

The SHORT WAVE Magazine

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DECEMBER 1977

NUMBER 10

TS820

TS520S

TS700S

TR7500

TR8300

R300



TR2200GX

TR3200

TR7010

TR7200G

TL922

R599

HS5

TRIO

Being the best equipment available,
what more is there to say ?

Except to wish all our customers past, present and
future, a Very Happy Christmas and a Lightly Taxed
New Year

LOWE ELECTRONICS

LOWE in Leeds

27 Cookridge Street, Leeds. Tel. 0532 452657

TS820

The ultimate transceiver . . . TRIO's TS-820. No matter what you own now, a move to the TS-820 is your best move. It offers a degree of quality and dependability second to none, and as the owner of this superb unit, you will have at your fingertips the combination of controls and features that, even under the toughest operating conditions, make the TS-820 the leader that it is.

Unprecedented demand plus the painstaking care TRIO lavishes on each TS820 created an initial backlog of orders but happily we can now supply the TS820 from stock. Once you have operated the TS820, you will not be satisfied with anything else.

Features

SPEECH PROCESSOR ● An HF circuit provides quick time constant compression using a true RF compressor as opposed to an IF clipper. Amount of compression is adjustable to the desired level by a convenient front panel control IF SHIFT ● The IF SHIFT control varies the IF passband without changing the receive frequency. Enables the operator to eliminate unwanted signals by moving them out of the passband of the receiver. This feature alone makes the TS-820 the pacesetter that it is.

PLL ● The TS-820 employs the latest phase lock loop circuitry. The single conversion receiver section performance offers superb protection against unwanted cross modulation. And now, PLL allows the frequency to remain the same when switching sidebands (USB, LSB, CW) and eliminates having to recalibrate each time.

Specifications

FREQUENCY RANGE : 1.8-30 MHz (160-10 metres)
Modes : USB, LSB, CW, FSK
INPUT POWER : 200W PEP on SSB
 160W DC on CW
 100W DC on FSK
ANTENNA IMPEDANCE : 50-75 ohms, unbalanced.
CARRIER SUPPRESSION : Better than 40dB.



SIDE BAND SUPPRESSION : Better than 50dB.
SPURIOUS RADIATION : Greater than -60dB (Harmonics more than -40dB)
RECEIVER SENSITIVITY : Better than 0.2µV.
RECEIVER SELECTIVITY :
 SSB 2.4 kHz (-6dB)
 4.4 kHz (-60dB)
 CW *0.5 kHz (-6dB)
 1.8 kHz (-60dB)
 *With optional CW filter installed.
IMAGE RATIO :
 160-15 metres: Better than 60dB.

10 metres: Better than 50dB.
IF REJECTION : Better than 80dB.
POWER REQUIREMENTS : 120/240 v. AC, 50/60Hz, 13.8v. DC (with optional DS-1A DC-DC converter).
POWER CONSUMPTION :
 Transmit: 280W.
 Receive: 26W. (heaters off).
DIMENSIONS : 13 1/2" w. x 6" h. x 13 1/8" d.
WEIGHT : 35.2lb. (16kg.)
DG-1, digital readout optional.
TS820 £645 inc. VAT DG-1 £127 inc. VAT

The Portables

TR2200GX. Represents the very best of TRIO design. It is the latest in the line of continuous progress from the first TR2200 and maintains the TRIO tradition of top quality at a reasonable price. The TR2200GX has all the features that you could want—high power output; sensitive receiver; flexible use from internal batteries or external supplies using the power lead supplied; built in removable telescopic antenna with flexible whip available; built in metering of signal strength, transmit output and battery condition; fitted with twelve channels at low, low prices; in short, all that you could want.

All operator controls are placed for maximum convenience on the top face of the rig and a protective carrying case is included in the price.

VB2200GX. This is the matching 10 Watt mobile amplifier for the TR2200GX (and all previous models). It is self contained and of very small size but produces well in excess of 10 Watts for 2 Watts of drive. It contains a regulated power supply for the TR2200GX and has positive SWR protection for the PA transistor. The amplifier may be switched out of circuit if required, but still supplies power for the TR2200GX.

TR3200. Not content with having the lead in 2 metre handy portables, TRIO have gone a step forward and produced the best 70 cm. portable rig to match.

The TR3200 is really terrific; over 2W output with switched reduction to 400mW for local contacts; tailored speech response with a new limiting amplifier and new microphone give you crisp speech quality.

Excellent receiver performance with double IF filtering at 10.7 MHz and 455 kHz with no less than five limiters to guarantee noise free performance on even the weakest signals.



12 channel capability with three channels factory fitted with crystals for SUB, 18 and 20. Supplied with all accessories as the TR2200GX and including a new high gain 5/8 wave antenna. Don't forget, the following accessories are provided with the TR2200GX and TR3200 —
Removable antenna Free
Carrying case Free
Shoulder strap Free

Battery charger Free
External power lead Free
 Prices including 12 1/2% VAT
TR2200GX £139 (3 channels)
 £169 (12 channels)
 £45
VB2200GX £182 (3 channels)
TR3200 £9.70
NiCad pack £9.72

LOWE in London

Communications House, 20 Wallington Square, Tel. 01-669 6700

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

TR-7500

Why settle for anything less ?



TR7500

We were delighted to see that a recent round of "It's A Blowout" contained one game which involved a contest between the owner of a TR7500 and someone who was using an FT**7R. In case you didn't see this game, I should explain that the rigs started out set to S0 (i.e. 145-000) and Neddy Boring then called out channel numbers to which the operators had to go. The start went roughly as follows:—Neddy Boring—"Go to S20." TR7500 driver turns main knob 20 steps until display reads 20. FT**7R driver thinks "S20? that's 145-000 so with a four digit display it should read 5500. I'll have to tune the main dial 55 steps to get there.

1st round to TR7500.

Neddy Boring—Down to S19. TR7500 driver turns main knob down one click to 19. FT**7R driver remembers quickly that S19 is 145-475 so display should read 5475 but then discovers that he has to turn the main knob down three clicks to 5470 then push an auxiliary button to raise the frequency by 5 kHz to 145-475—but he's getting quicker!

2nd round to TR7500.

Neddy Boring—"Operate on R7." TR7500 driver turns knob 12 steps (from S19) until display reads 7 and sets mode switch to N (Normal repeater). Pushes "TONE" button to activate automatic tone burst. FT**7R driver thinks "R7?" that means 145-775 to listen to the output so turn main knob 30 steps until display shows 5775 and then turns TX offset knob to 600 to get the necessary shift. Wastes further ten minutes trying to find switch for tone burst cunningly hidden on rear panel of set (try using it in a car!).

Neddy Boring—"Listen on the repeater input." TR7500 driver returns mode switch to S (Simplex) with the flick of a finger. FT**7R driver thinks "Oh no" and turns his main channel knob 60, *yes sixty* steps to get to the repeater input channel. By this time, the FT**7R driver is beginning to show signs of mental stress but the TR7500 driver is sitting back sipping gin and tonic.

Neddy Boring—"Back to normal repeater operation." TR7500 driver restores mode switch to N and carries on sipping. FT**7R driver changes hands and turns his main channel knob through another 60 *yes sixty* steps to get back to R7.

Neddy Boring—"Now operate reverse repeater." TR7500 driver yawns and sets his mode switch to R (Reverse repeater). FT**7R driver drags himself to the rig, turns the channel knob 60 steps (*yes again*) to get to the repeater input frequency and then sets his offset switch to +600.

Full catalogue available. Send 55p for postage and request "Short Form"

Neddy Boring—"Now to S23."

TR7500 driver turns main channel switch from 7 to 23 and restores mode switch to S (Simplex) FT**7R driver starts mumbling to himself "I'm on R7 input and the display shows 5175 but I'm transmitting 600 kHz up which means 145-775 and S23 is 145-575 but it's 400 kHz away so I have to turn the knob 40 times but then I'll be transmitting outside the band so I have to reset the TX offset and-and-and." At this point, the attendants were called and the poor FT**7R driver was carried off into the shadows. The sound of a shot shortly afterwards signalled the end of his misery—no you fool, they shot the FT**7R!

This story is not intended to be entirely for amusement. It illustrates the very real problems encountered when a piece of equipment is incorrectly designed from the operator's standpoint and also shows how a recent comparison table between certain rigs was carefully compiled so as to hide these design inadequacies.

If you are considering the purchase of a 2 metre FM mobile transceiver, read the specification carefully, but at some point, consider the use of the rig under real operational conditions and you will discover that TRIO design means good design of all aspects, and any of the happy TR7500 owners will confirm this for you.

Oh, I forgot to mention that the contest was judged by His Highness Ram Jam Butti, the Maharajah of Htuol which I believe is a backward little community somewhere in the Far East.

TR7500 basic specification

Frequency range	144-146 MHz
Channel spacing	25 kHz (current European band plan)
No. of channels	80 simplex
	10 repeater
	10 reverse repeater
TX output	13-15 watts (high power)
	1-5 watts (low power)
Repeater access	Automatic, using TRIO 1750 Hz tuning fork oscillator
RX sensitivity	0-2 microvolts or better for 12 dB SINAD
Method of display	LED showing correct channel number i.e. 20=S20 7=R7 etc.
Size	Not much bigger than a 2200GX!
Weight	Not much heavier either!
Quality	The very best—ask anyone.

**DON'T SETTLE FOR ANYTHING LESS THAN
THE TR-7500**

TR-7500 £225 inc VAT

postage and request "Short Form"

HEAD OFFICE

119 Cavendish Road, Matlock, Derbyshire. Tel. 0629, 2817 or 2430



WATERS & STANTON

TELEPHONE HOCKLEY (03 704) 6835 (2 LINES)

FDK

QUARTZ-16

£169 inc. VAT!

FITTED 10 CHANNELS



A POPULAR CHOICE — WHY?

This superb transceiver is now selling faster than ever before. With FDK's reputation for quality, reliability and above all, after sales service, little wonder. (It really amazes us that some customers are kept waiting for spares when the UK importer should have them in stock). Very rarely do our customers have to wait for FDK spares as we have taken the elementary precaution of making sure that we have most items to hand in our workshop. It ties up capital but it also makes for a happy customer!

NEW

MULTI-800D FM TRANSCEIVER

for versatility & safety

NEW DESIGN—ADVANCED CIRCUITRY

This is the latest answer to the digital synthesized revolution by FDK. And yes, you've guessed it, FDK have come up with some pretty unique features that will make operating that little bit easier. This brand new design, based on an LSI chip driving a PLL gives direct frequency readout on both transmit and receive.

ALL CHANNELS—DIRECT READOUT

All channels from 144-146 MHz are covered in 5 kHz steps and there's no guessing what frequency you have set the transceiver to. You get true frequency readout on both transmit and receive. If you wish to work R4 you simply switch to "—600 kHz" and dial up "5,700." Press the transmit button and the display reads "5,100." You can instantly monitor the repeater input channel by flipping to +600 kHz and immediately the receiver display changes to "5,100." Pressing the transmit button this time will display "5,700."

AUTOMATIC TUNING—SAFER DRIVING

No digital display would be complete without a built-in memory and the Multi-800D has something rather special. Press the memory button and you can instantly programme a second frequency and store it. At any future time you select memory the programmed frequency will appear. And what's more, if you switch the transceiver off and disconnect it, both memory and last frequency in use will be stored ready for when you next use the transceiver. You can also use the memory to programme any other repeater shift such as 1.6 MHz etc. Whatever you do to the Multi-800D it will never forget.

COMPREHENSIVE MEMORY—IT NEVER FORGETS!

No digital display would be complete without a built-in memory and the FDK Multi-800D has something rather special. Press the memory button and you can instantly programme a second frequency and store it. At any future time you select memory the programmed frequency will appear. And what's more, if you switch the transceiver off and disconnect it, both memory and last frequency in use will be stored ready for when you next use the transceiver. You can also use the memory to programme any other repeater shift such as 1.6 MHz etc. Whatever you do to the Multi-800D it will never forget.

25 WATTS OUTPUT—FULLY VARIABLE

In case you thought that we had already exhausted all the possibilities with the Multi-800D here's something else you should consider. The Multi-800D runs a full 25 watts output from 1 to 25 watts. Many of you will have seen the next production model at Leicester. Brief specification sheets on the Multi-800D are available together with illustration on receipt of a stamped addressed envelope.

Provisional Price: £239 inc. VAT. Remote Display £10
DELIVERY END OF DECEMBER

The Fast Selling 2m. FM Transceiver NOW ... 145.50 Reads "S 20"!

Yes, the latest version now has a calibrated dial giving direct readout in European "S & R" channels.

SOME QUESTIONS ANSWERED

It covers 144-146 MHz, any frequency, not just the 25 kHz spots! It is easy to QSY without having to wind the channel knob all the way round. For example if you fit S20 in the priority position "A" you can immediately flip from say R7 to S20 in a second. Low power is available but only in the low power position! (In the high power position you will typically obtain 12 watts output). Extra channels can be added simply by plugging in additional crystals thus ensuring complete freedom of movement throughout the band and, more important, a clean spurious free transmission. Tone-burst is automatic but with the facility of switching it out so that a distant repeater can be worked without switching on the local one. A remote vfo is available for complete coverage of 144-146 MHz with the addition of a synthesizer available soon. It also costs a lot less!

TECHNICAL POINTS

On the more technical side we can add that such things as helical filters, 10.7 MHz crystal filters, 455 ceramic filters are all included in the design. The transmitter is completely protected against open circuit or high SWR and the modulation is crisp and clear. The standard frequencies fitted are S0, S20, S21, S22, S23, R3, R4, R5, R6 and R7, included with the Quartz 16 is microphone, power cord, fuses, plugs, table stand and English manual.

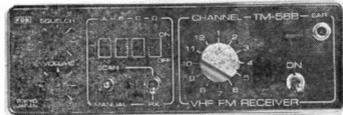
FDK FREE CREDIT

Pay no interest on H.P. over 6 months. Offer limited to holders of U.K. call-signs. Deposit M-11 £53, U-11 £59, G-16 £43. Send for full details.

TM56B AMATEUR VHF MONITOR RECEIVER

230 volts AC 12v. DC 10 Channels fitted

A PLEASURE TO OWN



Tune into the exciting World of Amateur Radio with this advanced monitor receiver. Listen to your local amateur radio stations both fixed and mobile, direct or through your local repeaters. From the comfort of your fireside chair using the built-in 230 volt AC power supply, this receiver will open up the whole new World of VHF Amateur Radio for you... Alternatively the necessary hardware supplied enables you to power the TM56B from your car radio battery for true mobile operation.

GREAT VALUE

Little wonder that the first shipments of these beautifully engineered receivers were sold out within weeks of the advertisements appearing. We really are amazed at their superb performance at such a low price.

SOUND DESIGN

The design is well and truly tried and tested, and the circuitry is almost identical to the receiver section of the FDK mobile transceivers. Both sensitivity and selectivity leave nothing to be desired and the auto-scan enables the popular calling channels to be continually monitored for activity.

NO HIDDEN EXTRAS

The receiver is supplied complete with all leads, circuit diagram, crystals for channels S0, 20, 21, 22, 23, R3, 4, 5, 6, and 7 plus space for a further 6 channels making 16 in all. An additional matching desk top aerial is also available at £2.50 extra.

£85 including delivery. Order yours today

ELECTRONICS

FAST
MAIL ORDER
SERVICE



TELEX 897406

FDK MULTI-2700 MkII

MULTI-2700—THE COMPLETE STATION

The FDK Multi-2700 is a front-line all-mode transceiver that incorporates every conceivable feature to ensure maximum enjoyment. In fact, apart from a mains plug and an aerial, there is little else we can sell the owner of a Multi-2700. All in all it is an unbeatable transceiver at an unbeatable price.

ALL MODES — ALL OCCASIONS

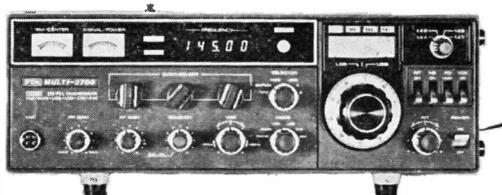
All modes are provided AM, FM, SSB and CW. For SSB operation VOX is included and for CW, fast break-in is provided with completely adjustable side tone. The 2700 can be used at home with its internal 240v. AC PSU or taken out to the local high spot and run from 12v. DC. This really has to be the QSO machine that you will never tire of.

BEAUTIFUL TO OPERATE — BEAUTIFUL TO HEAR

The transmitted audio quality of the 2700 is second to none. Its crisp, clear quality reflects the manufacturers knowledge that a clean signal sells more products! The Optimised 16.9 MHz 8 pole crystal filter gives clean SSB signals and good selectivity. On FM, direct modulation of the VCO gives smooth but penetrating audio. Typical power output is 16 watts but the flip of a switch and you have 1 watt on all modes. (An internal adjustment permits the power to be adjusted from approx 1 watt to 6 watts for driving linears or transverters.) The Multi-2700 has a built-in receiver RF pre-amp—no problems here with a deaf receiver.

DUAL VFO CONTROL

Until you have handled the Multi-2700 you cannot appreciate the advantages of dual vfo control. The conventional analogue VFO with its dual speed silky smooth feel, permits accurate tuning on all modes with 1 kHz readout. It also covers a complete 1 MHz segment at a time, resulting in minimum band switching. The flip of a switch and you have full synthesized control of your transceiver. The bright LED display allows the transceiver to be immediately set to any 2 metre channel. A VOX control ensures the synthesiser can be used equally well on SSB,



IN STOCK NOW

CW or FM. The versatility of dual vfo control is quite amazing. For example :—use the analogue vfo at the SSB end of the band and the synthesiser on the FM channels; set the synthesiser to the "sked" frequency and continue normal operation on the analogue VFO; set analogue VFO to DX frequency whilst continuing normal tuning of the adjacent frequencies on the analogue VFO—the combinations are endless. Repeater shifts are completely taken care of. The Multi-2700 has ± 600 kHz shifts and 1.6 MHz for 70 cms. operation.

ITS VERSATILITY IS ENDLESS

Inter-continental contacts are possible via OSCAR. Press the OSCAR button on the front panel and you bring in the 28 MHz downlink receiver converter to enable true transceiver operation through the satellite. An audio SPEECH PROCESSOR can be switched in to permit extra punch. The amount of compression being adjustable to suit the operator. RTT operates on all modes and both vfo's. A NOISE BLANKER is included for really excellent suppression of ignition pulses. The receiver section covers 143 to 149 MHz (Tx covers 144-146 MHz + 1.6 MHz shift). Apart from the two existing repeater offsets one further shift may be programmed. AGC control is continuously variable, as is the VOX DELAY and ANT-VOX etc. All pre-set controls are easily reached through the top hatch of the transceiver. Separate centre zero and rx S-meters are provided. We could go on but if you have read this far perhaps it is time you sent off for the 4-page brochure giving full details of this beautiful transceiver at a really competitive price.

£489 inc. VAT and SECURICOR DELIVERY.

WE ALSO STOCK—YAESU, BELCOM, MICROWAVE MODULES, S.E.M., JAYBEAM, HYGAIN, STOLLE, CDE, MINI-PRODUCTS, SAGANT, BANTEX, ASP, POLAR, MOSLEY, G-WHIPS, SEIWA, KEN, etc. STOP PRESS—NEW JAYBEAM KR400 ROTATORS, SUPPORTS ½ TON, COSTS £95 S.A.E.

FDK 70 cms FM! MULTI U—II OF COURSE

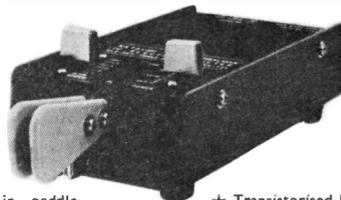


COMPARE ITS FEATURES: £249 inc. VAT & delivery

- * AUTOSCAN
- * 10 CHANNELS FITTED
- * RECEIVER IRT (ESSENTIAL!)
- * AUTOMATIC TONE-BURST
- * 27 CHANNEL CAPABILITY
- * MIC, BRACKETS, CABLES, Etc., inc.

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NEW EK-121 DELUXE ECONOMIC ELECTRONIC KEYS



- * Built-in paddle.
- * Autosemi selectable.
- * Extra hand key terminal
- * Plug-in board.
- * DC 150v./DC 1A max.
- * Transistorised keying circuit.
- * Audio monitor terminal.
- * Space-dash ratio adjustable.
- * 6-30 w.p.m.
- * Power reqd.—4-6v. 50ma or 4 x HP7 cells.

Price including VAT £29.95

FDK CASH BONANZA RESULTS

£100—J. WILL, Blackburn, Lancs.
£30—B. Thwaite, Chelmsford, Essex. £20—W. Hall, Caterham, Surrey.

MAIL ORDER & HEAD OFFICE: Hockley Audio, 31 Spa Road, Hockley, Essex. Tel.: 03-704 6835 (2 lines)

ALL PRICES INCLUDE VAT

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Monday to Saturday 9 a.m.—5.30 p.m. Early closing Wednesday





Western

At last

. the Mast

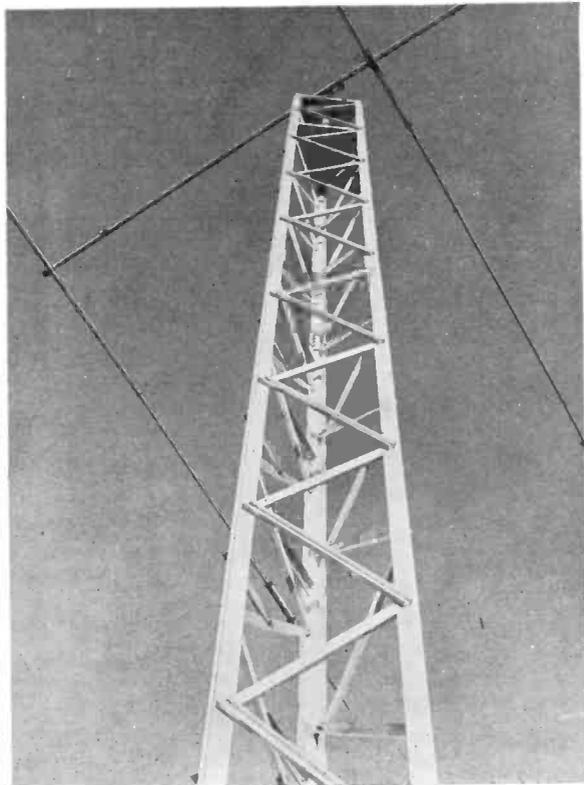
TO SOLVE ALL YOUR ANTENNA SUPPORTING PROBLEMS

Alumast

SUPERB VALUE . . . STRONG . . . LIGHTWEIGHT . . . Another **Western** Quality Product.
LISA CAN LIFT IT . . . and she's only 8 !



