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The
SHORT WAVE
Magazine

VOL. XXXIV

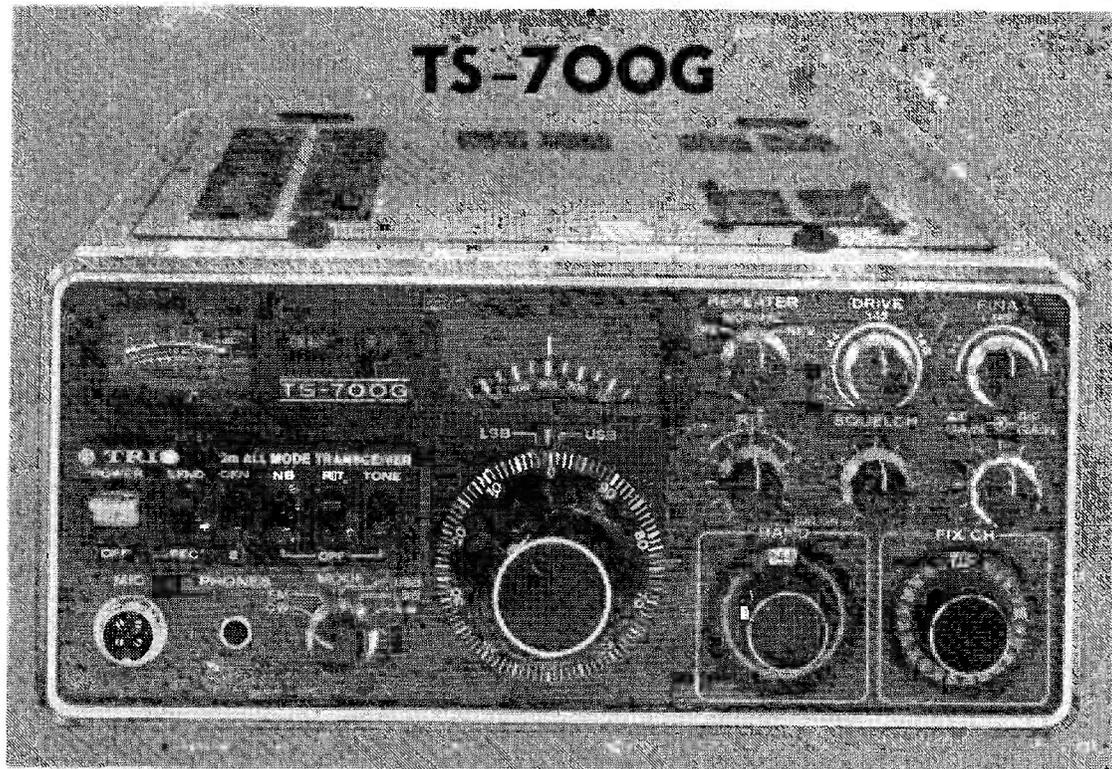
APRIL, 1976

NUMBER 2



WORLD WIDE COMMUNICATION

LOWE ELECTRONICS



TS-700G

In case you hadn't noticed, the TRIO TS-700G has a new look. Now updated and incorporating all the features which made it the most sought after transceiver on 2 metres, it now includes additional refinements which you, the keen radio amateurs, have requested.

The basic concept remains the same; a complete 2 metre station package operating from a.c. mains or 12v. d.c. supplies, providing full VFO coverage of the 2 metre band with facilities for 22 crystal controlled channels for popular repeater and net frequency working. The same TRIO design standards such as the ultra linear PA operation resulting from the use of an inverter derived 20 volt supply, are still used. The same supply is also used to feed the driver and the audio stages of the receiver. TRIO's acknowledged leadership in the quality audio field has been put to good advantage in their amateur equipment. Everyone comments on the clean crisp audio quality of the TS-700G both on transmit and receive.

The main refinements can be summarized as follows:

- ★ New improved receiver front end system contributes to a new standard of sensitivity; $0.25\mu\text{V}$ for 10dB S + N/N ratio on SSB, 20dB quieting for $0.4\mu\text{V}$ on FM. This is the best receiver on the market today.
- ★ New FM IF strip with narrower filter for European market.
- ★ New centre zero tuning meter for FM.

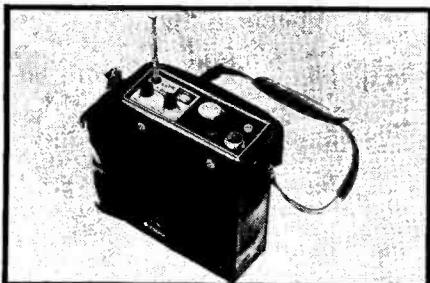
- ★ New 100kHz calibrator with automatic disconnection of antenna to remove confusing outside signals. Automatic transmitter disable in CAL. mode.
- ★ New logarithmic S meter.
- ★ New repeater and reverse repeater operation at the turn of a panel switch. Operates on either VFO or crystal controlled channels.
- ★ New improved audio system for FM and AM transmit. The use of fully balanced mixing at all stages of frequency conversion guarantees a clean signal free from unwanted products. The power output of the transmitter is normally between 15 and 18 watts and this, in conjunction with the TRIO amplified ALC system, gives you an outstanding signal. Just listen to 2 metres and judge for yourself which rig always sounds the best.

If you are considering your once only rig for 2 metres, then the TS-700G has to be your logical choice. Backed by the largest company in Japan making amateur radio equipment, and the best service facilities in Europe at Lowe Electronics, the TS-700G SSB/FM/CW/AM transceiver has to be the all time best buy. TS-700G, £324 + VAT.

Sole Importers
LOWE ELECTRONICS
 Cavendish Road
 Matlock Derbyshire
 Tel: Matlock 2817/2430



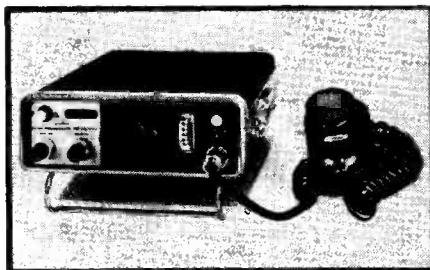
LOWE ELECTRONICS



TR2200G £88 + VAT

This little powerhouse is now the world's fastest selling two metre FM transceiver. Unbeatable at any price, its combination of rugged reliability and high sensitivity give it universal appeal. Now that more and more repeaters are opening, the TR2200G allows the operator to work over long distances with ease—we can often work GB3PI from Matlock using the whip antenna on the TR2200G.

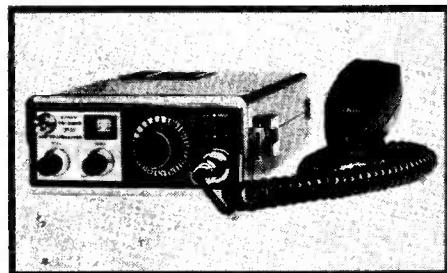
The rig comes complete with carrying case, shoulder strap, microphone, Nicad charger, two battery carriers and fitted with three channels (S20, S22 and R7 normally but alternatives supplied to your choice). Facilities for 12 channels and incorporating Trio's unique tuning fork repeater access tone generator.



TR7200G £130 + VAT

The TR7200G has set all 2 metre FM operators talking about its outstanding performance on both transmit and receive. Not only is it the best engineered transceiver on the market, but it's also the most sensitive at 0.3µV for 15 dB quieting and has the cleanest transmitted signal both in and out of band (the economy transceivers simply lack the interstage filtering to ensure that the owner is not put off the air by the Home Office.)

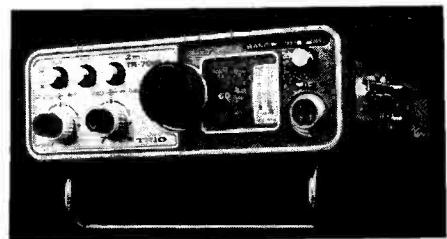
Supplied complete with microphone, mobile mount, power leads, spare fuses and incorporating the TRIO exclusive tuning fork access tone generator, the TR7200G includes five fitted channels (S20, 21, 22, R6 and R7) or alternatives if requested.



TR3200 £130 + VAT

The newest FM handy transceiver from the TRIO range. Superb performance for the 70 cm. operator, 12 channel capability in the range 432-436 MHz with three channels fitted (SUB, SU18, SU20). Transmitter output switched 2W/400mW and incorporating the TRIO exclusive 1750 hz tuning fork access tone generator. $\frac{1}{2}$ -wave detachable antenna for high gain performance on both transmit and receive.

Supplied complete with all accessories as the TR2200G and with the new miniature handy microphone.



TR7010 £176 + VAT

Following the worldwide success of the TS700, Trio have taken the TS700 basic design and packaged it for 2 metres SSB mobile use.

The TR7010 sets new standards in receiver sensitivity and low spurious emission on transmit. Operating CW and SSB from 144.1-144.3 MHz, the TR7010 covers all CW, SSB and beacon activity. 40.5 kHz channels plus VXO and RIT provide continuous coverage. 8 extra channels can be used, without retuning, in the range 144-145 MHz by fitting auxiliary crystals.

Single conversion using an IF of 10.7 MHz with a superb crystal filter provides outstanding selectivity. Wide range amplified AGC and newly developed FET devices in RF amplifier and mixer stages allow maximum sensitivity to be used with freedom from overload due to adjacent signals.

Single conversion transmitter with new fully balanced mixer system generates a beautifully clean signal with crisp audio quality.

HEAD OFFICE

119 Cavendish Road, Matlock, Derbyshire. Tel. 2817 or 2430 9 a.m. to 9 p.m.

BRANCH OFFICES

39 Pound Street, Carshalton, Surrey. Tel. 01-669 6822

Soho House, 362-4 Soho Road, Handsworth, Birmingham Tel. 021-554 0708

Alan GW3YSA, 35 Pen-Y-Waun, Efail Isaf, Nr. Pontypridd. Tel. Newton Llantwit 3809

John G3JYG, 16 Harvard Road, Ringmer, Lewes, Sussex. Tel. Ringmer 812071

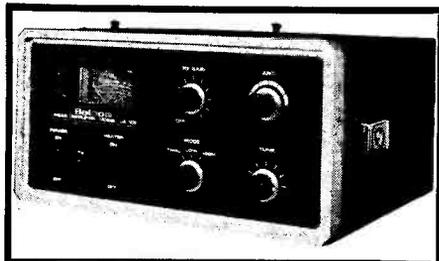
Sim GM3SAN, 19 Ellismuir Road, Baillieston, Nr. Glasgow. Tel. 041-771 0364

AGENTS (Evenings & Weekend)

OPENING HOURS: 9-5.30 TUESDAY TO SATURDAY INCLUSIVE

OPENING SOON. LOWE ELECTRONICS IN LEEDS. KEEP ALERT FOR DETAILS

LOWE ELECTRONICS



LA106

£158 + VAT

High power. High performance. Modest cost.

A reasonably priced, compact, high performance linear for 2 metres. SSB/FM/CW operation. 10W of drive for around 180W input gives your signal the extra kick to get it out of the noise. Built in receive preamplifier with adjustable RF gain and helical filters for increased selectivity and reduced intermod from out of band signals. Built-in regulated 13v. 2.5A supply for Liner 2 or any similar driver.

The LA106 will match any rig such as the TS700, FT221, IC201 in any mode provided that the drive level is around the 10W level. Using a rugged valve in the PA allows you to get away with occasional misuse (just try a high power solid state amplifier into a mismatched load) and gives very low intermod products.



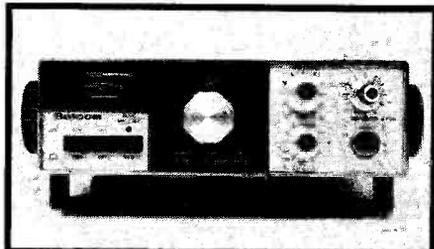
LINER 2 Mk II

Belcom have just introduced the latest model of the Liner 2 with many detail improvements, notably in the new receiver front end which results in much higher sensitivity, and transmitter modifications which improve the signal quality and lower the level of unwanted signals.

The Liner 2 is still the ideal way to get into real DX operation on 2 metres and continues the Belcom tradition of being one step ahead of the field in amateur radio developments.

Frequency coverage 144-1-144-34. 10W output. Complete with the usual Belcom comprehensive range of accessories including mobile mount etc.

Contact us soon for a demonstration.



LINER 430

£228 + VAT

Two steps ahead comes the Liner 430. Already being used by us to make mobile contacts with the U.S.A., the Liner 430 opens up a whole new dimension of long distance contacts via the OSCAR satellites.

Covering two 480 kHz bands in 20 kHz steps and using the exclusive Belcom Auto watch system which detects the presence of a signal anywhere within VXO range without tuning. No more missing signals and worn out fingers from control twiddling.

10 watts output. Selectable USB/LSB/CW operation. Dual conversion using 50 MHz and 7.8 MHz IF's results in excellent image rejection and high sensitivity. Truly a new dimension in amateur radio from the Liner 430.



FSI007P

The home station FM transceiver with everything. *Mains or 12 volt operation. *16 channel scanning * channel skipping facility * priority channel with front panel crystal sockets * manual or auto scan * switched high/low power * switched wide/narrow deviation * S meter * RF output meter * centre zero tuning meter * RX fine tuning control * built in SWR bridge * built-in digital clock with alarm and auto switching on * built-in loudspeaker * 10 watt TX * 0.3 microvolt sensitivity * superb styling and finish.

All this and supplied fitted receive crystals for 145, 145-25, S20, S21, S22, 145-6, 145-8, R3, R4, R5, R6, R7 together with transmit crystals for 145, S21, R6 make the FSI007P the most incredible bargain on the FM market. Backed by the combined reputations of Belcom and Lowe Electronics.

IC7300FB Announcing a marvellous new rig for mobile or portable use on 2 metres. Just read the basic specification to realise that this has to be the rig for you.

TX Power output of 40 watts eliminates the need for a linear. Low power consumption of only 1.2 Amps from a 12 Volt source allows long operating periods for portable contest use.

All mode operation using a newly developed system of simultaneous SSB, AM and FM sets new signal standards and eliminates mode switching problems. Ultimate deviation limiting at 100 per cent output power generates a superb punchy signal that will raise comment whenever heard.

RX 46dB quieting for an input signal of only 0.123 microvolts will now be the standard of comparison for other receivers.

NEW IF system using overcoupled filters to give two channel monitoring at the same time. Single conversion to an IF of 600 kHz produces automatic repeater shift using a single crystal for transmit and receive.

NEW Flexycryst (pat. app. for) device using a newly developed quartz/rubber mixture produces 1 MHz shift from one crystal—just think, only two crystals needed to cover the entire two metre band.

Before sending for further details, read the specification again and remember that figures on paper do not mean that the equipment described is actually any good.

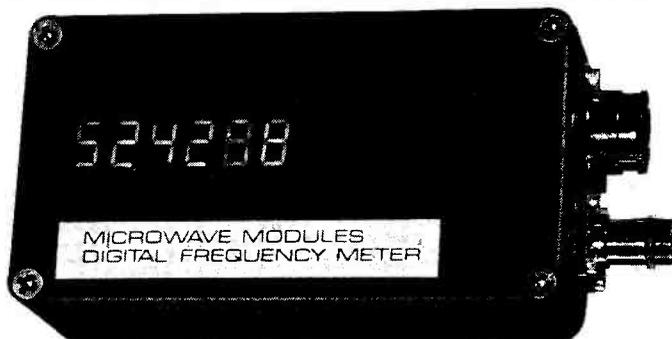
CRYSTALS — Special April Offer. As well as reverse repeater crystals for most 2 metre equipment, we have limited stocks of the following: —

Reverse S20, reverse S22 and reverse SO. Send now to avoid disappointment.

SEND 25p IN STAMPS FOR COMPLETE CATALOGUES AND PRICES

MICROWAVE MODULES LIMITED

50 MHz DIGITAL FREQUENCY METER MMD050



GENERAL DESCRIPTION

Recent advances in MOS technology have made possible the development of this extremely compact frequency meter which for the first time offers the user a convenient cost-effective means of frequency measurement.

The decimal point position can be programmed by applying +12v. to one of two pins on the DIN socket. For normal operation the plug would be wired for two significant figures before the decimal point. However, if a 500 MHz \div 10 prescaler such as our MMD500P is used, then the plug can be wired or switched for 3 significant figures. The counter has a high speed TTL input divider giving operation up to 50 MHz and this is preceded by a wide band input amplifier giving a sensitivity of 50 mV RMS over the range 0.45–50 MHz.

The counter has reverse polarity protection and operates satisfactorily from a nominal 12v. DC supply. A suitable 5 pin DIN plug is supplied.

SPECIFICATION

Digit Height	10 mm
Display Width	45 mm
Case Size	111 \times 60 \times 27 mm
Frequency Range	0.45–50 MHz
Sensitivity	Better than 50 mV RMS over above range
Input Connector	50 ohm BNC
Input Impedance	200 ohm approximately
Power Connector	5 pin 270° locking DIN socket (supplied with plug)
Power Requirements	11 – 15 volts DC at 200 mA approximately

PRICE **£66.00** Inc. VAT
Available from Stock

500 MHz \div 10 PRESCALER MMD500P

This prescaler uses high-speed ECL technology to achieve \div 10 operation to a frequency of 500 MHz, with an input sensitivity of typically better than 200mV RMS over the range 50–500 MHz. The input integrated circuit is diode-protected, and an internal regulator provides the 5 volt DC for the logic circuitry. The output from the unit is a TTL compatible level of about 2.5 volt peak to peak, enabling the prescaler to drive TTL logic directly, or to drive any counter having a maximum input voltage rating of 1 volt RMS or greater. The lower frequency limit is dependent on the nature of the input waveform, but for square wave drive the unit can be used down to zero frequency.

SPECIFICATION

Case Size	111 \times 60 \times 27 mm
Frequency Range	50–500 MHz
Sensitivity	Better than 200 mV RMS over above range
RF Connectors	50 ohm BNC
Input impedance	50 ohm
Power Connector	PTFE feed-through solder pins
Power Requirements	11 – 15 volt DC at 100 mA approximately
Output Voltage	2.5 volt peak, TTL compatible

PRICE **£27.00** Inc. VAT
Available from Stock

MICROWAVE MODULES LTD., Brookfield Drive, Aintree, Liverpool L9 7AN
Telephone : 051-523 4011
Cables : Microwave Liverpool



SOUTH MIDLANDS

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OVER

YAESU MUSEN MAIN UK DISTRIBUTOR WITH 2-YEAR GUARANTEE

SMC's guarantee, confident in Yaesu quality, is, until further notice, extended to 2 years, covering both labour and free components (excluding valves, semi-conductors and carriage)



FT101E

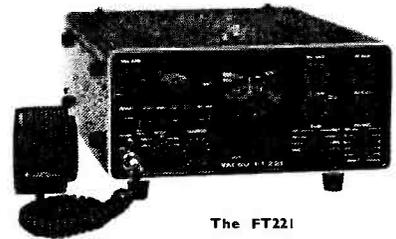
FT101E - FT101EE - FT101EX Ex Stock in TOTTON

The FT101E a complete mains or 12v. DC station contained in a compact 30 lb. package. 260W P.I.P. of SSB (with in-built R.F. speech processor), 180W, CW and 80W of A.M., 10 to 160m. (inc. 10 MHz RX). The sensitive and selective (permeability tuned RF stages and 8 pole crystal filter) receiver offers : threshold adjustable noise blanker, switchable 25 and 100 kHz calibrator, $\pm 5K$ clarifier (with separate on/off switch), etc., etc. The VFO is stable and linear (readout to 1 kHz), external VFO or crystal control can be selected, with LED indicators illuminated accordingly. Carrier level is adjustable for : tune up A.M., for CW operation, whose performance with the semi break in keying, with side tone, and the optional 600Hz filter installed is of a high order. Linear and transverter provisions are made with sockets for : relay contacts, ALC output, all internal HT supplies, low level RF heater links and switches, etc., etc.

Consider the rest - then buy the best

The FT221, complete 2m. station Ex Stock in Totton

The FT221. The multimode USB, LSB, AM, FM, CW (with semi break-in and side tone), 2m. transceiver offering the choice of : phase locked VFO or 44 crystal channels, simplex or repeater (600Hz up and down shifts), with unique "double push" auto tone burst, mains or 12v. (3A) operation, excellent selectivity, SSB 2.4 kHz (1.7 : 1 S.F.) or FM 12 kHz. Front panel adjustable VOX and mic gain, a calibrator (1 MHz \div 10), 1 kHz readout and linearity, sensitive squelch, clarifier with IRT and IRT with ITT (makes F.S.K. easy), switchable "S" and centre zero tuning meter, noise blanker, serviceable plug-in boards all contained in 11 $\frac{1}{2}$ " (14" x 5" x 11 $\frac{1}{2}$ ", 22 lb rigid package.



The FT221

NEW Linear Amplifiers

From KLM
Solid State Linears. SSB/CW/FM—12v. DC. 10W drive
80W output ... price about £100-00 (+ VAT)
160W output ... price about £150-00 (+ VAT)
SAE FOR FURTHER DETAILS



NEW 432 MHz Transverter

From Microwave Modules—23 or 00 MHz I.F.
* IDEAL FOR USE WITH THE FT620B
Tx Balanced dual gate Mosfet mixer 5 linear stages
6 watts output.
Rx Cascode low noise RF Mosfet mixer.



MMT 432

NEW Quality Coax Relays Ex Stock

Type TTE Coaxial change over relays 12v. DC 50 ohm (P/P 30p) VAT 8%

Power	Crosstalk	Insertion	1-5 : 1
500 MHz	500 MHz	0.2dB	VSWR
CX120	50W	35dB	5GHz
CX239	300W	40dB	3GHz
CX600N	600W	40dB	1GHz

1-2GHz Cable entry £6-50
2-3GHz BNC sockets £14-00
1-5GHz N sockets £16-75

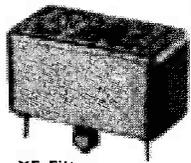
432 MHz Transverter ...	£71-20	144 MHz Mosfet Converter	£15-20
432 MHz Converter ...	£18-10	144 MHz Converter + LO	£16-30
70 MHz Mosfet Converter	£15-20	144 MHz Pre Amp 2 outs	£9-00
70 MHz Converter + LO	£16-30	1296 MHz Converter ...	£24-00

ALL EX STOCK P. & P. 30p VAT 25%

LOW PRICE CRYSTAL FILTERS AND AT ONLY £3.50 PAIR (Singles £2 ea.) CRYSTALS P & P 20p VAT Rate 25%

NEW for '101 OWNERS 350Hz CW and 12 kHz FM FILTER

Plug into your FT or FR101 to narrow up CW reception and give your optimum response on FM
EX STOCK IN TOTTON — CW FILTER, £16-00 ; FN FILTER, £14-50 (post paid, VAT 25%)



YF Filter

Individually supplied with ± 6 dB. (25dB), 60dB bandwidths, ripple factor and insertion loss.

