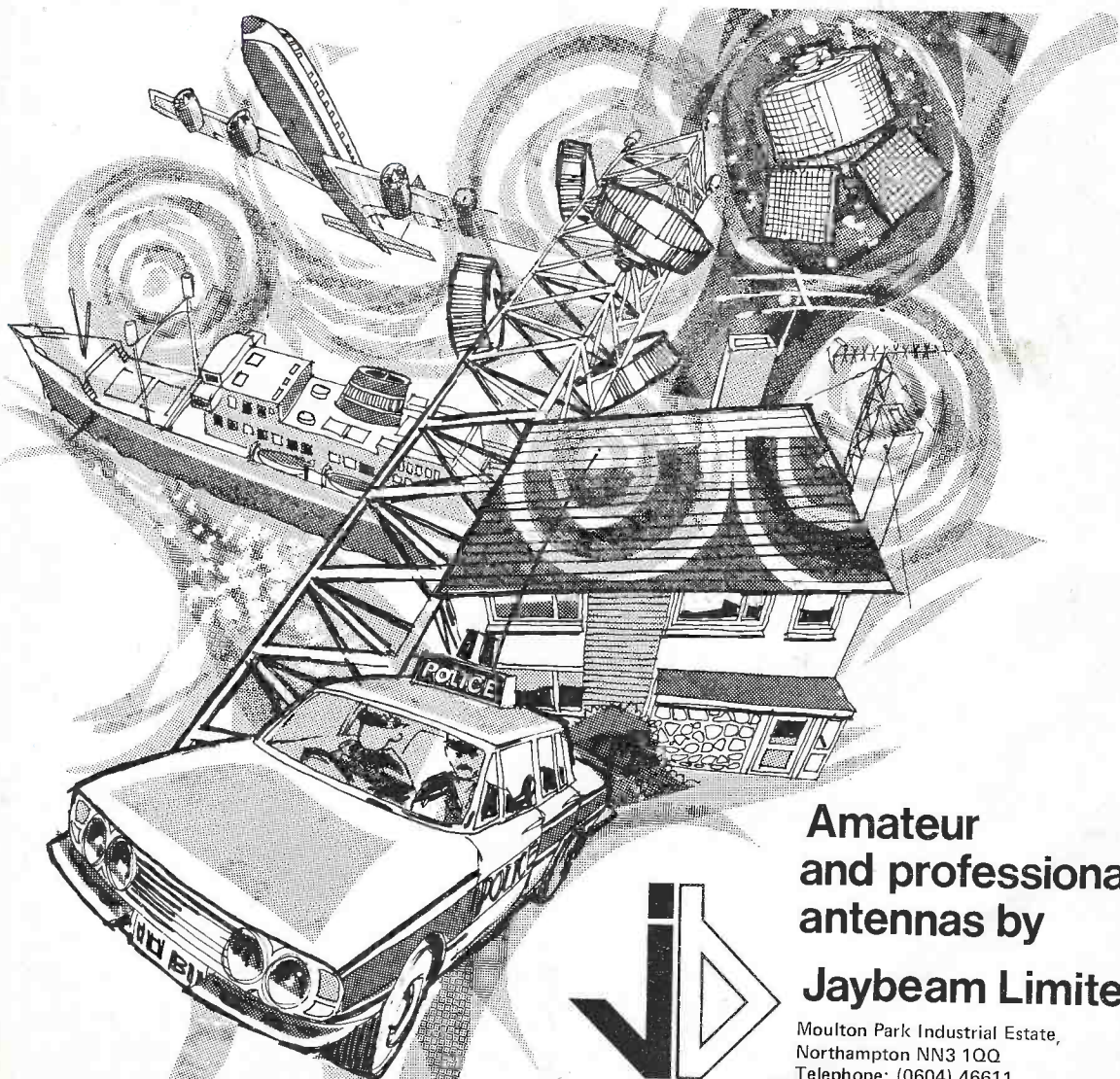


The SHORT WAVE Magazine

VOL. XXXIV

OCTOBER, 1976

NUMBER 8



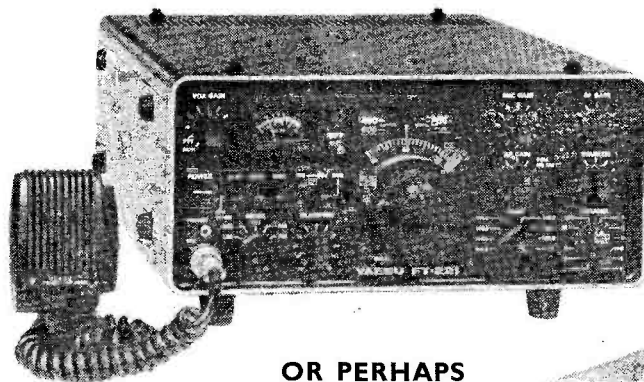
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Jaybeam Limited

Moulton Park Industrial Estate,
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Telephone: (0604) 46611

AMATEUR ELECTRONICS UK

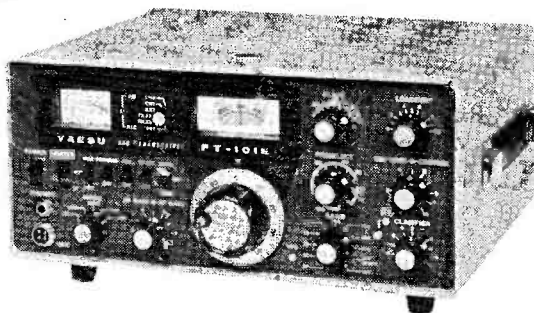
IT'S SHOW TIME AGAIN AND YOUR CHANCE TO SEE ON STAND No. 20 AT GRANBY HALLS, LEICESTER. THAT'S BEST FROM THE FOREMOST INTERNATIONAL PRODUCTS - DON'T FORGET THAT WE ARE THE PEOPLE WORDS ALL ITEMS EXHIBITED ARE IMPORTED BY US HERE'S A FEW EXAMPLES OF WHAT YOU WILL BE



HERE'S YOUR CHANCE TO GET ONE OF THE BRAND-NEW MODEL FT-221R



OR PERHAPS YOU HAVE DECIDED TO FOLLOW THE EXAMPLE OF COUNTLESS THOUSANDS AND SETTLE FOR AN FT-101E ?



WHO KNOWS ? YOU MAY BE ONE OF THE LUCKY ONES TO SECURE THE MUCH SOUGHT-AFTER FRG-7 GENERAL COVERAGE RECEIVER

AND IF YOU DON'T MAKE IT TO LEICESTER THEN YOU CAN ALWAYS CONTACT —
KEN McINNES, G3FTE, AMATEUR ELECTRONICS UK ● COASTAL,
316-318 NORTHDOWN ROAD, CLIFTONVILLE, KENT. THANET (0843) 22060
OR ● WALES & WEST ● ROSS CLARE, GW3NWS, CAERLEON 422232

AMATEUR ELECTRONICS UK

EQUIPMENT BY THE WORLD'S TOP MANUFACTURERS
 AMATEUR ELECTRONICS UK WILL BE FEATURING ALL
 MANUFACTURERS PLUS SOME OTHER EXCITING NEW
 WITH DIRECT AGENCY APPOINTMENTS - IN OTHER
 DIRECT FROM THE FACTORY - JUST TO REMIND YOU
 SEEING ON STAND No. 20.

The Sensational ATLAS-210-215X

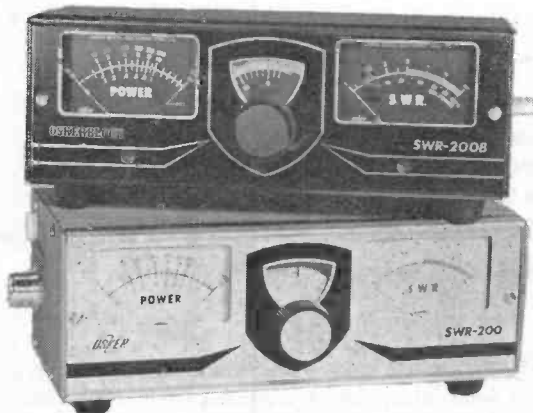
DON'T MISS THE
 CHANCE TO GET THE
 RIG EVERYONE'S
 TALKING ABOUT!



YOU'LL NEVER GET ANOTHER
 OPPORTUNITY TO BUY SWAN'S 700CX
 700 WATT AT THIS PRICE!



LAST BUT NOT LEAST, MAYBE WE
 CAN TEMPT YOU WITH AN OSKER
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 ● REMEMBER EVERYTHING
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 WITH IMMEDIATE CREDIT
 FACILITIES AVAILABLE FOR
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THANET



ICOM IC-22A

A special arrangement with the manufacturers enables us to offer the IC-22A, for this batch only, at a particularly attractive price. These sets carry the full THANET warranty.

11 CHANNELS WITH A CRYSTAL CONTROLLED AUTOMATIC TONE BURST
£164.00 including VAT (or £33.00 deposit)

11 CHANNELS WITH FACTORY FITTED R/C AUTOMATIC TONE BURST
£158.00 including VAT (or £32.00 deposit)

HOW ABOUT TREATING YOURSELF TO AN IC-22A IN ORDER TO GET THE BEST FROM ALL THE NEW 2 METRE REPEATERS WHICH ARE OPENING UP?

WITH THE OPENING UP OF THE REPEATERS IN NORTH WALES, LANCASHIRE, BIRMINGHAM, KENT AND CORNWALL THE COVERAGE IN THE U.K. IS GROWING ALL THE TIME.

The IC-22A is the most suitable mobile rig for repeater use. Both the crystal controlled and the factory fitted R/C tone burst are arranged by us to be entirely automatic, operating only on repeater channels when a burst of tone is given at the start of each transmission. There is no need to press buttons while driving!

The audio tailoring and limiting are ideal for repeater use, giving the characteristic clear sound associated with the IC-22A and the receiver is of top quality design giving high sensitivity and hard IF limiting. The filter provides excellent adjacent channel rejection which is so important with today's 25 kHz channel spacing.

In fact the IC-22A is good solid value for money. Maybe it does lack some fancy gimmicks—but it doesn't need them.

The Rx light comes on when a signal is received and the squelch opened—not just to tell you that there is a crystal in the socket. (You KNOW that crystals are there on the 11 most important channels.) You can work the chap next to you in the car park without pulling any plugs out and he won't blow your head off! What you get is what you want—plenty of expensive crystals and a no-fuss tone burst which doesn't demand that you press an extra button when driving. (The no-fuss THANET warranty is worth thinking about too.)

By the way, the size of the IC-22A is $2\frac{3}{8}$ " high x $6\frac{1}{8}$ " wide x $8\frac{1}{2}$ " deep and it fits into the excellent quick-release mobile mounting bracket which is supplied with the rig.

Your IC-22A comes fitted with SIX simplex channels, SO, S20, S21, S22, S23 and S24 PLUS the FIVE U.K. Repeater channels R3, R4, R5, R6 and R7.

Look at this list and find where your nearest repeater is (those shown in capitals are already in operation).

R3 SUFFOLK and YORKSHIRE.

R4 Central Scotland, DERBYSHIRE AND CHESHIRE, Devon, and KENT.

R5 HAMPSHIRE, BIRMINGHAM and CORNWALL.

R6 CAMBRIDGE, SOUTH WALES, NORTH WALES AND LANCASHIRE.

R7 LONDON, WORCS., Aberdeen, N. LANCS. and W. Wales.

COMING SHORTLY FROM THE **ICOM** STABLE

We are pleased to give you advance warning of the **ICOM** IC-215 which will be here in early December. It is a 3 WATT, 15 CHANNEL, FM PORTABLE with a generous supply of crystals. It resembles the IC-202 in size and appearance and the design is to the usual high quality ICOM standard. A demonstration model and further data will be available at the Leicester show.



THANET ELECTRONICS
143 Reculver Road, Beltinge, Herne Bay, Kent
(02273) 63859



ELECTRONICS

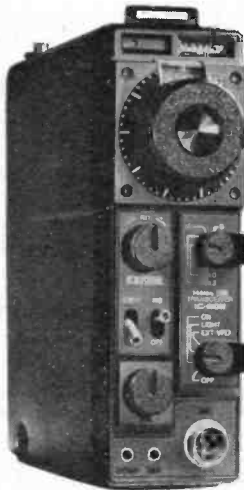
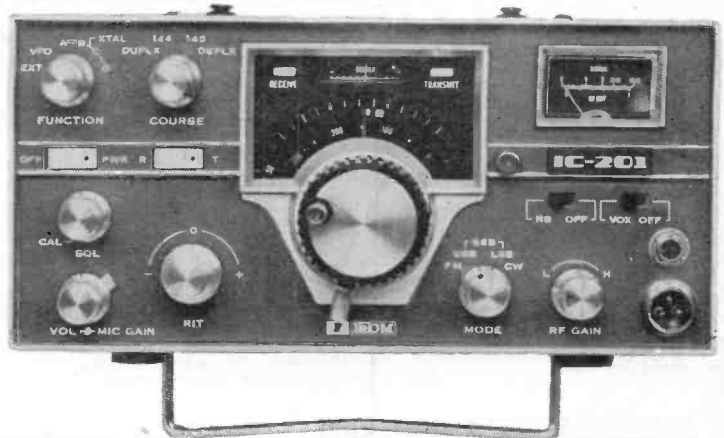
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IC-201

THE MULTI-MODE RIG THAT
SETS THE PACE IN LUXURY
AND QUALITY

£357.75 inc. VAT



ICOM IC-201 £357.75 inc. VAT

The luxury multi-mode rig which was described in full in our advertisement in May, providing full 2 metre coverage on FM, SSB and CW using its ultra stable VFO. Full facilities for Repeater and reverse repeater use at the flick of a switch, built in automatic crystal controlled one burst fitted by us, full break-in facilities on CW and VOX are but a few of the excellent facilities found on the increasingly popular IC-201. Send for further details or leave a message on our ansafone during the evenings.

ICOM IC-202 £161.10 inc. VAT (rechargeable batteries £18 extra)

This new rig from the ICOM stable is going to be another winner. You have a hand-held portable, giving 3 watts output on SSB or CW, with VXO tuning giving you continuous coverage from 144.0 to 144.4 and the option of other frequencies if you use crystals in its spare sockets. Add a linear and you have a beefy base station. To introduce this excellent transceiver it is offered at a price of £161.10 INCLUDING VAT. Send for a data sheet for further details—just the thing for going portable this summer! SEE AUGUST RAD COM AND JUNE SWM FOR REVIEW.

ICOM IC-3PA £42.18 inc. VAT

The perfect companion to convert your ICOM mobile into a base station. Provides 13.6v at 3.5A. Well regulated, with automatic electronic overload.

ICOM IC-225 £250.00 inc. VAT (still some at £225 without crystal controlled tone burst)

The ultimate luxury in 2 Meter mobiles. Comes FITTED with 80 channels to suit the 2 meter band-plan, complete with crystal controlled tone burst and repeater facility. Nothing else to buy unless you want reverse repeater which can be obtained by adding ONE extra crystal. Covers all the UK simplex and repeater channels and provides a very clean signal by virtue of its excellent PLL circuitry. Send for further details of this and the rest of the excellent range of ICOM equipment.



See ICOM at your nearest agents by telephoned appointments:—

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01 556 9366

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073783 3223

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South Midlands

ESTABLISHED 1958 — OVER 18

SMC PROUDLY PRESENTS The New SMC73 general coverage receiver
The New KLM 160W., 144 MHz Linear Amplifier

The : New FT301D digital, 200W., HF and the FT221R 144 MHz transceiver

The SMC73 New General Coverage Receiver

The SMC73 is an all Solid State, mains and 12v., communications receiver covering 550 kHz to 30 MHz (without gaps) in four ranges. Frequency readout is by two silk screened illuminated aluminium dials, tuned by coaxial spun aluminium knobs, the larger for general coverage, the inner for amateur band (10-80m.) band spread (set by use of internal 3.5 MHz crystal calibrator).

FET's are employed in the R.F. amplifier, mixer, VFO and BFO (these latter two stages being fed from independent stabilised supplies) ensuring good sensitivity, stability (electrical and mechanical) dynamic range (helped by adjustable RF attenuator), and marked freedom from "pulling" of both the local and beat frequency oscillators. An internal loudspeaker (but with jacks for phones and external speaker), illuminated signal meter, SO239 (UHF) coax socket and binding posts for antenna, switchable envelope (AM) and product detectors (SSB/CW) (provision on switch for possible fitting of FM demodulator), are all features of this exciting new low price receiver.



SMC 73
Ex-Stock ONLY £105 (+ VAT)

THE DIGITAL II (FM 144-105XR11)



The deluxe 2 metre FM transceiver, with a 5 kHz stepped synthesiser and bright digital readout, from 6 seven segment LED's. Selectable 10 or 1 watt output, for simplex or duplex (up and down shifts), across 144-146 (rx to 149 MHz) from a tiny 6 1/2" x 2" x 7 1/2". Easily undash mounted with the supplied mounting bracket, or slipped in place of the broadcast wireless.

For strong signal handling and low noise the R.F. mixer, first IF (16.9 MHz) second mixer (and LO) are all FET's. The front end is tuned by varicaps fed by the DC output of the P.L.L. with superb selectivity provided by a 15 pole (± 8 kHz at -6 dB ± 15 kHz at -70 dB) Ceramic filter. LED lamps indicate if the P.L.L. is unlocked or the squelch open. The V.C.O. is directly modulated (for exceedingly linear deviation). Unitary 6 circuit block construction (for serviceability and screening). Selective calling socket (mic/LS/PTT etc.) on rear panel.

Introductory Price £225 (+ VAT) Ex-Stock

KP202

The handheld KP202 with its 2W of RF and 1/2W of audio, immunity to image and IF break-through, offers performance to rival all walkie-talkies and many mobile 10W sets. The KP202 is supplied with telescopic whip, leather handle/whip case and F type plug. Accessories include automatic (R channels only) crystal tone burst (£10.00) flexi stubby antenna (£5.25), leather case (£4.40), base charger KCP2 (£10.50), set of 10 ni cads (£8.50), F to UHF adaptors (£1.45), F plugs, spare whips, spare hods, etc.

SIX CHANNELS fitted S20 and S22 and any 4 of S0, S21, S23, S24, R3, R5, R7 ONLY £99.50 (+ VAT)

NEW FROM SMC AMPERE & KLM SOLID STATE LINEARS (VHF & UHF)



SSB/CW/FM, 12v. DC 10W. drive, RF sensing with manual override—"micro-stripline techniques."

NEW HIGH POWER MODEL—
PA144/160/BL 160W. output, £155 + VAT.

COAX SLIDE SWITCHES

Up to —1 kW, 1-5 GHz, 0.3dB loss, 1:2 : 1 VSWR, 50dB isolation, 50 ohm "N" or "PL" fittings available. P. & P. 30 VAT 6% only.

TWS 120 1 in 2 out Nickle SO239 £4.45
TWS 150G 1 in 5 out Gold SO239 £9.50



For 144 and 432 MHz, RF sensing excellent bias arrangements 12v. (13.8v. DC), 10W. drive, 13 x 5.8 x 20 cms.

APB82A 145 MHz 80W. output £88.89
APB57A 432 MHz 45W output £88.89

COAX RELAYS

12v. DC 50 ohm, Silver plate.
Ex-stock P. & P. 30p VAT 8%
Power crosstalk (at 500 MHz)
CX120 50W, 35dB Cable entry £8.50
CX230 300W, 40dB BNC sockets £18.25
CX600N 600W, 40dB N sockets £21.75

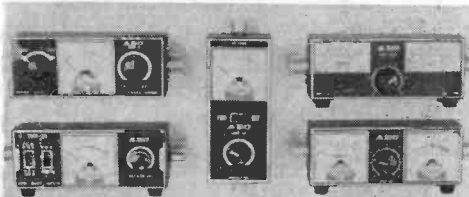


AEC METERS

SWR, Power (Pr), Field Strength (F.S.)
(P. & P. 40p VAT 8% ONLY)

Unless stated :—SWR ($\pm 10\%$), 1:5 to 160 MHz, 50/75 ohm)

SWR10 (TLH) single meter horizontal type ... £8.15
SWR20 (BLH) 50 ohm F.S., Pr. 10 and 100W. F.S.D. ($\pm 10\%$) £9.90
SWR40 (Centre) single meter Vert. type with F.S. ... £7.80
SWR50A (TRH) SWR ($\pm 5\%$) 3.5 MHz up, Pr to 1 kW ($\pm 20\%$) £9.60
SWR50 (BRH) as SWR50A (300 μ A) but 100 μ A meters ... £11.20



KP202
KCP12



PLEASE NOTE THESE PRICES DO NOT INCLUDE VAT (8% or 12 1/2%)

Terms:—Cash with order or credit card holders ust 'phone in for, if possible, same day despatch. Immediate H.P. available or card owners or amounts up to £225. Holders of current U.K. callsigns (where references have been provided) can be speedily cleared or normal H.P. at competitive rates is available.



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YAESU MUSEN 2-YEAR GUARANTEE
24-HOUR SECURICOR SERVICE

NEW GOLD LINE THE FT221R & FT301



The FT301D Demo Model Available — 6 week delivery

The FT-301D 200W, P1P, with digital readout (to 100 Hz), SSB (2-4 kHz), AM (kHz), CW and FSK (600 Hz), Passband IF tuning, rejector, 3 position AGC, optional mains PSU with, if required, a 12/24 digital clock and a programmable CW identifier.



The FT301D Ex-Stock in Totton

The FT-301S 10W, output, employs a pre-mix VFO and single signal conversion to 9 MHz IF using MOSFETS in the RF and mixer stages followed directly by a roofing filter for sensitivity coupled with dynamic range. SSB (2.4 kHz SF 1.7: 1) and CW (600 Hz SF 2:1).

The New FT221R Ex-Stock in Totton

The FT221R design offers an unparalleled level of technical sophistication, combining latest "state of the Art" techniques with extreme reliability and ease of operation.

One look at the construction; plug in boards throughout (with presets positioned for easy access) one glance at the circuitry and you will be convinced that the FT221 may have rivals but no peers. The final frequency is derived via single signal frequency mix from 10.7 MHz. The tunable component is produced by a 133 MHz voltage controlled oscillator (VCO), phased locked to the sum of; the temperature compensated 8 MHz VFO (or one of the 11 fix crystals and the nonupled 14 MHz band (or repeater shift crystals). This VCO cleans the oscillator spectrum, markedly reducing spurious, both on receive and on transmit, the DC control voltage from the VCO is applied to 8 varicap diodes, in both the transmitter and the receiver, effectively electrically ganging the RF tuned circuits to the VFO and Band crystals. Thus both the transmitted and receiver are always fully on resonance even when using the repeater facility. This narrow band technique further improves the transmitter output spectrum and the receiver's immunity to overload, rendering continual tweaking of pre-selectors obsolete.

If for any reason the VCO should not lock, the "S" meter and dial lights flash, both transmitter and the receivers' audio are disabled.

The transmitter employs a balanced FET mixer, RF derived ALC (which is fed to the two first mosfet TX I.F. amplifiers) preventing over driving and allowing operation at full rated output on low DC supply.

The driver is generously rated and the PA stage is the newly developed 2N5591, a device with high linearity and an amazing 70W, power dissipation capability that is rated by its manufacturer to withstand any VSWR irrespective of phase angle.

The sensitive receiver offers a remarkable immunity to overload. The Mosfet RF stage is AGC controlled, the FET mixer feeds a transistor or when an I.F. amplifier. This band limited signal, of the correct level, is presented to the noise blanker gate (before any serious pulse stretching occurs) and hence to either the quality crystal filter on SSB, or the 10.7 MHz to 455 kHz mixer for F.M.

Designed for the serious amateur, it also offers a unique double push tone burst, repeater up and down shifts of 600 kHz and any other shift (to 1 MHz), a socket (mic, PPT, LS (2v, etc.), full provisions for a linear amplifier (relay make and break and ALC sockets) with the spectral purity that allows you to use one with a clear conscience.

"The rig here is a FT221R—need one say more?"

The New FT-301 transceiver range (with options installed) offers:— Full solid state, 12v. DC working, external matching mains power supplies with speaker, and an external VFO are available. Plug in board construction, 160-10m. operation in 500 kHz segments, MSF and CB receive, RF speech processor, noise blanker, front panel controlled VOX (with MDX) and P.P.I., semi break-in keying with side tone, clarifier with separate ON OFF switch, 11" x 5" x 13½", 25 kHz crystal calibrator, internal VFO or 11 crystal per band (or external VFO with same facility) 3W. audio to internal or external speaker.



FT221R

Mic. supplied
Adjustable VOX
AC or 12v. DC
CW sidetone
Semi break-in
100 kHz calib.
11½", 5", 11½"
Rigid 22 lbs.

"S" meter/FM centre zero/PO
Clarifier IRT and IRT/ITT
600 kHz up and down shifts
44 FIX channels (4 x 11)
Fully adjustable squelch. AM,
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speed VFO drive. Readout
better than 1 kHz 2-4 and
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South Midlands

ESTABLISHED 1958 — OVER 18

SMC PROUDLY PRESENTS

The new QTR24 World Time Battery Clock
The new YC500 MHz Frequency Counter

The New Astro 200, Digital synthesiser solid state 200W. transceiver



Astro 200 Revolutionary H.E. Transceiver

To pack an entirely modular construction, 10-80m., digital readout transceiver in a box 2-8" x 9-5" x 12-3" is remarkable enough, but with a 0.2µV sensitivity and 100W. output from transistors with the boast of —stability better than 20 Hz/hour, from an electronically tuned (press switches with no other moving parts) 100 Hz. digital synthesiser, good RX front end filtering, TX TVI proofing, unwanted sideband at -60dB, carrier at -50dB, RTT, clarifier (±50Hz) inbuilt SWR bridge, semi break in CW with sidetone, etc., etc. The ASTRO 200 surely establishes a new plateau of sophistication.

