, Nebraska, USA, has continuous tuning from 0.5 to 30MHz with a 1kHz readout. Other features include a variable aerial attenuator, variable bfo, permeability tuned preselector, crystal lattice filter and a phase lock oscillator. Full details of this and other products in the Galaxy range can be obtained from V. Totten, Field-Tech Ltd, Heathrow Airport, London, Hounslow, TW6 3AF.

MICROWAVES—1,000MHz and up

by DAIN EVANS, G3RPE*

A self-calibrating wavemeter for 3cm

The wavemeter described below enables frequencies to be measured between at least 9.5 and 11GHz with an accuracy of ± 10 MHz. An important feature is that it is self-calibrating which avoids the need to refer to a precision frequency standard. It consists of a rod of adjustable length set coaxially in a cavity, which is loosely coupled to waveguide forming part of the rf system. Absorption of power occurs when the rod resonates, that is, when the rod is electrically (but not necessarily physically) either $\lambda/4$ or $3\lambda/4$ long.

Because the wavelength is short at these frequencies, the tuning rates of this type of wavemeter tend to be high; in the region of 1,300MHz/mm for the $\lambda/4$ mode, and 440MHz for the $3\lambda/4$ mode. The constructional problems that could be associated with these rates have been avoided by the use of a standard micrometer head (Moore and Wright type 952M or its variants), the spindle of which forms the resonating element. The wavemeter body is fabricated from a block of brass through which a $\frac{1}{8}$ in diameter hole is drilled. This single hole both locates the micrometer stem and forms the cavity, thus ensuring their alignment. A $\lambda/4$ choke within the cavity, through which the micrometer spindle passes, defines

electrically the position of the "cold" end of the resonating element more reliably than mechanical contacts such as fingering. A short probe from this choke passes through a hole in the thinned wall of the cavity, and through a corresponding hole in the wall of the waveguide, to couple rf.

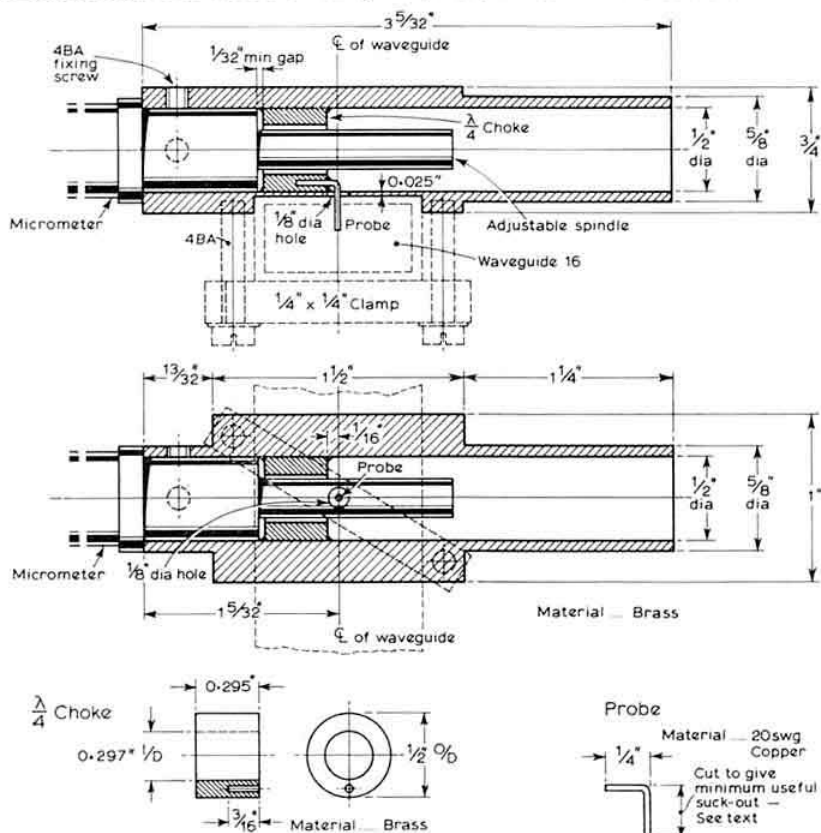
The choke and probe are best soldered in a single operation. The choke is fitted in the micrometer end of the body with the correct orientation, and the probe, formed at the end of a 12in length of wire, is inserted through the wall. The body is then pushed over the plain end of a $\frac{1}{8}$ in drill held vertically in a vice until the choke is in its correct position, with the probe located in the hole in the choke. The body is clamped using the micrometer fixing screws, and the extended probe wire supported externally. The choke and the probe are then soldered using the minimum amount of solder necessary. The probe is cut to a length of about $\frac{1}{8}$ in, and the cavity carefully cleaned. The body of the wavemeter and the micrometer spindle may be plated with gold, copper or silver, although this is not really necessary—the plating on the spindle should not exceed 0.0002in or difficulty may be found in reassembling the micrometer.

To calibrate the wavemeter, a source of rf and a means for

detecting relative power levels are required: these will normally be part of the receiver or transmitter with which the wavemeter is to be used. The probe should first be trimmed to reduce the suck-out to the minimum convenient, for example, a 10 per cent reduction in mixer current. For each of a number of (unknown) frequencies the micrometer readings R_1 and R_2 , corresponding to the $\lambda/4$ and $3\lambda/4$ suck-outs, should be noted. The difference between these readings is accurately $\lambda/2$ at the frequency measured. Hence

$$f \text{ (MHz)} = \frac{C}{2(R_1 - R_2)}$$

where R_1 and R_2 are in mm and $C = 299,600$ for air at 25°C and 30 per cent humidity. A conventional calibration curve can be built up in this way for both modes: normally advantage should be taken of the slower tuning rate of the $3\lambda/4$ mode.



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

Presidential Installation 1973

In the presence of more than 100 members and guests, Dr J. A. Saxton, PhD, CEng, FIEE, was installed as the thirty-ninth President of the RSGB during the course of a social evening at the Connaught Rooms in London on 5 January. The principal guest was the Minister of Posts and Telecommunications, Sir John Eden, MP.

Introducing Dr Saxton, Mr R. J. Hughes, G3GVV, the retiring President, spoke of the Society's past achievements and the necessity for continued efforts in the years ahead. He was confident that with the guidance of Dr Saxton the Society could look forward to a successful year.

In reply Dr Saxton expressed his appreciation of the invitation to become President during the Society's diamond jubilee year. He spoke of the necessity of close co-operation with the Ministry of Posts and Telecommunications, linking this with the honour accorded to the Society by the presence of the Minister at the presidential installation. Dr Saxton also emphasized the necessity of continuing co-operation in the international field in order to retain and expand the frequencies allocated to the amateur service.

The President then introduced Mr W. A. Scarr, G2WS, and invited him to present the Calcutta Key to Lt Col P-A. Kinnman, SM5ZD, the immediate past chairman of the IARU Region 1 division. Mr Scarr reminded members that the Calcutta Key was awarded to the person who, in the opinion of the RSGB Council, had done most during the past year to further international friendship through the medium of amateur radio. It was felt that this award had at no time been more fittingly awarded.

In reply, Per-Anders expressed his appreciation of the honour accorded to him by the RSGB, not only in awarding him the Calcutta Key but also for their invitation to become an honorary vice-president of the Society. He spoke of the services rendered to IARU Region 1 by many RSGB members since its inauguration in 1950. There was an ever-present need for the closest international liaison if the



Lt-Col Per-Anders Kinnman, SM5ZD (left), Dr J. A. Saxton and Sir John Eden, Minister of Posts and Telecommunications, admiring the Calcutta Key presented to SM5ZD

amateur service was to maintain its present status in the telecommunications world.

The Minister of Posts and Telecommunications was accompanied by Mr A. Fortnam, of the Ministry; and Mr Charles Sowton, the Director of Radio Technology, was present as a guest of the Society. Several members of the electronics press were present, including Mr H. W. Barnard, shortly to retire from his post as editor of *Wireless World*. Representing the BBC were Miss Joy Boatman of World Radio Club and Mr G. Luce. Among the 13 past-presidents of the Society attending the function were Major-General E. S. Cole and Dr R. L. Smith-Rose.

Regrettably it is not possible to mention all guests and members who were present. However, it was apparent that the presidential installation of the diamond jubilee year was a unique and enjoyable occasion.

G2BVN



Former Presidents of the RSGB at the installation, l to r: E. G. Ingram, GM6IZ; W. A. Scarr, G2WS; Dr R. L. Smith-Rose; R. F. Stevens, G2BVN; R. J. Hughes, G3GVV; D. A. Findlay, G3BZG; Dr J. A. Saxton; A. O. Milne, G2MI; G. M. C. Stone, G3FZL; L. E. Newnham, G6NZ; Major-General E. S. Cole; and F. C. Ward, G2CVV

FOUR METRES AND DOWN

by JACK HUM, G5UM*

The fm clip

Picking up the G3ZXN gage thrown down in December that sidebanders neither tune the whole of 2m nor listen for nbm, G8BCP of Newcastle under Lyme (who can and does do both) quotes to us numerous cases he has heard on the band where users of ancient taxi rigs or modern oriental ones are quite simply in need of more education. Or their rigs of modification. Or both.

To call these operators on ssb is to evoke the response: "I don't have a bfo but if you speak very slowly perhaps we can make a QSO of it" or "You seem to be overmodulated, and I can't read you." Yes, this in respect of an ssb signal received without bfo! Terry Cotton offers two further examples not because they are good for a laugh but because they indicate the need for much more to be said in print and over the air to help inter-mode communication to prosper:

Example 1: "I always use fm on the sideband channel because I don't have a sideband rig"; and—

Example 2: two operators discussing the choice of extra crystals for their FT2Fs: "How about 145.95? I know there is supposed to be a beacon on that frequency but I can't hear it anyway".

But examining the other side of the coin, G8GI of Lincoln notes that an increasing number of ssb transceivers omit a.m. altogether. Even though they may be able to tune the whole of 2m they remain unable to speak with fm or a.m. people, which was the burden of the G3ZXN remark in December. As a confirmed user of 60W of phase modulation, he thinks many operators would be converted (in both senses of the word) to fm if practical designs could be published of demodulators for receiver i.f.s between 60kHz-1.6MHz, preferably outboard to avoid disturbing original circuitry.

Another point raised by G8GI: "What does amateur nbm sound like through the 10.7MHz i.f. of a domestic receiver?" This would indeed be a stringent audio test, yet one which in our own experience of some of the excellent quality fm one hears on 2m is well worth trying.

Another sidebander to accept the G3ZXN challenge is GW3ZTH, who makes the point that most ssb users can resolve nbm so long as it is narrow band. He finds reception by exalted carrier insertion works well on good fm that observes the agreed deviation limits. But like many, many other A3J users he wishes nbm would stay away from 145.41 MHz: "To use the ssb calling channel is pointless and does the fm cause harm," he says.

Now back to the redoubtable G3ZXN himself. Ernie Earnshaw comes up with some useful comment about audio tailoring, and its considerable effect on the talk power of an fm signal: "Speech peaks are generally high frequency peaks (eg in a word like SuCCeSS) and these peaks cause the highest deviation. To keep deviation within ± 3 kHz,

gain is turned down so that the average level of speech is far less. Hence the need for audio tailoring which, with effective compression, helps overall talk power."

Members keen to follow this line of argument and to increase their knowledge of the fm mode in general have their opportunity to do so this month. The UK FM Group is to hold a convention on 24 February at Brooklands Technical College, Weybridge, Surrey, "... open to anyone interested, and it will, we hope, broaden the outlook of those who have recently appeared on 2m with black boxes!" in the words of G8CKT. And narrow their deviations, too, no doubt; for part of the proceedings will demonstrate the use of frequency and deviation measuring equipment. At 1430gmt the convention will be opened by RSGB VHF Manager G3FZL, then lectures and demonstrations on "Getting going on 70cm", "Getting going on 3cm" and "Using repeaters." Tea and buffet supper will be available. Tickets and further details from G8CKT, QTHR. Convention only, 20p; Convention and buffet supper, £1.

Easy receive on 70cm

Consistently we are asked for "... a quickstarter converter for 70cm" and equally consistently we recommend the G2DD as described in Chapter 5 of the *Radio Communication Handbook* (three cheap valves and a diode mixer: put a BF180 or AF239 preamplifier ahead of it and results are superb).

Now we note that Echford Radio Society have initiated through their club journal a 70cm project consisting of a 432MHz converter anyone can build, two cheap transistors in the crystal chain, and a BF180 rf into a 2N3819 mixer, the whole developed by two of the many young technical types who abound in Echford.

In the flat lands of south Middlesex where few obstructions impede topography-sensitive 70cm, this latest Echford project should persuade many more to try "the next band up" and thus relieve the pressure on 144MHz.

A useful accession of strength to the Midlands 432MHz link-line (FMD December 1972): two 70cm activity nights have been organized in the Greater Manchester area, Fridays from 2100gmt and Mondays after 2200gmt. "At least 20 stations around here are equipped for 70cm phone" reports G3ZOD of Stockport.

Things are quite different in Norfolk where John Tye and one or two others are small dots in a huge county, and dx to almost everybody outside it. Come April the dx will be easier to work, for John then gets G4BYV and will be able to work cw to winkle out the weak ones. It was a nice New Year news item to learn that he had passed the morse test.

A New Year bonus for another popular "seventy centimetrist": in 2½ hours on 1 January G8EOP worked 10 counties on 432MHz from his Dewsbury site. Yes, tropo was around and propagation good, but still ...

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

Contest commentary

Three sessions of the BATC amateur television cumulative contest have now passed: four more this month. Participants are asked to note that there are two sections, (a) for those sending television and (b) for all others. Be sure there will be some competition and that G6AEV/T and G6AGT/T, who were first and second in the BATC autumn event, will be hotly pursued. They notched 58 contacts and 54 contacts respectively. Best dx on that occasion put video over a distance of 225km (G6AFW/T to G8ARM).



Typical of the picture quality received at G6AEV/T, Dunstable Downs, winners of the BATC television transmitting contest

Supporting the G3NHE suggestion (*FMD* December) for a 2m cumulative contest for telegraphy men, G3DAO of Selsey offers some constructive criticism of last November's all-cw event. He, like others, regrets the all-night watches and concludes that "... a lot of stations active in the 1971 cw contest were not heard in the 1972 event, and I can only surmise that they valued a good night's sleep in preference to pounding the key in the hours of darkness."

Other members have mentioned to us the question of *their neighbours'* sleep undisturbed by the thump of beam rotating motors from the radio amateur next door. In the typical urban environment where most of us have to live this problem of beam noise inhibits much late-night contest activity on vhf. It would help such members, thinks G3DAO, if last November's event (or next November's) were broken down into two six-hour segments, say, 1800-2400 Saturday and 1000-1600 Sunday. And he does not like throwing 70cm (plus bonus points) into a predominantly 2m contest, where many "gotaways" occurred simply because they disappeared on to 432.

Why even as long as six-hour sessions? Disillusioned by the November affair, GW3ZTH says: "Make the cw contest like the ssb one, 0900-1200. There can't be any claim that there is more cw than ssb, so why a longer contest?"

The first of the 70cm Cumulatives, favoured by the tropo, exceeded last month's hope of a good turnout. It was terrific. Two hours was inadequate to work all who were on. May it continue thataway!

You could say the same of the 144MHz sideband contest the following Sunday, with G4BEL and GW3FEC/P battling for top place. The latter, in Snowdonia, secured their 140 contacts with two 2N3632s delivering 15W p.e.p. and a 14-el at 3,100ft (just in case you wondered why the signal was so strong). This well-organized expedition from Swindon was afflicted by many fm and a.m. men calling them on 145-41. Refraining from cusswords they took no notice of the intrusion and politely moved off channel. But on the night before they provided a copy book demonstration of how A3J can mix with fm and a.m. by working 48 non-sideband stations throughout the extent of the 2m band.

When driving carry "point nought"

When out on the road with the 2m mobile the best chance of getting a contact comes if the national mobile calling frequency can be used, which is a statement of the obvious not obvious to all, for even today mobiles appear on odd frequencies (often sadly "listening this channel only") where few normally expect to find them.

Carry 145-0 then (appropriate crystals have been advertised in this journal recently). Have 145-0 available also at the home station with which to call mobiles on the national frequency... yes, *call*, not *work*: ask them to listen on your own working frequency when you have moved off theirs (hopefully expecting that they are not too rockbound to do so: an increasing number are able to search, which is a good thing).

All modes are ok on 145-0. You may even expect some sideband now that new commercial ssb mobile equipments are getting into cars. So you will need a good stable bfo in the receiver. And it helps to have nbfm demodulation circuitry too, when "QRV 145 Point Nought".

Not many 70cm mobiles around yet. Here again it is a case of "Carry point nought" for 433-0 in case you do hear any.

Further to frequency-spotting, on now to...

Split or fixed

As has been observed here before, many 2m sidebanders cannot work split. A helpful suggestion, then, from GW3ZTH: Announce after a CQ that you are tuning the band and "will reply on the *calling station's* channel if not called on mine". He finds many stations call him repeatedly on 145-41 oblivious of the fact that transceive is in use at GW3ZTH and that they may expect their reply on their own megahertz.

To Hungary with meteors

If you want to work Hungary the easy way try HG5AIR via Oscar. Much more challenging is to try via meteor scatter. The GW3ZTH tests with him during the December Geminids produced fleeting signals both ways. If, says Joe Ludlow, the Hungarian could have passed the info at 100wpm instead of 45wpm enough might have been bounced during the split seconds of available time to constitute a QSO-with-reports (without them it is not a QSO). In the same period GW3NJW exchanged m-s with DJ5DT, but again not enough to record a statutory QSO.

For G3WZT of Sussex the November Leonids amazed him by the duration of the signal bursts from HG5AIR "... on 16 November three long bursts up to 45sec and all

containing both calls, reports and confirmations, almost like a QSO via extended tropo!" reports John Matthews. Checking later with the HG on 14MHz he learned that the longest burst heard from G3WZT extended for three minutes, this from his 150W and 10-el, keying being done manually.

—and to Sweden

The note in *FMD* requesting m-s skeds for G3WSN of Chelmsford brought him an enthusiastic telephone call from SM5LE: "Try tonight... Geminids!" Both did, and on 12 December got signal-bits across to each other within an hour's QSO-time. Many bursts lasted 10s, time enough for the digital keyer at the Stockholm end plus 32-el aerial to allow G3WSN to log all that was necessary to complete the contact, peaking 10dB in 1kHz bandwidth.

Beacon news

If you want a dx marker almost as valuable as HB9HB (a popular number during the Christmas lift on 2m, 599 over much of the country) try F7THF, recently commissioned at DH15G on 145.96 up at 3,600 ft, four aeriels for the four cardinal points of the compass.

Good news for "four meteorites": ZB2VHF was recommissioned on 70.26MHz on 2 January. Reports to ZB2A via Gibraltar Radio Club. Look out for the Gib-beacon via m-s (Lyrids around 20 April) or sporadic-E (or even given a bit of luck via tropo).

Oscar news

Now well into its second thousand orbits, Oscar 6 is no longer a subject for comment by the majority, is given fourth or fifth place in the GB2RS news bulletin, and in the words of one member is "the year's biggest non-event". However, it is still a subject of fascination to the devotees, eg "... busy with Oscar 6: usually the winter months leave us in the doldrums but not this winter"—EI6AS, or "... utilize all my spare time chasing Oscar just to see what can be done"—G6RH.

What can be done? With most of the devotees a couple of dozen countries and a couple of hundred different stations worked is normal. Some in fact seem to be running out of new ones to work, and GW3FSP has been enjoying repeat contacts with many of them, eg F9FT 25 times and VE2BYG 13 times. A rare gotaway was K7DDO heard calling "QRZ?" on the 'FSP channel at RST569 on Orbit 961—and then a local G clobbered him.