YF107M600 600Hz 10-7 MHz CW ...	£13-00	FT2FB (14 MHz Rx, 18 MHz Tx)	144 (-15R, -20, -30, -36, -40, -50R, -60, -70, -80)
YF107M2-4 2.4 kHz " " SSB ...	£12-00	ALL Simplex, ALL Duplex and all Inverse Repeater (both T&R)	145 (-06, -09, -00, -00)
YF107M12 12 kHz " " FM/AM	£12-00	TR2200 (44 MHz Rx, 12 MHz Tx)	ALL Simplex, ALL Duplex and all Inverse Repeater (both T&R)
YF90M600 600Hz 9 MHz CW ...	£13-00	SIMPLEX	(5 (20, 21, 22, 23, 24)
YF90F2-4 24 kHz " " SSB ...	£11-00	DUPLEX	R (3, 5, 6, 7)
YF90F12 12 kHz " " FM/AM	£13-00	DUPLEX	R (3, 5, 6, 7)
Carrier crystal HC18/U (each) ...	£1-50		

Spare Yaesu crystals available at £2-20-£3. 144 MHz (common types) channel crystals to order at £2-50 pair. 8 weeks delivery

FT200 at £2-20 each
10A, 10C, 10D

Converter crystal £2-00
33-666 (2m.), 42 (4m.)
50-5 (70cm.)

Pye Pocket Phones
433-2, £4-50 pair

Sub-standards—8% VAT
1 MHz HC8/U, £2-50
100

Send large S.A.E. for Free Yaesu catalogue and 22-page Stock/Price SH Lists



PLEASE NOTE THESE PRICES DO NOT INCLUDE VAT (8%)

Terms:—Cash with order or credit card holders just 'phone in for, if possible, same day despatch. Immediate H.P. available for card owners for amounts up to £150-00. Holders of current U.K. calligns (where references have been provided) can be speedily cleared or normal H.P. at competitive rates is available.



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17 YEARS OF PROFESSIONAL EXPERIENCE



THE 24-HOUR SECURICOR SERVICE

NEW! Two Metre Transverter

The FTV-250 styled to match the FT101 etc. Sensitive receiver converter with good image rejection and RF gain control on front panel. 10W P.I.P. (A3) and A1) 4W. (A3 and F3) metered power output and drive level. (3V. RMS at 29 MHz) 13 lb. 11 1/2" x 8 1/2" x 6".



FTV-250



FT620B

FT620B UHF Exciter Ex Stock

The FT620B features full 1 kHz resolution VFO coverage across 50-54 MHz in eight ranges. SSB (selectable), AM, CW (build your own FM modulator), four crystal controlled channels in each band segment, receiver clarifier, noise blanker, built-in AC and 12v. DC power supplies, mic. supplied. The exceedingly low level of spurious emissions and the 50 MHz output makes this unit highly suitable for use as a drive source transverting to 4, 2, or 70 cm., and/or parametrically up converting to 70 or 23 cm.

FR101S - FR101D - FR101SD - FR101DD Ex Stock

The FR101D (deluxe) wide coverage (23 (from 1-5MHz) 500 kHz bands + 4 and 2 metres) receiver. Analysis of the signal path shows : 0-20dB switchable attenuator, two section permeability tuned input filter, Mosfet R.F. stage and mixer (crystal controlled), 3 section top coupled bandpass filter, no gain at first I.F., IC balanced mixer, 20 kHz wide crystal filter, shunt diode noise blanker, single FET buffer stage, AM, CW or SSB (RTTY) filter, appropriate detector and audio stage. Add to this, two excellent VHF converters, squelch, FM detector, 1 kHz readout, excellent stability, Tx monitor control, crystal control facility, switchable AGC, transceiver capability (FT or FL, 101) and that digital readout options are available of this (deluxe), or the standard (less the plug-in optionals), converters, broadcast band crystals, filters, etc.) version truly an "apparatus communication sine fills" extraordinary.



FR101DD

NEW Lightning Arrester NSK7S

Gas Discharge (90v. Strike) DC-1 GHz, SO239 each end, VSWR 1:1:1, 50 ohms, max loss 0.2 dB, surge 5 kA. AC 5A.

Ex-Stock. Post and packing 20p. VAT 8%
NSK7S. Low Price ... £7.50



NEW Coax Slide Switches (8% VAT Only)

Up to : -1 kW, 1.5 GHz, 0.3 dB loss, 1:2:1 VSWR, 50 dB isolation. 50 ohm "N" or "PL" fittings.

Ex-Stock. Post and packing 30p., VAT 8%
TWS 120G 1 in 2 out Gold SO239 ... £5.35
TWS 150G 1 in 5 out Gold SO239 ... £9.50



AEC METERS Power SWR and Field Strength, calibrated to 160 MHz for SWR's of 3:1. Post and Packing 40p VAT 8%

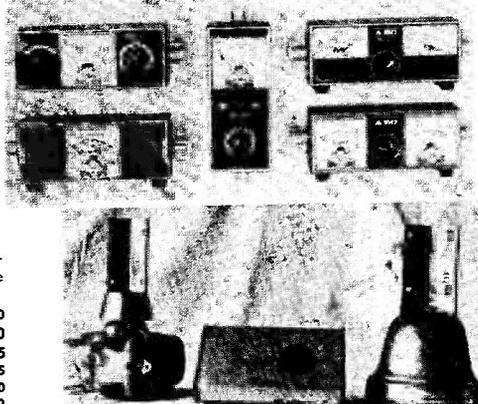
- SWR10 (T.L.H.), 50/75Ω, SWR (±10%), 1.5 MHz up ... £8.15
- SWR20 (B.L.H.), 50Ω, SWR (±10%), 1.5 MHz up F.S., Power 10 and 100W FSD (±10%) ... £9.90
- SWR40 (centre) 50/75Ω, SWR (±10%), 1.5 MHz up F.S. ... £7.80
- SWR50A (T.R.H.) 50/75Ω, SWR (±5%), 3.5 MHz up. Power to 1kW (±20%) ... £9.60
- SWR50 (B.R.H.) as SWR50A (300μA) but 100μA meters ... £11.20

CDE Rotators EX STOCK (IN TOTTON) FOR FAST DELIVERY (25% VAT, CABLE 8%)

CARRIAGE (B.R.S.) Free. Securicor delivery £1 ex.

All rotators supplied complete with appropriate control box and instructions.

- AR30 (illus. centre and immediate right) £26.60
- AR40 (illus. centre and far right) ... £34.60
- AR33 De-Luxe control AR40 ... £41.25
- CD44 (C.B. illus. left) medium duty ... £69.75
- Ham 11 (C.B. illus. left) heavy duty ... £105.50
- 2010/220 Stolle ... £37.50
- Control cable 5 core 18plyard, 8 core 27plyard



See overleaf for selection of Masts and Towers

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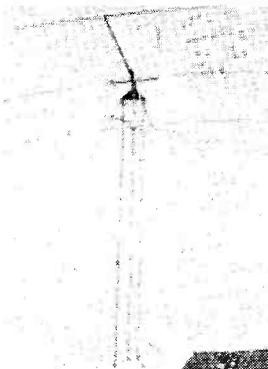


South Midlands Communications Ltd.



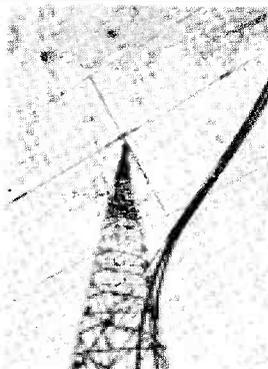
TELOMAST with TA33

TELESCOPIC GALVANISED
10' sections without or c/w rigging
Carriage £2, ex stock VAT 8%
30' ... £16-50 or £34-00
40' ... £23-00 or £42-00
50' ... £28-00 or £55-50



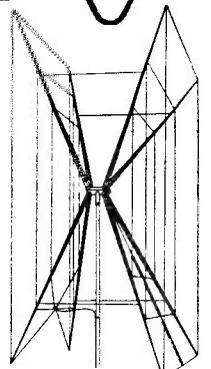
HAMTOWER with TH3 Jnr. SELF SUPPORTING

Galvanised lattice 10' sections.
Freesstanding with climbing steps.
Carriage £3-50 ex stock 8% VAT
30' c/w base grillage ... £135-00
40' c/w base grillage ... P.O.A.



TELETOWER with TH3 Mk. III TELESCOPIC GALVANISED

Carriage and rigging (RX) extra.
42' ... £121-00 (RK) £28)
57' ... £174-00 (RK) £28)
79' ... £224-50 (RK) £49)
101' ... £303-50 (RK) £76)



GEM QUAD

2 ELEMENT

10, 15 and 20 metres.
Balun included.
Weights only 21 lb.
Low angle radiation.
Front/back ratio 25dB.
Converts to 3 or 4 element.
Withstands 100 mph winds.
Fibreglass tri-dectic spreaders.

ALI MASTS

TELESCOPIC LIGHTWEIGHT

1-5, 2 or 3M: Quick Lock Sections
13 versions. 6 to 21m. from stock.
Rigging extra. Carriage £1 VAT 8%
4 x 1.5m. £13-60 3 x 3m. £17-20
5 x 2m. £21-70 7 x 3m. £42-00

ACCESSORIES

Terylene or steel rope, shackles.
Thimbles, mastings, clamps, sleeves,
brackets, cable ties, turnbuckles
in fact ALL YOU NEED from S.M.C.

VERSATOWERS

TILTING TELESCOPIC

Post, or wall mounting—25' to 120'.
Supplied c/w ropes, winches, etc.
Carriage paid. Ex stock VAT 8%
P25 ... £161-59 P60 ... £246-84
P40 ... £208-01 W40 ... £162-03

CUSHCRAFT VHF OMNIDIRECTIONAL (Car. 80p) VAT 25%

RINGO RANGER-ARX2-6dB gain over $\frac{1}{2}$ ground plans. Uses 3 x $\frac{1}{4}$ in phase and $\frac{1}{4}$ stub, ultra low angle radiation, approx. 10' high. (Illustrated right) **LOW PRICE EX-STOCK**

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AR2 3dB Ringo Vert. ... £10-90	ABW125 ABW harness ... £7-30
AR25 QRO AR2 ... £12-90	ASQ1 2m. Squalo ... £11-20
CX1000 29MHz Ringo ... £23-20	ASQ22 Stacked ASQ1 ... £23-00

JAYBEAM 70 (4m) 144 (2m) 432 (70) (Car. about 80p) 25% VAT

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D8/2M 8 over 8 slot ... £12-00	PBM18/70 18 ele. Para. ... £12-50
5XY/2M 5 ele. cross ... £9-40	MBM48/70 46 ele. Multi ... £13-90
8XY/2M 8 ele. cross ... £11-70	MBM88/70 88 ele. Multi ... £18-50
10XY/2M 10 ele. cross ... £16-15	12XY/70 12 ele. cross ... £19-00
5Y/2M 5 ele. yagi ... £4-90	4Y/4M 4 ele. yagi ... £7-75
8Y/2M 8 ele. yagi ... £6-40	PMH2/70 2 way harness ... £3-75
10Y/2M 10 ele. long yagi ... £12-60	PMH2/4M 2 way harness ... £6-00
14Y/2M 14 ele. long yagi ... £16-25	PMH2/C Circ. phasing ... £3-25
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S500W P.I.P. 14 SWG ... £17-85	P 600W P.I.P. Cu/Terylene
HP1/K P.I.P. 14 SWG ... £19-75	braid c/w 75' feeder, etc. £19-75

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BGA s.s. $\frac{1}{2}$ 2m. stainless ... £8-50	Magnetic Base Mount ... £8-50
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14AVO 10-40m. Trap Vert. ... £42-00	LA2 Lightn. Arrs. ... £3-00
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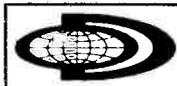
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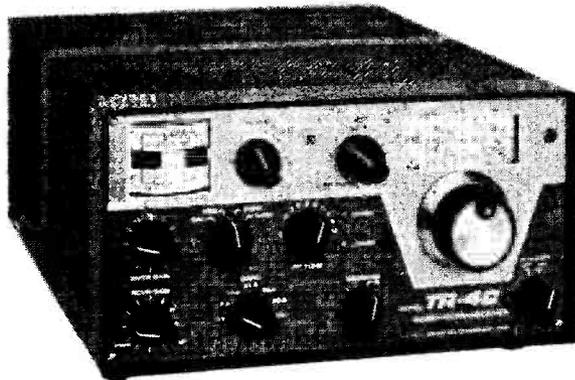
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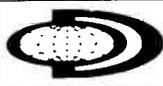
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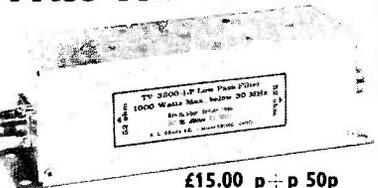
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Prevents spurious outputs to the antenna that cause TVI from transmitters operating below 300 MHz ★ Stops 2nd and 3rd harmonics on 15 and 10 metre amateur bands and 3rd harmonic of 20 metres. ★ Stops 2nd and 3rd harmonics of CB Band ★ Protects all World TV channels ★ Protects TV if frequencies above 36 MHz ★ Has low transmitter loss below 30 MHz.

SPECIFICATIONS

Transmitter Operating Range : 0 to 30 MHz.
Design Cutoff Frequency : 33 MHz.
Attenuation : Greater than 80dB above 41 MHz.



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Insertion Loss : Less than 1dB below 29 MHz.
Less than 1/2 dB at 30 MHz.
Power Capacity : 1000 Watts average.
Impedance : 52 ohm input and output.
Connectors : UHF type SO-239 sockets.
Dimensions : 8 1/2" x 2 1/2" x 2 1/2".

PRICE LIST APRIL 1976

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- FF-1 Crystal control ... £34.50

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SPR-4 Receiver—General Purpose ... £412.75

AL-4 Loop Antenna for SPR-4 ... £50.50

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TA-4TA-4 Transceiver adaptor for SPR-4 ... £28.00

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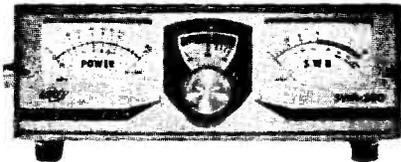
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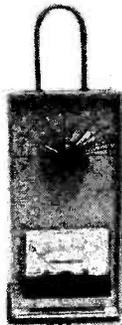
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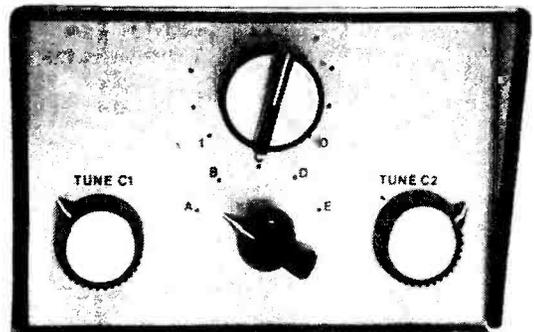
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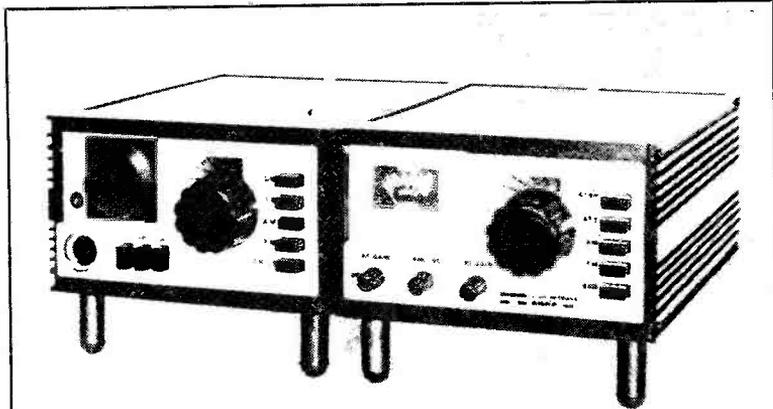
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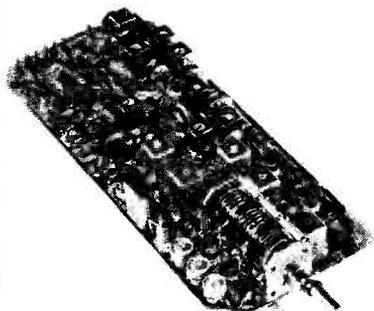
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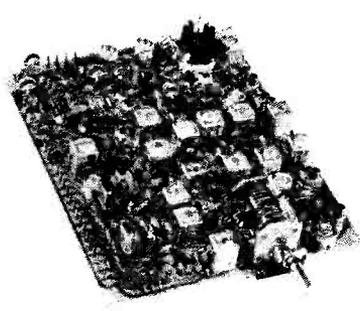


ATAL 228 Tx

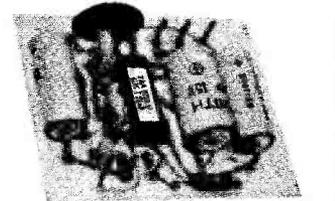
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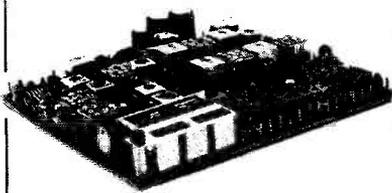
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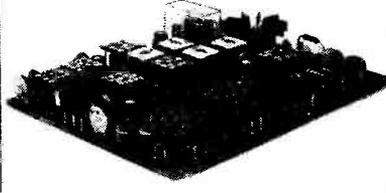
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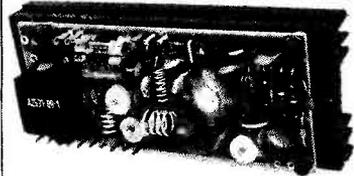
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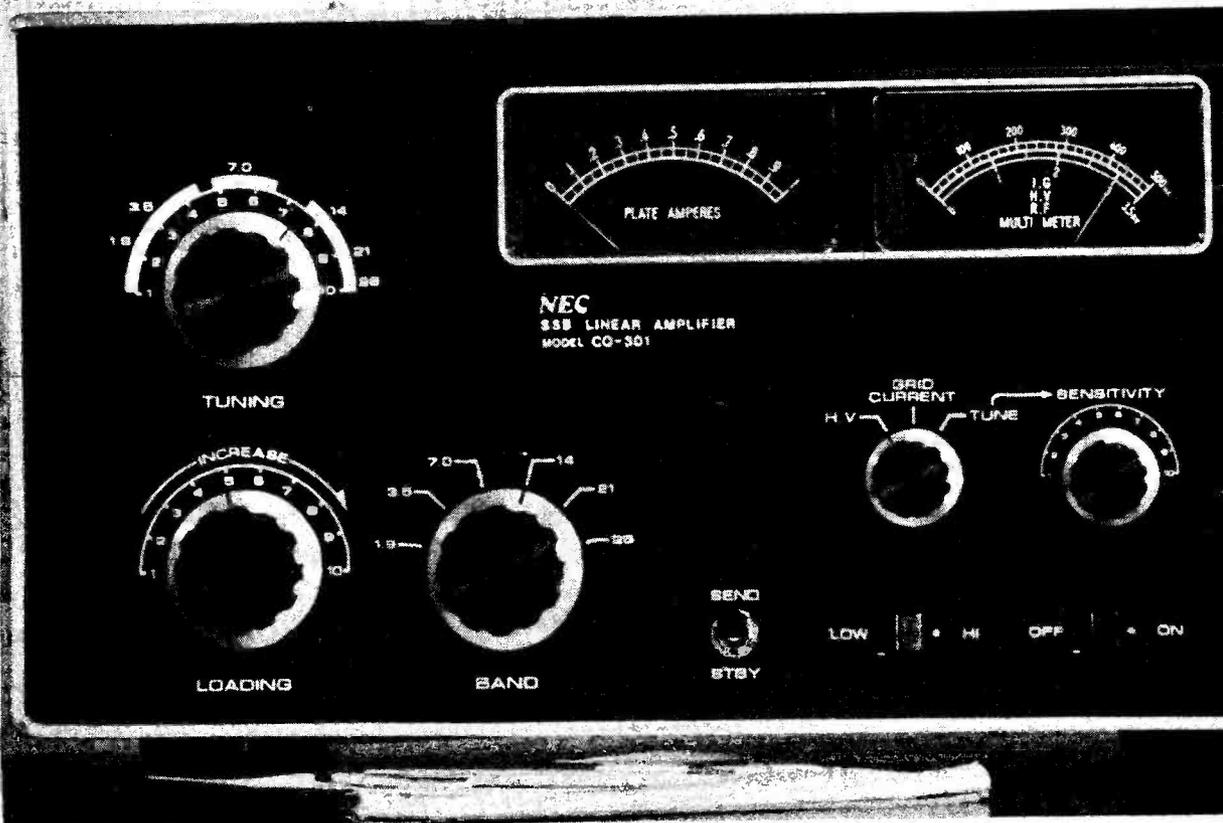
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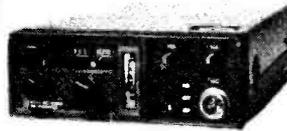
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SHORT WAVE MAGAZINE

(GB3SWM)

Vol. XXXIV

APRIL, 1976

No. 390

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Managing Editor: AUSTIN FORSYTH, O.B.E. (G6FO/G3SWM)

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The SHORT-WAVE Magazine

EDITORIAL

APOLOGY—MARCH ISSUE

This issue appeared one week late, for which we apologise to all concerned—it was due to production difficulties (*not* the fault of our printers) beyond our control. It is not often we are late in getting the *Magazine* out—in fact, this was only the second occasion in the last 30 years that an issue has not been ready for distribution by the due date.

It brought in a great many enquiries, by letter and telephone, and we are grateful for the understanding and forbearance shown by most of those affected.

RADIO FRATERNITY LODGE, No. 8040

Any radio amateur who is also a Freemason is invited to get in touch with S. Howard, G8TY, *Q1HR*. This lodge recently celebrated its tenth anniversary.

THE MOBILE SCENE

In addition to the listing here in the March issue, p. 21, the following Rally events have since been notified: **May 23**, Rally at the Rugby Ground, Merthyr Dyfan Road, Barry, South Glamorgan, with talk-in on two-metre FM/SSB by GW3VKL and GW4BRS; details and further information from D. H. Adams, GW3VBP, *QTHR*. **June 27**, West of England Mobile Rally at Longleat House, near Warminster, Wilts., with talk-in on Top Band, 80m. and two metres; overnight camping is permissible from 6.0 p.m. on the Saturday; details: B. Croker, G3ULJ, *QTHR*. **July 18**, Anglian Mobile Rally, Stanway School, Winstree Road, Colchester; enquiries to: T. A. Mills, G3YAI, *QTHR*. **Clacton** (0255) 21664. **August 15**: Bucket-and-Spade Party, Regency Hall, Saundersfoot, nr. Tenby, Dyfed, West Wales; talk-in, all modes, on all bands Top to Ten; this is a popular event, at a seaside location; information from M. A. Shelley, GW3XJQ, *QTHR* (*Manorbier* 544 or 319). **August 29**, Torbay Rally at Rugby Club ground, Newton Abbot, South Devon, opposite race-course; talk-in on Top Band, 80m. and two metres.

INTERNATIONAL CONVENTION, FRIEDRICHSHAVEN, LAKE CONSTANCE, SOUTH GERMANY, JUNE 25-27

This annual event, organised by the DARC, the German national Amateur Radio organisation, will be held this year at a new and more commodious *venue*. This is a full-scale convention, with a trade exhibition, lectures and many other attractions of an Amateur Radio nature. For accommodation, write: DARC,

Städtisches Verkehrsamt, Friedrichstrasse 18, D-7990, Friedrichshaven, West Germany, and for other details and information to: DARC, P.O. Box 1155, D-3507, Baunatal 1, West Germany. It should be quite worth taking in if you can be over there towards the end of June.