The MULTI UII A New Dimension in Seventy Cms.

A unique combination of frequency control by either external VFO, 23 switchable or 4 instantly selectable auto scanning channels. Both the Tx deviation and the Rx bandwidth are switchable for 50 or 25 kHz spacing.

The main dial is channel numbered (e.g. 16 = 433.4, 20 = 433.5 etc.) and is illuminated only when a channel is crystallised up. "Two R.F. stages in the receiver provide great sensitivity (0.5µV for 30 dB NQ). The use of a band pass first IF (CF 45 MHz) gives high image immunity and low channel crystal drift. Further conversions to 10.7 and 455 prevent IF image whilst providing good pass and skirt selectivity." The transmitter of switchable 10/1V, output draws only 2.5 or 1.3A (0.6 or 0.3A Rx) and has a netting of new crystal facility.

Other features include, diode RF switching, R.I.T., "on the air" lamp, PO meter, S meter, AFP, reverse polarity protection etc.

With 8 Channels from :-SU (0, 8, 12, 16, 18, 20) and RU (0, 2, 4, 6, 10, 14)

INTRODUCTORY PRICE ONLY £200 + VAT Ex-Stock



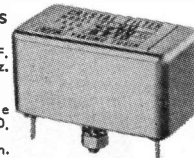
RF SPEECH PROCESSOR KP12
Audio to audio, via 10.7 MHz mains powered, illuminated meter, FT-101, FT2 plugs suitable all phone modes superb on FM.

Ex-Stock in TOTTON £53.50
P. & P. 40p (+ 8% VAT)

CRYSTALS and CRYSTAL FILTERS

VAT 12½% Post 20p + 8%
FILTERS — 3-18, 9, 10.7 MHz C.F. 350 Hz, 600 Hz, 2.4 kHz, 12 kHz. S.A.E. details.

CRYSTALS £3.75 pair. £2.00 Single
FT224, FT2AUTO, FT2FB, FT2F, TR2200, C146A, C826MB, etc., etc.
and FT221 FT75, etc., etc. £2.20 each.



QTR24 WORLD TIME CLOCK

Battery powered, gives local time around the world.

Only £13.00 (+ 8%) This month post free.



Lightning Arrestors MSK75

Gas discharge (90v. strike), 50 ohms, SO239 fittings. Up to 1:1 VSWR, 1 GHz, 0.2dB loss, 5KA, surge 5A AC.

Ex-Stock. Post and packing 20p. VAT 8%
NSK75 Low price £7.50

ROTATORS

Ex-Stock in Totton, fast delivery
VAT-Rotators 12½%. Cable and delv. 8%
Carriage (BR5 or post) FREE. Securicor delivery £1 extra (mainland).
All rotators supplied complete with appropriate control box and instrs.

CDE ROTORS

- AR30 Light VHF/UHF ... £29.25
- AR40 VHF and Light HF £38.50
- AR33 De luxe AR40 ... £44.75
- CD44 Medium duty ... £75.85
- Ham II Heavy duty ... £115.00

STOLLE ROTORS

- 2010/220 automatic ... £40.00

BEARING

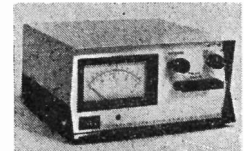
- CD562 ... £4.25
- RZ100 Stolle (ballrace) ... £10.00

MOUNTING KIT

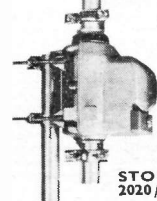
- AK121 CDE to Versatower £3.60

CABLE

- 5 core AR30/40/33/2010 per yd. 20p
- 8 core CD44/Ham II per yd. 32p



CD44/HAM II



STOLLE 2020/220

THE RINGO RANGER ARX2, 6dB±, 144 MHz, 9' 6" tall 1½ lbs. only £21.50 + 12½% (Carr. 90p + VAT 8%)

PLEASE NOTE THESE PRICES DO NOT INCLUDE VAT (8% or 12½%)

Terms:—Cash with order or credit card holders just 'phone in for, if possible, same day despatch. Immediate H.P. available for card owners for amounts up to £225. Holders of current U.K. callsigns (where references have been provided) can be speedily cleared or normal H.P. at competitive rates is available.



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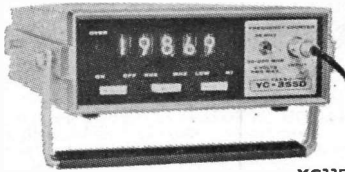
YEARS OF PROFESSIONAL EXPERIENCE



YAESU MUSEN 2-YEAR GUARANTEE 24 HOUR SECURICOR SERVICE

S M C looks forward to your company at Leicester to examine the fine range of Yaesu products

Failing this send 20p stamps or large S.A.E. for Yaesu catalogue, our price list, etc. etc.



YC335D

YAESU now offer you the choice of 5 frequency counters with an upper frequency limit of 35 MHz, 220 MHz and now 500 MHz. This latter model is available in three versions, with an accuracy of 10 ppm (J) 1 ppm (S) 0.02 ppm (E Model). All provide an eight digit readout (dual range system from 5 or 6 tubes), 50Ω/IMΩ switchable inputs (in the basic unit) and offer reliable operation and complete portability with built in mains and 12v. DC power supplies.

The FRG7, General Coverage Receiver Ex-Stock

The FRG7 is a general coverage solid state receiver with specifications unparalleled in its price range. It uses a Barlow Wadley triple mix drift cancelling loop for continuous, spin tuned, inclusive coverage of 0.5 to 30 MHz with calibration accuracy better than 5 kHz. Frequency selection is accomplished by setting the RF (pre-selector and range switch), dialling up the required number of megahertz, then tuning the VFO knob as normal.

The receiver is sensitive (0.5µV for 10 dB, S + N/N (SSB) and stable (within 500 Hz for any 30 minutes after warm up) with AM, SSB and CW modes catered for. A 3 position audio filter, RF attenuator, dial lamp conservation switch, recorder and phone sockets are fitted. It is mains powered, but should the supply fail, or portable operation be required, 8 dry cells are automatically switched in.



FR101D

FR-101 (S) (D) (SD) (DD) De Luxe Receiver Ex-Stock

The FR101D (de luxe) wide coverage (23 (from 1.5 MHz) 500 kHz bands + 4 and 2 metres) receiver. Analysis of the signal path shows: 0-20dB switchable attenuator, two section permeability tuned input filter, Mosfet R.F. stage and mixer (crystal controlled), 3 section top coupled bandpass filter, no gain at first I.F., IC balanced mixer, 20 kHz wide crystal filter, shunt diode noise blanker, single FET buffer stage, AM, CW or SSB (RTTY) filter, appropriate detector and audio stage. Add to this, two excellent VHF converters, squelch, FM detector, 1 kHz readout, excellent stability, Tx monitor control, crystal control facility, switchable AGC, transceive capability (FT or FL 101) and that digital readout options are available of this (de luxe), or the standard (less the plug-in optional of converters, broadcast band crystals, filters, etc.) version truly an "apparatus communications sine fills" extraordinary.

The FT-101E, Complete HF Station FT101E (EE-EX) EX-STOCK

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. or AM 10 to 160m. (inc. 10 MHz RX).

The sensitive and selective (permeability tuned RF stages and B pole crystal filter) receiver offers: threshold adjustable noise blanker, switchable 25 and 100 kHz calibrator, ± 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 600 Hz filter installed is of a high order. Linear and transverter provisions are made with sockets for: relay contacts, ALC output, all internal HT supplies, low level RF, heater links and switches, etc., etc.



FT101E



FTV650B

FTV VHF Transvertors

FTV250 Ex-Stock

The FTV-250 styled to match the FT-101, etc. sensitive receiver converter with good image rejection and RF gain control on front panel. 10W. P.I.P. (A3 and A1) 4W. (A3 and F3) metered; power output, and drive level (3V RMS at 29 MHz) 12 lbs., 11½" x 8½" x 6".

FTV (6)50B Ex-Stock

The FTV650B now styled to match the FT-101, etc. Modified to 70 MHz. 50W. P.I.P. (A3 and A1) 10W (A3 and F3) metered—cathode current power out and drive level (3v. RMS at 29 MHz). 9 lbs., 11½" x 8½" x 6".



FTV250

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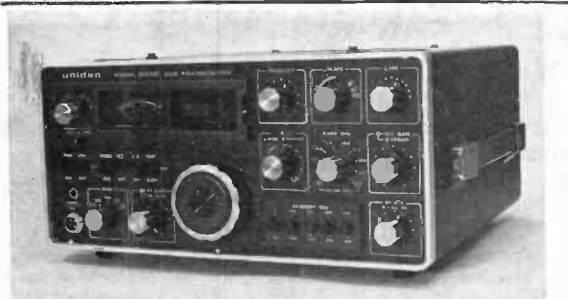
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STEPHENS-JAMES LTD.

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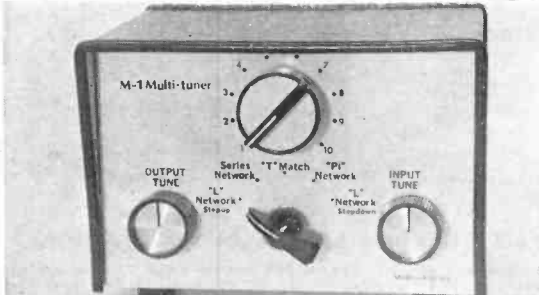
The North West's leading supplier for all your requirements. EASY ACCESS FROM THE M61-62.63—we're 5m. from M6, turn at the Grayhound Motel on the A580 (East Lancs. Road). OPEN 9.30 to 5.30, MONDAY TO SATURDAY.



UNIDEN 2020. AC/DC power supplies. CW filter. Noise blanker. Blower. Digital and analogue display give direct readout. 6146B in PA. 80-10 metres. Receiver is pre-mixed single conversion using phase lock loop oscillator circuit. Separate filters for USB/LSB.



UNIDEN 2030. 144-146 MHz FM Transceiver. 12 channels. 12v. DC operation. 10 watt or 1 watt output. Antenna impedance 50 ohm. Complete with microphone and mounting bracket.



Mk. I 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.



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 watt output. Sensitivity 0.2uv R.I.T. tone burst. Complete with microphone.

ELECTRONIC DEVELOPMENTS

PLEASE NOTE AS FROM SEPTEMBER 1st WE HAVE DISCONTINUED THE MANUFACTURE OF THE ELECTRONIC DEVELOPMENTS' RANGE OF EQUIPMENT. OUR NEW RANGE OF EQUIPMENT WILL BE ON SHOW AT THE LEICESTER EXHIBITION.

See our full range of equipment at the Leicestershire Exhibition. Full HP, Credit, Access and Barclaycard facilities will be available.

Accessories

Single Meter SWR Bridges (post 45p)	£8.50
Twin Meter SWR Bridge (post 50p)	£12.20
Osker SWR200 SWR/Power Meter (post 75p)	£27.00
Auto-Cq-Sender ... (post free)	£41.11
Eddystone 898 Dial Assembly (post 75p)	£15.00
Drake Low Pass Filter (post 50p)	£15.00
Omega TE-701 Antenna Noise Bridge (post 25p)	£21.00
Omega TE-702 Antenna Noise Bridge (post 25p)	£24.00
Whip antenna gutter bracket (post 25p)	£2.81
UR43 Co-ax 18p metre; UR76 45p metre, post 2p metre; 75 and 300 ohm twin feeder 10p metre, post 1p metre; Heavy duty 75 ohm twin feeder 20p metre. PL269 46p SO239 46p, Cable reducers 15p.	

LEICESTER 1976



Secondhand Equipment

(In stock at time of going to press)

Yaesu FR101D Receiver ...	£375.00
SPR4 Drake Receiver with two sets crystals and noise blanker ...	£375.00
Yaesu FR50B with 160m. ...	£80.00
Lafayette HA500 ...	£25.00
Swan 700CX Transceiver ...	£375.00
Swan 350 Transceiver ...	£235.00
Sommerkamp FTDC500 Transceiver VFO ...	£275.00
Electronic Developments 2m. Transverter ...	£65.00
Eddystone 730/4 Receiver ...	£150.00
Eddystone 770R Receiver ...	£150.00
KW202 Receiver ...	£225.00
TS510 Transceiver ...	£185.00

We can supply nearly all the equipment from stock. All equipment is sold from the premises. We do NOT supply any agents or agents of agents. All equipment is air tested and carries the normal guarantee. If you want any information on any equipment please send a large envelope or if you prefer send stamps and we will provide the envelope. No use asking for a Yaesu catalogue and sending a 6" x 3" envelope. Part exchanges are very welcome or we will sell your equipment for you on commission. Our secondhand equipment changes rapidly. If you are coming for something you saw advertised 3 MONTHS ago please give us a ring first. We try and main full stocks of all the equipment we advertise but we do occasionally run out of the popular lines.

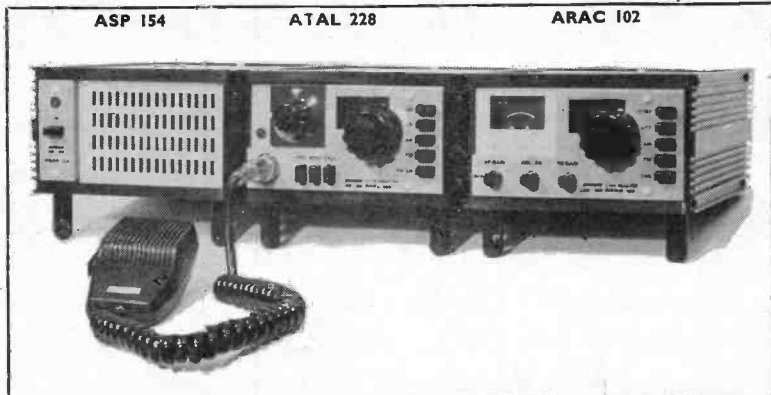
PLEASE NOTE ABOVE PREMISES WILL BE CLOSED OCT. 26th NOV. 2nd.

S.T.E. MILAN VHF EQUIPMENT

During the last two years the popularity of the range of equipment by S.T.E. has been growing. The ARAC 102 receiver has been a "Best Seller" (have you seen any second-hand?). Later in the year the Atal Transmitter came into stock and all reports have been good. Now we are offering the complete range of modules for the D.I.Y. enthusiasts. Transmitters, receivers, etc. The construction of these modules are first class — the P.C.B's are the finest we have ever seen.

Price List (includes postage)

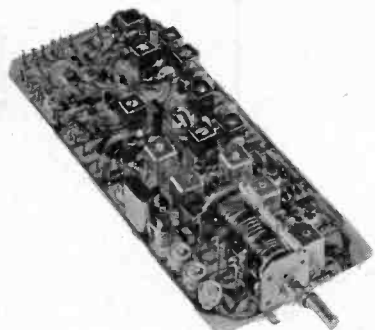
- ARAC 102 Receiver ... £100.00
- Atal 228 Transmitter ... £126.00
- ASAP 154 AC PSU with speaker £35.50
- AR10 Receiver Module ... £37.50
- AA1 Audio Amplifier ... £4.10
- AD4 FM Discriminator ... £5.00
- AL8 Linear Amplifier ... £27.00
- AT22 Transmitter ... £50.00
- AR20 C.C. Receiver ... £50.00
- AT23 C.C. Transmitter ... £36.00
- AS 15 Stabilised psu D.C. ... £10.00
- AG 10 Tone Generator ... £4.50
- AC2A Converter 28-30 MHz £20.00



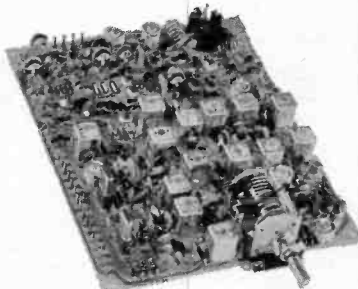
SPEAKER
AC POWER SUPPLY UNIT

144 - 146 MHz
AM FM TRANSMITTER
with Microphone

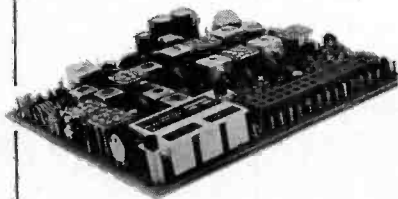
28-30 MHz 144-146 MHz
AM-FM-SSB RECEIVER



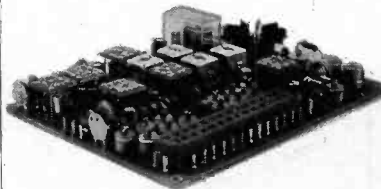
AR10 Mosfet receiver. 28-30 MHz Double conversion superhet. RF and amplifiers stages are gate protected mosfets for good sensitivity and low intermodulation. Noise limiter and squelch circuit. AM, SSB and CW reception. 12v. DC.



AT 222. A complete transmitter exciter unit for 144-146 MHz on AM or FM. VFO controlled or fixed channel operation. Complete with microphone pre-amp, speech processor including active audio filter. 1 watt output. FM. 25 watt AM. Output impedance 50-75 ohm adjustable. Frequency deviation 3-10 kHz adjustable.



AR20. 12 channel FM receiver 144-146 MHz. Input impedance 50-75 ohm. AM-FM modes. Sensitivity 0.2uV AF output 3 watts. 12v. DC operation.

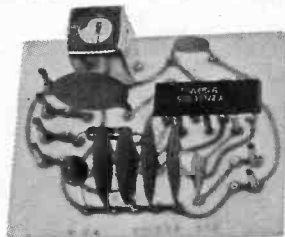


AT23. 12 Channel FM Transmitter. 3 watts. 144-146 MHz. Frequency deviation 3-10 kHz adjustable. 12v. DC operated AF input sensitivity 2mV adjustable to 50 mV.

TWO NEW MODELS FROM S.T.E.

ARAC 170 Receiver. Two bands 28-30 MHz — 430-440 MHz AM-FM-SSB/CW. Tuning 10MHz from 430-440MHz in 5 bands. SSB-0.2mv (10db S.N.) FM 0.3mv (20db S.N.) 12v DC OP. £127.50

AK20 FM Transceiver. 12 channel FM operation. Tone burst. 4 watts output. Sensitivity 0.2mv (10db Quieting) 0.35mv (20db quieting) Complete with microphone. **From £123**



455 kHz FM Discriminator Amplifier. Limiting threshold 100uV. Amplitude modulation rejection 40dB. Audio output voltage at 1 kHz 200-300mV frequency deviation + or - 3 kHz.



Linear Amplifier. Frequency 144-146 MHz output 10 watts FM, 8 watt PEP SSB. 8 watt AM. Input power 1 watt FM. 25 watt AM. SSB. Input impedance 50 ohm output impedance 50-75 ohm. 12v. DC.

SEE THE ENTIRE S.T.E. RANGE AT LEICESTER EXHIBITION.

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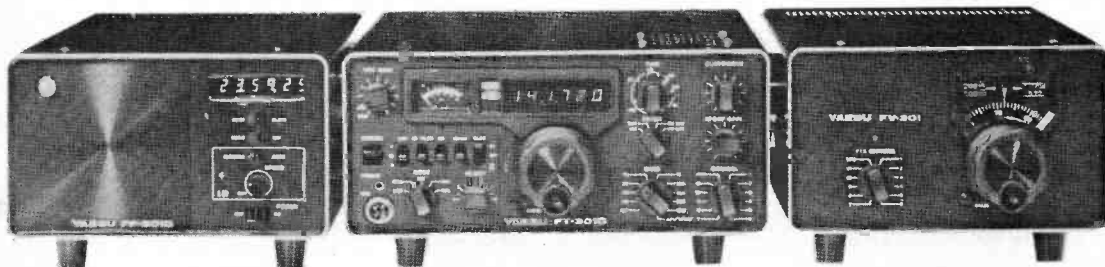
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The Leaders

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... announce two NEW MODELS ...

The outstanding **NEW GOLD LINE FT-301D**



ALL SOLID STATE

300W PEP

DIGITAL DIAL

- 6-Digit Readout ● All Modes—SSB/CW/AM/FSK ● 160—10 metres ● TX & RX Clarifier ● RF Feedback ● 3-position AGC ● Rejection Tuning ● Built-in DC Power Supply ● Optional AC Power Supply and Speaker unit, 24 Hr. Digital Clock ● Noise Blanker ● RF Speech Processor ● Computer Type Plug-In Module Construction ● Size : 11in. (w.) x 5in. (h.) x 13½in. (d.) ● Light Weight : 22 lbs.

The Model FT-301D is a precision-built, all solid-state, compact high performance transceiver of advanced design. All circuits are fully transistorised with ICs and FETs for reliability. A wide-band tuning system with preset pass band tuning combined with wide-band amplifier eliminates final amplifier tuning for band change. Also available as an option is an automatic CW identifier (programmable).

Whether you judge it on price, performance or operational features, the FT-301D comes out a winner!

(The new FT-301D does not replace the FT-101E but we are stocking the "D" model instead of the low power "S" model intended for the Japanese home market. Price: FT-301D, £624.37 incl. VAT.)

and the new 2m. FM/AM/SSB FT-221R Ex-stock **£403.76 (inc. VAT)**



BUYING A FRG-7? (£162 inc. VAT)

We despatch within 6 HOURS!
from our
NEW LARGE YAESU STOCK
OF ALL MODELS

FREE SECURICOR DELIVERY
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SUPERB AFTER-SALES SERVICE

It pays to deal with "WESTERN"

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STANDARD's

superb "3-in-1" Transceiver

YOU CAN . . .

1. "STICK IT UP YOUR JUMPER" (or put it in your pocket !)
2. FIT IT INTO A MINI MINI CAR (and yet it's still easy to service)

OR

3. USE IT AS A BASE STATION Either way . . .
for the serious FM Repeater operator—
There's no other choice !

the STANDARD C828 !

(Price : £151.88 inc. VAT and 10 channels)



ADD A
NEW DIMENSION
to your hobby with
SSTV

The HAMVISION

SS-727M	MONITOR	...	...	...	£405.00
SS-727C	CAMERA	...	...	...	£303.75
OR					
SS-303M	MONITOR	...	...	...	£236.25

is all you require to send and receive SSTV pictures when connected to your SSB transmitter.

(Prices inc. VAT and Carr.)

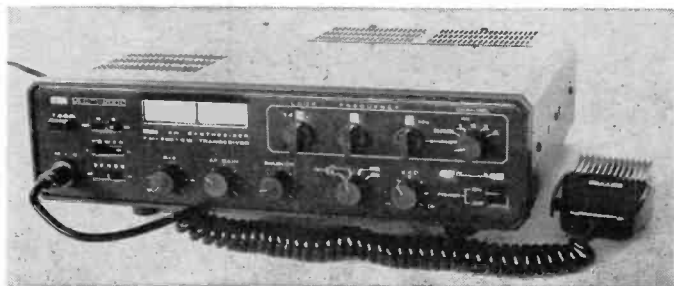
HERE IS ONE BARGAIN YOU SHOULDN'T MISS!

THE FDK MULTI-2000

2m. SSB/FM, CW 200 Ch. SYNTHESISED
AC/DC TRANSCEIVER

- * Full cover 144-6 MHz.
- * VXO gives full coverage between 10 kHz spacing.
- * Rapid change of frequency and mode is possible.
- * RIT (Receiver Incremental Tuning) allows receiver to be tuned without moving the transmit frequency.
- * 600 kHz Repeater shift works on all frequencies.
- * Tone access built-in.
- * Fitted narrow FM Filter.

SUPERB VALUE AT £365.62 inc. carriage (Securicor) and VAT



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Whether you wish to . . .

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BUYING A TELESCOPIC STEEL TOWER?

... then here are a few facts which you should consider :

Firstly, the head load (horizontal load due to wind) which will be placed on the top of the tower should be determined and the manufacturer of your antenna can tell you what the head load will be at a particular wind speed, e.g. 100lbs. (45Kg.) at 75 m.p.h. This means that when the wind is blowing at 75 m.p.h. you would need a HORIZONTAL pull of 45Kg. to restrain the antenna. The actual weight of the antenna is usually a factor of much less importance and is ignored. If you wish to have an installation which is rated at 100 m.p.h.—then the wind load on the antenna will be much greater than 100lbs., 176lbs. in fact: Obviously, a stronger tower would be required to take this additional load.

But there is the second consideration. At what wind speed would you like the structure to be safe? No doubt the answer you have in mind is "about 150 m.p.h." That way, it will never fall down! However, economics must come into the picture and the costs go up very considerably in achieving strength.