There is, however, irritation on two major counts: operators' failure to tune the rest of 2m when Oscar has passed, and consequently to miss much UK long-haul which called them during the recent openings; and secondly a desire for more information about translator shutdown. According to AMSAT the pattern is "On" from 0001 Friday to 2400 Sunday, and normally "Off" at all other times. Battery power must be conserved because of solar cell problems.

How much ground station power? Says GW3FSP "From some of the cards I've had for Oscar contacts 600W and a 44-el array or two 4CX250Bs are common. Even these seem to be QRP alongside some of the signals that have completely killed the transponder. If you can read the breaks in Oscar signals you can get their callsigns. Lately, as soon as Oscar 6 gets within range of the USA this break up of signals occurs. There is also some tendency for certain stations to



To gain experience in direction finding at vhf, the London FM Group held a 2m foxhunt in Surrey. The "fox" was G8AMG/P hidden in a wood. Ten teams tried to find him. One travelled 28 miles in the attempt. The shortest distance covered was 10 miles. Winners were G8FNF/G5AUC. In the picture left to right are G8BLB, G8AUU, G8FNF, G8CKT explaining the rules, and G4BJN. (Picture by G8BGJ)

treat the orbits as another rat race, why I don't know, for no medals are offered."

The weekend load on the satellite is evident to PA0WLB: he says he needs 300-350W erp to access it, but during weekdays when activity is less 80-100W is adequate. This power level, reports G3NHE, is plenty if beamed straight up at an overhead pass, but more is required at low-angle long QRB when the best dx is to be worked. He accepts the AMSAT recommendation of 100W to a beam of no more than 10dB gain, ie 1kW erp, as a perfectly good Oscar-accessor.

What aeriels? The outstanding results at F9FT are achieved with a 16-el on 2m and a full size 5-el on 10m. Incoming signals on 10m are detected five minutes before announced acquisition time and held as much as five minutes after LOS. At SM6PU four 9-el Yagis may be tracked in elevation or azimuth, while on 10m a 3-el or a groundplane are in use.

G6RH had reports of many USA stations calling him whom he could not hear, even though 50 VE/W had been worked. He suspects his 30ft apex balun fed inverted dipole and a replacement may go up. At G3NHE replacing a N-S dipole at 15ft with a rotary 10m dipole at 35ft achieved a great improvement.

Dissatisfied with his crossed dipoles for 2m, EI6AS equipped himself with Skybeams set at right angles to one another on a 4ft mast length secured to the top of a 20ft length of tubing with one bolt, tiltable with a cord from the radio room to cope with high-angle passes as well as distant ones. Azimuth tracking is by a car steering wheel and eye level indication by an ex-RAF 0-360° disc Ref 10B/126. Rotating the mast through the roof with one hand and pounding the morse key with the other poses no tuning problems to Albert Latham: "No need to tune the receiver: Doppler shift looks after that!"

Dodging the QRM The bandwidth of Oscar 6 appears to be wider than many of us think. G3IUD of Cornwall has heard his 145-88MHz signals returned on 29-43MHz, and

police transmissions evidently 30kHz above our 2m band have been heard translated on 29.58MHz, which is quite an intriguing thought! He concludes that this apparent Oscar frequency spread could be turned to good use to dodge the QRM emanating on 29.45-29.55MHz. In other words, drop your up-frequency below 145.9 and see what happens (hoping others will be listening that low on 10m, which after the appearance of this note perhaps they will).

On the general subject of QRM there is much support for the scheme to segregate cw between 145.9-145.95 and ssb to the upper 50kHz, in spite of the fact that an overwhelming preponderance of through-Oscar traffic is on the key.

Propagation phenomena Discussion continues about apparent bending of the 10m signal after Oscar should have officially gone below the horizon. At GW3FSP the Americans are heard for several minutes after Dewi's own signal is no longer audible to him. A similar report comes from G6RH, who adds: "I have also noted my own signals coming back on the S-N orbits well after radio horizon time, and wonder whether the north magnetic pole has some effect".

Tech corner

From G8ACB (Malcolm Sparrow of Wolverhampton) Following the note here in December about adapting the Mullard ELC1043 uhf television tuner to the 70cm band, there have been requests for further information. This is now given below:

To connect up the tuner proceed as follows:

First, connect the aerial input to the feedthrough on the end of the tuner, taking the coaxial braid to the case of the tuner (use low-loss coaxial cable);

Counting along the bottom of the tuner, there are 11 holes, six of which have feedthroughs fitted. Count these from the aerial input end and connect as follows: Pin (hole) two: 2.5V to 3V positive (agc line); Pin (hole) four: +12V rf transistor supply; Pin (hole) five: tuning voltage to varicap diode of which only 0 to +2V is required to tune the whole of the 70cm band including the tv section (Note: to tune the whole of tv band 1V a range of 0 to +30V is required).

Pin (hole) eight requires the +12V supply to the osc/mixer transistor, and Pin (hole) nine is a test point and may be ignored. Pin (hole) ten delivers i.f. (Take i.f. braid to case of tuner). The negative of the 12V dc supply goes to the tuner case.

Tune the i.f. output slug for maximum noise on tv screen with power on and 70cm aerial connected, and output of

tuner fed to tv set aerial socket. The tv set should be switched to Ch 1 (45MHz).

Quoted noise figure for the ELC1043 is 8dB and the power gain 20dB.

From G8EEJ (K. Basterfield, Plymouth)

Referring to the circuit (*FMD* December 1972) showing three BF180 transistors as power amplifiers to drive an EF183 on 2m, could I point out before others are misled that the BF180 was primarily designed for forward gain control in tv tuners? The essence of forward agc is that as the emitter current is increased above 3-4mA then the gain falls off dramatically, as may be seen from the appropriate Mullard data sheet.

The BF180 is an excellent small signal amplifier on both 2m and 70cm, and even above, but it would not be much use as a pa above say 30mW input.

What they say

"I was most interested in the *FMD* suggestion for a retired OM's net on 4m weekdays at 1100gmt, and would like to fix definite skeds"—G2DD.

"So the GMs complain that Zone D is blanketed by QRM from the border southwards? The answer is simple: tell them to plug in a morse key and try 144.15. They will find this part of the band to be blanketed by silence!"—G3DAO.

"There appears to be a new brigade swishing their vfo/vxos around the 2m ssb channel . . . I only wish they could take their bad Oscar-channel manners back to 80m"—GW3ZTH.

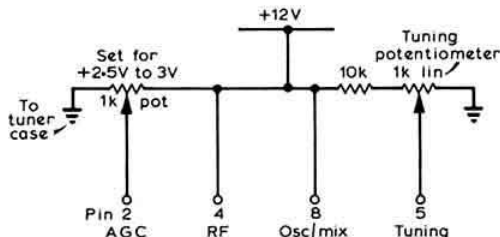
Here and there

Interested in slow scan tv on 2m? Try a sked with G3WW. He now has permission from the MPT to transmit it on 144-146MHz, at 128 lines.

BRS Ron Ham and his neighbour BRS Terry Cooper have been in demand by the "communications media" . . . a five-minute film about Ron's radio observatory went out on BBC TV ("South Today"). And Radio Solent put him on to do a three-quarter hour disc session in "Morning Call." From Radio Brighton Terry broadcast a piece about the RSGB VHF Listeners' Championship (he being the year's "champ"). Local press then tailed both of them.

In addition to the beacons, a useful conditions marker is PA0AA, which broadcasts VERON news in English on 145.14MHz Fridays 1900gmt to 2130gmt, morse practice at 1930gmt and an rty bulletin at 2030gmt at 45 bauds.

Gordon Bracewell, ex G3EGK, pioneer 2m sidebander and former RSGB masts-and-planning-permission co-ordinator, is now permanently in Australia, new VK2 call expected any moment. He asks old friends to note his QTH: 36 Corang Road, Westleigh, NSW 2120.



The external wiring required to put the Mullard ELC1043 into service in the 70cm amateur television band (see note by G8ACB)

25 YEARS BACK

"To encourage interest in V.H.F. work, and in particular work in the centimetre portion of the spectrum, I have decided to offer a pair of trophies to the first two home members who succeed in establishing contact with one another over a distance exceeding 25 miles on frequencies within the 420-460Mc/s band." G5VM in his Presidential Address.
RSGB Bulletin, February 1948

THE MONTH ON THE AIR.....

.....by JOHN ALLAWAY, G3FKM*

FOLLOWING last month's comments your scribe would hasten to add that the use of exclusive cw frequencies by phone stations is not by any means confined to those who are situated in parts of the world where there is no band plan! There are far too many UK amateurs using frequencies below 3,600kHz and 7,040kHz for phone contacts, and although there is no law against this kind of bad manners, these selfish individuals could cause mandatory band planning to be introduced in this country. The writer feels that we should not need to ask for restrictions of this nature to be written into our licences.

Slow scan television

A useful booklet on this topic has been written by B. J. Arnold, G3RHI, and published by the British Amateur Television Club. This gives an introduction to a method of transmission which seems to be gaining in popularity. Further information is available from Mr C. Grant Dixon, Kyrle's Cross, Peterston, Ross on Wye, Herefordshire HR9 6LD. The booklet is priced at 25p.

Richard Thurlow, G3WW, has received clarification from the MPT of sstv licence conditions. He has been told that the number of lines per picture may now be 128 (plus or minus eight)—this enables certain American equipment (eg the ROBOT camera) to be used.

Top band news

Richard Limebear, 8P6DR, has provided details of eastern Caribbean sunset propagation tests to be carried out in February. He will be on 1,803kHz from 5 February to 2 March (Monday to Friday only) from 2130 to 2300 (plus or minus 30min), and will transmit "vvv... 8P6DR test" one minute on and one minute off. This will be an automatic transmission and will not be interrupted for QSOs; he will, however, listen for callers after the beacon type transmission finishes. Sunset schedules may be made for Saturdays or Sundays. All reports of reception and requests for schedules should be sent to 8P6DR, c/o Cable & Wireless Ltd, PO Box 614, Bridgetown, Barbados. These tests are to try to establish whether propagation is best to Europe at sunset and to find out whether it is best along the line of sunset or in other directions.

VK3CZ's latest letter reports contacts with G2H DU on 27 November, and OK1ATP on 16 December at 1900. He heard G3YMH just after 1900 on 29 December, and on 1 and 3 January. G3LIQ was audible at 1924 on the 1st. DHJ has been audible most mornings. Arthur advises that the best frequency in VK3 is 1,827-1,828kHz.

The International Reciprocal Operators' Club

This is a new organisation which has been formed "to support the establishment of worldwide reciprocal amateur radio privileges". Membership is open, and free, to all

reciprocal operators. Send a copy of home and reciprocal licence with two IRCs and QSL to IROC, Box 11, Medway, Mass, 02053, USA.

Help needed

G4AHJ, QTHR, would like advice on how to obtain a reply to his application for the ZB2RE certificate.

BRS17567 comments on the fact that he has submitted a number of IRCs as well as SAES stamped with USA stamps to K2BPP without reply. K2BPP is listed as QSL manager for a number of stations and your scribe would be pleased to hear from anyone who has received cards from him. Neville also draws attention to CN8CG who bluntly says, "Three IRCs or no QSL".

G3NKK would appreciate information concerning the present whereabouts of VP8HO.

News from overseas

G3DYY returned to Sierra Leone on 8 January and will be using his 9L1GC call for several more months. Ross wishes readers to know that the delay in receipt of his QSLs is due to the fact that they are provided by his employers at the rate of 250 per three weeks and this figure has been insufficient to cover the very large number of 9L1GC contacts. The backlog in September was some 7,000 and a rubber stamp is being made so that applicants' own QSLs can be verified and returned. Sincere apologies are extended to all those who are waiting, and a definite promise to QSL everyone is made. Eighty-metre activity from Freetown is very erratic, with best times being 1800-2030 and 0530-0700. 9L1MF will be returning with Ross. The only other licensed 9L1 amateurs at present are 9L1VW who is active on all bands, 9L1JT who uses 21MHz cw, and 9L1RP.

Latest news from Cyprus is that by early December licences had been issued in the 5B4 series as far as 5B4AN. These are being given to former 5B4 call holders, and to those who pass the City and Guilds of London examination which is now being held locally twice yearly. A number of QSL cards are being held by the CARS QSL bureau (Box 216, Famagusta) for ZC4s CB, GM, HS, RB, TK and VB, and the owners of these callsigns are asked to notify the bureau of their present addresses or to give permission for their cards to be destroyed.

Tom Cheesley, MP4TEE, writes to say that he has an FT101, FL2100 and a two-element Yagi beam at 50ft, and is on the hf bands daily from 1000 (0400 on Fridays). He may have a long wire up for 40/80m operation by the time this reaches readers. MP4TEE will be in Abu Dhabi for a further 18 months and should be QSLd via G3LQP—there is no MP4 QSL bureau.

Alfred Benyon, G3FXG, is now living at Calle Maestro Falla 19-11 p38, Castellon, Spain, and his wife (who is licensee of the station) is active on 2 and 20m, cw and a.m.

Robert Wilson, G3YZO, is at present at Hajja, Yemen, and working on the acquisition of a 4W1 call. He is trying to locate someone who would be kind enough to lend him some

* 10 Knightlow Road, Birmingham B178QB.

simple equipment for 20 and 80m. Transistorized gear is a "must" because only battery power is available, and cw only with 10W or less input is desirable for the transmitter. Robert will be in Yemen until July, and asks that anyone who can help him contacts G3YMH (65 Wraysbury Rd, Staines, Middlesex). Hajja is 6,200ft asl and should be an ideal location for QRP work.

BRS33802 is now in Gibraltar and on the air as ZB2CO. Ian gives a list of currently active stations on the Rock as ZB2s A, AT, AZ, BL, CL, CF, CH, CI, CJ, SS and himself. The only calls which have been issued out of sequence were ZB2s FFG, GAS, SS and VHF, and it seems that "ZB2XX" is being pirated frequently on cw.

G6XJ sails for the Antipodes on 9 February and hopes to spend at least six months each in ZL and VK where he will be on the air as ZL2ACN and VK3AMM respectively, using cw and ssb on 14MHz. He may also operate from 3D2, FO8, VS5 and Antarctica.

W2GHK has recently received logs from DJ6QT for his 1970-1 expeditions, and all unanswered cards will be sent out as soon as possible. Callsigns covered are: CT3/DJ6QT, HB0XSV, TY9ABC, TY0ABD, TZ2AB, TZ2AC, XT2AB, XT2AC, ZD3N, DJ6QT/5T5, DJ6QT/5U7, 5V8WS. Box 7388, Newark, NJ, 07107, USA, is still Stu's DOTM address, although he now lives near Washington and is with RCA.

9H3WPD was on the air on 1 January from Pope John XXIII Peace Laboratory in Malta for World Peace Day. The operator was Ron, 9H1R.

Larry, ex-G3LWF, is now active from Chingola, and would like his regards passed on to old friends in SW England, especially to John, G3LYW, with whom he has lost contact. His callsign is 9J2LF.

G3TZL/MM and G3ZXH/MM closed down on 19 December after making over 1,000 contacts. Pete Bowen, G3TZL, says that there will be delay with QSLs for contacts after 20 November as he is awaiting fresh supplies. Anyone still needing his card at the end of February will get one by return by sending an sae to 79 Stakes Rd, Purbrook, Hants. Pete will be /MM again in March—this time to JA, KZ5 and the USA.

DX news

A number of unusual prefixes have been heard on the air recently. DX40PAR celebrated the completion of 40 years' of amateur radio in the Philippines. WG3SFC, WM5MSC and WM4SFG were all active during the Apollo 17 mission. UK30SB commemorated the 30th anniversary of the battle of Stalingrad.

UPOL 21 is located on the USSR North Polar drifting ice station 21 in the Arctic Ocean and seems to favour 14MHz cw around 0400 and 1600. In Antarctica UA1KAE/1 is located at Sovietskaya base, UA1KAE/6 and UA1GZ/M at Vostok, and UA3YH/M at Molodezhnaya. The last mentioned asks for QSLs via UK3XA1.

Those needing rapid QSLs from VQ9HCS are advised to apply to WA1HAA as cards sent to the Nairobi address will not be dealt with until early summer.

E10YSE was on the air from the National Young Scientist of the Year Exhibition in Dublin in early January—QSLs should go via EI5A. To celebrate 25 years of post-WWII amateur radio in Hungary, HA and HG stations may use HA25 and HG25 prefixes during 1973, and to celebrate the

HF BEACON STATIONS

Callsign	Frequency (MHz)	Location	Reports to
DL0IGI	28.195 and 28.200 switches to 28.200 MHz between 15-20 and 45-50 min past each hour	Mt Predigtstuhl near Salzburg	DJ5DT, Kollwitz- weg 1, D 6100 Darmstadt, FR of Germany
GB3SX	28.185	Crowborough, Sussex	G3DME
VE3TEN	28.175	Ottawa, Canada	G3DME
3B8MS	28.190	Signal Mount, Mauritius	G3DME (Beacon keeper: 3B8DG)

Budapest Centenarium others will be using HA100 and HG100 prefixes. 4K1C, reported on 14MHz ssb, says that he is located at Vostok, Antarctica.

VP5LD and VP5GR are on Grand Turk Is, and the former will be there until 1974. He is using a Drake T4X/R4B combination, with an inverted-Vee aerial for 14MHz. VP5s GR and RF have been heard on 3.5 and 7MHz.

NRL 50th anniversary

The US Naval Research Laboratory (Washington, DC 20390) plans to celebrate its 50th anniversary by providing special QSL cards for those who contact any of its amateurs or the club station W3NKF during the period 1 January to 16 July 1973. Concentrated activity will take place between 23 June and 15 July, and a special certificate and reproduction of the 1922 QSL of NKF (the naval station of NRL) will be sent to those who contact five or more NRL amateurs. A certificate will also be given for a successful sstv or e-m-e contact. Frequencies to be used will mostly be near 1,805, 1,820, 3,560, 3,860, 7,060, 7,230, 14,060, 14,260, 21,060, 21,360, 28,060 and 28,560kHz. SSTV will be transmitted on 14,230kHz from 1600 to 1700 (1600 to 2200 during the concentrated operating period).

Expeditions

VE6BAA, VE6TP and VE6BAW have formed the Canadian World DX-pedition and have as their objective putting "the top 40 most wanted countries on the DXCC list on the air". They plan to devote several years to this purpose and expect to have completed the building of a large ocean-going trimaran by June. They will award the Canadian World DX-pedition Trophy annually to the amateur who has proof of the most two-way communications with the group while operating from any of their officially announced operations. Only one contact per band per mode. The winner will be offered a two week free trip on the trimaran as a full participant in the expedition!

A Japanese group is still intending to visit Bhutan in the spring.

VE3AGC, recently returned from EA8, has organized a visit by EA8GK, EA8CI and several others to Spanish Sahara. This will probably take place in April and two complete stations will be taken.

VE6TP reports that the French authorities may allow visitors to Clipperton after March. In this case VE6TP and other Canadians hope to go there with the callsign FO8C.

Contests

The 1973 IARC Propagation Research Competition

0001 17 February to 2400 25 February (CW/RTTY).

0001 24 March to 2400 1 April (Phone).

Object is to contact as many ITU zones and countries as possible (the IARC Zone/Country list will be used). Exchange RST plus zone no (the UK is in zone 27). Each contact counts one point and stations in one's own zone may only be worked for multiplier credits. The multiplier is the number of zones and countries contacted on each band, 1-8 to 28MHz totalled together. A station may be worked more than once and contacts lasting more than six minutes count as separate contacts for each six minute period or fraction—these must be logged separately in the log. Entries may be single- or multi-band, and listeners may take part. Logs should have 40 QSOs per page, give own zone no once per page and indicate new zones in separate column. Mail logs to L. M. Rundlett, 2001 Eye St, NW, Washington DC, 20006, USA. (Official log sheets etc may also be obtained from this address).