ALUMAST TYPE 375/PSS/3



Consider these star features . . .

- * One 10' section weighs only 11 kg.
- * Easily assembled by one person
- * Self-supporting . . . no guys
- * Can be extended to 200 feet !
- * Climbing rungs incorporated
- * Corrosion resistant high strength alloy

PRICES (Carr. paid) VAT 8% Extra

375/PSS/3.	30' Self-supporting Alumast Only	£111.00
TP-1.	Top Plate, takes 1 ²⁹ / ₃₂ " mast		£6.50
RMP-1.	Rotor Mounting Plate	...	£4.00
FB-1.	Fixed Base	£12.00
HB-1.	Hinged Base	£21.00
375/PSS/1.	Additional 10' Sections		£37.00

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Some firms just drive round in their
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At "Western" we plough back our profits to give **you** better value. So instead of buying a "Rolls" we have purchased high speed hydraulic punching machinery to bring you an accurately manufactured mast at a price way below anything else on the market.

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Names synonymous for SERVICE and VALUE since we first introduced YAESU

**THE NEWEST LEADER — FT227R FROM
THINK HARDER NOW BEFORE BUYING**



ONLY
£180
INC. VAT
EX. STOCK

COMPARISONS ! Have you ever tried it?

Confusing, isn't it—turning from one ad. to another, some giving one piece of information, others not ; some showing data in one form, some in a different form. How can you decide on which 2 metre FM rig to buy ?

LET US HELP YOU . . . Take as a basic requirement—10 watts FM, with a good receiver, freedom from "funnies," and no need to spend extra later to extend flexibility.

NOW READ ON . . .

	Yaesu FT-227R	Trio TR7500*	Icom IC240*	Digital II*
CHANNELS AVAILABLE BY FRONT PANEL CONTROL	400	80	22	400
FULL 4 MHz COVERAGE (144-148) WITHOUT MODIFICATION	(800 over 4 MHz)	Apparently NOT	Apparently NOT	Receive only
FREQUENCY STEPS	5 kHz	25 kHz	25 kHz	5 kHz
TRUE FREQUENCY DISPLAY	YES	NO	NO	YES
FREQUENCY MEMORY FACILITY	YES	NO	NO	NO
REPEATER SHIFTS	YES	YES	YES	YES
TONE BURST	YES	YES	YES	EXTRA
FACTORY-FITTED HIGH/LOW POWER SWITCH	YES	YES	NOT YET	YES
PRICE (including VAT) FROM WESTERN	£180	£225	£198	£264†
PRICE COMPARISON	LOWEST	£45 MORE	£19 MORE	£84 MORE!

* All details taken from current advertising.

† Tone Burst £11.25 extra.

**NOW . . . YOUR CHOICE IS CLEAR . . . THE YAESU FT227R SCORES ALL ROUND !
BE THE FIRST WITH THE BEST ! LET YAESU DO YOUR TALKING !**

**NEW 1978 YAESU MODELS. FT-901 and FT-7 HF TRANCEIVERS
HURRY ! FT-221R STILL ONLY £336.37 (inc). FT-101E ONLY £448.87 (inc).
A 'HAPPY CHRISTMAS' and a 'WESTERN' 1978 to you!**

Western Electronics (UK) Ltd

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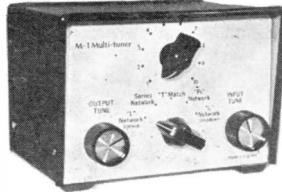
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Midland and North West distributors for the XCR30 unique crystal controlled receiver. This receiver is designed to provide precision frequency tuning over the full short wave spectrum up to 30 MHz with exceptional frequency stability for both AM and SSB. Separate tuned whip antenna.
£145.00 inc. VAT
XCR-30 FM Receiver with FM band 87-5 to 101 MHz.

£170.00 inc. VAT



Mk. 1 MULTI TUNER. Designed and manufactured by us. 50 tunable switched positions for antenna lengths over 5 metres in the 2-30 MHz range. Five different circuits to give an excellent match between your receiver and antenna. Now in use in over 35 countries.

Price £17.50 including VAT and Postage

Mk. 2 VARSION, £23.00. Covering 550 kHz to 30 MHz. Send S.A.E. for full information and Test Report.

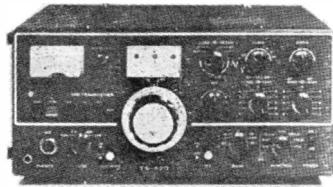
G3MCN

Merry Xmas

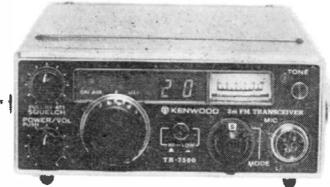


YAESU FRG-7 RECEIVER. Mains and battery operated receiver 0.5 to 30 MHz. Solid state. Advance circuitry offers excellent performance for the DX listener at a moderate price.

TR2200GX PRICE £130 (3 ch.), £160 (12 ch.) inc. VAT Ex stock This is the definitive 2 metre FM portable rig which has won praise from all over the world. Over 2W. transmitter output with switched reduction to 400 mW for local contacts. High gain receiver with double IF filtering at 10.7 MHz and 455 kHz for razor sharp selectivity. The TR2200GX is supplied with all accessories including the battery charger for the optional Nicad battery pack, the removable telescopic antenna, the carrying case, the shoulder strap, external power lead, microphone and handbook. Fitted with 12 channels, the price is only £160 inc. VAT. If you wish to start out at a lower price, we can supply the rig fitted 3 channels for only £130. With all its performance, the TR2200GX is a must for the portable operator. At the price, it has to be the best around. Just look around at the next rally and see how many operators are carrying them. Also available are a mobile mounting bracket at £9.45, a matching 10 Watt amplifier for £45 and a flexible antenna. Send for full details now.



TS520 PRICE £432.00



TR7500 PRICE £225.00

Secondhand Equipment

RAC Receiver	£400.00
T4XC Transmitter SACPSU	£425.00
Drake 2c Receiver	£125.00
KW20L Receiver	£185.00
Eddystone 940 Receiver	£140.00
Trio JR310 Receiver	£65.00
Yaesu Frioird Digital Receiver	£450.00
Barlow Wadely XCR30 RX	£125.00
Yaesu FT201 Transceiver	£300.00
Atlas 210X Transceiver	£375.00
Yaesu FL101 Transmitter	£270.00
Liner 2 SSB Transceiver	£120.00
Heathkit SB 230 Linear	£325.00
Drake RAC + 3 Filters	£475.00

TR3200

PRICE £171 inc. VAT. Ex stock

The newest FM handy transceiver from the ever expanding TRIO range. Superb performance for the 70 cm. operator with all the advantages of portability and TRIO reliability. 12 channel capability in the range 432-436 MHz with three channels fitted (SU8, 18, 20). Transmitter output switched 2W/400 mW and incorporating the exclusive TRIO 1750 Hz tuning fork access tone generator (does that mean you can ring for credit!) High gain 5/8 wave antenna for enhanced performance on transmit and receive. Supplied complete with all accessories as for the TR2200 GX and including the all important battery charger.

We have just received the first shipment of the VB 3200 10W amplifier for the TR3200. Rather more complex than the VB 2200, the VB3200 also includes a switchable receive preamplifier. Price £95 inc. VAT. Send for details now.

Other TRIO Models available

TS820 HF Transceiver	£645.00
DGI Digital Display	£127.00
TS520S HF Transceiver	£489.00
TR700G VHF Transceiver	£426.00
TS700S VHF Transceiver	£542.00
TR7010 SSB VHF Transceiver	£189.00
TR8300 70cm. FM Transceiver	£227.00
PS5 PSU with clock	£58.00
PS6 PSU	£57.00
R559D All mode HF Receiver	£403.00
VB220GX Mobile Amplifier	£45.00
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Twin Meter SWR	£12.00
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KW E-Z Match	£32.53
KW109 Matching Unit	£118.12
KW107 Matching Unit	£95.63
KW103 SWR/Power Meter	£19.15
3 Way Antenna Switch	£9.00
KW Antenna Traps	£9.63
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PL259 Plugs	51p
SO239 Sockets	51p
Cable reducers	17p
Line conns	75p
Aluminium Co-Ax plugs	15p
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Nye King Morse Keys	£6.75
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S.T.E. MILAN VHF EQUIPMENT

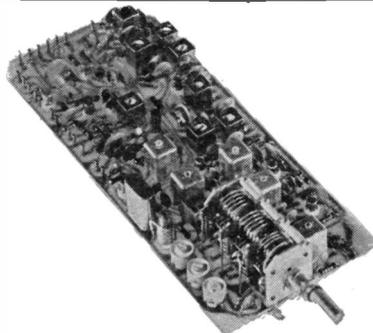
As sole distributors for the STE range of equipment for four years despite rising prices, we have maintained prices stable for over two years. Surely the finest value for the money on the market. With the opening of the 28 MHz band the AR10 Receiver module is now one of our fastest selling lines. Demand for these is growing every month.

PRICE LIST including VAT and postage

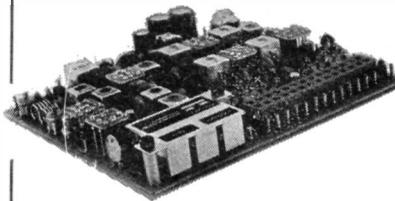
AK20 FM Transceiver	£165-00
AK20 FM Transceiver Kit	£105-00
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ATAL 228 Transmitter	£127-50
ASAP 154 AC PSU	£37-50
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AS15 Stabilised DC PSU board	£10-00
AL8 Linear Amplifier	£27-00
AB40 Mobile 40 Watt FM Amplifier	£55-00



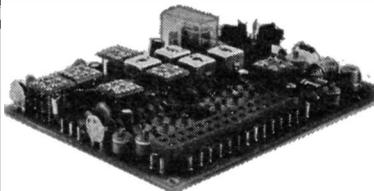
ARAC 102 receiver, 28-30 MHz. 144-146 MHz. AM-SSB-FM-CW Price £100-00



AR10 Mosfet receiver. 28-30 MHz Double conversion superhet. RF and amplifiers stages are gate protected mosfets for good sensitivity and low intermodulation. Noise limiter and squelch circuit. AM, SSB and CW reception. 12v. DC.



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AT23. 12 Channel PM Transmitter. 3 watts, 144-146 MHz. Frequency deviation 3-10 kHz adjustable. 12v. DC operated AF input sensitivity 2mV adjustable to 50 mV.



AK20, STE. Latest model from the famous STE Milan range of equipment. 12 channel operation in the 144-146 MHz range. 11-15v. DC operation. 3 watts output. Sensitivity 0.2 uv R.I.T. tone burst. Complete with microphone, and mobile bracket.

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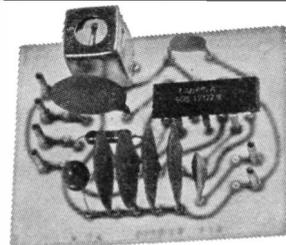
SWR200B. Switched 50 and 75 ohm. 3 to 200 MHz. 2000 watts at HF. 2-200 watts at VHF. £36-25

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FRG7 ANALOGUE £145 + VAT

FRG7 FITTED WITH SMC DIGITAL READOUT (to 100Hz) £199, COUNTER ONLY £50 (all + VAT)



FT227R

STOP Think carefully before investing in your new 2m. multi-mode rig.

LOOK At the published specifications. Remember some manufacturers claim performance figures their equipment can only just reach, Yaesu write their specifications very conservatively. Look at the features — internal VOX, CW sidetone, crystal control facility, 600 kHz and 1.6 MHz shifts, auto tone burst, digital readout options, etc. Look at the spurious outputs (or try to find them if the transceiver has a P.L.O. to clear sub harmonics of oscillator chain). Look at the ergonomics, are there more controls than necessary, preselectors or varicaps tuned receiver. Look inside, take off the case (or merely lift the lid); does it look like the bottom of granny's sewing box or is it modular constructed with plug in boards, etc.

LISTEN To weak signals, listen to strong signals, listen to your own signal. Is your PA rated to dissipate 7 times the claimed output power.

**TAKE A LOOK — TAKE A LISTEN — GIVE US A CALL
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THE FT227R NEW FROM YAESU IS WITH SMC NOW

The new FT227R uses a "single knob" tuned digital synthesizer employing a photoelectric sensor for an optical coupled system which eliminates both noisy, unreliable rotary switches, and crystal banks. Full coverage of 2 metres in 5 kHz divisions with a \pm 600 kHz shift plus a memory feature which permits recall of any entered frequency or particular offset. Bright, large, digital readout gives unequivocal readout of the frequency in use. The receiver offers 0.3 μ V (for 20dB S+N/N) sensitivity into a \pm 6 kHz (at 6dB) bandwidth whilst maintaining a remarkable immunity to overload and image problems. The 20W, DC input transmitter features Hi/low power outputs, AFP, tone burst on repeaters and an out of band inhibition trip, etc.



FT227R
ONLY
£167.50
(+ VAT)



FT101E

FT101 EX STOCK IN TOTTON (new service manual £12)

The FT-101E 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 AM 10 to 160m. (incl. 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, AM and for CW operation, whose performance with the semi break in keying, with side tone, and the optional filter installed in 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.

- QTR24** World time clock, battery powered, analogue readout £13.00 +8%
- YD844** Desk microphone, 50K ohm impedance P.P.T. with lock and microswitch £18.00 +12½%
- YD846** Hand microphone, 500 ohm or 50K ohm (state which) P.P.T. £7.50 +12½%
- FF50DX** Low pass filter sharp cut off type c/w 2 PL259's. £15.25 +12½%
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SUPER VALUE SMC MONITORSCOPE ONLY £69 + 8% VAT. (Post free for Christmas).

The MONITORSCOPE is a convenient Test Instrument allowing "on the air" monitoring and testing of Radio Transmitters operating in the frequency range 500 kHz to 30 MHz with a power rating of up to 2kWPEP (1kW average). The Monitorscope is designed to be connected between the Transmitter or Linear Amplifier antenna socket and the Antenna or Antenna Tuning Unit. A visual display of the Transmitter "envelope" is provided. This will allow the Transmitter to be "talked up" to a full power output whilst watching for "flat topping" which would cause distortion and loss of readability due to the "splatter" produced would create interference to Stations on adjacent frequencies. By using the 2-tone Test Generator which is incorporated, an SSB Transmitter may be adjusted to ensure that it is operating in a linear condition, necessary for good quality SSB transmission. Likewise, amplitude modulation and Morse Keying characteristics can be observed. A flexible screened lead is provided for connection to the Transmitter audio or microphone input.

Power requirement: 115/230v. 45-65 Hz. A.C. $\pm 20\%$ 10 watts.
 Input/Output impedances: 50-75 ohms using two SO239 UHF type connectors.
 RF Power Capability: 10-2000 watts PEP
 Sweep Speed: 20-200 Hz
 Tone Oscillators: Nominally 1.3 kHz and 2.3 kHz
 Tone Level Output: 0-50mV rms per Tone at 50K ohm
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LPM880. Absorption. 1.8-500 MHz. 5-20-120W. FSD
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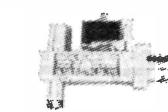
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LAC895. 3.5-30 MHz. 50/75 coax (SWR >5) and single wire (10-250 ohms) feed transformed to 50 ohm. Wattmeter 20 and 250W. FSD, (SSB 500W. PIP.)
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LDM815
 1.5-250 MHz on fundamentals battery c/w earphone and 6 plug-in coils 2 kHz modulation. 1-15 MHz Crystal facility.
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 Antenna impedance meter 1.8-150 MHz. 0-1Kohm direct reading c/w load.
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12 VOLT POWER SUPPLY
ODR 123C
 12v. DC from 240v. AC 3 amps. (5A peak)
 3½ lbs. 3" x 4½" x 6". £12.55 +8%

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 Up to: 1kW, 1.5 GHz, 0.3dB loss. 1:2:1 VSWR, 50dB isolation, 50 ohm "N" or "PL" fittings. Ex-Stock P. & P 30p (VAT + 8%) EX STOCK
TWS120 1 in 2 out nickel SO239 ... £5-40
TWS150 1 in 5 out nickel SO239 ... £9-35
TWS220 2 in 4 out nickel SO239 ... £9-35

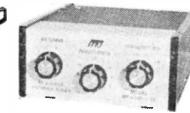


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 12v. DC 50 ohm, Silver plated. P. and P. 30p (VAT + 8%)
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SWR25
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KSW1 3 SO239 sockets £7.70 + 8%
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CUSHCRAFT colinear (illustrated right)
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FOR MOBILES;

IC-240 The well tried and highly popular FM synthesised rig. If you know a friend with one you will know we have every right to boast about the excellent quality of the signal it puts out. (Perhaps that is why we have sold so many!) Now available with Super-Scan as an extra. By the way this is the same size as the SSB unit on the IC-245E.

IC-245E The leader in multi-mode mobiles. Fully synthesised to give full band coverage in 100Hz or 5 kHz steps. LED readout of frequency to the nearest kHz. FM, USB, CW, Normal or Reverse Repeat or split frequency working with any spacing, automatic tone burst etc. An excellent bit of engineering which can also serve as a base station.

FOR PORTABLES with a decent power output and large battery capacity;

IC-202 The 3W SSB portable which is tunable over all the sideband patch and can be used, when fitted with extra crystals, to cover 144-145 and 145-8 to 146 MHz. Used by many as a prime mover for something bigger because of its excellent clean signal. By far the most popular VHF SSB only set on the market. There are a lot about!

IC-215E The big boy in FM portables, with Rx sensitivity and transmission quality every bit as good as a base station (and better than many!). A healthy 3W of FM and sensible batteries with four times the capacity of those used in most other portables—so that they don't run flat on you in the middle of a QSO quite as often. Despite this and its rugged construction it is still easy to carry around. Lots of these about also!
*We have a limited number of IC-215s fitted with 8 Channels at the special price of £149 inc VAT

FOR BASE STATIONS;

IC-211E The leader of them all. Fully synthesised VFO with 7 digit LED readout to the nearest 100 Hz. FM, CW, LSB, USB. There's nothing quite like it. Most would make this their choice if it wasn't for the problem that you have to pay more for the best! (With these days of inflation it isn't silly to think about HP.) See October's ad. for more details.

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THANET ELECTRONICS
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IC-240

Still your best choice in mobiles

Are you going around in circles trying to choose which synthesised mobile to buy?

About twelve months ago there was no problem in choosing as there was only the 240 and one other which was much more expensive and difficult to tune when driving. Now it's a bit different, with two others on the market—and all claiming to be the best. Before you choose just sit down and think about what you really want from a mobile. For instance, do you really want 400 channels and do you understand the complex mathematics which enables you to fit these into two megahertz of bandwidth when each channel requires some 16 kHz?

How many channels do you actually need to have available? Well, there could well be up to ten repeater channels in time in the UK and in a really busy area such as London you could well need 8 simplex. Another requirement is that you want to be able to listen on the input frequency of the repeaters to check whether a simplex QSO is possible. You want to be able to do this instantly at the flick of a switch and don't want to have to do a bit of computer programming in order to tell your rig which channel the input is on.

Most important though is that you want an ABSOLUTE MINIMUM of knob twiddling and button pressing when driving and your tone burst should work automatically as and when required. Just think how complicated it will be when the rig offering some 800 channels is required to operate on the frequency Joe has suggested:—"QSY to 23" he says to you on R4 "QSY" you reply—and then your problems start when you have to do the following (perhaps while also driving at 70 m.p.h. on a busy motorway):—

1. What frequency is S23 — 145.575 MHz.
2. Can I manage to QSY without looking at the dial for more than about $\frac{1}{4}$ sec.—NO, unless you work out in your head how many 10 kHz steps you need to click the switch round, i.e. $145.575-145.100 = 575 \text{ kHz} = 57\frac{1}{2}$ steps. (You need to memorise the repeater input frequencies of course).
3. Do I have to press the 5 kHz button? Well, as S23 is odd and R4 is even the answer is YES.
4. OH! QRX for a moment... Sorry officer I didn't see him as I was tuning my radio.

... so that really leaves you with a choice of excellent rigs to choose from which both have 25 kHz tuning steps and are easy to operate, providing easy channel selection and reverse repeat at the flick of a switch. No doubt the respective importers will both try to tell you their's is best—so let us list the advantages of the IC-240:—

1. Its solidly built and the several hundred already sold have shown an excellent reliability rate.
2. You can reduce switching down to an absolute minimum as you can arrange the channels exactly where you want them. 22 is plenty when mobile and it's easy to arrange, up to 80 if you wish, for home use (you can also get up to 148 MHz if you are going to the USA! Also you can have a scanner if you wish).
3. It has that superb, clear and crisp modulation which is so very characteristic of ICOM.
4. The receivers are very sensitive—we measured 0.1uV pd for 10dB SINAD (which for comparison is better than 0.14uV for 12 dB SINAD!)
5. Its cheaper in price but not in quality.

YOU CAN'T GO WRONG WITH AN IC-240!