There is a British Standard Code of Practice (CP3. Ch5. Pt2.), which relates to the "Wind Loading on Structures" and they recommend Basic Windspeeds of about 85 m.p.h. for the London Area to as high as 110 m.p.h. for Edinburgh and 120 m.p.h. for the North of N. Ireland. This "Basic Windspeed" is the maximum gust speed likely to be exceeded on the average only once in 50 years at 10m. above ground in open level country. An average figure for England is therefore 100 m.p.h. Commercial installations are designed to this standard and we recommend a minimum design speed of 75 m.p.h. for an amateur installation. Most towers currently advertised in this magazine carry the stated headload at 60 m.p.h. ONLY! Oh! Oh! Yes, we could mis-lead you into thinking that the WESTOWER is considerably stronger by saying, "Withstands winds of 100 m.p.h. plus." So it may with no aerial on! But what good is that? Remember, "AT 'WESTERN' OUR AIM IS YOUR SATISFACTION." So, if you want a good sound installation you'll be wide to deal with "WESTERN"; we'll be pleased to advise. This is why they blow down with no aerial on or when only partly raised! Because of our considerable experience in this field we have now designed and manufactured our superior quality product AND—IT COSTS LESS! QUALITY UP and PRICE DOWN—that can't be bad!

- Designed by Chartered Engineers to BS CP3. Ch5. Pt2.
- Constructed of High Quality Special Alloy Steel
- Fabricated Using the Latest Electronically Controlled Techniques

HERE'S HOW THE "WESTOWER" COMPARES :

HEIGHT	"WESTOWER"			Brand X			Brand Y		
	MODEL	PRICE	HEAD LOAD	MODEL	PRICE	HEAD LOAD	MODEL	PRICE	HEAD LOAD
40'	2S/FP	£189	275lbs.	A	£208	185lbs.	A	£250 +	50lbs.
60'	3S/FP	£230	175lbs.	B	£246	125lbs.	B	£280 +	50lbs.
80'	4S/FP	£345	1000lbs.	C	£366	60lbs.	(+Carr. extra)		

(Prices include carriage. Headloads taken from manufacturers' current literature)

FROM THIS YOU WILL SEE THAT A 60' "WESTOWER" IS 40% STRONGER AND COSTS LESS!

THEN THERE IS THE "WESTOWER" HEAVY DUTY WHICH TAKES ITS FULL HEAD LOAD AT 100 M.P.H.

Rotate... with EMOTO ROTORS

FEATURES :

- ★ SUPERIOR BRAKING TORQUE
- ★ CONSTANT BEAM INDICATION
- ★ BETTER REMOTE OPERATION
- ★ LESS POWER LOSS THAN LOW VOLTAGE TYPES
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PRICES (Carr. paid, inc. VAT)
 102LBX £61.87
 1100 MXX £129.37

COMPARISON OF ROTOR BRAKE TORQUE FIGURES (kg./cm.)

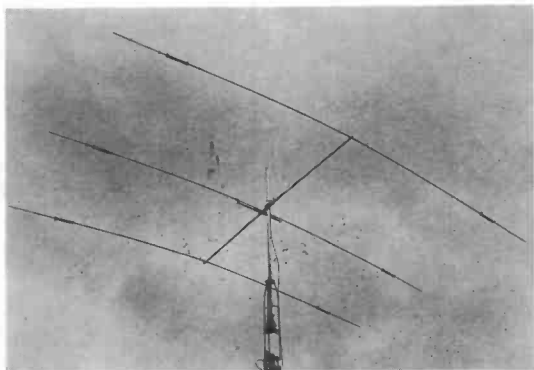
CDE model	Torque	Emoto model	
AR30	575	102 LBX	1,500
AR40	920	1100 MXX	10,000
CD44	1,152		
HAM-2	4,025		



Electronics (UK) Ltd

OR *Radiate...* with Western Antennas

THE FIRST OF A NEW PENETRATING RANGE OF ANTENNAS !



The **WESTERN "PENETRATOR"**

DX-33 for 10-15-20m.

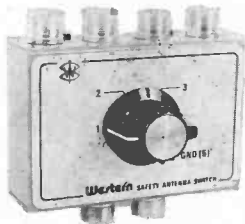
(illustrated left) **£73.12** (inc. VAT and Carr.)

- ★ 3 elements on each band.
- ★ Heavy duty 2 kW. rated.
- ★ Gain up to 8dB.
- ★ Broadband operation.
- ★ Stainless steel hardware.
- ★ SWR less than 1.3 : 1

YET ANOTHER 'Western' PRODUCT WITH QUALITY UP AND SAVE £££s!

NEW 5-WAY ANTENNA SWITCH

- ★ Handles 1.2 kW.
 - ★ Earths antennas not in use.
 - ★ Fitted YAESU style knob.
 - ★ Mounting holes for wall or equipment.
- £8.85 (incl. VAT/P. & P.)



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BN86 1 : 1 ferrite Balun ...	£13.50	TH2MK3 10-20m. 2 ele. ...	£119.25
103BA 10m. 3 element ...	£56.25	TH3JNR 10-20m. 3 ele. ...	£122.62
153BA 15m. 3 element ...	£67.50	TH3MK3 10-20m. 3 ele. ...	£163.12
203BA 20m. 3 element ...	£123.75	TH6DXX 10-20m. 6 ele. total ...	£168.75
204BA 20m. 4 element ...	£151.87	DB10-15 10-15m. 3 ele. ...	£118.12
402BA 40m. 2 element ...	£180.00	LC80Q 80m. coil for 18v. ...	£14.62
18V 10-80 Load Vert. ...	£28.12	LA1 Lightning arrestor gas ...	£18.90
12AVQ 10-20m. Trap Vert. ...	£40.50	LA2 Lightning arrestor spark ...	£3.24
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18AVT/WB 10-80m. Vert. ...	£82.12		

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D5/2m 5 over 5 slod feed ...	£12.26	PBM14/2m 14 ele. Para ...	£24.75
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8XY/2m 8 ele. crossed ...	£15.63	MBM48/70 46 ele. Multi ...	£18.22
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Q4/2m 4 ele. quad ...	£12.93	PMH2/C Circ. phasing ...	£4.61
Q6/2m 6 ele. quad ...	£18.87	PMH2/2m 2 way harness ...	£13.50
PBM10/2m 10 ele. Para ...	£19.57		

MOSLEY (Prices inc. Carr. and VAT)

TA31 Jnr. 10-20m. Dipole ...	£33.18	TA33 Jnr. 10-20m. 3 ele. 300w. AM ...	£74.25
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BARGAIN. Still at the old price !
 4BT + RM80S. 1kW 10-80m. self supporting vertical ... £63.00
 Full range of "HUSTLER" HF and VHF ex-stock again.

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SSB?

IF SO, THEN DON'T FORGET TO —
VISIT US AT LEICESTER
 AND SEE WHAT'S UP OUR SLEEVE FOR YOU !

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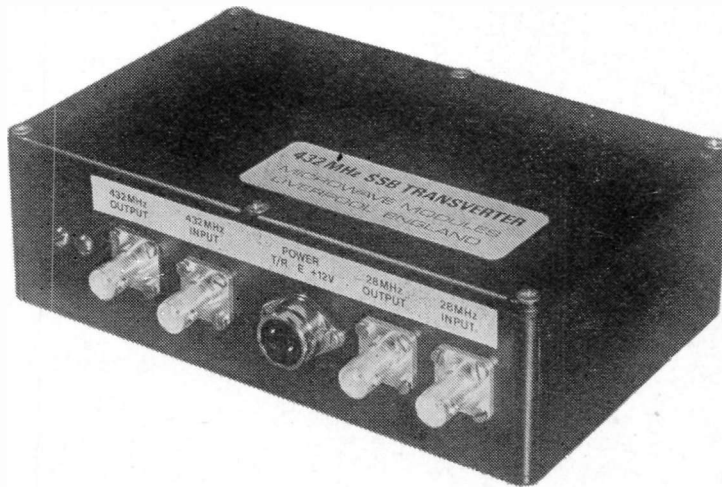
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SPECIFICATION

Frequency range	432-434 MHz	First oscillator :	101 MHz
Input modes :	SSB, FM, AM or CW	Second oscillator :	116 MHz
Input frequency range	144-146 MHz	Receive converter gain :	10 dB
First IF :	28 MHz	(Through transceive port)	
DC power requirements :	12 volts nominal	Receive converter gain :	25 dB
Current consumption :	2.2 Amps peak	(Through independent port)	
Power output :	10 watts continuous rating	Power connector :	Better than 3.0 dB
Drive requirements at 144 MHz :	10 watts (Built in RF termination network)	RF input/output connectors :	5 pin DIN
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		Price :	900 g.
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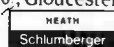
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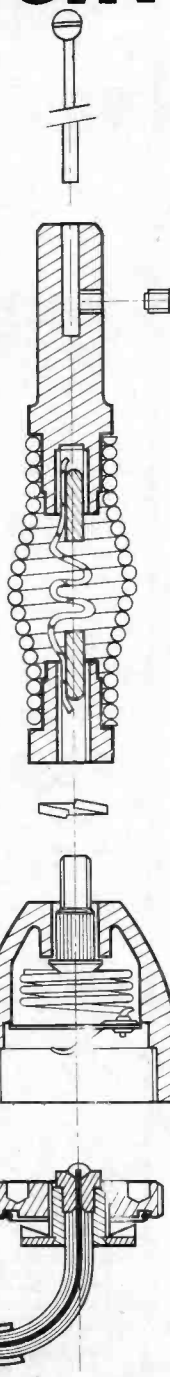
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(GB3SWM)

ISSN: 0037-4261

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

Advertising: Charles Forsyth

Published at 34 High Street, Welwyn, Herts., AL6 9EQ, on the last Friday of the month, dated the month following. Telephone: 04-3871 5206 & 5207

Annual Subscription:

*Home: £4.80, 12 issues, post paid
Overseas: £4.80 (\$10.00 U.S.), post free surface mail*

Editorial Address: Short Wave Magazine, Buckingham, MK18 1RQ, England

Prices shown in advertising in this issue do not necessarily constitute a contract and may be subject to change.

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The SHORT-WAVE Magazine

E D I T O R I A L

CB Radio

The contemporary press is giving a good deal of space to the matter of what is called "Citizen's Band" radio—meaning use of the ether for private communication purposes, two-way. This has become very popular in several countries, notably the U.S.A., where CB operators are now numbered by the million, a large proportion of whom are on the air without benefit of licence—for there is a licensing system (note-of-hand alone, four dollars down, and away you go). The frequency band used is only 300 kHz wide, around 27 MHz, and is divided into crystallised channels in zones spaced across the country. Though there are power and aerial limitations, these are commonly ignored—U.S. CB stations can often be heard in the U.K. when the 10-metre band is open to the West.

There is widespread abuse of the CB Radio system itself, which the FCC admits it is now powerless to control. Apart from unlicensed operation, interference is severe on all channels and a good deal of the traffic is of a very dubious character.

What, in this country, should be our attitude to CB Radio? In the first place, recognising that it would be virtually uncontrollable by regulation, it would certainly lead to the same abuses that disfigure CB Radio in America. Secondly, the incidence of BC1/TVI would be enormously increased, and such interference would inevitably be blamed on licensed Amateur Radio operators. Thirdly, it would make a nonsense of the present system of granting U.K. amateur licences.

However, there are other factors involved. CB Radio would open up a big new equipment market and could conceivably produce a flow of recruits for what might be called legitimate Amateur Radio. So long as authorised CB Radio was kept outside any of our present band allocations, it could not be said to be directly harmful to Amateur Radio. It would also establish the principle that the ether should be free for all to use, subject to reasonable safeguards and limitations in the common interest—as we have always proclaimed about Amateur Radio itself.

CB Radio is probably a movement that cannot now be stopped—it is too attractive in the public sense, and would seem to most people to be quite harmless. Though we do not at all favour the introduction of CB Radio in the U.K., one must face realities and appreciate the pressures that are building up.

In fact, one might as well realise that there is really nothing—except price and import duty—to prevent CB Radio equipment being imported from the U.S.A. and used over here, with or without a licence, right now! Many of the CB Radio sets on sale in America are very fine examples of modern transceiver design and engineering, as is evident to anyone following the American non-amateur radio press, which regularly gives much space to CB Radio and everything connected with it.

The authorities in this country have some very difficult decisions to make on this subject. Let us hope they will be the right ones.

*Austin Forsyth
G6FO*

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

EVENTUALLY, one could predict, the long hot summer of our discontent would have to cease—but it needn't have been quite so sudden about it! And, one might have added, the Clerk of the Wx could have had the decency to hold on until all the jobs "up aloft" were completed, like freeing the pulley and new halyards, ready for a trial of the "Easy Quad" by GW2DDX, which as far as this writer is concerned represents the Definitive Answer to the problem of how to get a Quad up in this garden without first cutting down the apple-tree, which has been puzzling him for years. So Easy, so Simple, so *Practical!* Why ever didn't someone think of this ploy before? Of course, the pundits will say that by using this shape as against the more usual square configuration one will lose 0.9 dB of forward gain as measured on a range; but one has more than a suspicion that this loss would not in fact be apparent at DX. What is really needed is for someone to plot three-dimensional polar diagrams at UHF (to approximate the free-space condition), in order to see just what really *does* happen at the angles of interest to the DX'er. In any case, the neighbours will probably be far happier with a beam that "disappears" to ground level when not in use!

Conditions

Allowing for the state of the sunspots, not too bad; there were times in August when the daily sunspot count was up in the thirties, and W4UMF predicating Above Normal for days on end. On the debit side, there has been the problem of the Electronic Banyan Tree which has been infesting 14 MHz of late. It has been claimed to be a jammer and thought to originate in the Ukraine. However, whether it is in fact a jammer is debatable, and an alternative suggestion is that it may be some sort of propagation-study monitoring by the Russians. Whatever it is, it is strong enough to pin S-meters in Europe, and to wipe everything out as far afield as W6-land when it is in full song. It is

understood that protests from various countries have been sent to Russia about this signal.

Readers of WCDXB or Geoff Watts' excellent *DXNS* will have not failed to observe how accurately W4UMF pitches his short-term propagation predictions; however, it is now understood that the WWV hourly up-date, on which the predictions are largely based, is to cease from September 30. On the other hand, it is believed that ARRL are looking into ways and means by which the information required can be propagated by the ARRL Hq. station, W1AW. It would indeed be a shame if, having at last got into the position in which one can reasonably plan for an evening at the workbench when DX conditions are flat, at least a week ahead, we should find ourselves, as it were, back to Square One.

Ten Metres

Let G2BY (Wroxall, I.O.W.) open the batting here; Bert tried all bands during the period under review, but on Ten largely drew a blank in terms of DX save for one UI8 and a clutch of Europeans.

GM3YOR (Kirkcaldy) at the time of his rather early letter was preparing for his trip to GI. However, he did use the bands above 7 MHz quite a bit as time offered, and on Ten tangled with C3IJX and ON6KO, CW—as indeed were G2BY's contacts.

No actual contacts are recorded by G3NOF (Yeovil), albeit Don did hear the odd South American in the early evenings and Europeans during the day.

Then there is GW4BLE (Newport, Gwent) who brought his band total to nearly 130 countries with a quick 59 QSO on SSB with 6W8FP, and was so surprised that he confined himself for the rest of the time to working local G's and GW's.

21 MHz

Down at Horndead, ex-G2XC has been playing with aerial arrays, and even noting the incidence of sunspots. At which point, for any

new reader, we should repeat the old warning about *not* trying to look straight at the sun with the naked eye. Project its image on to a suitable surface, with a neutral density filter to reduce the brightness to an acceptable level, and look at the image that way—never, ever, directly. Anyhow, back to ex-G2XC and his receiver; the routine has been, basically, a listen-round in the early evening, and then for an hour or so before turning in, plus the odd check on 15 metres around morning tea-break time—and it was on one of these that he heard a couple of JA's and VU2BO on CW, plus VQ9HCS on SSB. Africa and South America have been heard at reasonable strength. Africans heard included EL, TU, ZD8, ZE, ZS's, 9J and 9Q, while the South American parade include CE, CX, LU, OA, PY, PZ, and ZP, with HI and W's a bit further north; on one day W5UAN was noted at workable strength, and G5AFA was heard to mention a QSO with 9M2DQ around midday.

Possibly the main event of the month for G4EAN (Nottingham) was the "up-grading" of his Versa-tower from 40 to 60 feet—there were too many other things to be done to get in much operating, but just to show all was well, PY5ZAJ was worked on SSB.

G2BY found the opening to South America pretty good, with the reports between S7 and S9 both ways; but otherwise it was just EU's at short-skip distances.

GM3YOR stuck to CW, to knock off UT5AB/UF6 (the sting was in the tail, as it were!), UK9AAA, ZS3LK and 4J6A.

G3NOF, after his enthusiastic words of the past few months, reverts to a rather more pessimistic tone about Fifteen; Don, it seems, found EU's during the day and some South Americans in the early evenings.

On the other hand GW4BLE was rather pleased with the band, noting that he got a thirty-over-nine report from VQ9HCS, while the latter was on Astove using just the Argonaut rig—and the QRP was

producing a meter deflection at Newport of between S7 and S9. It really is amazing just what real QRP can do when the bands give it half a chance. Other SSB contacts included KP4DHW, C6AEY, CE1HD, CE2BC, CE3PY, CE5BF, CT2BB, CX4BD, C31HD, C31MS, D2ALB, D2AWR, EA8LD, EL1A, FM7AV, HC1GN, HC1KV, HC2YL, HI8EJH, JY6ZZ, KC4AAC, KP4DHW, KV4AD, KZ5AS, KZ5RL, LU5PB, LU9DVA, PT2VI/2, PZ1DR, SM4ARJ/4U (in the Sinai desert), VE2AQS/TG9, VP5RP/MM (running two watts p.e.p. from the Caribbean), YV, ZE's, ZS's, 4U1ITU, 4Z4TH, 5Z4NH, GW8AAD, 9G1GE, 9J2WS, 9Q5DM and 9X5RK.

As for old 'KFE, for part of the period he was away from home without a rig—during which period his only contact with Amateur Radio activity was the sight of a most *elegant* Quad—there was no other term to describe this one, which so lacked the usual rather droopy mien of the Quad and which stood so regimentally erect, on parade right at the junction of A37 and A303. For him at home it was also largely a matter of EU and South Americans.

Twenty

Here, undoubtedly, the over-riding theme has been that of the previously mentioned electronic Banyan Tree, with various interesting descriptions being offered. It was likened to a motor-boat punting around the band, while G2BY felt it had more affinity to one of those nice old gas-engines, happily bumping away at 300-400 r.p.m. W6PN, late director of engineering for Radio Free Europe in Munich, does not look at it as a jammer but reckons its millisecond pulses, overmodulated at about 5 kHz, would be more suitable for propagation studies or some wide-band operation, though nothing of any such mode as the latter is known.

G4DIY (St. Helen's, Lancs.) makes a first report; Ron uses a vertical aerial, to which he has recently added some 600 feet of copper wire below ground, to a rig described as a "DX-cum-KW-100" which is mainly used on Twenty CW at 100 watts. This gear yielded contacts

on the key with all JA areas, all W call areas with the exception of W7, also CM2HB, VP9's, VE1, VE2, VE3 and most of Europe; not, G4DIY reckons, much for the Quad merchants but good enough for his vertical! On a different line, the query about CX1EK/AC4 by G4DJY recently can be dealt with, Ron having worked Luis twice and received two QSL's—no more doubt there!

G4EVO stuck to his QRP on Twenty CW, according to the copy log received, and his five watts and Joystick are spreading their wings a little more as confidence is gained; we notice a UA6 and a brace of W's this time, not to mention most of Europe.

Another Joystick user is G4DJY (St. Annes-on-Sea), though he tacks it to 120 watts and plays the contests with it. This way of life yielded contacts with all W call areas in one week, at 579 or better reports, Asians, South Americans and of course Europeans, with a nice even scattering of DX throughout the log from these areas, not to mention a lone ZE at 599 both ways; adding up to some 93 countries worked (in five Continents, over the month reviewed).

GW4BLE says for him Twenty took second place to 21 MHz this time, but he did have his usual evening session, which gave PY0AW (Trinidad Is.) for an all-time new one, along with A4XGR, C31KJ, CE1DM, HI8CRP, HK4DHR, HR3JJR, KL7CYH, KZ5ZS, OA4AX, PJ2MI, TI2FDM, VP2KK, VP2KAA, VP5GT, VK5BC, XE1LFH, YS1GMG, YS1GMV, ZP5KB, ZP6AT, 8R1CB, all taken on SSB.

Apart from joining the universal condemnation of those who pro-

pagate the 14 MHz "thing" which he defines as sounding "like a machine gun," G3NOF found the early mornings not so good as in August; very few of the VK/ZL types, or West Coast W's. However, W's have been audible from 1000 onwards, with some W7 around 1700, at which time also some South Africans have been heard; evenings have been dominated by North and South America. Contacts were made with A4XGB, A9XBD, C6AEY, F0HI/FC/MM, FW8CO, HL9TJ, JA's, JY9CR, KX6BU, NG2USA, OA4RB/W7 (Oregon), OE5GML/YK, PY0AW, TA2BK, TU2GG, UK0SAJ, VE7LB, VP2MAI, VR3AH, VR4DX, W6MBV, W7BKR (Wyoming), W7RLL (Montana), W7WJP (Washington), W0MK/MM, WA6EGL/VQ9 (Diego Garcia, Chagos), W7YPO, ZD7SD, ZS1LM, ZS6APO, ZS6BNH, ZS6ML, ZS6VA, 5B4CA, 6W8MW, 8P6FU, 9G1LZ and 9Y4SF.

On to GM3YOR, who as already mentioned stuck to the key all the month, and was rewarded for his energy by getting up to the 100 countries on CW only. Leaving out the EU's who contributed, this month showed EP2OD, FP0BB, HK3AHM, JA1DAX, JA2CMM, JH1UZZ, LU8ADK, PY5CFK, R3FL, ST2SA/1, UG6GAP, UL7GAA, UH8HAS, UI8ADF, UA9FDW, UV9BA, VE3GIK, VK3MR, VP2MFB, YS1O, YV1AVO, DL2RL/YV6, VE3BPU/YV6, ZP3CA, W1HFB, WA1ABV/1, W2GXD, WA2DWE, AC3ABT, AC3FRY, K3YAU, WA3YST, K4EFG, K4PQL, W4BV, W4LVM, WA7VOS, K8MFD and W0FHE.

G2BY spent so much energy describing the Big QRM already

THE LEICESTER EXHIBITION

This opens at noon on Thursday, October 28, at the Granby Halls, and will run for three days, as in previous years. The exhibition will be the fifth in the series staged by the ARRA (Amateur Radio Retailers Association). There will once again be a fine array of all that pertains to Amateur Radio, with everyone there who wants to see or be seen. Leicester, in the heart of the commercial Midlands, is reached easily from all parts of the country. The ARRA can be relied upon to organise a good show, for everyone interested in Amateur Radio, licensed or SWL.

discussed, and its antecedents for several generations back, that he clean forgot to mention his "scalps!"

G4EAN (Nottingham) says that his Versatower is now at 60ft.; but he only found time for a couple of tries, one of which resulted in a contact with OY2EL, while W6YH was a gotaway—he was S7, but G4EAN was not!

The DX Scene

The Bill Rindone, WB7ABK, expedition finally came to an end after the Geyser Reef effort; this last only gave 450 contacts in the first two days, and since the Comoros are so close Bill reckoned it would be easier to stay put for another couple of days, and so racked up another 1400 contacts. QSL's for all the DX-pedition stops should go to Bill Rindone, WB7ABK, 3049 Doris Court, Lake Oswego, Oregon 97034. Band conditions, we understand, had a bearing on Bill's decision to wrap up the Expedition, it being all but hopeless trying to work the W6/W7 people who were most eager.

If South Georgia comes into your "wanted" list, look out for VP8MS, around 14265 kHz on Sundays; as for South Shetlands, this one has been showing as CE9BSA, same frequency at 1130 and 1630z, with PY1ZAE usually somewhere on the scene—the latter puts a good signal into the U.K. Up a bit more and you may come across XT2AG. Taiwan will be a little elusive for a while; BV2A lost his aerial to a typhoon; despite taking all possible precautions as soon as the advance warning was received, the mast came down and replacements have to come from the States; meantime, there is a dipole with which to get on the air.

Obituary

Silent keys fall to be mentioned now; VK3JW, who will be recalled for his Mellish Reef operation back in 1972; John had had a long illness; another notable call to disappear from our bands is HZ1AB, killed in a helicopter crash in Saudi Arabia.

Much nearer home, and better known to many readers, we much regret to have to record the passing of Sydney Boakes, G3HXN, who

died on August 14, at the age of 68, after having been in failing health for some time. He was closely connected with Amateur Radio for many years, first on the sales side with Heathkit, Gloucester, and latterly with Western Electronics (UK), Ltd., Louth, Lincs. For part of the time in his later years he was a keen worker for RAIBC, and was always ready to give unstinting help and advice to any radio amateur, aspiring or otherwise. He was well-known at exhibitions, and rallies up and down the country.