The 1973 WAB Contests

HF phone (11 March), HF CW (25 March)—14, 21 and 28MHz.

LF phone (1 April), LF CW (8 April)—1-8, 3-5 and 7MHz. Each contest lasts from 0900 to 2100. Contacts count five points and stations may be worked on each band for credit. The multiplier is the number of different WAB areas plus DXCC countries contacted—each is counted only once. Note that all British prefixes count as one country for UK competitors. Overseas entrants count only WAB areas as their multiplier. Exchanges consist of RST plus serial number (starting from 001) followed by WAB area, county, and WAB book no (in the LF contests *only* if applicable). Overseas stations give RST and serial number. Logs should contain signed declaration that licence conditions and band planning were observed and must reach G3EJF, Bridge House, Hunton, Bedale, Yorks, within 50 days of the contest. Overseas logs go to G2DSF, N. Booth, 49 Baggrave St, Leicester. Logs should indicate time, station worked, no out, no in, WAB area, county, points claimed. Please give full address and WAB book number if you have one. Note that VE, VK, and W call areas count as separate multipliers. G3ABG offers to supply anyone with his WAB number in exchange for an sac (9 Fairmount Drive, Cannock, Staffs).

The Third Worldwide SSTV Contest

1500-2200 10 February, and 0700-1400 18 February. Frequencies 3-5 to 28MHz. Exchange picture and numbers. Each contact counts one point (each station may only be worked once) and a multiplier of 10 points for each continent and five for each DXCC country contacted will be given. The W and VE call areas count as country multipliers. Logs must reach Prof F. Fantì, via A. Dallolio 19, 40139 Bologna, Italy, before 20 March. They must contain a declaration that all the rules of the contest have been observed, and should indicate date, time, frequency, station worked, number sent, number received, country, points claimed. This contest is sponsored by *CQ Elettronica* magazine.

Australian NFD

0600 10 February to 0800 11 February.

This is the WIA's Field Day Contest and Australian /P and /M stations gain five points for contacting fixed, and 15

points for contacting /P and /M stations outside their call area. A certificate will be awarded to the two overseas stations who make contact with the greatest number of Australian /P and /M stations. Send logs to Federal Contest Manager, PO Box 638, Brisbane, Queensland, 4001.

The 1972 Welsh 80m Contest results were as follows:

Morning section: GW3YSA (126 points), GW3YNM (104) and G3SWX (79).

Evening section: G6UW (81 points), GW3YCD/A (79) and G16YM/A. Winners of the listener sections were P. Wong (116 points) and A. Hall (111) in the respective sections.

Odds and ends

G3XFH reports that his callsign is being used by an unauthorized person on 80m. He only operates on 40, 20, 15 and 10m and does not use phone.

G3UMN is receiving QSL cards for contacts which he has not made. At present his activities are limited to 160m cw only.

The BBC Glasgow staff are hoping to run a special station on all bands 1-8 to 144MHz between 6 and 10 March as part of the 50th anniversary celebrations of the opening of the Glasgow transmitter, 5SC, in March 1923. The callsign will be GB5SC and contacts with other BBC staff members and old-timers who remember the early days of broadcasting will be specially sought.

Band reports

As might be expected at this time of the year a great deal of activity has been reported on 3-5MHz, and an extraordinary amount of dx has been worked. Conditions into the west of the USA have been very good at times and W6s NLZ, NXP, WB6UBC, K6s AHV, SEN, UA, W7s RM, SFA, and VE7s EL and SV, have all been heard on ssb between 0600 and 0700.

Many thanks to the following for supplying the information used in compiling this part of the feature: G2BJY, G2HKU, G3HB, G5JL, G6GH, G3AAE, G3GVV, G3LPS, G3NKK, G3ORP, G3RFG, G3XWZ, G3YBH, G3ZPF, GW4BLE, BRS2098, BRS17567, BRS31301, BRS32799, BRS33823, A7056, A7511, A7785, A7850, A7951 and A7964.

Calls listed in italics were stations using cw, the rest ssb.

1-8MHz. 0000 VE3EK, W1BB/I, W2EQS, W2UEZ. 0100 KV4FZ, W3IN, K8RRH. 0200 W5SZ, W8IJI. 0300 PY1DVG, K1PBW/I, K2ANR, W1HGT. 0400 VE3DN. 0600 W4BRB. 0700 W7DOL/6.

3-5MHz. 0000 EL8I, M1I, VP2LI, VU25BX, YA1s AH (QSL to UN, Kabul), DT, ZS1MH. 0100 CE8AA, EP2WB, G8NF/W4, WX3MAS, XE11IJ, 4S7DA, 9K2AL, 9L1s LW, VW. 0400 ZD3Z. 0600 LU2AFH. 0700 DJ7ZG/CE0, CT3AS, OX3EA, YV5AMW, ZL3KK/C, K3WEU/6Y5H. 0800 FP8CT, JX9TM, KV4CI, LU8ATG, OH0NJ, ZLs 2BT, 3GS, 4KF. 1100 EA6BH. 1500 W7RM. 1600 DU1EJ, VS6DO. 1700 HZ1TA, ZLs, 4Z4JW. 1800 KL7HAQ, ZL2BT. 1900 JA2CPY, VK2AWA. 2000 EP2TW, ST2SA, ZS3GH, 5X5NK, 6W8DY, 9H1BX. 2100 JY1, 5Z4s KL, LW. 2200 FL8OM, JA9BE, W1/W2s, 4W1AF, 5B4AA. 2300 PY7RO, VP7NZ, ZB2BL, 9M2DQ.

7MHz. 0000 MP4BIE, PYs. 0700 JA7NDZ, TU2DO. 0800 CM3HG, JA1OHV, VP2DH, ZM3ACS. 0900 JAs, VE8RE, W6s. 1000 KP4AST (3-el beam at 160ft). 1500 KG6JAR. 1600 TA1MB. 1800 JASACF, 4UIITU. 1900 CT2BJ, VKs

QTH Corner

FL8BC BP 4, Djibouti, Fr Somaliland.
FL8OR BP 1279, Djibouti, Fr Somaliland.
FY7AG D. Godde, BP 229, Kourou, Fr Guyana.
WA4KPH/HK0 via W4CPX, 10 Rockmont Rd, Greenville, SC, 29607, USA.
HT0V via YN1VMD, PO Box 2519, Managua, Nicaragua.
JD1ABZ Rya Okabe, Weather Stn, Chichijima, Ogasawara, Japan.
JY9FOC via G210, J. Lees, 17 Trevoze Gdns, Sherwood, Nottingham.
K411W USCJ Loran Stn, P.O. Seattle, Wash, 98181, USA.
KX6KL Box 2272, APO, San Francisco, Cal, 96555, USA.
MP4BIN via WB2FVO, 55 Elliot Place, Edison, NJ, 08817, USA.
MP4TEE via G3LQP, 56 Combe Rd, Tilehurst, Reading, Berks.
P29AC PO Box 1021, Albina, Surinam.
TJ1BB BP 4, Yokodoma, Cameroun.
VP5LD L. A. Desoto, Western Electric Co, Dept 9463, 2400 Reynolds Rd, Winston-Salem, NC 27106, USA.
WA1RDH/VQ9 via W4WFL, BM/W4WFL, London WC1.
VR3AC via INDXA, PO Box 125, Simpsonville, Md, 21150, USA.
WG3SFC Goddard ARC, Box 86, Greenbelt, Md, 20770, USA.
WM5MSC NASA ARC, Houston, Texas, 77058, USA.
YV0AA via RCV, Box 2285, Caracas 101, Venezuela.
ZF1GS via W4BRB, 6510 Carambola Circle, W Palm Beach, Fla, 33406, USA.
ZF1SF via WB4SHB, 821 St, W Palm Beach, Fla, 33407, USA.
ZF1VD via W4HAW, W Palm Beach RC, 823 Newark St, W Palm Beach, Fla, 33401, USA.
VP2VPI PO Box 411, Tortola, Br Virgin Is.
5U7AZ BP 309, Niamey, Niger Rep.
8R1N Lloyd Kunar, PO Box 841, Georgetown, Guyana.
8R1M via WA3HUP, Mary Crider, 105 June Dr, Camp Hill, Pa, 17011, USA.
RSG6 QSL Bureau, Bromley, Kent, BR72NH.

QTH Corner correction

Last month we incorrectly gave A2CJP as QSL via VE4SW. It should have been via P. Johnson, PO Box 52, Gaberone, Botswana.

2EO, 3XB, 6HD, ZS6AM. 2000 ZS3GH, 5Z4KL. 2100 ET3USA, 5X5NK. 2200 CR4BS, JAs, YV5MO, 9K2BQ. 2300 DL2GG/YV5.

14MHz. 0000 CE6EF, VP2SBH. 0100 KC4USZ, OA6BH, ZD8RR. 0700 ZK2BD. 0800 JD1ACF, TU2AA/M, VK9s GN, NI, ZB2A, ZL3PD (ex-G4AY). 0900 FK8KAA, KG6JBS, KX6IQ, OH0MA, PZ1DR, VK9VG. 1000 VK9SS. 1100 JT1KAA, MIC. 1200 XV3AC, YAI1A. 1300 VS6GM. 1400 TT8AC, 9M2DQ. 1500 A51TY, KL7MF, MP4TEE, SU1MA, TJ1AX, WA1RDH/VQ9, YB0AB, 4W1BC, 8P6AE. 1600 FB8XX, VK0WW (Macquarie Is), VQ9HCS, WG3SFC, ZS2MI, 3D6AX, 4S7PB. 1700 FR7ZW, K1V4AB, G4AMJ/VP9, VR3AC, ZL1AH, 3B8DL, 5R8BP. 1800 CR3AB, F08DF, VP1BH, XT2AF. 1900 CR6MK, PZ2AD, VP2VV, VQ9DC, ZD9BM, 4W1BC. 2000 FY7AG, VP8KF, ZD8KO. 2100 VP8LR, ZD3M, ZD7SD. 2300 VP8JV, 9G1BF.

21MHz. 0800 FL8AG. 0900 DU1REX, ZL3UY, 5N2AAN, 5V4AK, 9H3WPD. 1000 HS4AHX, HV3SJ, VQ9s HCS, W, VS6DO, ZLs, 7P8AC, 9K2BQ, 9M2DQ. 1100 CE6EF, MP4TDM, VU25TVA, 5T5BH. 1200 PJ2MI, TR8PB, TY5ABK (QSL via W8CNL), XW8BP. 1300 FP8CT, OH0MA. 1400 FB8XX, 5X5NK. 1500 CE2NM (Box 3016, Valparaiso), TJ1BG, VP1BH, ZF1SB. 1600 EA9AJ, OX3YY. 1700 FL8OR, KC4USP. 1900 SM2AGD/CE0, YN8AJC.

28MHz. 0900 9M2DQ. 1000 ZD8TS, 5B4KP. 1100 CR4BS, TJ1BB. 1200 KV4AD. 1300 PJ2VD, ST2SA, 9E3USA. 1400 CX, KG4, ZE, 3B8DG, 9J2. 1500 CR6, YV, ZE, 9J2. 1600 WI-W4, WB0CEI.

Many thanks to all correspondents, and especially to the authors of the following news sources for items obtained from them: the DX'ers Magazine (W4BPD), NARS Newsletter (5N2ABG), Long Skip (Nick Sawchuk), the West Coast DX Bulletin (WA6AUD), the Ex-G Radio Club Bulletin (W3HQO), DX'press (PA0INA/PA0TO), DX News

Propagation Predictions

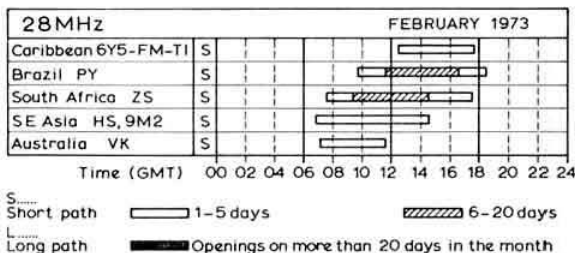
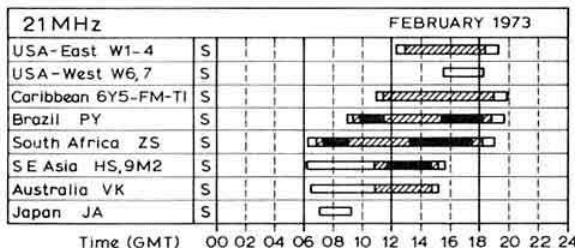
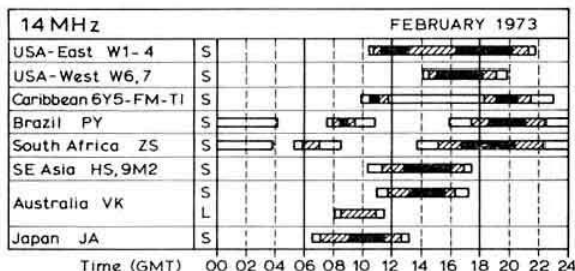
Because of the great increase in solar activity during 1972 the level forecast for February 1972 will not be reached until February 1973. With winter coming to a close and a decrease in solar activity even the present high F2 MUFs do not ensure certainty of dx traffic on 28MHz. Decrease in solar activity will also be noticed on 21MHz, but not as much as on 28MHz. It will probably be difficult to reach all continents with certainty. Communication will be more difficult from Northern Europe than from countries further south.

Longer days mean that as well as 21MHz, 14MHz will remain open longer in the evenings, specially towards the end of the month. 14MHz will close around midnight for dx traffic. From April-May and for the rest of the summer this band will remain open all night.

During February the main dx band will be 7MHz from a few hours before midnight to the early hours of the morning, and 3.5MHz will also be usable during part of this time. DX on 7MHz will be possible when the greater part of the path lies in darkness, while communication on 3.5MHz will be interrupted by the dead zone during the latter half of the night.

In February 1972 it was pointed out that a sudden flareup of solar activity like the one in the spring of 1951 was possible, and it did in fact occur and facilitated good dx conditions. It is unlikely that this will happen again during this cycle (next minimum probably 1975).

The provisional sunspot number from the Swiss Federal Observatory for December 1972 was 42.5. Solar activity was reasonably evenly distributed throughout the month. The predicted smoothed sunspot numbers for April, May and June are 41, 39 and 37 respectively.



Sheet (Geoff Watts), the 29 DX Club Newsletter (George Allen), and QUAX (G3DME).

Please send all items for the March issue to reach G3FKM no later than 7 February, and for the April issue by 7 March.

SPECIAL EVENT STATIONS

1973 Spalding Tulip Festival, 12-13 May

The Spalding & DARC will be operating GB3STF from the Grammar School, Priory Road, Spalding, to coincide with the Tulip Festival. Operation will be on ssb/cw on all bands 160-10m, and a.m. on 2m, with special QSL cards for contacts. The Wireless Preservation Society will provide an exhibition of vintage radio equipment.

ss "Great Britain", 1-31 August

The special station GB2GB will be operated by the Bristol City and County RSGB Group from on board ss the "Great Britain", currently in dry dock being renovated. This is part of the celebrations to commemorate the 600th anniversary of the granting of the Royal Charter to the City and County of Bristol.

Bath and West Show, 30 May-2 June

Mr R. B. Holman, G2DYM, is organizing a special station, call sign GB2BWS, to be operated from the showground at Shepton Mallet, Somerset. He hopes to enlist the help of any licensed amateurs or SWLs who live in the area, or who may be on holiday in the area at that time, with the installation/operation of the station on a rota. Free entrance and car park tickets will be available to helpers, as will free site facilities to caravan owners who wish to assist. Use of the HTV 80ft towers has been arranged for transmitting aerials, and it is hoped to be able to operate the station for the week before the show opens to the public. All interested amateurs please contact Mr R. B. Holman, G2DYM, at the Old Saw Mills, White Ball, Wellington, Somerset, as soon as possible.

St Bartholomew's Hospital, 8-11 May

A special station, call sign GB2SBH, will be operated during the celebrations to mark the 850th anniversary of the hospital. The station will be mounted during the "Bartholomew Fair" and an open day, at some time during the dates given above. Enquiries for skeds are invited, particularly from others in the medical world, universities, or dx. A good exhibition station would be welcomed, proposals should be sent to Gerald Bulger, BSc, G3WIP, MSCR, St Bartholomew's Hospital, London EC1, as should enquiries for skeds.

Bedford Amateur Radio Club, 3-24 February

The Bedford ARC have arranged with the Bedfordshire County Librarian to stage an exhibition at the County Library, County Hall, Bedford, to mark the 60th anniversary of the RSGB. The exhibition will be static on weekdays, but on each of the Saturdays during the period the club station G3WTP will be operated.

OBITUARIES

Mr E. W. Camps, G8BIN

"Bill" Camps died in a Bristol hospital on 30 December. He will be greatly missed by the 70cm enthusiasts in the south-west.

Mr L. G. Knight, G5LK

Leslie George Knight, of Waterlooville, Hants, died on 21 December. As one of the best known blind amateurs, he was active on hf and vhf and a founder member and secretary of the East Surrey Radio Club (now Reigate Club). His funeral was attended by many amateurs, the RSGB being represented by G6NZ and G3NKS.

Captain N. P. Spooner, G2NS

Captain Spooner, of Southbourne, died in December, aged 75. Although not engaged professionally in communications since working as a cable telegraphist before 1915, he was active and well known in amateur radio circles.

We are also advised of the deaths of the following:

Mr W. Clemenson, G6KQ, of London.

Mr J. H. Goodliff, G6LF, of Sheffield.

Mr J. D. Siddall, G4BM, of Formby.

Mr R. Stevenson, of Northampton.

RAYNET

by S. W. LAW, G3PAZ*

As we have a continual flow of new members it may well be that a mention of a few finer points in connection with our organisation may not come amiss as, with due respect to our hard working controllers, these points may not have been explained.

First is the question of insurance. Each registered member is insured while engaged in disaster relief operations under a policy held by the Raynet Committee as part of the RSGB. Particulars of this insurance can be obtained from the committee at any time by a member sending a stamped addressed envelope to the hon chairman either c/o RSGB HQ or to the address in the panel below. Note that this insurance only covers bona fide Raynet activities and not the private hazards of members' radio or otherwise.

Secondly, members are often puzzled by our apparent disregard of what appear to be obvious cases for Raynet participation. The explanation may not at first glance appear obvious but a little thought will make the matter clear. An examination of the MPT amateur (sound) licence will show that third-party messages may only be transmitted and received on behalf of three named bodies (the user services) during disaster relief operations. There is, it is true, a rider to this clause which allows us to conduct exercises which enable us to become proficient in the passing and handling of such messages as we might be called upon to deal with in a genuine case of emergency.

Note our use of the phrase "called upon". This last is an important point; the request for emergency communications must originate from one of the user services although there is nothing in the foregoing to prevent a group controller from calling his team to a stand-by condition should he become aware of any condition of hazard in his or an adjoining area. Also the controller may proffer the services of his group to the appropriate authority if he considers the circumstances warrant it. Needless to say, the groundwork of liaison should have been laid well in advance as we have so often advocated, in which case the user service will be well aware of the availability and scope of the particular group and will call upon its services should their own available systems of communication become inadequate at the time.

Appropos the matter of messages sent during exercises, the content should on no account be of such a nature as to create alarm or despondency to any person who might inadvertently receive them. In order to avoid such a contingency, all messages should be prefixed by a Raynet identification exercise phrase in order to make it clear that the content is not factual.

Finally to clear up a much vexed point often raised, Raynet is not permitted to take part in any event wherein there exists a pre-conceived hazard. For example, if the public pay admission to a sporting event such as a motor race any mishap is the sole responsibility of the persons concerned in a risk of which all participants and the spectators are well aware prior to the event.

We trust that the above will have answered many of the questions which have arisen in the minds of both new and prospective members and apologise to our longer-standing members for the reiteration of that with which they have, of course, long been familiar.