INLAND WATERWAYS NATIONAL RALLY— GB3IWA

The annual get-together of canal craft, organised by the Inland Waterways Association, at which 500 boats are expected from all parts of the country, is being held at Peterborough, Cambs., over August 6-8. There will be many "side-shows" connected with cruising in inland waters (the event is also an exhibition) with large daily attendances of enthusiasts for canal cruising and the "narrow-boat life" generally. The Peterborough Radio & Electronics Society will have GB3IWA on the air for the occasion.

"MARINE VHF FOR YACHTS"

Further to this article in our March issue, we are informed that Ch. 16 in the marine VHF band has been officially designated as the distress frequency, corresponding to 2182 kHz in the MF band, and used in the same way.

THE LATE CEDRIC BENHAM, CBE (G4TZ)

The estate of the late Cedric Benham, G4TZ, of Towcester, Northants., at one time principal of the well-known firm of Painton & Co., Ltd., Northampton, was proved at £350,354—on which duty of £168,461 was paid.

INDEX — Vol. XXXIII

Our last (March) issue started a new volume, the 34th in the series—it seems impossible that it should have lasted so long under the same Editorial direction, but that is the fact—and each copy contained, as a free loose supplement, an Index for Vol. XXXIII, March 1975 to February '76. Some back-number copies of a few issues are available, at 35p post free.

WELSH AMATEUR CONVENTION

The 1976 Welsh Amateur Radio Convention will be held on Sunday, September 26, at Oakdale Community College, Blackwood, Gwent, South Wales (as last year). It is organised by the local Blackwood & District Amateur Radio Society, and an interesting programme is being planned. Information from: R. B. Davies, GW3KYA, *QTHR*.

Austin Forsyth
G6FO

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

LAST time round we were in aerial trouble. However, when the 14AVQ came down to ground, it has to be admitted the smile was wiped well and truly off the "KFE face at the sight that met his eyes. Although everything had been well slathered in grease before it went up in the air, the U-clamps had to be sawn free before the thing could be released from the mast, and most of the clamps holding things together were in a similar condition. However, it was noticed that the traps had a plastic "hat" each, to locate the outer sleeve with relation to the mast above it, and in the process to provide weather protection for the trap itself. Now, although these weather-proofing hats were very tightly fitted on the mast parts, they had, over the years, ridden upwards so that they ceased either to support the trap outer sleeve or give weather protection. This does not seem to have been a disaster—we had caught it before it got that far—but when it does up again, a car hose-clamp (jubilee-clip) will be fitted just above each trap to stop any repeat performance. Similarly, those books on Aerials and those instruction sheets which recommend a dose of *Penetrox* should not be disregarded—it is clear that the problem with 7 MHz is due to the condition which *Penetrox* is designed to prevent, i.e., corrosion between two pipes sleeved one inside the other causing an open-circuit between two sections. Additionally, although the wires at "KFE" have always been given regular routine maintenance, the 14AVQ, because of its inaccessibility has rather been left out of it—and now we are suffering the consequences, in that it is touch-and-go whether we can save the thing from the results of neglect.

Conditions

For a solid month, W4UMF has been predicting Low-Normal or worse conditions—mid-February to Mid-March—with nary a single lift in the muck, at least as seen from this QTH. However, all is not lost, and doubtless the sunspots will reappear—it is of interest to notice that W9WNV's *DX Handbook* suggested half-way up the slope of this last cycle, that the bottom would be in mid-1975. It is possibly of interest to note that the group of three sunspots noted on February 10 were in the high latitudes on the solar disc, which suggests they were part of the new cycle; as the cycle proceeds, the sunspots tend to move down towards the solar equator. Thus, we may yet be seeing the first indications that the turn is getting near. Have Hope—and Prepare!

Forthcoming Attractions

By the time this reaches print, assuming all goes well, Bill Rindone, WB7ABK will be off on a major DX-pedition; it was to start (before you read this) with a session from Tonga, A35, over the ARRL CW

Test of March 20/21. This is the shakedown for the gear and aerials, and will be followed by a tour of the South Pacific, on to Asia, and then to East Africa, most stops being from rare countries, and there will be at least one new country if all goes well. The itinerary calls for minimum time spent travelling, implying that there will be only short breaks between the various stops. Frequencies to watch are, for CW, 25 kHz inside the lower band-edge; for *Phone*, check around 3800, just below 7100 kHz and just below 14200. Main action will be 80/40/20, but if there is life on Fifteen or Ten, the same CW form will serve, with SSB around 21300 and 28600 kHz. No details to hand on the QSL arrangements as yet. Unless memory serves ill, this is that same Bill Rindone who was with W9WNV over here in U.K. back in 1966.

Turning now to Lloyd and Iris Colvin, it is understood the operation from 3D2KG raked up a total of 7,500 contacts, so that already they have logged some 20,000 contacts from VR1Z, VR8B and 3D2KG, about evenly between SSB and CW. Interestingly enough, both these DX-peditions are using Trio equipment, WB7ABK having the TS-520, and the Colvins the separates. It is understood that the next stop for Lloyd and Iris will be C21, Nauru—what a pity that G2DC is no longer with us, as Nauru was the one he was seeking in those last weeks of operation, and Lloyd and Iris were his friends as well.

Over April 20/21, noon zulu to noon, 9L1BH and 9L1JM will be operating from Banana Is. or Turtle Is.; the indications are that maybe this one will rate as a new "country."

The Bands

Or, this is the name of the game. Let's first take a look at the suffering upper end of the spectrum, namely Ten and Fifteen.

Our first stop is with SWL D. A. Whitaker, who, it will be recalled, organised a Ten-Metre Activity Day last year, resulting in many short-haul contacts but few DX QSO's. However, he is game to try again—good for him!—and the 1976 one will be on April 11, 0001 to 2359Z. Although it is *not* to be regarded as a contest, call "CQ Ten-Metre Activity Day" and exchange report plus a serial number, and then get your logs off to David at Hillcourt, 57 Green Lane, Harrogate, North Yorks., showing time, mode and, if possible QRG. Reception of beacon signals should be logged if this occurs, but not *Oscar*. The object of the exercise is to study propagation at the bottom of the sunspot cycle, and, above all to demonstrate *use* of Ten before the next World Conference.

GW4BLE (Newport, Gwent) mentions the International Ten-Ten Net on 28.8 MHz at 1100 on Sunday mornings, into which he hopes to break for a few QSO's, and he also intends to try and join the G1 net we mentioned last month; in addition he has himself been working some GDX on Sunday mornings, to G4BTI (Berks.), G4DXE in Worcs., and G5AQZ in Somerset, plus a solitary I4. As for 21 MHz, Stephen found it fairly fruitful, with some new ones for the band and an all-time new country in FB8ZG, hooked in the ARRL Phone Contest. Other SSB QSO's were made with A4XFE, FG7AN, HC2LF, KC4AAC, KP4BCL, PY1ZAE, PZ1AE, ZE1BP, ZS2ND, GW8DY and 7P8AR.

The only other mention of Ten comes from G3NOF (Yeovil) who simply says "No signals heard on Ten." On Fifteen, he found a week of relatively good conditions at the end of February. Largely it has been Africans from 1000 to 1600, though not always strong, and subject to deep fades. Occasionally North Americans have surfaced in the afternoons. QSO's, all on SSB were made with FB8ZG, A2CME, 4X4VJ, ON5GT/MM, TU2EI, ZD7FT, ZS1OE, ZS6CR, 3D6BD, 9G1LZ, 9J2PH, 9J2WR and 9K2DR.

Twenty

As always, this is where the action is—when there is any *and* the band is open! As a matter of interest, W4UMF tells all in the way of a long-range prediction for 1976-1977; while it's too much to expect Ted to be as uncannily accurate as he is with the short-term ones, at least it will plot the large-scale map of the future for us.

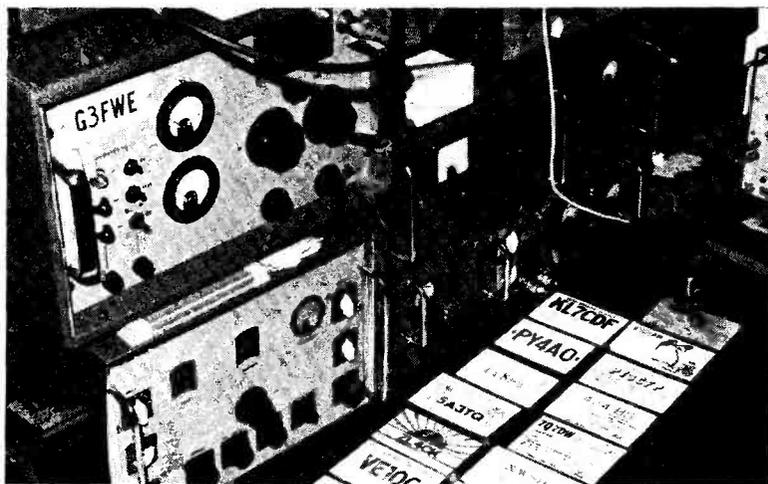
G2HKU (Sheppey) comments that Professor Murphy is on both overtime and piecework! However, he presses on and using Twenty latched on to the SSB emanating from JA8ISU, UK0AAC, ZL1AAE, ZL1ACC, ZL1VNV and ZL3RS, while CW managed to find 9H1CFH and ZL1VN.

GW4BLE says conditions have been up and down, but mostly down! Often the band has been dead by 2030, bar a few South



"Beam coming round on you now . . ."

The station of V. G. Scambell, G3FWE, 23 Laburnum Close, Lancing, Sussex, is all home-built, using mainly what is normally known as "junk." Panels are of 1/8th-in. dural, and all items are constructed as modules. His aerial for 21 MHz is a dipole in the roof-space. We have insufficient space to describe this interesting equipment in detail.



Americans apparently nattering across town—which leads Stephen to think in terms of taking a course in Spanish or Portuguese so as to be able to raise some of these characters! SSB contacts were made as follows: C5AL, CP1BCC, CT2BB, FC9VN, FG7AE, FG7XN, F6KDJ/FM7, FP8HL, FY7AW, FY0BHI, HK4CCW, K3 (VG)/HR6, JA, JE, JR, PJ3AD, PJ3AR, PJ8CO, YNSJAR/TI2, TR8CM, TU2FH, TU2FI, YS1AJE, YS1EMW, 5T5ZR, 6W8DY and 8R1J—which list being completed GW4BLE realised he had missed a few out and he added HC0HM, VP2GH, VP2KF, VP9CB, VP9HE, and G4BK1/VP9, who is there until September, lucky fellow.

The odd morning opening to VK/ZL JA/DU has been noted by G3NOF, but they have usually been of short duration around 0830z, and the opening of the band itself has been as late as 0800, which is much different from the same period in previous years. Africans have been heard from 1700 onwards, with a few ZL's at the same time, coming in over the South Pole; W's have been noted from noon until the band closes, which, has on occasion, been after midnight. In real terms, for Don it added up to SSB QSO's with A2CBW, AC7DSZ, AB7ABK, AD7RSC, DU1EH, EL2A, FY7YE, H18MOG, JA4BKE, JA6JBR, JA0AXV, JR6WVM, KV4AD, M1D, PJ8CO (Sint Maarten), PJ0USA (St. Eustatius), TR8WR, TU2FH, TU2FJ, TU2GA, TU2GG, VK1KA, VK2BPS, VP2MEV, VP8NK, 9H1X/MM, WB9AJF/6Y5, ZB2RB, ZE1DP, ZL3GG, ZS1EZ, ZS1FP, ZS1WW, ZS6BNH, SZ4GK, SZ4PG, SZ4RG, SZ4TXE, 6W8AK, 6W8DY and 9X5RK.

G4DMN is at Shrewsbury most of the time but he did contrive to slide home for half-term for three days, and also managed a quick trip during a part of the ARRL DX Contest, for a couple of hours on Sunday which gave eight new States toward WAS. The half-term holiday produced contacts with JA9AA, K0GVG, SV0WZ, UK7PAL, UK4FER, VE6CBY, VE7MT, VK5FH, VP2GH, W1-4 W7KSA (Oregon), WA0ONL (S. Dakota), WB01KN (Colorado), YV4AKI, ZL1BD, ZL2AUX, ZL3FD, ZS6BNH and J 6Y5GB.

Then there was G3CED/G3VFA (Broadstairs) who has a bit of a problem at the moment; The Boss has said that operating must stop until the shack has been spring-cleaned, not to mention office 'flu! George is now QRO with a *Ten-Tec* "Argonaut," and reckons the receiver to be a great improvement; considering he was using an AR88D that is no mean praise! For the moment, G3CED is still on his 300 milliwatts and using his Joystick with 1½ inches of feeder in the shack—putting up the outside one again awaits the time to give the mast a lick of paint on the general principle of "a stitch in time..." As to the contacts, initially we must note a QSO from back in August last year when he was on the 600 milliwatt level, with which he worked PY1HQ but did not claim it as he was unsure that the call the PY had come back to at the end was his own to complete the QSO—however, at last a QSL card has come home which brings up four continents now on less than one watt to the Joystick, plus a near-miss

on a fifth—pretty remarkable operating when you consider just how abysmal conditions have been over the last few months. However, since losing the outside mast and having the Joystick indoors with such a tiny bit of feeder, on top of the tiny output, George has this month been confined to working countries at first-hop distance on Twenty, covering Europe and the Iron Curtain, but also a noticeably shorter-than-usual time spent on the air.

Forty Metres

We only have a couple of reports covering the band this time, the first one being from G2HKU, who raised EA9FC and YV5MO on Sideband, plus AA4LZR, KP4APB, KV4CI, K4YFQ, PY7BTO, UF6FBX, UL7GAP and UL7HD, these last being on the key.

GW4BLE returned for a time to his old stamping-ground for a couple of mornings. The dipole is now working properly, but it does generate some TVI, owing to a local piped-TV system centred on 7 MHz, which results in QRT on the band in TV hours until the relay people sort it out; the trouble is also noticeable on Eighty, and even Twenty if the beam is heading South at full power (straight into the system) though this latter band in fact is tolerable. A couple of morning sessions, though, produced contacts with CE3BBW, CE3BGL, D4CBS, VK7GK and 6W8DY, all around 0800-0830. On a different tack, Stephen says that GW4CXM has now settled in the area, with his FT-DX401 and a wire beam, and GW4BLE is rather looking forward to some QRM from that quarter as all the locals seem to have emigrated to VHF!

Now Eighty

Sometimes enough to make strong men weep—but for the chap with what Baden-Powell used to call "stickability" there are things to be found.

G2NJ (Peterborough) wonders why so many people tend to congregate at the low end of the CW section; this results in them QRM-ing each other on the one hand, and on the other makes life easier for the AM nets who persist in occupying part of the CW section of the band (perhaps one should tell them to "persist" off!). Nick has been QRT for some weeks because of illness, but is now back in action with the QRP types around noon; contacts have included G5VU, using one watt in a Sunday net, G3XZX, also on a Sunday with one watt, G3GET with 1-2 watts of all-home-brewed gear also on a Sunday, G3WBO at two watts, and G3RJV running four watts into his Joystick. One hopes Nick is fully repaired by the time this gets to publication.

G2BJY (Walsall) built a copy of the KFE Linear PSU mentioned back in November 1974's issue, and is quite pleased with it; his version uses the 400-0-400v. transformer out of an old Murphy TV



An interesting feature of the station of S. E. Janes, G2FWA, Hillside, Bushcomb Lane, Woodmancote, Cheltenham, Glos. is the table-lamp—adapted from a big 852 triode transmitting valve, once owned by the late Gerald Marcuse, G2NM, and nowadays glowing from a different source of power.

set; to date it has not blown him up! On a different tack, Geoff reckons his 18 months on Top Band paid off, in that he was the first G to land the Low Band CC, endorsed for 150 points and first G. As to QSO's, most have been on CW, but the QSL's are slow to arrive; the XW8BP card turned up, though after 18 months! An unusual SSB contact on the band was with GM3UA, Pladda Lighthouse in the Firth of Clyde.

G3CED seems to have done all his operating from G3VFA; his Eighty-metre doings seem to have been timed for a few minutes before the staff arrive, plus a few minutes while the mid-morning cup of tea is cooling; it yielded lots of G contacts on CW, plus Fs, PAs and ON's, all with the feapower and Joystick in a corner of the office desk.

A new reporter this time is G3GET (Sittingbourne) who, as has already been mentioned, is all home-brew. Peter reckons he can't compete with G3VFA and G2HRU at QRP DX working, but, bearing in mind his small available time-ration, he gets a lot of fun out of his rig—there is an ECO/PA at 1.2 watts on Top Band and

Eighty, used with a simple home-built superhet, plus an HW-7 for the HF bands with its direct-conversion receiver, all into a 70 foot aerial bent into a triangle to get it into a thirty-foot garden. Back in the Fifties, Peter used to work a lot of QRP phone, but what he hears on the phone end these days puts him off it, so nowadays it is largely CW, which of late has yielded contacts with G5OJ—a solid ragchew of over an hour, G4AWY, G5JP who has not only gone QRP but is doing so with a 45-year-old valve at two watts, G4BUQ, G3OGY, G6AB, G3TMA, G4DDS and G2NJ.

Just one QSO is mentioned by G2HKU this time, with DJ6SI/LX on CW. On a different tack, Ted has found a use for a metal locator—he is borrowing one from a friend with which to trace out his radials so that the putting in of new ones does not interfere with the old, which were not marked out on a plan at the time of installation.

Top Band

Here we must first make an apology; last time round, we didn't

include the Top Band Table, not for want of time or entries, but because we were so fuddled with antibiotics that it didn't occur to your scribe that the Table hadn't been included until the "bug" had been bumped off and a return to normal duty was possible. Far too late to do 'owt about it, in fact. But, Murphy being willing, it shall appear this time.

G4CBQ (Southampton) has his gear in the Students' Union, which means that in practice all the interesting events on the band happen when the place is locked up for the night. Nonetheless, one evening Phil heard PA0HIP/LX/P, and sat patiently in the line till all the OK's should have been dealt with, only to hear the LX say he was going QRT till 2300—well past Students' Union chucking-out time! On the other hand, from home on March 1, there was the pleasure of a SSB contact with K1PBW, starting with a 56 report but with conditions dropping quickly enough to make completion of the contact only just possible.

Next there is G2HKU (Sheppey), who mentions his regular PA0PN SSB contact, but adds CW ones made with DJ3CY, DL1BU, G13JEX, and OK1DOK.

Of course, we musn't forget W1BB, whose work has done so much to make Top Band the DX scene it is; Stew notes that the ZL's have now got an allocation from 1803-1813 kHz—this is a far better proposition than their old 1875 kHz; and on the first night they had this chunk, ZL2BT celebrated by working a number of W's, just to make sure they all knew! W1BB has sent a photograph of his shack, with himself, W1HGT and PY1RO all on view. And, we could remark, it looks like a *proper* shack, with a bench-vice, a model boat, the odd bit of home-brew gear, and a *lived-in* sort of look that reflects the man who uses it and his interests. How different from the sort of "clinical corners" one so often sees these days, as mass-produced as the car outside and as faceless.

Another Top Band item comes from Geoff Watts' *DX News Sheet*, where we notice that G3ATU, will be operating as ZB2CJ

from March 10 to April 23, looking in the DX window for his DX contacts, but within 2 kHz of his frequency for Europeans. There are a brace of ZE's active; one of them, ZE4JX, was hooked at 0340, and in the dawn openings, both EA8CR and VR1AA have been heard.

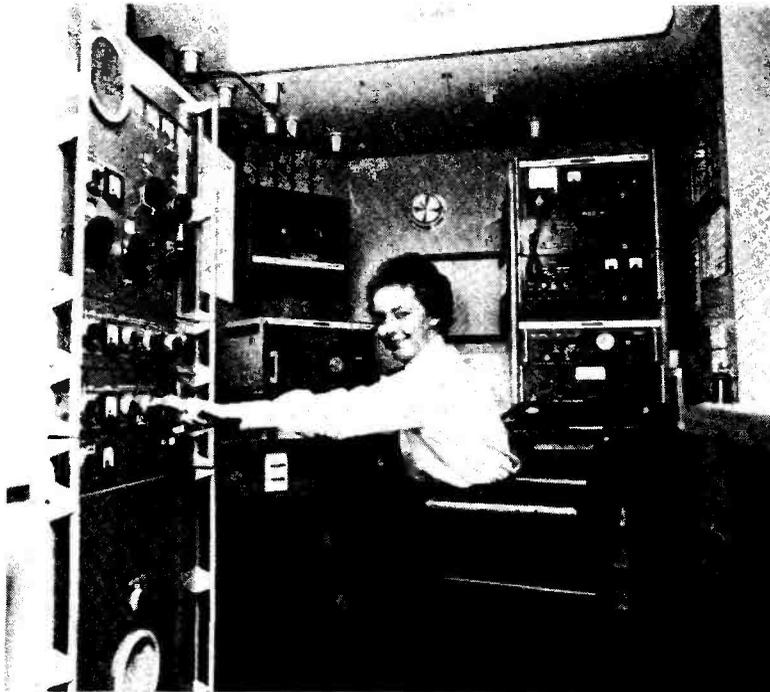
Other Points

G3RJV (Calverton) writes to give a hint of his doings, which are reported elsewhere, but here it is perhaps opportune to note that he is still the secretary of the QRP Club. His ambition is to get the membership over the 200 mark, and he has been stuck fast at 196 for some time; four volunteers, please step forward! The address is *not* as per *Call Book*, but 8 Redgates Court, Calverton, Nottingham NG14 6LR.

B.A.R.T.G. contest manager G8CDW encloses with his letter a note of the "World Champion of RTTY" award sponsored by *CQ Electronica*, which is awarded to the (in effect) most consistent RTTY contest operator, the various RTTY contests all being taken into account. For this year, the organisers are adding a bonus to the first prize in the form of an Inoue IC21A plus the digital VFO. So, you RTTY types, go to it!

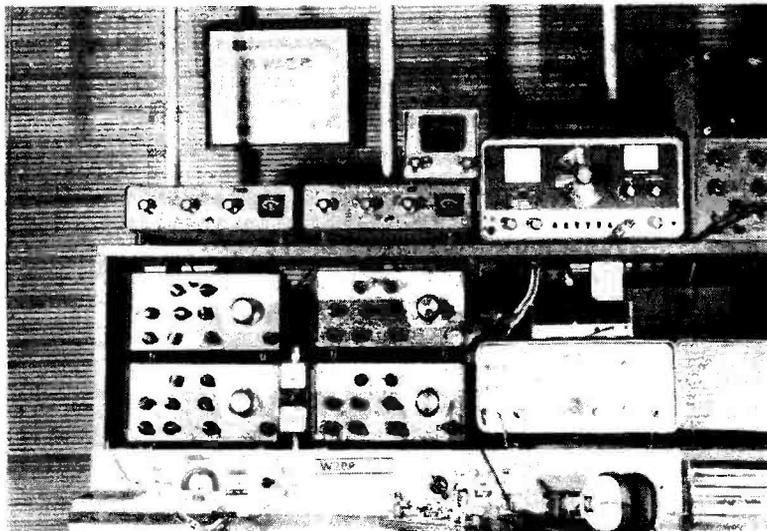
G3GET brings up a rather interesting question, in that his aerial has recently been changed from single copper conductor, to a stranded wire one, otherwise exactly the same. The point is that since the change, the incoming reports seem to have gone up by an S-point all round. Is it "skin effect" as the stranded stuff is rather like the Litz wire of old; or is it conditions, or just chance, or what?