*Wishing you all a very
Happy Christmas and plenty
of DX next year!*

From Dave, Paul, Phil and Fraser
and all the other members of the
Thanet team

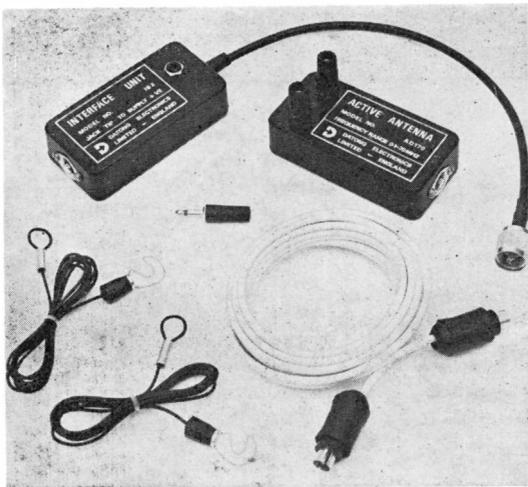
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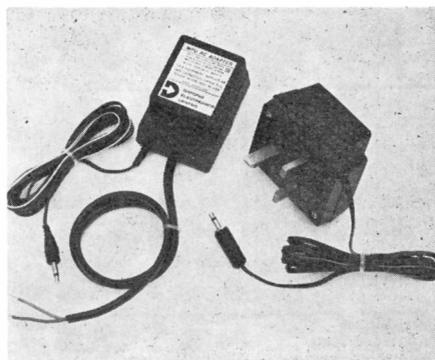
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SHORT WAVE MAGAZINE

(GB3SWM)

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Editor: PAUL ESSERY, G3KFE/G3SWM

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The SHORT-WAVE Magazine

EDITORIAL

Christmas

It falls to the writer's lot to offer, for the first time, Season's Greetings to all our readers and trade friends, from all of us on the staff of SHORT WAVE MAGAZINE. The past nine months have been a period of consolidation as the change was made from being a freelance contributor to finding oneself in the Editorial chair, and in the next year we hope and expect that there will be a general lifting of the profile now that the present "regime" has become established. One thing is certain: SHORT WAVE MAGAZINE will continue, as it has done for so many years, to be an Independent, commenting when and as it may be necessary, but beholden to no one.

To any and all who may chance to read these lines—may your Christmas be Merry, and in the New Year may we all find Peace and Prosperity.

We return, with some reluctance, to the distasteful business discussed in last month's Editorial. All the "proper channels" referred to in that Editorial—we are reliably informed—have received appropriate inputs and are considering their actions in the light of their various responsibilities, and indeed in some cases may well have initiated actions by the time this comes to be read. This being so, it behoves us all to act *responsibly* regardless of our opinions on repeaters. No more letters need be written, no more jamming, no more tyre slashing: everything is in hand.

Because of Christmas, the January issue will appear on December 23rd—a week earlier than normal.

Ed. Wilson
K3KFE.

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

THIS comes to be written a couple of days after the end of the Leicester show, at which so many of the callsigns of contributors to this piece were, by meeting, translated into faces to be remembered. However, the writer is possessed of a remarkable memory for names and faces but not for connecting the two, as G2NJ demonstrated forcibly. Nick was laughing like the proverbial drain, the while the 'KFE brainbox was saying to itself "I know you—but who are you???" for several minutes! G4EAN stopped by for a natter, as did GM3YOR, GM3OLK, G3XTJ, G3NOF and the Yeovil gang, G4BUE of the Channel Contest group and umpteen others—a particular pleasure was to have a few moments chat with G3FKM, John Allaway and G2CVV, Fred Ward. Then, on the one short trip around the Stands, there was G3NMH, and somewhere between, we ran across G4BMO. Indeed a pleasure, in between all the hard grafting before and during the Show.

As to Conditions, the gentle but slow rise seems to be maintained, and Twenty was almost too full to be worth a try on the Sunday evening of the CQ WW Phone contest although it appeared at that time to be getting ready to close when next we looked. The Haiti DX-pedition seemed to be doing a roaring trade, as did some others, while W2PV was a bigger signal in terms of genuine S-meter readings than the writer has heard for a very long time. Perhaps the aerial isn't ready for taking down and overhauling after all!

Top Band

Our first words here were in fact written into last month's piece, but had to be excised to make everything fit into the ordained space. So here it is now.

We propose to re-introduce the concept of county-chasing for an Award, the counties to be worked on Top Band only. Originally, it will be recalled, there were some 98

taking into account GM, GW, GI and GC, a number that has taken a bit of a beating through the "rationalising" of local government; but if we refer to them as the "administrative areas" it will be taken to mean counties where such would appear on a station's address, plus the designated areas such as the two parts of Sussex, Merseyside and so on. Orkney and Shetland will each count as one, of course, as they always did but to make up a number we will this time take into the list the Isles of Scilly, on the grounds that the local Scillonian Council partakes of some at least of the duties of a county council even though the islands are administratively part of the Duchy of Cornwall. On a similar reasoning basis we will also count the Isle of Wight; the Hebridean Islands as a group to count as one county in their own right, and of course the Isle of Man. The basic Award will be for sixty, covered by adequate verifications, and the Award will be available either as a mixed-mode, one or CW-only. There will be no restriction on the country of origin of the claimant—if we get a valid claim for a W6, fine! It will also be available to SWL's who submit adequate veris. To distinguish it from the old WABC and the WAB of today, this one will be called CCA—County Chasers Award. The grand opening will be on January 1, 1978, and no QSO's or hearings before that date will count towards the new Award.

The mail all arrived on this desk with a thump, on the day when it should be going out—which isn't very conducive to a long and interesting tale, especially as for some reason this time the Top Band is rather thin.

G4FJU (Bloxwich) comments that his local QRN level is high, which is why he can't hear 'em—which is why he can't work 'em either! Point taken; but as he says there is so much fun to be had in overcoming the QRM, rather than go the easy way out on other bands.

Ben notes the date of January 1 on the Table (p. 549, Nov. issue), and queries it—he is quite right and the Table was wrong. The Table head *should* have read "November 1976 to October-end 1977," so we'll have to make an extra space for it to show the final placings in the February 1978 piece, in case anyone has missed out some points due to our mistake. Ben is pleased to see some of the older callsigns returning to the band; a situation that goes for the writer too.

The world is full of dumb-clucks, as we all know, but they do seem to all latch on to us—Murphy's Law? G2HKU mentions the Pestilence from Poltava as being audible right up on to Medium wave at times. Nevertheless, his SSB is noted as having latched on to DKØKX, DJ6TK, DJ8WLA, DJ4PI, OH1VP, OF3VV, OH2KA, OH2BO, PAØHIP, PAØPN, EA8CR, YU3TJA, GM3WTA, YU1BCD, HBØHA, HB9H, HB9BLQ, GM3XOQ (Shetland), plus CW to G13PDN, GM3PFQ, GM3TMK and OK1HAS.

Odds & Ends

Old-Timer readers will be interested to hear that ZE3JO, ex-VQ1JO, ex-G2SO is still about; he has a Drake 2B on the receive side, and an HT-32 with about 80 watts of output into the TA33 up aloft. He is still as active as ever on the bands, finding that the majority of his contacts are with Europe, but very few are with G's; which gives Mal to wonder why there are so few of us about. A good question, only partly explained by TVI, some of the rest to the swing to VHF, and for some odd reason a lack of desire to work the world on the part of many of the newer licensees.

Changing course, we were pleased to see in the *Echelford* club Newsletter the plea for more use of Ten—it is opening up more and more of late, and may well be our best DX band for some time. It's quite a thought to look at the statistics,

which say so many of our current licence-holders have never known what a sunspot peak on Ten can be like in terms of easy DX.

We have a note from G3CED/G3VFA (Broadstairs) which indicates his old buddy and fellow QRP DX-chaser G4EVO is in hospital—Viking Ward, Ramsgate General Hospital. One would hope that by the time this gets to print he will be home again, but a letter to him at his QTH will certainly be appreciated, and passed on if he is by some mischance still in there. If in any doubt, you could give G3CED a ring, either at home or at his Partridge Electronics business as shown in his advertisement, for the latest "state of play."

What a long time it is since last we heard from GM3JZK: he is still up in the Isle of Mull, and our reference to him a little while back provoked him into having a scrounge round for the raw materials for an aerial on Forty and another one on Twenty. More of the results anon, but it is interesting to notice that the builders' apprentices who watched the aerial-erecting tactics said they wouldn't dare try to emulate these simian antics! That in a back-handed way is quite a compliment when one realises that George's call is dated before they were born—and a self-condemnation when one hears of a building apprentice who is scared to go up a tree!

Ex-G2XC (Horndean) has one of the better exit lines on offer this month, and a suitable greeting for any G to boot: from a JA—"The weather in Tokyo is very no good!"

From G3RCA (Wigan) we have the note that the operator of A35AF and ZK2AR in 1976, Kazu, is not QSL'ing, there being a domestic problem to be overcome. It is understood that attempts are being made to see if JA1KSO would be prepared to take over the logs and "dead" QSL's.

G4GMW (Bristol) seems to be having trouble with his trap dipole, which yields an excessively high SWR on all bands save Forty—sounds like a case for dropping it first, checking that all the dimensions are as per book, particularly between traps and ends, and then going through an exercise to adjust the length of the end sections until the VSWR comes down to a civilised

sort of level on all bands. Pretty clearly the inner section and the traps are OK, or Forty wouldn't play either.

We have it that WA4TWG has undertaken to clear some 2000 QSL's accumulated at W4SPX, from TT8AC, 5VZDB, and 5VZWT; these in addition to his existing chores for FY7AE, TJ1BF (1972), 4X4NJ, 4X4VB, 4Z4DX.

Eighty

This is very largely the band of the QRP types on CW, the DX SSB types at the top of the band, and just about all the rest of the world in between. However, for this month we are a bit thin on the ground, lacking the usual reports from G4EVO and F9UO which are usually sent in by G3CED, who is also QRT owing to work pressures.

G2HKU used his 3 watts of QRP to work DM2CWB, GM3KPD, and CE1ZGA. On the other hand G4FJU now has more power than before, having acquired a Sphinx, but he still prefers his little 8-watt CW effort which this time went over to UA1ADQ, PAOFVL, and an interesting one with G4FJF of Dover, who had just finished reading the G4FJU saga of last month when the contact was made.

One of the many we didn't mention in the preamble as being at the Show was G4DMN (Wirral), who comments that it's always nice to see the face behind the call; he adds that after looking at all the expensive goodies he came away with only a few coaxial plugs; that is parallel to your scribe, who in his usual style remembered that he had intended to buy some of the Belling-Lee ones—but this was half-way home after the Show had wrapped up! Richard found the band a little bit patchy, although the advent of winter seems to be having its usual rejuvenating effect on the band. CO2JA, EA8CR, HH2MC, HH5HR, KP4RF, HB08HA, PY's, PJ9CG, UA9CBO, UK9CAE, VE2JL, VE3, VP2MSA, VS6DO, VP2LDV, VB3ICR, W5NU, W5YU, W7KW, WOMJ, ZF1SV, ZL3NE, ZL2BT, ZL4QL/A on Cambell Is., 4Z4DT, 7X2DG, and 9Y4LA were all SSB contacts.

G6TC (Wednesfield), found the change to GMT upset his activities, he being one of the early-morning experts. The usual operating times

have been from 0700 to 0800, and CW has seen contacts to W1, W2, W3, W4, W8, VE1, VE2 and VE3—the latter just a moment before Ted realised he was nearly on the deadline!

Next we have G4EAN (Nottingham) who found his SWR on the 18AVT/WB had shot up to 10:1 on Eighty, and adds, a little crossly "With a 60-foot tower I should use an 18-AVT/WB?" Ian may well have a point, as we seem to recall a time when GW4BLE had one of these verticals and at one stage in the quest for eighty-metre signals took it down in favour of an inverted-vee centred atop a similar-sized tower.

"CDXN" deadlines for the next three months—

January issue—December 1st
February issue—January 5th
March issue—February 2nd
Please be sure to note these dates!

G4GIE (Gt. Moulton) now has his HW-8 operational and has tried it out on various bands. Eighty yielded G4ERJ, G4FPK, G3VTT and OE7GPW during these trials. John is also appearing on Top Band, where he is using an AT5 transmitter at full CW power with the HW-8 as the IF strip for a Top Band converter; the question is, what do you call such a set-up—indirect conversion?

G2NJ (Peterborough) was one of the chaps who came to the Stand for a chat; Nick passed on a B2 receiver to G3RJV, which would appear to be the precise same one that G3KFE passed on to G2NJ some twenty-five years or so ago! On the matter of QSO's, G2NJ is usually to be found around 3570 kHz at noon; this time there has been some minor gear problems, but one chat of interest was with G2CAS when the latter was out on the /P stuff again. This time it was from Blubberhouses, a little village on the A59 between Skipton and Harrogate and north of Otley, where G2CAS/P had some 75 feet of wire out, 15 feet at the near end and down to three feet high at the far end: enough to produce a cracking signal, three more people calling G2CAS when G2NJ signed off.

Forty

This is the band where the hard cases survive and thrive, and those amateurs who drive their receivers as BC sets don't hear a thing!

That delta-loop aerial has been paying off for G3ZSU (Maidstone); Shaun has contrived to load it up on 160, 40, 20 (for which it was designed), 15 and 10! Marvellous gadgets, these new-fangled ATU's! On 7 MHz it was doing well enough to get over the pond to K1VOW.

GM3JZK reckons that maybe it was just instinct, but more or less as soon as he had got the dipole up and hooked the FT-101B to the bottom, the band seemed to be just crawling with DX signals; within the first few days he had worked OH9TH/SU, 5Z4NI, PY7PO, 4J6AM, 4UI1TU, W6YX, W6BVM, K5MAT (N. Mexico), JA8UI/PZ, PY2FMI, HI3PC, WA4KZF, VK2BQQ, UA9OED, UA9CHZ, VK3DT, USUSP (who took George unawares, he thinking that by putting his dipole end on to them he had disposed of UB5's, in disguise or not!) and VK3VJ, not to mention lots of East Coast W's. It was rather an interesting one with W2JB, who has a wire three-element beam up and was switched to fire SW rather than NE; the contact lasted from 0840 to 0900, which was long after the other W's had gone, from which one can only guess that the signal was coming in over the long path, the more so as the GM3JZK plot has a clear run to the South-East and not to NW, which must favour any long-path QSO. We rather liked his comment on the band after his long lay-off: "The nasty noises get nastier, and the lids liddier—or maybe I'm getting older and less tolerant!"

When he was a young lad of 13, G4GMW (ex-G8GMW) saw his first copy of SHORT WAVE MAGAZINE, and he has been reading it ever since that far-off day in 1956. Now the full call has been obtained and a start made on 7 MHz, the first CW contact being with LA1CU, an on SSB with IIFNX; since then there have been EA8CR, EA8OZ, EL0AA/MM, HB0BHA, LX1BW, LX1GG, UB5WE, UP2NV and UR2FU. Martyn comments on the effectiveness of the RF Gain control or attenuator in cleaning up the band, both with his own FT101B and his

father's KW-202—the latter, incidentally is BRS 751 which makes him into a real OT SWL.

CW was the mode on Forty for G2HKU, giving him QSO's with 4J6AM, N5TP, W3DA and VE3FXT.

G4DMN only checked the band on a few mornings, but he still managed to work CN8CC, EA6EJ, EP2TW, FP8DX, HH5HR, HI8EPS, HPIYV, IS0LXX, JA2BAY, OH0AC, VE2AQS/OA4, VK's, TG4BC, UK0AAB, ZL and 4Z4RB.

G6TC reckons the band has been a bit off-colour this past month, having worked only ten VK's, three ZL's, plus W's in the first, second, third, fourth, fifth and sixth call areas.

Ten Metres

Has really been "showing" on occasion; the only discordant note is that from G2BJY (Walsall) who recalls the band right back to the thirties, and reckons it has been rather disappointing; in his argument, he makes the point that if we accept the eleven-year cycle, and that there was a maximum in 1946, then things just "don't add up!" One feels Geoff is taking the "eleven years" bit rather too literally, in that the cycles so far seen and well documented (namely the past twenty) have varied quite a lot about the mean figure from as low as about eight to a high about fourteen years, figures within which some scientists try to discern lesser patterns. The point of it all is that there isn't any real doubt that the bottom was reached around Spring last year, so at best we are not far up the slope to the peak; thus comparisons with 1946 and 1968-9 are not really valid. In fact Geoff then goes on to demolish his own argument with his DX list; the EU's are assumed, and then we follow with EP2SV, OD5AP, PY's, UF6VAZ, UI8OU, UK9AAN, UA9CIT, UA9FBH, UA9SCH, UA9WEE, UK7GAA, UL7AAP, VO1AW, ZS1NX, 5R8AL, 4J6AM, 4X4VB, 9H1CB.

Next G3NOF (Yeovil), an old campaigner on the band. He noted several morning openings to VK/ZL, and afternoon session to both North and South America, with some Africans also in the afternoon. He worked A4XGB, K4UTE, K5LM,

K5OA, KOGU (Colorado), KORF likewise, VE1ACC, VO2BK, W3RJ, W4FDA, W4ORH, W4QQN, W4WS and ZP5LX.

By the time this comes to be read, GW4BLE (Newport, Gwent) will be a married man, with all that that entails. We had a letter from Steve covering just his ten-metre doings, although a verbal report from GM4CXM was received at the Show as to how the Contest station GW4ENT did in the Contest. Steve's own report covers all-SSB, to A2CZV, FM7WE, VP8LP, PY5ATL, PY5UG, KZ5USN, ZP5CBE, ZP5CD, Z6EJJ, KP4APT, KP4CQG, PJ2FR, DM4DA, LU4EFC, HC1BU, HH2MC, CX5BR, ZS1ZF, ZS2AD, ZS5SP, HC1EE, G4DMN(!), CE4KX, K1HUC/KP4, YV4TI and lots of assorted W/K stations. As soon as it was written, we gather, he was rushing away to do the next chore, namely moving to a temporary home in the centre of Newport, to which end he was busily packing away the QSL's and the gear—one wonders just how Steve will pack the tower?

G2ADZ (Chessington) covers 28 MHz CW, and found only two bad days in October, long spells of DX, and surprises galore. Beacons heard—sometimes all on one day!—were 3B8MS, DL0IGI, N4RD in Florida, GB3SX, 5B4CY, VP9BA, A9CX and EA2OIZ. As for stations worked, G2ADZ says his list is far too long and so he pruned it before sending it in. It mentions ZS's, ZC4, PY/LU's, EA8's, 4J6AM, W's except for W6 and W7, U49's, JH1JEC/MM, VK8HA (complete with the QSL to prove it), OD5LX, HZ1HZ, OA8V who had five watts, VE1AHQ, OA7BI, HI8LP, UL7AAP, UL7TA, EP2VW, TU2GA, FG7AM, VS6EJ, HH5TW, ZS3BT and J28AY in Djibouti. On the Gotaway front we noted YU, VO, 9K2 ELOAA, VP2VL, ZP5NW, PZ1AP, KP4 and KZ5.

The list from G4DMN, says Richard, needs pruning, but was given in full just to show how good the band had been. We counted about sixty DX calls, and space won't let us take it in full, but suffice it to say it covered all continents and quite a lot of East-West stuff, which is the real measure

of how good the band is.

G3ZSU claims his Gotaway list is the most impressive, including as it does *H18, VP2, PY, OY, S8, KV4* and some *JA's*, as compared with a solitary *W* worked on SSB and another on the key. However, it did what he set out to prove, which was that the Delta loop would cover all bands!

Fifteen

G3ZSU, continuing his tests of a Delta loop used on all bands, tried 21 MHz and managed a brace of *W's* with good reports.

Long time since we last heard from G3VLX (Petts Wood); since then he has moved from Sidcup to Chislehurst to his present location; in retrospect the first place was a good QTH; a clear take-off, with a clay subsoil and good propagation characteristics. The Chislehurst QTH had trees—for one-fifth acre including the house, there were no less than *twelve* trees!—but again all on clay and high up with a superb take-off to the West and South. For the past 2½ years G3VLX has been at the present place; again high but on loam, free draining, and the Water table looking to be well below ground level; G3VLX suggests the right answer would be to cover the garden with a sheet of copper, but somehow the *XYL* doesn't approve of the idea! She prefers to keep him hard at it, rebuilding the place, so his few QSO's are all made from away, either /P or /M. /M has managed JH3VKT on the band, while /P looked at another *JA* type, VU2AO, and 5Z4PW. Just one short session from home showed that the place can't be too bad radio-wise, if it can show good DX on Forty.

G2DHV (Sidcup) reckons that September and October conditions were erratic, but he managed to find AP2TN, IT9XUL, *VE's, W/K/N's, 4Z4, ZE1, PY, ZS6* and such, the activity being Crystal-controlled on 21134 kHz.

Ex-G2XC (Horndean) reckons that the rise in conditions have at times almost made him feel a wish to be back several months when at least he could listen to one station at a time! The Woodpecker Thing has also made a pretty determined onslaught on the band, sometimes

pushing the meter up to the "forty over S9" mark on the scale, so Ted set about trying to work through it. The AGC switch is one of the key controls; if the Thing is louder than the wanted signals, AGC should be turned to "off" or at least to the "fast" setting, and the RF Attenuator or RF Gain used as the volume control enabling SSB to be read between the pulses; as for CW, the use of an audio filter and judicious application of the attenuator can work miracles, to the extent that on both SSB and CW, the Pestilence is less of a problem than domestic appliances, and car ignition QRM from the A3. Heard this



Visitors to the recent Dayton Hamvention included, left, Erik Sjolund, SM0AGD and Morgan Godwin, W4WFL, Editor of "CO". The Hamvention is the most important amateur radio event in America, and this year attracted 16,000 enthusiasts!

month include DUITOM, FH0FX, HL9VG, HS1WR, P29JS, UK0LAK (Vladivostock), VE6KWY, VE7DFS, VS6AJ, all SSB, plus CW from FP8DG. This makes the 21 MHz total of countries heard up to 202, with 193 on SSB and 146 on CW, all at R5 and all on the indoor aerials. They seem to have been OK on Ten too, as G2XC recalls the situation as being rather like the first QSO's he made on the band, back in September and October 1936.

G4DJY (Blackpool) with his Joystick and 100 watts, kept to the CW end; looking at his log we find on 21 MHz, most of the world between Russia-in-Asia, *JA's*, through to

W6's, VP8NO, 5T5ZR and FY7AN.

Twenty

Space runs out fast on us; and so, since the band has been doing it's thing up to all expectations, we will only mention a few. G3NOF sums it up by saying that it has been good in the mornings *after* he has set off for work, the opening not being before 0800 but by 0830 *VK, ZL* and the Pacific stations have been available; on the other end, Don found the band fading out after dark. The vast majority of G3NOF's contacts were made on 21 MHz, but on 14 MHz he made it to JA6WSB, HI8RCD, HH5HR, K7SA, KG6JIB, KV4FZ, VP2MSA, VP9DX, W7ATF, ZL3GS, ZL3WM, 3A0JF, 4L6M and 8P0A.