Incident and exercise records

Controllers are once again reminded that any call-out, standby or interesting exercise will be recorded in the incident book if sent to the committee or direct to the compiler, G3MBQ QTHR.

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

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

CONTEST NEWS

Rules for NFD 1973

Entrants should note that Rule 9 has been revised.

1. The General Rules for RSGB HF Contests, published in the January 1973 issue of *Radio Communication*, will apply.

The provisions of General Rules 4b and 8 are amended by NFD Rules 7 and 13 respectively.

2. Applications. Each group intending to compete must send in a properly completed application form to the RSGB HF Contests Committee, c/o D. Thom, G3NKS, 20 Bramble Close, Cophorne, Crawley, Sussex RH10 3QB, not later than 30 April 1973. Application forms are obtainable from RSGB headquarters (ask for Form HFC 10/73); entries made other than on those forms will not be accepted.

The information required on the application form includes the following:

- Call signs of stations.
- Name and address of the RSGB member responsible for the entry.
- Exact site location six figure National or Irish Grid Reference. In addition, entrants are required to give full site access information to enable a site to be located by station inspectors who may not be familiar with the district. Incorrect or inadequate information may be grounds for disqualification.

3. When. From 1700gmt Saturday 2 June to 1700gmt Sunday 3 June 1973.

4. Eligible entrants. All clubs, affiliated societies and RSGB groups within the prefix zones G, GC, GD, GI, GM and GW. NFD is a multi-operator contest as provided in General Rule 5b.

5. Contacts. CW (A1) only in the 1.8, 3.5, 7, 14, 21 and 28MHz bands.

6. Sections.

(a) **Double station.** Each competing group must operate two portable stations; the one using the lowest frequency shall be called the "A" station and the other the "B" station.

Each "A" station may operate on a maximum of three of the above bands; and up to three of the remaining bands may be allocated to the "B" station.

The "A" and "B" stations need not be operated from the same site, provided that they are located within the same RSGB Region.

(b) **Single station.** Each competing group must operate one portable station on one or more of the above six frequency bands.

7. Apparatus. General Rule 4b applies, and in addition the site must not be used for any portable activity for the seven days prior to the commencement of the period specified in General Rule 4b.

8. Aerials. No part of any aerial shall be higher than 45ft above the ground.

9. Equipment.

(a) Only one transmitter and one receiver, or one transceiver, may be used at any one time.

(b) Monitoring stations, ie fixed stations specifically nominated to observe and report on band conditions, activity, etc during the contest for the benefit of competing stations, are not permitted.

10. Power input. The total dc input power to the valve(s) or other device(s) energizing the aerial, or to any previous stage of the transmitter, shall not exceed 10W.

The valve(s) energizing the aerial shall have a total maximum rated anode dissipation not exceeding 13.5W.

Where semiconductor devices are used, the total maximum rated dissipation (at an ambient temperature of 25°C) of the device(s) energizing the aerial shall not exceed 20W for the purpose of this rule. Manufacturers' published ratings only will be accepted for this purpose.

11. Scoring. Points will be scored on the following basis:

- Fixed stations in the British Isles... 1 point
- Fixed stations in the rest of Europe including Eire... 2 points
- Fixed stations outside Europe... 3 points
- Fixed stations in the British Commonwealth... 6 points
- Portable and mobile stations in the British Isles... 3 points
- Portable and mobile stations in the rest of Europe, including Eire... 4 points
- Portable and mobile stations outside Europe... 6 points

(h) Portable and mobile stations in the British Commonwealth... 12 points
A multiplier of two will be applied to the total claimed score for contacts on the 1.8MHz band only.

12. Group contacts. Points must not be claimed for contacts made by a competing station with members of its own group, whether fixed, mobile or portable.

13. Entries. These are to be in accordance with General Rule 8, with the following exceptions and additions:

(a) The normal cover sheet will not be used. Special cover and summary sheets are provided, and these will be sent to the person responsible for the entry.

(b) Points claimed must be totalled separately for each band.

(c) Entries must be sent to the RSGB HF Contests Committee, c/o A. Davis, G3MGL, 41 Gainsborough Road, Tilgate, Crawley, Sussex.

ENTRIES SENT TO RSGB HEADQUARTERS WILL NOT BE ACCEPTED.

14. Trophies.

(a) National Field Day Trophy to the group obtaining the highest combined score.

(b) Gravesend Trophy to the group obtaining the second highest combined score.

(c) The Scottish NFD Trophy to the Scottish group scoring the highest number of points.

(d) The Frank Hoosen Memorial Trophy to the group with the highest score on the 14MHz band.

(e) The Bristol Trophy to the group having the highest score in the single station section.

(f) Commemorative certificates to the groups having the highest scores on the 1.8, 3.5, 7, 14, 21 and 28MHz bands.

15. Check logs. While overseas stations are not eligible to enter NFD, check logs are very welcome. A certificate will be awarded to the overseas portable station in each continent whose check log shows that he has contributed the most points to competitors.

16. Inspections. All stations are subject to inspection by nominated representatives of the HF Contests Committee.

These representatives will make every endeavour to interfere as little as possible with the stations' operations, and to assist in this entrants should make it easy for the inspector to see the final stage(s) of the transmitters.

Diamond Jubilee HF Contests rules

TRANSMITTING SECTION

1. The General Rules for RSGB HF Contests, published in the January 1973 issue of *Radio Communication*, will apply.

2. Eligible entrants. All paid-up members of the RSGB resident in the British Isles (ie G, GC, GD, GI, GM and GW) holding a Class A licence. Single-operator entries only may enter. Operation must take place from the home address shown on the entrant's licence, and must not be from a station belonging to a club, college, company or other organization. Callsigns issued to club stations, colleges, companies, etc may not be used.

3. When. Telephony contest: 0600gmt 12 May to 1800gmt 13 May 1973.

CW contest: 0600gmt 19 May to 1800gmt 20 May 1973.

4. Operation. A maximum of 24 hours of operation within each 36-hour contest period is allowed. At least one, but no more than three, periods of rest must be taken during each contest. Each period of rest must last for at least two hours, and must be clearly indicated in the log by, eg, "Rest for 120 minutes". No transmissions may be made during rest periods.

5. Contacts. 12-13 May: telephony. 19-20 May: CW (A1) only.

Bands: 1.8, 3.5, 7, 14, 21 and 28MHz. The IARU Region 1 band plan must be observed.

Reports, RS or RST, and serial numbers must be exchanged. The serial number may start anywhere between 001 and 500, and must then continue consecutively.

6. Scoring. Three points for each completed contact with a station within the British Isles (G, GC, GD, GI, GM and GW). Each station may be contacted for points once only on each band.

7. Entries.

(a) Each entrant must make at least 30 contacts.

(b) Separate log sheets must be used for each band, with the score for each band clearly shown. A cover sheet with the combined

score and a signed declaration must accompany the logs, which must be sent to: RSGB HF Contests Committee, c/o R. S. Biggs, G2FLG, 29 Lord Avenue, Clayhall, Ilford, Essex. Comments and photographs suitable for publication are invited.

8. Awards.

(a) The winner of the telephony contest and the winner of the cw contest will each receive one economy-class return ticket provided by BOAC to one of the following cabotage points: Bermuda, Hong Kong, Seychelles, St Lucia, Antigua or Nassau. BOAC staff will not be eligible for this prize should one of them win.

(b) The leading three stations in each British Isles country, the individual band leaders and runners-up will each receive a special certificate.

(c) All entrants will receive a commemorative certificate.

(d) BOAC will provide an all-day airport visit with lunch for four entrants chosen from each contest. The acceptable entries in each contest will be balloted to determine the eight winning entrants.

RECEIVING SECTION

1. The following **General Rules for RSGB HF Receiving Contests**, published in the January 1973 issue of *Radio Communication* will apply: 1, 2, 3, 4, 5, 7, 8.

2. **When.** As Transmitting Section.

3. **Operation.** As Transmitting Section.

4. **Logging.** A station may only be logged once in the column headed "Station heard" and not more than 10 times in the column headed "Station worked" on each band. Where both sides of a contact are heard, claim for points may be made for one station only, not both.

5. **Scoring.** Three points for each contact heard.

6. **Awards.** The winner of each contest (telephony and cw) will receive a special award. Those placed second and third will receive a certificate. Certificates will also be awarded to the leading receiving station on each band.

7. Entrants must operate from their home address, and not from a club or other special station.

1972 144/432MHz CW Contest results

The support for this contest was disappointing. Although some contestants welcomed the operating times, which were designed to coincide with any evening or dawn lifts, the majority of operators found the times inconvenient. Some competitors suggested splitting the contest into Saturday evening and Sunday morning sections with a scheduled sleeping period between.

The winner was PA0EZ, who also made the best dx on both bands, on 432MHz he worked G3DAH at 290km and on 144MHz he worked HB9ADJ/P at 640km.

M. D.

Posn	Callsign	County	144MHz		432MHz		Total Points
			QSOs	Points	QSOs	Points	
1	PA0EZ		55	665	5	64	729
2	G3NHE	YS	33	255	3	55	310
3	G3OHH	SD	29	208	3	35	243
4	G3WSN	EY	32	202	4	40	242
5	G5UM	LR	11	51	8	140	191
6	G3DAO	SA	29	191			191
7	G3UKV	SP	31	189			189
8	G3KMI	HE	27	141			141
9	G3TQZ	WH	23	125			125
10	G2WS	ST	20	114			114
11	G4AEQ	LE	11	61	4	50	111
12	G4BEZ/A	GR	22	97			97
13	G3BPM		21	75			75
14	G3YFF/P	SX	13	71			71
15	G3ZOD	CH	7	23	3	15	38

Check logs received from G2HH and G2ZFZC

1972 2nd 1.8MHz Contest results

This event was won by Donald Field, G3XTT, operating the station of Cambridge University Wireless Society, G6UW, with a score of 742, fairly closely followed by a battle royal for 2nd which resulted in a runners-up certificate for P. F. Linsley, G3PDL, with 722. The certificate for the highest entrant under 18 years goes to A. McHale, G4AMH, with 386 points. The current leader for the Maitland Trophy is James Christie, GM3FXM, who scored 550.

A number of logs had to be rescored upwards due to a misprint in the rules, but this is nothing, compared with the loss of points

suffered by many stations due to errors. A large number of these errors were incorrectly logged callsigns. It should be realized that if a station logs your callsign wrongly, you will be penalized too, for not correcting him successfully.

Comments were few, among them:

"Must be getting old I, but why not, say, 1900-midnight?"—G3LCH.

"Worked my first 'W' ever, but he wouldn't give me a number"—G4AEL. (You should have logged him, it would have been the only "W" among the entries, and could have counted for points!)

"A daytime contest, to give the people with small gardens a chance, would be interesting"—G3RVM.

Subject to Council approval the Victor Desmond Trophy will be awarded to D. Field, G5XTT.

The HF Contests Committee gratefully acknowledges check logs from OK1ATP, OK1MCW and OL1A0H.

Posn	Callsign	Points	Cnty	Posn	Callsign	Points	Cnty
1	G6UW (Op. G3XTT)	742	CE	21	GM3YOR	482	FE
2	G3PDL	722	LN	22	G3XWZ	436	NM
3	G3RVM	715	WE	23	G3JZ	407	KT
4	G3ZPC	711	DH	24	G4AMH	386	YS*
5	G3VUM (Op. G3XDY)	677	LE	25	G3MGL/A	384	SX
6	G6BQ	671	KT	26	G3IGU	324	YS
7	G4AFS	659	HF	27	G4AEL	302	GR*
8	G3VRW	656	LE	28	GW3JI	296	CV
9	G3WTA	622	ND	29	G3LCH	294	LD
10	G3MZV/P	584	GR	30	GM4ASY	273	RW*
11	G3JEQ	573	SY	31	G3ATF	262	MX
12	G3WDF/A	571	EX	32	G2BTO	257	LE
13	G3TIR	566	SX	33	G3ZYW	246	ST
14	G3VMO	561	EX	34	GW3GWX	242	CV
15	G3XTJ	561	LD	35	G4AZN	232	BE
16	GM3FXM/A	550	FE	36	G3VLX	219	KT
17	G3TR	519	SY	37	G4ALG	204	BE
18	G3HVX	515	HD	38	GM3UKG/P	202	BF
19	GW3UCB (Op. G3WXS)	511	CV	39	GW4BCA	196	CV*
20	G3ORY/A	504	LR	40	G3DOP	156	CL
				41	G8OZ	148	DY
				42	G3YMC/A	100	BE
				43	G3VJZ	88	EX

The following entries were unacceptable: G3TLK (late entry), G3FJE/A and G3FVW (both sent to wrong address, arriving too late for checking).

* Entrant under 18.

September/October 1972 BATC National ATV Contest results

SECTION 1

Posn	Callsign	Points	QSOs	Best dx
1	G6AEV/T	4,294	58	G6AFW/T—165km
2	G6AGT/T	3,309	54	G6AEV/T—135km
3	G6AFW/T	3,102	31	G6ARM—225km
4	G6KQJ/T	1,450	18	G6ARM—203km
5	G6GDR/T	679	13	G6OPB/T—46km

SECTION 2

1	G3YQC	712	6	G6AGT/T—68km
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Colchester VHF/UHF Contest results

Some 24 stations operated during this contest on 14-15 October 1972. The overall winner was G3ZVC, the runner up G8FBL, and the SWL Award goes to BR53794.

The organizers would like to thank all who took part in this event, and hope to run a further contest in April 1973.

February 70MHz Open Contest rules

Date: 18 February.

Times: 1000-1800gmt.

All entries and checklogs must be sent to: VHF Contests Committee, c/o G3XHU, 5 Birkdale Drive, Oakham Green, Tividale, Warley, Worcs.

The following General Rules, published in the January 1973 issue of *Radio Communication*, will apply: 1, 2, 3, 4b, 5a, 6a, 7a, 8b, 9a, 10a, 11-24.

March 144/432MHz Open Contest rules

Dates: 3-4 March.

Times: 1600-1600gmt.

All entries and checklogs must be sent to: VHF Contests Committee, c/o G3VPK, "Mapleleaf", Great Braxted, Witham, Essex, CM8 3EJ.

The following General Rules, published in the January 1973 issue of *Radio Communication*, will apply: 1, 2, 3, 4b, 5a, 6a, 7a, 8b, 9a, 10a, 11-24.

A multiplier of 6 will be applied on 432MHz. The timing of the contest has been agreed with IARU.

March 144MHz Fixed Station Contest rules

Date: 4 March.

Times: 0800-1600gmt.

All entries and checklogs must be sent to: VHF Contests Committee, c/o G8ACJ, "Easedale", Woodway Merrow, Guildford, Surrey.

The following General Rules, published in the January 1973 issue of *Radio Communication*, will apply: 1, 2, 3, 4b, 5a, 6a, 8c, 9a, 10a, 11-24.

432MHz Open Contest rules

Dates: 31 March-1 April.

Times: 1600-1600gmt.

All entries and checklogs must be sent to: VHF Contests Committee, c/o L. Hawkyard, G5HD, 100 Shirley High Street, Southampton SO1 4FB.

The following General Rules, published in the January 1973 issue of *Radio Communication*, will apply: 1, 2, 3, 4b, 5a, 6a, 7a, 8b, 9a, 10a, 11-24.

The Council Cup will be awarded for this contest.

Amateur Television Cumulative Activity Contest

In connection with the rules of this contest published in the December 1972 issue, it should be noted that there are two sections in the contest:

- Those amateurs who transmit atv.
- All other amateurs.

Barry College of Further Education ARS 10m Contest rules

- 1000-1200 and 1400-1600gmt on 18 February 1973.
- Open to all amateurs in Zone A of the 2m band plan. Only one section may be entered for scoring although operation may be in both parts.
- All modes.
- Exchange RS(T) plus serial number beginning at 001 in each section.
- Each contact counts one point.
- Logs should show time, callsign of station worked, report out, report in, mode, points claimed, and be sent not later than 18 March 1973 to: Barry Radio Society, c/o D. H. Adams, GW3VBP, College of Further Education, Barry, Glamorgan.
- Listeners in any part of the country may enter and should log stations taking part in the contest, noting the serial numbers sent and received.
- A £1 Book Token will be presented to the leading amateur and listener.
- In the event of any dispute the ruling of the committee of the society shall be final.

RSGB Direction Finding Contests

The dates and districts for the seven qualifying events are given in the "Contests Calendar" in this issue; only minor changes have been made in the rules, copies of which will be issued to all competitors. The Final will commence half an hour earlier at 1250, and three transmitters will have to be located.

Contests calendar

January-February — Amateur TV Cumulative Activity (Rules in December issue)

January-February — 432MHz Cumulative (Rules in this issue)

10-11 February — First 1-8MHz (Rules in January issue)

17-18 February — ARRL DX CW

18 February — 70MHz Open (Rules in this issue)

24-25 February — REF Phone

3-4 March — 144/432MHz Open (Rules in this issue)

3-4 March — ARRL DX Phone

4 March — 144MHz Fixed (Rules in this issue)

10-11 March — BERU (Rules in November issue)

11 March — WAB HF Phone

17-18 March — ARRL DX CW

24-25 March — CQ WW WPX SSB

25 March — WAB HF CW

24-26 March — BARTG Spring RTTY (Rules in January issue)

31 March-1 April — 432MHz Open (Rules in this issue)

1 April — WAB LF Phone

8 April — WAB LF CW

8 April — 80m Low Power

15 April — 70MHz Portable

21-22 April — Bermuda Phone

29 April — DF Qualifying, Rugby

5-6 May — 144/432MHz Open

5-6 May — Bermuda CW

6 May — 432MHz Fixed

12-13 May — Jubilee Phone (Rules in this issue)

19-20 May — Jubilee CW (Rules in this issue)

20 May — DF Qualifying, S Manchester

27 May — 144MHz Portable

2-3 June — NFD (Rules in this issue)

9-10 June — 70MHz Open

10 June — DF Qualifying, High Wycombe

16-17 June — Microwave FD

17 June — WAB VHF Phone

23-24 June — Summer 1-8MHz

24 June — DF Qualifying, Chelmsford

7-8 July — Jubilee VHF/UHF

14-15 July — SSB FD

15 July — DF Qualifying, Coventry

22 July — 432MHz Portable

5 August — DF Qualifying, Slade

12 August — 70MHz Fixed and Portable

18 August — 144MHz QRP

19 August — 144MHz SSB Open

1-2 September — VHF NFD

1-2 September — IARU 144MHz

9 September — 80m FD

9 September — DF Qualifying, Dartford Heath

23 September — DF Final, to be organized by Stratford Group

6-7 October — UHF NFD

6-7 October — IARU 432/1,296MHz

13-14 October — 21/28MHz

20-21 October — 7MHz CW

3-4 November — 7MHz Phone

3-4 November — 144/432MHz CW

10-11 November — 2nd 1-8MHz

11 November — 70MHz Cumulative

9 December — 144MHz Fixed

Mobile Rallies Calendar

- 1 April** White Rose RS, Lawnswood Girls' High School, Ring Road, West Park, Leeds 16.
- 6 May** Spalding Tulip-Time.
- 27 May** Northern, at Moorgrange Secondary School, West Park, Leeds.
- 24 June** Bristol City and County RSGB Group, at Longleat, Warminster, Wilts.
- 1 July** South Shields and DARC, at Redwell School, Prince Edward Road, South Shields.
- 8 July** Cornish RAC.
- 19 August** Bristol Mobile Picnic, Ashton Court Bristol.

CLUB NEWS

REGION 1

RR B. O'Brien, G2AMV

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

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

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

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

Bury (B & RRS)—Second Tuesday each month, 8pm, George Hotel, Market Street, Bury. At the December meeting, the AGM, the following were elected:— chairman G3TFM; secretary G8DHT; treasurer G3FLR; members G3SUI, G4AOS, G8GTP. January meeting is a constructional competition. Club net Sundays 11.30am, 145.8MHz. Club secretary: G8DHT.