Yet another of the African countries has become doubtful enough of its stability to cancel licences and confiscate the equipment, namely 7Q7, Malawi. Makes you think a bit, doesn't it? Right now, it is fashionable to regard these African countries as able to stand on their own two feet on the World scene; but fashion and truth were ever uneasy bedfellows, and the truth seems to be that these African



Not, as you might think, a rather well set up YL station—but the radio room of a 24,000-ton container carrier owned by the Blue Star Line, of which the certificated radio officer is Miss Sara Jolin. The equipment is by Redifon Telecommunications and Miss Jolin has been trained by the firm as a marine radio and electronics officer. After three years' study and practical work, she now has her own ship, with good prospects for travel world-wide, excellent pay and conditions, and every assistance available to her for further training and advancement. Good luck to Sara, now signing GOVR on the high seas.

W2BP of Pleasantville, New Jersey, U.S.A. is one of the dab-hands on Top Band—he has worked more than 80 countries on 160 metres, and has also signed VP2G, FG0ADT /FS7, VP2LH, FM0ADT and VP2MAD, giving many a Top Band operator a "new one."



TOP BAND COUNTIES/COUNTRIES Starting date November 1, 1975

Call	AM	CW	SSB	Countries	Total
G4CBQ	23	86	71	13	193
GW3WMY	71	80	—	10	161
G4EAX	33	10	65	8	116
G4AYS	18	58	—	6	82
G4EPL	15	2	57	7	81
GM3YOR	—	—	—	27	27

Scoring is on the following basis: One point per county on SSB, two per county on CW, and three per county on AM. In the case of an AM/SSB contact claim two points, scored in the AM column by the AM station and in the SSB column by the SSB end. No other cross-mode contacts permissible.

"democracies" we set up as we found our post War responsibilities too much for the tuppenny-halfpenny politicians to cope with, all instantly turned into dictatorships which make Russia look civilised, to put things mildly.

Late news indicates the Colvins have now started up from Nauru signing C21N1. The same source indicates that the Bill Rindone expedition mentioned earlier will be stiffened from April time by joining forces with Gus Browning, the old maestro himself—so things should Start Happening!

GW4BLE has a soapbox this month. He has already been noted as remarking how most of the locals have gone VHF, and indeed Stephen himself has a black box in the shack. However, as he says, so many of these chaps have HF gear, but will only stick up a bit of damp string. Then they look at it and say "It can't work against the pile-up" and half the time it doesn't, so then they go to VHF and make obeisance to the Great God Repeater Atop The Big Mountain. As he says, GW4BLE isn't "agin" repeaters or VHF, used with sense, but he is against these apathetic types who treat their Amateur Radio as a sort of second-class Citizens' Band. Which opinion, from the opposite end of the chain, is fervently echoed by those G8's who want to be radio amateurs properly, save that they retire to 1296 MHz to get some peace and proper operating in. As for the writer, he

wonders just how many of these sheep have any *real* interest in Amateur Radio—precious few.

G4CBQ is brewing himself up a handie-talkie for Top Band, all in an Eddystone die-cast box, and using SSB, as he has already found out that a properly set up /M or handy-talk box on this band is better than the VHF ones, if you go about loading it up properly; and he reckons it'll cost him a tithe of the price of one of those commercial FM rigs.

Now we have a problem. W1BFK wants to know how to get to a copy of the Russian *Call Book*, assuming there is such a thing. Possibly the likeliest way would be to write to Box 88, Moscow, but there are about thirty pages of Russians in the DX Listings section of the *Call Book*. Anyone any ideas on this one could possibly get in touch with J. Holderness, W1BFK, 514 Union Street, New Bedford, Mass 02740, U.S.A. direct.

A couple of South Yorkshire Contests fall for mention next. April 11 is on VHF and doesn't concern us, but the eighty-metre event is on April 25, 0930 to 1230z. The rules are somewhat complex, so it is suggested you get in touch with C. M. Eley, G8DNF, 6 Barncliffe Drive, Upper Fulwood, Sheffield, S10 4DE.

Just a reminder that the SSB leg of the Bermuda Contest falls this month, namely on April 24-25. U.S. and Canada can work VP9's and U.K. stations; U.K. stations can work W/K, VE, and VP9's. Exchange RST and your county in U.K., state in U.S.A., province in VE, or Parish in VP9. Count three points a contact and multiply by the total number of VP9 stations worked on each band. Logs to Radio Society of Bermuda, P.O. Box 275, Hamilton S, Bermuda, to arrive not later than June 30, 1976.

One final point: G4EVW (ex-G8KUU), of Etwell, Derby, asks us to mention the excellent work done by G3RJC (Burton-on-Trent) and G4DYP (Walsall) in radiating Morse practice transmissions nightly throughout the winter, for the benefit of the many G8:3's in the Midlands. He writes "... their friendly approach, encouragement and run-in for the exam, day resulted in 100% first-time passes for at least four of their listeners..." We are glad to do as he asks—and would like to hear of other such activities and successes. (Too often, the people who provide this valuable service never get a word of thanks or appreciation. *Editor*).

Conclusion

That seems to be about all for this month, and our thanks to all the correspondents who took the trouble to write in. For next time, the deadline will be to arrive by April 13, the address being, as ever, "C.D.X.N." *SHORT WAVE MAGAZINE*, BUCKINGHAM, MK18 1RQ. And let's hope for some sunspots!

"Short Wave Magazine" is independent and unsubsidised

ABOUT SLOW-SCAN TELEVISION

DISCUSSING THE PRINCIPLES

T. F. WEATHERLEY (G3WDI)

SLOW-SCAN television is a comparatively new field for the Amateur Radio enthusiast. It offers to the licensed amateur, SWL and experimenter an extra dimension, a pictorial component, to the audio information received. It differs from A/TV in many ways, one of the chief being the fact that since the SS/TV picture information is at *audio* frequency it can be recorded on a domestic cassette recorder in the same way as an audio signal.

This article aims to introduce the reader to SS/TV, its historical past, present practice, and possible future development. If the reader requires more detailed information, circuits, etc., he is referred to the books listed under references at the end.

Slow scan television was devised as a means of sending visual information within a bandwidth no greater than SSB, in a form that was easily resolved using low cost "surplus" bits-and-pieces. The normal UH/TV signal requires some 3 MHz bandwidth, whereas the slow scan signal occupies less than 3 kHz.

In 1958 Copthorne Macdonald, a young engineering student, began investigating the possibility of devising such a system. One way of reducing bandwidth is to reduce the resolution of the picture. Baird's first TV picture had only eight vertical lines—this was later increased to 30 vertical lines. (Viewers of "Blue Peter" on February 16 will have seen a demonstration of a Baird-type camera and receiver showing such a 30-line picture). This resolution was used when the first TV play was televised. The extract seen showed 30 lines to be viewable. A modern TV picture has some 625 lines. This resolution is reduced somewhat by narrow IF's and poorly adjusted interlace, and an actual resolution of 250 lines is often accepted by the viewer. The resolution adopted for slow-scan was 120 lines, which can give very acceptable resolution on a small screen and show fair detail.

Bandwidth

A further reduction in bandwidth can be obtained by slowing the vertical frame rate. Slowing the frame rate first produces flicker. Early films had a rate of about 10 frames a second. Slow it down even more, and the individual pictures become obvious and the illusion of movement is lost. On an ordinary TV tube with a normal (P1) phosphor there would be long blank pauses between each frame. If, however, a long-persistence phosphor (P7) tube is used, the picture will persist after it has been traced. The tubes available to the experimenter in 1958 were the 5FP7 ex-radar type. The persistence of these tubes—found by experiment—was 10 seconds. A slow scan frame rate of 7 seconds was thus practical and this was adopted as standard. A line-rate that could be locked to the mains frequency was an advantage and 15 Hz ($60 \div 4$), 1, $16\frac{2}{3}$ in 50 Hz areas ($\div 3$), was chosen.

Thus slow-scan standards were established as:

	U.S.	U.K.
Resolution	120 lines	128 ± 8
Frame rate	7 seconds	7.68 (6.79—8.68)
Line	15 lines/sec.	$16\frac{2}{3} \pm 1$
Aspect rates	1 : 1	1 : 1

It is now possible to calculate video bandwidth of such a system. (This analysis is approximate)—

Vertical resolution = 120 lines

∴ Horizontal resolution 120 "bits" (assume each alternate "bit" is black alternated with white, Fig. 1.)

When scanned the output will go from peak black to peak white 60 times in 1/15 second. This corresponds to a waveform of: $60 \times 15 = 900$ Hz.

∴ maximum video bandwidth is 900 Hz.

A video bandwidth of 900 Hz leads to problems in practice because of a great deal of video energy being at or near to zero. These problems are overcome by using the 900 Hz to modulate a sub-carrier. The sub-carrier is placed at 1500 Hz. Originally the sub-carrier was amplitude modulated but this has been superseded by FM. Today the sub-carrier operates at *Peak Black*, 1500Hz; *Peak White*, 2300Hz.

Sync. pulses are transmitted at 1200 Hz so that the



Fig. 1

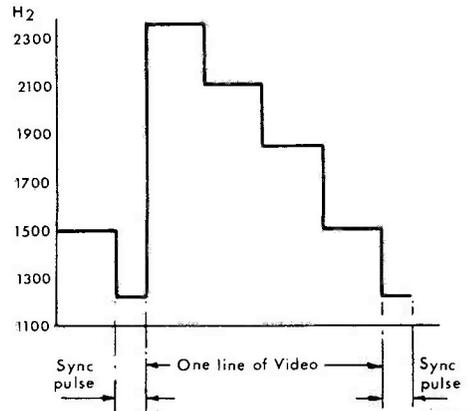
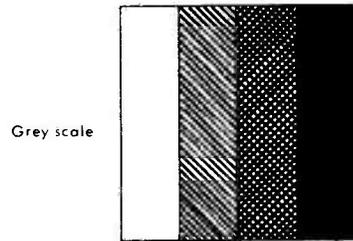


Fig. 2

Q 607

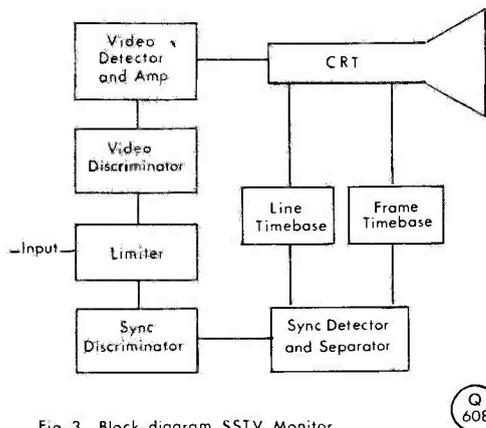


Fig. 3 Block diagram SSTV Monitor

raster is blanked during retrace.

A single slow-scan line of a "grey scale" is shown in Fig. 2.

A slow-scan signal can be received on an ordinary SSB receiver; to process the signal a monitor is required. A block diagram of a typical monitor is shown in Fig. 3.

There are a number of published circuits for monitors, for both electrostatic and electro-magnetic tubes. These are listed in the references. Very sophisticated monitors can be purchased (at very sophisticated prices) from the usual suppliers of amateur gear. The writer's monitor was home-built using a set of printed circuit boards produced by M.K. Products. These boards are a very economical and uncomplicated way of starting on slow-scan. The monitor tube is a 7FP7A ex-U.S. surplus radar type. The scanning coils were salvaged from an old 14in. TV, as was the line-output transformer to provide the required EHT (6kV).

Construction

The boards are mounted vertically inside the monitor. The connections to the various parts are *via* edge mounts and a printed circuit baseboard. The physical layout of the monitor is left to the individual constructor. (Some of the board-mounted controls were brought out to the front for convenience). The various jack sockets allow connections to and from the transceiver, tape recorder and microphone. This permits the received signal to be taped and the transmitted signal to be heard, since in many transceivers a signal taken *via* the phone socket mutes the transceiver speaker.

This particular monitor circuit does not have a free running raster and the screen is blank unless a slow-scan signal is received. On a domestic TV set the raster is present all the time.

Where to Look

Slow-scan signals can be found on the HF and VHF bands. A useful frequency on 20 metres is 14.23 MHz where SS/TV signals can be found from many countries, while 3.73 MHz is the frequency for the U.K. and near Europeans. There are a few signals on two metres at 144.230 MHz each evening at about 21.30z. The pictures can be of almost anything, of the OM and XYL, or

drawings, or cartoons, maps showing the QTH, etc.

G3IAD's archer announces his QTH as Nottingham. Most slow scanners have a tape programme of pictures and written information. One American sends a caption "the boss" and follows it with a picture of the family bulldog!

The pictures are usually obtained *via* a camera, either a commercial slow-scan camera or a conventional fast scan camera the output of which is "sampled." A simpler and cheaper method is to use the flying spot scanner. A surplus photo-multiplier tube (931A) is used in a typical circuit, as in Fig. 4. Results can be as good as a camera. The slow scanner without a camera can usually find an enthusiast with a camera who will make a tape from captions and photos supplied, and this can be used in SS/TV contacts. There is scope here for the imaginative amateur to make and transmit some really interesting pictures.

Future Development

What of the future? DL2RL has recently demonstrated a slow-to-fast scan converter which displays a slow-scan picture on an ordinary television screen. A fast-to-slow camera converter fed by a commercial fast-scan camera to give a slow-scan output with no internal modification of the fast-scan camera is also a reality. At an American convention this year there is to be a demonstration of slow-scan moving, in colour, and in 3D—the mind boggles!

SS/TV Licensing

The transmission of SS/TV signals is *not* covered by the ordinary amateur licence and permission has to be obtained from the Home Office. The letter of authorisation allows "use of the facility in the 80, 40, 20, 10 and 2 metre bands providing the equipment conforms with our standard specification. This authority is valid for a maximum period of two years from the date of this letter . . . and is given on the understanding that it is without prejudice to re-examination by the Home Office of the use of narrow-band image transmission at the end of the two-year period, or earlier, should the circumstances so warrant."

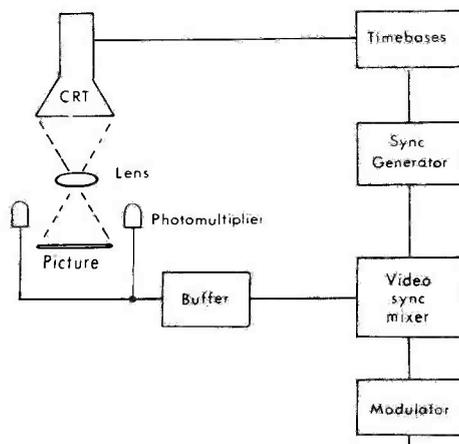


Fig. 4 Block diagram Flying Spot scanner

SWITCHING APPLICATIONS OF THE TRANSISTOR

SOME IDEAS FOR CIRCUITRY

I. D. POOLE, B.Sc. (G3YWV)

SINCE the transistor was first introduced it has been used in many applications, both for analogue and digital purposes. In amateur stations the application is more in the analogue situations than the digital. There are, however, many instances where the transistor used as a two-state device could be of great benefit.

Basic Theory

Fig. 1 shows the basic switching circuit. When a reverse bias is applied to the base of the transistor, it becomes cut off and no current flows in the collector. Thus, the voltage at this point rises to that of the supply. If the base voltage is increased to turn the transistor hard "on" there will only be a very small voltage across the device (typically about 0.2 volts), and the voltage at the collector will fall nearly to ground potential.

In most applications the transistor will be used in the common-emitter mode because this offers the largest power gain and enables the comparatively large collector currents to be switched by the small base currents.

With the transistor in the "off" condition, the base current is zero and the collector current will be limited to only the collector-emitter reverse current I_{ceo} . Thus, the "off" resistance of that transistor can be very high if silicon planar transistors are used.

When the transistor is in the "on" condition, there must be some base current flowing. As the current is increased a point is reached when a further increase in base current does not result in a corresponding increase in collector current. At this point, the transistor is said to be saturated, and both the junctions are forward biased in the device.

To prevent the base-emitter junction having too large a voltage across it, a series resistor (R1) is connected to the base. The value of this is calculated to give the required base current for the applied switching voltage. In many cases, the switching waveform may not fall to zero, and to ensure that the transistor turns "off," R2 is included. It should be noted that in the popular 7400 series of TTL integrated circuits, the logical-O output may be as high as 0.4 volts.

Pulse Response

Having designed the switch it will be discovered the output as square as one may like. It will also be found that the pulse will be delayed slightly. The waveform shown in Fig. 3 can be divided into four separate regions: t_d , the delay time, which is the time between the leading edge of the input pulse and the output rising to 10% of its final value; t_r , the rise time which is the time taken for the output to rise from 10% to 90% of its final value; t_s the storage-time is the time from the trailing edge of the input pulse to the point on the output where

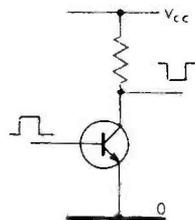


Fig. 1

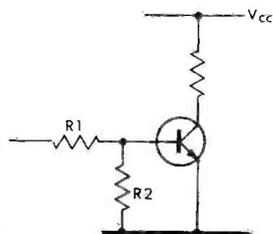


Fig. 2

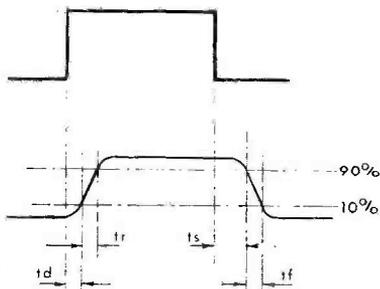


Fig. 3

it is 90% of the maximum; t_f the fall-time, which is the time taken for the output to fall from 90% to 10% of the maximum.

The rounding of the output is caused by the limited frequency response—a square wave has a high harmonic content, and removal of these causes rounding of the edges. The delay and storage times are due to the fact that it takes a finite time for the carriers in the transistors to travel, or to disperse in the device.

The output waveform can be squared by adding what is known as a speed-up capacitor (Fig. 4) which produces a small spike to turn it on or off faster. The storage time can be minimised by not driving the transistor too hard into saturation, and thereby having to remove excess stored charge.

Relay Operation

In many applications it may be necessary to operate a relay from a low voltage and current source. To give the necessary power gain a transistor switch is ideal; the small operating signal is fed into the base and the

relay is connected to the collector for the majority of applications.

The main precaution to take, apart from ensuring that the transistor will withstand the voltages and currents present in the quiescent state, is to protect the transistor from the back e.m.f. generated by the relay coil when the magnetic field collapses. This is done simply by placing a diode across the coil (Fig. 5), so that it is reverse-biased when the coil is conducting current but becomes forward biased by the spike generated by turning the relay off. A capacitor may be placed across the diode to aid suppression, but this is thought to be unnecessary.

If required a several-stage amplifier can be constructed to provide more gain, but it should be remembered that the voltage waveform on the collector will be the inverse of the one on the base.

Conclusion

Using a few basic principles there are many ways in which a transistor can be employed as a switch and it is hoped that this piece has helped clarify a few points. The basic circuit described here can be easily modified to produce *OR*, *NOR*, *AND*, and *NAND* gates. However, as they are available in integrated circuit packages for less than the constructor could build them from discrete components, they need not be described in detail.

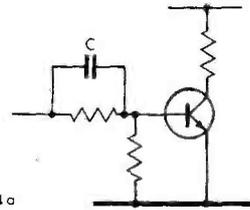


Fig. 4a

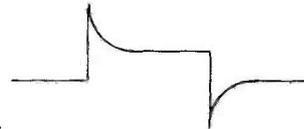


Fig. 4b

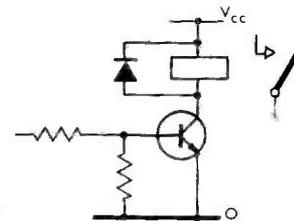
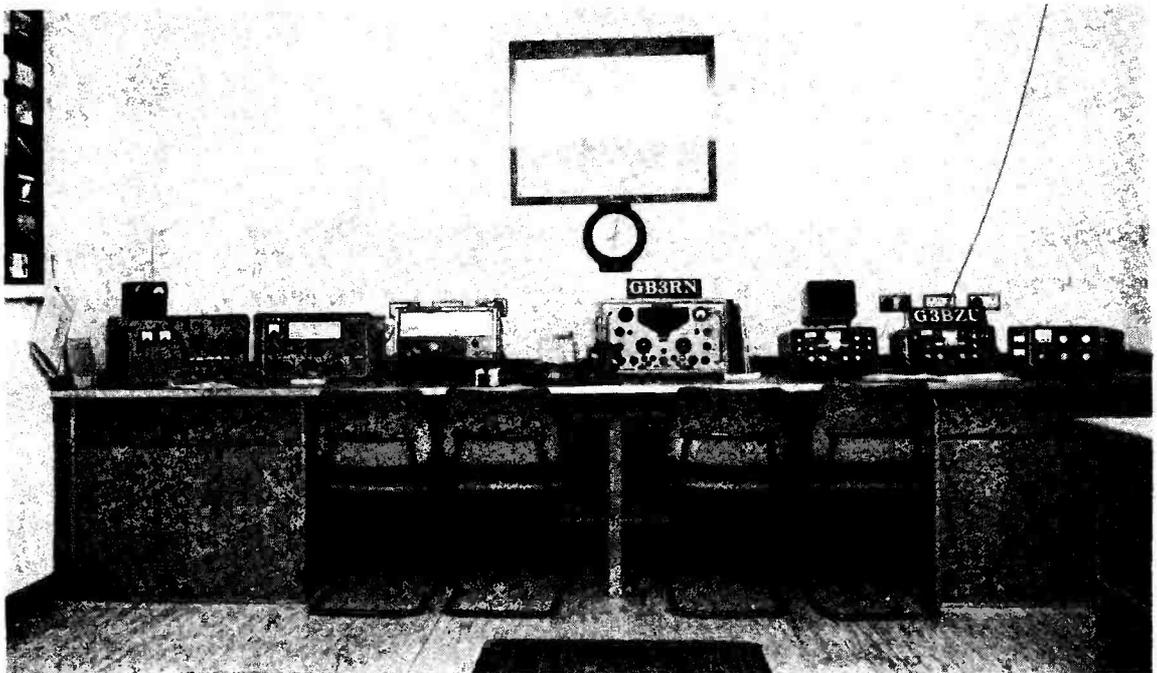
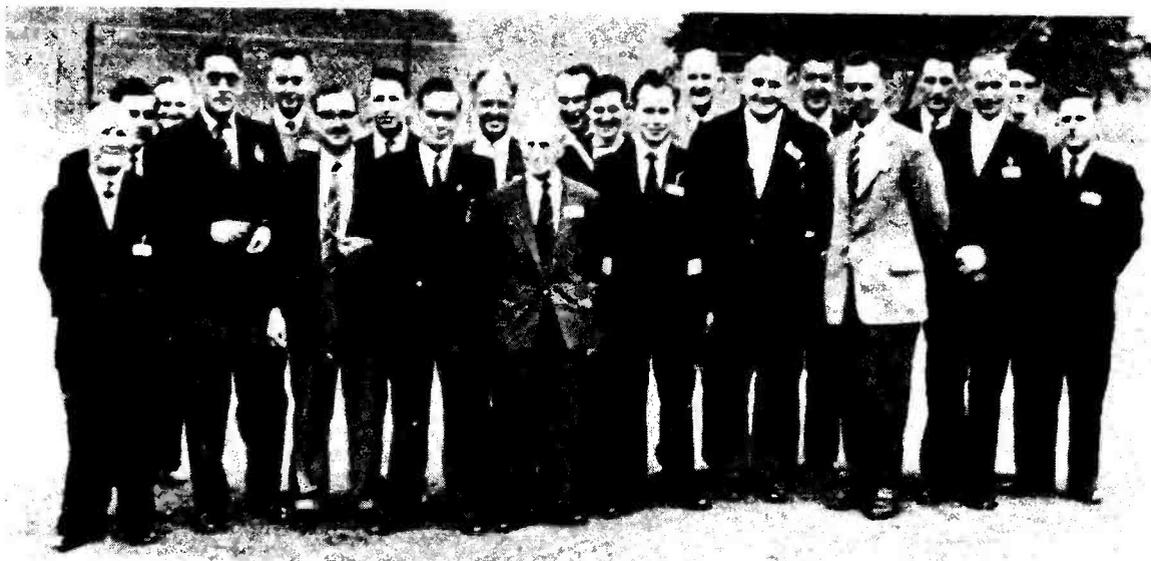


Fig. 5

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The amateur-band station of the Royal Naval Amateur Radio Society, H.M.S. "Mercury," East Meon, Petersfield, Hants, as now in operation. All amateur bands are covered and the call signs G3BZU and GB3RN are well known. The accompanying article gives some of the details.