Sunset-Sunrise Times

ON4UN writes to tell us of his computer programme, which, given your latitude and longitude will print out for you sunrise and sunset times for all DXCC countries, all 48 continental U.S. States, all Canadian Provinces and seven VK call areas, at 15 day intervals—18,528 computed times!—all in GMT. The general rule, of course, is that there are two short-path peaks, one at sunrise at the Eastern end of the path and sunset at the Western end being the other; for a long path the requirement is that sunrise at the Western end is later than sunset at the Eastern end of the path. It all adds up to 97 pages of data plus two of explanation and example. To get your chart you need to obtain your own latitude and longitude as accurately as you can, and order on John A. Devoldere, Poelstraat 215, 9220 Merelbeke, Belgium; to whom should also go any initial enquiries. This is an invaluable idea from the point of view of the LF-band DX operator planning skeds, and probably worth it too for the HF operators who are looking for particular countries to fill in gaps in their coverage. (As this offer could result in an avalanche of mail, please be sure to enclose a large addressed envelope, unstamped, with at least two IRC's for return postage from Belgium.—*Editor.*)

First off in the Contest section of this piece, we have the results of 1975's *CQ WW 160 Contest* from W1WY (who, incidentally entered himself a very respectable score—congratulations, Frank). By far the major entry was from OK, if we leave out of account the W's, closely followed by the U.K. and JA. In

the final Top-20 list, KV4FZ was leader, with K1PBW second; G3SZA was fourth, GD4BEG sixth, and GM3YOR/P seventeenth, there being precious little to choose between the scores of GD4BEG and GM3YOR/P so close was the scoring after the first two places. Congratulations to all.

Now, to the coming month, October 2/3 for Phone, and the following weekend for CW are the dates for the *VK/ZL/Oceania Contest*; 1000z to 1000z Saturday to Sunday, sending RS(T) plus a serial number starting at 001; two points for VK/ZL QSO's, one point for other Oceania contacts. Final score is the QSO points total *times* the total of VK and ZL call areas worked on each band. Underline each new VK/ZL call claimed per band in your log, which should be accompanied by summary sheet and declaration, and be on a separate sheet for each band. Logs to be received not later than January 31, 1977, to *NZART Contest Manager*, P.O. Box 489, Wellington, New Zealand; and if you want the Jubilee Certificate available to *each* entrant who submits a log, then send an IRC to cover postage as well.

For the twelve-hour RSGB 21/28 MHz Contest on October 10 0700 to 1900z is the time. Even if you don't make an entry get on the band—*particularly Ten*—and make some 28 MHz activity. Logs to M. Harrington, 123 Clensham Lane, Sutton, Surrey.

Then of course there is J-O-T-A, the annual Scout event, 1800 Friday to 2359 Sunday (local time) for contacts with individual amateurs and scouts or groups; 3740, 7090, 14290, and 21360 kHz are *Phone* frequencies to watch out on, with *CW* likely to be heard at 3590, 3740 (U.S. Novices) 7030, 14070, 21140 and 28190 kHz.

Noon Saturday to Noon Sunday on October 16/17 for Phone and on November 6/7 for CW is the time to be available if you are man enough to tackle a 7 MHz Contest—there is the RSGB 7 MHz Phone on those days, but the W1WY data isn't all that clear about U.K. scoring, so we suggest a rapid line to G3HCT, *QTHR*. Logs also go to him, by

December 15 and December 30 respectively.

And, that is probable as good a lead in as any to:

Forty Metres

A few hours of serious operating on this band is warranted either to put hairs on your chest or drive you round the bend! But, for the hairy ones, the pickings are pretty good and, since there are so few beams, the dipoles and verticals are in there with a level chance. However, if anyone should have an RF Valve (or semi-conductor) millivoltmeter, or, better, micro-voltmeter, it is instructive to hang it on the end of the aerial feeder in place of the ATU and watch the needle pin itself; and to note how many ranges you have to go up before you get an on-scale reading! *Then*, figure out how you are looking for microvolt DX signals under that lot, and marvel not that your receiver occasionally can't cope without a 20 dB pad in its front-end, but, rather, that it *ever* copes!

GW4BLE uses a dipole at 45 feet for this band, and had one morning session, which yielded him SSB contacts with HI8JAG, HK2AQT, YV40W/7 and ZL4OP, as an earnest of the DX season to come.

GM3YOR on CW worked lots of EU's, UF6, UL7, UK9ACP, UW9WL, also W1, W2, W3, W4 and 4J6A.

G2BY is one of those who favour Forty, and found that conditions had improved somewhat, with VK contacts, one at S9, another with VK7CH (first raised 'way back in the thirties) and several with G6CJ, operating as VK5BV. Add to that 8P6GO, HI8HQG, OA4AHO, CM2HB, ZL, W and JA, to prove 40m is giving.

An interesting letter about Forty comes in from G4EDG (Newton Abbot); while Steve continues on the trail of DX on Forty there have been some slight setbacks, the first due to much-wanted rain getting into a trap in the aerial instead of ground; and the second a distressing immunity to an alarm-clock at 0500! Perhaps a good solution to the latter problems would be to place said alarm on an upturned galvanised-iron bucket; and to also pile a great heap of pennies atop the alarm-clock

TOP BAND COUNTIES/COUNTRIES

Starting date, November 1, 1975

Call	AM	CW	SSB	Countries	Total
G4CZE	85	76	77	11	249
G4EAX	58	50	84	10	202
G4CBQ	23	86	71	13	193
GM3YOR	2	130	18	28	178
G4AEJ	65	54	38	8	165
GW3WMY	71	80	—	10	161
G4EPL	17	46	78	10	151
G4AYS	43	86	—	7	136

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

itself. The bucket acts as a sounding board both for the alarm and for the pile of pennies when they fall due to the vibration as the alarm goes off! Even if it doesn't do the trick it *is* warranted to awaken the neighbours. Early evenings have come up with JA's, UAØ and a near-miss with KG6SW, who was raised but flattened by a station from Ukrainian territory who was obviously lacking a receiver. Early mornings give the Middle West States, followed around 0600-0700 by VK and ZL. Then there was VP8PB who popped up and worked a couple of chaps before going QRT—Steve lost out on that one to our old friend GM3JDR. CP7GM, CR9AJ, EP2SV, JA5BJC, JA9YBA, PY1SJ, UAØWAS, VP1MPW, VK3OC, VK2OI, VK3QL, VK3BJL, WA5YTX (New Mexico), a gaggle of Texan W5's, W6TSQ, YV1OB, ZL2UV, ZL3GQ and ZL4FT make up an interesting and good month's haul.

G3ZGC/MM on *Esso Scotia* (GZJG) was off South Africa when he started his letter, and from that area found 7 MHz in the mornings to be quite excellent, ZS's being worked from just south of Ascension right the way round to the southern part of Somalia, a good fifteen degrees of latitude more than usually noted on previous runs. The main activity has been chasing other /MM operators, some on the 14 MHz *Seanet* at 1200z but many on 7 MHz, such as JH3DZC/MM and JH2LWA /MM who were worked off ZS2; they fish for tuna, spending a whole year off the ZS coast, and seem to have a net around 7050 kHz around lunch-

time for the many /MM's among the tuna fleet. G3ZGC also adds a little background information on VQ9HCS, who is the only inhabitant of Astove Is., which is about two miles by three with a lagoon in the middle. VQ9HCS lives off the land and looks after the Island; the quiet life, indeed!

Snippets

For almost as long as your scribe has been writing this piece, Don Radley has been a part of the African scene. As 9G1GE first, from 1967-9, then 9J2GE from 1969 to 1974, and back to 9G1GE since then; but this month he makes the last CQ from Ghana and starts to pack the rig for transportation to his new posting—he should be able to start up again from Athens with an SV call shortly after he gets there in November. Meantime there are plenty of QSL's for both callsigns, available from QSL manager (and brother-in-law!) G3USE, who is *QTHR*. And, if you hear G4ABI—you'll be hearing Don using his "other" call.

Ted, ex-G2XC, seems to have obtained a lot of pleasure from the trying out and tweaking-up of those to W8JK-type aerials in his loft. As if that were not enough of a man-trap up there, Ted has now added 51 feet of wire in an L-shape around the same loft to give him reception on the other bands. The original 8JK's were put up with whatever was around, some of the feeder being 25 years old, and the velocity-factor and impedance just guessed. During the past month a transistor dip-meter has been built, and it has

shown that some of the assumptions were wrong and enabled them to be corrected; it was interesting to note that this resulted in a considerable change in the ATU tuning and, which is maybe more to the point, the removal of the ATU now makes very little difference to signal strength, which is a good sign.

And talking of aeriels and GDO's, this old scribe made a transistor type years ago with an OC170, using as a basis an old Eddystone absorption wavemeter of such an age as to be calibrated for the 112 MHz band! Now, when this GDO was built, the junk box and the tin-bashing facilities were pretty poor, so one pot was fitted on the side of the box, and in the absence of an on-off switch a bit of wire and a croc-clip poked out of an opportune hole. Thus it stayed for 15 years, until last month we changed the battery (which has dropped to 8 volts from nine!) and got around to giving it a nice little toggle-switch in place of the croc-clip; and it has seen a fair amount of use over the fifteen years of its life; on the one hand we have a noise bridge, also home-built, and on the other the dipper and an aerial bridge—and both are used to check against each other when doing aerial measurements, at least at HF.

Eighty & 160 Metres

Quite a bit if they are lumped together, not a lot each if separated.

G4EVO seems to have been quite active with two watts and a Joystick; outside the U.K. the contacts were mainly with ON's and a gaggle of PA's, some DL/DM.

A new reporter is G3PKS (Wells) who has been interested in /P operating with a whip roof-mounted by means of a quick-fix gadget, initially on Top Band (largely CW) and more recently on Eighty. On Top Band, calculation gives an e.r.p. of around 0.05 watts for five watts of actual input RF to the whip (which is pretty fair for Top Band /M whip efficiency, at that). With this, and a rig giving all modes and designed by G3OTK, plus a homodyne (direct-conversion) receiver boasting an IC mixer and a couple of stages of audio filtering, all of the U.K., round GI, to Northern GM, PAØ, with a plum in the form of ET3USA/MM, getting

569 with a change to SSB making 57, while G3PKS was in Brough, Cumbria and the ship was 150 miles east of Hull—a total distance of around 300 miles. Since this, and as yet not boxed up, a rig for Eighty has been built—a CO on 3.513 MHz drives a BD131 as PA stage; again the receiver is homodyne, covering just a few kHz around the "transmit" frequency. So far this has been very effective in working U.K. in daylight; the best being a call from JX6AF when the car was parked at Weymouth on holiday.

G2HKU (Sheppey) is still horizontally-polarised, it having been at last found that there is a broken bone right in the instep which the local hospital X-ray had failed to record but showed up on the Medway Accident Centre machine which Ted reckons must have had its linear connected! However, Ted still can't get up the ladder to the shack, so he is stuck with Eighty CW and about one watt, with which he has managed DK2YN, DF7FA, GM4CMO, GW3MPB, GW3RVT, GW6AQ, ON4GU, ON4IE, ON6HJ, ON6IN, PAØGCM, PAØGRU, PAØMDG, PAØPN, PAØSA and, of course, lots of G's.

G4AEJ (Birmingham 25) managed to borrow a Sphinx transmitter from son G4AEK, to supplement his own AM and CW with some SSB scoring; on the other side of the coin his two /P expeditions with the Solihull Club rather cut into his home operating time. However, a satisfactory movement for the Tables is noted.

G2NJ (Peterborough) is a chap your conductor has been going to visit for so long—but, like G2BJY, we never seem to find the time. Anyhow, Nick still writes regularly, and this month has been no exception. G2NJ was operating at the Inland Waterways Association "meet" at Peterborough, under GB31WA (and 'KFE didn't go because he thought there wouldn't be enough water to float on!) and worked G2CP with his half-watt, also G6PG with three watts, well enough to rattle the loudspeakers; then from home there was G4CLR, a 35-minute contact with a station using 750 milliwatts, G4FAI in London with one watt, GW5TW near Swansea with a watt, G4EVO

Broadstairs on two watts, and G4CQK with an HW8 at 3.5 watts. As for Top Band, G2NJ heard ET3USA/MM rattling 'em off on CW, on the night of August 11, when the ship was about 150 miles East of Hull.

G4CZE/A (Droitwich) has been pretty inactive of late, mainly due to practising for the /M activity—but he remembered to put in a revised score for the Table, and also means to make a final burst before the end of the time.

GM3YOR has not been particularly active on either LF band from home; but there can be no doubt whatever about the way he stirred things up under his GI callsigns! We are promised the story for next time—must be the first GI DX-pedition for many years.

A final-final on the subject of the LF Bands (and indeed, all bands!). Let it be known by the whole world that there is such a place as the *Scilly Islands*, part of the Duchy of Cornwall; and please don't damn as a Pirate an operator who says he is from there. There are G3UUZ and G3RPC on St. Mary's, and the latter has suffered considerably from poetical types rhyming his call letters into rude phonetics. *Neither* of these stations are pirates, *both* are genuine licensed radio amateurs. Far from being "silly" the islands are known through history as "the islands of the blest" and anyone who pays them a visit will realise why—this bit of information came from "Club Secretary" who was prospecting for a DX-pedition to one or more of the "off-islands" as they are called by the people of St. Mary's.

Tables

Final entries for the year are required to be made up to October-end, which means they should be sent in with the gen during November, for display in the December issue. If possible, we would appreciate table entries in early, at that, and above all, don't miss the last date even by one post!

We sign off for another month; deadline for which will be **October 12**, and for the month after the date to remember is **November 9**. Address, as always, to "CDXN," SHORT WAVE MAGAZINE, BUCKINGHAM.

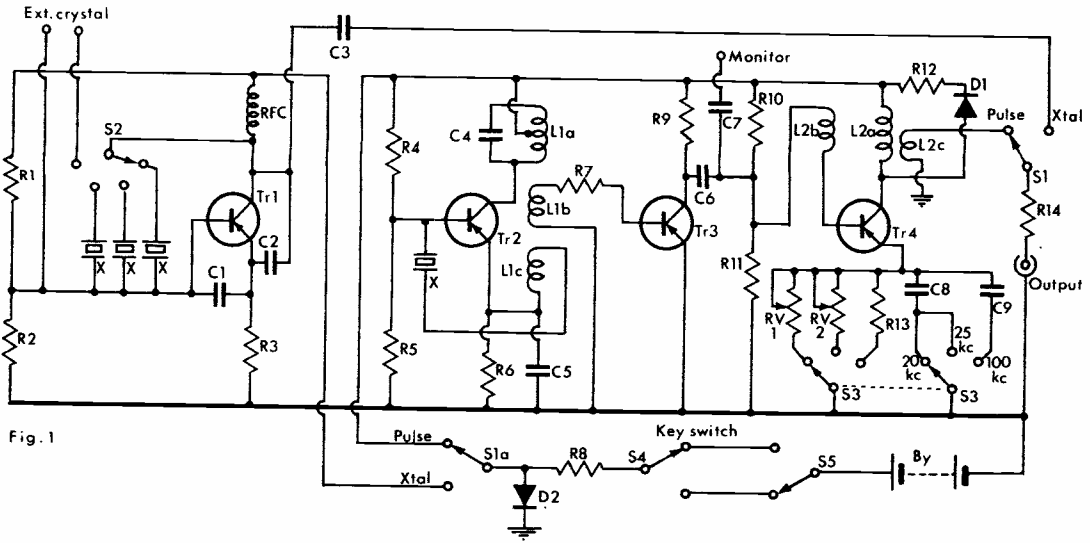


Fig. 1

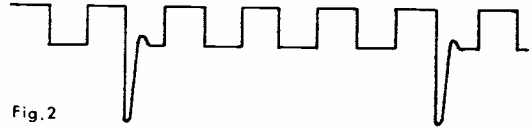


Fig. 2

Fig. 1. Circuit of the transistorised crystal-controlled calibrator and band edge marker. The CO side, Tr1, gives three outputs at known frequencies, which will be as exact as the calibration accuracy of the crystals used; provision is also made to switch in an external crystal, either for checking against the bars, or as an additional marker frequency. The section Tr2-Tr4 is a separate circuit, which gives strong harmonics through a wide frequency range from the 100 kHz bar at Tr2; the advantages of this are explained in the text. The wave shape, as obtained from the monitor point on the collector of Tr3, is shown in the diagram at Fig. 2.

BASIC SPECTRUM GENERATOR

FOR RECEIVER CALIBRATION, BAND-EDGE MARKING AND OTHER APPLICATIONS

THE advantage of a pulse-type signal, as distinct from a square-wave (as would be obtained from a multivibrator), for frequency marking is that the fundamental power is less and the harmonic power very much greater. Adequate power can be obtained at the higher harmonics without blocking the receiver on the lower frequencies.

For the "pulse" section a crystal-controlled pulse generator, operating at a p.r.f. of 20, 25 or 100 kHz, provides markers at the selected intervals, covering the whole spectrum into the VHF region. The spectrum coverage will depend on the rise time of the pulse, which will be limited mainly by the transistor used.

In this case, with an OC170, the rise time was measured at 50 milli-micro-seconds using a commercial instrument, which itself has a rise time of approximately 50 milli-micro-seconds, so the pulse could well be shorter.

From the "crystal" section markers are provided at 5 MHz, 1 MHz and 500 kHz, or any frequency in the range 500 kHz—8 MHz, using external crystals.

Fig. 2. Referring to Fig. 1, this is the waveform seen on a CRO with the output taken from the monitor point when the blocking oscillator is switched to the 25 kHz setting, to give a 4 : 1 division of the fundamental frequency.

Table of Values

Fig. 1. Circuit of the Transistorised Calibrator Unit

C1, C2,	RV1,
C3, C7 = 22 μ F	RV2 = 5,000 ohms
C4 = 250 μ F	S1 = 2-pole, 2-way
C5, C6 = .04 μ F	S2 = 1-pole, 4-way
C8 = 0.1 μ F	S3 = 2-pole, 3-way
C9 = .01 μ F	S4, S5 = 1-pole, 2-way
R1 = 39,000 ohms	RFC = 1 mH RF choke
R2 = 47,000 ohms	X1 = 5 MHz xtal
R3, R11 = 1,000 ohm	X2 = 1 MHz xtal
R4, R5 = 15,000 ohms	X3 = 500 kHz xtal
R6 = 470 ohms	X4 = 100 kHz xtal
R7, R12 = 1,500 ohms	D2 = 6.8v. Zener diode
R8, R14 = 100 ohms	TR1,
R9 = 2,000 ohms	TR3 = OC44
R10 = 4,700 ohms	TR2 = OC71
R13 = 1,200 ohms	TR4 = OC170

COILS: L1 is on Ferroxcube LA3 former, winding L1A 180 turns 40g. tapped at 60th turn; L1B, 70 turns 40g., and L1C as L1B. L2 is on Ferroxcube E Core, winding L2A 15 turns 28g.; L2B 5 turns 28g., and L2C 3 turns 28g.

Circuit Description

The crystal circuit is a Colpitts crystal parallel-resonance oscillator, which can be made to oscillate over a range from 500 kHz to 8 MHz with suitable fundamental mode crystals. Replacing the OC44 with a VHF drift transistor permits operation of the oscillator

D 250

in the range from 10 to 25 MHz with suitable overtone crystals. Provision is made on the switch for external crystals.

Output voltage of the crystal unit at 1 MHz is 1 volt R.M.S. open circuit, and approximately 80 millivolts into 100 ohms.

Pulse Unit

A crystal oscillator with a tuned collector circuit is used, and the crystal connected in series with the feedback winding, L1C. The output from this oscillator is squared by Tr3 and the square-wave is used to synchronize the blocking oscillator Tr4. The square-wave must have a short rise time to ensure reliable triggering of the blocking oscillator, particularly when working as a divider; for this reason an OC44 transistor is also used in this stage. The blocking oscillator transformer L2 is wound on a Mullard Ferroxcube "E" core.

The variable time constant in the emitter circuit of Tr4 determines the operating frequency of the blocking oscillator. In this case the circuit was adjusted to divide by 5, 4 and one by the resistor-condenser combination. The division was checked at the monitor point provided using an oscilloscope (see Fig. 2).

With the diode and damping resistor connected across the primary of the pulse transformer excessive overshoot is prevented (D1, R12, Fig. 2).

The power supply is stabilised by a 6.8v. Zener diode, to ensure stability of the blocking oscillator, particularly when operating as a divider.

Transistors of similar types to those suggested may of course be used.

Harmonic Output

This was measured by injecting the signal from the generator into the low-impedance input of a SP600 receiver, tuning to the desired harmonic and noting a reference level, and then substituting a signal from a standard signal generator. The results are shown in the table.

HARMONIC OUTPUT LEVEL

	Freq.	Harmonic	Level
P.R.F. 100 KHz	1 MHz	10th	100 mV
	10 MHz	100th	10 mV
	20 MHz	200th	1 mV
	30 MHz	300th	250 μ V
	50 MHz	500th	100 μ V
P.R.F. 20 KHz	500 MHz	25th	25 mV
	1 MHz	50th	20 mV
	10 MHz	500th	1 mV
	20 MHz	1000th	200 μ V
	30 MHz	1500th	100 μ V
	40 MHz	2000th	80 μ V
	50 MHz	2500th	50 μ V

Operation

The Pulse/Crystal switch controls the DC supply and switches the output socket to the appropriate position. A two-way press switch operates in conjunction with the on/off switch. In the "on" position, flicking the key switches the unit for identification. In the "off" position, operation of the key brings the signal on.

SIXTEEN-ELEMENT ARRAY FOR SEVENTYCEMS

NOVEL CONSTRUCTION WITH CHEAP MATERIALS

THIS very effective—yet cheap and simple to construct—432 MHz beam originated from a supply of galvanized (zinc-coated) iron wire coat-hangers, as used by most local dry-cleaner firms who return each laundered garment on one, at no extra charge. Being non-returnable, the writer's wardrobe was quickly over-burdened with spare galvanized (zinc) coat-hangers, which were duly pressed into radio service.

The total material complement for this beam is: 12ft., of coat-hangers, 12g. galvanized; 10ft., 26g. tinned copper wire; two 5ft. x $\frac{3}{8}$ in. diam. bamboo canes; 10ft. of thin, strong cord (fishing line); 8in. of PVC sleeving, and one reel Arax cored solder.

Each hanger is made from a 42in. length of galvanized wire, which is very strong. Figs. 1 to 9 show clearly the construction, step-by-step. The first thing is to straighten out the hangers, using a strong pair of pliers, after which cut and bend two pieces to shape as in Fig. 1, and four pieces as in Fig. 2.

Now bind these six pieces together with thin tinned copper wire, and solder with Arax cored solder, taking care to arrange the overlaps so that the centre phasing-line spacing is not stepped. This is achieved by laying the sections on the ground and arranging the overlap joints so that one lies on top of the other, and *not* as shown in Fig. 3, which is drawn for clarity showing the overlaps side by side.

These six pieces combined form the radiating elements and phasing lines. It should be noted that the phasing line sections between the upper and lower radiator sets have cross-overs in them. The spacing between the lines is one inch, and the cross-over is achieved by a judicious bend around a broom shank, thereby forming a semi-spiral in each line. The two semi-spirals thus produced result in a cross-over with a constant one-inch spacing. (This operation sounds much more complicated than it really is.)

At this stage, strip 8 inches of the outer sheath of $\frac{1}{4}$ -inch coaxial cable, cut into one-inch lengths, and slip one over each radiator element, positioning them at the centres.

Fig. 4 shows the construction of the element supporting members, of which two are required. Each one consists of a 41in. length of 12g. wire and four pieces $6\frac{3}{4}$ inches long. The 41in. piece is the vertical member and the $6\frac{3}{4}$ in. pieces are fixed to it by twisting one end two complete turns in a downward direction. By giving two turns, the cross member is held rigidly at right angles to the vertical member. Now bend a downward hook on the remote end of each cross member, as shown in the drawing, forming an arm $5\frac{3}{4}$ inches long. As before, a strong pair of pliers is necessary for this operation.

Lay the two supporting pieces thus formed on the ground to ensure that all the cross members are in the same plane, and solder each spiral joint.