Carlisle (C & DARS)—Mondays, 7.30pm, Currock House, Lediard Avenue, Currock. Secretary: G8GSE, 6 Carlton Gardens, Stanwix, Carlisle GA3 9NP.

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

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

Douglas IOM (D & DARS)—Secretary, G3YUM, will be pleased to hear from any member who intends to visit the island.

Eccles (E & DARS)—Tuesdays, 8pm, Bridgewater School, Worsley, Manchester. Club 2m net 11am on Sundays on 145.65MHz. All visitors and prospective members welcome. Secretary: G4AEQ QTHR.

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

Leyland Hundred (ARG)—Second Monday each month, 7.30pm, Rose & Crown, Ulnes Walton, Leyland. Net night Saturdays, 1900bbs on 145.8MHz. Details from F. Harrison, 78 Lancaster Lane, Leyland, Lancs.

Liverpool (L & DARS)—4 February (L & DARS 2m Contest), 9 February (G3AHD on the air), 13 February (Review of commercial equipment—Stephens-James), 20 February (Lecture), 27 February (Visit by Basil O'Brien, G2AMV, RSGB Region 1 Representative). The club station is on the air on the first Tuesday of each month. Secretary: G3WCS.

Liverpool (NLRC)—Tuesdays, 8.30pm, informal meeting at the "Nags Head", Thornton, Crosby, Liverpool 23. Visitors welcome. Please note new secretary is Alan L. Hart, G4BLI, 50 Strawberry Road, Liverpool L11 7AD.

Liverpool University (M & DARS)—Liverpool University radio club meets every lunchtime in the Radio Room, Students' Union. G3OUL will be active in the next 2m contest, either mobile or from the top of the physics tower, and visitors are welcome. Please arrange visits with the secretary, Nigel Pope, G4AXA, c/o Students' Union, 2 Bedford Street North, Liverpool 7.

Manchester (M & DARS)—Wednesdays, 7.30pm, all meetings include Morse classes. 203 Dryollesden Road, Newton Heath, Manchester 10. Secretary: G3IOA.

Manchester (SMRC)—The club meets at 8pm at the Sale Moor Community Centre, Norris Road, Sale, Cheshire (every Friday). The vhf lads meet on Mondays at 8pm at the club shack, "Greeba", Shady Lane, Manchester 23. 2 February (Surplus Equipment Sale—visitors welcome), 9 February ("Radio Astronomy Part 2" by P. Stewart), 16 February ("A 2m transverter" by P. Torry, G3SMT), 23 February (Talk on batteries by W. L. Seddon, G3VIW), 2 March ("Safety in the shack" by W. R. Parkinson, G3FNM). Visitors are welcome on both Mondays and Fridays. Secretary: G3WFT QTHR.

Manchester University (ARS)—G3VUM is active on all hf bands and now also on 2m. Details may be obtained from G4AZA, G3ZNS

or G3XDY. The programme of lectures, visits, RAE and Morse tuition continues as previously. Enquiries may be addressed to any of the above at the University Union, Oxford Road, Manchester.

Preston (PARS)—1 and 15 February, 1 March, 7.30pm, Windsor Castle (private room), St Paul's Square, Preston. Secretary: G. Earnshaw, G3ZXC. Morse practice 7.30pm, main feature 8pm.

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

Thornton Cleveleys (ARS)—First and third Wednesdays, 8pm, St John Ambulance Brigade HQ, off Fleetwood Road North (behind Police Station), Thornton, Lancs. Project Group meets on Fridays, 7.15-9pm, at the Project Laboratory, Rossall School, Fleetwood. Work in hand includes 160 and 2m transmitters and receivers. Further details from G3ZYE.

Warrington (W & DARS)—Tuesdays at Thames Board Mills Social Club, Alford Hall, Manchester Road, Warrington. Secretary: G3ZRN. Alternate meetings are devoted to beginners.

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

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

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

REGION 2

RR J. E. Agar, G8AZA

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

Bradford (BRS)—Meets at club HQ, 10 Southbrook Terrace, Bradford N7. Hon sec: R. Harker, A7585, 65 Whitby Road, Bradford BD8 9JN. Tel Bradford 43971.

Doncaster (DC of TARC)—Meets Mondays, 7pm, at the College of Technology (refectory), club callign G3UER. Details from hon sec: G. Boothroyd, 38 Ascot Avenue, Cantley, Doncaster. G4AWT.

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

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

Halifax (NHARS)—7 February (Committee meeting), 14 February (Ragchew), 28 February (Favourite gadget demonstrations). Hon sec: G3MDW QTHR.

Harrogate & Knaresborough (H & KRS)—Meets second and third Mondays each month, Hon sec: G4AZJ QTHR.

Hull (H & DARS)—2 February ("Hair raising experience" by G8EAH), 9 February (N.K. Green, president of Hull Photographic Society, will show members some of his own films), 16 February (Quiz), 23 February (P. Brumpton of the Yorkshire Electricity Board, "Power Distribution and Protection"). Hon sec: Mary Longson, 4 Chester Road, Hull.

North Riding (NRARG)—Meets at Alma Inn fortnightly. Details from hon sec: G8AZA QTHR.

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

Otley (ORS)—Meets fortnightly, Tuesdays. Details from D. G. Mott, hon sec, 17 Newall Carr Road, Otley. ORS is pleased to announce the Eighteenth Northern Mobile Rally on 27 May 1973 at Moorgrange Secondary School, West Park, Leeds. Other rally organizers please note so as to avoid a clash of rally dates. Further details from hon sec. Details as above. Tuesday 20 February (Further discussion on the use of hardware—using tti to best advantage), 8pm, in the club HQ, all visitors welcome.

Scarborough (SARS)—Meets Fridays, 7.30pm, at Technical College, Scalby Road, Scarborough. Details from hon sec: G3VAN QTHR, or area rep and pro: G8KU QTHR.

Spen Valley (SVARS)—1 February ("Measuring equipment" by L. M. Dougherty, MSc, FRAS), 8 February ("160m dx contest" by Jim Fish, G4MH), 15 February ("Computers" by W. G. Scarlett, G3RXS), 1 March (Electronic quiz versus Northern Heights ARS, at home).

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

Tyneside (TARS)—Meets Mondays, 7.30pm, at the Community Centre, Vine Street, Wallsend upon Tyne. Visitors always welcome. Hon sec: G. Lowden, 21 Winefred Gardens, Wallsend NE28 6EF. Tel Wallsend 627878.

Wakefield (WRS)—Meets alternate Tuesdays, 7.30pm, at Youth Centre, Ings Road, Wakefield. Details G3XVU QTHR.
York (YARS)—Thursdays, 7.30pm. Club callsign: G3HWW, 61 Micklegate, York. RAE course in progress. Hon sec: J. A. Rainbow, 14 Temple Road, Bishopthorpe, York.
 It is proposed to hold a Region 2 ORM at Denby Dale, Yorks, at a date to be arranged. Comments from club secs concerning the above meeting would be appreciated. Either to G8AZA or G4JW.

REGION 3

RR R. W. Fisher, G3PWJ

Birmingham (MARS)—No information, The Birmingham & Midland Institute, Margaret Street, Birmingham 2. G3ZMT.
(South)—9 February (Visit to the Motorway Control Centre), 16 February (Informal supper), 23 February ("With a Camera in the Alps" by Mr L. Evans), 8pm, The Church House, High Street, Erdington, B23, G4BRT.
Coventry (CARS)—Every Friday evening, 8pm, Baden Powell House, St Nicholas Street, Radford Road, Coventry. G3TFA.
Cannock (CCARS)—1 February, 5 March, 8pm, Bridgtown Social Club. G8EHY.
Dudley (DARC)—6 February, 20 February, 8pm, Central Library, St James's Street, Dudley. G3PWJ.
Hereford (HARS)—2 February (AGM), 16 February, 7.30pm, Civil Defence HQ, Gaol Street, Hereford.
Solihull (SARS)—20 February (Photographs of members' shacks), 7.30pm, The Manor House, High Street, Solihull. G4ABV.
Stourbridge (STARS)—6 February (Informal at Shrubbery Cottage), 19 February, 8pm, Longlands School, Stourbridge.
Sutton Coldfield (SCRS)—7, 14 February (visit to the Motorway Control Centre), 12 February (Informal meeting), 26 February ("RSGB matters" by R. Fisher, G3PWJ), 8pm, Sutton Town Football Club Social Centre, Coles Lane. G8ALO.
Wolverhampton (WARS)—5 February (Basic radio & tv servicing" by G3FWD), 7.30pm, Neachells Cottage, Stockwell End, Tettenhall. G3UBX.
Telford (WARS)—7 February (Films), Walker Technical College, 14 February (Construction evening—filters for tv), 21 February (Making printed circuits), 28 February, 8pm, Kettle Bank. G3UKV.
Worcester (W & DARC)—5, 17 February, 5 March, 8pm, Shakespeare Hotel, Angel Street. G8ASO. (Worcester 29208).

REGION 4

RR T. Darn, G3FGY

Derby (DADARS)—7 February (Surplus sale), 14 February ("To the North Cape of Norway by coastal steamer", illustrated talk by the president, A. G. G. Melville), 21 February ("Automatic broadcasting" by R. Leslie of the BBC), 24 February (Annual dinner and dance at the Derbyshire Yeoman, Kingsway, Derby). Tickets £1.50 each from G2CVV. 28 February (Film show). All meetings are held in the newly decorated clubroom at 119 Green Lane, Derby, and commence at 7.30pm. Everyone welcome. Monday night is activity night in the clubroom; Thursday is devoted to radio control of models. G2CVV.
Lincoln (LSWC)—7 February ("DF" by Mr L. Harding), 14 February (Club project, construction of receivers etc), 21 February (Open night), 28 February (Film show). The club now has a new secretary, Mr F. Day, and meetings are now held at the Lecture Room of the Lincoln Astronomical Society, Westcliffe Street, off Burton Road, Lincoln. Meetings start at 7.30pm and visitors are always welcome.
Melton Mowbray (MMARS)—16 February (Film show—RSGB films and others), 7.30pm, St John Ambulance Hall, Asfordby Hill, Melton Mowbray. G3NVK.
Nottingham (ARCON)—8 February (Talk—to be announced) 15 February (Activity night), 22 February (Another mystery talk). The latest information on the subjects of talks will be broadcast on Radio Nottingham. All meetings held at the Sherwood Community Centre, Mansfield Road, Nottingham, at 7.30pm.
Heanor (SEDARS)—Every Tuesday evening, 7.30pm, during College terms, at Derbyshire South East College of Education, Ilkeston Road, Heanor, Derby. (W. Clarke).
Spalding (SDARS)—The club is now affiliated to the RSGB. 16 February (Club's own films and discussion), 7.30pm, the Holland Teachers' Centre, Knight Street, Pinchbeck, nr Spalding. G3VPR.

REGION 5

RR P. J. Simpson, G3GGK

Bedford (B & DARC)—1 February ("Receiver comparisons" by G3XKB), 8 February ("Audio and quadraphonic sound" by Alan Hawkins), 15 February ("Amateur television techniques" by G8BCX), 22 February ("Linear amplifiers, vhf and hf" by G8FMG and G3FWA), 1 March ("FT2er demonstration" by G8GQD). RSGB Jubilee Year

Exhibition, each Saturday from 3 February to 24 February at the County Library, Bedford. Meetings 7.30pm, the Dolphin, the Broadway, Bedford. Hon sec: John Bennett, G3FWA, 47 Ibbett Close, Kempston, Beds.

Cambridge (CADARS)—2 February ("New electronic materials" by G8DLM), 9 February (Informal), 16 February ("L.E.D.s" by G3PJJ), 23 February (Informal), 2 March (Film night), 7.30pm, club HQ, Corporation Yard, Victoria Road, Cambridge. Hon sec: J. Hern, G3NAC, 5 Acheson Road, Bampton, Hunts.

Dunstable (DDRC)—2 February ("70cm PAs" by G6JP), 9 February (Between week), 16 February (AGM), 23 February (Contest discussion), 2 March ("GB3PI repeater" by G3SXX). Meetings 8pm, Chews House, 77 High Street South, Dunstable, Beds. Hon sec: C. G. Powell, G8BPK, 1 Wenwell Close, Buckland Wharf, Aston Clinton, Aylesbury, Bucks.

Shefford (S & DRS)—1 February ("Oscilloscopes" by G3EUS), 8 February ("Workshop practice" by G3VMI and G8EKU), 15 February ("Operating club equipment" by G3VMI), 22 February (Preliminary NFD planning). Morse practice at 7.45pm before each meeting, Church Hall, Amphill Road, Shefford. Hon sec: Chris Davies, G8DUY, 17 Brigham Gardens, Biggleswade.

Stevenage (S & DARS)—1 February (General discussion), 15 February (S. Brown, G3RFG), 1 March ("GB3PI repeater" by G3SXX), 7.30pm, senior staff canteen, Hawker Siddeley Dynamics Ltd, Gunners Wood Road, Stevenage. Hon sec: F. Collett, G3OVT, 8 Silam Road, Stevenage, Herts.

REGION 6

RR L. W. Lewis, G8ML

Banbury (ARS)—Meeting at Woodgreen Hall, Banbury, 7.30-10pm, 9 and 23 February. Other Fridays at Fairhaven, Hanwell. Details from G3LTN. Tel Banbury 710623.

Cheltenham (RSGB Group)—First Thursday in each month, 8pm, at Royal Crescent Hotel, Clarence Street, Cheltenham.

Gloucester (ARS)—First Thursday of each month at the Oddfellows Club, Barton Street, Gloucester, 7.30pm. Also each remaining Thursday of each month at the Drill Hall, Education and Leisure Centre, Chequers Road, Gloucester. Friday, 2 March (First annual dinner/social at the Fleece Hotel, Westgate Street, Gloucester). G3MA.

North Bucks (ARS)—12 February, 8pm (Talk on teleprinters), 19 February (Visit to Bletchley signal box). Meetings at Wolverton Youth Club, second Monday in each month. G8AAT.

South Bucks (VHF Club)—First Tuesday in each month at Bassetbury Manor, High Wycombe. 6 February ("Helpful hints and mods to vhf receivers" by G6AMF). All visitors welcome. G8DDM.

REGION 7

RR R. S. Hewes, G3TDR

Acton, Brentford & Chiswick (ABCRC)—20 February ("A 2m transverter" by G3CCD), 7.30pm, Chiswick Trades & Social Club, 66 High Road, Chiswick, W4. Hon sec: W. G. Dyer, G3GEH QTHR.

Addiscombe (AARC)—Every Tuesday from 9pm, "Prince George", High Street, Thornton Heath. Hon sec: S. V. Knowles, G3UFY QTHR.

Ashford, Middlesex (Echford ARS)—12 February (Special general meeting), 22 February (Surplus equipment sale), 7.30 for 8pm, St Martin's Court, Kingston Crescent, Ashford, Middlesex. All visitors welcome. Hon sec: Vic Higgs, G3WVJ QTHR.

Barking (BR & ES)—Every Thursday, 7.45pm, Westbury Recreation Centre, Westbury School, Ripple Road, Barking, Essex. All visitors welcome. Hon sec: H. Davidson, G3FZP QTHR.

Bexley Heath (North Kent RS)—8, 22 February (No details received), 7.30 for 8pm, Congregational Church Hall, Chapel Road, Bexley Heath. Hon sec: Maurice Lee, G4BAL QTHR.

Burnham Beeches (BBARC)—1, 15 February (No details received), 8pm, Hedgerley Scout Hut, Hedgerley, Nr Slough, Bucks. All visitors welcome. Hon sec: Nina Appleby, G8ENX QTHR.

Cheshunt (CDRC)—2 February (No details received), 8pm, Methodist Church Hall, opposite Theobalds Station, Cheshunt. Hon sec: Richard Cudwell, G3ZZQ QTHR.

Chingford (Silverthorne RC)—Every Friday, 7.30pm, Friday Hill House, Simmons Lane, Chingford, E4. Hon sec: M. Higgins, G8BUF QTHR.

Cray Valley (CVRS)—1 February (Demonstration of equipment by KW Electronics), 15 February (Natter nite), 8pm, United Reformed Church Hall, Court Road, Eltham, SE9. Hon sec: P. E. Vella, G3WVP QTHR.

Croydon (Surrey Radio Contact Club)—20 February (No details received), 8pm, Swan & Sugarloaf, Brighton Road, South Croydon. Hon sec: Sid Morley, G3FWR QTHR.

Crystal Palace (CP & DRC)—17 February (Annual general meeting), 8pm, Emmanuel Church Hall, Barry Road, SE22. Hon sec: Geoff Stone, G3FZL QTHR. Tel 699 6940.

Dartford Heath (DF Club)—2 February (Club night), 16 February (Talk on theatrical production), 8pm, The Scout House, Broomhill Road, Dartford. Hon sec: Maureen Worby, G3XVC QTHR.

Dorking (DR & DRS)—Second and fourth Tuesdays, 8pm, "Surrey Yeoman", Dorking. Hon sec: P. B. Gilby, 6 Hawkwood Rise, Gt Bookham, Surrey.

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

East London RSGB Group—Meeting every third Sunday each month, 2.30pm, Wanstead House, The Green, Wanstead, W11 (200 yds from Wanstead Underground Station). Details from Cyril E. Lumley, 48 Latchingdon Gardens, Woodford Bridge, Essex, IG8 8EA. At the recent AGM the following officers were elected: chairman, A. W. Rix, G3RYF; secretary, C. E. Lumley, BRS31964; Treasurer, J. Rixson, BRS26769.

Edgware (E & DRS)—8 February (To be announced), 22 February, (Informal), 8pm, Watling Community Association, 145 Orange Hill Road, Edgware. Hon sec: Alan Masson, G3PSP QTHR.

Gravesend RSGB Group—Mondays at 7.30pm, "Windmill Tavern", Shrubbery Road, Gravesend, Kent. Area representative: P. F. Jobson, G3HLF QTHR.

Guildford (G & DRS)—Second and fourth Fridays, 8pm, Model Engineering hq, Stoke Park, Guildford, Surrey. Further details from hon sec: Peter Hopwood, G8CQM QTHR.

Hampton Court (Thames Valley ARS)—7 February (No details received), 8pm, "The Three Pigeons", Portsmouth Road, Long Ditton, Surrey. PRO: Rob Muir, G3LHN QTHR.

Harlow (DRS)—Every Tuesday, 8pm, Mark Hall Barn, First Avenue, Harlow. Club station now operative on 80-10m ssb/cw. Club net Sunday mornings, 10.30 on 28.8MHz, members use frequency most nights at 2100gmt. Hon sec: V. Heard, 106 Vicarage Farm Road, Harlow Essex.

Harrow (RSH)—2 February (Film show), 9 February (Bring and buy), 16 February (Practical evening), 23 February (To be arranged), 8pm, Harrow Sea Scouts hq, Woodland Road, Harrow. Hon sec: Leslie Light, G3KDL QTHR.

Havering (H & DARC)—14, 28 February (No details received), 8pm, British Legion House, Western Road, Romford. Hon sec: S. J. Hobday, G3SKV QTHR.

Holloway (Grafton RS)—Mondays (RAE), 7pm, Fridays (Morse club night), 7.30pm, 9 February ("Power measurements" by G3ZKE), 23 February ("Aerials & Propagation" by R. S. Roberts, G6NR). Visitors welcomed. Archway School Annex, Whittington School, Highgate Hill, N19. Further details from hon sec: H. D. Ashcroft, G8AYU QTHR.

Ilford (ARS)—Every Thursday, 8pm, Mortlake Road (off Ilford Lane), Ilford. Hon sec: F. G. Jarvis, G3HIW QTHR.

Kingston (K & DARS)—14 February ("Design and construction of an If band transmitter" by Mike Diprose, G4AKA), 8pm, "Penguin Lounge", 37 Brighton Road, Surbiton, Surrey. PRO: Mike Diprose.