The group of members at the inaugural meeting of the Royal Naval Amateur Radio Society, on June 25, 1960. Fourth from the left is Fleet CRS M. J. Matthews, G3JF, the first hon. secretary, and one of the leading lights of the R.N.A.R.S. ever since its foundation. He holds a rank specially created for exceptionally qualified senior non-commissioned officers in the specialist branches of the Royal Navy, and was one of the first such to be appointed.

“H.M.S. MERCURY”

ABOUT THE ROYAL NAVAL AMATEUR RADIO SOCIETY

WHEN Amateur Radio was first introduced into H.M.S. *Mercury* in 1946 the equipments were housed in any odd corner of a Nissen hut that could be found. In the mid-1950's the Mercury Amateur Radio Club was moved into a small brick building which had until then been the NAAFI manager's office. The building suffered from damp and the only heating available was from a small electric fire (which consumed the watts and produced no heat) or a temperamental oil fire. So it can be seen that those who braved the winter elements to activate G3BZU had to be a hardy lot!

When the Royal Naval Amateur Radio Society was formed in June 1960 they took over the assets of the Mercury Amateur Radio club. The original K.W. Vanguard transmitter and HRO receiver were replaced with modern SSB equipment and a tri-band beam. Some two-metre gear was also constructed and limited operation undertaken on that band.

During the latter part of 1975 the new Physical and Recreational Training Block in the establishment was opened. As well as housing the Establishment swimming pool, which until then had been exposed to the elements, there were also facilities for a wide range of sporting and recreational activities—not the least being Amateur Radio. The new block houses the new Hq. of RNARS in large, comfortable, well-lit and heated premises. A far cry from the drafty Nissen huts and damp buildings of yore.

In these “palatial surroundings” it has been possible to utilise all the equipment to better purpose than in the

cramped conditions of the older building. With custom-built operating positions it was decided to run three main stations with the following equipments:

K.W. Viceroy/KW-500 Linear with an Eddystone EA12/Racal RA17 receiver, into a trapped dipole for 80 and 40 metres.

KW202/KW204/KW1000 Linear into a TH6 beam for the HF bands. Additionally, Top Band operation would also be available into a long-wire antenna.

The VHF bay consists of Pye “base station” for 4 metres (nominally 70.26 MHz) with a beam or ground plane antenna, and a Yaesu FT 200 transceiver for 2 metres with a beam or ground plane. This way we could cater for fixed-to-fixed or fixed-to-mobile operation.

In addition to the operating bays there is adequate space for holding talks, meetings, and facilities for constructional work and secretarial chores.

The Royal Naval Amateur Radio Society runs its affairs from this building and G3BZU can often be heard on the regular 80-metre SSB nets on Wednesday evenings and Sunday mornings. In addition, the well-known code-proficiency transmissions are sent from here. The Society produces a bi-monthly newsletter and an annual callbook of members. In addition, it sponsors the “Mercury Award” and the “Hampshire County Award.”

The London members of the society maintain and operate a Club station on board *H.M.S. Belfast*, in the Pool of London, signing G4EOK, and the Society holds an annual activity period from here over the Easter Week. In addition, the Society has undertaken to renovate and re-equip the Main Wireless Office of the ship as it was when *Belfast* was in commission, so that it can be added to the sightseeing attractions for visitors.

Another popular event organised by the Society is

the Mobile Rally held at the Signal School, East Meon, which is situated on the edge of the lovely Meon Valley.

Membership of the Society is open to anyone with Naval connections (be they RN, Merchant Navies or Commonwealth Navies). Associate membership is also open to members of Foreign Navies. The subscription, which has recently been increased for the first time in 15 years, is now £2 for Corporate membership and £1.50 for Associate membership.

Full details can be obtained by dropping a line, with s.a.e., to FCRS Mike Matthews, G3JFF, Hon. Secretary RNARS, H.M.S. Mercury, Near Petersfield, Hants.

MINI-RHOMBIC LAYOUT

FOR MULTI-BAND WORKING

S. POLSON (GM3RFR)

LARGE horizontal Loop Antennae of the rhombic type are usually by-passed wishfully by amateurs who generally lack the space for erecting such extensive arrays.

The mini-rhombic which has been in use at this QTH for some time is not of the large space-consuming variety and might conceivably be of interest to any amateur who possesses a garden large enough to encompass it. It has the great virtue of being all band, 80-10 metres, though its rhombic directional properties are only available on 20 metres and above. Yet it provides a very useful means of getting out on 80 and

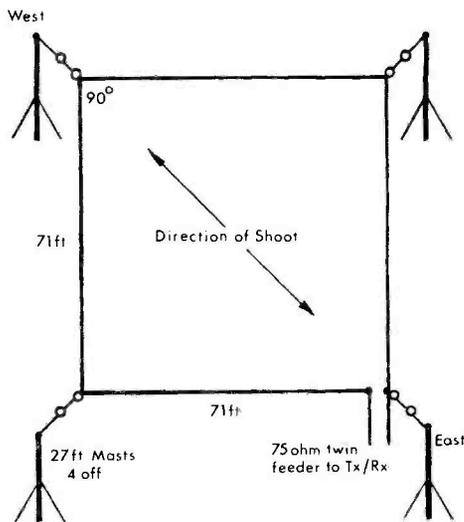
40 as well. The formula for construction is $\frac{1006}{F}$.

The basic calculation was made for 3.53 MHz, giving a total size of approximately 285 feet. The loop was put up in a square of 71 feet per side but it can be made oblong without much "damage" to its radiating properties. The antenna is fed with 75-ohm twin feeder and quite a low SWR can be attained by trimming the system to get resonance in the region of 3.53 MHz, using a SWR meter and the Tx as a means of adjusting for proper resonance. Once the antenna is resonant on 3.53 it should show resonances at 7.06 MHz, 14.12 MHz, 21.18 MHz, etc.

Directivity is apparent from 14-28 MHz. On 20 metres gain is about 5 dB over a dipole and on 21 MHz about 6.5 dB, which makes it a useful bi-directional beam. The optimum direction in this QTH has been found to be W-E and good results have been obtained from America North, South and Central and from the Far East.

If space is lacking it can be compressed down to approximately 143 feet or 35½ ft. a side. An antenna of this size was erected in oblong shape along the roof of a large room in the local school and has worked very well, especially on 21 and 28 MHz with very good results on these bands, there being quite a few dB gain on both bands.

Naturally longer loops can be made in the same way



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Any convenient points can be used for support provided the essential configuration is maintained.

to include Top Band and giving very big gain on the HF bands—the author awaits wire and calm weather conditions to try out a yet larger loop. But the present one has been very interesting and quite successful.

BOOK REVIEW

"SPECIALISED COMMUNICATION TECHNIQUES FOR THE RADIO AMATEUR"

This is one of the newer titles in the well known ARRL (American Radio Relay League) series of books and manuals of Amateur Radio interest. The particular topics dealt with—in seven chapters—include A/TV transmission, SS/TV, Facsimile (Fax) transmission and reception, RTTY in all its practical aspects, Space Communication, and the more advanced techniques involving laser beams, digital and pulse-code systems.

There are good discussions on techniques for the use of OSCAR, for E-M-E (earth-moon-earth) working and operating methods, and also on layouts for Amateur Television in both modes ("instant" and "slow"), transmitting and receiving.

Much practical and constructional data are given, with plenty of illustration, on each topic and the book can be recommended to anyone interested in these special Amateur Radio communication systems.

Of more than 200 pages, written in the usual ARRL style for easy reading and comprehension, *Specialised Communication Techniques for the Radio Amateur* costs £2.00, post free, from stock, of the Publications Dept., Short Wave Magazine, Ltd., 29 High Street, Welwyn, Herts., AL6 9EE. (Delivery from stock, same-day despatch).

LECHER-LINE SYSTEM

FOR VHF MEASUREMENT—AN OLD DEVICE RESURRECTED

H. E. G. WATTS (G8GBT)

HAVING seen a mention of the use of a Lecher line for VHF/UHF measurement recently and no recent description of even what the device looks like (or what it does!) it is thought that a description could be very useful, not only how simple it is to use but how to make one.

Application

At these higher frequencies it is possible to measure, with a fair degree of accuracy, the wavelength of a signal direct in metres.

With two-metre measurements the two (or more) peaks that occur do not necessarily appear at the ends of the wires, Fig. 1 hence the physical length of the construction—in fact, distances between several peaks may be read off for checking.

The peaks occur at half-a-wavelength apart, as standing waves, and so, on two metres, would be about one metre, or 1000mm., apart—but, strictly speaking, our VHF band is 144 to 146 MHz, which is 1041.6mm. to 1027.4mm. (so our 2 metres are slightly long!)

Thus, with the standard conversion between frequency (f), wavelength (λ) and basing the velocity (v) on the usual 300,000 metres/sec., we have the formula:—

$$\lambda = \frac{300,000}{f} \quad \text{or} \quad f = \frac{300,000}{\lambda}$$

and we are measuring *half* wavelengths, so that we have:—

$$f = \frac{150,000}{\lambda}$$

and, as an example, if the actual measurement between two peaks is 1034.5mm. this gives:

$$f = \frac{150,000}{1034.5} = 144.997 \text{ MHz.}$$

Construction

A very simple method is to use two lengths of 2in. x 1in. planed timber fixed together with woodscrews to form a bridge, with perhaps a couple of cross pieces to make the device more stable on the bench. Fig. 2 shows the general construction, where the underside piece can be shorter and so perhaps make the cross pieces from spare, and allow enough for the end pieces, the main part being about 9 feet (or 2.7m.) long for VHF applications.

Alternatively, if you have a bench or working space that long, a couple of stand-off insulators fixed at each end could form the anchorage(s) for the wire(s). The stand-offs should be at 1½ in. or so, centre to centre, and the wires stretched over a total length of about 9ft. 6in.

The actual wires, copper or tinned copper so that it does not corrode too soon, have to be stretched fairly tight from end to end and insulated; pieces of perspex can be used with a simple device for tightening at the end opposite from the connection.

The writer's prototype employed some ex-Government standoff insulators adapted for the fixing of the

wires but as these are not likely to be obtainable, two pieces of perspex about ½ in. thick are shown fixed at the ends for locating the two wires. At the opposite end to the take-off a couple of screws, with the wires preferably soldered to them through a small clearance hole, are put through the perspex with a nut on (about a 2 BA would be a reasonable size) so that each wire can be individually tightened and the piece of perspex fixed with two wood screws to the upright end-piece. On the take-off end the writer fixed a co-axial socket on the perspex, with the idea of allowing various connections to be plugged in leaving a short length, about 12in. or so, of coax, as shown in Fig. 1, with an insulated wire loop on the end for coupling.

The slider with shorting bar is made from a short length, about 3in., of the same "two by one" wood and fitted sideways by two pieces of aluminium sheet, just sufficient to locate it from moving sideways out of line on the main bar. The shorting bar, which should be slightly higher than the wires, has two "V" notches, preferably with sharp edges to make better contact. This is fixed slightly higher than the two wires, so that the wires when tightened automatically make a fairly good contact. The wires should be parallel to each other.

Assembly

The whole unit can be assembled quite easily with wood screws, with or without glue, and various modifications obviously suggest themselves to anyone making this unit—but basically, of course, both ends of each wire should be soldered because one is dealing with very small currents and the slightest bad contact at the input end shows up. The same applied to the prototype that was made two or three years ago and for recent use the wires were replaced with some bright new bare copper of about 22g., the gauge is not very important, except for rigidity.

The spacing between the two wires is recommended by one authority as being less than about 2% of the wavelength. This works out at 40mm. approximately for 2m. use and the writer's spacing was about 1.3in. thus keeping the wires and fixings just clear of the thickness of the wood.

One recommendation for the length is about a wave-

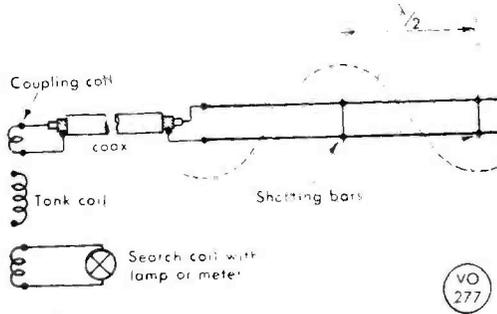


Fig. 1

Fig. 1. Diagram of Lecher-Line System, coupled by a short length of coax to an RF source, with a coupling coil incorporating a miniature indicating lamp—when a half-wave point is found on the Line, the lamp goes out. It follows that for accurate measurement, coupling should be as loose as possible consistent with sharp indication, and the distance between the half-wave points measured to the millimetre. This gives a physical measurement of the wavelength.

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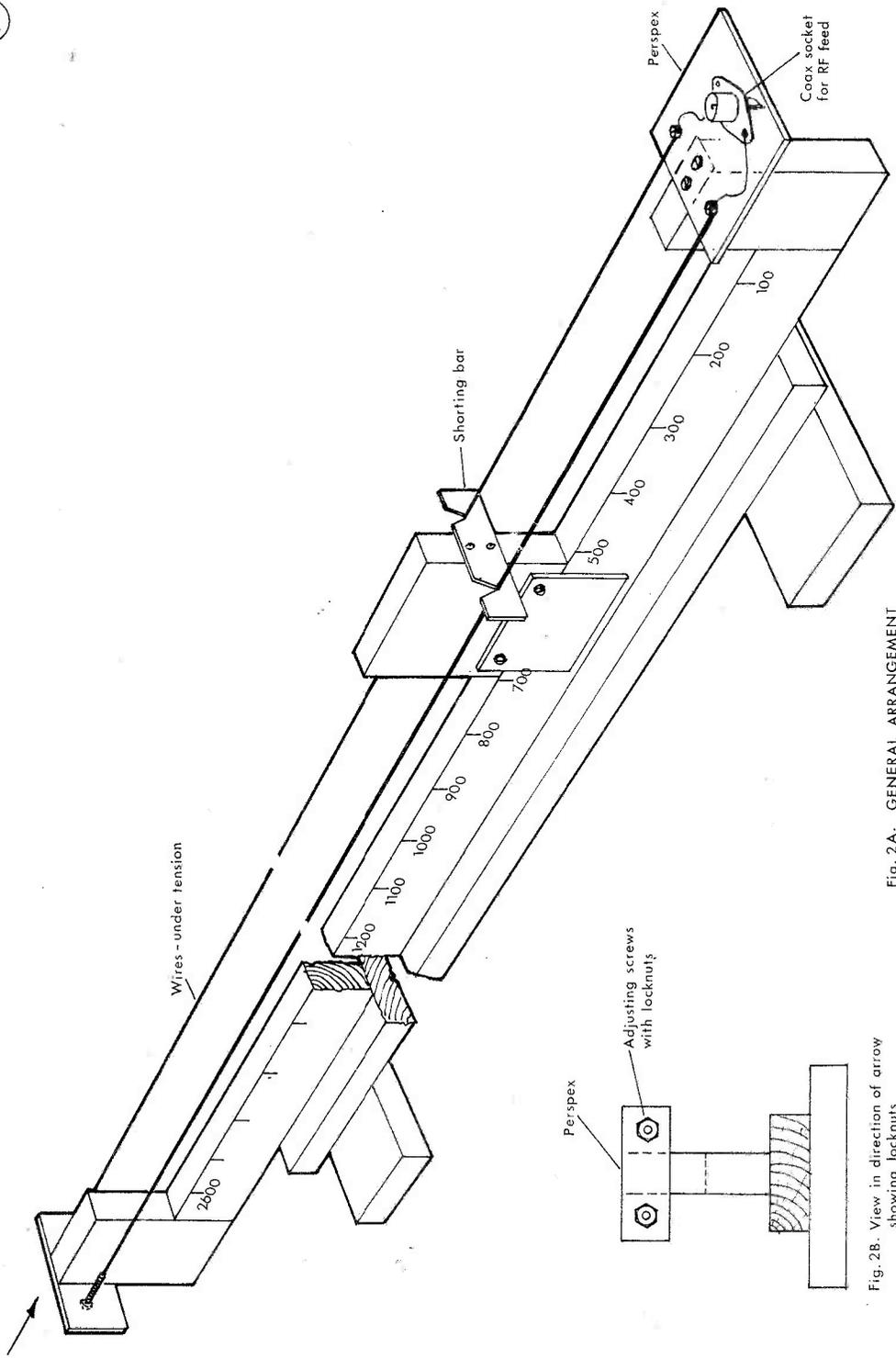


Fig. 2A. GENERAL ARRANGEMENT

Fig. 2B. View in direction of arrow showing locknuts

Fig. 2. General view of the whole mechanical set-up, as described in the text. A system of this sort can be likened to an accurate VHF absorption wavemeter, and as such has many uses.

length, which is roughly 7ft. The standard D-I-Y timber supply now appears to be 9ft. (2.7 metres). With two of these, the main scale one being full length and the under T-piece cut quite a lot shorter, spare pieces of timber will be available for the two vertical end pieces and feet.

The writer has used this device and lent it to a two-metre friend. Both have obtained fairly accurate results and, although in some of the literature, claims of an accuracy of about 0.1% are made, careful marking and measurement is necessary. The main piece of timber is marked off at 100mm. intervals and a small scale can be used to measure the difference, otherwise it becomes extremely tedious to try to apply accurate markings over the whole length.

Application

It appears that this simple device is perfectly satis-

factory on the higher frequencies and, of course, if it is only used for this purpose a much shorter unit can be made and perhaps rigid bars could be used, rather like a stub with a shorting bar. With the effect of the search coil and co-axial the peaks are not likely to occur at precise and predictable positions along the Lecher line so end effects are not important, so long as two peaks, preferably three, can be measured for checking and the measurements are made carefully. Quite reasonable results can be obtained and a little imagination will suggest various applications, albeit of a very old device—but fundamentals in most technologies still exist and this unit has the advantage of being extremely cheap to make compared with such items as crystal calibrators. (Also, you can see it working!). It has been used to check on the 145 MHz radiation from a small calibrator (used by the writer to find settings on receiver dials) and a variable, rather crude oscillator, which is now calibrated fairly accurately from the point of view of being able to inject signals into coils both for receiver and transmitter use, and allowing adjustments to be made quite accurately.

S-METER FOR THE R.1475

MODIFICATION CIRCUITRY

M. MANN, C.Eng. (G8ABR)

THE R.1475 is a 2-20 MHz receiver that came into Service use in 1947 and is easily recognised by its unusual plug-in "guard" unit. The few so far released are much sought after by amateurs because of the extremely good tuning scale which allows reading the frequency directly to a kHz or so right up to 20 MHz. However, the receiver lacks an S-meter and this article shows how one can easily be fitted. The S-meter is much more responsive than the "magic-eye," and is better for showing a null, as when measuring antennae with the Cambridge antenna noise bridge, for instance.

Fitting

The R.1475 has amplified AGC with a separate AGC detector/amplifier, V8. The S-meter is a 500 μ A moving coil meter inserted in series with R52 as shown. It reads backwards, i.e. maximum signal is zero microamp. with the AGC holding the level at about 160 μ A and no signal at about 440 μ A. The author's meter is a small edgewise instrument mounted vertically with the zero at the top, so that increasing signals move the needle upwards. The meter could be fitted in place of the "magic eye", but this would upset the heater voltages.

The easiest point to get at the wiring is on tagboard C on the left hand end of the receiver. Fig. 2 shows the layout of the tagboard and where to attach the meter wiring. Note that the meter "floats" from 60v., so make sure the wires are well insulated from the chassis.

Results

Fig. 3 shows the calibration for the S-meter, which is practically linear over almost three S-points. Fig. 4

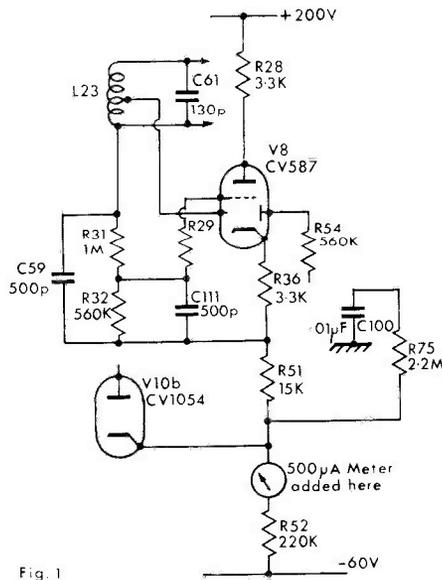


Fig. 1

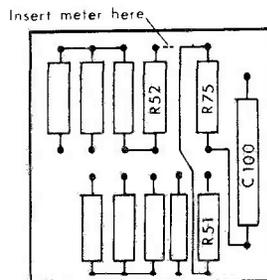


Fig. 2 Tagboard 'C'

shows the calibration for the RF gain control, both measurements being made at 8 MHz.

When the AGC is off the RF gain and AGC detector work independently and so using the two together gives a measuring range of about 100 dB, which is very useful for measuring transmitter spurious outputs, and such.

Small Advs. on pp. 120-126

BOOK REVIEW

"RADIO VALVE AND SEMICONDUCTOR DATA"

Tenth Edition

The latest edition of this reference book—which over the years has sold more than 450,000 copies—is now available.

Its contents are well described by the title—about 1,000 valves and cathode-ray tubes and nearly 10,000 transistors, diodes, rectifiers and optical semi-conductors are listed, with their uses, characteristics and base-connection diagrams—all divided into sections according to application, e.g. NPN, PNP Transistors, Amplifier Triodes, Small Transmitting Valves, Rectifiers, etc., etc. Obviously, an essential reference for anyone, professional or amateur, concerned with design or constructional work, or involved in any sort of "checking up" on valves and transistors.

Of 180 pages, in large format and a clear print, with index and equivalents, *Radio Valve and Semiconductor Data* costs £2.35, post free, from: Publications Dept., Short Wave Magazine, Ltd., 29 High Street, Welwyn, Herts., AL6 9EE (Immediate despatch, from stock).