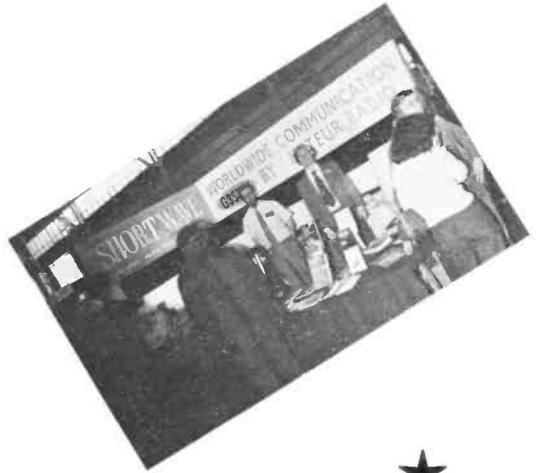
G2HKU stuck to the KW—2000, and found himself talking to VK5LC, ZL1VN, ZL3RS, ZL3SE, ZL1BEP (who wishes to be remembered to all the older generation of *S.W.M.* readers, and is nowadays a fruit farmer), ZL1ON and KA2DX.

G3RCA (Wigan) mentions that the reason for his absence last time was simple—no contacts! The beam rotator and stub mast thrust bearings needed to be renewed, not to mention urgent aerial repairs. This month, Tom set out to test everything, with the result that he has a list a couple of pages long. SSB worked FK8AI, FK8CC, FK8CD, KC6BS, VK9NI, VKOKH, VR4CF, ZL1YL/Y, D4CBS and 5T5CJ in the morning stints, while afternoons and early evenings gave to FO8DO, FB8ZL, YB1CS, 5R8AL, VP8PL, PJ9CG, HH5HR, 3B8DR, FR7BN; in between came P29CC with the elevenses, VS5MM likewise, but with the afternoon break.

Finale

There it is for this time; a pity it all came in one great lump at the last moment, but it couldn't be helped; and to counterbalance it, there has been the pleasure of meeting and talking to so many of you at the Show. Look in the "box" for the deadline, addressed as ever to CDXN, SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ. Meantime, have a nice Christmas, with plenty of DX!

THE 1977 LEICESTER A.R.R.A. EXHIBITION, OCTOBER 27th - 29th



THE HAZARD OF HILL-TOP OPERATING — HYPOTHERMIA

D. BRADFORD, G3LCK

THE advent of compact commercial—and home-brew—solid-state equipment, especially at VHF and UHF, has meant more and more amateurs taking to the hills to enjoy their radio. For many years, G3LCK has been interested in portable operation on the one hand and fell-walking on the other. Recently, the effects of a rather sinister condition called accidental hypothermia have been realised among the outdoor-pursuits groups; this over and above the expected hazards such as getting lost in mist, falling off high places and so on.

Whatever causes accidents, the suffering to those directly involved, the bother to Mountain Rescue teams, and other people, not to mention the ghoulish outpourings of the Press and Radio, add up to a requirement that one should take every endeavour to avoid such situations.

Some may regard what we are saying as “a bit needless, don’t you think,” or “hell it’s Snowdon not the Eiger!” Before saying this, remember the notice which used to appear on an American radar during the war: “Danger—remember, DEATH is PERMANENT.” Also recall that the folk who go out on the hills regularly would not dream of making a start without their safety gear check-out, or of ignoring recommended procedures. In addition they are probably very much fitter than the radio amateur who decides to nip out for the day virtually un-equipped. In addition, they would themselves defend their action by saying they have the rig with them and they can instantly yell for help. This is plain daft. As sure as may be, it will be on the one occasion when the gear is wanted to yell for help that it decides to pack up. In addition, how long would a casual contact take to find out how to get things moving, and how long would it take for a team to get to the site? *Far too long!*

It is a good maxim that you are best able to deal with a problem when you know what the problem is: in this case accidental hypothermia. What is it, and how does it get at you?

Most people know that, when they are healthy, their body temperature sits at around 37°C (98.4°F). If one works hard, slogging it up to that desirable hilltop in time for the start of the contest, various chemical reactions occur to sugars, resulting in a feed of energy to muscles—but, at a price. A comparable situation arises with a PA valve; at 100 watts input, and fifty watts output you have a residue of fifty watts of waste energy, as *heat* to be dissipated by ventilation or forced-air cooling. In either case it could be regarded as the “heat of inefficiency.” In the case of the human body this heat is got rid of by *evaporation*, breathing out hot air and sweating (YLs just *glow*, of course!) under the control of a very wonderful feedback system; but many diseases can upset the feedback which is a reason for the interest in your temperature by the doctor making a diagnosis.

Let’s look at it on the hills. It is cold; the feedback system detects this as a tendency for the body temperature to drop below 37°C, and calls for the bodily biochemistry to release heat energy. This comes from the body core, and especially the liver. This is the rub. You are now,

all hot and sticky, at that desirable hilltop site, and you have burned up a lot of vital energy getting there, along with the material from which the energy came.

Out comes the gear, as you sit on the rock and gaze around at all the umpteen counties in sight. Each simplex channel is full of DX, each repeater crawling with signals; “Ye Gods!” you mutter as you reach for the log and the pencil, and settle into a prolonged session of DX-chasing and DX contacts.

Meanwhile, back at the liver, and at the surface of the skin *things* are happening; those sweat-soaked clothes are being dried out by the wind blowing; but the heat to evaporate each molecule comes from the *body skin* and is quite considerable. “Cooling down!” signals the bloodstream. “Right-ho” says the system, “Come on liver, let’s have some heat.” However, right now, the liver is a bit short on energy-giving substances, so even though it does its best the body temperature falls a bit. “Hi! What the blazes are you up to?” yells the system, and the liver replies “OK, I’m trying, give me a chance!” while the body temperature goes down a little further.

Systems in general obey the Laws of Thermodynamics and Kinetics; if you cool a chemical reaction it will go slower. At this slower rate less energy will be dissipated to the surroundings per second. If heat is being lost from the system through some other route as well, then things will go slower still. In the end, it will be going so slow that . . .

These light-hearted words are a look at a very serious hazard—after all, jumping around is *not* part of the operator’s notion of good operating technique, is it?

So. First, go properly equipped. A brief review of suitable garments would include:

Boots. Hills and mountains are rocky and boggy places. Broken ankles are not fun, so boots giving good support are essential. These are costly, but so is your life! Most good quality shoe shops sell fell-walking boots by Hawkins and others, or will get them for you. *The Climber and Rambler* magazine has many advertisements for suitable gear. Having got some suitable boots, set about breaking them in, and getting them well water-proofed with dubbin or neatsfoot oil.

Socks. Two pairs on are advisable. Wool socks next the skin are essential—blisters five miles from the nearest road are a darned nuisance. Also, carry a spare pair, and some *Elastoplast* plasters in a polythene bag.

Trousers. Not, please not, jeans—they get wet, and on drying out they shrink on the wearer, which is not funny in rough country. You can get posh breeches, purpose made and ideal. A good loose old pair of gardening trousers will serve; in cool weather, an old pair of pyjamas underneath, to trap warm air and insulate from the cold. If you get wet the cotton soon dries out.

Shirts and Jumpers. These should involve several thin layers rather than one thick one. Those ghastly old woollies the XYL wants to send to the Jumble Sale are ideal; again, trapping warm air is the aim. With several layers, you can “tune” your covering to conditions, better than with one or two thick garments.

Water and Wind Proofing. These days there is a vast amount of nylon/PVC gear on the market. It is better to go for quality—and avoid cycle capes unless you like involuntary hang-gliding! Both top and trousers will be needed.

Headgear. A very large amount of heat is lost *via* the exposed head, so cover it with a bobble hat or a balaclava.

Carrying Gear. Camping shops have a good selection; some frame rucksacks seem to be just *asking* for a well weatherproofed rig and some nicads to be attached to 'em!

Other Essentials. Map and compass—and find out how to use them before you set off! Almost any small-boat cruising man will tell you how much a compass can be put out by ferrous materials nearby—like the speaker on the rig, for example! Even on a brilliantly sunny day, the visibility can drop to zero in thirty minutes. Walking off an unseen precipice is quite painless until you are retarded by the ground! A good torch, plus spare battery and bulb, together with a whistle are called for. Six toots on a whistle should never be sounded unless you are really in distress—you look a prize twit when the Mountain Rescue team arrive and you lamely explain you were “just trying it out.” They get quite cross! Energy-giving foods, chocolate, boiled sweets, flask of tea or coffee—slimming diets are *out* on the hills. An emergency pack of glucose sweets must be included. And remember, this is for *summer activity only*. Don't go out in winter without expert companions and full winter equipment. To revert to summer, it is wise to have a survival bag or space blanket with you too.

Procedure

First, decide where you are going! Check with the locals on weather hazards, dodgy routes, and so on. Let someone know you are going, and *don't* go somewhere else! Estimate your time of return, using Naysmith's Rule which states: three miles per hour, plus thirty minutes for every 1,000 feet climbed, plus an hour for

“Tired Tim” effects equals travelling time; add your proposed operating time, and your return trip time to get your return time of arrival; *don't* forget to let your “someone” know that you have got back! If nasty conditions force you off your intended spot, try to let your “someone” know.

Don't go alone. The symptoms of the dreaded Hypothying are loss of concentration, irrational behaviour, slurred speech, and collapse. If these are observed, the patient *must* be got into shelter—hence the survival bag—given food, extra clothing, and a hot drink if possible; assistance is required as soon as possible. Note that the old-fashioned use of alcohol and attempts to “rub warmth” into a collapsed person actually increase the risk of a fatality by channelling cold blood into an already over-cool body. The logistics of help are more difficult if you are on your own, and a party of three or four is a useful size. This will enable you to break up operating into shifts, so that those not operating can get an hour's exploring in and get warm and “going” again.

The Return

When the time to return comes, remember you will be in a less sharp-witted condition than when you set out; this can make you careless if you do not make allowance for it, so beware. And, if you hump all the extra safety tackle for a warm sunny day on a prize peak, just thank Heaven for it—if you weren't equiped properly and it had turned nasty, you mightn't be around to hear the prayers of others over your corpse.

(*Editor's Note:* We agree with everything G3LCK says; we would just add that, while the weather forecasts are almost always right when considered in relation to the *areas* mentioned, locally things can be quite different; so keep an eye lifting for any signs of trouble in the sky.)

“FM-IZING” THE TR1986 MODULATOR UNIT

OBSOLESCENCE IS SOMETIMES
ONLY APPARENT

JACK HUM, G5UM

AMONG the last valved equipments to be used in RAF airborne applications was that known as the TR1986, which represented just about the ultimate in miniaturisation using hot devices. In due course when it succumbed to the onward march of transistorisation it found its way on to the surplus market in some numbers. Among its various units that found special favour in amateur radio circles was the tiny four-valve modulator unit, which appealed not solely on account of its attractive price of thirty shillings in old money but also because it was capable of giving very good quality AM speech from a unit measuring only 5½ by 3 in old inches!

The TR1986 modulator must have found its way into many hundreds of VHF amateur transmitters during the AM years of the Fifties and the Sixties when its push-

pull 6C4 output stage was well able to modulate fully the 10 to 15 watt transmitters of those days. Now there must be many samples of this delightful unit languishing unused in radio rooms as the result of its apparent obsolescence in the predominantly FM conditions of the metre-wave bands of today. One uses the word “apparent” with deliberate intent, for in fact the 1986 modulator may be given a new lease of life in the F3 mode.

At G5UM several erstwhile AM transmitters have been “FM-ized” with the aid of this modulator in what must be one of the simplest methods available, namely, to apply modulation to the screen grid of the crystal oscillator. Pundits will aver that this method produces phase modulation rather than true FM; but there is no doubt that what emerges from the other man's loud-speaker sounds like—and is reported as indistinguishable from—common or garden FM. All that need be done is to interpose the secondary winding of the modulator's driver transformer T2 (Fig. 1) between the CO screen grid and its feed resistor, as shown in Fig. 2—and hey presto, FM!

If this sounds perhaps a little too much like “FM made easy—and on the cheap” one hastens to add that the experimenter should take great care in setting the system

VERTICAL TWO-ELEMENT BEAMS FOR FIFTEEN AND TWENTY METRES

OF PARTICULAR INTEREST TO THE NEWCOMER

F. C. SMITH, GW2DDX

THE newcomer to amateur radio, who has just received his licence and wishes to work some DX, but has a slim purse and small garden, faces a problem.

On one hand he could use a ground plane which has the advantage of low angle radiation, but to offset this, the radials can be an infernal nuisance and so can the omni-directional pattern. On the other hand, a full size 14 MHz horizontal beam is quite space-demanding.

The writer has often wondered why he has seen no two-element vertical beams—after all they were very

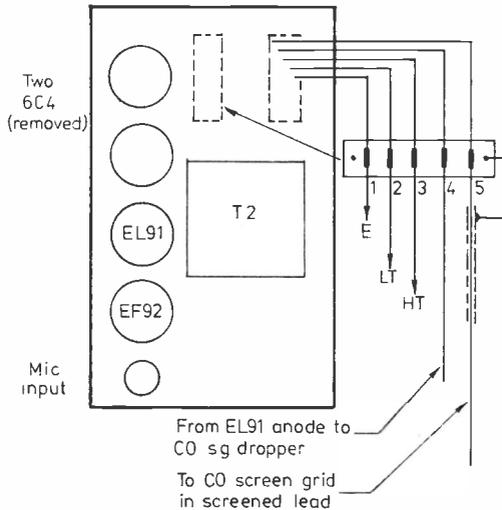


Fig. 3

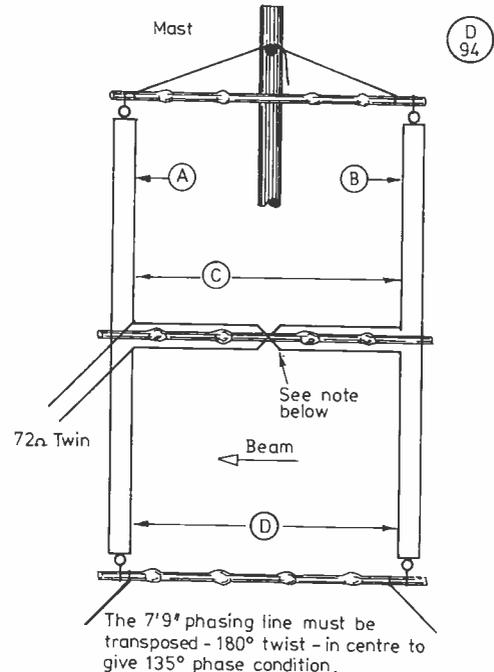
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A five-way tag-board is mounted over the piercings disclosed by removal of the original modulation transformer from the TR1986 modulator unit; it picks up HT, LT and E lines from within the unit, and is fed with HT, LT and E from the existing transmitter. Pins 4 and 5 connect to Pin 6 on each of the 6C4 valve sockets to pick up the output from the EL91 driver valve in the modulator unit. This output then feeds the CO screen in the existing VHF transmitter.

The omission of any form of audio control will have been detected by the percipient reader. There is no room for one on the TR1986 chassis, but if desired a 2 megohm variable resistor mounted on an external bracket may replace the 2.2 megohm grid-input fixed resistor referred to earlier, but if it is, keep leads short to obviate instability or the inducing of unwanted hum or RF components into the front end of the modulator.

What will also be noticed is the omission of an audio roll-off filter network, commonly regarded as necessary in PM or FM systems. A modicum of top-cut is provided by the retention of the SG by-pass capacitor C2 in Fig. 2, but if more is needed a standard form of RC audio filter may be inserted between the EF92 output and the EL91 input, though the extremely tight packing of the components beneath the 1986 modulator chassis makes this an awkward task for the less dextrous.

In practice, neither audio gain control nor de-emphasis filter has proved to be necessary, and on-air reports tell of "good crisp quality" or even on one memorable occasion "Sounds a lot better than that TS-700 of yours"! But if the output from the operator's larynx is to be in effect the gain control system, then it will be no bad thing for him to ascertain from his partners on the air just how near or far from his microphone he should speak. Experience has shown both in the 145 and 433 MHz applications of this FM system that a normal conversational voice is all that is required to realize the considerable gain provided by the EF92/EL91 combination and at the same time to avoid "whiskers" on the transmitted signal.

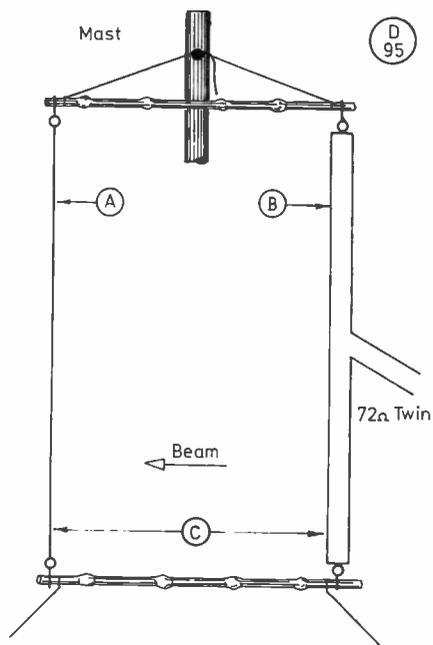


D
94

	14MHz	Ribbon	21.3MHz	Ribbon	
A	30' 9"	300Ω	A	20' 7"	300Ω
B	31' 5"	300Ω	B	21' 0"	300Ω
C	7' 9"	300Ω	C	5' 2"	300Ω
D	7' 9"		D	5' 2"	
Feed	72Ω		Feed	72Ω	

Fig. 1 ZL SPECIAL VERTICAL

The beam is full size using 300-ohm ribbon for the elements; half-inch or three-quarter-inch bamboo canes, 8 feet long and treated for weather, are used for the top, centre and bottom supports. The bottom cane may be anchored by cord to keep the beam heading. Gain, which has not been measured, should be at least 4 dB.



21 MHz		
A	20' 10"	Director
B	22' 1"	Dipole 300Ω
C	6' 6"	Spacing
	Feed	72Ω Flat twin

Fig. 2. PARASITIC VERTICAL

Of similar construction to the ZL-Special in Fig. 1, 16 s.w.g. wire is used for the director.

popular indeed in the early Band 1 TV channel areas—as they take little real-estate, are easy to rotate and have gain over the vertical dipole of around four dB. It is a fact that earth losses tend to restrict the radiation at the very lowest angles, but this is not too serious when beaming the signal as an appreciable amount of power is radiated at the desired angles, and not much at the wasteful high angles. It cannot be over-stressed that the low-angle radiation is paramount, the more so when one has, as the writer, but ten watts on a crowded 14 MHz band. Both the types of beam described have been used by the writer with very satisfactory results.

The only known method of controlling the angle of the radiation from an aerial is by adjusting the height; at $\frac{1}{2}$ -wavelength high there will be a lobe at twenty degrees (but with a fat lobe at the vertical); but with the beam vertical, the feedpoint height need only be twenty-four feet. Thus one can also work DX with the aerial height considerably lower if one has a vertical. The ability to raise and lower the beam to deal with variations in the ionospheric changes which may occur is of help, so the beams described are pulled up and down the GW2DDX mast by way of a rope and pulley.

Where the mast height is less than forty feet, it is

permissible to run three feet each of the driven element and reflector element along the canes without detriment to performance; on a 35-foot mast the aerial will work well with the feed-point at 19 feet with no adjustment needing to be made. If in any doubt one may use a GDO, along the lines set out by E. J. Williams on p.218 of the July 1977 issue.

Results

With the ZL-Special when conditions were good, W, ZS, ZL, ZE, VE, ST2, 5X, JA, UA9, VQ9, were all worked, along with the inevitable hosts of Europeans.

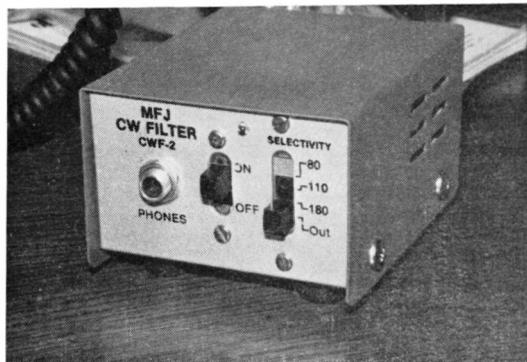
For the beam, when conditions were fair, there were ZS, A4X, OD5, 3D6, YB2, 4X4, JA, UH8, UI8, UL7, UK9, UKØ, VE and W.

(Editor's note: It should be noted that the ends of the vertical elements carry very high RF Voltages and so if the garden is to be used by children while you are operating, the aerial should be high enough to keep them safe from shock.)

TRANSATLANTIC TIP

CHARLES WESTRICH, WB3OWM

Finding the battery flat in the MFJ Filter—as did G3FKE in "Communications and DX News" for January—can be very frustrating: Murphy would not have it any other way. As with any battery powered accessory, one can quickly develop the very human habit of turning off the rig, but leaving the accessory "on." This may be great for the battery industry, but rough on the shacks' economy. So for all us "Forgetful Charleys" this easy and inexpensive solution is offered. Place a miniature LED on the front panel of the MFJ Filter. (Note: this can be done to any battery powered item around the shack). After determining the proper load resistance to get the mini-LED to "just glow," thus drawing only a few micro-amp (the writers' draws about 20µA), connect it to the "ON-OFF" switch. The mini-LED can easily be seen from across the room, reminding "Forgetful Charley" to QRT the MFJ as well!



The MFJ Filter with a mini-LED between the two top screws on the front panel.

A C-MOS MORSE KEYSER

N. HOULT, G4CIK

IN the past many designs for electronic Morse keyers have been published; however, they have generally used either discrete transistors or TTL integrated circuits, with a resultant high power consumption. Now that C-MOS integrated circuits are available at a reasonable price, they appear to be the obvious choice for this application; they tolerate widely varying supply voltages and take so little power that it is often possible to power the complete keyer from the line if keys, eliminating the need for batteries or a mains PSU. The keyer to be described may be powered in this way (although more conventional techniques may be used if preferred), and may be used as a normal electronic keyer or as a squeeze keyer. Although designed to be powered from the key socket of an FT-101, modifications are described which would enable it to be used with most other rigs.