To form the reflector elements, cut 8 straight pieces

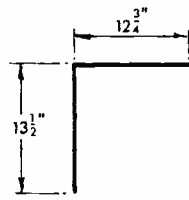


Fig. 1 2 off

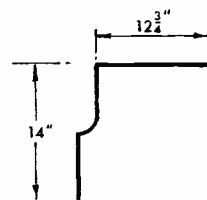


Fig. 2 4 off

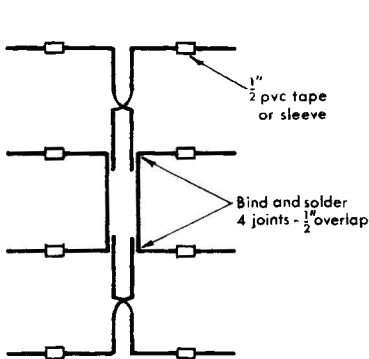


Fig. 3 Radiators and Phasing lines

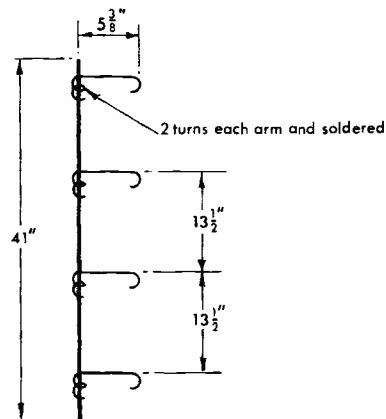


Fig. 4 Element support 2 off

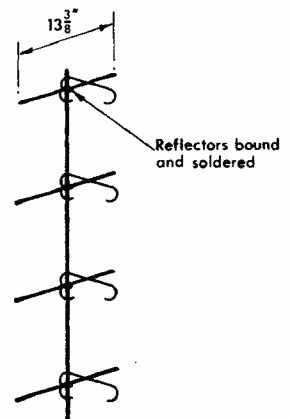


Fig. 5 Reflector mountings

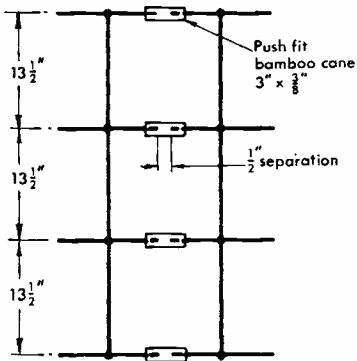


Fig. 6 Bamboo reflector spacers

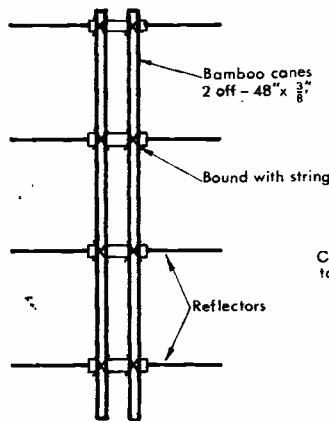


Fig. 7 Mounting canes

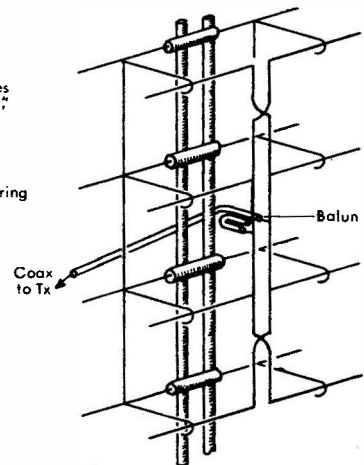


Fig. 8 Complete Assembly

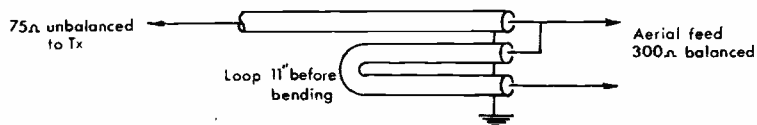


Fig. 9 Balun transformer

of 12g. wire¹ 13½ inches long, and fasten one to the underside of each cross member, hard up against the spiral joint, mutually at right angles to the vertical and cross members, and bind in position with thin tinned copper wire. Solder at each joint after binding—see Fig. 5.

Now cut four pieces of bamboo cane 3 inches long from the 5-ft. canes, by taking 6 inches from each one. These pieces will of course have holes through their centres.

Take the two sections of aerial which from the supporting members complete with reflector elements, and lay them side by side on the ground. Make a pencil mark 1¼ in. inwards from the inner end of each reflector, and push one 3 in. piece of cane over these ends of each pair as far as the pencil marks, as shown in Fig. 6. This should leave a centre spacing of ½-inch between the reflectors inside the cane spacers. Make sure that the spacers are a good tight fit by packing with scrap pieces of PVC sleeve if necessary.

Lay the two 4½ ft. canes down the back of this section, with a spacing of about one inch, and bind them with cord at each intersection between the long canes and the cane spacers. Leave about 12 inches of cane overhanging at the bottom for fastening to the mast head—see Fig. 7.

The final stage is to take the radiator and phasing line assembly (which is in two sections) and insert each radiator into the hook formed in each cross member. The position of the hook should correspond to the centre of each radiator, and the hook is then nipped tight with the pliers. The one-inch PVC sleeving pieces form insulating bushes between the cross arms and radiators, so ensure that they are not nipped through. Theoretically, these insulating bushes are not necessary as the centre of the radiator is a low impedance point, but in practise it is preferable to have them.

The phasing lines should be equally spaced about one inch along their length; the radiating elements 12½ inches long, spaced vertically 13½ inches; the reflectors 13½ inches long, spaced vertically 13½ inches; and the reflector-to-radiator spacing is 5½ inches, which is 1/5th of a wavelength. It can be seen that both the reflector and radiator are mounted *below* the cross arm in each case.

For extra rigidity, and to help keep the phasing line spacing symmetrical, a 3 x 1¼-in. piece of perspex can be laid across the phasing lines between the top and bottom pairs of radiators, and fixed in position with PVC tape.

Feeding

The array is fed at the centre of the phasing lines, and has an impedance of about 300 ohms.

It can be connected either by 300-ohm tubular twin feeder, or by 75-ohm low-loss TV type coaxial cable, with a balun transformer. A suitable balun of simple construction is shown in Fig. 8.

In the author's case, the balun is made with 75-ohm semi-air spaced coax, the total length of the loop before bending being half-wavelength, which, after taking into account the velocity factor of the cable, is 11 inches for 433 MHz. The three braided ends thus formed are strapped together (preferably soldered, but care should be taken to avoid melting the inner insulant) and earthed. In practise, the earthing has no noticeable effect and need not be bothered with. The centre conductors are connected as shown, and should be soldered to the centres of

the phasing lines, after which the ends are sealed against moisture by liberally coating the bare ends with polystyrene or *Bostik*. As a further precaution, arrange the feed cable so that it runs *down* to the feed point, by taping the coaxial cable to the canes about one foot above the centre. Finally, clean off all residual flux from the joints, and rinse with water, as this flux is mildly corrosive.

The complete 16-element 432 MHz stack, which took only a few hours to build (in spite of the apparent complications) is extremely strong, light in weight, has low windage and is durable. It can be clamped to a mast by the canes. The beam as described has survived many gales and much severe weather, 15 feet above the chimney, without damage or rusting, and has proved most effective, the performance being noticeably better than the previous array, which consisted of a dipole in a close-mesh 2 x 1 wavelength-sided corner reflector.

With only 10 watts RF into the array at a height of 30 feet, good distances have been worked on the 70-centimetre band. More recently, power has been increased to 100 watts.

Finally, it hardly needs mentioning that the same general design can be adapted to other materials—it is not likely that everyone, everywhere, has a fully supply of galvanized coat-hangers! Probably, 12 or 14g. wire would do as well, but would be more expensive.

Do You Know That —

— An almost professional-looking lettering job can be done on panels by using draughtsman's *Uno* stencils, their size 1½ or 2 being just about right. The inking can be white on dark panels, or black on grey or aluminium. Then by warming the panel and spraying it with one of the clear aerosol lacquers (obtainable from any good motor accessory stockist) a durable finish is given to the work. The *Uno* items are quite cheap and are always available from office equipment suppliers, and can often be had at large stationers.

— Standard plastic conduit, in sizes from ½ in. diameter upwards, can be used to make coil formers for almost any RF application, and is excellent for the purpose. Any electrical contractor, or the local Electricity Board sales office, can supply it—and may even have unwanted off-cuts to give away.

— Another use for empty ball-point pen cases is as lead-in insulator ducts. Drill a hole through the wall so that the case is a tight fit, and the wire can then be fed through; it will take up to 14g. quite comfortably. An obvious limiting factor is wall thickness, as these plastic cases are barely 5 in. long. They also make neat formers for small coils, when cut to the required length.

— Spreaders for open-wire feeder lines can easily be made from insulated tag boards. Cut the board into strips so that there is a rivetted tag at each end, and pinch it over the wire with pliers; solder to make a solid job.

— An attractive "circular frosted" effect can be quickly and easily imparted to aluminium panels by inserting a small pad of steel wool in the chuck of a hand-drill. A few turns will produce a permanent pattern.

FURTHER R.A.E. COURSES—1976/77

THE first List under this heading appeared on pp. 429-430 of the September issue of SHORT WAVE MAGAZINE. The courses shown below have been notified since.

Readers who cannot see a course going in their locality, or within reach, may find that the local office of their Education Authority know of one which has not been otherwise publicised—quote “Subject No. 765, City & Guilds of London Institute, Radio Amateur’s Examination” when making such enquiries.

If a sufficient number of candidates (usually, not less than ten) can be mustered, a course can sometimes be arranged by approaching the Principal of the local Technical College, Adult Education Centre, or College of Further Education. There are also very good correspondence courses for the R.A.E.

Deal: At Hilderstone House, Broadstairs, probably on Monday evenings. Information from the Principal or the course tutor J. R. Clarke, G3OWQ.

Glasgow: At the College of Nautical Studies, 21 Thistle Street, on Tuesday and Thursday evenings, 7.0-9.30 p.m. covering R.A.E. theory and Morse instruction. Fee for the course £3, free for under-18’s.

Harlow: At the Technical College, The High. Details from the College, or the course tutor, E. P. Essery,

G3KFE, QTHR, or ring *Bishops Stortford 52501.*

London (Islington): At the Debeauvoir Evening Institute, Tottenham Road, Ballspond Road, N.1, with courses for beginners on Monday and Wednesday evenings, and Advanced instruction on Tuesdays and Thursdays. The Institute has a workshop for constructional work and its own amateur station for all bands. Details from F. Barnes, G3AGP, senior instructor, at the Institute, or ring 864 5311, extn. 2283.

London (South Croydon): At Haling Manor High School, Kendra Hall Road, on Thursdays, 7.30-9.30 p.m. Full enrolment details on application to the School; tutor P. L. A. Burton, G3ZPB.

Northampton: At Weston Favell Upper School, Booth Lane, on Wednesday evenings 7.0-9.0 p.m., covering theory and Morse. Information from the School, or from the course tutor B. Hayes, G3JBU, QTHR, or ring 43020.

Nottingham: At the Hucknall Further Education Centre, Portland St., Hucknall, on Monday evenings 7.0-9.0 p.m. Course tutor Rev. G. C. Dobbs, G3RJV, Woodborough 3920.

Todmorden (Lancs.): At the Calder College of Adult Education, on Thursday evenings from 7.15 p.m., starting on Oct. 7.

MEASUREMENT OF SIDEBAND POWER

UNDER AMATEUR LICENCE CONDITIONS

ONE condition of the Amateur Sound Licences “A” and “B” effectively limits the maximum power that may be radiated, the permitted power level being dependent on the frequency used. The power *output* level is specified and the licence has stated the maximum permitted DC power input to the final amplifier stage of the transmitter, *i.e.* the stage feeding the aerial. For instance, in the 3.5-3.8 MHz (80-metre) amateur band the maximum permitted DC input is 150 watts. Assuming that the conversion efficiency of the transmitter final stage is 66½ per cent, the mean RF power delivered to the aerial with 150 watts input would be 100 watts giving a *peak envelope power* of 400 watts under 100 per cent amplitude modulation conditions. (Peak envelope power, *p.e.p.*, is the average power supplied to the aerial during one radio frequency cycle at the highest crest of the modulation envelope.)

Measurement on SSB

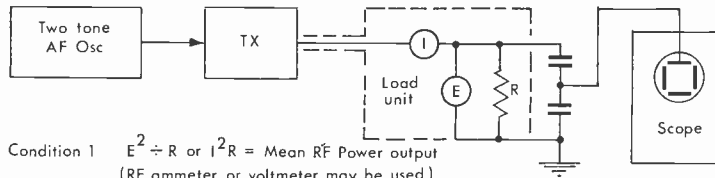
In most transmitters it is a simple matter to measure the current and voltage in order to determine the DC power supplied to the PA, and this process is generally satisfactory for telegraphy (A1 and A2) and double-sideband telephony (A3), or AM/FM Phone. In single-sideband working (A3A, A3H, A3J), however, the Tx output stage operates (or should be) in a linear condition, where the 66½ per cent efficiency no longer applies and DC power is supplied even when there is no RF output.

The most satisfactory method of assessing the power rating of a linear amplifier is based on measurement of RF *output* power instead of DC *input*, and it is output power rating that is now generally used. Accordingly, a method of power assessment for amateur Side-band transmitters is now specified in which the permitted *p.e.p.* output from an SSB transmitter does not exceed that from a CW or AM Phone transmitter using the maximum permitted DC power input. This method, which should be used wherever appropriate in preference to the DC *input* method, can be set up as shown in the diagram herewith, but readers may find the following comments helpful.

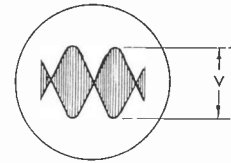
Method of Measurement

The sketch shows how the various items of test equipment are connected during power measurements. The transmitter output is terminated in a resistive load of the appropriate impedance value (50, 72 ohms or whatever) and provided with an RF ammeter or rectifier/voltmeter to enable the power in the load to be calculated. The load should have low reactance at whatever frequency is used (say, a non-inductive carbon resistor) and should be surrounded by an earthed screen. A cathode-ray oscilloscope is set up to observe the output waveform in the load; with most oscilloscopes the necessary high-frequency response and high-impedance input can be obtained only by making a connection direct to one of the vertical deflection plates. A capacity potential-divider can be used for controlling the input to the oscilloscope, as shown.

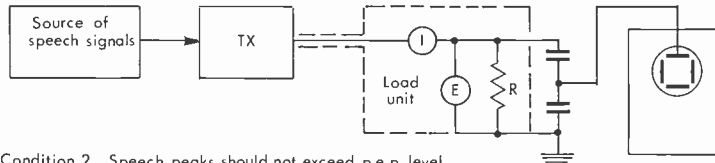
The first step in the measurement procedure is to adjust the SSB Tx for suppressed carrier operation and to connect two audio-frequency tones of equal amplitude



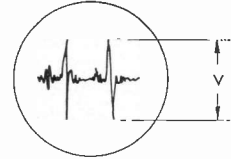
Condition 1 $E^2 \div R$ or $I^2 R =$ Mean RF Power output
(RF ammeter or voltmeter may be used)



V represents peak envelope power
 $= 2 \times$ mean power



Condition 2 Speech peaks should not exceed p.e.p. level
represented by V



CRT display

M
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Amateur SSB Tx Power Measurement

Set-up for the test equipment discussed in the article on SSB power measurement. When correctly adjusted under Condition 1, the waveform displayed on the oscilloscope should be "perfect," near enough.

to the transmitter input. The Tx is then adjusted to give a mean RF power output, as measured in the load, of the value appropriate to the frequency band involved (for instance, 200 watts at 3.5 MHz—see Appendix). If the time-base is correctly adjusted the oscilloscope will display the RF envelope waveform resulting from the combination of the two tones. Provided that the input tones are sinusoidal and that the transmitter is not overloaded the peak envelope power (p.e.p.) output will be twice the mean power measured in the load, and the maximum deflection on the CRO display will represent this p.e.p. level. By this process the oscilloscope can be calibrated to indicate the maximum permitted p.e.p. for any frequency band.

The second step is to adjust the transmitter for A3A, A3H or A3J (SSB) operation and to replace the two-tone input by speech, the level being adjusted so that the CRO deflection on speech peaks does not exceed the calibration level. The transmitter is then providing the maximum permitted p.e.p. output and line-up conditions should not subsequently be altered in such a way as to increase this output.

Here it should be noted that a licensee is not obliged to provide himself with a two-tone oscillator, dummy load and oscilloscope—but this equipment is most useful not only for power measurements but also for checking the general performance of the transmitter.

APPENDIX

Power Measurement of SSB Transmitters

The method now specified for power measurement of SSB transmitters is therefore as follows:

Suppressed or reduced carrier, single sideband operation. The radio frequency output peak envelope power (RF p.e.p.) must not exceed that from an A3

transmitter working at an overall efficiency of 66 per cent when supplied with the appropriate maximum permitted DC input power. The output power shall be measured, using a resistive dummy load, RF ammeter or voltmeter and oscilloscope, by the following method:

(i) Apply two non-harmonically related sinusoidal tones of equal amplitude to the SSB transmitter, with the carrier fully suppressed and adjust the input power to give a mean radio frequency output power under linear operation of 200 watts (see Note 1) when measured into a resistive load by means of an RF ammeter or voltmeter (see Note 2) or equivalent method. Under this condition note the peak-to-peak deflection on the cathode-ray oscilloscope (see Note 3).

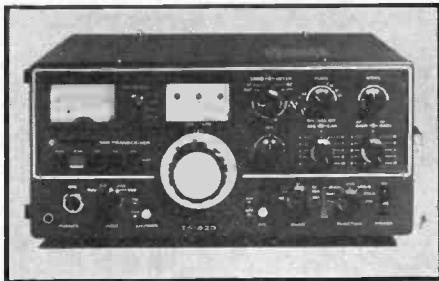
(ii) Replace the tone by speech; the maximum vertical deflection on the cathode-ray oscilloscope shall not be greater than the previously recorded deflection obtained with the two-tone input.

Note (1) 200 watts mean radio frequency output power in the case of those bands limited to a maximum DC input power of 150 watts; 66½ and 13½ watts for those bands limited to a maximum DC input power of 50 watts and 10 watts respectively.

Note (2) In the case of VHF and UHF measurements the RF ammeter or voltmeter may be replaced by a crystal rectifier and calibrated meter; for SHF measurements a bolometer may be used.

Note (3) In the case of VHF, UHF and SHF measurements this use of an oscilloscope may not be practicable. In this case the test may be limited to a measurement of the mean radio frequency output power.

SHOWCASE 1976



The TS520 is another outstanding example of TRIO design excellence. It produces one of the best sounding signals on the air—just listen for yourself on any band. The TS520 covers all bands 80–10 metres and even 2 metres using the matching TV502 transmitter. It has all the features of equipment costing a good deal more at no extra cost—AC/12 volt operation, speech compression, 1 kHz readout, VOX calibrator, blower cooled PA using real transmitting valves, 4 function metering, etc., etc. A full range of matching units allows you to build) up a station which is second to none : VFO 520, SP520, TV502.

Why not send for details today and find out what TRIO design is all about, or just call on us either at Matlock or one of our branches to try out the superb TS520 system for yourself. You are in for a pleasant surprise, particularly when you realise that its nearest competitor is a much older design and costs £100 or so more than the TS520.

£378 inc. VAT



TS520



The TS700G has earned the reputation of being the finest all mode 2 metre transceiver available today. TRIO design and inherent quality are outstanding in this equipment and the TS700G has become the standard by which other transceivers are judged.

Full 2 metre coverage using VFO or crystal control. All modes FM, USB, LSB, CW, AM. Mains or 12v. DC operation. Simplex, repeater and reverse repeater use without retuning—ask us what that means. 15W. TX output. 0.25 microvolt sensitivity. European standard selectivity. TRIO exclusive tuning fork access generator.

We are often asked "Why is it better than brand X?" There are many reasons, but they all stem from the basic excellence of TRIO design. The transmitter sounds better than all the others because of the high voltage supply to the driver and PA—even when operating from 12 volts. The operator can use repeater or reverse repeater without having to touch the main tuning dial. The tone burst is automatic and operates in the repeater modes only. So many more features but you need to see for yourself. Ask us for details right now, all it costs is 30p in stamps for the full catalogue.

£382.50 inc. VAT



TS700G



TR7010

LEICESTER SPECIAL PRICE
£160 inc. VAT

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

The TR7010 sets new standards in receiver sensitivity and low spurious emission on transmit. Operating CW and SSB from 144.1–144.3 MHz, the TR7010 covers all CW, SSB and beacon activity. 40 5 kHz channels plus VXO and RIT provide continuous coverage. 8 extra channels can be used, without retuning, in the range 144–146 MHz by fitting auxiliary crystals.

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

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



TR7200G

Fitted S20, 21, 22 ; R6, R7
£162 inc. VAT

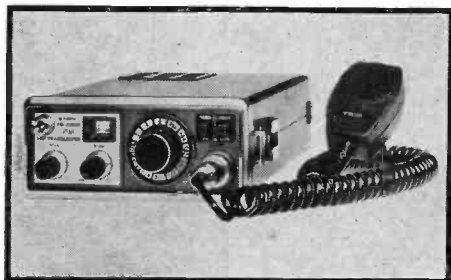


The TR7200G has set all 2 metre operators talking about its outstanding performance on both transmit and receive. Not only is it the best engineered transceiver on the market, but it's also the most sensitive at 0.3µV for 15 dB quieting and has the cleanest transmitted signal both in and out of band (some economy transceivers simply lack the interstage filtering to ensure that the owner is not put off the air by the Home Office). Minimum TX output power of 10 Watts (normally 15W. when mobile) will give you the extra quiet signal into your repeater. The TRIO exclusive tuning fork access tone generator ensures repeater access first time every time even when the inside of the car is at elevated temperatures.

Supplied complete with microphone, mobile mount, power lead and spare fuse, the TR7200G also has factory fitted crystals for S20, S21, S22, R6 and R7. If ordered at the same time as the rig, we will fit three extra channels for £10 inc. VAT (normally £14.40) or six extra channels for £20 inc. VAT (normally £28.80).



SHOWCASE 1976



The newest FM handy transceiver from the TRIO range of top quality rigs for the discriminating amateur operator. Superb performance on the 70 cm. band, opening up new horizons for the repeater operator. 12 channel capability in the range 432-436 MHz with three channels fitted (SU8, SU18, SU20). Transmitter output switched 2W/400mW and incorporating the TRIO 1750 Hz tuning fork access tone generator. $\frac{3}{4}$ -wave detachable antenna for high gain performance on both transmit and receive.

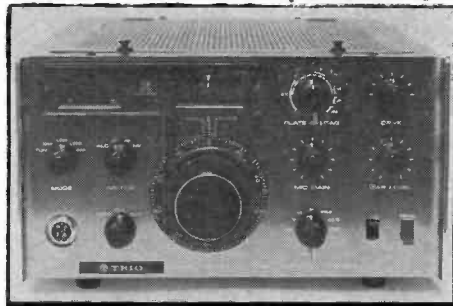
Supplied complete with microphone, carrying case and shoulder strap, battery charger (for optional Nicad pack) and backed by the finest service in Europe.

Also available is the quick release mobile mount MBI for using the TR3200 in your car.

£148.58 inc. VAT



TR3200



Completely solid state except for the driver and two 6146B fan cooled PA tubes (for that low intermod. signal that means real quality), the T599S has all that you could want. All mode operation SSB, CW, AM on all bands from 80m. to 10m. Built in vox with adjustable delay and anti-vox. Multi position metering for complete operator information. Break-in CW with built-in sidetone generator. Dual impedance microphone input system—and of course, TRIO quality of construction with a die cast front panel and rugged casing. Signal quality.

Guaranteed by TRIO's acknowledged leadership in the audio field; by the use of an 8 pole crystal filter; by the use of linear PA tubes and by the use of an amplified ALC system which gives signal punch without sacrificing signal quality.

Measuring only 10 $\frac{1}{2}$ " x 5 $\frac{1}{2}$ " x 12" and weighing only 25 lbs., the T599S is a real mighty mouse. Able to sit on the smallest operating desk, it's a perfect match for the R599S or the earlier JR599 receivers—or any receiver for that matter.

LEICESTER SPECIAL

£255 inc. VAT

T599S



LEICESTER 1976



EXHIBITOR



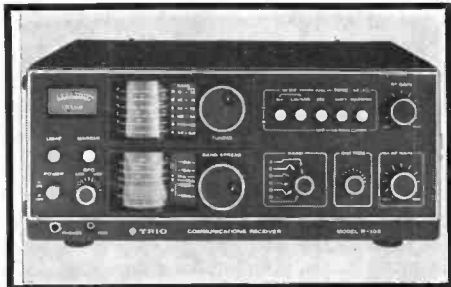
R300

£168.75 inc. VAT

The latest from the range of TRIO general coverage receivers AM, SSB and CW reception on LW (170-410 kHz), BC (525-1250 kHz), four SW bands covering the frequencies from 1.25-30 MHz with separate calibration for the commercial (75-11 metre) and radio amateur bands (80-10 metres) on the large back lit main tuning and bandspread dials.

Outstanding sensitivity—the dual gate MOSFET front end assures excellent cross modulation and spurious characteristics as well as high sensitivity. Between 18 and 30 MHz the R300 operates as a double superhet, giving typical sensitivities of 1 microvolt for AM and 0.5 microvolt for SSB.

The 500 kHz marker is built-in and included in the price. Switched filters give two I.F. bandwidths to suit all modes of operation. The R300 can be used on 110-240v. AC or 12v. DC external supplies or from internal batteries. Automatic changeover from one supply to another is a further feature of the R300. Contact your nearest branch for details.



TR2200 GX

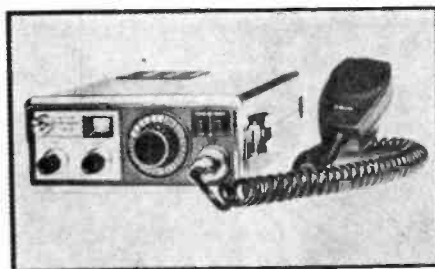
£117 inc. VAT



Following on the most successful handy portable line ever produced, the TR2200GX leads the field once again. Higher performance all round with better selectivity from the receiver which is now fitted with additional crystal filters at 10.7 MHz. Higher power from the transmitter at 2 Watts (optional reduction to 400mW) and new styling to match the TR3200 UHF transceiver. Detachable $\frac{3}{4}$ -wave antenna with optional flexible heli-whip available. VFO facility for addition of external VFO30G.

Supplied complete with all accessories as the TR3200 and factory fitted with crystals for S20, S22 and R7. Extra channels are available ex-stock for most I.A.R.U. frequencies at a cost of £4.80 per channel (inc. VAT). Also available is the new mobile mounting bracket MBI which gives quick mounting and removal of the TR2200GX from your car.

See the TR2200GX soon at Leicester or at one of our branches.