Loughton (L & DRS)—2, 16 February (No details received), 8pm, Loughton Hall, near Debdon Station. Hon sec: David Bowers, 12 Theydon Park Road, Theydon Bois, Essex.

New Cross (Clifton ARS)—Every Friday, 8pm, 225 New Cross Road, London, SE14. Details from hon sec: R. A. Hinton, 58 Camilla Road, Bermondsey, SE16.

Northolt (BEARS)—First Thursday in the month, BEA Trident Club, Western Avenue, Northolt, Middlesex. (This club is open to non-BEA employees by invitation. Contact David Evans, G3OUF. Tel Amersham 21573 for details).

Paddington (P & DRS)—Every Wednesday, 8pm, Beauchamp Lodge, Warwick Crescent, W2. Further details from hon sec: Mike Pawley, G8AWV QTHR.

Purley (P & DRS)—First and third Fridays, 2 February (Natter night), 8pm, Lansdowne Hall, Lansdowne Road, Purley. Hon sec: Alan Frost, G3FTQ QTHR.

Reigate (RATS)—7 February (Constructional contest), 8.15pm, Nutley Hall, Nutley Lane, Reigate. Hon sec: F. H. Mundy, G3XSZ QTHR.

Scouts (Baden Powell House ARG)—15 February (No details received), 8pm, Baden Powell House, Queensgate, South Kensington, SW7. Hon sec: Alf Watts, G3FXC QTHR.

Southgate (SRC)—8 February (No details received), 8pm, Civil Defence Hut, Bowes Road, N11 (Near Arncliffe Grove Underground station). All visitors welcome. PRO: Steve White, G3ZVW QTHR.

St Albans (Verulam ARC)—21 February (No details received), 8pm, Market Hall, St Albans. All visitors very welcome, hon sec: Hugh Young, G3YHY QTHR.

Sutton & Cheam (SCRS)—20 February (Construction contest), 8pm, "The Harrow Inn", Cheam, Surrey. Hon sec: Jack Korndorfer, G2DMR QTHR.

UK FM Group (London)—8 February (Being arranged), 7.30 for 8pm, Scout Hut, Hayes Road, Southall, Middlesex. Details from PRO: Mike Tooley, G8CKT QTHR.

Welwyn (Mid-Herts ARS)—8 February (No details received), 8pm, Welwyn Civic Centre, Herts. Hon sec: Peter Wilcocks, G8AIE QTHR.

Wembley (GECARS)—Every Thursday, 7pm, Sports Club, Preston Road, North Wembley. (This club is open to non-GEC employees by invitation. Tel Dain Evans, G3RPE, at 01-904 1262 during business hours for details).

West Middlesex ARC—Meets at Greenford Community Centre, Oldfield Lane, Greenford, Middlesex. Details from John Hedges, G3MMQ QTHR.

Wimbledon (W & DRS)—9, 23 February (No details received), 8pm, St John Ambulance hq, 124 Kingston Road, Wimbledon, SW19. Hon sec: F. W. Hill, G3WDO QTHR.

REGION 8

RR D. N. T. Williams, G3MDO

Canterbury (EKRS)—3 February (Annual dinner dance), 15 February ("Simple receivers for the beginners"), 15 March ("Accurate frequency and time" by G3JIX).

Canterbury University (UKCRC)—Details of club meetings from K. Beesley, G3UXE, Eliot College, University of Kent at Canterbury.

Crawley (CARC)—Monthly meetings held at Trinity Congregational Church Hall, Ifield, Crawley.

Medway (MARTS)—Meetings held every Friday at Aurora Club, Gillingham. Further details of meetings from H. E. Willis, 111 Laburnum Road, Strood, Kent.

Maidstone (MYMCAARS)—2 February ("CW & radio theory for the beginners" by G3ORH/G3XUN), 9 February ("Junk sale", mc: G3ORP), 16 February ("CW & beginners' tuition" by G3ORH/G3XUN/G3ORP), 23 February ("Discussion re Maidstone Mobile Rally 1973", mc: G3WXL), 13 April (AGM).

Horsham (HARC)—Formal meetings held on the first Tuesday of each month at Guide Hall, Denne Road, Horsham. 6 February ("Building for 23cm" by G3NPF). On the third Tuesday of each month an informal meeting is held in the Popular Bar of the Star, Roffey. At the annual general meeting in December, Ron Polley, the former secretary, was appointed chairman. The new secretary is Tony Wadsworth, G3NPF, and the new committee G3TNO, G3VQO, G3XCM and G4BMS.

Eastbourne (SARS)—Meetings held on first Monday in the month at Victoria Hotel, Latimer Road, Eastbourne. PRO: G3JFM.

Brighton (BTCARC)—Details of future meetings from hon sec: G2CMH, 35 Willington Way, Brighton.

Tunbridge Wells (WKARS)—16 February (Special sale of equipment), 2 March ("Digital clocks" by Stan Smith). Meetings held alternate Fridays at Arts Centre, Monson Road, Tunbridge Wells, further details from H. Richards, 17 Reynolds Road, Tunbridge Wells.

Worthing (W & DARC)—Meetings held every Tuesday, 8pm, at Rose Wilmot Youth Centre, Littlehampton Road, Worthing. Details of meetings from G8ETL, 12 Bramble Crescent, Worthing.

Mid-Sussex (MSARS)—Details of future meetings and activities from hon sec: G3RXJ.

REGION 9

RR H. W. Leonard, G4UZ

Bristol (City & County Group)—26 February ("3cm" by G3WDG, G8ADP and G8CVS), 7 for 7.30pm, Becket Hall, St Thomas Street, Bristol 1. G3ULJ.

Bristol (BARC)—Every Tuesday, 7.45pm, 24 Bright Street, Bristol 5. G3XEL.

Bristol (Shirehampton)—Every Friday, 7.30pm, Twyford House, Shirehampton.

Bristol (University ARS)—Most Saturdays during term time, 2.30pm, Dept of Physics, Royal Fort, Tyndalls Park Road, Bristol 8. G8CVS.

Cornish (CRAC)—First Thursday in month, 1 February (Team quiz and natter period), 1 March ("The Newquay Club" by G3THT and sale of surplus equipment), 7.30pm, SWEB Clubroom, Pool, Camborne. Visitors most welcome.

Newquay Group (CRAC)—Fortnightly on Wednesdays, 7 February ("Construction of a simple signal generator"), morse instruction at each meeting, 7.30pm, Treviglas School, Newquay. G3THT. Tel Newquay 4512. Further details of Cornish and Newquay Group gladly supplied by G3NKE QTHR.

Exeter (EARS)—Every Tuesday, 7.30pm, Community Centre, St Davids Hill, Exeter. Hon sec: A. W. Bawden, 232 Exwick Road, Exeter EX4 2BA.

North Devon (NDRC)—Second and fourth Wednesdays of month, 7.30pm, "Grinnis", High Wall, Sticklepath, Barnstaple. G4CG.

Plymouth (PRC)—First and third Tuesdays of month, 7.30pm, Virginia House, Bretonside, Plymouth. Hon sec: G4BCX QTHR. 6 February (2m seminar), 6 March ("Oscar 6" by G5ZT).

Saltash (S & DARS)—First and third Fridays of month, 7.30pm, Burraton Toc H Hall, Saltash. Further details from G3ZHM.

South Dorset (SDRS)—First Friday of month, 2 March ("Aerials"), 7.30pm, Alma Road Section of Weymouth Technical College. G3VPF.

Taunton (T & DARS)—Fridays, 7.30pm, Jelalabad Barracks, The Mount, Taunton.

Torbay (TARS)—Every Tuesday and special meeting on last Saturday of month, 24 February ("Navigational aids by radio" by G3OGH), 7.30pm, rear of 94 Belgrave Road, Torquay. 10 March (Annual dinner). Visitors always welcome at the clubrooms. G3NQD.

Weston-super-Mare (WsmRS)—Second Friday of month, 7.30pm, room Lewis M2, Worle School, New Bristol Road, Worle. G3PQE.

Yeovil (YARS)—Every Thursday, 7.30pm, The Youth Centre, 31 The Park, Yeovil. G3NOF.

REGION 10

RR D. M. Thomas, GW3RWX

Blackwood (ARC)—Fridays, 7.30pm, Oakdale Community Centre, Oakdale, Blackwood, Mon. GW3TUG.

Barry College of Further Education (ARS)—Thursdays, 7pm, College of Further Education, Colcot Road, Barry, Glam. GW3VKL.

Cardiff (RSGB Group)—Monday 12 February, 7.30pm, at BBC Club, Llandaff, nr Cardiff. GW3GHC.

Haverfordwest (ARS)—Tuesdays 7.30pm, hq, Rosemary Lane, Haverfordwest, Pems. GW3YBB.

Hoover (ARC)—Mondays, 7.30pm, Hoover Social Club, Hoover Works, Pentrebach, nr Merthyr, Glam.

Pembroke & District (RSGB Group)—Last Friday of each month, 7.30pm, at the Defensible Barracks, Pembroke Dock, Pems. GW3LXI.

Pontypool (RSGB Group)—Tuesdays, 7pm, at the Educational Settlement, Rockhill Road, Pontypool, Mon. GW3JBH.

Port Talbot (ARS)—Second Tuesday of each month, 7.30pm, at the Rail & Transport Club, Station Road, Port Talbot, Glam. GW5VX.

Sully & District Shortwave Club—Tuesdays, 7pm, at the Annexe, Sully Bows & Social Club, 59 Port Road, Sully, Glam. GW4AMV.

Rhondda (ARS)—Meets at Rhondda Transport Employees Club & Institute, Porth, Rhondda, Glam. GW3PHH.

Swansea Radio Society—Meets on first and third Tuesdays of each month at 7.30pm. Also meets on second and fourth Tuesdays for RAE and Morse classes. All meetings at the Palace Bar, High Street, Swansea. Further details from Mr D. E. Connor, 54 Talley Road, Penlan, Swansea SA5 7EU.

South East Wales Raynet Group—Details from GW3ZFG. Tel Cardiff 62411.

University College of Wales, Cardiff (ARS)—Details from the secretary, Mr Simon Northeast, c/o Students Union, Dumfries Place, Cardiff.

University College of Wales, Aberystwyth Radio & Electronics Society—Details from the secretary, c/o Students Union, University College of Wales, Aberystwyth.

REGION 11

RR P. Hudson, GW3IEQ

Conway Valley (CVARC)—8 February ("The Westminster" by GW3ELM and "Navigation" by GW3GRY), 8 March ("Counters" by GW3GRY and "Simple Field Day rig" by GW3HGL), 1930, The Quarries, Llanddulas, Abergale.

Rhyl (R & DARS)—13 February ("Oscilloscope measurements" by M. Thistlethwaite, Tektronix), 13 March ("Aerials and matching" by GW3DZJ).

UCNWARS—8 February ("Tape noise reduction" by Mr I. Herdcastle of Dolby Laboratories Inc), 22 February (To be arranged), 8 March (Hi-fi lecture and demonstration).

REGION 13

RR V. W. Stewart, GM3OWU

Berwick (BARS)—Last Sunday in each month, 3pm, Tweed View Hotel. Further details from C. H. Crook, G3YOG, 19 Hatters Lane, Berwick-upon-Tweed or from the AR, G. Shankie, GM3WIG, 8 Ettrick Terrace, Hawick, Roxburghshire.

Dunfermline (DRS)—Second Wednesday in each month, 7.30pm, Abbot House, Dunfermline. Further details from G. Martin, GM3NVQ, 42 Rose Street, Dunfermline.

Edinburgh (LRS)—Second and fourth Thursdays, 7.30pm, 66 Hanover Street, Edinburgh. Further details from K. C. Henderson, 97 Ganton Road, EH5 3NH. (Phone 552 2147).

Glenrothes (GDARC)—First Sunday in each month, 7.30pm, Old Nursery Buildings, Leslie, Fife. Details from A. B. Givens, GM3YOR, 41 Veronica Crescent, Kircaldy, Fife. 4 March ("VHF portable" by GM3OXX).

St Andrews (USTARS)—7 February (Tape/slide lecture), 21 February (Colour tv), 28 February (AGM and films), 5pm, Dept of Physics, North Haugh, St Andrews. Further details from R. Marchant, GM3ZCQ as above. No meetings in March.

REGION 14 RR M. A. Comrie, GM3YRK

Ayrshire (AARG)—11 and 25 February, 7.30pm, YMCA, Howard Street, Kilmarnock.

Greenock and District (ARC)—Tuesday and Friday, 7.30pm, Watt Library, Union Street, Greenock. Visitors welcome, all enquiries to sec. Club callsign GM3ZRC.

Glasgow University Radio Club (GURC)—1 and 15 February, George Service House, University Gardens, Glasgow.

Falkirk and District RSGB Group—Temperance Cafe, Lint Rigge, Falkirk. For dates enquire to hon sec: J. Ramsay, 78 Wheatlands Avenue, Bonnybridge, Stirlingshire.

Ardeer (ARCARS)—Thursdays at 7.30pm, Ardeer Recreation Club, Stevenston, Ayrshire.

West of Scotland (ARS)—Wednesdays and Fridays at 7.30pm, 81 Virginia Street, Glasgow. Visitors welcome.

REGION 16 RR D. F. Beattie, G3OZF

Chelmsford (CARS)—First Tuesday of each month, 7.30pm, at Marconi College, Arbour Lane, Springfield, Chelmsford. 6 February (Film show), 6 March (Lecture—rtty). Details from G3YNY.

Colchester (CRA)—The name of the club has been changed to the Colchester Radio Amateurs. Meetings are still held at the North-East Essex Technical College every Wednesday, 7.30pm. Details from E. T. Jacobs, 26 Pondfield Road, Colchester.

Gt Yarmouth (GYRC)—Last Tuesday of the month, 7.30pm, at the Central Library, Gt Yarmouth. Details from A. D. Besford, 49 Blake Road, Gt Yarmouth.

Ipswich (IRC)—Two meetings each month at Handford House, Ranelagh Road, Ipswich, 7.30pm. 14 February ("Electronics in Industry"), 28 February (General meeting). Details from G3YWM.

Norfolk (NARC)—Every Wednesday, 7.45pm, at Crome Community Centre, Telegraph Lane East, Norwich. Details from G8BLD, The Rectory, Framingham Pigot, Norfolk, NOR 45W.

Southend (S & DRS)—Every other Thursday, 7.30pm, at the Flarepath Canteen, Southend Airport. Next meetings 8 and 22 February. Details from G3AXN.

University of East Anglia (UEAREC)—Meetings are held during term times, details from Mike Wade, School of Biological Sciences or from G3IOR.

REGION 17 RR L. N. G. Hawkyard, G5HD

Reading (RARC)—1973 committee: chairman G8DOR, treasurer G3XOW, secretary D. King, 34 Crawshaw Drive, Emmer Green, Reading RG4 8SY. Meetings 13 and 27 February, 7.30pm, in the clubroom of the White Horse Public House, Kidmoreend Road, Emmer Green, Reading. Club callsign G3ULT, holder G3LFM. All welcome.

Swindon (SDARC)—7 February ("Uses for the fet voltmeter"—talk), 21 February ("The use of ICs in communication equipment"—lecture), 7.30pm, Penhill Junior School.

UK FM Group (Southern)—First Wednesday of each month, Chineham House, Popley, Basingstoke, 7.30pm. This month (Talk-in on 144.8MHz), details from G8FFV or G8AKA.

Basingstoke (ARC)—First and third Saturdays each month, Chineham House, Popley, 7.30pm. G3CBU.

Southampton (RSGB Group)—Saturday 10 February ("VHF propagation and other topics" by Ron Ham), the Lanchester Building, Southampton University, all welcome. Every Wednesday evening at the clubroom, Kent Road. G5HD. Tel 773378.

Harwell (AEREARC)—Third Tuesday of each month, also informal meetings and junk sales every Friday lunchtime, at the Social Club, AERE, Harwell, Berks. G3NNG.

Maidenhead (M & DARC)—5 February (Open meeting), 20 February ("Oscilloscopes" by G3VCT), at the Viceroy Hall, Cox Green, Maidenhead. G3VMR.

RADIO COMMUNICATION February 1973

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

FOR SALE

Cossor double beam scope, good wrkng order, with operating manual, ccts etc, £15 ono. W. Concannon, 55 Walton Rd, Sale, Ches. Tel 061-973 7398.

New VBC 78K varactors, 7W at 70cm, £2.50; Oxley min trimmers, 10pF and 15pF, 2p; PTFE feedthroughs, 1p; tub ceramic trimmers solder in 5pF, 1p; disc ceramics, 1kpF, 1p; 100kpF 2p plus p & p. G8BYL QTHR.

TCS5 tx £5; QOV03-20 50p; QOV06-40 £1; valve bases and superb mesh cans for B7G B9A high wattage carbon resistors, 75p; xtals 50p; other superb components, see list. Cohen, "Coomtata", Coombe Park, Kingston-on-Thames. Tel 01-549 2366.

Multichannel Pye AM10D Cambridge, exc cond, tuned to 145MHz, with 145MHz xtals and mounting cradle, £28. **Wanted** hf all band a.m./cw tx, eg, KW Valiant, KW Vanguard or why, all letters answered. P. Martin, 41 Ottoline Drive, Troon, Ayrshire, Scotland KA10 7AN. Tel Troon 2756.

R147, R1155, 1355, offers; W1191 wvmt, good cond, £7.50; cassette recorder £8; mw, fm, vhf portable radio £6; 234 psu £3; Pye mains radio £3.50. **Wanted** original manual for JZ set rx. G. Webb, 91 Gallows Hill Lane, Abbots Langley, Watford, Herts. Tel Kings Langley 64172.

Trio JR310, mint cond, extra band + fm detector, tunes 28-30, orig packing, offers, £60 or over. W. Sherriffs, 10 Glen Gardens, Dyce, Aberdeen, AB2 0FD. Tel Dyce 2675.

RCA AR8516L rx, good cond, spare valves, £165 ono; Trio JR310 exc £60; BC221 with charts, no psu, £15. **Wanted** Inoue IC700R rx. M. Marment, 35 Lidford Ave, Paignton, Devon. Tel 0803 55488.

Ten channel fm Cambridge with control box (push button), £30; a.m. dash mount £23; rty fsk unit 50p. G4AME, 13 Meadow Walk, Higham Ferrers, Northants. Tel Rushden 56076.

6 over 6, 2m J-beam, 9ft alloy mast, chimney lashing kit, never used, £9 the lot; pair wrkng 27MHz tx/rx sets, offers? Owen, 76 The Glade, Shirley, Croydon, Surrey. Tel 01-654 5741.

Heathkit sig-gen, RF10, £12; audio gen AO-1U, £12; box 100+ valves, mixed types, £1.50, coll or post extra. G8BI QTHR. Tel Welwyn Garden 23676.

Ex eqpmnt mains trnsfmrs, 13V 8-5A ct, £2.50; 350V 0-6A, £2.50; 1 H? 0-6A chokes £1; all enclosed types; 4 new Mullard Z520M digitrons with bases, £3, all post free. G8CXS QTHR. Tel Sheffield 396774 after 6pm.

Millen 2in monitor scope, 50Hz timebase, 120V ac 19in panel, as new, £3; 2 TZ40 heater trnsfmrs, large, £1 ea; Advance 190-260V ac 50W regulator, £3; Sullivan 0-1 decade box 0-1-100, 1-100kΩ, £4, carr extra. GM3JHL QTHR. Tel Fauldhouse 433.

Heathkit OX-60B tx and HG-10B vfo, £25, fair cond, H. Rounds, 157 St Albans Rd, Sandridge, St Albans, Herts. Tel St Albans 62830 (after 5pm).