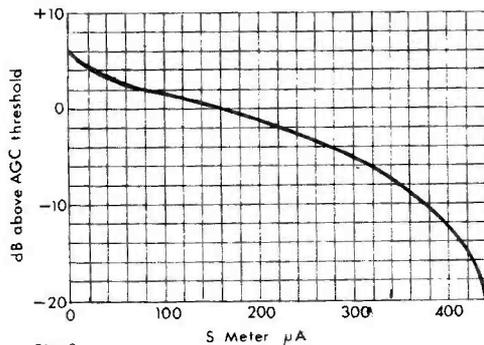


Fig. 3

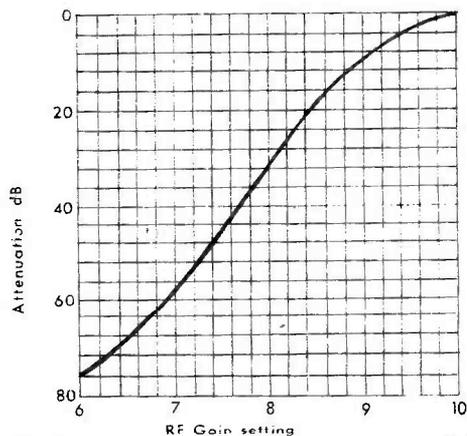
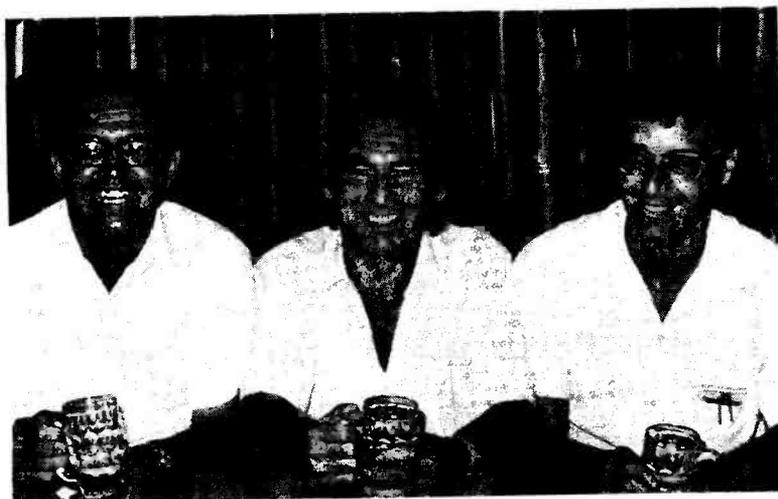


Fig. 4

R
278



Meeting in a beach chalet near Mombasa on the coast of Kenya were, left to right, 5Z4PQ, VQ9HCS and 5Z4TXE. The occasion was one for beer and much talk about Amateur Radio.

VHF BANDS

NORMAN FITCH, G3FPK

VHFCC Awards

SEVEN readers have been awarded the VHF Century Club certificate this month, all for two metres. No. 252 goes to Alan Floyd, G8KLN (East Preston, W. Sussex) who managed to get all the cards in five months. Most stations were worked with 50 watts of FM, some with a *Liner-2* in a three-week period. The aeriels were an 8-ele. Yagi and a quarter-wave ground-plane. Keith Ballinger, G8BBP, wins No. 253 from his Worcester "hole" surrounded on three sides by hills. In marked contrast to G8KLN, G8BBP's certificate represents ten years of operation! The 8-ele. Yagi was fed with FM from 0.23 to 10 watts until 1973, when a *Liner-2*, since disposed of, was acquired. Keith is now back on FM with a much modified *FT2F-B*, and has moved to a better QTH; he hopes to be on 70 cm. soon with A/TV in mind.

Roger Thorn, G3CHN (Bolberry Down, Devon) is the first claimant to send in a claim of 100 French QSO's and his certificate. No. 254, has been suitably endorsed. He gave up the HF bands in 1972, "... having become thoroughly disenchanted with operating standards on those bands ..." since when he has been on 2m. with home-built gear. The first Tx was a 10-watt crystal-controlled job on AM, followed by a 150 watts VXO controlled AM/CW rig, with 6CW4 converter-plus *Racal*, RA-117. Roger's present set-up is a 300-watt p.e.p. output transceiver on SSB and CW, the aerial being a 10-ele. Yagi at 60ft. to date. "... this heap of reconstituted, electronic scrap ..." has brought G3CHN 22 countries on 2m. G8IQO is operated by Peter Henley from Eastbourne and he submitted an "all foreign" list for No. 255 award. The R.A.E. was passed in December, 1973 and Peter finally got going with his own station—a *Telford* TC-10 and *Yaesu* FR400SDX—in November, 1974. The winds clobbered his original 8-over-8 aerial which has since been replaced by a 10-ele. crossed Yagi. June 1975 saw a change to a *TS-700*, with 100-watt linear.

Paul Eaton, G4EDW, from Folkestone, Kent, started as G8NNH in August, 1973 with two watts of AM and a 6-ele. beam. G4EDW was licensed in June, 1975 and in September, Paul and G4EGQ completed a home-built, SSB transceiver, which has since been used to good effect. No. 256 certificate has been awarded. No. 257 is another "all foreign" award, this time to Laurie Myneitt, G4DRD, who operates from the same QTH as G8IQO. However, they have completely separate stations from this disabled, ex-

Servicemen's home at Eastbourne. Laurie's Tx is an *FT-200* into a home built transverter with a QOV06-40 final, the receiving side being via a *Microwave Modules* converter. The aerial is a 9-ele. Yagi, horizontally polarised, with a 4-ele. vertical screwed on the front. Finally, No. 258 goes to G8GRO, R. D. Nicholls, from Brownhills, W. Midlands, who started operating in September, 1972 with a home built Tx. *Eddystone* EC-10 and *Microwave Modules* converter. Present gear consists of the *Trio* TS-700, an *FT2-Auto* and a home-built 4CX250B amplifier. G8GRO also operates on 70 cm. using a varactor tripler, a 70 cm. transverter being the next project. He is also QRV on 23 cm. The QTH is 550ft. a.s.l. and only indoor aeriels have been used; e.g. a halo in the loft. Nevertheless, 60 counties have been worked and ten countries.

Overseas News

Julian Macassey, OZ9IY, writing from Farum, confirms that there are no "call areas" in Denmark, the figures having no geographical significance, as is the case in the U.K. He would like to see 144.3 MHz kept as the calling frequency in view of the lack of SSB activity at his end. Regarding the FM scene, Julian advises that S20 is hardly used at all and has been dubbed, "The Tourist and Foreign Workers' Frequency". However, OZ and SM stations use S22 heavily. The Swedes run 145.0 and 145.7 MHz as simplex channels, even though they are active repeater frequencies in Denmark. The "Taxi-driver Fraternity" use 145.9 MHz as a simplex channel and do not seem to care that it is an *Oscar* up-link region. The OZ7IGY, 2m. beacon is QRT due to spurious problems and a "lazy" keyer. The beacon has been on since 1957 from its cement factory site in Copenhagen and is an all-valve device and there are plans afoot to rebuild it solid-state and relocate it. OZ7LX, the Ringsted repeater manager, has been contemplating erecting beacons there for 23 cm. 70 cm. and 2m. Incidentally 23 cm. operation in OZ required a special permit, issued on a yearly basis, separate from the normal licence, but at no extra cost.

Writing from Gibraltar, Richard Buckley, G3VGV, tells us that resident Jimmy Bruzon, ZB2BL, is building an SSB transverter for 2m. mainly for *Oscar* use but that he will be beaming to the U.K. during the summer Sporadic-E season. ZB2CH has 2m. AM. Richard's wife, Anne, well known on 2m. as G8KMB, passed the Morse test first time and is now G4EYL. They took a *Trio* 2200G and a *Liner-2* to see what they could work from the Rock but report that no stations have even been heard on CW or SSB. Much calling, "CQ Dos" from a high point on the Rock with a 4-ele. quad on FM finally produced a QSO with EA7CZ, all of 2 km. away in La Linea. From this QSO, it was gleaned that most EA/FM activity—at least in Andalusia—is via repeaters, four of which are within range of ZB2, being: Granada on R1; Malaga on R4; Sevilla on R8 and Cordoba on R0, all using vertical polarisation. Of course, the Buckley's only had R5, R6 and R7—Murphy at it again! The ZB2VHF, 2m. beacon is QRT at present from the ZB2BL home, due to TVI, and it is hoped to relocate it at the top of the Rock, some time. The 4m. beacon is now located at the RAF Amateur Radio Club and is on almost continuously, into a low, 2-ele. Yagi. Armed

with a *Call Book*, Anne and Richard spent a weekend in North Africa but could not find any amateurs in Tangier. However, in Ceuta, they spotted a TH3, Quad and trapped dipole and tracked down EA9EY. Francisco has a *Standard* FM transceiver tuned to the Granada repeater which comes in very well across the Mediterranean. Later visits to EA9FF and EA9EX revealed that neither have 2m. capability yet, but that EA9FF should be QRV soon.

Scottish News

GM6XI reports growing 70 cm. SSB activity in East Scotland with the advent of the *Microwave Modules* transverter, which, in turn, has led to competitive *Oscar* 7, mode B working amongst GM's 3BQA, 6X1, 6XW, 8BJF and 8DOX. On 4m. most activity is from the Edinburgh and Fife areas. GM4DIJ has made an SSB transverter from a *Murphy Rover* and is doing well. More operators are getting ready for GB3CS, although there seems to be a fair bit yet to

QTH LOCATOR SQUARES TABLE

Station	Total	2 m.	23 cm.	70 cm.
G8FUF	138	138	—	63
G3COJ	109	54	10	45
G4DGU	90	60	—	30
GD2HDZ	66	41	6	19
G4BWG	119	102	—	17
G8IFT	41	29	1	11
GM4CXP	93	84	—	9
G8BKR	79	72	1	6
G3FIJ	40	34	—	6
GC8AAZ	53	50	—	3
G3POI	127	127	—	—
G3PK	107	107	—	—
G8HVV	86	86	—	—
G6UW	78	78	—	—
G4CIK	61	61	—	—
OZ9IY	53	53	—	—
G8KSP	52	52	—	—
GD3YEO	48	48	—	—
GW8HVP	48	48	—	—
G8KKX	48	48	—	—
G8JJR	44	44	—	—
G4EYL	41	41	—	—
G8JEF A	38	38	—	—
G8ITS	28	28	—	—
G8JEF	25	25	—	—
G8JAJ	23	23	—	—
G8JKA	21	21	—	—

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

be done to the repeater. On 2m, GM4DGC, from his new Kirriemuir QTH, is putting a fine signal on SSB into Edinburgh with his *Liner-2* and indoor aerial. A new East Lothian licensee is GM8LLY. From his mountain top on the Isle of Mull, GM3JZK is active.

Contests

Winning station in the 70 MHz CW Contest on January 18 was GW3WRA/P with 365 points, runner-up being G3NHE with 314 pts. and G3UKV/P in third place with 302. No written comments about the 432 MHz Open Contest on February 8 have been received but G3JXN told your scribe "on the wireless" that he managed 33 QSO's in the first two hours before the rig blew up! John said there seemed to be no SSB signals from North of Bedford but that G3BW, G3NHE and G5UM were good signals on CW.

The "two-in-one" style, 144 MHz Open Contest on March 6/7 turned into a farce. The idea was that in the all-mode, DX section, only contacts over 200 km. would count for points—a sensible proposition for mountain-top portables and well-sited fixed stations. The Local section was for stations not using SSB, and cross-mode contacts were allowed. The result was that many AM and FM stations operated in the SSB section throughout. Conditions were generally poor to the North, so signals were weak. All too often at G3FPK, these weak stations were obliterated by AM and FM signals from stations who most likely could not hear any DX. If looked as though many, regular 2m. contest stations simply switched off in disgust. It seems incredible that, having agreed a band plan at the IARU Region 1 Conference last year, the organisers should promote this kind of contest which seemed bound to encourage AM and FM operation in the SSB part of the band. It will be most interesting to see what the adjudicators do about Rule 15 which states, "Entrants are also encouraged to observe the . . . provisions of the RSGB/IARU bandplans."

There has only been time for getting opinions over the air. G3JXN (London) had 55 scoring contacts and worked nine countries, including GM. John felt it was a very unfair contest for poorly-sited stations using SSB only and who were denied entering the Local section. G4BWG operated portable from the Isle of Sheppey and found conditions very puzzling. From the apparently favourable coastal site, they were hearing very many Continentals but found it extremely difficult to raise them. However, when they did, their reports were very good. Best DX was in FT11a but Steve feels that their 765 pts. from 65 scoring QSO's was very poor going. G4JZ (Birdlip, Glos.) reckoned the contest to have been a complete waste of time for, in four hours, Frank managed just four scoring QSO's, one Dutch, one Scottish and two French. He reports hearing someone calling a spurious transmission emanating from a Welsh portable and feels that speech processors should be banned and power greatly reduced. Strong stuff! GW4BXE (Pontypool, Gwent) also thought this contest to have been a silly idea and Phil, too, would favour a power restriction. G8KKK (Rushden, Northants.) mentions this contest as being "a fiasco". Writing on behalf of the Isle of Man ARS group, GD3FLH/P. GD3YEO reports 82 scoring contacts in less-than-average condi-

tions and windy, Arctic weather. He feels the rules for this contest openly invite the use of full power and big aereals and drives yet another wedge between the SSB/CW and FM operators. A very valid point, OM. At G3FPK, signals in all directions were down, but an unexpected success was G3UUS/LX/P in DK71g on SSB. Even so, their signal was in and out of the noise at Riddlesdown, although LX is about the worst direction. We await readers' comments for the next issue with interest, especially from non-SSB operators. How did "channelized" operators fare, for example?

Forthcoming Contests are:—70 MHz Open on April 4 (0900-1700z); 1.3 GHz Open on April 24/25 (1600-0100 & 0500-1600z); then the 432 MHz Open on May 1/2 (1600-1600z).

Beacon News

We understand that GB3DM and GB3ANG will be taken out of service due to interference with the Satellite Service. "When?" is not clear, however. The Emley Moor beacon, GB3EM, has been licensed for operation on 432.910 MHz and will be a 100 watt e.r.p. station using horizontal Yagis. Identification will be 400 Hz FSK. The Wrekin (Salop) beacon, GB3WR, has also been licensed but has yet to be built. Mike Adcock, G8CMU, would like to hear from anyone prepared to assist in this 23 cm. project and mentions that a little finance and some "muscle" would be welcomed. Mike is QTHR. The French VHF/UHF fraternity are devising a plan for beacons and seek to persuade the P.T.T. (their licensing authority) to agree to a network whereby nobody will be further from a 2m. beacon than 500 km. or 300 km. from a 70 cm. one. In the pipeline are proposals for a Paris beacon on 70 cm., a 70 cm. *ditto* at Sadirac (Gironde) and a 2m. one at Foix (Ariège).

Four Metres

G3BW (Cumbria) is the only one to mention 4-metre activity. Bill says he spends a lot of time on the band but finds the going very slow. QSO's with G13CDF and G13TLT were arranged via 2m. G3BW promises to be QRV each evening around 2000 local on 70.2 MHz and is fully transceive on CW/SSB, the aerial being a home-built, wide-spaced 4-ele. Yagi. G3BW will tune the band if not called on his QRG and net on the caller's frequency—and he can't say fairer than that!

Two Metres

Written reports are rather few this month, no doubt due to our being a week late with the March issue. *Aprapas* the January 10 Aurora, GD3YEO carried out a lot of beam hearing experiments which are certainly worth publishing and should be self-explanatory: GM3JFG, 2155, XR40:060°, GM3EOJ, 2203, YR70f 060°, GM3ZBE, 2300, YR8j 060°, GM4CXP, 2330, YY37c 060°, SP2AOZ, 0037, J044f 084°, GM4CXP, 0100, YP37c 078°, G13RXV, 0108, WO18f, WO18f 078°. The 2330 contact with GM4CXP was T9 both ends—very strange, and the beam headings are much further East than we noted at G3FPK. By contrast, Richard heard nothing of the February 7 event. Since then GD3YEO reports poor conditions, with the Kent beacon often difficult to find for much of the time. He tells us that GD8LFA is now QRV on SSB with a *Liner-2* and 6-ele. Quad from a better site than at 3YEO. They often notice a see-saw type QSB for, when a station is in the dip at GD3YEO, it is often peaking at GD8LFA, and *vice versa*. Richard wonders where everyone has gone on 2m. SSB? Maybe the "licensed listener" syndrome, eh?

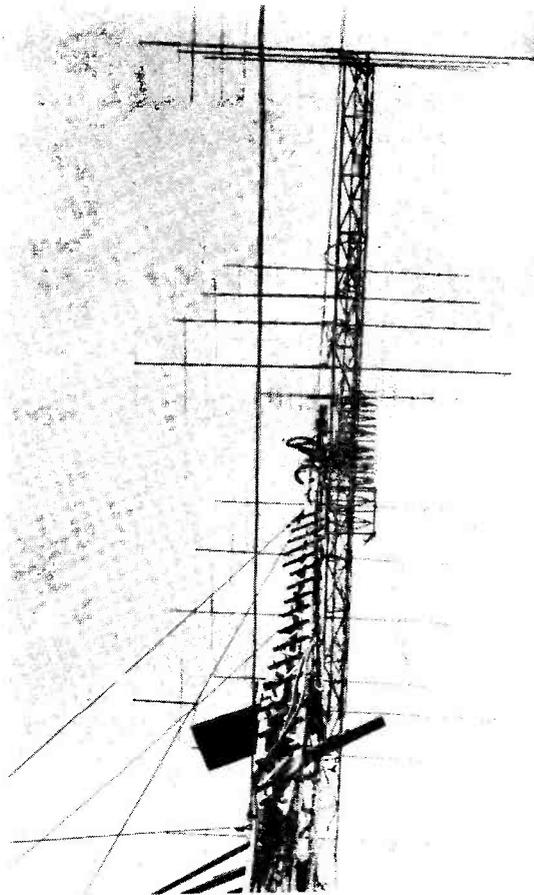
The log at G3FPK reveals a mixture of conditions varying from, "Has the Rx

THREE BAND ANNUAL VHF TABLE

January to December 1976

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	
G5DF	23	2	47	6	13	1	92
G4BWG	25	2	41	12	8	3	91
GM4CXP	3	2	53	14	4	2	78
G2AXI	13	1	27	6	19	3	69
G3FPK	—	—	54	15	—	—	69
G3BW	13	5	14	8	16	5	61
G4CZP	—	—	53	7	—	—	60
G8GML	—	—	38	6	6	1	51
GD3YEO	—	—	35	7	—	—	42
G8ITS	—	—	28	5	—	—	33
G8KSP	—	—	24	6	—	—	30
G8BKR	—	—	17	6	4	2	29
GC8AAZ	—	—	11	7	3	3	24
G3FIJ	—	—	10	4	—	—	14
GD2HDZ	1	1	1	1	1	1	7

The point of particular interest about this array is that it is entirely home-built, by SM7BAE, who first of all had to learn how to weld with ladders. It is fully equipped with laddering and carries multi-element beams for the VHF bands.



blown up or the aerial collapsed?" to, "Who left the Rx on 20m., then!" The persistent anticyclone which wandered in leisurely from the Atlantic, across Northern France and into Germany proved the point that high pressure does *not* automatically produce a lift. At times the band was in mediocre shape but we were also rewarded with spells of above-average conditions. The first of these was the period February 14-18 when propagation to the North and West from London and the South-East was very good. During the period from the 24th to 27th the band was well populated by the nearer Continentals. On the first two days the opening favoured a block of twelve QTH squares bounded by CM, EM, EJ and CJ. Two very welcome QSO's were with Luxembourg stations LX1SI (DJ22g) and LX1EX (CJ40e) and these two must have given many their first LX with their good signals. The conditions on the 26th and 27th seemed better to the South with a number of F's worked on SSB and CW in the Paris region. Even so this lift seemed confined to Southern stations and G4CCH (Humber-side) reports hearing them knocking off the Europeans who were barely audible with him.

The first few days of March brought slightly enhanced conditions with some good QSO's into GM in the early evening of the 3rd. Both GM4CXP (Borders) and

GM8BDX (Borders) were very potent signals into the London area for a time. Also worked on CW that evening was EI9Q (Waterford) but only S2. GM4CXP writes that February was a very poor month in GM apart from the Aurora of the 7th which lasted from 1612 to 1948 GMT. Derrick reckoned he was on the fringes of it, only bagging three LA's, four GM's, two G's plus SM5EJN.

Seventy Centimetres

G3BW spends a lot of time on 70 cm. but finds activity sparse, though improving slowly. He has been trying to persuade the EI/GI lads to populate both 70 cm. and 4m. where at present there seems to be no activity. Bill advises there might be something doing on 70 cm. from that direction, shortly. G3OHC (Sutton Coldfield) is now QRV on the band with a *Modular Electronics* QM-70 transverter and 18-ele. parabeam. In three weeks, Graham has notched up two countries and 11 counties. G3ZYC (Matlock) reports that G8DKU is a nice signal from West Hartlepool (Cleveland). G3AUS (South Devon) and G3BW have shifted their nightly sked to 432.15 MHz to avoid any QRM on 432.2, although Bill remarks, "What a joke that is!" There must be many readers who *do* operate on this

band so we would like to hear from you; your future plans as well as any achievements.

No reports of any 23 cm. activity this month and the All-Time Table remains unchanged, so your up-dated scores for next month, please.

Liner Clinic

As promised, this time we are featuring GD3YEO's circuit for CW operation of the *Liner-2*. It can be made up on 0.1 inch pitch *Veroboard*, less than two inches square, so can be mounted easily inside the equipment. Richard's circuit eliminates "live" keying leads, and comprises a slave transistor, Tr2, connected across the Test switch. Tr2 *must* be a very low leakage PNP silicon type so as not to upset the balanced-modulator when used on SSB. The 4FX29 is suitable. To hold the transmit/receive relay in during CW operation, a delay circuit is employed, the period of which can be adjusted by varying R2; 3.3K gives about one second. The type of key socket was chosen so that the delay is inoperative on SSB. The first contact—nearest the panel—connects to the barrel of the jack plug and is earthed to the mounting nut when the plug is inserted. When the key is depressed, the second contact is earthed, closing the T/R relay.



W. L. Barnes-Rickers, G8JKN, 11 Inchbrook Road, Kenilworth, Warks. CV8 2EW, with his XYL, took a trip round the world recently and while in Australia operated as VK3ZRC. He started on the air in 1974, having obtained his U.K. license at the age of 69 — we congratulate him! Always keen on Radio, his activities go back to the days of KDKA and W2XAD — and receivers built on bread boards.

Tr2 is forward biased via R1 and applies 12 volts to the balanced-modulator circuit. Diode D1 isolates normal PTT operation whilst D2 provides constant delay, irrespective of keydown time, by discharging C2 each time the key is depressed. GD3YEO has used a modified, "end a transmission bleep" oscillator, using a Plessey SL 630c i.e., as a keying monitor and we will run this at a later date. Send in your comments and mods, so that we may continue this feature.

Repeater News

The Repeater Working Group's proposals for 70 cm. repeaters has now been officially adopted. Output frequencies are as follows, the figures in parentheses being the British channel numbers:—433.05 (RB2); 433.10 (RB4); 433.15 (RB6); 433.25 (RB10); 433.35 (RB14), the user, or input frequencies being 1.6 MHz higher, while 433.20, 433.40 and 433.45 are simplex channels, designated SU8, SU16 and SU18 respectively, and 433.30 (SU12) is the RTTY channel and 433.50 (SU20) the calling one. This plan is based upon a 50 kHz spacing and obviously further channels could be slotted in should it be necessary in the future. On June 1, the input frequency for the GB3PY repeater will be changed to 434.95 MHz to bring it into line with the final U.K. Plan.