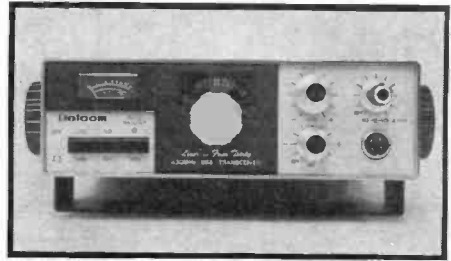


SHOWCASE 1976



High power. High performance. Modest cost.
 A reasonably priced, compact, high performance linear for 2 metres, SSB/FM/CW operation. 10W of drive for around 180W input gives your signal the extra kick to get it out of the noise. Built in receive preamplifier with adjustable RF gain and helical filters for increased selectivity and reduced intermod from out of band signals. Built-in regulated 13v. 2.5A supply for Liner 2 or any similar driver.
 The LA106 will match any rig such as the TS700, FT221, IC201 in any mode provided that the drive level is around the 10W level. Using a rugged valve in the PA allows you to get away with occasional misuse (just try a high power solid state amplifier into a mismatched load) and gives very low intermod products.

BELCOM LA106



Two steps ahead comes the Liner 430. Already being used by us to make mobile contacts with the U.S.A., the Liner 430 opens up a whole new dimension of long distance contacts via the OSCAR satellites.
 Covering two 480 kHz bands in 20 kHz steps and using the exclusive Belcom Auto watch bands in 20 kHz steps and using the exclusive Belcom Auto watch system which detects the presence of a signal anywhere within VXO range without tuning. No more missing signals and worn out fingers from control twiddling. 10 watts output. Selectable USB/LSB/CW operation. Dual conversion using 50 MHz and 7.8 MHz IF's results in excellent image rejection and highly sensitivity. Truly a new dimension in amateur radio from the Liner 430.

BELCOM LINER 430



Picture by kind permission of Pan Books

BELCOM FS 1007 P

LEICESTER SPECIAL OFFER £125 inc. VAT
 See us for details

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



NR 56 FM RECEIVER

£54 inc. VAT Crystals £2.40

This remarkable little receiver gives the 2m. FM listener everything he wants at a very reasonable price. Excellent sensitivity, stability and selectivity coupled with a built-in VFO and very effective squelch make it the ideal receiver for both beginner and keen listener. Although the built-in VFO more than covers the entire 2m. band, crystal control of FM channels offers many advantages (particularly in mobile operation), so crystals, which are ex-stock, may be fitted for the popular channels and repeaters. It requires 12v. DC for operation and is thus an excellent mobile receiver for mounting in the car, boat or caravan as well as for home use.



LOWECASE 1976



OTHER THINGS

As you will realise, it is simply not possible to show in an advertisement of this type, all that is available from our ever-widening range of products for the radio amateur. We could not show, for instance, the TRIO TS820 (maybe when we have cleared the waiting list...), nor the R5995, nor the new 70 cm. mobile transceiver, the KF430, nor the Uniden 2020, nor the Uniden 2030, nor the AMR104 2 metre scanner, nor the 2 metre pocket receivers, nor the RAK aerials, nor the Shinwa filters, nor the complete range of Microwave Modules products, nor the J-Beam aerials, nor the keys and keys, nor the plugs and sockets, nor the Hy-Gain range, nor the rotators, nor the complete range of TRIO station accessories—and so on and so on.

The answer of course is to come along to Leicester and see the lot all together. Alternatively, you can call at Matlock or one of our branches in order to try out any or all of the items in our catalogue. You could always send us 30p in stamps to receive sheets and sheets of information about all kinds of good things.

Remember that we operate a money-back guarantee scheme for all that we sell; we also operate the finest service system bar none; our advice is free, honest and based on the widest accumulated experience of amateur radio equipment available in this country. Those of you who are our customers will be aware of this already; those of you who may be contemplating becoming customers should ask around to find out if all we say is true—it is.

73
JOHN WILSON,
G3PCY

OUR LONG SUFFERING AGENTS

Our agents are constantly amazed when someone walks into their premises and says "Fancy Lowe Electronics having a branch here, it's about time." This occurs, naturally, after the branch has been in operation for at least a year with wide publicity in our adverts.

So that there is no confusion in the future, we have full time branches in the following places:—

LONDON

Run by Peter Burton, G3ZPB at —
Communications House,
20 Wallington Square,
Wallington,
Surrey.
Tel. 01-669 6700

BIRMINGHAM

Run by Peter Ward, G3XWX at —
Soho House,
362-364 Soho Road,
Handsworth,
Birmingham.
Tel. 021-554 0708

LEEDS

Run by Tom Beaumont, G4DVZ at —
27 Cookridge Street,
Leeds.
Tel. 0532-452657

In addition to the full time shops listed above, we also have patient part time agents who give up their evenings and weekends in order to show interested amateurs the latest expensive goodies. My heartfelt thanks to the wives who see a constant stream of visitors taking up their home life. The stalwarts in question are:—

Alan, GW3YSA, 35 Pen-Y-Waun, Efail Isaf, Near Pontypridd.
Tel. Newtown Llantwit 3809

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

Sim, GM3SAN, 19 Elliamuir Road, Baillieston, Near Glasgow.
Tel. 041-771 0364

SERVICE

It's worth remembering that we believe our service to our customers to be the best available in this country.

Our Japanese suppliers also think the same way—that's why we were chosen to represent them.

When you buy equipment from Lowe Electronics, this is the hidden extra that you get as part of the deal.



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THE EISCAT PROJECT

FOR RESEARCH IN THE UPPER ATMOSPHERE AND THE IONOSPHERE

A NEW international project, EISCAT, was launched at the turn of the year with the signature by scientific agencies in France, Germany, Norway, Sweden and Finland, and the SRC, of an agreement to set up an organisation to build and operate a high powered radar system in Scandinavia. This will enable scientists from these countries to carry out research in the upper atmosphere and ionosphere in the auroral zone. This note gives the scientific background to the project and outlines the proposed facilities.

Historical Notes

Fifty years ago, Appleton and Barnett in Britain and Breit and Tuve in America carried out crucial experiments that demonstrated that radio waves can be reflected from the upper atmosphere. Soon afterwards, Watson Watt coined the term "ionosphere" for the reflecting layers which were soon found to possess a complex structure. With the ensuing decades, the ionosphere's effect on radio waves became a topic of great scientific interest and practical importance. Even today, in the satellite era, a vast amount of communications traffic goes via the ionosphere. Meanwhile, the study of the ionosphere itself has become a well established branch of pure science, with a literature of dozens of books and thousands of papers.

Ionospheric science has told us more and more about the upper atmosphere as a whole: not just the ionized layers, but also the neutral air from which they are formed, and even something about the solar ultra-violet and X-radiation that produce the ionization. Though just a small fraction of air is ionized at any one time, in some ways the ionization acts as an easily observed "tracer" of the upper atmosphere. Thus ionospheric science (apart from its radio propagation aspect) has rightfully tended to merge into the larger field of aeronomy, Sydney Chapman's term for the whole study of the upper atmosphere.

Our knowledge of the ionosphere is based on far more diverse kinds of information than could be provided by the radio echo sounding technique, a forerunner of radar, that originated in Breit and Tuve's experiments of the 1920's. Still the work-horse of ionospheric research, the radio sounder (ionosonde) has been used for decades at sites in every corner of the Earth. In the 1950's, and especially during the International Geophysical Year of 1957-58, the extensive use of rockets and satellites enabled the ionosphere to be probed with a variety of instruments. Ground based experiments flourished too. An outstanding advance was the "incoherent scatter" technique, proposed in 1958 by W. E. Gordon of Cornell University and soon afterwards used by K. L. Bowles in Illinois, though apparently foreshadowed in a 1926 paper by the French physicist Fabry.

The Technique

The incoherent scatter technique uses very high frequency radio waves that can penetrate the ionosphere at ease, being not reflected at all in the conventional sense. There exists, however, the very weak "Thomson" scattering of the electromagnetic waves by charged particles, each free electron behaving more or less as an independent scatterer, 10^{24} cm² in area. A typical ionospheric incoherent scatter experiment requires the detection of the radiation scattered from a 1000 km³ volume of ionosphere containing 10^{24} electrons, so the "target area" is about 1 cm². Only about one part in 10^{11} of the transmitted power is scattered in this way; of the rest, perhaps one part in 10 is scattered in the lower atmosphere before it ever reaches the ionosphere, and the rest escapes into space. Of the 1 part in 10^{11} , only about 1 part in 10^7 will be scattered into the receiving aerial, even if this is a big radio-telescope. So a 1 MW transmitter only gives about 1 pico watt (10^{-12} watt) of available signal.

There are two basic types of incoherent scatter radar. The first type uses pulses in the conventional radar way: the transmitter and receiver can be located at the same place and, with suitable switching, can use the same aerial. The second type uses continuous waves which are normally transmitted vertically upwards from the transmitter site. The scattered signals are received at remote aeriels, the observing height being selected by suitable pointing of the receiving aerial. This technique, pioneered in France and used in a recent UK experiment, is rather more complicated than the pulse technique, though the use of continuous waves gives the advantage of better definition of the spectrum of the scattered signal. For it is by detailed analysis of the spectrum that the incoherent scatter technique yields its vast wealth of information.

The incoherent scattering of radio waves by ionospheric electrons and ions is actually a very complicated process. Very roughly, the spectrum shows Doppler broadening due to random thermal motion of the ions and electrons, the detailed shape being determined by the mean molecular mass of the ions and the temperatures of the ions and electrons. The centre of the spectrum is displaced from the transmitted frequency by an amount representing a Doppler shift due to the large scale motions of the charged particles—i.e. a "wind" or "drift" in the ionosphere. This "drift" is a quantity of great interest to ionospheric physicists, and is difficult to determine reliably by any other technique.

In the lower part of the ionosphere, at heights around 100 km, the neutral air is sufficiently dense for collision between ions and neutral particles to affect the spectrum, and this provides a measure of neutral air density.

The electron density in the ionosphere can be found in several ways: in principle it could be determined from the strength of the scattered signal, but in practice it is more accurately determined in a way that utilises the Faraday rotation effect, or by an interesting plasma resonance phenomenon. If strong electric currents are flowing in the ionosphere, as happens in the auroral zone, it is possible in principle to estimate these currents from their effects on the incoherent scatter spectrum. Some indications of the influx of energetic charged particles entering the ionosphere can also be obtained from

incoherent scatter spectra.

In short, for the charged particles in the ionosphere, and to some extent for the neutral gas as well, as incoherent scatter radar acts as a thermometer, mass spectrometer, anemometer, densitometer, and sometimes a galvanometer and energetic particle detector as well. Not all this information may be obtainable at one and the same time by a given radar, but nevertheless the wide range of information produced cannot be matched by any other technique.

Equipment Considerations

Because of the expensive equipment necessary—large aerials, powerful transmitters, sensitive receivers—only a few incoherent scatter stations have ever been built. Most of them have been situated in North America or Western Europe, where the ionosphere behaves fairly conventionally. But even in the early 1960's one radar was located at a geophysically more exciting place, namely at Jicamarca on the magnetic equator in Peru. As the scientific problems of the mid-latitude ionosphere, and even of the equatorial ionosphere, have become better understood, scientific interest has shifted to high latitudes, where the ionosphere is linked by the Earth's magnetic field lines to the outer magnetosphere and even to inter-planetary space. The high latitude ionosphere therefore taps some of the energy carried away from the Sun by the stream of particles known as the solar wind.

It is this energy source that produces the fascinating scientific phenomena of the high latitude ionosphere. The aurora is certainly its most spectacular manifestation, but the accompanying strong electric currents, ionospheric variations, and atmospheric heating all form part of a scientific jigsaw puzzle of cause and effect. The heating sets up winds and waves that spread the energy around the globe, so that in a sense the upper atmosphere is "driven" from high latitudes. This is particularly marked during the complex event known as a "magnetic storm," which follows an intensification of the solar wind. At such times the high latitude energy input may surpass the input of solar wave energy—short ultraviolet and X-radiation—that is conventionally regarded as the ionosphere's main energy source. Even the lower atmosphere, and hence the weather, may be affected by the solar wind energy source. To understand all these processes is the major scientific challenge still presented by the upper atmosphere. The incoherent scatter technique provides an outstanding tool for meeting this challenge.

Apart from a short-lived Canadian experiment in the early 1960's, incoherent scatter observations in high latitudes only started in 1971 at Chatanika, near College in Alaska, under the auspices of Stanford Research Laboratories. Meanwhile a proposal for a much more sophisticated incoherent scatter experiment in Northern Scandinavia was being prepared by a group of European scientists. The project, known as EISCAT (European Incoherent Scatter facility), has now received financial approval in the countries concerned and the international agreement to set it up was signed in December 1975. EISCAT aims to provide by the end of this decade a sophisticated incoherent scatter observatory embodying the best features of the various available techniques.

EISCAT is to have two radar systems, both using transmitters located at Tromsø, Norway. One will be a UHF system operating at 933 MHz (32 cm. wavelength), with a peak power of 2 MW and mean power of 250 kW. There will be three receivers, one each at Tromsø, Kiruna (Sweden) and Sodankyla (Finland). This UHF system will be able to measure electron densities, electron and ion temperatures, and drift velocities at heights of about 90-500 km; in many ways it will be a larger version of the existing French system. Unlike the latter, however, it will have to use pulses instead of continuous waves, because one of the receivers is located close to the transmitter, and pulses are therefore needed to obtain height discrimination. The Kiruna and Sodankyla receiving systems, respectively 210 and 400 km from Tromsø, will select their observing heights by suitably pointing their aerials.

Frequency and Power

The VHF system will operate at 224. MHz (134 cm. wavelength) with a peak power of 5 MW and mean power of about 600 kW. The same aerial will be used for transmitting and receiving, and will to some extent be movable, to enable a range of latitudes to be studied. The VHF system will measure ion density, electron and ion temperature, and line-of-sight drift velocity at heights from 90 to over 2000 km. Hence the VHF system can monitor conditions along the lower parts of the geomagnetic field lines linking the Tromsø ionosphere to the outer magnetosphere, besides being useful for studying the lower ionosphere. Thus, the UHF and VHF systems will complement each other very well in the range of information they will provide.

There is a German proposal to build a powerful medium frequency transmitter near Tromsø for ionospheric heating experiments; EISCAT will provide an excellent diagnostic facility for monitoring the resultant phenomena.

All in all, there is no doubt that EISCAT offers excellent facilities for tackling the exciting science of the high latitude ionosphere, and ten UK university departments and research institutions have already expressed interest in using EISCAT.

FROM THE SCIENCE RESEARCH COUNCIL *BULLETIN*
July 1976.

THE NEW QTH PAGE

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

VHFCC Award

THERE are now several YL/XYL Operators to be heard on the VHF bands and it is a pleasure to record that Ann Buckby, G4EYL, has been awarded VHFCC No. 266 for 2m. operation, initially under the call G8KMB and more recently using the Class-A licence, which arrived on April 8 last. Ann has been very active since first being licensed in August, 1975 and runs a *Liner 2* for SSB and *Trio TR2200G* for FM. The aerials are a 4-ele. Quad and a colinear for working mobiles passing along the M1, near to the Spondon, Derby, QTH. With OM Richard, G3VGW, Ann has operated as ZB2YL last June but did not catch any of the E's openings. Her country score from the home station is eleven and she reports that G3VGW gets a little despondent when the XYL gets better reports than he does!

Beacons

The new Cornish beacon, GB3CTC, is now operating on 144.915 MHz running 75 watts e.r.p. omni-directionally from a two-stack clover-leaf aerial system. The keying is F1, A1 and the call and QTH locator of XK64a are sent. The old GB3CTC will continue to operate for a while on 144.128 MHz. Applications are in for 70 and 432 MHz beacons at this location. The much missed Durham beacon, GB3DM, has been repaired and converted to its now QRG of 144.935 MHz. The aerials were found to be damaged and are being replaced by two 4-ele. Yagis firing north and south simultaneously with 50 watts e.r.p. The QTH locator is Z012a and 'DM may be operational by the time this issue reaches you. Our thanks to G3COJ for this information.

The 3 cm. men will be pleased to learn that GB3LBH is now QRV from Romford, Essex. Nominally on 10.1 GHz, it is at present about 4 kHz low. Reports to G4ALN please (QTHR). It is understood that the Lerwick beacon, GB3LER, may be back soon. In the September "Region 1 News" from IARU, its QRG is listed as 145.925 MHz. G4EYL reports that ZB2VHF on 4m. was not operational in July, when she was on the Rock, but that the 2m. one should be on.

VHF BANDS

NORMAN FITCH, G3FPK

Contests

Winners of this year's VHF NFD were the March & District Radio Amateur Society, runners up being the Martlesham Radio Society, with the South Dorset Radio Society (operating from Alderney) in third place. Band leaders were: 70 MHz, Isle of Man Radio Society; 144 MHz, Hull & District Amateur Radio Society; 432 MHz, Stockport Radio Society and 1.3 GHz, March & District Radio Amateur Society. The Fixed section of the 144 MHz QRP contest on July 25 was won by GD8EXI with 895 points, with G4ASR in second place, whilst GW3WRA/P won the portable section with 1150 points, G3PIA/P being runners up.

During the 144 MHz Open contest on Sept. 4/5, your scribe could only spend short periods on the band and only 27 contacts were made. Conditions seemed quite good, activity high and the quality of the great majority of signals, good. Many operators running high e.r.p. from populous areas seemed very concerned to radiate the best possible signals, often almost imploring other stations to tell them if there was the slightest cause for criticism. It seems that some 16 countries were available. In addition to all the British Isles countries, DL, EA, F, HB9, LX, ON, OZ and PA were worked, and likely a few others we have not heard about.

Best conditions seemed to be in a north/south axis and G8HQJ (Crawley) is one who noted the diminished activity from the London area; Barry's log shows a predominance of northern stations in his 276 contacts worth 1638 points, his best DX being GM8FFX and G3NYY/P (Scillies). The south coast stations worked well down into

France into ZD square (F1EGK), whilst several stations raised EA1CR running QRP in XD. G4BAH (London) mentions that DC8RLA gave a serial number of 681 with 40 minutes to go and G3SEK told us that G3PIA/P, the A.E.R.E. Harwell Group, made 519 contacts. G3VCP/P, the Crystal Palace & District Radio Club made 391 contacts from AK11a, whilst the Martlesham Radio Society, G4BPO/P, managed 12 countries in their 443 QSO's but their spokesman, G4DKX, reckoned that conditions were very poor with not much Continental activity noted, although they did work OZ.

Two correspondents have mentioned the four-metre Open contest on August 7/8. GM3YOR (Fife), operating portable in Tayside Region, made 38 contacts worth 410 points and mentions a pleasing amount of activity from Scotland. Drew reports favourable conditions with G4ADV/P in Cornwall, heard, G3PFM/P in Dorset and G4BWH/P near Sevenoaks worked, plus GI, GD and GW. He feels that some incentive is required in the scoring system to encourage operators in outlying areas to participate; may be a countries multiplier? By contrast, Ned Cartwright, G4DKX, who, along with G3NYK and G3XDY operated G4BPO/P in this event, from Suffolk, found the Sunday activity to have been, "... abysmal; just like Field Day!"

Forthcoming Events: Oct. 2/3, 1600-1600Z is the Region 1 UHF/SHF event, 432 MHz and above with a one-point-per-kilometre scoring basis and multiplier of 5 for 70 cm. and 25 for 23 cm. contacts. The 70 MHz Fixed contest is on Oct. 24, a six hour affair starting at 0900z. The 432 MHz. Cumulative contest starts on Oct. 11 from 2030-2230z followed by further sessions at the same time On Oct. 19 and 27, then Nov. 4, 12, 20 and 28.

Microwave World Record

A new World record distance of 521 kms. was achieved on August 14 by GW3PPF, operating G4BRS/P from Pendeen Watch in Cornwall, 15 kms. west of St. Iver, and GM3OXX/P located at Port Patrick on the Mull of Galloway in Dumfries and Galloway Region. Using 10-15 mW. to dish aerials, contact was

QTH LOCATOR SQUARES TABLE

Station	23 cm.	70 m.	2 m.	Total
G8FUF	1	72	159	232
G3POI	—	—	158	158
G3JXN	16	49	65	130
G4BWG	—	22	108	130
G3COJ	15	49	63	127
G4BAH	—	32	92	124
G3CHN	—	—	124	124
GM4CXP	—	20	102	122
G3FPK	—	—	122	122
G4CDF	—	—	109	109
G8GML	—	21	74	105
G4DGU	1	35	66	102
9H1CD	—	—	102	102
G8IWA	—	17	74	91
G2AXI	1	34	54	89
G8HVV	—	—	86	86
G6UW	—	—	85	85
G4DKX	2	16	66	84
G8BKR	1	6	77	84
G3XCS	—	9	75	84
G8EOP	8	36	38	82
GD2HDZ	8	24	45	77
G3FIJ	—	23	53	76
G8GHI	—	11	62	73
G8HHI	—	—	69	69
G3BW	—	21	47	68
GC8AAZ	—	11	54	65
G8JJR	—	—	63	63
G8KLN	—	1	61	62
G4CIK	—	—	62	62
G8KSP	—	—	60	60
G8HAF	—	—	60	60
G4AEZ	—	15	44	59
G8KKX	—	—	55	55
G8IFT	5	15	34	54
OZ9IY	—	—	53	53
GD3YEO	—	—	52	52
G8LHT	—	—	48	48
GW8HVP	—	—	48	48
G8ITS	—	1	43	44
G4EYL	—	—	41	41
G8JEF	—	—	40	40
G8JEF/A	—	—	38	38
G8JAH	—	1	35	36
G4CIK/A	—	1	23	24
G8JAJ	—	—	24	24

G8LLG — — 24 24

G8JKA — — 21 21

Starting Date January 1, 1975. No satellite or repeater QSO's.

established directly on 10 GHz, signals varying between 10 and 40 dB above noise. U.K. operators now hold World records on three of the six microwave bands. This QSO lasted three hours and was recorded on tape. It was repeated the next day but in poorer conditions. Our congratulations to all concerned. On a somewhat sour note, GM6XI reports that: "Friends of GM3OXX have been shocked to learn that George has dismantled and disposed of all his microwave gear following upon actions taken by certain, local fellow microwave group members. . . ." It would seem that this decision is final though nothing can detract from this and previous achievements.

DX-Peditions

Upon his return to England, G3SCP told your scribe that his portable operation from Luxembourg did take place as planned but that not one U.K. signal was heard, not even the expected "big guns." Gregg had 185 QSO's in nine operating sessions and found conditions very good to the north coast of France and along the Dutch coast, but nothing from across the water. Blessed with more success was G3NYY's trip to the Scilly Isles. Walt took the trouble to find a good portable site and was a welcome participant in the 2m. Open on September 4/5.

From EI9Q, your conductor heard that EI9V has plans to activate the rare "U" QTH squares in early October. Nothing very definite concerning times and frequencies but well worth pointing the beams to southwest Ireland. G3BOC will be in Brora in Sutherland (Highlands) in the last week of October in the rare YS square, so listen for GM3BOC/A on 2m. SSB and CW.

The GM3OLK/GM3YOR expedition got off on time. Your scribe worked G13OLK/P on 2m. on Aug. 29 when they were in Antrim, but did not hear them any more. However, conditions to the northwest from London were pretty awful thereafter.

Four Metres

G2CAT (Dorset), in response to the query from EI7CV in the previous issue, tells us that there is a lot of FM activity in the Pool/Bournemouth area on 70.26 MHz using vertical polarisation. Wally suggests that the proposed new FM channels may mean that the locals will build VFO's and start doing some serious listening. He asks if there are any London stations on 4m. FM? G3BW (Whitehaven) has been concentrating mainly on 4m. this year as his 61 counties and 7 countries shows. Bill praises the efforts of the expedition types and says, ". . . bless them for going into such remote parts as Fermanagh and Tyrone, and to such people as GM3JJ/P who trounces up to Stornaway . . ." We will second that, OM.

GM3YOR's 4m. transverter packed up during NFD but another one was borrowed for the GI trip. Drew tells that his calling frequency is now 70.17 MHz which he hopes will be clearer down south for those listening for him.

Two Metres

During much of the period covered by this report the VHF/UHF bands have been wide open for weeks at a time. For some that is. Crudely summing up, it appears that stations in south-east England, and those on the eastern side of England and Scotland enjoyed fine conditions, whereas the further west one went, the worse they became. G2AXI (Hants.) does not mention any Continental DX worked but did manage GW3JXN/P in rare XM square on both SSB and CW. G3BW found little Euro-DX about apart from the occasional F and PA. Even G3COJ (High Wycombe) says he was just a little too far west to get in on the act. For example, on one occasion he heard G3POI in Kent giving S9-plus-10 dB to an LA who was inaudible at G3COJ.