B40C rx, gd cond, 0-64MHz-30MHz in 5 ranges, xtal fltr, agc, noise limiter, various mods inc fine tuning control, del rsnbld distance, £22 ono. J. Pedley, "Romily", High Oakham Rd, Mansfield, Notts. Tel Mansfield 23801.

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.

Heathkit DX100U £20; Heathkit SB10U £20; Geloso G209 £20, all items £55, fair wrkng cond. Dunbar, 7 Marchmont Ave, Falkirk, Stirlingshire, Scotland. Tel Polmont 2879.

AR77 with hndbk, vgc, £25; scopes, 1035 £16, Solartron CD513.2 £25, TO3 portable £27; Marconi noise grnr £7.50, video oscillator TF885 £19; No 13 sig gen a.m./fm £12; Airmec 712 vtm £5. R. C. Whitbread, 32 Iron Mill Lane, Crayford, Kent, DA1 4RR. Tel Crayford 24625.

Scope tube, VCR139A, £1 + postage; valves, cmpps and mags for disposal. A. Defty, 119 Westmorland Rise, Peterlee, Co Durham. Tel 2062.

Superb Marconi heavy duty marine lin amp, 2 x 4-250 or 2 x 4-400s, only £35, buyer coll; new FL2100 £110; Heath OS18 scope £30; Mosley A203C, wide spaced 20m beam, £35. Fit Lt J. M. Hern, HQTC, RAF Brampton, Hunts. Tel 51928.

NCX-5 Mk2 with NCX/A psu, little used, as new, £175; NCX/D £25; xtal fltr (Yaesu) 3,180kHz, new, unused, £8.50; PTC-8207fm, QOV06/40, ok, 144MHz, unmodded, no control box, £10; many other items—offers. G3MOE QTHR. Tel Cheltenham (0242) 24217.

R107, S-mtr, hndbk, mint cond, £15; Geloso vfo/exciter 10-80m £2; BC221, as new, tropicalized, with calbrtn charts, £15; trnsfmrs 650-0-650V, 250mA, 6-3V etc, 350-0-350V 120mA, 6-3V, etc, offers; four 6146s £1 ea. G8ERR QTHR.

LCR bridge B101 0-500Ω, 0-500MΩ, 0-5,000H, leakage, Q, power factor, with leads and data, £7; 2m cnvtr with command rx, tunable i.f. and mains psu, £5, carr extra. G3NPF QTHR. Tel Horsham 66290.

MF455-15CK with FT241A xtals and data, £7; Electronics HB166T £12, unused Tavas, 160m whip, complete, £4. **Wanted** Electronics GC166 also KW 9MHz XF9B fltr and sideband. G4AGJ QTHR.

Pye Cambridge AM10D rx, 144-146MHz, varicap mod Jan *Radio Communication*, auto-scan June *Radio Communication*, tx 2 chann 145 + spare, £38, buyer coll; Pyramid 800W passive grid lin amp, 4 x 6HFS, built-in power supply, 80 to 10MHz, £38; buyer coll. A. J. Wright, 34 Webbs Way, Stoney Stanton, Leicestershire. Tel Sapcote 3404.

KW2000A with ac psu, perf, £145; dynamic mic £2.50; pref buyer coll. R. J. Trebilcock, 20 Spinney Brow, Cromwell Rd, Ribbleson, Preston, Lancs.

Mosley TA-32 Jr beam aerial, 4 mths old, £15; Hansen swr mtr, £3. A. E. Robinson, 34 Haddon Way, Carlyon Bay, St Austell, Cornwall. PAR 2337.

Plessey PR155, Mk1, 1-30MHz, a.m., fm, cw, ssb, all fltrs, hndbk, 5 hrs use only, £350. Tel Romford 63687 evenings.

KW2000B £175; Eddystone EA12 £140; EC10 MkII £65; AT5 + psu £25, all mint cond, delivered; KW Vanguard £25; E-Zee match £10; Eddystone S640 840 PR30, RQ10 mult, Joymatch III, TW 2m rig. G3MNW, 35 Ward Ave, Cowes, Isle of Wight. Tel Cowes 5228.

GEC Vidicon camera VCT1 and 19in Monitor PM19, both 625 line, £50 ono. G8CYA QTHR. Tel Kenilworth 53309.

CR100 rx, 60kHz to 30MHz, S-mtr, sidetone, etc, hndbk, £16; J-beam 18-el 70cm beam, £4; BC221 freq mtr, £10, buyer coll, or local del by arrangement. G3MEH QTHR. Tel 01-660 6263.

Hallcrafters Super Skyriders S11, gen cov rx, 240V, diag and 12in spkr, £15. D. J. Gibbs, 42 Downshire Hill, NW3. Tel 01-435 2064.

KW77 £50 ono. G3UMV QTHR.

Vanguard, 160-10m, £24; Lafayette HA350 £45; Sorno CQM33C with control box and mic, cnvrsn instructs for 4m (easy) and 2m (harder), £6.50. G3ZEP QTHR. Tel Wetherby 2099.

Rtly Creed 7E/RP teleprinter page printing and tapepunching, £25; Creed 85 printing reperforator with cover and manual, £12, both in gd order, del by arrangement. G3RDG QTHR. Tel 01-455 8831.

Charging trnsfmr 230/50V input, tappings 10V, 18V, 34V o/p with rectifier, £1.50; tv tuner modifying 405 vhf to 625 uhf, new, £4; Pye mirror galv/meter £1; Turner ohmmeter 0-1mA, 50p, H. H. Seymour, 6 Chichester Bldgs, Swan Mead, London SE1 4RY.

HC6U xtals for 4m 7805, 7807, 7815, 7818.5, 7819, 7820, 23-420. G3ADZ QTHR. Tel Liss 3314.

Pye Mk IV tv camera, with control unit, 60ft cables, handbk and sync pulse gntr, £40 ono. **Wanted** Bits of waveguide 16 and square choke flanges. Gordon Lean. Tel 01-997 0901.

EMI stereoscope preamp and two Heathkit 12W power amps, 16 inputs, sep power supplies, with ccts, £25; Jennings electronic organ, two 61 note manuals with sep gntrs, oak console, 32 stops, 4 couplers, with ccts, £60. P. J. Hughes, 14 Waresley Rd, Gamlingay, Sandy, Beds. Tel Gamlingay 370.

Birds model 43 thruline wattmeter, as new, with 10W and 25W els and hndbk, sensible offers pse. **Wanted** new valves, 6AV6, 6005, 955. G3RNV QTHR.

Selling cheap, rack fitting, 2m a.m. exciter and driver with ample space for adding 150W p.a., a good performer, selling old pattern scope tube VCR138, as new, cheap. Parker, 133 Station Rd, Cropston, Leicester. LE7 7HH.

Orig series KW Vanguard, 160 to 10m, no mods, little used, vgc, with gntr, £20, buyer coll or carr extra. **Wanted** KW Ezee-Match and KW dummy load. G4OQ QTHR. Tel Southend-on-Sea 73389.

DX100U with hndbk, built at Heathkit, exc cond and perf, £35 ono. G3PXJ QTHR. Tel 021-444 4312.

Working Admiralty 5AH tx and B46 rx, all hndbks, buyer coll outside Birmingham, £15 ono. R. J. Anderson, 38 St Agnes Rd, Birmingham B13 9PW. Tel 021-449 1521.

Coaxial Z-match, Contil Case using Johnson 3.5kV capacitors, inc harmonic trap, large but wld take biggest lin, £10. G3IZJ QTHR. Tel Farnboro (Hants) 48561.

Pam amp, 3 horn spkrs, 1 less tweeter, adjustable stand, step up transformers, mic and stand, exc ARD88H or why. R. F. Slade, 166 Kingston Road, Staines, Middx. Tel Staines 53970.

KW2000B with ac psu, unmrkd, perf working order, few hrs use only, £185, wld del any rsbnl distance, will demonstrate at Fleet. G3MSL QTHR. Tel Fleet 21446.

Trio 9R59DS rx, few wks old, filled voltage stab, with orig box, £42 ono. **Wanted** Aerial rotator for vhf beam, Garex or sim 2m cnvtr i.f. 4-6MHz or possibly 2-4MHz. Paul Hubbard, 60 Mill Rd, Gt Burstead, Billericay, Essex. Tel Billericay 3935.

Eagle RX80 communication rx, 550kHz-30MHz bandsprd, all amateur bands, 50kHz i.f., good cond, with manual, £15. **Wanted** AR88 or pt exch for above. M. B. Worvill, 40 The Leys, Chipping Norton, Oxon. Tel 2724.

EA12 £125; KW202 £120; KW204 £140; KW2000B £180; KW600 £50; Tiger 200 £20. G2QT QTHR.

Pye Rangers, type 2207, low band, transistor PSUs and modulators with harnesses and control boxes, £9 ea. G3TNE QTHR. Tel Ipswich 75241.

GEC Vidicon camera VCT1 and 19in Monitor PM19, both 625 line, £50 ono. G8CYA QTHR. Tel Kenilworth 53309.

New BNC plugs, sockets, angle sockets, all 50Ω at 7½p; new BNC T pieces, 50Ω, 25p; new BNC 75Ω sockets, bulkhead sockets, ½in coaxial, 7½p + p & p. G8AAE QTHR. Tel Stock (0277) 840539.

Newtronics "Hustler"/M aerial, resonators for 80, 40, 20, 15, 10, bumper mounts and spring, £20 ono; Minimitter 160 whip £2; KW2000, dc psu £20; Mosley TA32Jr, £12. G3OHC QTHR. Tel 021-308 2512.

4in slow scan tv monitor, gd cond, homebrew, exc HW32A psu or other ssb rig, tx/rx on 14MHz or 28MHz. Tel Bolton 57775.

Elliott chart recorder 0-5-10-15V, rates 15min to 32 hrs, £10, buyer coll; type 103B fm tx/rx, as supplied by Baginton for 2m /M cnvrsn, £8, inc mic power unit etc. **Wanted** Pair walkie talkies on 28m. B. R. Smith, 1 Belle Vue Rd, Herne Bay, Kent. Tel Herne Bay 3748.

SB101 and HP23, exc, £160; 14/1-8 transverter, 6146 p.a., takes PWR, fm, HP23, £8; **Wanted** Collins 32S1 and psu, SB400. Aird, 5 Whitfield Way, Kingsthorpe, Northampton.

TV channel, camera, FSS, interlaced SPG, £35; Vidicons £5, studio £15; Marconi TV scope £20 with spare CRT; Pye 14in monitors, 405/625, £15; 70cm pa cavity w blower, £8; 4CX250Bs, overlays, varactors, 25in colour CRT, various other tv/rf gear, pref buyer coll. G8AKQ QTHR. Tel 0226 (Barnsley) 3862.

KW202 rx with spkr and clbrtr, mint, £105, KW Vespa, MkII tx with psu, KW aerial switch and 10W trap with KW balun, all in exc cond £75. Steven Glenn, Tizard Hall, Southside, Princes Gardens, London SW7. Tel 01-584 9902.

2m xtal controlled monitor rx, on 145MHz, £12.50; xtals 1.0000, 6.035, 12-0208, 12-0291, 12.0458, 12.1635MHz, 55p ea post paid; 4m W15AM complete, £40; Philips EL3552 £10. G8CPB QTHR. No phone calls please.

Trio 9R59DE rx with manual, vgc, £30. **Wanted** Heathkit HW32A. D. Yeaman, 5 Chartwell Rd, Bishopton, Renfrewshire. Tel Bish 2941.

KW Viceroy 3A, full lat fltr, 6146Bs pa, £65 ono, del cnvrsd, Pallant, "Wheatley" Martins End Lane, Gt Missenden, Bucks. Tel 2642.

MCR I AMT phones, 4 coil packs, wrkng offers; Ferrograph rcrdr 3A/N, 20hrs use only, offers; Pye base stn, wrkng, 70.374MHz, £10; KW77, mint, £75 ono, buyer coll. Thomas, Zelah PO, Zelah, Truro, Cornwall. Tel 329.

Avo vtm type CT38 97 ranges, with probe, leads, handbk, as new, £16; mains driven chart recorders, cheap. J. Adamson, Woodent, Victoria Rd, Kingsdown, Deal, Kent. Tel Deal 3788.

813 tx rack built 6 sep units, power packs suitable lins, 200W modlr, £18; motor gntr 40V 7A, 1½hp motor and gntr, 2 x 1,500V 250mA, £20 both; *Short Wave Magazine* 150, 180 *Bulletins*, clean, offers, buyer coll. G2FU QTHR. Tel Kearsney 2014.

Complete tv stn minus rf, 625/405 standard, camera and control unit, solid state, broadcast standard, own spg etc, and monitor, offers or will exch for ssb eqpmnt, tx/rx, lin, amp, etc. Foster, 64 Station Rd, Over, Cambridge, CB4 5NJ. Tel. Swavesey 588.

Unused valves, 2 Sylvania 6JB6s, 2 RCA 6JB6As, 1 RCA 6LQ6, £1.50 ea; Heath HD10 electronic keyer £6; Mosley Lancer /M aerial, all coils and holdall, £18; Drake W4 Wattmeter, £19. G3HHX QTHR. Tel Liskeard 3749.

62H (Navy R1392) tunable 95-150MHz, built in psu, £4.50; transformer, 230V primary, 140V, 50mA ct, 500V 220mA ct, 1,000V 80mA ct, £1.50. M. Maisey, 5 Woodhatch Spinney, Coulsdon, Surrey. Tel 01-668 2880.

EA12 immac cond £135, buyer coll. J. E. Thomas, 41 Redhill Lodge Drive, Redhill, Nottingham, NG5 8JH. Tel 262603, evngs.

Toko ceramic fltrs for ic/transistor/valve, prealigned 455kHz units, 6kHz, 8kHz, 40p; 4-8kHz 45p, mech fltr 5kHz £1.05, ideal for sharpening old commercial gear (see p522 Aug *Radio Communication* for description). W. S. Poel, Littlecroft, Mill Hill, Brentwood, Essex.

Marconi CR150/6 with manual, £50; Creed 75RPN3 with manual, £50; two 813 bases £1. Buyer to coll. G3VJI QTHR. Tel. Appleby 51638.

Murphy 25W o/p a.m. base stn, £20; Murphy a.m. /M from £4; Pye a.m. Ranger £4, all lo-band and useful for 4m, buyer coll. G8AKA QTHR, Tel Mortimer (Reading) 332582.

TA33 JR £15; Trio 9R59 £15. Mrs C. M. Abbott, Stable Cottage, Teeton Rd, Guilsborough, Northants. Tel Guilsborough 413 after 6pm.

2m AM 25B Vanguard with control box and cables, £23; HRO with psu, 4 gen cov coils, plus 80m bndsprd, £18, 12V, 80W gntr, £12. G8FAS, 208 The Avenue, Tottenham, N17 6JN. Tel 01-808 6824.

CR100 £15, good wrkng order. McEwan, 29 Newton St, Mansfield, Notts. Tel Mansfield 22269.

AR20 rotator, little used, with new control box, £15. P. A. Gibson-Daw, 479 Wellingborough Rd, Northampton. Tel. 37944.

FE3500 lin amp, 1 hr use, £75 ono; Heath RF1U sig gen £10; C3U capacitance bridge £9; V-7A/UK valve vmtr £8.50; AO-1U sine/sq gen £10, all perf; carr extra, see for list. J. R. Easton, 48 Crawford St, Motherwell, Lanarks. Tel M'well 65443.

EC10, good mech cond, but loss of sensitivity, fault needs attn, £20; need 2m fm walkie talkie, swop, cash or why. Packer, GW3UUS. Tel 0633-65572.

Heath RA1, good cond, £25; RG1, vgc, c/w QPM 16, Q mult, £30; Pye Ranger, wking on 2m, £30, all above with manuals. G8DXD QTHR.

Core store 4K, 6 bit, with driving ccts, rack mounted, psu and hndbk, £20. G3UUU QTHR. Tel 0533 872525.

Creed 75R teleprinter £10; Model 35 tape readers £4; Model 25 performers £5.50, all good cond; Creed tapewriter, new and boxed, £5, used but in good cond, £4. G8DXZ QTHR. Tel Walton-on-Thames 20805.

Pye Industrial cctv camera, valve type one 2in lenses, two 3in lenses, 625 line, interlaced pan-tilt tripod, rf unit, fitted for uhf, offers or exch ssb tx or tx/rx. L. R. Beeson, 5 Hollies Close, Royston, Herts. Tel Royston 42098.

No 19 tx/rx £6.50; R209 £10; 6V6 o/p stage £1.25; new heater trnsfmr 6-3V, 6A, £1; 6V vibrator trnsfmr £1; aluminium case 9 1/2 x 5 1/2 x 5 1/2 in. O. Walker, 63 Harbridge Ave, SW15. Tel 789 0706.

Trio JR310, s/b fltr, very little used, £65; BC221, orig chrtss, psu, £15. Tel Ruislip 39576, evngs.

2m Marconi tx am/cw, 40W fully modded, 6-40A pa, table-top cab, inc xtals and mic, £30; Echelcomm-2 2m cnvtr, low i.f., £10 ono; 2m Nuovistor cnvtr, low i.f., £6 ono. G3NYY. Tel 01-736 0084, evngs.

Viceroy exciter, 80-10, £20; Minimitter tx, 80-10, 150W, £12, buyer coll. G3WJK, QTHR. Tel 01-300 1608.

SCR522 tx, unmodded, all valves, £6; hi-band boot transistor psu Ranger, £7; Pye i.f. and audio boards, 10-7 fltr trnsfmrs, £2.50; BCC69D tx on 2m, rx needs attn, with psu, £7; PR807s £1.50; PR5B 255M £1.50, buyers coll. Reynolds, 224 Station Rd, Rolleston, Burton-on-Trent. Tel Tutbury 3395.

KW Valiant tx £25; Trio 9R59D £35; BC221 with charts £10, can del Manchester area. G3YSE QTHR.

Valves, unused, EBF80, ECH81, EF85, PCL81, 6AS6, 6AU6, 6A95, 6BA6, 6X4, 20p ea; used ECC82, ECF82, EF183, EL84, PCC84, PCF80, 6BO7, CV140, CV453, CV2127, CV2522, CV4004, CV4024, CV4014, 150C4, 15p ea. 20 Winslow Way, Walton-on-Thames, Surrey. Tel 25946.

DX40 and VF1U, good cond, £20 the pr, ono; four brand new Nixie tubes (0-9) £3. G3WGV QTHR. Tel Bournemouth 741278.

JR310 narrow fltr, 160 Q mult fitted, phones, like new, £70, consider trade T28 or solid state rx, tx/rx etc, qrp tx, why? any offers, trade or cash considered, no callers. G4AQY QTHR. Tel 01-858 1448, evngs.

Heathkit GR-64 rx, GD-125 Q-mult, HD16 morse practice set, pr cheap hdpns and homemade pre-selct, £30. **Wanted** Hy-gain 18AVT/WB aerial, under £20. A. D. Riley, The Mount, Vicarage Lane, Helsby, Cheshire, WA6 9AE. Tel Helsby 2005.

2m ssb/a.m. tx/rx, all solid state 2N4440 final, 10W o/p (single tone) lin vfo/3 mech fltrs, exc cond, £120; Schlumberger/Heathkit 120MHz counter Moden SM-105, i.e.d. display, as new, £150. D. Dall, 28 Southwold, Roman Wood, Bracknell, Berks. Tel Bracknell 20358.

Exchange Pye Cambridge and two Bantams, 70MHz, for high band versions or sim eqpmnt; selling Solartron digital vmtr, LM902-2, rty 654 tape reader, FS10 and AP103352 discriminator, two tape decks, motored variac. R. H. Barnard, 33 Wallis Rd, Basingstoke, RG21 3DN. Tel 4590, evngs.

KW2000B, ac psu, vgc, homebrew swr Z-match, buyer coll, £160. G3DBF QTHR. Tel Mansfield 27293.