On the 2m. front, we now learn that there is some delay at the Home Office in licensing the St. Austell repeater, GB3NC, which is not now expected to be on until the summer. G8BGU (Ovingham) reports on the February 1 tests conducted by the Tyne and Wear Repeater Group from Wretherton, two miles South of Newcastle-on-Tyne. Between 1000 and 1500, 135 contacts were made with the Tx running 10 watts to a quarter-wave vertical at 35ft. Ten mobiles participated and they now have a good idea of likely coverage. This group meets on the second Wednesday each month, the venue being given over GB2RS.

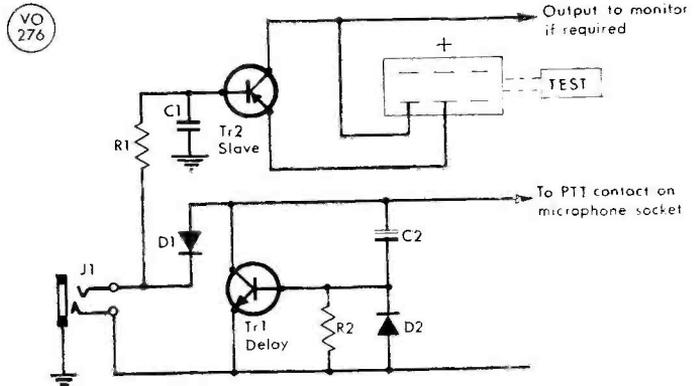


Fig. 1

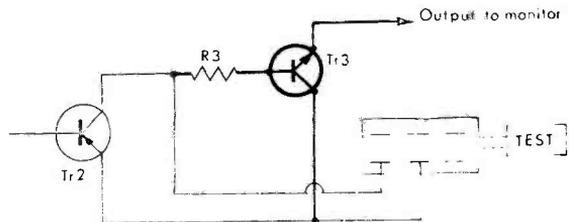
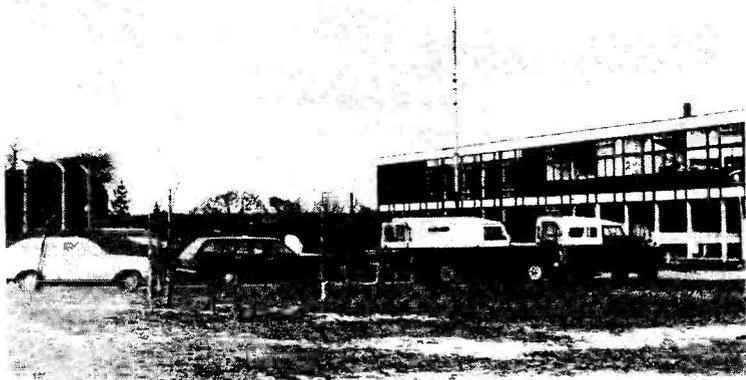


Fig. 2

Keying circuit for the Liner-2. The heavy line indicates the modification wiring. In Fig. 1, C1 is 100pF, C2 47pF, R1 22K (for R2, see text). Tr1 BC107, Tr2 BFX29 and D1, D2 1N4002. The jack should be a miniature type with an insulated socket. For Fig. 2, R3 is 22k and Tr3 BC107. Items already in the Liner-2 are in light line.

Early in February, the Tyne/Wear Repeater Group met to carry out tests at a site two miles south of Newcastle, running ten watts input and a quarter-wave vertical at a height of 35 ft. Results were most encouraging, both fixed and mobile.



Satellite Topics

Oscar 6 seems to have survived the "hot" phase in February when it was subjected to maximum sunlight. The new AMSAT control tapes have arrived to the satisfaction of G3YJO, in charge of the British Command Centre at Surrey University, Guildford. There remains the problem of stations using too high c.r.p. to get into the satellites and 80-100 watts is enough. The difficulty is one of imbalance, in that most people using the 2/10m. system have sufficient "sock" to get their signals in, but their 10m. receiving systems are very inferior. Consequently, they only hear the loudest signals and never the DX. A 10m. preamplifier is a "must" for most amateur bands receivers. A single 40673 affair with toroidal coils is the simplest thing to build, but if you are too lazy, then the very modestly priced "Oscaramp" from *Hamgear Electronics*, as advertised in the *Magazine*, is just the job. It got a good write-up in the latest *Oscar News*, the official journal of AMSAT U.K. Anyone who is seriously considering satellite activity should contact G3WPO at 5 Erin Way, Burgess Hill, W. Sussex, RH15 9PN, for membership details.

Some knowledge of the *Oscar 6* and 7 orbits is essential for serious satellite work. In a forthcoming issue we will publish a simple chart devised by GCBAAZ from which essential times and beam headings can be read, given just the time of equatorial crossing.

General Matters

We regret to record the deaths of two VHF enthusiasts. Eric Cosh, G2DDD, of Littlehampton on January 26; he was a keen 5-metre man, pre-Hitler's War and later a 23 cm. and 70 cm. experimenter. B. "Mac" McCall, G3GHO, died on February 15 aged 63 and was a well known 2m. operator from Roade (Northants.) in the early days.

Phone operation by certain London stations in the CW part of the 2m. band

persists in connexion with A/TV talk-back on 70 cm. This selfish practice frequently makes it impossible for any DX beacons to be searched for by those interested in propagation studies. Perhaps those concerned would care to QSY to the 144.75 MHz region as suggested in the BATC Club journal *CQ-TV*.

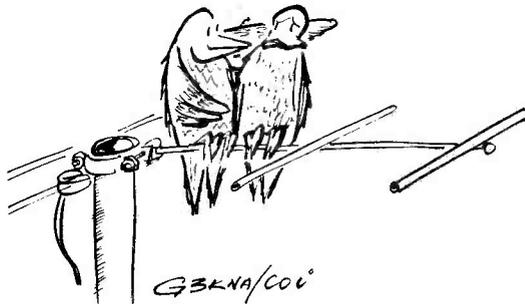
Regarding the Tables, please note that the new Scottish regions should be counted once only, just like the other counties, even though the three-band annual scores will be lower: it is the same for everyone. Also, please note that all QSL's for your VHFCC claims must be for QSO's via normal means,

and this excludes satellite and repeater contacts. No QSL's needed for your table claims.

G3USF feels it would be interesting to publish a list of DX records on the VHF/UHF bands for the various modes, such as MS, tropo, Sporadic-E and Aurora. If any reader would care to research this one, we would be pleased to publish it.

Deadline

All your contributions, please, by April 9 for the May issue and May 7 for June, all to: "VHF Bands," *SHORT WAVE MAGAZINE*, BUCKINGHAM, MK18 1RQ. 73 de G3FPP.



"... Give over, Fred, this chap's on A/TV."

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for May issue: April 9)

THE last issue having been a week late in appearing, it is possible that some Club secretaries did not get their copy in time for the deadline—even though it was revised to take in the delay, so far as that was possible. For this unfortunate *hiatus*, we apologise—there was nothing we could do about it.

Often enough, the writer hears from a Club Secretary who is worried about falling attendances or lack of support, so perhaps it would be pertinent to consider for a moment some basic principles.

First, for no two groups is the secret the same. One group may be contest-minded, another shun any such activity, for example. This is the cumulative effect of the personalities who make up the membership of the group. It follows, therefore that the successful group is the one in which the Secretary and/or the committee can distinguish what is best for the whole group when their personalities as individuals are considered; a lecture on eighty-metre SSB DX, illustrated by tape-recordings, won't be very successful as an attraction in a repeater-and-FM group. The venue should also be considered with care; if your chaps all sneak out round to the local pub before the end, it is well to consider whether the Club room is warm or comfortable enough—or do the majority like to end with a can of ale and a ragchew? Maybe a move to a pub will help a Club; it is equally likely to give a fall in attendance at another one just a few miles away.

It is a reasonable axiom that those who attend do so because they like to; but the reason for that liking is not always so obvious. The lecturer may actually like giving a talk simply because he is greedy for the approval for his fellows, while the chap at the back simply wants to soak up knowledge silently and be un-noticed, while someone else goes because he feels it his "duty" to give support.

It follows, then, that the chap who organises the programme is the key to most of it; usually the Secretary, after some discussion with the committee, is charged with writing the letters and doing the work. Let us look at *him*, then, for a moment. He will have been elected, and will have accepted the nomination for one of three main reasons: It flatters his ego to be nominated as a "big wheel" in the

group, or he thinks he can do the job as well as the next man even though it will be a further loss of his spare time (this type usually has unpteen activities and ends up on all their committees), or he has been shotgunned into it through being too soft-hearted to say No; this last type breaks into two sub-grades, namely the guy who makes the best of it while cussing under his breath, and the other chap who does nothing at all and excuses himself with "I've been too busy to write letters for the Club."

Of these types of personality the second is best for the Club in the long run; the first may have lots of drive but no understanding of the personalities of his fellow members, resulting in him presenting lectures or events which, while maybe good in themselves, are not of the right sort to keep his members, being usually selected by reference to his own feelings in the matter. Of the third type of secretary, any club which does things this way is gambling with its corporate life. The guy who is shotgunned may prove to be a winner, or he may be so useless as to cause a Club to be completely closed down within a year of his election.

Summing up, the Club should be more careful in placing its votes for the Hon. Sec. vacancy at the AGM, and that individual when he has been elected should concern himself to study the minds of his membership before he plans a programme. And, of course, to accept that there will always be some chaps who are not suited by what you have to offer and will either not be members of any group, or will go elsewhere.

Reports Round The Country

It is unfortunate that our late arrival on the news-stands (the first time for about 30 years, incidentally!) was coupled to a tight deadline. However, those Club scribes who noted the form of the deadline pattern were still able to get their reports in on time, while many others will no doubt be in the post to arrive after deadline time but as fast as the scribe can react. So, for convenience in writing-in the late-comers, we will go straight down the clip this time.

Bishops Stortford seem to continue their steady if unspectacular year; they have a regular Hq. where they have always met, namely the British Legion Club, Windhill, Bishops Stortford, and alternatives should they wish to change or be heaved out, neither of which seems likely. The booking is for the third Monday in each month normally, which in April would land it on the Bank Holiday. This being so, it would be well to contact G8BTK to see if the date has been altered a week either way.

Down West now, to Cornish, where their *Link* has a most interest-

Names and addresses of Club Secretaries reporting in this issue:

NAMES AND ADDRESSES OF CLUB SECRETARIES REPORTING IN THIS ISSUE:

- ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, Acton, London, W3 8LB.
- B.A.R.T.G.: J. P. G. Jones, GW3JGG, Heywood, 40 Lower Quay Road, Hook, Haverfordwest, Dyfed, SA62 4LR.
- BISHOPS STORTFORD: C. Harlow, G8BTK, Thorn Cottage, Old Mead Lane, Henham, Elsenham, Bishops Stortford, Herts.
- BRISTOL (RSGB): B. Croker, G3ULJ, 36 Portland Street, Staple Hill, Bristol, BS16 4PT.
- CHELTENHAM (RSGB): G. D. Lively, G3KII, 26 Priors Road, Cheltenham (34785), Glos.
- CHILTERN: M. Connell, G8HDL, 38 White Close, High Wycombe (31314), Bucks., HP13 5NG.
- COLCHESTER: T. A. Mills, 75 Lymington Avenue, Clacton-on-Sea, Essex.
- CORNISH: H. Webster, G3XTF, Crandale, Gillyfields, Redruth (6905), Cornwall.
- CRAY VALLEY: M. Tripp, G3YWO, 57 Cathcart Drive, Orpington (38199), Kent.
- CRYSTAL PALACE: G. M. C. Stone, G3FZL, 1 Liphook Crescent, London, SE23 3BN.
- DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby (2193), DE3 7GE.
- ECHELFORD: J. H. Ellis, G2FNK, 15 Georgian Close, Leacroft, Staines (54828), Middx., TW18 4NR.
- GRIMSBY: G. J. Smith, G4EBK, 6 Fenby Close, Grimsby (88720), South Humberside, DN37 9QJ.
- HEREFORD: S. Jesson, G4CNY, 181 Kings Acre Road, Hereford (3237).
- LOTHIANS: B. W. Flynn, GM8BJF, 8 Corrennie Drive, Edinburgh 10. (031-447 5527.)
- MAIDENHEAD: E. C. Palmer, G3FVC, 37 Headington Road, Maidenhead (20107), Berks., SL6 5LA.
- MIDLAND: A. Walton, G3ZKQ, 243 Barnes Hill, Weoley Castle, Birmingham, 29.
- NORTHAMPTON: S. J. Purser, G8GHZ, 2 Dobson Close, Great Houghton, Northampton.
- NORFOLK: M. J. Coan, G4EOL, 117 Ranworth Road, Norwich, Norfolk.
- NORTH KENT: R. Wells, G4ARQ, 12 Bulbank Road, Belvedere, Kent.
- NOTTINGHAM: M. C. Shaw, G4EKW, 50 White Road, Nottingham, NG5 1JR.
- PEMBROKE: M. A. Shelley, GW3XTQ, Woodview, St. Florence, Tenby, Dyfed SA70 8LS. (*Manorbier 544.*)
- PETERBOROUGH: L. Critchley, G3EEL, 36 Waterloo Road, Peterborough, Cambs.
- REIGATE: R. Wells, G3RIN, 5 Cronks Hill Road, Redhill, Surrey.
- SOLIHULL: S. R. Jones, G4AXW, 112 Highwood Avenue, Solihull, West Midlands, B92 8SR.
- SOUTH BIRMINGHAM: N. Gutteridge, G8BHE, 68 Max Road, Quinton, Birmingham, B32 1LB. (024MMMMMMM Road, Quinton, Birmingham, B32 1LB. (021-475 2833.)
- SOUTHDOWN: B. Chuter, G8CVV, 15 Coopers Hill, Willingdon, Eastbourne, East Sussex, BN20 9JG.
- SOUTHGATE: B. Oughton, G4AEZ, 48 Morley Hill, Enfield. (01-366 7166.)
- SURREY: S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon, CR2 8PB. (01-657 3258.)
- SUTTON & CHEAM: A. Keech, G4BOX, 26 St. Albans Road, Cheam, Sutton, Surrey.
- TORBAY: M. Yates, G3UIQ, Top Flat, 23 Waverley Road, Newton Abbot (3025), Devon.
- VERULAM: B. H. Pickford, G4DUS, 130 The Drive, Rickmansworth, Herts.
- WHITE ROSE: R. Hughes, G4DZI, 3 Primley Park Crescent, Leeds, West Yorkshire, LS17 7HY.
- WINCHESTER: B. W. Homer, 69 Ashdown Way, Saxon Meadows, Romsey (513982), Hants.
- WOLVERHAMPTON: D. T. Pugh, G8BSR, Brigands, 38 Applebrook, Snifnal, Salop.
- WORTHING: S. G. Williams, G3LQI, 58 Grinstead Lane, Lancing (4017), Sussex.
- YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.



Group of members of the Kingsway Tech. College Amateur Radio Club, Dundee, signing GM4AAF. They climbed to second place in our November MCC, with 14,209 points. They meet at the College every Wednesday evening. At extreme right is GM4ADS, with GM3ZXE operating.

ing article on the GB3CTC beacon, its start and its purpose. As for the meeting, it is on April 1, for the Annual General, the venue being the SWEB Club Room, Pool, Camborne.

A change of Secretary is noted at Peterborough (not to be confused with the Greater Peterborough lot!) which puts G3EEL into the Address Panel. For this month, they are changing their usual routine, which would put them on Good Friday, so as to foregather on April 23, at the Scout Hut, Occupation Road, for an "Activity Night."

Having remarked on the presence of two Clubs in an area, it might be as well to indicate to readers just how we refer to a club in this piece. Most have some suffix to the town or district name such as "X and District Amateur radio Club" and we always drop the last part of the title, *unless it has some significance*; for instance, there are three Clubs who on occasion report from Cheltenham, so we refer to Cheltenham, Cheltenham (RSGB) and so on, to avoid confusion; but if there is only known to be one outfit in an area, then it matters not one whit to us whether it calls itself Society, Club, Group, or Organisation; we will just refer to it as "X-ville." This way, we cope with everyone without too much repetition, and, hopefully, at no time do we dent the morale of a member by mis-titling his particular group.

Up North now, to Lothians who are now based at Riddles Court, High Street, Edinburgh, where they have changed to Room 2, thanks to rising membership. April 8 is set aside for GM8DOX to display a range of commercial gear, while on the 23rd, GM8BKE will be talking,

we understand, about Radar.

At Cheltenham (RSGB) the AGM has been taken and the new chaps set to work, so that already the programme is arranged for the next six months. Hence, for April, we find G3DPS, of the Royal Signals A.R.S., talking about "Military Communications through the Ages." Sounds an interesting change, at that.

Wolverhampton have their place at Neachells Cottage, Danescourt Road, Stockwell End, on Monday evenings, with something organised for pretty well each session, and a quarterly Newsletter of considerable interest, which is on an "exchange" basis with most of the local groups, too. The compiler of the Newsletter seems to be G3UBX, with insets in cynical mode (FM?) from G6GR.

April 21 is the date for Chiltern, and it should be noticed that they have new Hq. at 42-44 Castle Street, High Wycombe; the facilities being available, it is proposed to provide refreshments at meetings. At the time of writing it was not certain just what was to be done at the April session—but they will have something of interest to offer, doubtless.

Now to Maidenhead, where the Hon. Sec. wrote in so early that he just missed the deadline for the previous piece! One gathers that he has hopes of off-loading the secretaryship at the March AGM, as he feels he has done his fair share over the years. On April 1, they will have a talk about Logic Systems, and on April 13 G3LTF will be making the long journey to talk about VHF Propagation, at the Red Cross Hall, The Crescent, Maidenhead. We can add, from



Some members of the Silverthorn Radio Club, at their recent constructional contest. On the right is G4AJA (secretary) displaying the winner's trophy and his miniwatt Top Band transmitter. G3CPH (standing) was the runner-up in the contest. For many years, this group has been led and inspired by G2HR.

our own experience outside Amateur Radio, that this Crescent is a bit elusive if you don't know where to look for it, so follow the directions you get *carefully* if you are a stranger!

That 400th meeting of the Surrey group was a *wow*, we gather, with G5AA as guest of honour, he having been one of the founder members all those years ago. They seem to foregather on the third Tuesday of each month, and the venue is the Ship Inn, Croydon. However we do not have any firm details, for which you can doubtless contact G3FWR—see Panel, or just turn up anyway!

Southdown have their booking at the Victoria Hotel, Latimer Road, Eastbourne, on April 5, and the event will be the Annual Junk Sale.

The Sutton and Cheam crowd seem to be settled in quite nicely at the Sutton College of Liberal Arts, where they assemble on the third Tuesday in each month. We do not, at the time of writing, have any details, but no doubt the Secretary—see Panel—will be pleased to fill in the gap.

Norfolk write in to notify a correction to the Secretary's address, for which see Panel; they get together each Wednesday at Crome Community Centre, Telegraph Lane East, Norwich.

Northampton (Radio Club) seem to have a weekly meeting-routine, on Thursdays; but it is not clear that this is definitely so, nor is the Hq. address given; so we refer you to G8GHZ, at the address in the Panel.

B.A.R.T.G. Contests and Awards Manager G8CDW sends along some information on the 1976 "World Champion of RTTY Award" sponsored by the Italian Magazine *CQ Elettronica*—this year there is an extra prize for the final top scorer, in the form of an Inoue Base Station IC-21A plus its digital VFO. Anyone with an interest in the 'printer mode of operation should join this group—details from GW3IGG, as Panel.

Another crowd to have a change of home are Grimsby; they have moved to the New Alexandra Social Club in Alexandra Road, Cleethorpes. The form seems to be to be there on alternate Thursdays, and have a welcome for any SWL's or folk interested in Radio or Electronics; details from G4EBK, as Panel.

April 17 is the date for the Crystal Palace folk, at Emmanuel Church Hall, Barry Road, S.E.22, for a talk on the elements of simple telephony switching as practised by the Post Office, given by G3XFT and G8HAX.

Now on to Echelford, who have Hq. at St. Martins Court, Kingston Crescent, Ashford, Middx., where they are "At Home" to visitors on the second Monday and the *last* Thursday in each month. For March, the main item is to be the AGM, from which we may deduce that the new committee will be fixing things up for the April dates.



"... Standing by now for my RNARS sked ..."

In the current *Southgate Newsletter*, we notice a quotation lifted from an old RSGB *Handbook*, on the subject of Power Supplies; it recalls the mercury rectifiers, such as the GU50, and how they were to be used, the waiting time before switching on HT, and so on, which we used to have to go through for the sake of a reasonable HT supply for the PA (not to mention the "hash" the darned things could generate in the receiver!), and makes a comparison with the modern BY127. The old valves were rated about 250 mA, around 1500 volts, for an envelope about 6 by 2 inches—the modern BY127 gives you 1250 volts P.I.V. at 1½ amp. in a size around half-inch long and less than ½ in. wide. Such is the progress we have seen! *Southgate* have also "found fame" in another way—we note a quotation from *Punch* about their activities from the Scout Hut in Wilson Street, Winchmore Hill. They can be met on the second Thursday in each month at this venue.

Up at York they have recently had a home-brew show, which further indicates the progress of the past years; an entry of a digital clock using IC's was alongside one built some years ago by G3KAS using an all-discrete circuit, for which over 1000 resistors and transistors had been wired-in! They use the British Legion Club, 61 Micklegate, York, as their Hq., every Friday evening *except* the third one, and they like to have visitors.

Torbay have social evenings every Friday which are proving successful, and in addition will continue with the monthly "formals" the next one being on April 24 for the AGM. Hq. is at Bath Lane (rear of) 94 Belgrave Road, Torquay.

North Kent are at the St. Mary's Institute, 2 North Cray Road, Bexley on the second and fourth Thursdays of every month; we note an evening of nostalgia "touched the spot" back in January, when G8ARB brought some old receivers along, variometers used as tuners, *Varley* and *Lissen* bits and some of the old Scott-Taggart blueprints!

Rather a nice idea is mentioned in the *Hereford Newsletter*, which notes that members of Gloucester and Merthyr Tydfil Clubs are intending a get-together which will possibly be at Hereford and involve

some of the local Club members as well. The lads have a talk on RAEN down for April 2, and another on Circuit Layout and the use of Components on April 16.

In Nottingham they have a place at the Sherwood Community Centre, Mansfield Road, every Thursday evening. April 1 is down for a tape-lecture, and the 8th for their "Forum" session. April 15 is the AGM and on the 22nd there is an Activity Night. Finally, on April 29, they try a VHF Foxhunt.

Even after all these years we still get surprises from the Clubs—this time it is from Derby, whose note of their activities at 119 Green Lane every Wednesday bears a Gibraltar post-mark! As always, the first week of the month—they assemble on Wednesdays—is a Junk Sale, but for the rest, ZB2RB says he has left his programme at home, so please refer to G2CVV, as Panel.

Acton, Brentford & Chiswick are, as usual, at 66 High Road, Chiswick, London W4, on April 20, where, we understand, they will be hearing from G3LBQ about his trip to Sweden and meetings with the SM amateurs.

More change is hitting Verulam; their main meeting after being moved from the third Wednesday to the Thursday, now has to be shifted again to the *fourth Thursday* at the Market Hall, St. Peters Street, St. Albans; the informal is still at the R.A.F.A. Hq. in Victoria Street, on the first Monday in each month.

Bristol (City) have not written in for many a long day, but they seem to be going well nonetheless, with a programme in the membership card running out till the end of 1976. On April 26, they have G3VA of the IBA to talk about Aerials, television and other. This should be quite an interesting one, as G3VA is a knowledgeable on Aerials.