C-MOS

Two types of integrated circuit are used in this keyer: NOR gates and D-type flip-flops. A C-MOS NOR gate, with its truth table, is illustrated in Fig. 1. In this application V_{DD} is grounded and V_{SS} is connected to a supply of about $-5v.$; logic level 0 is $-5v.$ and logic level 1 is $0v.$ (this inverted mode of operation is used so that negative supplies may be keyed). It will be seen that each input to the circuit is connected to the gates of a P-type MOSFET and an N-type MOSFET; these are "enhancement-mode" devices, *i.e.* the N-type only conducts if its gate is positive with respect to its source, and vice-versa for the P-type. Thus if either input is at logic 1 (V_{DD}) at least one of the paralleled N-type FETs is conducting, while the chain of two P-type FETs is not; the output is therefore logic 0. If both inputs are at logic 0, both P-type FETs conduct and both N-type FETs are turned off, giving logic 1 at the output. As in either logic state one set of FETs is conducting while the other is not, the device only draws a very small

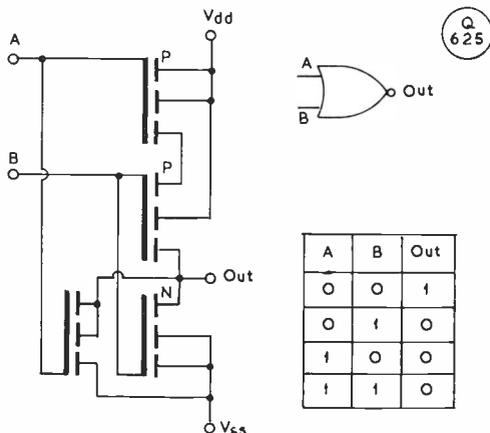


Fig. 1. Circuit diagram and truth table for a NOR gate.

Clock (CL)	Data (D)	Reset (R)	Set (S)	Q	\bar{Q}	
0→1	0	0	0	0	1	
0→1	1	0	0	1	0	
1→0	X	0	0	Q	\bar{Q}	No change
X	X	1	0	0	1	
X	X	0	1	1	0	
X	X	1	1	1	1	

Fig. 2. Truth table for a D-type flip-flop. X = "don't care" case.

current (typically less than $0.1\mu A$) except when switching, at which time both sets of FETs are partially conducting.

The D-type flip-flop is rather more complicated, and its circuit will not be described in detail; a truth table is given in Fig. 2—note that this is slightly different to that for TTL D-type flip-flops in that some inputs work in the opposite sense. Further information about logic circuits in general may be found in [1], and about C-MOS in particular in [2].

Keyer Logic

Fig. 3 gives the circuit diagram of the keyer except for the output stage, which will be described separately later as the reader may wish to modify this to suit his own transmitter. Against several key points is shown the logic state when no character is being sent; this is useful for checking purposes. The oscillator is developed from a design in "Technical Topics" [3], while the rest of the logic is based on an earlier TTL design [4].

The operation of the circuit is as follows: IC1a and b form an oscillator, which may be turned on or off by the line X; IC1c and d delay the control voltage to IC1b relative to that to IC1a, eliminating the risk of a spike at the output upsetting the counters IC2 and IC6. IC2a and b form a divide-by-4 circuit, driven by the oscillator IC1, which is used to generate dashes, while IC6a is a divide-by-2 generating dots. IC3b and c, and IC7c gate through dots or dashes as required to the output, and are controlled by the flip-flops IC4a and b, which record which character is being sent. IC9a and b record whether or not the paddle has been pressed to the dash side, while IC8a and b do the same for the dot side. Information is passed from these bistables to the main memories IC4 via gates IC9c and IC8c in the case of a character immediately following another one (oscillator running continuously) or via IC9d and IC8d in the case of an initial character—in this situation IC5 provides some delay in setting the flip-flop IC4a to allow other parts of the circuit to reset first. The gating provided by IC9s and IC8s is such that if both dash and dot memories (IC9a/b and IC8a/b) are activated, the keyer will next send the opposite character to the one it is currently sending; this enables the keyer to perform as a squeeze keyer when used with a twin paddle. The remainder of the circuit is concerned with controlling the oscillator and gating of the various lines; it is so designed that the paddle position is sensed at the end of the bit space following the current character (the latest possible moment). If the paddle is neither to the dash

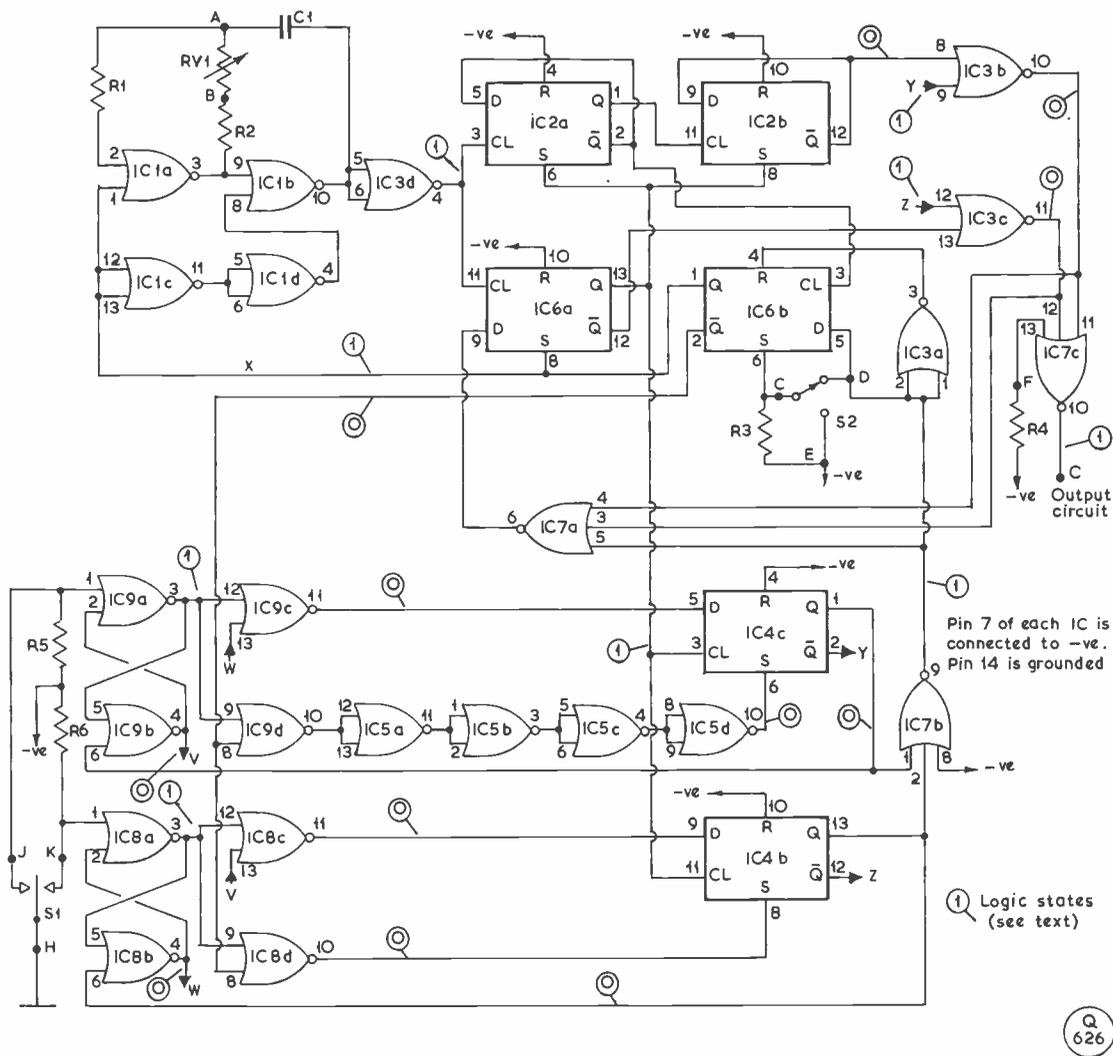


Fig. 3. Logic diagram of the Keyer.

side nor the dot side, the keyer will either stop its oscillator and return to the idling state or output a character space, check the paddle position again, and then either stop or send the next character. This facility is controlled by the switch S2, which on the circuit diagram is shown in the "Character space off" position. Although the keyer is easier to use in this mode, the author finds that better Morse generally results with the auto character spacing turned on!

Power Supply and Output Circuit

The one used in the prototype is illustrated in Fig. 4, and it can be seen that the output of the C-MOS circuit feeds a "Darlington" pair of transistors which effectively short out the key socket of the transmitter when required. Power for the logic circuits is derived from the key socket via a diode (to prevent the keyer from shorting out its own power), and is stabilised by the zener D2. The capacitor C1 stores adequate charge to power the

Table of Values	
Fig. 3. The Logic Section	
C1 = 0.22 μF	IC1, IC3, IC5, IC8,
R1 = 910k, 1/4W.	IC9 = CD4001
R2 = 100k, 1/4W.	IC2, IC4,
R3, R4 = 4.7M, 1/4W.	IC6 = CD4013
R5, R6 = 1M, 1/4W.	IC7 = CD4025
RV1 = 1M linear	S1 = Keying Paddle
	S2 = SPDT switch

logic during the longest key-down period (a dash at the slowest speed) while R1 is chosen so that C1 recharges completely during the following space i.e. the charging current is at least four times the maximum current drawn by the logic circuits. Provision is made for the connection of an external power supply; in this case the diode D3 protects the circuits against the supply being connected the wrong way round. The push button

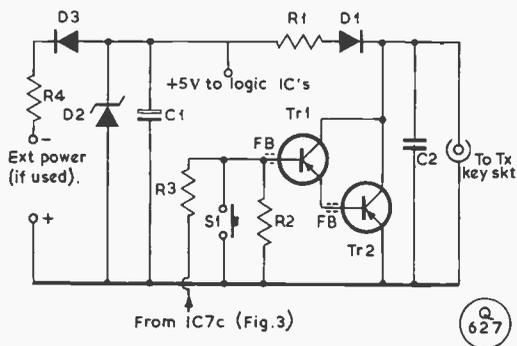


Fig. 4. Power supply and output circuit.

Table of Values

Fig. 4. Power Supply and Output Circuit

C1 = 100 μF, 10v. elect.	D2 = BZY88C5V6 or
C2 = 5 nF disc ceramic	any 5-6v. Zener
R1, R4 = 22k, 1/4w. (see text)	Tr1 = 2N3964, BC214
R2 = 150k, 1/4w.	(see text)
R3 = 470k, 1/4w.	Tr2 = GET890 (see text)
D1, D3 = BAY38, 1N914,	S1 = 1 pole, push-to-
etc.	make
	FB = Ferrite bead!

switch S1 is used to reset the keyer on switching on and at any time when the supply fails; this is necessary because when the keyer is switched on, before its supply line voltage has risen sufficiently for the logic circuits and oscillator to operate correctly, its output goes into the "key down" state, preventing the capacitor C1 from charging further, and so holding itself in this state. The switch turns off Tr1 and Tr2, allowing C1 to charge to its correct voltage; this reset switch is only required if the keyer is to be powered from the transmitter key socket.

The components used in this part of the circuit are not critical, and will depend largely on the voltage and current to be keyed. Those indicated are suitable for an FT-101B, where the open-circuit voltage across the key is about 13v. and the short-circuit current about 6mA. For this particular type of rig it is important that Tr2 is germanium, as the minimum voltage drop across the keyer in the "key down" state is 'V_{be} of Tr2 plus V_{ce(sat)} of Tr1', and full power cannot be obtained if this exceeds a few tenths of a volt. Equally, Tr1 should be silicon in all cases, as the leakage current of a germanium transistor can be large enough to turn Tr2 on permanently in hot weather! In the prototype Tr1 was a 2N3964 and Tr2 was a GET890; these were used because they were to hand, and in practice Tr1 could be any high-gain silicon transistor and Tr2 any low or medium power germanium transistor. If using the circuit to key a different transmitter, there are two points to check: firstly, that the combination of Tr1 and Tr2 can pass enough current when driven by the logic ICs, i.e. h_{FE}(Tr1) x h_{FE}(Tr2) x 10μA is less than required current and secondly that R1 is of a suitable value to keep C1 charged; the required value may be calculated from.

$$R1 = (V_{oc} - 5.6) / 4I_1,$$

where V_{oc} is the open-circuit voltage across the key, and I₁ is the current taken by the logic (measured) plus an

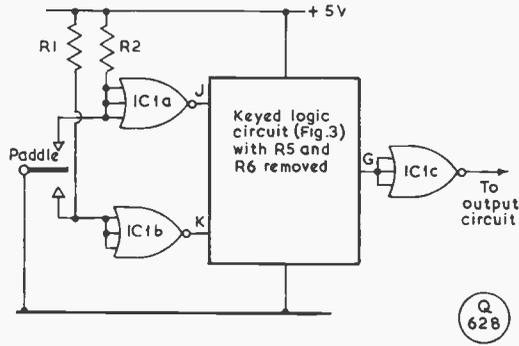


Fig. 5. Additional circuitry required when keying positive voltages.

Table of Values

Fig. 5.

R1, R2 = 1M 1/4w.	IC1 = CD4025
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allowance of a few microamps for leakage in damp conditions. If in doubt, it is always better to over-estimate the current demand than to underestimate it. If using conventional power supplies, R4 can take any value less than V_{supply} - 5.6v / I₁ (within the limits of the current D2 can take); a suitable value would be similar to that calculated above for R1 with the same supply voltage.

Modifications to Key Positive Voltages

The circuit as described so far is suitable for keying negative lines, such as in grid-block keying. However,

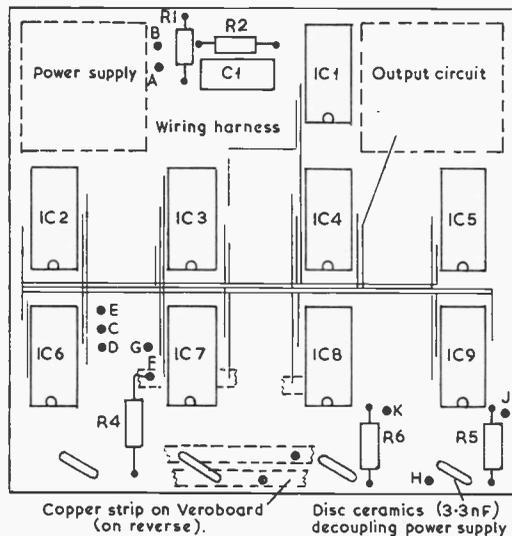


Fig. 6. The construction technique and layout used in the prototype.

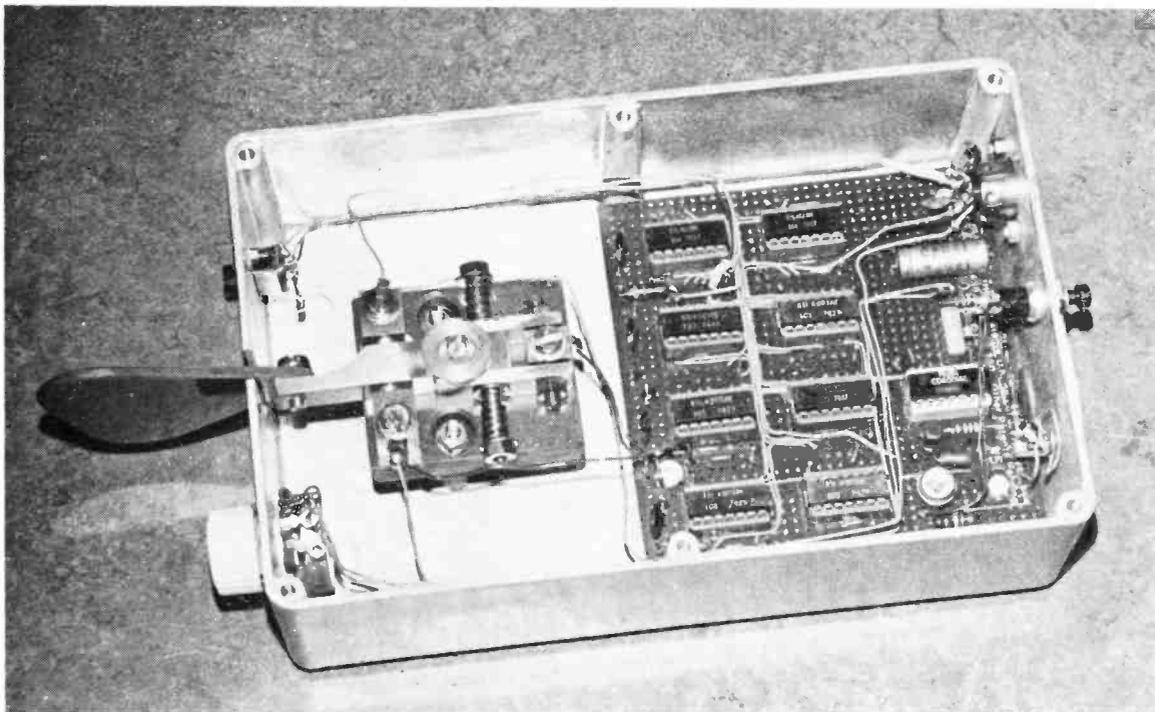


Fig. 7. General internal appearance of the C-MOS Morse Keyer, discussed in the article by G4CIK.

it may easily be modified to key positive voltages, such as in cathode keying circuits. As far as the logic section is concerned, it is necessary to connect all points shown grounded to a +5v. supply, and ground all points shown connected to -5v. In order to keep the paddle at 0v. it is necessary to invert the dot and dash inputs, and the output will also need inverting; Fig. 5 shows how this may be done with one extra IC. In the keying and power supply section it is merely necessary to replace all PNP transistors by NPN, and reverse all diodes and electrolytics. In the case of cathode keying, where the current is appreciable, it might also be necessary to add an extra transistor to the "Darlington" pair already present to get sufficient current gain. Note that for the key-socket powering technique to work, there must be a voltage present across the key even on receive. While this will almost certainly be the case with grid-block keying, it may not be with other types, and should be checked in any case. It does not matter if the voltage on receive is less than on transmit; as long as it is significantly greater than 5.6v. it will be enough to keep C1 charged.

Construction

Almost any form of construction can be used, as the layout is completely non-critical. The prototype was built on veroboard, as shown in Fig. 6, using the copper tracks only for the -5v. line, ground, and the output circuit; all other connections were made with wire links—this is shown in the photograph of the complete unit, Fig. 7. The power supply to the logic IC's was decoupled with a small ceramic capacitor at the end of every row

of three or four IC's.

One important point is that the circuit should be completely screened, and its output (and power) leads decoupled, to avoid RF pickup; the prototype was built in a diecast box for this reason.

It is best not to decouple the leads to the paddle, if possible, as this could appreciably increase the rise and fall times of the inputs to the logic circuit, giving slightly higher current consumption and the risk of flip-flops mis-triggering; however, if RF pickup on the paddle leads is a problem small decoupling capacitors, possibly with chokes to form an RF filter, should cause no trouble. When the keyer is powered from the key socket the symptoms of RF pickup are that the keyer will latch up in the "key down" position when sending continuously if the transmitter output is turned up, but not otherwise. If this happens during testing, the keyer may be reset with S1 on the output circuit.

Setting-Up

As with most digital circuits, little setting up is required. It is desirable to put a meter in the supply line to the logic circuits and to run the unit from a separate power supply when first testing it. The current taken by the logic circuits should be at most 50 μ A, and should drop to zero as the circuit assumes its idling condition; if not, check for short-circuits or wrong connections. Then press the paddle to one side and check that the current rises to 30 μ A or so, varying in time with the output and falling to zero shortly after releasing the paddle. If this is so the keyer may then be connected to

a transmitter or practice oscillator. A point to note with the FT-101B (and possibly other similar transmitters) is that the voltage supplied to the keyer *via* the key socket is reduced on receive, which will cause the keyer to work only in the "transmit" mode; this should not cause any problems in normal use as in the PTT or manual modes the keyer is always supplied with an adequate voltage, while in the VOX mode the capacitors in the keyer will keep it running while the relays in the transmitter are changing over (if an external power supply is being used, of course, none of the above problems can occur).

Fault-finding

While it is difficult to cover every possible problem with a unit of this complexity, the following notes should at least enable faults to be traced to a particular area of the circuit; after that it is a matter of testing each logic element until the fault is found.

There are two ways of checking the unit; either the speed is set to minimum and voltages are checked using a multimeter, or it is set to maximum and an oscilloscope is used—note that the 'scope will have to be DC coupled for this technique. In either case, an external power supply will have to be used for the tests, due to the additional load provided by the test equipment which will be too great for the key-socket supply system.

First check the logic levels shown in Fig. 3; if this fails to reveal the problem, press the paddle to the dot side and check that line "X" goes to logic 0 and that the oscillator IC1 is working. If line "X" does not respond, check the input circuitry starting at IC8 and working through to IC6b. If the circuit so far is working, follow the oscillator signal through the dividers IC2 and IC6a to the output. Finally, press the paddle to the dash side and check the operation of IC9, IC5 and IC4a.

Possible Additions

Provisions were made in the original keyer for one or two extra facilities which have not as yet been used; these are the use of an external paddle (to give the option of normal or squeeze keying) and a connection to provide for input to a memory—point "F" on the circuit diagram (Fig. 3). Either or both of these may be omitted if desired; however, if the memory input is removed, pin 13 of IC7 should be connected to the negative rail rather than left floating.

REFERENCES

- [1]—"Learning about Logic" by P. J. Horwood, Radio Communication June 1976 onwards.
- [2]—RCA COS/MOS Data Book.
- [3]—"Technical Topics," Radio Communication November 1975 page 847.
- [4]—The Radio Amateur's Handbook (published by ARRL) 1974. Chapter 11 page 363—"The WB4VVF Accu-Keyer."

STOLEN

Two Pye Pocketfones, Serial Nos. C-707001 and C-707004, have been stolen from the Search & Rescue Dog Association (South Wales). Any information regarding their whereabouts should be sent to Hon. Secretary, Rev. P. Keward, 11 Grosvenor Street, Cardiff.