Although the Scandanavian stations were not as numerous and strong in the London area as they seem to have been in East Anglia and eastern Scotland, nevertheless conditions were very good. Many stations were heard working SM and LA using 10-15 watts. At G3FPK, 14 countries were worked from the

beginning of August and 46 QTH squares. It was fascinating to note how the openings varied from day to day. Late on Aug. 14, a couple of portable OZ's from EP square were quite strong. On the 15th, the OZ's were weaker but the SM's were stronger, the loudest signals being the LA's. On the 16th, the OZ's were about again, also on the 18th with some northern DL's in EO square. Best signals were from the EQ, FQ, ER and FR region. On the 19th, the band was full of strong DL's from DL, EM, EN squares particularly and the DLØPR beacon on 144-910 MHz was extremely loud. On the 20th, best propagation was towards PA, ON and northern DL. After that, things quietened down somewhat until the 25th when the SM5 and SM6 stations were very good with SM5BUZ in HS36e the best DX. The night of the 26th brought a number of GM's, including GM8FFK/P, Elgin, in YR24j. A single "CQ GM" on 144-160 MHz at 2210z resulted in a dozen QSO's with GM and northern G stations. G3XCS (Cornwall) and G(W) 3JXN who was in Cardigan on holiday, both confirm that the opening was non-existent with them. Robert Matthews, G3ZNZ (Driffield, N. Humber side) worked no less than 256 continentals in the period 8-21 August, including DM, HB and SP on SSB! G8BBP (Worcester) suggests it is much more fun to work the DX with QRP and mentions raising F, G, GD, GW, ON and PA whilst operating *pedestrian* mobile with his IG-202 from the Malvern Hills, near the GB3MH repeater. Keith's prize *gotaway* was a *pedestrian* mobile DL!

A welcome new contributor to the QTH squares table is G8LLG (Dorset) who started with a *Liner-2* but now has an FT-221 with pre-amp. on receive, the aerial being an 8-ele. Yagi. GM4CXP (Borders) took advantage of the good weather and conditions to go out portable with the IC-202. From the home station, Derrick worked "the locals" like DL, F, ON, OZ, PA and SM between the 10th and 25th! GM8FFX (Aberdeen) confirms how excellent the conditions have been in eastern GM. Graham reports that GM8CMY (Fife) worked SM1BSA on the Island of Gotland

THREE BAND ANNUAL VHF TABLE

January to December 1976

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	
G3BW	61	7	63	14	37	6	188
G2AXI	46	7	55	13	28	8	167
G5DF	43	5	63	13	30	9	163
GD2HDZ	49	6	49	12	40	7	163
G4BWG	44	6	64	21	19	5	159
G3FIJ	43	7	54	14	31	10	159
G3XCS	37	7	58	17	15	5	139
GM4CXP	16	4	70	19	20	9	138
G8HBQ	—	—	69	13	43	8	133
G3BOC	52	7	60	13	—	—	132
G4BYP	41	7	54	9	16	5	132
G8GML	—	—	58	13	33	10	114
G4AEZ	32	6	46	12	13	3	112
G8GII	—	—	54	16	25	6	101
G3FPK	—	—	75	21	—	—	96
G8BKR	—	—	70	13	6	2	91
G4DKX	14	2	45	13	4	7	85
G3ILO	—	—	58	18	6	2	84
G8EOP	—	—	28	8	35	9	80
GD3YEO	6	5	55	13	—	—	79
G8KLN	—	—	53	14	1	1	69
G8HHI	—	—	54	13	—	—	67
G8ITS	—	—	48	13	—	—	61
G8KKX	—	—	45	13	—	—	58
G8KSP	—	—	47	11	—	—	58
G4CZP	—	—	51	7	—	—	58
G8HAF	—	—	46	10	—	—	56
GC8AAZ	—	—	26	10	10	5	51
G8IFT	—	—	20	5	12	4	41
G8JAJ	—	—	31	6	—	—	37
G8GLS	—	—	18	4	—	—	22
G8LGZ	—	—	9	3	2	1	15

(JR22e) at 5-and-9 both ways, and that LA3EQ has worked "hundreds" of British stations, mostly on SSB. From the Elgin area, GM8's AZS, FFK, KMO and LHE are very active and have been working the DX. This group is on most evenings from 2100z on 144-188 MHz. GM8LVG is on from Lossiemouth and GM8DQK from Thurso.

Puzzle Corner: G8KKX (Northants.) says he heard a station at S9 at 0645Z on Aug. 20 signing LZ4KI on 144-245 MHz. Our

suggestion is that it could have been OZ4KI, who is listed in the *Call Book* but Roy wonders if anyone else heard this station?

There was an *Aurora* alert for Aug. 9/10 which did not happen. However, G8LRN (Sunderland) says that at midnight on Aug. 24/25, OZ stations reported a brief period of auroral reception from LA.

Reverting to the *E's* events of the summer, the last opening was a very brief one on Aug. 9, when I8DVF was heard at 1824Z. IT9TAI has

forwarded copies of his logs covering eight days of *E*'s propagation, an analysis of which reveals 50 QTH squares worked at least, from WM in the west to HM in the north, representing some 14 countries. Dom wonders about the calls of two GC3's worked on June 23 at 1810 and 1811z. His log shows YBI and YOA which cannot be right. He also has GM6..? logged at 0922 on June 29 but that cannot be, surely? Has any reader a solution to the mystery? Dom writes that his brother Piero, IR9ZGY and IW9ABL, IT9BXX and IT9RFW are all SSB DX-minded types in Palermo province. Others QRV from Palermo include IW9ADC, IW9ACH, IT9EUR, IT9ISP and IT9LUP. IT9TDN is in Messina province, IT9GYR in Trapani and IT9PLT in Siracusa, whilst a lot of Sicilians are on FM.

Just too late for last month was another very interesting report from 9H1CD. On July 24, there was an *E*'s opening lasting 107 minutes in which Henry made 96 QSO's with eight countries. In a 51-minute opening the next day he had 17 contacts and was very annoyed to miss E19Q due to persistent QRM from French stations, which lost him his 22nd country. The "season" resulted in 498 QSO's in 13 countries: —69 DL, 8 DM, 172 F, 127 G, 5 GC, 13 GW, one each HB9, LX and OE, 28 ON, eight OZ, 59 PA and six SM. Henry remarks that he has frequent QSO's with SV1AB in Athens and they have reduced power to 50 milliwatts on occasions. Another regular is SV1KH in Pirgos. Both George and Nicos run *TS-700*'s and SV1AB has a 4CX250B linear and 9-ele. Yagi and SV1KH an 829B amplifier.

To underline how good conditions have been, G8JRR/M has worked ten countries using a halo aerial, all contacts established initially whilst on the move. Well done, Kevin! On the matter of QRP working, G8APZ in AL32 mentions a QSO with PA0AWA in CL14, the latter running just 50 milliwatts. Robin calculates this at 6½ kms/mW. Without wishing to detract from such achievements, readers are referred to the November 1975 piece concerning the G3SCP/G3FPK experiments when 100-150 micro-watts to an indoor dipole resulted

in R5 copy at 67 kms.

Seventy Centimetres

Much the same pattern of conditions have obtained on 70 cm. over this period as on 2m. their frequently being better on the higher band. G3BW was very disappointed that the "fantastic DX" on 70 cm. did not reach into Cumbria. Bill finds that the band needs careful treatment and that beams have to be correctly aligned, much more so than on 2m. G4BAH (London) has devoted considerable time to 70 cm., increasing his squares score from 14 to 32. Bob found conditions to have been very fine for many days in this period. Concerning his previous comments on the low level of activity, John Tye, G4BYV (Norfolk) asks, "Does he call 'CQ' or, like so many of us, tune the band and conclude that it is dead?" G4BYV (Liverpool) has only recently got going on 70 cm. so was pleased to have a 15-minute contact on the morning of Aug. 19 with DC3EQ on SSB with not a word missed.

G4DKX (Ipswich) is now QRV on 70 cm. with less than one watt RF output from a DJ6ZZ-type transverter, suitably tamed, and transistor. linear. Ned has a 4CX250B amplifier built awaiting completion of a 2kV power supply. With a 46-ele. *Multi-beam* at 25ft. he says it is amazing what QRP will achieve and 10 kms. per milliwatt seems normal under good tropo. conditions. However, Ned agrees with G4BAH about the low activity, even when OZ2UHF is S9-plus. G8GII (Shepperton) has worked no great DX but is making steady progress in the counties stakes.

"In the last two months of excellent conditions, two watts of 70 cm. SSB into a 48-ele. *Multi-beam* have produced nearly 100 contacts, about half of them G. Best DX so far is SM5CCY at about 1180 kms." So writes Paul Melbourne, G8GML, from Cambridge. Another newcomer to 70 cm. is G8IWA (N. Humberside) who uses a *TS-700* as driving source in a double conversion transverter, the final being a QQVO2-6 running 6 watts. Tony has already clocked up five countries and 17 squares and would welcome skeys if anyone is interested. (QTHR). GD2HDZ,

whilst sorry that none of the recent Euro-DX reached the Isle of Man, was glad to receive QSO's from HB9AMH/P confirming the first HB9/GD contacts on both 70 cm. and 23 cm.

For GM4CXP, F9FT was a new country and square on Aug. 21 and GD8EWM/A a new county and country on the 25th. GM8FFX says that the band has been particularly good, continuously open to the continent from Aberdeen from July 29 until Aug. 20. On one night, Graham worked eleven countries! He uses 10 watts from a *Modular Electronics* transverter to a 70-ele. aerial. He lists "regulars" as DK1KO, DM2BHA, F5ID, G3DAH, LA8OJ, ON5QW, PA0VV and SK6AB and advises that GM3JFG is now on the band from the Black Isle.

Twenty-Three Centimetres

G3COJ, in spite of being a little too far west for working lots of DX, mentions the DB0IZ beacon in ENO8a being RST 579 with QSB at 0630z on Aug. 20. QRG is 1296-001 MHz. At the same time both DL0PR on 144-910 and OZIALS on 432 MHz were very strong. G4BYV reports that group SK6AB are now very active on the band with 75-100 watts output of SSB; they have a 2.5 dB NF receiver pre-amp. John was their first G contact, QRB of 883 kms. John also worked GM3ZBE at 5-and-9 and his all-time squares are now 23. G4DKX has had enormous trouble with 1152 MHz local oscillator generation. The LO chain finally packed up when he was trying to work his first PA. Ned now has a new effort based on the DC8NR design which works beautifully. He recommends it to anyone having trouble with 384/1152 MHz LO generation from 96 MHz rocks.

G8ARM (London), explaining why he has not up-dated his All-Time table claim, explains that he scrapped the old tripler and embarked on a 23 cm. SSB project two years ago that never got completed. However, Brian hopes to be back with SSB later this year. G8EOP (W. Yorks.) is now QRV with 20 watts of SSB to Quad Loop Yagis and has increased his All Time score to 11 counties and 5 countries. G8GML hopes to have

a few watts of FM on 23 cm. any time now. GM6XI reports that GM4DIJ and GM8BJF have been assiduously developing equipment and aerials for the band. With it, GM8BJF (Edinburgh) worked SK6AB for the first GM/SM 23 cm. QSO. GM8FFX also mentions this feat and that GM3ZBE, using about three watts output from a varactor tripler to an indoor aerial, worked G3LQR and several PA's in addition to G4BYV.

Thirteen Centimetres

G4BYV managed his 4th QTH square on the band thanks to DCØDA at a QRB of 472 kms. John got a 5/5 report, whilst the German was 5/6. G4BEL is also on this band and has been heard by John and G3LQR.

The Repeater Scene

In compiling a feature such as this, we have to try to please most readers most of the time. From time to time, requests are received that we devote a special section to repeaters in view of the large number of VHF/UHF operators using them. Whilst not wishing to detract from the ingenuity and expertise of those who design repeater hardware, and from the efforts of those stalwarts who install and maintain them, the question must be asked, "How does the user of a repeater advance his '... self training... in communication by wireless telegraphy'... mentioned in his licence?" The original, prime case for the establishment of a repeater service was to enable the very limited range of mobile stations to be extended. It appears to the writer that the only knowledge required of a repeater user is to which channel number his transceiver should be switched.

In this feature, it is the policy to give prominence to the more scientific aspects of VHF operation, which is why E's, auroral and extended tropo. openings are dealt with in detail. Analyses of these events can only be of value when as much data as possible are published. The results are that, through the work of G2FKZ on auroral, and F8SH on Sporadic-E phenomena, for example, a very large body of scientific data are produced to the credit of the Amateur Service as a whole. Any amateur participating in a period of anomalous propaga-

tion, and reporting it, is actively training himself in the art of radio communication. With the greatest respect to repeater users, as opposed to designers, it would appear difficult on this basis to make out a case for there being much space devoted to repeater topics, in this feature. It is hoped that the foregoing remarks will not be misconstrued for it is not the intention to ignore repeater activity. It is hoped that regular readers will let us have their views on the amount of repeater news they would like to read here, bearing in mind that most repeater groups produce news letters (some of them very good indeed) whilst the Amateur Radio Mobile Society's journal, *Mobile News* attempts to knit the whole repeater scene together nationally and internationally.

Now for some hard news. The UHF repeater, GB3ER, at Danbury in Essex is now operational on RB10 and full information can be obtained from G3WCO (*QTHR*). There are now 12 VHF and 12 UHF repeaters operational in the U.K. The East Midlands Repeater Group's GB3ME, located at Clifton Road, Rugby (ZM54b) was put into service on July 17 on RB6 and consists of a modified ITT base station. Information from G8DLX (*QTHR*). It seems that the Tyne and Wear group will site their GB3TW, 2m. repeater on R5 at the Burnhope IBA site. The Durham beacon, GB3DM, will operate from the same site only 190 kHz from the repeater's input frequency. G3URE (*QTHR*) will divulge details of this group. GM6XI infers that the Central Scotland FM Group's repeater GB3CS should be on any time on R6; details from GM8FM (*QTHR*).

GB3HU on RB10 is licensed but, according to G8IWA from whom all details can be obtained, it has suffered yet another set-back; the Post Office "lost" the receiving converter! With a bit of luck, Tony thinks it could be on the air in the latter part of October. Gordon Adams, G3LEQ, is the secretary of the U.K. FM Group (Western) responsible for GB3MP on 2m. and GB3LL, GB3MR and GB3ST on 70 cm. The group has now submitted plans for GB3CR, Chester on RB6 and GB3LI, Liverpool, on RB10. In addition, they are

proposing a linear repeater, GB3LR, 432.225 MHz input and 145.825 MHz output for near Mold in Clwyd. Gordon was able to access GB3LL near Colwyn Bay from East Belfast during a recent trip to GI.

Satellite News

IARU News Bulletins are now transmitted via *Oscar 6* on alternate Wednesdays. These originate from the Budapest control station, HG5BME, and can be heard on 29.490 MHz SSB in the 10m. band. The next bulletins should be as follows:—*Oct 13*, orbit No. 18265, AOS/LOS 0716/0735 and 18271, AOS/LOS 1822/1843. *Oct. 27*, 18441, AOS/LOS 0834/0855 and 18466, AOS/LOS 1748/1808; all times GMT. The intersatellite tests on Aug. 9 were a fiasco due to users clobbering both 0-6 and 0-7. The U.K. *Oscar 6* telecommand station at the University of Surrey in Guildford became fully operational on Sept. 8. Following last month's plea, G8CSI has received an offer of assistance in assembling software for the Intel 8080 micro-processor from G8KWR.

JAMSAT, the Japanese satellite group have sent their 145/435 MHz transponder to the U.S.A. It is hoped to fly this on the next ITOS launch in June, 1977, probably the last ITOS launch, by the way, along with the AMSAT-USA *A-O-D* which is another 0-6 type 145/29 MHz transponder. If successful, 0-7 will then be switched to Mode B permanently.

New stations on the satellites include A4XGB on SSB 29.44 MHz, ST2SA on 29.475 CW, UJ8DP on 29.456 CW and very fast at that! UQ20W on 145.94, VU2RM on 29.473 and 9L1JM. 5X5FS is EI9G in Uganda and reports his call being pirated by certain I and DL stations. Those wanting 9XSSP cards should QSL via DL80A. YV5ZZ on 29.485 is ex-DL3GD, QSL via P.O. Box 76093 Caracas, Venezuela. EA6BK on 29.46 SSB and KG4FU on 29.457 CW are more new ones.

Deadlines

That's it. How about some MS news next time? Everything by Oct. 8 for the November column and Nov. 5 for the next one, to "VHF Bands." *SHORT WAVE MAGAZINE*, BUCKINGHAM, MK18 1RQ. 73 *de G3FPK*.

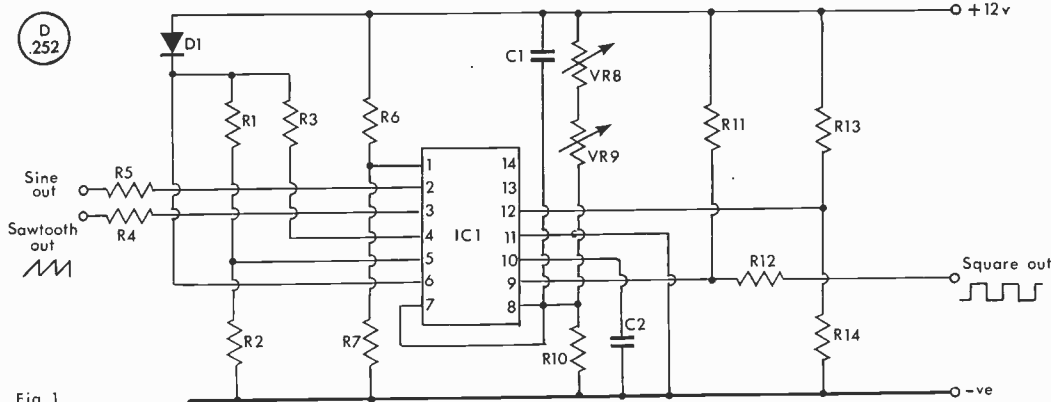


Fig. 1. Circuit of the Unit, for which values are : C1, .01 μ F; C2, 6800 pF; R1, R3, 4.7K; R2, 4.7 megohm; R4, R5, R11, R12, 15K; R6, R7, R13, R14, 47K; R10, 27K; RV8, 1K; RV9, 5K; D1, BY206; IC, 8038CC. VR9 is for frequency control.

USEFUL TEST UNIT

FOR SOLID-STATE CIRCUITRY

W. H. JARVIS (GM8APX)

THIS article describes a small mains-powered box which contains most facilities, apart from a 'scope and a multimeter, needed by those who regularly experiment with solid-state circuitry.

A 6-month survey showed that the author seldom needed anything other than AC and DC supplies at about 12 volts, a wide-range audio source, and a crude

amplifier to ascertain whether low level AF's are present.

All these facilities have been combined in a tough plastic box 9 x 6 x 3 inches. The general layout is not critical. Fig. 1 shows the oscillator circuit board, which gives sine, triangular, and square outputs at 20 to 20,000 Hz in one range, using the 8038CC integrated circuit. Fig. 2 shows the audio amplifier, and virtually any two n.p.n. transistors could be used instead with suitable resistance changes. Fig. 3 shows the unstabilised DC supply circuit, which could hardly be simpler.

The controls and terminals are on one of the 9 x 3 inch sides, and the box sits all day at the back of the shack bench with this side up, thus clearing the table of many separate instruments.

Readers will immediately note the lack of an RF source; but ten turns of insulated wire wrapped round any pocket calculator, with a 0.1 μ F capacitor at one end for isolation, easily makes up for that!

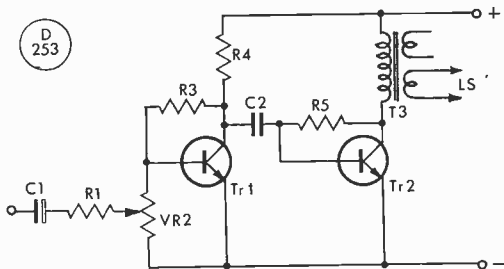


Fig. 2 Amplifier Board

Fig. 2. Amplifier board, for which values can be : C1, 1 μ F; C2, 2.2 μ F; R1, 47K; R3, 100K; R4, 15K; R5, 470K; VR2, 5K; Tr1, BC107; Tr2, 2N3053; xformer, 6v. 3w. secondary; speaker; 3 ohms.

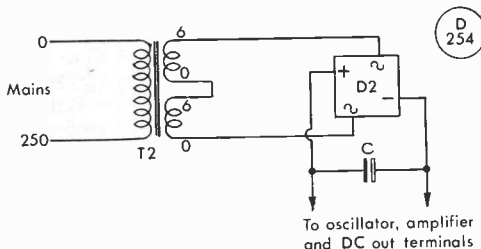


Fig. 3 DC Power supply

Fig. 3. PSU circuitry for the Unit. C1, 1000 μ F, 25v.; D2, full-wave 1 amp. rectifier; T2, 12v. 6w. secondary.

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for November issue: October 8)

BY the time this comes to print, most of the organised R.A.E. classes will have made their start. However, many areas which are quite capable of supporting a local Club certainly cannot do the same in terms of numbers for the local technical college class-size requirement. Where this is so, or seems to be, it is still worth negotiating with the College to put a course in next year's prospectus, because often the majority of the folk who sign on are not in any way connected with the local Club or known to the local amateurs at all!

On a different tack, quite a few groups have their own places; if this is the case, they would be well advised to take a good look at their properties for any signs of subsidence due to the abnormally dry summer and consequent drying-out of the water-table under the club room—or your own home for that matter, come to think about it!

Veering yet again, your scribe annually takes the odd few days of complete solitude over and above the family fortnight; and in this period usually makes an effort to look in at the local group. The 1976 visit fell on the *Cornish* crowd on return from the Isles of Scilly. Thus it was that he arrived half-way or more through the meeting, and from the back was able to marvel at the numbers such groups can attract when they are as well organised as this one—the place was bulging with people! Of course, they are far from the centres from which the "guest speaker" can be attracted, but they make the maximum use of the talent they have within the group, and they work to create a best-possible programme on a once-monthly basis; it certainly would be an eye-opener to some of the faint-hearted Club secretaries who bewail the lack of membership in populous areas and can't or won't be bothered to ask speakers to come along or members to give a talk, and to try and get the membership back up. Success is the progenitor of success, in club life as elsewhere.

The Reports

Our first stop here must be with WAMRAC; their SWL representative writes in to point out that although the group started as, and has retained, the word "Methodist," it is now open to all denominations of the Christian faith. For the details, drop a line to G3AGX, as Panel.

The Secretary of BARTG has lots of things to say this time, so we will have to condense a bit. Initially, let us say that the Group is the focal point for those who have an interest in operating in the teleprinter mode on the air. Initially, they are after more news on the reception of their GB2ATG news bulletin transmissions. report forms for which have been distributed to members. Other reports are also welcomed, of course. Secondly, their very much travelled exhibition will be on show at Leicester.

Out West

Covers not only what is conventionally called the "West Country" but also GW and Ireland, not to mention the Marches; and it is in the Marches that we find our first stop, namely **Hereford**. It looks as though for October 1 they have a Quiz, and on the 15th, G3HVX is going to answer, and provide some enlightenment on, the question "What is Frequency." Both will be at the Hq. Room at the Civil Defence Hq., Gaol Street.

At **Torbay**, we have a brief note to say the Friday evening natter sessions have been very good this summer, with various visitors popping in. As for the main meeting for October this is in the nature of a retrospect of past doings, seen on slides. In addition, they will have G3GDW/A at Newton Abbot during J-O-T-A. Hq. is at Bath Lane, rear of 94 Belgrave Road, Torquay, and October 30 the relevant date.

A report on their recent Bucket-and-Spade Party comes in from **Pembroke**; 47 visitors signed the book at the Regency Hall, Saundersfoot, where they had talk-in, and—an enterprising touch this—a group of members up on the hilltop with a station, to cover for the fact that Saundersfoot is claimed to be the worst VHF site in the country! Turning to the regular Club affairs, the October session is on the 29th, at the Defensible Barracks, Pembroke Dock—details from GW3XJQ at the address in the Panel.

Now the AGM is out of the way, the **Bangor** chaps, over there in GI, are setting out on the winter season in earnest; October 1 is down for a talk on Practical Aerials for the Radio Amateur, at the Redcliff Hotel, Bangor. Looking on to November, there will be a Surplus Sale, but for this one you must get details as to date and venue from GI4EMS.

For **Yeovil**, the first thing we note is that the p.r.o. has added G4EVI to his signature—congratulations. At the time of writing, a change of Hq. is in the wind, so before making any visit, check with the secretary for the latest state. However, subject to this reservation, they have October 7 for a visit to Hinkley Point group and on the 14th a talk by G3MYM on "Some Aspects of Resonance." The same speaker looks at Signal Ducting in the Ionosphere on 21st; while on November 4 G3XFV will talk about a Frequency Counter.

We had already mentioned **Cornish**; but now we are to say that they have a place at the SWEB Clubroom, Pool, Camborne, where they will be on October 7, to hear G3CZZ talking about "SWR and all That!"

North

Here again our heading covers more than one would expect, including as it does those shy Scots who so rarely tell us of their doings. **Lothians** is the sole GM representative this time; it is to be noted that during *October* and *November* they have a temporary change of venue from Riddles Court, Lawnmarket, Edinburgh on the second and fourth Thursdays of every month, to

31st ANNUAL MCC

The 1976 Magazine Club Contest (MCC) will take place over the week-end December 4-5, evenings 1700-2100z. Rules will appear in the next issue. Start planning now!

be the same dates but at Cannonball House, which is about 100 yards further up towards the Castle. Further details from GM4BYF, as Panel below.

Now to **White Rose** with Hq. at 83 Town Street, Armley, Leeds 12, where they are to be found every Wednesday from 7.30 onwards; they have just about everything here in the way of facilities, and the Secretary indicates that he has quite a lot of interesting talks lined up, though he won't commit himself to giving away firm dates.