AR88D, as new, £55; KW Vespa Mk2 £85; buyer coll. G4ALG QTHR. Tel Twyford 0734-345046.

Modified Pye base tx, 6-40 pa, pr EL34 modulator, xtal mic input, £20; 70cm tx, fm QV02-6 in pa, £16. G3TTV QTHR.

SSB tx, 600W input, sep vfo, with two PSUs, pa, TT21s, cov 10-80m, only £35. buyer coll or postage extra. G3ZBM QTHR. Tel Crewe 68693.

Mercury cells, have been stored for some time but tested for voltage before despatch, eg 1.34V per cell, ideal for transistor work, etc, fraction of orig cost, send 10p for samples. Mr D. R. Roberts, 33 St Martin's Park, Haverfordwest. Tel H/West 2409

Heathkit 301 rx, factory-built and recent Heathkit overhaul costing £30, in mint condition, transceives with 400 and 401 series, first class job, any test, £95. Lee, 0425-2 5974.

Stereo tape recorder, Akai 4000D, as new cond, still under guaran tee, £60. Stagg, 62 Prospect Place, Grays, Essex.

BC221 wvmtrs, several at £12 ea, moving house soon so must clear shack. G3OSE QTHR. Tel Nuneaton 67992.

Mains trnsfmrs, ex eqpmnt Woden 700V ct 80mA, 6-3V 3A, 5V 2A, £1 ea; Partridge 600V ct 110mA, 6-3V 2-5A ct, 0-5-6-3V 2A, £1.50 ea; unused electrolytics, 2,500/50V, 1,500/50V, 3,000/25V, 32/500V, 60 + 100/450V, 16/375V, 4,700/100V, 15,000/55V, 2,000/50V, 3,500/25V, 200 + 200 + 10 + 10/300V, ea 20p + carr. G3GOT QTHR. Tel Billericay 4986.

FR-100B, FL-200B, first class cond, £130; **Wanted** SB220, MF-455-10AZ fltr, HW17A, QY4-400, why? Johnson, 42 Browick Rd, Wymondham, Norfolk. Tel Wymondham 3382.

Lafayette HA600, solid state rx, immac, hardly used, genuine reason for sale, yl now xyl, £35 ono. **Wanted** Circuit for 2m cnvtr, tuning 28-30MHz. D. Snape, 30 Culcross Ave, Highfield, Nr Wigan, WN3 6AA. Tel Wigan 211397.

2m tx (rf section only), QV03-10 pa, £3, 70cm tripler/pa with two QV02-6, £3; Garex 70cm cnvtr, 28-30MHz i.f., £5; all post paid; J-beam 70cm Multibeam £5; buyer coll aerial. G8ANU, 60 Brocton Road, Millford, Stafford.

Eddystone EC10, good cond, unmarked, £45 ono, will del to buyer, pse write D. J. Andrew, 23 Flamborough Close, Castle Bromwich, Birmingham 34, Warks.

Clearance sale, Elizabethan tx, 2m tx, power packs, modulator, Z-match, swr mtr, mains trnsfmrs, chokes, mtrs, variable tx capacitors, valves, resistors, capacitors, etc, junk box prices or lot £30. G3BRQ QTHR. Tel Fleet 6588.

813 valves with 10V 10A fltr trnsfmr, Codar AT5 with 250S power/control unit, 0.5A, rf ammeter, 4 x EL34 valves, psu, 1,500V 250mA, made from Woden comps, sell or exch. **Wanted** 28-30MHz tunable i.f. rx. G3RFG QTHR. Tel 046-272 391, ext 406.

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Hy-gain 20m 3FLM beam, full size, 16ft boom, model 203B, good cond, £30. G3BXI QTHR, Tel Gt Eastern 235.

Emsac TX2 tx, with psu, £35 ono. GW3EDE QTHR. Tel 0222-707964.

FB Heath RA-1 rx, less xtal cal, £28 plus del costs. G8FXO QTHR. Tel 061-928 0530, evng.

CR100, spkr, S-mtr, manual, muting connectns, 2in scope by Industrial Electronics, model 2300, KW 75Ω lpf £24 the lot, all good cond, might consider separating, pref buyer inspect and coll. G3RRD QTHR.

Pye Ranger on 145, type 2007, new xtals, £18; another 2007, tatty, tuned to 2m, less xtals, £10; Unica UR1A transistor rx, 550kHz-30MHz, £16; small scope £5, buyers coll. G8FHN QTHR. Tel Medway 63365.

Eddystone 680X £50, offers, buyer coll. G3LIA, 11 Carol Close, Stoke Holy Cross, Norwich. Tel Framingham Earl 3478 after 6pm.

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Eddystone 840C, rx, mint cond with fitted S-mtr; Sentinel 2m cnvtr, immac, first offer over £45 secures. John Champion, Ard-na-Coille, Newtonmore, Invernesshire. Tel Newtonmore 214.

Eddystone 840C ac dc model £35 ono; Marconi CR100, sep S-mtr, spkr, hndbk, reas cond, £15 ono. S. R. Bradford, 18 Newey Rd, Wyken, Coventry.

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TCS6 tx modified and rewired with psu, Heathkit QPM1 Q mult, 450-470kHz, internal psu, modern psu, 1,000V 1A, 350V 500mA, 30V, 10V, 6-3V ac ct 10A, 125V bias 7 x 11 x 15in, offers. C. Linnell, Flat 5, Brookhill, Finchampstead Road, Wokingham, Berks.

Trio 9R59DS with matching spkr, fitted stblz tube unmrkd cond, £34. Smith, 37 Lonsdale Drive, Enfield, Middx. Tel 01-363 1653.

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UECL printed cct edge conntrs 0.15in, 16 way, 22 way, 0.1in 16 + 16 way (double sided), 15p ea; video amp panels, 2 1/2 x 7 1/2in, 5 transistor with cct, £1, all above new and unused, postage 10p. G3YLQ QTHR. Tel Luton 25595.

AR88LF rx, gd cond, handbk, spare valves, CN2 cnvrtr, 28-30MHz i.f., £40. G8ECA QTHR. Tel Rotherham 873370.

Heathkit 10-12U scope £35; 2m phase mod tx, 48W, with psu and 6 xtals £22; 70cm a.m. tx £18; Jason audio gnrtr £8; 70cm cavity wvmtr TS184A £12; QQV03-20A £1.50, all exc. Pawley, 52 Sumatra Rd, W Hampstead NW6. Tel 01-794 9934.

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TS510 cw fltr 100/25kHz calbrtr, mint, some spares, £140; FL1000, spare valves, £70; finance possible, Hamgear preselector, PMII, slight case damage, £5; Hansen 50Ω swr bridge £3, pref buyer coll, TCVR and lin. GW3TMP QTHR.

SB620 Scanalyser £60; SB200 lin £85, both little used; Hartley double beam scope £20. G3SWV QTHR. Tel 01-777 1579.

Eddystone EC10 MkII, little used, £60 ono. G8BZF QTHR. Tel Preston, Lancs, 43926.

Heath SB101 + HP23 psu prof built, SBM102-1 mod fitted, very little used, £155 ono; Panda atu 150, £7, buyer coll or carr extra. R. Smethers, 46 Church Rd, Burntwood, Nr Walsall, Staffs.

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Crystal calbrtr No 10, or Class D w/mtr No 1 or 2, price and cond to S. Fenwick, 28 Gimble Way, Pembury, Tunbridge Wells. Tel Pembury 2836.

Buy/loan, hndbk/cct diag, Murphy Rover MR 960/25H, costs refunded G8FHI QTHR.

RCA 8516L rx, good cond, up to £150 offered. G3RED QTHR, Tel Peterborough 72282 after 6pm.

2 FX2249 ferrite rings, 1 FX1115; Newmarket PC1 audio amp. G3RSJ QTHR.

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Collins 51S1 rx. F. B. Jones, 85 Woolsbridge Rd, Ashley Heath, Ringwood, Hants, BH24 2LY.

KW Valiant tx or parts, also AR88D S-mtr, London, SE England. G6BJ QTHR.

Urgently, manual for Pye Ranger 2007 a.m. version, hi-band type. Richard Perzyna, 25 Cranbrook Rd, London, SE8 4EH.

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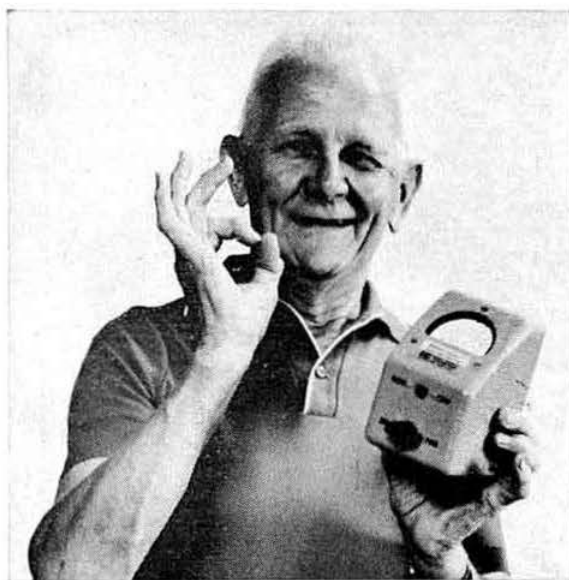
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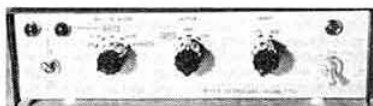
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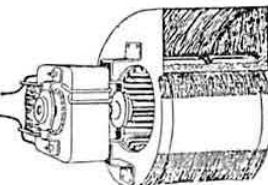
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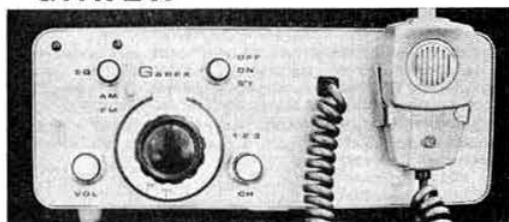
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INDEX TO ADVERTISERS

Aero & General Supplies	134
AJH Electronics	cover IV
Amateur Electronics	cover III
Amateur Radio Shop	142
Athena Semiconductor Marketing Co Ltd	133
Baginton Electronics	cover II
Bird Electronic Ltd	130
J. Birkett	132
BOAC	129
British National Radio & Electronics School	135
Burns Electronics	133 & 139
Canley Engineering Ltd	136
CHC Electronics	140
Calomir Electronics Ltd	130
Davian Electronics	138
Dodson-Bull Carpets Co Ltd	136
Echford Communications	131
Ensign	143
Garex Electronics	144
Gurney's (Radio) Ltd	141
GWM Radio Ltd	141
L. Hardie	143
Heath (Gloucester) Ltd	84 & 85
Holdings Photo Audio Centre	140 & 143
Hy-Q Electronics Inc	134
Imhof Ltd	132
International Correspondence Schools	141
J. W. S. Products	143
KW Developments Ltd	141
KW Electronics Ltd	90
Lowe Electronics	82 & 83
Mark Equipment	138
Markham Electronics	136
John F. McMahon	141
Microwave Modules Ltd	135
Mosley Electronics Ltd	132
The M-O Valve Co Ltd	130 & 137
North West Electronics	135
P & P Developments	137
Radio Shack Ltd	137
RT & I Electronics Ltd	141
Arthur Sallis	143
Senator Crystals	148
H. L. Smith & Co Ltd	143
Solid State Modules	139
Spacemart Ltd	140
Stephens-James Ltd	134
Strumach Engineering Co Ltd	139
Telegraphy Systems Ltd	139
Trampus Electronics	143
J & R Tweedy	133
Waters Electronics	141
Western Electronics (UK) Ltd	86-89
York Photo Audio Centre	141

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Shure Microphones Model 201 Hand	£5.75
Model 444 Desk	£13.25
(S.A.E. with enquiries please.)	
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/VB 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 DX 6 ele beam	£97.00
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(carriage extra on Mosley/Hy-Gain)	
Rotators. All post paid. Stolle Memomatic 3001	£22.40
Stolle Automatic 2010	£28.00
CDE AR20	£20.40
CDE AR22	£25.65
CDE TR44	£45.75
CDE Ham-M	£70.80
Wightraps Standard pairs	£2.90
High Power	£3.90
G-Whip Antennas all ex stock, catalogue by return.	

Please note: All items of equipment and accessories are priced to include carriage/postage unless otherwise stated.

Credit Facilities: 10% Deposit only with balance up to 3 years on most items advertised.

Private car park facilities for the caller.

Southern Agents: J. H. Associates Ltd. (Jeff Harris G3LWM) Cricketfield Lane, Bishops Stortford, Herts.
Tel. 0279-56347

ELECTRON HOUSE, 508-514 ALUM ROCK ROAD, BIRMINGHAM 8

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Proprietor: A. J. HIBBERD

Tel: RUGBY 71066

Terms of Business Cash with order, Mail order only, or Callers by appointment. S.A.E. with all enquiries.
Postage Charge 15p

CLOSED CIRCUIT TV EQUIPMENT consisting of PYE FET LYNX camera, 12" transistor monitor (19" rack mounting), control unit panel and control chassis (no connecting cables) all units BRAND NEW and boxed, camera supplied with f1/9 Mk. 2 Dallmeyer TV lens £135. Prefer buyer to collect.

FM10P CAMBRIDGE FM PORTABLES new incomplete, Rx sections complete except for RF board, Tx sections include 2 YL1080 but less coils, & tx phase mod phase, these units are offered as spares & not as working sets a bargain at £10.00 each + 75p p/p (money back if not satisfied).

LC10FM CAMBRIDGES (same as FM10B) boot mounting HIGH BAND 10 channel, all transistorised except for two quick heat valves in Tx. 10-12 watts RF output phase modulated, push button control box, handset, (can be used with std. mic. and speaker) control box has tone oscillator built in which can be used with repeater stations this is set up to 1.750KHz. The volume and squelch controls were incorporated in a tone squelch unit which is not supplied and these will have to be wired to the control box and mounted on a separate bracket attached to the bottom of the control box. Complete with handbook alignment data and mods for 145MHz. All units tested and in very good condition £35.00 each.

AM25B VANGUARDS set only no control equipment high and low band good condition with handbook, reduced to £16.00 p/p 75p.

SANDERS X BAND variable attenuators type 1621/1C round flange brand new in original boxes £5.00 each. two only with micro-meter adjustment square flange in original boxes £8.00 each.

LABGEAR TEST SETS for LSP30 SSB Manpack. £4.00 each brand new in makers box. REDUCED.

RACK MOUNTING PSU 230v AC mains input, output 300v DC @ 300 m/a, separate heater xformer 6.3V AC @ 5A, LT and HT individually switched and fused 19" x 7" x 6" deep used condition give away @ £2.00 each buyer to collect by arrangement.

Tx MODULATOR PRE-AMPS on PC board 6" x 2 1/2" 5 transistors unused manufacturers surplus with circuit of board 80p.

12v RELAYS 2 pole change over as used in boot Cambridges removed from unused equip. 20p each. 6v 2 pole change over made by Plessey metal cover brand new 20p each.

LOW BAND CAMBRIDGE RF BOARDS NPN transistors in RF stages, new unused £2.50.

ELECTROLYTICS 2,500 Mfd 40 vw 40p, 4,000 Mfd 40 vw 40p, 1,000 Mfd 25 vw reversible 20p 1,000 Mfd 15 vw wire ended 15p, 1,000 Mfd 10 vw 10p

FT243 xtal holders 3p

AM10D CAMBRIDGES low band used condition £25.00 + 75p p/p

VHF RF CHOKES 17.5 microhenries (the size of 1/2 watt resistor) 25 for 22p.

14/0076 SCREENED CABLE 100 yd. drums approx. 1/4" dia. brand new £1.25 post paid. No outer insulation.

DIODES:

1N648 two for 15p (500piv @ 400m/a).

D1003 15p (100 piv @ 3 amp).

CG61H 2p (detector general purpose).

BYX10 12p 800 piv 200m/a.

BYX22/800 800 piv @ 1A 15p, (4 for 50p)

BY126, 450pn 1A 10p, (4 for 35p)

PL259 PLUGS 25p each, reducers for std co-ax few only 10p (only supplied with plugs).

BNC PLUGS 75 ohm 10p each.

50 OHM BNC CONNECTORS all brand new in sealed packets

BNC socket (flange fixing) 10p.

BNC socket (free cable mounting) 10p.

50ohm "N" type chassis sockets 25p each

PYE PLUG as used for Ranger Aerials etc. 10p.

BELLING LEE MINIATURE CO-AX PLUG on short length cable unused 10p.

HC6/U CRYSTAL OVENS 6/12v 80 deg. C plug in type as used on PYE base stations 35p. No Bases.

UR1 70 ohm low loss co-ax approx. 1/8" dia. in 100ft rolls 2-2db loss per 100ft @ 145MHz 4-5db loss per 100ft @ 432MHz unused in sealed polythene bags £3.50 per roll + 50p p/p.

MINIATURE CERAMIC CAPACITORS (disc type all 50 V/W)

22pf 5%	68pf 5%	180pf 5%	470pf 5%
27pf 5%	82pf 5%	220pf 5%	560pf 5%
33pf 5%	100pf 5%	270pf 5%	680pf 5%
39pf 5%	120pf 5%	330pf 5%	820pf 5%
47pf 5%	150pf 5%	390pf 5%	1000pf 5%
56pf 5%			

1500pf +50% -20% 0.01 Mf +50% -20%

2200pf +50% -20% 0.015Mf +50% -20%

3300pf +50% -20% 0.022Mf +50% -20%

4700pf +50% -20% 0.033Mf +50% -20%

6800pf +50% -20% 0.047Mf +50% -20%

Prices 22pf to 1000pf, 10 for 15p or 2p each. 1500pf to 0.01Mf 10 for 20p or 2 1/2p each or 2p each.

0.015Mf to 0.047Mf 10 for 25p or 3p each.

1/2 & 1 WATT CARBON FILM RESISTORS 22 ohms to 2.2 megohms in E12 series with axial leads all 5% tolerance 1p each 75p per 100 state values required.

TRANSISTORS 2N708, P346A, V405A, 15p each.

TRANSISTOR IFTs 470KHz:

Set of three 1st double tuned, 2nd and 3rd single tuned detector diode in 3rd IF can, supplied with spare 1st or 2nd transformer of your choice, designed for use with OC171/AF115 transistors, size approx. 1/8" sq. with circuit for reference to pin connections new unused 35p set.

94.000KHz, 99.725KHz & 100.275KHz CRYSTALS glass wire ended £1.00 each. 4,000KHz HC6/U NEW 50p.

10MHz CRYSTALS in TO5 transistor can £1.00 each (all new).

1/2" COMPUTER TAPE made by Ilford 10 1/2" reels, new and boxed £2.00.

BOX OF PRINTED CIRCUIT BOARDS these consist of computer panels with loads of components trimmings, transistors, resistors, capacitors, etc. plus printed circuit boards removed from brand new famous manufacturers professional SSB/FSK receivers I have no circuits or any details of these boards so its pot luck they contain standard components Rs Cs transistors BSY19 series and GET895 series etc. miniature Belling Lee co-ax sockets etc. full money back guaranteed £2.50 per box.

PC BOARD fibre glass double sided new with protective film on copper faces size approx 9" x 10" 45p each two for 80p discount for quantities. Single sided 40p each.

TRIMMERS split stator butterfly type approx 15pf new 20p each.

EDDYSTONE split stator cat. No LP2969 high voltage design 35p. each. 16 + 16pf

EDDYSTONE KNOBS 1/4" dia. std 1/2" spindle 10p each 6 for 50p.

SMALL EDDYSTONE DIE CAST BOX with 4 GEX66 UHF diodes, 2 miniature Belling Lee co-ax sockets EX-EQUIP. Few only £1.25.

WANTED manufacturers stocks of surplus electronic components and equipment PC boards etc.

59 Waverley Road, The Kent, Rugby, Warwickshire.

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