BOOK REVIEW

ARRL "ELECTRONICS DATA BOOK"

THIS publication is from the American Radio Relay League, who produce so much that is good and practical in the way of technical and semi-technical material in the field of Amateur Radio.

The *Data Book* treats in depth the data for RF circuitry, L/C/R networks, broad and narrow band inter-circuit transformer design, antennae and feeders, and shows a large selection of "thumb nail" solid-state circuits. With this goes a great wealth of tabular matter—such as dB equivalents to voltage, current and power ratios; RF circuit data; a reactance nomograph; table of L/C constants, numerous formulae, inductance data for all types of coils, chokes and toroids; and much similar information of the sort one needs to look up or check.

The solid-state circuitry includes more than 50 designs involving transistors of numerous types, for AF, RF and switching applications. A useful chapter deals with what might be called engineering, construction and testing, with circuits for several test instruments.

In general, this is the sort of book which will not only find a place on any experimenter's work-bench but (like many other ARRL publications) would also undoubtedly be of great practical value to many professional electronics engineers and designers working in the field of radio communication—and, at the price, for these days it is very good value for money.

It is in large format (11 x 8½ in.), of 128 pages, well produced and clearly printed, copiously illustrated in line and adequately indexed, and the writing is (as with all ARRL publications) in straightforward language.

ARRL Electronics Data Book, price £3.25 inclusive of postage, from: Publications Dept., Short Wave Magazine, Ltd., 34 High Street, Welwyn, Herts., AL6 9EQ.



"... I think I can detect a bit of crackling at your end"

VHF BANDS

NORMAN FITCH, G3FPK

VHFCC Award

MICHAEL Ball, G8LZK, from Long Sutton near Spalding in Lincolnshire, is the recipient of the 289th 2m. VHFCC certificate of this series. He studied for the R.A.E. at the Kings Lynn College of Arts and Technology, passed the exam. and was licensed in August, 1976. Mike's first station comprised a *Trio* TR-7010 providing 10 watts p.e.p. of SSB to a 10-ele. Yagi. FM operation was with a *Hudson* base station. In April, 1977 a *Trio* TS-700G with preamplifier was acquired and the aerial changed for a *Parabeam* plus 5-ele. Yagi for FM these both at 40ft. *a.s.l.*

Applicants for membership of the VHF Century Club will find the simple rules mentioned in the October, 1977 "VHF Bands" column.

Beacon News

Readers will recall that part of *Project VESNA*, which is the study of *Sporadic E* propagation over the North Atlantic path, was the installation of a beacon FX3VHF (Lannion) operating on 50.1 MHz and beamed towards Central America. Now the *E*'s season is over, FX3VHF is now aimed towards Rhodesia where it has been copied, according to Martin Harrison, G3USF. G4BPY in Wall-sall is also reported to have heard it *via* tropo. and meteor pings.

The Scottish Scene

Jack Wilson, GM6XI, has kindly sent some notes concerning activity North of the Border. The recent gales caused considerable damage but Jack reckons the attendant floods improved a few earthing systems. The high standards of operation through the GB3CS repeater are being maintained. The Mid-Lanark 70 cm. repeater on RB10, GB3ML, is operational and

the Edinburgh one, GB3ED on RB14, should be by the time this appears.

GM8BJF and GM4DIJ have completed the 23 cm. beacon and obtained site clearance for it at the Edinburgh University Engineering Faculty building in south Edinburgh, but there is no sign of the 70 cm. beacon which the Edinburgh ARS promised to construct some time ago.

On a sad note Jack writes:—"It is with regret that I have to report the death of Syd Rowden, GM6SR, at the ripe old age of 88. He was active on 2m. until the summer of this year when he was

QTH LOCATOR SQUARES TABLE

Station	23 cm.	70 cm.	2 m.	Total
G8FUF	2	84	207	293
G3POI	—	—	204	204
I4EAT	—	—	192	192
G3CHN	—	—	148	148
G3FPK	—	—	140	140
GM4CXP	—	25	122	147
9H1CD	—	6	120	126
G4BWG	—	25	110	135
G3XCS	—	21	110	131
G3OHC	4	31	98	133
G4DEZ	—	—	98	98
9H1BT	—	—	94	94
G8HVY	—	33	93	126
G4BAH	—	32	92	124
G8BKR	1	17	92	110
G4FCD	—	22	88	110
G8GML	8	47	87	142
G6UW	—	—	85	85
9H1C	—	—	83	83
G3JXN	26	63	82	171
G8HHI	—	24	81	105
G4AWU	—	—	80	80
G8LEF	4	37	79	120
G8JJR	—	—	79	79
G81WA	—	29	77	106
G8JHX	—	—	74	74
G4FBK	—	5	72	77
G2AXI	1	43	71	115
G4GET	—	—	69	69
G3COJ	16	52	68	136
G4DKX	5	30	68	103

GJ8AAZ	—	22	66	88
G8GII	—	22	63	85
G3FIJ	—	27	62	89
G8KLN	—	1	62	63
G4CIK	—	—	62	62
G4GCQ	—	—	61	61
G8KUC	—	7	60	67
G8LHT	—	1	60	61
G3KPU	—	—	60	60
G8KGF	—	—	60	60
G8KSP	—	—	60	60
GD3YEO	—	8	59	67
GD2HDZ	10	32	58	100
G8JEF	—	—	58	58
G4AEZ	2	22	57	81
GW4FJK	—	—	57	57
G8KSS	—	—	54	54
G4ERX	1	20	53	74
OZ9IY	—	—	53	53
GM8NCM	—	2	52	54
G8ITS	—	10	50	60
G3BW	—	21	47	68
G8IFT	7	18	45	70
G4GEE	—	22	41	63
G4EYL	—	—	41	41
G8EOP	8	36	38	82
G8LLG	1	1	38	39
G8JAH	—	1	35	36
G8JGK	—	—	34	34
G8JAJ	—	—	24	24
G8JK	—	—	21	21

Starting Date January 1, 1975. No satellite or repeater QSO's. "Band of the Month" 2m.

admitted to hospital from which there was no return. He was well known on the HF bands from 1925 and well remembered for his pre-war exploits on VHF in the company of the late GM6FN and GM6XI."

Overseas News

Italy:—Fausto Minardi (FE60) has written to say he now has 40 countries worked on 2m. in 192 QTH squares. His tally of British counties stands at 30 but he is baffled by the Scottish regions since the GM QSL's understandably use their *postal* addresses which still retain the old county names. To clarify matters, the large *Geographia Map*, "County Map

British Isles" has been despatched to Fausto.

Spain:—Julio Garcia, EA3AIR from Barcelona, mentioned several local stations in EA3 who have 1 kW capability on 2m. These include EA3ADW, EA3WN and EA3XS but they are only interested in tropo. and E's contacts. (See also MS news.)

Czechoslovakia:—Franta Strihavka, OK1AIB from Unhost, sent along a picture of the QTH from which he operated -/P on October 14/15. It was 1603 metres *a.s.l.* on Snezka, which means "Snow Mountain," and very close to the Polish border. He is QRV on 433, 1296 and 2304 MHz as well as on 2m.

Satellite News

No sign of any Russian "OSKAR." It seems that a Russian amateur had told an AMSAT member that they were having problems and that the first launch might not now take place until 1978. Well, *Concordski* was only six years late!

Oscar 7's batteries continue to be rather too hot for comfort. This situation is further exacerbated by some Mode "B" users in particular who insist on firing kilowatts of RF at the satellite. When this happens, and the battery temperature rises sharply, it will switch to Mode "A" eventually, thus denying these anti-social types their use of it. Unfortunately, those who *do* stick to the 100 watts *e.r.p. maximum* are also denied its use.

AMSAT has decided to alter the schedule of 0-7 with effect from January 1, 1978. January 1 Mode "B"; January 2 Mode "C" (This is QRP Mode "B" *i.e.* 10 watts *e.r.p. maximum*); January 3 mode "A"—and so on. In other words, it will be in Mode "A" only if the *day of the year* is divisible by three. For example, Sunday, Feb. 26, 1978 is the 57th day of the year, therefore an "A" day. This new schedule could be brought forward.

The band plan will be revised effective Jan. 1, too. On both "A" and "B" downlinks, the lower third will be CW, the middle third mixed modes and the top third SSB only. Please spread the news to users and make a list of those stations whose signals are consistently much louder than the beacon signals on 145-972

and 29-502 MHz. Send your list to G3RWL (*QTHR*) who will drop a line to the offenders.

Readers new to satellite communications are invited to write to AMSAT-UK at 60 Willow Road, Enfield, Middx. for a copy of:—"Guide to Oscar Operating," enclosing a 9 x 4 inch *s.a.e.* This guide is an up-dated version of an article in the *Magazine* published last March. The 1978 Orbital Predictions Calendar will be distributed in the UK by G3AAJ. Those wishing to reserve a copy should send their request to Ron with a small *s.a.e.* and when supplies arrive, he will reply and quote the cost. If you are an AMSAT member, please mention your membership number. Ron's QTH is:—94 Herongate Road, London, E12 5EQ.

Contests

Result:—The results of the 2m. "Open" of Sept. 3/4 are to hand. In the Portable section, the Hastings Electronics and Radio Club, G6HH, was the winner with 6035 points and GW3OXD, the Albright & Wilson ARS, came second with 5465 points. In the Fixed section, the University of Kent ARS station, G8KUC, was first past the post with 3656 points. In second spot with 2984 points was the G8IQO/G8DRD/G4FDW team. (*Tlx* GB2RS News Bulletin.)

Coming Event: The last VHF contest of 1977 is the 144 MHz Fixed on Dec. 4, from 0900-1700 GMT.

E-M-E Experiments

The power budget for 2m. Earth-Moon-Earth communication is such that very high *e.r.p.'s* are used to overcome the average 253 dB path loss. Those limited to 150 watts DC input would need very large aerial gains usually only attainable by large dishes or ambitious stacked arrays. However, large aerial gains can be achieved by simpler, wire aerials the main disadvantage of which is that they are fixed in direction.

The A.E.R.E. (Harwell) ARC have adopted this latter approach by erecting a 50 wavelengths-per-side wire *rhombic* aimed at a true bearing of 290° and based upon a design by VK3ATN and K0MQS. The aerial is 30 feet high and on Nov. 3, using a souped up *FT-221R*, they copied

K5MWH from Texas at RST 539. Chris Bartram, G4DGU, says his signal actually moved the S-meter! Future experiments will be to try some two-way E-M-E contacts and to install a stacked array for further gain.

Meteor Scatter

The recent *Orionids* shower was a non-event with no more pings than are experienced randomly. The next major shower is the *Geminids* from Dec. 12 to 15 with the peak on the 14th. The dedicated MS operators have already fixed up their main skeds but there will be plenty of random contacts. To avoid causing unnecessary QRM please keep well clear of 144-200 and 144-100 MHz, the internationally agreed, random SSB and CW MS frequencies. MS is a rather specialised art—see notes in last month's column.

EA3AIR and EA3PL combine their MS activity. The local noise level in Barcelona makes MS impossible so they operate from a second QTH in AB48d. The only other MS operators in Spain are EA4AO in Madrid (YA42d) and EA5KF in Valencia (ZZ square) who runs 1 kW to a good aerial system. Keith Naylor, G8FUF (Essex), finally worked CT1WW *via* sporadic meteors on Sept. 18 exchanging RS 37/26 reports. Thus far, Clive Penna, G3POI (Kent), has not been so lucky with the Portuguese.

In a note to G3CHN, Jaques Guerin, FIJG (CD24g) says he is QRV for MS and has a sked lined up on Dec. 14 with OE5JFL. He will be on in the *Quadrants*—Jan. 2-4—and would welcome proposals for skeds with G, GI and GW stations. He is limited to SSB and seems to favour 144-165 MHz or thereabouts. His QTH is simply:—Petit Sonnailler, F-13200, France.

Four Metres

Ray Elliott, G4ERX (Essex), is now QRV on 4m, achieving his first aim of being on all bands from 160m. through 23 cm. on most modes, too. Alan Scott, G4BYP (Merseyside), found the 4m. Fixed contest on October 23 very disappointing and wrote:—" . . . I could not muster the enthusiasm to continue after only working four stations in the first two hours!"

Angus McKenzie, G3OSS (London), agrees about the poor conditions but nevertheless managed 55 QSO's, the furthest being GU3HFN and G3JYP (Cumbria). G3WCS from Merseyside was a consistently good signal and so was G3PFM (Dorset). Angus heard GD2HDZ but not one *GW*. He feels activity was good considering the conditions and commented upon the excellent standard of operating and quality of signals.

Two Metres

No doubt that the main excitement was the fine tropo. opening to central Europe on Oct. 14/15. John Heys, G3BDQ (Hastings), really seems to have had the very best of it with no less than *nine* OK's worked including OK3CDI/P (K101d). The others were, OK1AGE/P (HK29b), OK1AIY/P (HK28c), OK1KKT/P (HK17f), OK1LD/WBK (HK70g), OK1OA (HK63e), OK1VFJ (IK51b) and OK2KRT (JJ41j), all worked between 1840 and 2045 GMT on the 14th. In the period 1335-2005, John seems to have had a private duct to OK1AGE/P who was S6 with his key up and S9-plus-40 dB with key down! Also on CW, and starting at 1803, East Germans DM2CZI (FL66e), DM2BYE (HM53a), DM2BOM / 5WN (GK15e), DM3FML/OML (GL79e) and DM3SB (FN58d) were worked while SSB yielded DM2CJK (FK12c) and DM4PSN (GK07c). Three Polish stations were also worked on the key:—SP6FUN (IL53c), SP9EWU (JK56c) and SP9KDE (JK55c). Two Austrians were contacted on SSB:—OE2CAL/P2 (GH16e) and OE3HJW/P3 (HH17f) with OE5JFL (GI48h) on the key on the evening of the 14th. The DX faded out at 1858 on the Sunday after John had worked on SSB, OE3WBA/P3 in HH25a.

The high pressure system responsible for these conditions was a little too far to the east for most UK stations, however. G3BDQ mentions a QSO with PE1ARC on the 18th in which the Dutchman said he had worked 40 SM's, many OZ's, "... and some OH's" that morning.

Roger Thorn, G3CHN (Devon), found this opening, "... quite unexceptional..." even though he did work SP9FG (JJ70b), however, the two LX's heard seemed only interested in working OK's. Roger

THREE BAND ANNUAL VHF TABLE

January to December 1977

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	
G3OHC	51	7	60	15	32	9	174
G2AXI	47	7	53	20	36	7	170
GD2HDZ	41	5	57	14	39	10	166
G8HBQ	—	—	70	14	54	10	148
G8GML	—	—	66	14	54	12	146
G4BYP	25	5	57	12	31	9	139
G3XCS	44	6	53	19	10	4	136
G3FIJ	37	5	52	11	24	6	135
G4FCD	36	2	69	19	3	1	130
G8LEF	—	—	66	17	36	11	130
G4ECQ	44	4	65	15	—	—	128
G4GEE	—	—	54	15	41	10	120
G8BKR	—	—	70	16	28	6	120
G8HHI	—	—	57	15	36	11	119
GM4CXP	18	2	55	21	14	8	118
G4DWZ	26	3	52	13	17	4	115
G8HQJ	—	—	58	17	28	10	113
G8IFT	—	—	61	13	31	5	110
G4AEZ	29	6	37	12	17	4	105
G4ERX	3	1	50	13	29	7	103
G3FPK	—	—	77	23	—	—	100
G3BW	—	—	49	12	30	7	98
G4CMV	—	—	69	15	7	2	93
G4DEZ	—	—	17	21	—	—	92
G4FOR	—	—	62	16	7	2	87
G4FBK	—	—	58	14	12	1	85
G8ITS	—	—	48	10	23	4	85
G4DKX	7	1	37	11	19	6	81
G8JHX	—	—	61	18	—	—	79
G8KSS	—	—	57	17	—	—	74
G8LHF	—	—	58	14	1	1	74
G8JJR	—	—	58	15	—	—	73
G8GII	—	—	31	5	28	6	70
G8MKW	—	—	51	12	—	—	63
G8JGK	—	—	46	12	—	—	58
G4GCQ	—	—	45	9	—	—	54
G4GET	—	—	40	7	—	—	47
G8IZY	—	—	38	7	—	—	45
G4FKI	—	—	21	5	4	1	31

managed SK7CE in a tropo opening on Oct. 26. Back in September, he was lucky enough to contact EI4CM when Paul was in UO and VO

squares but missed him in UN.

Mark Deutsch, G3VJG (London), reported that OY1A told him that they had watched British TV up

there all evening on Oct. 15. Dave Johnson, G4DHF (Grimsby) missed the start of the mid-October opening but still reckons it to have been one of the most spectacular tropo. events so far experienced. He did work OE3WBA/P3 on the afternoon of the 15th but was disappointed by the poor operating tactics of some north Midlands stations who chatted amongst themselves whilst the OE was in QSO with others. OK1AGE/P was worked on CW and DM2BEN/P (GK05g) answered a "CQ" call. A PA0 was heard calling "CQ OY." During the evening of the 15th, many Germans in EF, EJ and EM squares were heard/worked, mostly RST 52/39 but with fairly regular S9 meteor pings every 15-20 seconds. Dave caught the aurora on Sept. 22 but it was very weak. He finds it exceedingly difficult to copy *Au* signals at 25 w.p.m. and wonders why operators do not QRS a bit.

Bob Nash, G4GEE (Coventry), was in on the Oct. 14/15 fun and worked DB1DIA (EL62h) on SSB and DJ2MG (FJ26d) on CW for a couple of new squares. DD2KN (DL62g) was Bob's first continental YL QSO. G8FUF has increased his squares total to 207, some of the new ones being OK2KWF/P (IJ), DM2DLD (GN) and OK1QI/P (IK) worked on the Oct. 14/15 weekend. Other recent successes were G3OUR/P (WJ), F6CQQ (BD), EA1CR (XD) and EA1BL (WD).

A warm welcome to another new correspondent John Morgan, G8NCC (Warks.), currently at college in Cardiff. He runs a *Trio TR-2200GX* on FM and an *Icom IC-202* on SSB. At college, John uses an *HB9CV* aerial on the balcony railings with which he worked EA1CR on Oct. 14. Mobile and portable operation is also indulged in.

Alistair Simpson, GM8NCM, (Fife), reports exceptionally good conditions on October 15 when twelve new QTH squares were worked. His best DX was OE3WBA/P3 at 1550 km. using the *Yaesu FT-221R* and 8-over-8 aerial. He was able to access the DB0XJ repeater (FM64b) and found many strong repeaters on R2 through R8.

Kay Bennett, GW8CFQ (Clwyd), had a QSO with HG5AIR (JH47j) around 0400 GMT on Oct. 15

lasting *one-and-a-half hours*, according to G8JHL. It is rumoured that G8HDS heard a UR2 on CW at 0200 on the 15th and it would be interesting to learn if any "real DX" was heard/worked in the mid-October period.

On Oct. 25, conditions were up to the west and EI5DA (WN28b) in Co. Louth was worked on CW, followed by G14FME (WO27h) in Co. Tyrone. The band was again open to Ireland the following evening when G18KIA and EI5DA were contacted on SSB and on CW, G14GID in Lisburn, Co. Antrim. The aurora of Oct. 27 produced many GM stations but obviously not the DX worked by more northerly stations. Conditions during the CW contest on Nov. 5 were very poor towards the north, with GB3NEE in the noise. Even so, activity seemed reasonable. Bryn Llewellyn, G4DEZ (Oxon.), chalked up 56 contacts in the contest including GM and DL and it seems that leading participants had around 70 QSO's.

Seventy Centimetres

G3AUS (Devon) wrote to correct the report of his 2m. activity mentioned in last month's column; seems Bob does not use that band very much. In fact he contacted EA1AM (XD32) at 0820 on Sept. 11 for probably the first G/EA QSO on 70 cm. since confirmed. During the Oct. 14 lift, Frank Howe, G3FIJ (Essex), added new squares DI and EI thanks to F0MD and DJ7FJ/M respectively, the latter also contacted by John Tye, G4BYV (Norfolk). John also worked SM5DWC (IT) as did G3LQR and G4BEL.

Twenty-three Centimetres

Harold Meerza, BRS 34348 (Kent), copied a QSO on SSB between G3VPK and G3ZIV (ZN16j) in N. Yorks. during the Oct. 26 lift. The previous night, G3ZIV had worked G3AUS in Devon with his home built 144/1296 MHz transverter. Back on Sept. 11, G3AUS worked into HB9 and G4BYV passes along the news that Simon Freeman, G3LQR (Suffolk), worked OK1KIR/P for perhaps a G/OK "first" on 1296 MHz? Others worked by Simon in the October lift included ON5GF (CK),

DC6BUA (EK), DCS6J/P (EK), DC7HM (VM), DF1EQ (DL), DJ3ZU (DL), DK2UO (DL) and DL7YCA (CM). 90 per cent of these contacts were from direct CQ calls on 23 cm. He also had a one-way QSO (crossband?) with SM0DFP (ET). G4BYV also had a good response to his direct CQ calls which brought QSO's with ON5GF, PA0ZM (DM), DC3QS (DM), DC6MV (DK), DC8BB (EM), DF8QK (DM), DJ5BV (DK), DJ6MB (DK), and DK0SF (FL).

Scientific Studies

While it is very gratifying to work some DX during times of anomalous propagation, it is just as important that such events are properly reported for scientific study and this is why auroral and *E's* openings are covered in some detail in this feature. When you hear an aurora, even if you do not work anyone, please record the times, signal strengths, beam headings (QTF) and QTH locators of the stations heard/worked, as well as their calls. Of particular interest is the Doppler shift. For instance, during the event of October 27, it was possible to copy at G3FPK both the direct, tropo. signal and the auroral return from G5YV and G4CZP and to note the considerable Doppler shift.

Short Wave Listeners can play a very useful part in these studies and it is suggested that rather than work stations you have already contacted previously, you may like to attempt measurements of the Doppler shift where possible. Obviously, if the reflecting "curtain" is moving towards you, the return frequency will be higher and *vice versa*. The amateur who coordinates all these data is: -G2FKZ, 61, Merriman Road, London SE3 8SB, so drop Charlie Newton an *s.a.e.* for a few RSGB report forms.