Of to the Wild West we go next, to Pembroke, where the group are well known for their Bucket-and-Spade-Party at the Regency Hall, Saundersfoot, which this year is on August 15, with talk-in on all bands from Two-metre FM (and *via* repeater, hopefully), down to Top Band, any mode. The normal get-together in April is on Friday, April 30, at "The Defensible Barracks" at Pembroke Dock, where it is hoped GW3IGW will initiate the members into RTTY and its ways.

At Reigate the new Hq. will be used for the AGM on April 20.



During the period January 1-11, the Rugby Amateur Radio Transmitting Society had GB3GBR on the air, to celebrate the 50th anniversary of the inauguration of the world-famous long-wave station, known throughout the world as GBR. All amateur bands were covered and the gear throughout was provided by members, seen in this group. They made over a thousand log entries—despite severe local-noise QRM due to gale damage to the antennae round the GBR aerial farm!



Last December, the Coventry Technical College Amateur Radio Society staged a special-event station signing GB2CTC, during which they were visited by the Principal of the College. The Club runs a Morse class and has a lot of RTTY equipment available. The secretary is J. Witt, G8ISJ, Dept. of Electrical Engineering, at the College.

being the upstairs meeting-room of the Constitutional Club, 18 Warwick Road, Redhill: since it's the AGM, the start is to be 8.15 sharp. As for the informals, they continue at the Marquis of Granby, Hooley Lane, starting at 8.30 on the first Tuesday of each month. Hooley Lane is, again, in Redhill rather than Reigate.

Cray Valley take their AGM on April 1, at Eltham United Reformed Church Hall, 1 Court Road, London, S.E.9 while the informal is down for April 15 (if we have our calculations right). On a different tack, we notice in the membership list no less than six G2 calls among the 93 licensed amateurs in the Club.

Worthing's secretary reckons that even a mention of their existence nets them a new member each time—fine! They get together each Tuesday evening at the Adult Education Centre, Union Place, Worthing, and seem to have an alternation of ragchew evenings and more formal activities—details from G3LQI (Panel).

Colchester (of whom we do not often hear) have weekly meetings on Wednesdays at Stanway School, Winstree Road, Stanway, and have a big Mobile Rally planned at that venue for July 18.

White Rose (Leeds) also meet every Wednesday evening, at 83 Town Street, Armley, where they have a fully-equipped shack, lecture room, lounge, library and workshop, with canteen facilities—nice set-up, lucky lot—but you can bet they've worked for it!

The South Birmingham R.S. have monthly meetings on Wednesdays, and for April 7 they are to have a film show. Their Hq. is at

Hampstead House, Fairfax Road, West Heath.

Winchester have had their AGM, with a new hon. secretary shunted into the hot seat, and meet on the first and third Fridays of each month at Antrim House, St. Cross Road. The new committee is planning the programme for the coming year, part of which involves the City's "twinning" with Geeson and Versailles. There is no doubt that a "twinning" commitment gives enormous scope for practical Amateur Radio activity.

Solihull have meetings at the Manor House, High Street, their next being on April 13, when the talk will be by G3PYR on Antenna Systems—and what could be a better topic for any Amateur Radio discussion.

The Midland A.R.S. have the Midland Institute, in Margaret Street, Birmingham, as the centre for their activities, with a meeting on April 13 (talk by G2CVV, 8.0 p.m.) and on the 25th they are, of course, heavily involved with the North Midlands Mobile Rally—always one of the big occasions of the year—at Drayton Manor Park.

Finale

That covers us for this month. For next time the deadline is April 9, giving your May details—and please don't forget to include your meeting dates, your Hq. address, the name and full address of the Secretary (with a telephone, if applicable). Send it all, to reach us before the deadline, addressed as ever to "Club Secretary," *SHORT WAVE MAGAZINE*, BUCKINGHAM, MK18 1RQ.

NEW QTH's

This space is for the publication of the addresses of holders of new call signs, or changes of address, in EI, G, GC, GD, GI, GM and GW of stations not already listed. All addresses published here will appear in the U.K. section of the American "CALL BOOK" in preparation. Please write clearly and address on a separate slip to QTH Section. Be sure to give correct County designation and post-code. In the case of direct subscribers needing Change of Address, please state for card index adjustment. Address items for this space to: "New QTH Page," *SHORT WAVE MAGAZINE*, BUCKINGHAM, MK18 1RQ.

EI2CY. M. J. Breen, Holy Cross College
Glonliffe, Dublin 3, Eire.
EI2CZ, P. J. Doyle, 29 Stephen Street,
Waterford, Eire.
G3ILO, S. G. Spencer (ex-G4BK Y), 57 The
Quarry, Cam. Dursley, Glos. (re-issue).
G4EMT, J. Tawn, 16 Griffin Close, Eccleston,
St. Helens, Merseyside, WA10 5BL.
G4EPW, L. H. Goulding, 24 Lancaster
Drive, Primrose Hill, Lydney, Glos.,
GL15 5SL.
G4ERC, E. R. Chandler (ex-G8EWZ), 13
Kingsdown Avenue, London, W13 9PS.
(01-579 2515.)
G4ERH, J. P. Perry, 27 Upton Park Drive,
Upton, Nr. Liverpool, Merseyside, L49
6JN.
G14ERM, K. Bones (ex-G18KEP), 13 Beech
Park, Lambeg, Lisburn, Co. Antrim,
BT27 4JB, Northern Ireland.
G4ERU, J. P. Taylor, 5 Luther Road,
Winton, Bournemouth (50400), Dorset.
BH9 1LH.
G4ERW, D. G. Lurcock, 12 Quakers Hall
Lane, Sevenoaks (51594), Kent, TN13
3TR.
GM4ESW, D. W. Calder, 111 Muirside
Avenue, Kirkintilloch, Glasgow, G66 3PA.
(041-776 5495).
G4ETS, J. G. Forsey, 36 Siband Road,
Thornbury, Bristol, Avon, BS12 2EP.

G4ETX, D. Ludlow, 53 Bicester Road,
Kidlington (2834), Oxon., OX5 2LD.
G4EUD, H. L. Egglestone, 21 Chenery
Drive, Norwich, Norfolk, NR7 8RR.
(0603 49993.)
G4EUE, E. A. Hewitt, 15 Boulters Lane,
Wood End, Atherstone, Warwickshire.
G4EUF, G. E. Mayo (ex-G8JXB), 117
Tamworth Road, Kingsbury, Tamworth,
Staffs., B78 2HH.
G4EUX, K. Marrison (ex-G8KQD), 91
Taylor Road, Hindley Green, nr. Wigan,
Lancs., WN2 4TL.
G4EVC, K. Chadwick, 37 West Park Road,
Leeds, West Yorkshire, LS8 2HA.
GW4EVJ, T. Watson (ex-GW8JXR), 19
Kelvin Road, Cladach, Swansea, West
Glamorgan, SA6 5JP.
G4EVK, I. E. Shepherd, M.P.S., Westmead,
Orchard Road, Shanklin, Isle of Wight.
G4EVS, D. N. Johnstone, Longcroft,
Hutton Gate, Guisborough, Cleveland.
TS14 8EQ.
GM6FP, Wm. C. Thomson, Cruachan, 21
Broom Road, Newlands, Glasgow, G43
2TP. (041-637 4648). (Re-issue.)
G8KMI, University of Southampton Amateur
Radio Club, c/o JCR Post, Students'
Union, The University, University Road,
Highfield, Southampton, SO9 5NH.

G8KPE, E. Howard, The Haven, Filsham
Drive, Bexhill-on-Sea (216760), Sussex.
G8LFB, J. M. Rabbits, 13 Whitefield
Avenue, Sundon Park, Luton, Beds.,
LU3 3AQ.
G8LGL, P. A. Broadhurst, Edgemoor, 92
Clevedon Road, Tickenham, Clevedon,
Avon, BS21 6RE. (02755 2478.)
G8LGZ, P. W. Northover, 94 Risley Lane,
Breaston, Derbys., DE7 3AU. (03317
2168.)
G8LKI, G. K. Pitcher, 27 Calder Court,
Gringer Hill, Maidenhead, Berks., SL6
7NB.
G3LMO, H. G. Moody, 59 Helmtan Road,
Sheffield, South Yorkshire, S8 8QJ.
(0742 54047.)

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G3YY, C. T. Fairchild, 4 Chalkland Rise,
Woodingdean, Brighton (33744), East
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G3AEP, R. P. Mackrell, 67 Laverton Road,
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G3AWQ, D. R. Hill (VE3ABT), 8 Roanoke
Road, Apt. 201, Don Mills, Ontario,
M3A 1E6, Canada.
G3DUW, R. Hodgson, The Shealing, Forest
Moor Drive, Knaresborough (3663),
North Yorkshire, HG5 8JT.
GM3OXA, A.S. Foster (ex-3B8AX), 8 Edward
Drive, Helensburgh, Strathclyde.
G3PRR, I. S. Partridge, Rivendell, Main
Road, North Reston, nr. Louth, Lincs.
G3UFX, H. Julian (ex-V8P1H, 3B8CW),
3 H.M. Coastguard Station, Tol Pedn
Penwith, Porthgwarra, St. Levan,
Penzance, Cornwall, TR19 6JY.
G3UYC, J. Peirson, 25 Saxon Close, Wick-
ford, Essex.
G3XPM, R. E. Tinson, Newington, 92
Leeds Road, Harrogate, HG2 8HB,
North Yorkshire.
G4BGP, C. P. Barber, 13 The Sycamores,
Baldock, Herts., SG7 5BJ.
GM4DGC, A. Paterson, Carraig West,
Westmuir, Kirriemuir (2575), Angus.

COMPLETE LIST OF INTERNATIONAL NUMERICAL PREFIXES

(Likely to be used by Expedition and Special-Activity Stations)

2A-2Z	United Kingdom	4X	Israel
3A	Monaco	4Y	International Civil Avia- tion Organization
3B	Mauritius	4Z	Israel
3C	Equatorial Guinea	5A	Libya
3D2	Fiji Is.	5B	Cyprus
3D6	Swaziland	5C-5G	Morocco, Kingdom of
3E-3F	Panama Republic	5H-5I	Tanzania
3G	Chile	5J-5K	Colombia
3H-3U	China	5L-5M	Liberia
3V	Tunisia	5N-5O	Nigeria
3W	Vietnam	5P-5Q	Denmark
3X	Guinea, Republic of	5R-5S	Malagasy Republic
3Y	Norway	5T	Mauritania Republic
3Z	Poland	5U	Niger Republic
4A-4C	Mexico	5V	Togo Republic
4D-4I	Philippine Is.	5W	Samoa, Western
4J-4L	U.S.S.R.	5X	Uganda
4M	Venezuela	5Y-5Z	Kenya
4N-4O	Yugoslavia	6A-6B	United Arab Republic
4P-4S	Ceylon	6C	Syria
4T	Peru	6D-6J	Mexico
4U	United Nations	6K-6N	Korea
4V	Haiti	6O	Somali Republic
4W	Yemen		

(Over)

6P-6S	Pakistan	8R	Guyana
6T-6U	Sudan	8S	Sweden
6V-6W	Senegal Republic	8T-8Y	India
6X	Malagasy Republic	8Z	Saudi Arabia
6Y	Jamaica	9A	San Marino
6Z	Liberia	9B-9D	Iran
7A-7I	Indonesia	9E-9F	Ethiopia
J7-7N	Japan	9G	Ghana
7O	South Yemen Republic	9H	Malta
7P	Lesotho	9I-9J	Zambia
7Q	Malawi	9K	Kuwait
7R	Algeria	9L	Sierra Leone
7S	Sweden	9M	Malaysia
7T-7Y	Algeria	9N	Nepal
7Z	Saudi Arabia	9O-9T	Zaire Republic
8A-8I	Indonesia	9U	Burundi
8J-8N	Japan	9V	Singapore
8O	Botswana	9W	Malaysia
8P	Barbados	9X	Rwanda
8Q	Maldive Is.	9Y-9Z	Trinidad and Tobago

LIST OF COUNTRIES BY PREFIX, ALSO SHOWING ZONE

*Current Prefixes, with Zones in brackets
after Country names*

A2	Botswana (38)	CT2	Azores Is. (14)
A3	Tonga (32)	CT3	Madeira Is. (33)
A4	Sultanate of Oman (21)	CX CV, CW	Uruguay (13)
A5	Bhutan (22)	DA, DB, DC, DF, DJ, DK, DL	Federal Republic of Germany (14)
A6	United Arab Emi- rates (21)	DM, DT	German Democra- tic Republic (14)
A7	Qatar (21)	DU, DX	Philippine Is. (27)
A8	(see EL)	EA	Spain (14)
AC3	Sikkim (22)	EA6	Balearic Is. (14)
AC4	Tibet (23)	EA8	Canary Is. (33)
AP	West Pakistan (21)	EA9	Ceuta and Melilla (33)
AX	(see VK)	EA9	Spanish Sahara (33)
BF to BU	China (23), (24)	EI	Republic of Ireland (14)
BV	Taiwan (24)	EL	Liberia (35)
C2	Nauru (31)	EP, EQ	Iran (21)
C3	Andorra (14)	ET	Ethiopia (37)
CE	Chile (12)	ET (ET3ZU/A)	Abu Ail. and Jabal at-Tair (21)
CE9	Chilean bases in Antarctica and South Shetland Is. (13), (12)	F	France (14)
CEOA	Easter Island (12)	FB8W	Crozet Is. (39)
CEOX	San Felix and San Juan Fernandez (12)	FB8X	Kerguelen Is. (39)
CE0Z	(see VE)	FB8Y	Adelie Land (French bases in Antarctica) (30)
CF, CI	Cuba (8)	FB8Z	Amsterdam and St. Paul (39)
CM, CO	Morocco (33)	FC	Corsica (15)
CN	Bolivia (10)	FG	Guadeloupe (8)
CP	(see CR6)	FH	Comoro Is. (39)
CQ6	Portuguese Guinea (35)	FK	New Caledonia (32)
CR3	Cape Verde Is. (35)	FL	French Territory of the Afars and Issas (37)
CR4	Sao Tome and Principle (36)	FM	Martinique (8)
CR5	Angola (36)		
CR6	Mozambique (37)		
CR7	Portuguese Timor (28)		
CR8	Macao (24)		
CR9	Portugal (14)		
CT1, CT7			

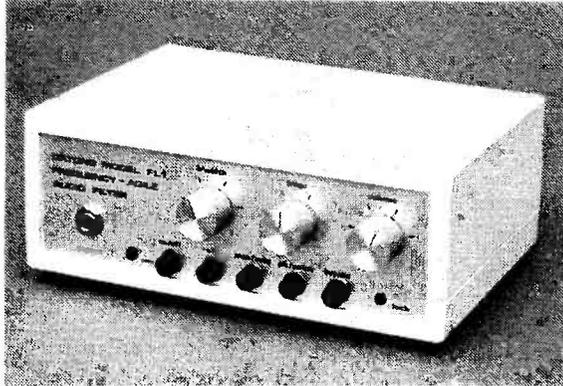
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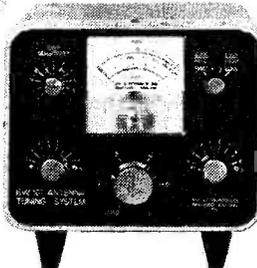


KW 108 MONITOR SCOPE

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- A further safeguard for your PA tubes.

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- The KW 109 is for use with linear amplifiers.
- Antenna selection.
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- Dummy load incorporated.
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- Attractive "G" line case.

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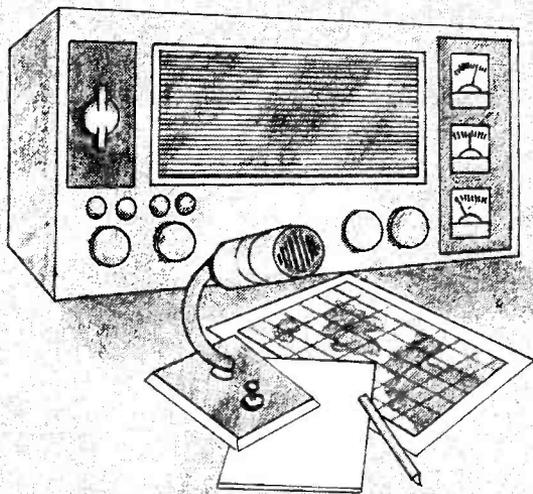
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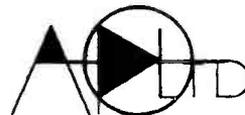
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OUTPUT FREQUENCY													
144-030	...	b	b	b	b	b	b	b	b	b	b	b	b
144-4/433-2	...	a	a	a	a	a	a	a	a	a	a	a	a
144-480	...	b	b	b	b	b	b	b	b	b	b	b	b
144-600	...	b	b	b	b	b	b	b	b	b	b	b	b
144-700	...	b	b	b	b	b	b	b	b	b	b	b	b
145-000/SO	...	a	a	a	a	a	a	a	a	a	a	a	a
145-050/R2T	...	a	a	a	a	a	a	a	a	a	a	a	a
145-075/R3T	...	a	a	a	a	a	a	a	a	a	a	a	a
145-100/R4T	...	a	a	a	a	a	a	a	a	a	a	a	a
145-125/R5T	...	a	a	a	a	a	a	a	a	a	a	a	a
145-150/R6T	...	a	a	a	a	a	a	a	a	a	a	a	a
145-175/R7T	...	a	a	a	a	a	a	a	a	a	a	a	a
145-200/R8T	...	a	a	a	a	a	a	a	a	a	a	a	a
145-300/S12	...	b	b	b	b	b	b	b	b	b	b	b	b
145-350/S14	...	b	b	b	b	b	b	b	b	b	b	b	b
145-400/S16	...	b	b	b	b	b	b	b	b	b	b	b	b
145-500/S20	...	a	a	a	a	a	a	a	a	a	a	a	a
145-525/S21	...	a	a	a	a	a	a	a	a	a	a	a	a
145-550/S22	...	a	a	a	a	a	a	a	a	a	a	a	a
145-575/S23	...	a	a	a	a	a	a	a	a	a	a	a	a
145-600/S24	...	a	a	a	a	a	a	a	a	a	a	a	a
145-650/R1R	...	b	b	b	b	b	b	b	b	b	b	b	b
145-675/R3R	...	b	b	b	b	b	b	b	b	b	b	b	b
145-700/R4R	...	b	b	b	b	b	b	b	b	b	b	b	b
145-725/R5R	...	b	b	b	b	b	b	b	b	b	b	b	b
145-750/R6R	...	b	b	b	b	b	b	b	b	b	b	b	b
145-775/R7R	...	a	a	a	a	a	a	a	a	a	a	a	a
145-800/R8R	...	a	a	a	a	a	a	a	a	a	a	a	a
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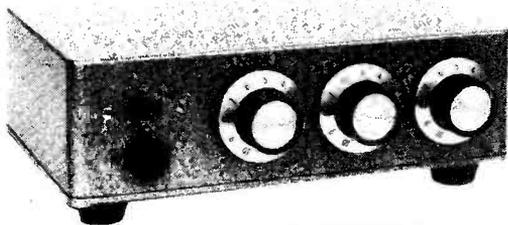
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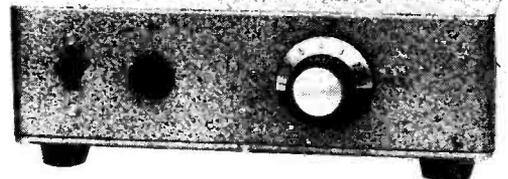
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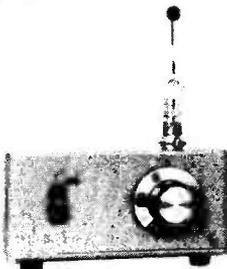


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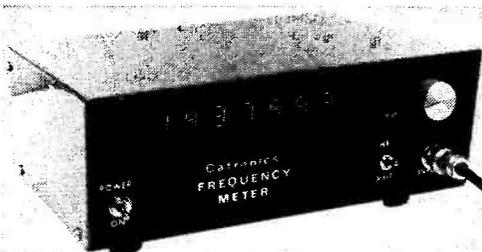
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SOLDER, 20SWG, 60/40 alloy approx., 8 yds., 25p.

1½" Polythene chassis mounting fuseholders, 6 for 30p.

MULTITURN POTS, 10 turn, ½" spindle (ex-equip.), following values available: 2 kohms, 5 kohms, 400 kohms, £1 each.

2-6pf, 10mm circular, ceramic trimmers (for VHF/UHF work), 3 pin mounting, 5 for 50p.

MULLARD TUBULAR CERAMIC TRIMMERS 1-18pf, 6 for 50p each.

HEAVY DUTY HEATSINK BLOCKS, undrilled, base area 2½" x 2", with 6 fins, total height 1.2½", 50p each.

9V RELAYS, Continental type, 2 pole change over 25p.

SPECIAL OFFER
XTAL PACKS, 51 MHz range (our selection), HC6U, 10 for £1. SAE for our latest xtal list.

1mA METERS 2" square, plastic fronts (these have a paper scale stuck over the original marked 0-1mA, which is easily peeled off, and an internal 18K resistor which is easily removed), £1.75 each, or 2 for £3.00.

EDGEWISE METERS, 50 microamp FSD, centre zero, but can be left hand zero'd, display area 1½" x 2", smart modern appearance, £1.50 each.

Small Chrome handles, ¼" dia., 1½" between holes, 1" clearance, tapped 4BA (with screws and washers), 2 pair for 40p.

ALL BELOW — ADD 25% VAT

HIGH QUALITY SPEAKERS, 8½" x 6" elliptical, 2" deep, 4 ohm, inverse magnet rates up to 10 Watts, £1.50 each, or 2 for £2.75. (Quantity discount available.)

ELECTROLYTICS

ELECTROLYTICS, 50µF, 450v., 2 for 50p.

ELECTROLYTICS, 100µF, 275v., 2 for 50p.

ELECTROLYTICS, 470µF 63v., 3 for 50p.

ELECTROLYTICS, 1,000µF 30v., 3 for 60p.

ELECTROLYTICS, 1,000µF 180v., 3 for £1.

ELECTROLYTICS 5,000 mfd. at 35v., 50p each.

ELECTROLYTICS, 5,000µF 50v., 60p each.

ELECTROLYTICS, 5,000 mfd at 70v., 65p each.

ITT ELECTROLYTICS, 6,800 mfd at 25v., high grade, screw terminals, with mounting clip, 50p each.

ELECTROLYTICS, 10,000 mfd at 63v., 75p each.

PLESSEY "CATHODRAY" CAPACITORS.

0.04µF at 12.5V. DC, screw terminals, £1.50 each.

A large range of capacitors available at bargain prices, S.A.E. for list.

TV PLUGS (metal type), 5 for 50p.

TV SOCKETS (metal type), 4 for 50p.

TV LINE CONNECTORS (back-to-back skt.), 4 for 50p.

DIN 3-pin LINE SOCKETS, 15p each.

DIN 6-pin RIGHT ANGLED PLUGS, 20p each.

R/S MIDGET 3 pole, 4-way, rotary switches, 40p each.

MINIATURE EARPHONES with min. jack plug, 2 for 50p.

1 Meg. Lin. POTS ½" plastic spindle, 2 for 50p.

50k hom lin. POTS, ½" plastic spindle, 40p each.

TWIN IF CANS, approx. 1" x 1" x 1" high, around 3.5 to 5 MHz, 2 separate transformers in one can, internally screened, 5 for 50p.

IF CANS, 1" square, suitable for rewind, 6 for 30p.

IF CANS, ¾" x ¾" x 1", suitable for rewind, 10 for 30p.