Deadlines

All your reports and comments and entries for the tables for the January issue by Dec. 1 and for the February feature by Jan. 5 to: - "VHF Bands," SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts., AL6 9EQ. 73 de G3FPK.

THE MONTH WITH THE CLUBS

By "Club Secretary"

COMING back to the Leicester Show for the first time for some years, one of the unexpected pleasures was that so many club secretaries "made their number" at quiet moments—it's a pleasure to put a name and a face together when a card is taken from the file each month. Great—keep up the good work!

However, after coming back to the shack we now must off-jacket and get stuck into the pile for this month, including the ones we picked up at the Show; straight through the pile this month!

For a start, let us look at B.A.T.C., who have their "centenary" 100th issue of their magazine "CQ-TV." It seems odd to recall that your scribe was a member in those far-off days when Mike Barlow, G3CVO, was the chap who "made it all happen." Now, nearly thirty years later, there are several hundred members and a thriving group who themselves mount a stand at the Leicester show and other events. Details from the Hon. Sec.—see Panel for his address.

At Peterborough the group have their next get-together on Friday December 16, for a film-show and Christmas Party. The Hq. (which is where the festivities are being held) is at the Scout Hut, Occupation Road, Peterborough.

At Cheltenham, the amalgamation activity between the Club and the Group seems to be going fairly smoothly; so if you head for the Old Bakery, Chester Walk, behind the Library at about 2000 on the first Thursday in December or January, you'll be able to meet the gang.

A.R.M.S. covers the interests of the chaps who like their operations to be /M; and of course G3FPK of VHF Bands, does the chore of Hon. Sec. and Newsletter-editor rolled into one with his usual efficiency. If you are, or are considering, /M operating then this surely is the one for you.

Oddly enough, in its own way, our next one also has an interest in the mobile operators—UK FM Group (London). At this moment, they are a little worried as to the future of the repeater system on which all their activities are based. They need have no fear on that score; several "anti-repeater group" people came to the SHORT WAVE MAGAZINE Stand and they described the repeater operation—every man-jack among them—as being like Citizens Band, although a question from the Editor led them to say they had never actually heard Citizens Band in the U.S.A. The joke of it all is that every one of them was led into volunteering the information that they had themselves at one time or another been guilty of deliberate infringement of licence conditions, in most cases to the extent that the authorities had shut them down for periods. Now, the writer isn't exactly pro-repeater, but he does have an overall view, and he did listen to the Editor chatting with these chaps and getting them to volunteer all this. It adds up to us as saying that these fellows feel that they want to be allowed to break the

terms of their licence at will, the while they also want to debar others from using the licence in a way that is quite legal—on the argument that this legal way of operating is like another type of radio which they have heard of as going on in a country which they have never been to! That, we submit, is as daft as the guy who operates NBFM in the hopes of getting a DXCC on 14 MHz! Anyway, the "argument" offered indicates a state of mind; maybe a dozen devoted ones have this sort of idea, and most of them will also be members of the National Front or the Communist Party for equally ill-argued reasons; they are a liability to society at large and in previous times would have been detained in Bedlam. To return to our business, contact the Hon. Sec. for the details of group membership, dates and venues.

Deadlines for "Clubs" for the next three months—
 (For January issue—November 25th)
 For February issue—December 30th
 For March issue—January 27th
 For April issue—February 24th
Please be sure to note these dates!

At Silverthorn they have a stately home as Hq.—Friday Hill House, Simmons Lane, Chingford, where there is a shack, a lecture room, and all sorts of facilities such as one would expect in a building used for community purposes generally. Every Friday at Friday Hill House!

R.A.I.B.C. like BATC were also in evidence at the Leicester show, and no doubt many members, and supporters for that matter, took the time out to make a personal contact at this focal point. If you know of anyone who could be interested in radio, as SWL or transmitter, you should point them at the Hon. Sec.—see Panel. And, we could add, it wouldn't be a bad idea for you active and fit types to join as representatives or supporters too.

Derby have their place at 119 Green Lane, Derby, each Wednesday; on 7th there is a Junk Sale, while on December 14 they have a Constructor's contest. The Christmas Party is on December 21, and on 28th they will look back at the last twelve-months of the club and its members.

The report from Clifton indicates that they are still going strong; they are to be found every Friday at eight, at the Hq. address of 225 New Cross Road, London SE14. We were a little amused by the sad tale of their D/F event in which one team failed to find the start, let alone the finish—but all credit to them for admitting it! They sound a pleasant lot to be with.

R.A.F. A.R.S. announce their "members contest" in a letter from Locking—the details will be found in *CDXX*, but it is for us to comment that this is a very active outfit, and anyone who has R.A.F. associations past or present could do worse than join; details from the Hon. Sec.

It's the first Monday in the month for Southdown, at their Hq., Chaseley Home, South Cliff, Eastbourne; the

routine only changes at Bank Holidays when, if they clash, the booking is put back a week. December 5 is to be the AGM, and in addition they have a visit to *MV Senlac* at Newhaven Harbour down for 0900 on December 11. More details from the Hon. Sec. at the address in the Panel.

The upstairs room at the Constitutional Centre, Warwick Road, Redhill is the venue for the formal Reigate meetings, and the date December 20 for a Constructional Contest and demonstration of the club project. However, earlier in the month, namely on 6th, there is the Natter session at the Marquis of Granby.

Now to the Medway group and here we have the very best of reasons for not being able to give a firm date. This is because, they hope, it will be possible to call an Extraordinary General Meeting to discuss a new home for the club which they will own for themselves and not just hire for each meeting. Good for them—and we suggest you get in touch with the Hon. Sec. at the address in the Panel. However, we can say that the programme says "every Friday" as well, which will give you a start!

From Medway to Milton Keynes from whom we have a note of a change of Hon. Sec.—see Panel for details. They will be at Lovat Hall, Silver Street, Newport Pagnell, the kick-off being at 2000; December 12 is a talk with the intriguing title of "ETC—Where are We?" which will be given by Mr. D. Robinson.

Acton, Brentford & Chiswick are at Chiswick Trades and Social Club, 66 High Road, Chiswick, London W4,

on Tuesday December 20, when G3IGM will demonstrate his new two-metre SSB Transmitter and its Linear.

The Dolphin Hotel, Bournemouth, is the home of Wessex (Bournemouth) group on December 2 and 16; the first is a series of short lectures on various topics relevant to R.A.E., such as interference and licence conditions, and the latter date is down for a talk on D/F both Top Band and two-metre variety. We also notice a Skittles evening with the South Dorset chaps, at the Prince of Wales, Puddletown, for details of which G3YWG is the contact. Bournemouth's Hon. Sec. is at the address given in the Panel.

December 14 is the date for Crawley, with the AGM also "in the pipeline" for January 25. The former is down for a Members Evening. The venue, as ever, is Trinity United Reformed Church Hall, Ifield.

A little further to the north and left a bit brings you to South Manchester, where they are "regulars" every Friday evening at Sale Moor Community Centre, Norris Road, Sale. December 2 is for a talk by G8MQW called "Simple Introduction to Microprocessors," which is a good lead-in to the Club Quiz on December 9. G4AOK takes over on December 16, to talk about the Demodulation of FM Signals, and on 23rd there is, naturally enough, a Christmas Party! On the other hand, December 30 sees the club still closed. As if all this were not enough, the informals on Monday evenings in the club shack at Greeba, Shady Lane, Baguley, continue weekly.

Names and Addresses of Club Secretaries reporting in this issue:

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, Acton, London W3 8LB. (01-992 3778.)

A.R.M.S.: N. A. S. Fitch, G3FPK, 40 Eskdale Gardens, Purley, Surrey CR2 1EZ.

B.A.T.C.: M. Cox, G8HUA, 13 Dane Close, Broughton, Brigg, South Humberside.

BRISTOL CITY (RSGB): B. L. Goddard, G4FRG, 2 Greenfield Park, Fortishead BS20 8NQ. (Bristol 848140.)

CHELTENHAM: G. D. Lively, G3K11, 26 Priors Road, Cheltenham (34785), Glos.

CHICHESTER: T. M. Allen, G4ETU, 2 Grange Cottages, Colworth. (Chichester 88069.)

CLIFTON: R. A. Hinton, 42 Sutcliffe Road, Welling, Kent.

CORNISH: H. F. Adcock, 1 Bowglas Close, Castle Road, Ludgvan, Penzance TR20 8HD. (Corkwall 562.)

CRAWLEY: G. C. Reid, G3OUX, 11 Coombe Close, Langley Green, Crawley RH11 7TP, West Sussex.

CRYSTAL PALACE: G. M. C. Stone, 11 Liphook Crescent, London SE23 3BN. (01-699 6940.)

DERBY: Mrs. J. Shardlow, G4EYM, 19 Portreath Drive, Darley Abbey, Derby DE3 2BJ.

ECHELFORD: R. S. Hewes, G3TDR, 24 Brightside Avenue, Laleham, Staines, Middx.

EDGWARE: P. D. Ling, G4BZY, 42 Greencourt Avenue, Edgware, Middx. (01-952 2495.)

FARNBOROUGH: C. J. Beezley, G4FEA, 152 West Heath Road, Farnborough (49481), Hants. GU14 8PL.

GLENROTHES: A. Long, GM4BRM, 31 Church Street, Glenrothes, Fife.

GUILDFORD: L. Bright, G4BHQ, 4 Dagley Farm, Shalford, Guildford, Surrey.

HEREFORD: S. Jesson, G4CNY, 181 Kings Acre Road, Hereford.

INVERNESS (Technical College): W. Lee, 36 Old Mill Road, Inverness (37254) IV2 3AR.

MAIDENHEAD: M. Adams, G3ZLQ, 76 Blind Lane, Bourne End, SL8 5LA.

MEDWAY: P. J. Poole, G4EYV, 5 River Drive, Strood, Rochester, Kent ME2 3JW.

MELTON MOWBRAY: R. Winters, G3NVK, 32 Redwood Avenue, Melton Mowbray (3369), Leics. LE13 1TZ.

MILTON KEYNES: F. Walters, 2 Queen Street, Stony Stratford, Milton Keynes, Bucks.

NORFOLK: P. W. Forster, G3VWQ, 12 Thor Road, Thorpe-St.-Andrew, Norwich NR7 0JS.

PERTH: R. Grant, GM4DQJ, 31 Stormont, Scone, Perth PH2 6SD.

PETERBOROUGH: L. C. Critchley, G3EEL, 36 Waterloo Road, Peterborough, Cambs.

R.A.F.A.R.S.: Admin. Secretary, R.A.F. Amateur Radio Society, R.A.F. Locking, Weston-super-Mare, Avon BS24 7AA.

R.A.I.B.C.: H. Boutle, G2CLP, 14 Queens Drive, Bedford MK41 9BQ.

REIGATE: F. H. Mundy, G3XSZ, 2 Conifer Close, Reigate (43130), Surrey.

ROYAL NAVY: FCRS M. Matthews, G3JFF, c/o Royal Navy A.R.S., H.M.S. Mercury, Leydene, Hants.

SILVERTHORN: C. J. Hoare, G4AJA, 41 Lynton Road, South Chingford, London EA 9EA. (01-529 2282.)

SOUTHDOWN: B. Chuter, G8CVV, 15 Coopers Hill, Willingdon, Eastbourne, East Sussex BN20 9JG.

SOUTH MANCHESTER: W. L. Seddon, G3VIW, 12 Barwell Road, Sale, Cheshire M33 5FF. (061-973 3355.)

STOURBRIDGE: A. Dewsbury, G4CLX, 10 Rectory Road, Oldswinford, Stourbridge (3530), West Midlands.

SURREY: S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon CR2 8PB. (01-657 3258.)

SUTTON & CHEAM: J. Korndorfer, G2DMR, 19 Park Road, Banstead, Surrey.

TORBAY: M. Yates, G3UIQ, Top Flat, 23 Waverley Road, Newton Abbot (3025), Devon.

UK FM GROUP (London): R. G. Street, G3TJA, 3 White Ledges, St. Stephens Road, London W13.

VERULAM: B. Pickford, G4DUS, "Netherwood," 130 The Drive, Rickmansworth (77616), Herts.

WESSEX (Bournemouth): G. D. Cole, G4EMN, 6 St. Anthony's Road, Bournemouth BH2 6PD. (0202-20027.)

WIRRAL: H. I. Crofts, G3DLF, 3 Barnmouth Road, Wallasey. (051-638 2515.)

WOLVERHAMPTON: J. Cook, G8EDG, 75 Windmill Lane, Castlecroft, Wolverhampton WV3 8HN.

YORK: K. R. Cass, G3WVO, 4 Hewarth Village, York.

The West Country is represented next, by way of Torbay who have Hq. at Bath Lane, rear of 94 Belgrave Road, in Torquay. For December it is the Christmas Party on 10th, this year being held at the Community Centre, Kingsteignton Road, Newton Abbot. On a different tack, members who seek a QSO with EP-land could do worse than note that member G3SXW is now operating from Tehran as EP2IA, looking for home contacts around 14030 kHz.

At York we know they are to be found every Friday *except* the third one of each month at the United Services Club, 61 Micklegate, York. In recent weeks they have had a first run in the Jamboree-on-the-Air, and an excellent Annual Dinner, not to mention having battered the local Education Authority into offering an R.A.E. class—which was over subscribed in the event! Such a response must have been very gratifying, as there is nothing harder than making a local government set-up move from a pre-decided position, short of putting a bomb in its pants!

Verulam have their place at the Market Hall, St. Peter's Street, St. Albans on the fourth Thursdays in each month, the subject for December being not known to the writer at this moment—but either a visit (or a note to the Hon. Sec.—see Panel)—will certainly be worthwhile. The second Thursday of each month is the informal evening, this one being held in the R.A.F.A. Hq. in Victoria Street, St. Albans.

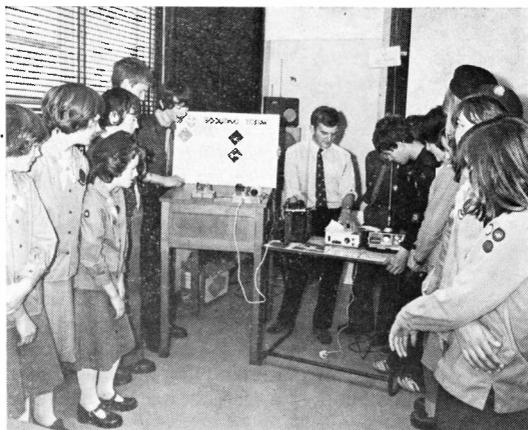
Monday December 19 is the date for Britsol RSGB group, their venue being Queens Building, University Walk, Clifton, Bristol. On this occasion they have a diet of Potted Lectures, three or four of around 20 minutes each given by speakers to be announced on the night. 1900 is the start time for this mystery tour.

The Wolverhampton Hq. address is at Neachells Cottage, Stockwell End, Tettenhall, Wolverhampton, on Monday evenings December 5, 12, and 19; December 26 and January 2 will be skipped. The first date mentioned will be down for G3VPE, the Regional Representative for Region 3, to come along and explain all about the inner workings of RSGB; the second date is a Natter session, and on the 19th they will venture forth from the clubroom to a local alehouse for Seasonal potatoes.

Edgware have the second and fourth Thursdays of each month at the Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. A Junk Sale occupies December 8, but for this month the other December date is passed as it would fall rather near to Christmas.

New Ones

To our amazement, both in Scotland—which country normally keeps its club news very dark. Right to the North first, to Inverness Technical College, which in fact has been running for some few months. The Chairman writes on their behalf, the Hon. Sec. having recently had to resign his commitment for personal reasons. The group is mainly for the students, of course, but they positively welcome all radio amateurs who can attend. The meetings are on alternate Wednesday evenings in Room C30—the Electronics Lab—Inverness Technical College, Longman Road, Inverness. One wonders what has happened to the “old” Inverness club which we haven't heard of for years—two clubs in the same area would indicate a startling level of activity.



The JOTA weekend, Oct. 15th-16th. Above, Peter Hardy, G3VNH, gives a talk at the camp held at H.M.S. Mercury, Hq. of the Royal Naval Amateur Radio Society. Below, J. G. Barnes, G3AOS, with members of the 1st Hale Barns Scout Group.



Our second one is also in Scotland, and also is based on a Technical College. This one is Perth, where the work of GM4DQJ has been clearly recognised at the inaugural meeting when they shotgunned him into the Hon. Sec's. chair, with all the work it entails. They have every Tuesday evening between 1900 and 2130—and they also would like to welcome some visitors.

Returning to the established groups, we have a letter from Norfolk the first for a very long time; we well recall the fine Newsletter they used to put out as being one of the best of the bunch. They have now moved to Crome Community Centre, Telegraph Lane East, Norwich, every Wednesday evening, speakers being called upon for alternate dates. In addition they have been, and will go on, putting their talents in front of the public at special-event shows, and of course we must not forget the Annual Dinner on December 16 at Horning Ferry.

The Sutton & Cheam lads appeared at our Leicester Exhibition stand, and berated us for the date we picked for MCC—a fair comment, but of course we did announce the date along with the results of the previous MCC

just because so many groups didn't like a November date! Luckily, we've broad shoulders and it was all in good spirit. The group have two places to meet, namely Rays Social Club, London Road, North Cheam, and Sutton College of Liberal Arts, Cheam Road, Sutton. For December it will be the first-mentioned, on December 14, for the Christmas meeting. There will be a committee meeting however, at the other place—just to keep the seats warm!—on December 7.

At **Maidenhead** the Hq. is at the Red Cross Hall, The Crescent, Maidenhead, on the first Thursday and the third Tuesday of each month; the formal for December will be December 1 for a constructional competition.

It looks to be the first and third Wednesday for **Surrey**, at their Hq. in *TS Terra Nova*, the local sea cadets Hq. For December we understand that the main meeting will be a combination of a Christmas Party and a call for help!

At **Wirral** your scribe was saddened to note that the Newsletter editor had found it necessary to ask some members to be quiet while a speaker is on his feet—not for the lack of courtesy as such, but for the fact that the main offenders are younger members. However, you can always pay a visit to the Sports Centre, Grange Road West, Birkenhead, on the first or third Wednesday of each month, to find out for yourself whether the Newsletter editor was in earnest, or just “having a stir” in his final, 72nd Newsletter!

Hereford have a prize group of workers—they set out to raise some £300 for a club transceiver, then decided that they wanted a Trio TS-520, which meant they had to go after another £100 if they were to buy new. So—they are back in the fund-raising business! The group Hq. is at the County Control, Civil Defence Hq., Gaol Street, Hereford, where they may be found on the first and third Fridays in each month.

At least someone reads this column—we questioned the origin of the **Stourbridge** informal meeting-place's name, and got the reply that they don't know either! The main meeting is at Longlands School, Brook Street, Stourbridge, as are the new Construction/CW sessions, while the informals are in the Shrubbery Cottage pub, Heath Lane, Stourbridge. The latter is on December 6, the day after the Construction/CW session on 5th; the “main” one will be December 19 for the Grand Surplus Sale.

For **Melton Mowbray** December 16 will be firstly a Junk Sale and then, more importantly, the presentation of the G3FDF Memorial Trophy to bring back memories of a long-serving and loyal club member. The venue, as always, is the St. John Ambulance Hall in Melton Mowbray.

It's the first Tuesday and the third Thursday for the **Chichester** crowd, the Hq. being the Lancastrian Boys School. How to Home-Brew will be the topic on December 6, with G2DZT passing it all on, and of course on December 15 it will be near enough to Christmas to throw a party! On a different tack, that famous old call of G2NM has been used on the air again, having been re-issued to the club, with the full permission of the family of the late G2NM.

Up to GM again, to hear that GM3YOR has relinquished the office of Hon. Sec. at **Glenrothes** to

GM4BRM; Drew adds that the group still foregather at the Club Rooms, Provosts Land, Douglas Road, Leslie, every Wednesday evening. In addition they have an “Open Night” as in past years at the Laurel Bank Hotel, Markinch, set for November 23—what a pity we didn't hear of this last a little earlier!

A change of shape and of print-size signals that the **Echford** Newsletter has a new editor; he says on the front page that the venue is The Hall, St. Martin's Court, Kingston Crescent, Ashford, Middx., on the second Monday and the last Thursday of every month.

WAMRAC is the Methodist Church group, and accepts as associate members those of other denominations. They most certainly have recovered well from the loss of their founder, under the wise control of G3AGX. For details of the group, write to him at the address in the Panel. It is nice to see that at their recent Conference, the collection at the Sunday service was some £7.50 which was passed on to RAIBC—a practical gesture indeed.

After just a short time out of office, we hear that once again the Newsletter of **Crystal Palace** (and the Hon. Sec. chore too!) reverts to G3FZL, who did the job for so many years before. On Saturday December 17 they have a Film Show and Christmas Party, while the new informal session for December is on December 6 *chez* G3IIR.

Just so the lads can listen to it, G8CQM will be playing his tapes of CB activity in the States for **Guildford** on December 9, while on 23rd there is a Natter Nite. The Hq. is at . . . but now we read that the lads have been asked to remove their magazines, etc., from Guildford and District M.E.S. (Model Engineering Society?) which is as near as we can get, so we must refer you to the Hon. Sec.—see Panel.

Farnborough have a place at the Railway Enthusiast's Club off Hawley Lane, on the second and fourth Wednesdays of each month, and also have a quarterly Newsletter with a quite magnificent picture of a formation of aircraft apparently flying between the elements.

At **Cornish** they have the Christmas Social Evening on December 1; but we are not sure whether the meeting will be at the old venue or not, so for this information we suggest you contact the Hon. Sec.—see Panel.

Our final stop is with the **Royal Navy** group; they have a very fine Newsletter with plenty of both the technical and the personal touch—well worth a sub for this alone! Details from the Hon. Sec.—see Panel.

Finale

Which is where we do a bit of reminding—the deadline dates are in a “box” in the body of the piece, which means that by now you will have the January news all sent off. This year we will try to have both an abbreviated “Clubs” as well as the MCC report which, the feedback says, must be a bit more detailed than in the past few years—O.K., point taken! The address is as ever, Club Secretary, **SHORT WAVE MAGAZINE**, 34 High Street, Welwyn, Herts. AL6 9EQ. Meanwhile, may we take this chance to offer our best wishes for Christmas and the New Year.

A THERMOSTATICALLY CONTROLLED OVEN FOR THE VFO

N. H. SEDGWICK, G8WV

WE had a amateur-radio problem which dogged us for many years and which must surely have been experienced by many other amateurs. The "shack" is indeed a shack which lives down the garden and is not an economical proposition to keep heated all the time during winter. Thus, the frequency determining components of the VFO were subjected to very considerable change of ambient temperature on every occasion that we decided to spend some time in the shack and put on heating in cold weather so that the VFO frequency drifted for a couple of hours or so.

Now there exists a great wealth of literature which deals with making oscillators stable, and the number of VFO's that we built over the years must have run to twenty or more. But they all drifted in much the same degree, and slowly it dawned upon us that the speciality which gives the claimed excellence for all of these various circuits is isolation of capacity changes in the amplifier part of the oscillator from the LC circuit which fixes the frequency. The isolation is achieved either by swamping inter-electrode capacities, etc., with a much higher capacity across that part of the tuned circuit presented to the amplifier (as in the Clapp), or by reducing the coupling capacity into the amplifier to a very low value which appears in series with any stray or inter-electrode capacity from the amplifier (as in the Franklin), and is useless in stabilising frequency if the drift is caused by direct temperature change of the LC circuit components as occurs when the ambient temperature in which they are placed changes.

Once the idea had been grasped that all these trick circuits assume room temperature to be steady it was clear that the only cure for frequency drift as experienced was to make the assumption true by putting the tuned circuit into a temperature controlled oven, and whilst this changed the tempo, it started a long period of frustrating experiment, for nowhere could any practical information on such matters be found.

Before embarking on making an oven an attempt was made to write down a technical specification by posing and answering questions which seemed pertinent to the requirement. These worked out rather like this:—

Q. 1: What components shall I put into the oven?

A. 1: As few as possible because once boxed, they will be difficult of access, and every time the box is opened it will take hours to settle down to steady temperature again. It depends on the type of oscillator to be used too.

Q. 2: All right, what type of oscillator?

A. 2: If a Colpitts/Clapp is used the quite large capacitor in shunt with inter-electrode and stray capacity will have to go in the oven as it is across the tuned circuit. Its power factor will get worse as it gets hotter. It will probably get brittle and ooze wax or other goo in the heat. Better to use a Franklin because the very low capacity couplings

can be home-made by soldering washers onto screws and making them up like the old-fashioned neutralising capacitors, so that they are adjustable and use air dielectric. Really depends on how much heat.

Q. 3: Yes indeed, how much heat?

A. 3: Ideally somewhat above maximum ambient temperature likely to be encountered. In fact it will have to be whatever is fixed by the thermostat available.

Q. 4: What thermostat?

A. 4: Ah, better get one out of a crystal oven. That is the same sort of requirement and should be somewhere around optimum.

Q. 5: What sort of heating/cooling cycle should one aim at?

A. 5: If the thermostat only switches off for a very short time it means the loss of heat in the oven is high. Wrap the oven up in fibre-glass lagging so that it holds its heat. If the thermostat only switches on for a very short period the heating power is too great and should be reduced. It is a fair bet that the optimum situation exists if thermostat on and off periods are of the same duration when room temperature is at an average. A small lamp on the front panel of the VFO is needed to indicate by glowing when the oven is heating. Commercial oven controlled devices in telecommunications seem to change over between heating and cooling every two or three minutes, so adjust oven insulation and heating power to give this sort of performance in an ambient temperature of say 20°C.

Q. 6: How do we calculate the heating power required to satisfy *A. 5*, size of element, applied voltage, etc.?

A. 6: We do not! We suck it and see and hope our guesses are intelligent. It is going to be a long job, so arrange the element in a way that enables it to be changed easily. We don't want the voltage very high because that would make the element wire thin and fragile to get enough resistance to limit the current. Let us start with 24 volts, which is nice and handy for available transformers. If we aim at a maximum of 2 amps that is 48 watts, and if we need more than that the thing will probably catch fire! Incidentally, that enables us to fix the wire size of the element to around 30 s.w.g. of nickel-chrome, which will not glow red hot at that current, but will enable a reasonable length to be used to make two elements for fixing on facing sides of the oven box.

Q. 7: Will an element on each side be enough or do we need them on top, bottom, and back as well?

A. 7: Don't know, but it's a very long and complicated job to fit them to every flat surface of the oven box. Let's start with the two sides and see how it works out.

Q. 8: What is this oven box?

A. 8: A metal box containing the thermostat, variable condenser, inductance, and coupling capacitor assembly for the Franklin oscillator. A larger metal box giving 3/4 inch or so clearance around

the inner box and the elements mounted on the insides of the side plates of the outer box, i.e. in the cavity between the two boxes. The whole assembly wrapped in 3-inch fibre-glass lagging. Size of the inner box determined by the components in it, but probably about three inches cubed.

At this stage the junk box was broached and an old 100 kHz crystal in an oven taken to pieces to provide the thermostat. This was quite large and the bi-metal part was in the form of a disc about one inch diameter. When heated it became convex very suddenly with a loud "plop" and the contact made. It was found to operate at 80°C, which seemed high, but it was obviously quite a precision job.

The VFO was built with this at its heart. Readings taken with a laboratory Centigrade thermometer (purchased quite cheaply at a local chemist's shop) pushed through a hole in the box showed no variation at all in temperature, once the device had settled. Only when the oscillator was set working did the snag show up. Every time the big thermostat operated, the mechanical shock caused the oscillator to jump in frequency. There was no way round it but to discard this mechanical hammer which called itself a thermostat and seek deeper in the bowels of the junk box for something gentler. This came to light in the form of a plug-in oven for HC6U crystals of the type currently advertised in a number of periodicals. The thermostat was a tiny strip contact of unpretentious appearance, and one needed a small hack-saw and some careful cutting to detach it from the oven, which was then completely wrecked. In the VFO it also held the oven to 80°C, but seemed light for the current it was switching. That trouble was eliminated by switching about 20mA DC to a relay with the thermostat contact and using one contact of the relay to apply AC volts to the elements and another contact of the relay to switch power to the "OVEN HEATING" indicator lamp on the front panel.

The junk box also provided the assembly for the heating elements. Some old components mountings consisting of strips of ½-inch wide bakelite fitted with turret lugs at ¾-inch intervals were cleaned and cut into four lengths each 3½ inches long. They were fixed along the top and bottom edges of the vertical sides of outer box in the cavity between the boxes, and the nickel-chrome wire strained up and down between opposite lugs to form a grill. Only the start and finish of the wire were soldered to the lugs, and the two elements so constructed were connected electrically in series.

The inevitable snag showed up as soon as power was applied. The neat and tight wire grills immediately went slack as the wire expanded with the heat, contact occurred with the metal of the box and the wire fused. This big expansion of the wire was quite unexpected but is clearly a feature of nickel-chrome. The insides of the box were then lined with asbestos sheet cut from oven mats with a *Stanley* knife, and the turret lug strips mounted on top of the asbestos, so clamping it flat whilst it serves to protect the wire from contacting the metal sides. Which brought us to Q. 9.

Q. 9: Where should the thermostat be mounted in the oven, relative to the components?

A. 9: It seemed sensible to place it right in the middle

of the oven in the air, and it was dangled thus on its connecting wires.

That answer was the worst guess of all and the thermostat was hopeless in that position, because the components were of necessity screwed down to metal surfaces which conducted the heat to them at quite a different rate from the conduction of heat to the thermostat by the air. After weeks of trial and error it was found that the best arrangement was to fix all components and the thermostat in the middle of them to one flat metal surface, and to group them as close together as possible.

The break-through now seemed to have occurred and the oscillator had become enormously stable by previous standards, which then introduced the problem of how to measure its stability. The VFO frequency range was 5 to 5.5 MHz and, in the absence of a digital frequency meter, another HC6U crystal oven was produced from the junk box and put into action with a 5.210 MHz crystal in position in an oscillator. We assumed this would have a much higher order of stability than the VFO, and that if one brought the VFO to zero beat with the crystal oscillator, any drift in frequency that followed could be blamed onto the VFO. By this time we were quite happy that the VFO was entirely adequate for its purpose in the transmitting rig, but it was nice to have a measurement of stability even if it was a bit approximate. In fact the measured frequency stability was disappointing when compared with advertised performances of similar commercial devices.

A law of diminishing returns operates in all development work. As one gets nearer to perfection further improvements become more and more time-consuming and expensive and provide less and less in the way of advantages. So with this one! We were looking for an improvement of a couple of parts in 10⁵ or so, and the oven was wrecked and built again twice before the trouble was located. It was very simple; the ¼-inch brass spindle of the tuning condenser extended out of the oven into the dial mechanism and changes of room temperature were conducted down that spindle direct to the tuning condenser. The cure was to cut the brass spindle short inside the oven and extend it externally by a piece of ¼-inch bakelite rod having much poorer thermal conductivity than the brass.

In practice the two-element arrangement was quite satisfactory for heating the oven, but the 48 watts of the original 'guesstimate' was rather high and we found 30 watts nearer the optimum, applying the criteria of A. 5. Nickel-chrome 30 s.w.g. is roughly 12 ohms to the yard, so the total wire used in the two elements was 57 inches.

The secret of the Franklin oscillator is to adjust the coupling capacities to be as small as is consistent with maintaining oscillation over the tuning range. The output of the oscillator is therefore small and a buffer amplifier is necessary. We did try using a twin gang condenser in the oven with one section tuning the Franklin and the other tuning the output of the buffer amplifier, but this spoils the frequency stability of the Franklin because load variations on the output were coupled into the Franklin tuned circuit by stray capacity between the two condenser sections. The final version of the VFO therefore has a separate output tuning control and an RF voltage meter for peak indication.

Since heating elements were only located against the two vertical sides it is not necessary to use a double box for the oven. A single die-cast box with two partitions fitted to provide enclosed compartments for the heating elements would serve admirably. One word of warning however; since the boxes are moulded, they

taper slightly, so that a tuning condenser screwed to a side will have its spindle not quite perpendicular to the top and bottom of the box. It is therefore better to mount the components on one of the partitions enclosing an element, as this can be set when fitted to bring the condenser spindle out perpendicular to the front panel.

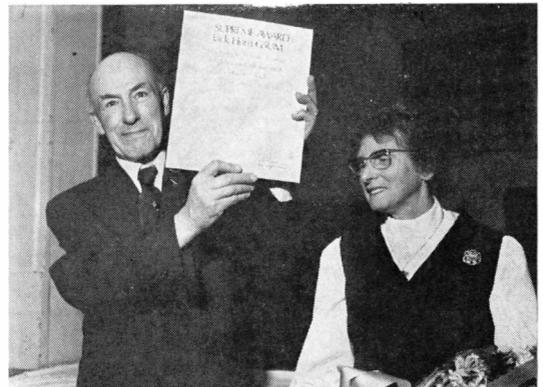
RECENT CELEBRATIONS AND PRESENTATIONS



At a recent meeting of the Farnborough Radio Society, Mike Hearsey, G8ATK, (left) presented Ken Alford, G2DX, with a copy of the "Blackwater Valley Award, No. 44" endorsed "In recognition of devotion to the amateur radio movement."



The Jack Hum, G5UM, half-century! Above, to celebrate his 50th year as a licensed radio amateur Jack held a dinner-party for a group of old friends whom he and his wife, Grace, had known for the last 25 years. Left to right, rear : G3BJC, G8VN, G6FI, Mrs. G3GGK, G3AAZ, G5UM, G3GGK, G3DXI and G2BLA ; front, left to right are Stella (Mrs. G3BJC), Jessie (Mrs. G3AAZ), Gladys (Mrs. G8VN), Grace (Mrs. G5UM), Eve (Mrs. G6FI), Joyce (Mrs. G3DXI) and Sheila (Mrs. G2BLA). When sending us this picture, G5UM recalled that he and the late Editor of SHORT WAVE MAGAZINE, G6FO, were licensed at almost exactly the same moment in 1927 and together did much to open up the then-neglected 160m. band. Below, Jack and Grace with the Certificate presented to him by fellow radio amateurs to mark his 50th anniversary. The Award reads: "The supreme award to Jack Hum, G5UM, for his unique 50 years of service and dedication to the true spirit of amateur radio."



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MMT144/28 :	144 MHz linear transverter. FEATURES : 10 Watts RMS output power. 30 dB receive gain. 2.5 dB noise figure. Aerial changeover achieved by a PIN diode switch.	MMT432/28S :	432 MHz linear transverter. Now fitted with 2 MHz upshift facility for OSCAR operation. FEATURES : 10 Watts RMS output power. 30 dB receive converter gain. 3 dB noise figure. Aerial changeover achieved by a PIN diode switch.
I.F.:	28-30 MHz.	I.F.:	28-30 MHz.
PRICE :	£79 + VAT. (£88.88 inc. VAT).	PRICE :	£119 + VAT. (£135 inc. VAT).
MMC144/28 :	144 MHz receive converter utilising protected dual gate MOSFETS. Typical gain 30 dB. Noise figure 2.5 dB.	MMT432/144R :	432 MHz DOUBLE CONVERSION linear transverter. Now fitted with a 1.6 MHz repeater shift. FEATURES : 10 Watts RMS output power for 10 Watts 144 MHz input. 10 dB receive gain. 3 dB noise figure.
Other I.F.'s :	12-14, 14-16, 18-20, 24-26, 28-30 MHz.	PRICE :	Aerial changeover achieved by a PIN diode switch. 144-146 MHz.
PRICE :	£18 + VAT. (£20.25 inc. VAT).	MMC432/28 :	432 MHz receive converter featuring 2 RF amplifiers and a MOSFET mixer. Typical gain : 30 dB. Noise figure : 3-8 dB.
MMC144/28LO :	As above unit, but has an extra buffer amplifier at 116 MHz for use in transverters. Provides 5mW at 116 MHz.	Other I.F.'s :	14-16, 18-20, 28-30, 144-146 MHz.
PRICE :	£20 + VAT. (£22.50 inc. VAT).	PRICE :	£244 + VAT. (£27 inc. VAT).
MMC144/2 :	Double conversion 144 MHz receive converter which achieves good image rejection at low intermediate frequencies.	DIGITAL PRODUCTS	
Other I.F.'s :	2-4, 4-6 MHz.	MMD050 :	Six digit 50 MHz frequency counter. Frequency range : 0-45-50 MHz. Input sensitivity : Better than 50 mV RMS. £62 + VAT. (£66.96 inc. VAT).
PRICE :	£18 + VAT. (£20.25 inc. VAT).	PRICE :	MMD050/500 : Six digit 500 MHz frequency counter. Two ranges : 0-45-50 MHz. 50-500 MHz.
MMA144 :	Low noise preamplifier with two independent outputs. Typical gain : 18 dB. Noise figure 2.5 dB. ALSO AVAILABLE FOR 70 and 136 MHz.	PRICE :	MMD500P : Combined version of MMD050 and MMD500P. £79 + VAT. (£85.32 inc. VAT). Divide by 10 prescaler to give 500 MHz capability when used with MMD050 or similar counter. Fully TTL compatible. Output level is 2.5 volts p.p. Input sensitivity : Better than 200 mV. Frequency range : 50-500 MHz. £25 + VAT. (£27 inc. VAT).
PRICE :	£13 + VAT. (£14.63 inc. VAT).		
1,296 MHz		70 MHz	
MMC1296/28 :	1296 MHz receive converter utilising a hybrid ring mixer, with a matched pair of schottky diodes driving a MOSFET I.F. amplifier. Typical gain : 25 dB. Noise figure : 8.5 dB.	MMC70/28LO :	Similar to MMC144/28LO. Features buffered local oscillator facility at 42 MHz for transverter use. £20 + VAT. (£22.50 inc. VAT).
Other I.F.'s :	28-30, 144-146 MHz.	PRICE :	
PRICE :	£28 + VAT. (£31.50 inc. VAT).		
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Finally, if you have managed to read so far you certainly deserve our wish of a very Merry Christmas and a successful New Year.

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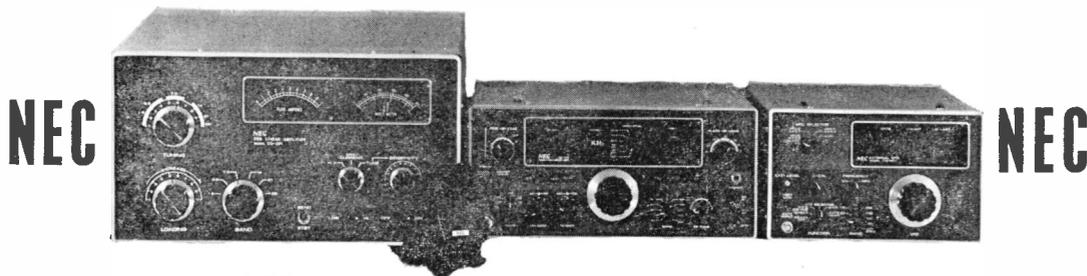
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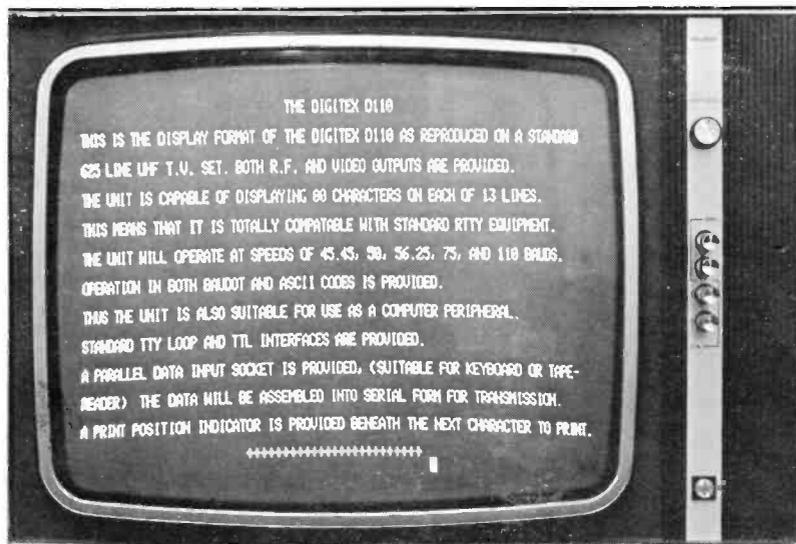
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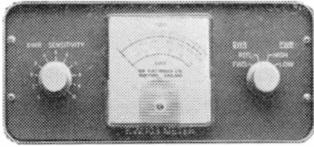
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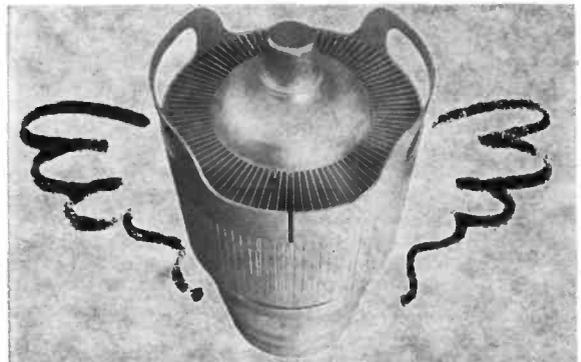
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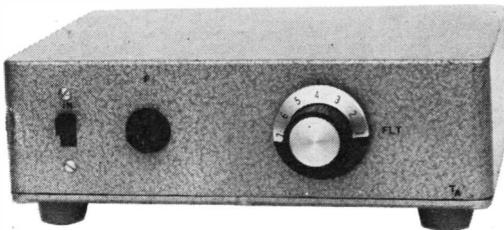
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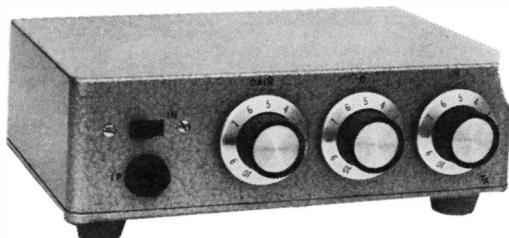
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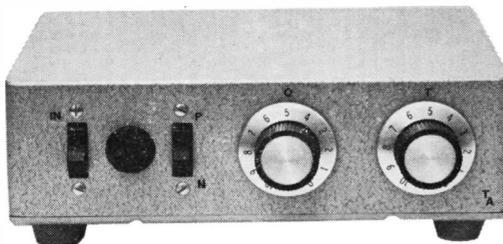
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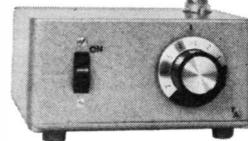


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	OUTPUT FREQUENCY																											
144-030 ...	b		b		b		b		b		b		b		b		b		b		b		b		b		b	
144-4/433-2 ...	a		a		a		a		a		a		a		a		a		a		a		a		a		a	
144-480 ...	a		a		a		a		a		a		a		a		a		a		a		a		a		a	
144-800 ...	b		b		b		b		b		b		b		b		b		b		b		b		b		b	
144-850 ...	b		b		b		b		b		b		b		b		b		b		b		b		b		b	
145-000/SO ...	a		a		a		a		a		a		a		a		a		a		a		a		a		a	
145-050/R2T ...	a		a		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		a		a	
145-100/R4T ...	a		a		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		a		a	
145-150/R6T ...	a		a		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		a		a	
145-200/R8T ...	a		a		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		b		b	
145-350/S14 ...	b		b		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		b		b	
145-500/S20 ...	a		a		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		a		a	
145-550/S22 ...	a		a		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		a		a	
145-600/S24 ...	a		a		a		a		a		a		a		a		a		a		a		a		a		a	
145-650/R2R ...	b		b		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		b		b	
145-700/R4R ...	b		b		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		b		b	
145-750/R6R ...	b		b		b		b		b		b		b		b		b		b		b		b		b		b	
145-775/R7R ...	b		b		b		b		b		b		b		b		b		b		b		b		b		b	
145-800/R8R ...	a		a		a		a		a		a		a		a		a		a		a		a		a		a	
145-950/S38 ...	a		a		a		a		a		a		a		a		a		a		a		a		a		a	

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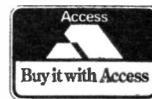
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