Scarborough, after their summer recess at the Salad Bowl Cafe thanks to G3JBR, return to the Technical College in Scalby Road, every Friday evening at 7.30. Incidentally, four members passed their R.A.E., and again we gather G3JBR had a hand in the game; the sort of chap, obviously, who is needed in the Club to which your scribe belongs!

A change of venue for **Hull**, they having been rather troubled at the old place by vandals. Now it is to be in the lecture room at the Dorchester House Hotel, Beverley Road, Hull, every Friday evening, with a talk on alternate weeks; and there are hints of a new place of their own in the future, too!

The **Northern Heights** data are not quite clear, but we understand that they have a weekly session at the Peat Pitts Inn, Ogden; for October we see a talk on Amateur TV on October 13, and on October 27 there is a film show.

A pointed hint from **York**—they still have a few pages left in their visitors' book! They can be found on each Friday *except* the third one in each month, at the British Legion Club, 61 Micklegate, York. In October, highlights include the Annual Dinner and the Leicester show.

Though at their AGM the **Harrogate & Knaresborough** secretary had to report a diminished membership, finances are in good order and there are plans to make G3HRS more active on the air, also to establish a quarterly *Newsletter*. Meetings are every Monday, 7.0 p.m. at the Adult Education Centre, 2 Victoria Avenue, Harrogate.

The Midlands

It is quite a while since last we heard from the **Swindon** crowd, who now have their Hq. at the "Coldharbour" pub in Blunsdon, which is about five miles north of Swindon on the Cirencester road. On October 6, the details are crossed out, presumably due to some doubt as to the date on which they pay a visit to Harwell. But for October 20 there is no doubt—it's the club Junk Sale.

Warrington have their place at Grappenhall Youth and Community Association, Bellhouse Farm, Bellhouse Lane, Grappenhall, and meetings appear to be on a weekly basis, with something laid on for every Tuesday between now and Christmas; October 5 is for G8FBX to talk about SWR, while on the 12th

Names and Addresses of Club Secretaries reporting in this issue:

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 B.A.R.T.G.: J. P. G. Jones, GW3IGG, Heywood, 40 Lower Quay Road, Hook, Haverfordwest, Dyfed, SA62 4LR.
 CHILTERN: I. Eamus, G3KLT, Windrift, Shortacre Lane, Princes Risborough, Aylesbury, Bucks.
 CORNISH: S. Halfyard, G4EIS, Studio 12, Rosewall Terrace, St. Ives (5576), Cornwall.
 COULSDON: N. Moyes, G8KMJ, 23 Ellenbridge Way, Sanderstead, S. Croydon, Surrey (01-657 2548).
 CRAY VALLEY: M. Tripp, G3YWO, 57 Cathcart Drive, Orpington, Kent.
 CRYSTAL PALACE: G. Cluer, G4AVV, 24 Patterson Road, Upper Norwood, London SE19 2LD (01-653 4340).
 DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby (21931), DE3 7GE.
 ECHELFORD: R. S. Hewes, G3TDR, 24 Brightside Avenue, Laleham, Staines, Middx.
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 HARROGATE: G. Crossland, G4CWW, 9 Olive Walk, Harrogate, North Yorkshire.
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 HULL: F. Moss, G8GDD, 324 Ings Road, Hull (76603), North Humberside.
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 PETERBOROUGH: L. Critchley, G3EEL, 36 Waterloo Road, Peterborough, Cambs.
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 SOUTH MANCHESTER: C. Scholefield, G8GDM, 57 St. Werburgh's Road, Chorlton-cum-Hardy, Lancs.
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 VERULAM: B. H. Pickford, G4DUS, 130 The Drive, Rickmansworth, Herts.
 WAMRAC: L. Colley, G3AGX, Micasa, 13 Ferry Road, Warne, Hull, Humberside, HU7 5XU.
 WARRINGTON: R. E. J. Staples, G3MMD, 3 Willow Close, Lyynn (3533), Cheshire.
 WHITE ROSE: R. Hughes, G4DZI, 3 Primley Park Crescent, Leeds, West Yorkshire, LS17 7HY.
 WIRRAL: H. I. Crofts, G3DLF, 3 Barmouth Road, Wallasey (051-638 2515), Merseyside.
 WORCESTER: B. A. Jones, G8ASO, 12 Woodside Road, Larkhill, Worcester (351565).
 YEOWIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil, Somerset.
 YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

For their meeting on Sept. 2, G2BAR gave the Cheltenham Group a demonstration of Slow-Scan TV, very successfully, and for which they had a packed house. This picture was taken by their Secretary, G2FWA, using a hand-held Leica IIIc in a subdued room lighting.



G3WFB details some Receiver tests. For October 19 G3SBI is in the spot, but no subject specified, while on the 26th it is "Club Matters" which we presume means a business meeting.

Things seem to be on the change at **Midland**; following the move to the University of Aston, they are also having additional dates at Brasshouse Centre, off Broad Street, this latter being on October 5, while Room 110 at the University is the venue, on October 19, for the AGM, starting at 8 p.m. sharp.

Not far away is **South Birmingham**, and here they congregate at Hampstead House, Fairfax Road, West Heath; a Surplus Sale appears on October 6, and the AGM is down for November 3.

We had to dig a bit in the **Worcester** newsletter to find their Hq.—the old Pheasant Inn, New Street. October 4 is set aside for G4FAT and G4ETH to show slides of their GM trip, while on the 16th they have some visitors to whom they are going to show what Amateur Radio is all about. This is a great idea—one which every other club could do well to copy.

At **Peterborough** the group have Hq. at the Scout Hut, Occupation Road, where on October 15 there will be a brief business meeting, followed by a Film Show.

On to **Wirral**, where there is never any doubt as to the dates or the Hq. address—it's part of the heading. First and third Wednesdays it is, at the Sports Centre, Grange Road West, Birkenhead. This gives October 6 for G8IVW to deal with Part 3 of the Semiconductor Saga, and on the 20th there is the vitally important AGM to be dealt with.

Pressing on with the clip we next arrive at **Northampton**, where the Hq. address is Spencer Dallington Community Centre, Tintern Avenue, off Gladstone Road;

they foregather there every Thursday evening from about 8 p.m. The main event for October is on October 28, the all-important AGM.

Once in a while we get the excellent **Spalding Club Newsletter**; from it we see they have split into a southern and a northern group. Southern first, and October 8 for demonstration and a discussion about commercial equipment, at the Teachers Centre, Knight Street, Pinchbeck. The Northern area chaps have their venue at William Lovell Secondary School, Stickney, on the A16 road, and their date is October 21.

We seem of late years to hear from the **Melton Mowbray** chaps just once in a twelvemonth—a time to give notice of the AGM; the only snag this time is that the AGM was down for September! However, they normally have a Friday once each month at the St. John Ambulance Hall, Asfordby Hill, Melton Mowbray, and no doubt the remaining information can be obtained from secretary G3NVK—see Panel, opposite.

Now we come to a Club with a Problem—**South Manchester**. It seems they are soon to lose the use of their shack, as the land on which it is situated and on which they are equipped with aerials, has now been sold and they will have to find a new place for this facet of their activity. Can anyone offer useful suggestions?—if so, please get in touch with G8GDM. He can be reached at the address in the Panel, or by going to one of the normal meetings, which are on October 1, for a talk on Contest Operating by G4AUR; the 8th, for a Club Quiz; 15th, when the Stability of Oscillations will be discussed; October 22, which is down for a showing of the RAC's Lombard Rally film; and October 29, when G3SVW talks about Modulation and Multiplex. All these are at Sale Moor Community Centre, Norris

Road, Sale; and for the moment the shack at "Greeba," Shady Lane, Baguley is still in use on Monday evenings.

On to **Derby**, at their Hq. at 119 Green Lane. Here on October 6 they have a Surplus Sale, and on the 13th G2CVV will discuss the History of the Licence—a topic which might have a few surprises in store for the younger chaps! October 20 is down for a Video Show, and on the 27th there is to be a practical demonstration of Constructional Techniques.

Sherwood Community Centre, Mansfield Road is "home" to the **Nottingham** group, each Thursday evening. October 7 sees one of their favourite "Forum" sessions, but it is not yet known what is to happen on the 14th. No doubt at all about October 21—an Activity Night—while on the 28th, G8FWH will be talking about Semiconductors.

Southerly

First, **North Kent**, who have their gatherings on the second and fourth Thursdays at the St. Mary's Institute, 2 North Cray Road, Bexley; however, we do not have any detail on the up-coming dates, the reason being no doubt that, as the duplicator for the *Newsletter* has been out of action for some time, there was much to be caught up with in the current issue!

At **Reigate**, the next natter-session is on October 5, at the Marquis of Granby, Hooley Lane, Redhill, in the Saloon Bar. As for the main meeting, this one is at the Constitutional Centre, Warwick Road, Redhill, at 8 p.m. Visitors who may have been before should notice this is a new venue.

The **Chiltern Newsletter** indicates that the Hq. address is now at 42 Castle Street, High Wycombe; the date is October 27, but at the time of writing nothing had been arranged firmly—doubtless it will have been sorted out by the time the gang arrive!

For **Southgate** the chaps are very coy indeed as to when they foregather—but our spies with their calculators indicate that it is the second Thursday in each month, at the Scout Hut in Winchmore Hill. No details though, on what is going to happen. Doubtless the Hon. Sec. will be able to give you the latest "gen" nearer the date.

A novel title is used for the **Coulsdon** group's *Newsletter*—they call it "*Cat's Whispers!*" From it we glean the news that they now have two dates each month, each at a different address. October 7 is to be at the 10th Purley Scout Hall, behind the row of shops in Chipstead Valley Road opposite Rickman Hill, for a series of mini-lectures; and on Monday October 19, they are at the 1st Purley Scout Hall, in Purley Park Road, for an Activity Night.

Verulam have their "proper" meetings at the Market Hall, St. Albans; this month G6JJ will be talking on October 28 about the "New Luxembourg Effect." There is also an informal, held at the RAFA Hq., in Victoria Street, St. Albans, this being on October 14.

A joint talk is to be given to **Acton, Brentford & Chiswick** on October 19, by G4GD and G3CCD, the title being "Hardware and Software." This one is at the normal Hq. at the Chiswick Trades and Social Club, 66 High Road.

It's back to the spirit duplicator temporarily for the **Crystal Palace Newsletter**, but quite readable none the

less; they foregather at Emmanuel Church Hall on the third Saturday evening in each month, with October down for G3IIR to talk about Bedrooms he has been In—we guess this to have some reference to radio gear! A small point here is that as the Church have started to enforce a "No Smoking" rule, the meeting will now be in the small room just inside the main entrance, as a permanent thing.

Another Mammoth Junk Sale is forecast for October 4 by **Southdown**, their last one having seen £225 change hands! This one will be at Hq., the Victoria Hotel, Latimer Road, Eastbourne.

A terse note from the **Harrow** secretary gives us the information that they will be in action on each Friday in October; on the 1st a Film Show, "Practicals" on 8th and 22nd; a Junk Sale on October 15, and a lecture on the 29th. The only snag is the venue isn't mentioned—but doubtless he will be only too pleased to tell you, if you ring G3KDL at the address in the Panel.

Over to **Surrey** who have their Hq. at *T.S. Terra Nova* on the first and third Wednesdays in each month. No details as to what is arranged, for which contact the Secretary, as Panel p. 492.

SE Kent (YMCA) is the title of a group who get together each week at Dover YMCA. On October 6 they have a talk on Satellites by G3XVY, and on the 13th it is Project Night dealing with the DFM under the surveillance of G8KEN; an Open Evening is down for October 20, with some Morse thrown in, and on October 27, more Morse, a Junk Sale and some HF activity.

The **Echelford Newsletter** this month comes up with the block diagram of a Frequency-Meter/Timer—most interesting but it'll be better still next month when the rest appears! To get "the rest" you'll have to go to St. Martins Court, Kingston Crescent, Ashford, Middx., on October 11 for a Film Show to which YL's and XYL's are invited, or on October 28 when you are advised to bring your wallet to the Surplus Sale.

October 7 and 21 are the dates for **Cray Valley**, who this month will be celebrating their 30th anniversary. The first date will be a slide show called "Meet the Members," while the second will be given over to a celebratory birthday gathering. The place to aim for on these dates is Eltham United Reformed Church Hall, 1 Court Road, London, S.E.9.

The secretary of **Guildford** writes to say they "are fit and well and wish for a mention" in this piece. Meetings are at the Model Engineers Hq., Stoke Park, from 7.30 p.m. On October 8, they will have the "G3OLM Aerial Show" and the 22nd is the Construction contest. With a membership of nearly fifty, average attendances are around 25, in a friendly and informal atmosphere; new membership is always welcomed. On the practical side, they ran an amateur-band station, very successfully, for the recent Guildford Town Show.

Finis

It's just that for another month; deadline for next time is **October 8**, arrival, addressed as always to "Club Secretary," **SHORT WAVE MAGAZINE**, BUCKINGHAM, MK18 1RQ. And don't forget that it should contain your notes and news for November, the venue address, the dates, and, most important the address of the Hon. Sec. and, if possible, a telephone number. Thanks!

NEW QTH'S

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

G3EMJ, A. J. Smith, 169 Belper Road, Stanley Common, Derby, DE7 6FT. (re-issue.)
 G3FKH, D. Roberts, 23 Pine Drive, Ingatestone, Essex, CM4 9EF. (re-issue.)
 G3JWY, B. Reddington, 1 Grange Close, Outlane, Huddersfield, Yorkshire, HD3 3FU. (re-issue.)
 G4ATC, Staffs, Wing Air Training Corps, c/o Flt./Lt. V. J. Reynolds, RAFVR (T), Wing Radio Officer, G3COY, 25 Yoxall Avenue, Hartshill, Stoke-on-Trent (0782 44875), Staffs., ST4 7JJ.
 G4EOR, P. R. Stevens, 2 Vincent Close, Hainault, Ilford, Essex.
 G4FBB, D. J. Ellis (ex-G8KRJ), 17 Victoria Avenue, Yeading, Leeds (0532 502967), West Yorkshire, LS19 7AS.
 G4FCO, D. K. Stevens, 3 Boyleston Road, Hall Green, Birmingham, B28 9JN.
 GM4FEO, J. G. Gaughan, 9 Guy Manning Road, Helensburgh, Dunbartonshire, G84 7TH.
 GM4FGI, Rev. M. A. McCarthy, St. Leonards Presbytery, St. Leonards Road, East Kilbride (2894I), Glasgow.
 G4FGN, J. S. Hitchens (ex-G8GBN), 48 Granville Road, London, N12 0HJ.
 G4FGP, F. C. Preece (ex-G8LBA), 44 Broadmeadow, Aldridge, Walsall, West Midlands, WS9 8JA.
 GI4FHB, W. A. McFaul, 48 King Street, Londonderry, BT47 1EA, Northern Ireland.
 G4FHH, P. Jerome, 41 Belgrave Road, Newton Abbot, Devon.
 G4FIR, K. B. Chandler, 2 Argentan Close, Abingdon (20707), Oxon., OX14 5QW.
 GM8LBC, C. Dalziel, 6 Keeplestone Avenue, Aberdeen, AB1 7XF.

G8LEQ, G. L. Adams, o/b/o Cavalier Club, 2 Ash Grove, Knutsford (4040), Cheshire, WA16 8BB.
 G8LNM, R. E. Chastell, 4 Fairley Way, Cheshunt, Herts., EN7 6LG.
 G8LTG, D. Fillingham, 16 Hardy Street, Leeds (704260), West Yorkshire, LS11 7AP.
 G8LTU, T. Routledge, Stoneleigh, Allonby, Maryport (984 27J), Cumbria, CA15 6PB.
 GM8LUD, R. A. C. Smith, 28 New Abbey Road, Dumfries (0382 3892), DG2 7NA.
 G8LUV, G. E. G. Fairbrass (ex-ZB2GF), c/o Sgts. Mess, R.A.F. Station Marham, Kings Lynn, Norfolk.
 G8LVT, S. J. Carter, 88 Lancaster Road, Marton, Blackpool, Lancs., FY3 9ST.
 G8LWK, H. L. Millard, 32 Rosehill Road, Burnley (28530), Lancs., BB11 2JS.
 G8LWX (Mrs.), C. A. Fogg, 6 Linden Leas, West Wickham, Kent, BR4 0SE.
 G8LWZ, K. Griffin, 97 Woodlands Road, Allestree, Derby, DE3 2HH.
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 G8LXQ, J. Head, 84 Sherwill Hill, Chelston, Torquay, Devon.
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 G8LYF, D. Hope, 34 Rowan Road, Exwick, Exeter, Devon.
 G8LYZ, R. C. Woolley, 29 Belle Vue Road, Ashbourne, Derbyshire, DE6 1AT.
 G8LZQ, S. A. James, RPI House, 16 Mount View Road, Orpington, Kent, BR6 0HN.
 GW8MAW, J. Lawton, 4 Glanstewi, Penrhyncoch, Nr. Aberystwyth (097-087 646),

Dyfed, SY23 3EG.
 G8MBT, D. Tomkinson, The Old Hunters Tavern, Acres Lane, Stalybridge (061-303 9477), Cheshire.

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G3GNL, M. J. Frost, 53 Stroma Gardens, Hailsham (0323 843915), East Sussex, BN27 3AZ.
 G3JFF, M. J. Matthews, 127 Drift Road, Glanfield, Portsmouth, Hants., PO8 0LN.
 G3LAT, R. Arnold, 33 Russel Road, Kinson, Bournemouth, Dorset, BH10 7HB.
 G3NFV, R. Skyes, 16 The Ridgeway, Fetcham, Leatherhead (72587), Surrey, KT22 9AZ.
 G3NNJ, F. Huggins, 110 Larch Street, Nelson, Lancs., BB9 9RJ.
 G3PEK, B. D. Simpson, 5 Guilden Green, Guilden Sutton, Chester, CH3 7SP. (Tel. Mickle Trafford 0244 300897.)
 GM3VEY, F. Baxter, Carnegie Lodge, Hillside, Monrothe, Angus.
 G3WVY, C. W. Heigh, 156 The Stour, The Grange, Daventry, Northants., NN11 4PT.
 G3XDY, J. H. Quarmby, B.Sc., 16 Pearcecroft Road, Ipswich, Suffolk, IP1 6PJ.
 G3ZGC/MM, R. Joliffe, s.s. *Esso Scotia*, c/o 51 Masefield Road, Thatcham, Newbury, Berks., RG13 4AT.
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 G4NJB, P. J. Roberts, Flat 2, 18 Western Elms Avenue, Reading, Berks.
 G4DMN, R. A. Syme, Heronsgate, Manorial Road, Parkgate, Wirral, Merseyside, L64 6QW.
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 G8KUW, S. B. Walsh, 6 Saxon Road, Barnack, Stamford, Lincs.

NOTE FOR AUTHORS

When being offered articles for possible paid publication in *SHORT WAVE MAGAZINE*, we are often asked the sort of questions already answered under the heading "Authors' Mss.," to be found on the Contents page of any issue of the *Magazine*, where it has been appearing literally for years. If material is prepared strictly along the lines laid down there—which, in the case of technical articles, involves a study in detail of how such articles are presented in the *Magazine*—you will not go far wrong. Yet we are still offered contributions demanding extensive Editorial marking and adjustment simply because they do not conform to our setting convention (which means how you see them in print). And this as well as

the work that may be required on the purely technical side.

While no article can be expected to go through exactly as the author composed it, those that require minimum Editorial attention always command the highest fee. Authors should also note that we expect their material to be "right the first time"—this means not only careful drafting in the first place but also checking and re-checking before sending it in. A full copy should be kept of the article complete, in case the Editorial Dept. have any queries.

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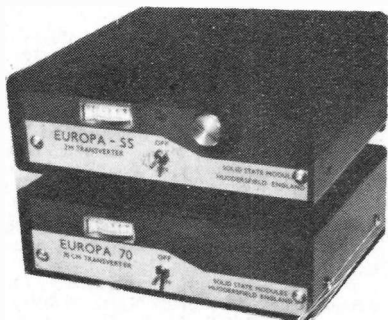
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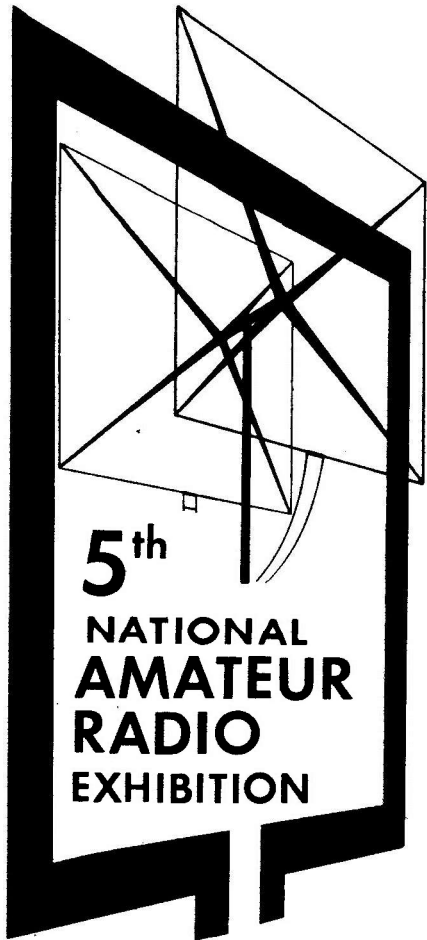


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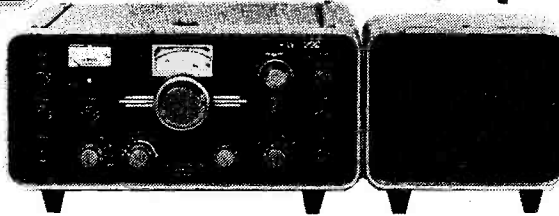
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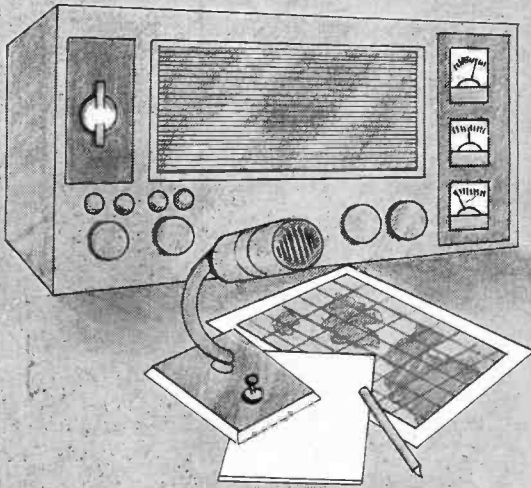
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144-030	b	b	b	b	b	b	b	b	b	b	b	b
144-4133-2
144-480	b	b	b	b	b	b	b	b	b	b	b	b
144-600
144-700	b	b	b	b	b	b	b	b	b	b	b	b
145-000/SO
145-050/R2T
145-075/R3T
145-100/R4T
145-125/R5T
145-150/R6T
145-175/R7T
145-200/R8T
145-300/S12
145-350/S14
145-400/S16
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145-525/S21
145-550/S22
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145-600/S24
145-650/R2R
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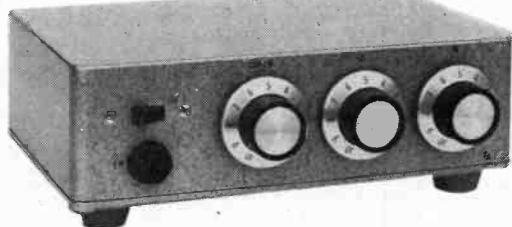
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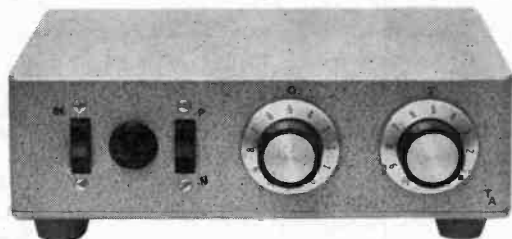
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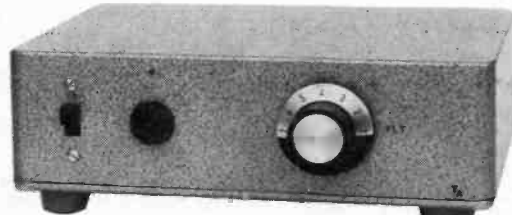
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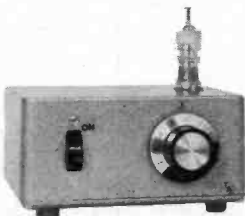
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Selling: EC-10 Mk.II, mint condition, delivery by arrangement. — Bell, G3SKQ, The Cottage, Hall Garage, East Raynham, Norfolk. (Tel: Fakenham 2283).

For sale: Yaesu FR-50B Rx, with calibrator, matching speaker and handbook, coverage 160-10 metres (full coverage 28-30 MHz), FB condition, £65. Buyer collects, or carriage extra. — Robb, 28 Stron-say Street, Glasgow G21 (Tel: 041-770 7573).

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Wanted: Redifon R.145 receiver (as S.W.M., June 1960), with VLF adapter unit; also ex-R.A.F. HF-type radiogoniometer, with manual. Please state condition and price. Can collect suitable instruments. — Box No. 5534, Short Wave Magazine, Ltd., 34 High Street, Welwyn, Herts., AL6 9EQ.

Sale: Shure 401 ceramic hand microphone with p-t-t and bracket, £5.50 post paid. **RTTY:** Creed 7B teleprinter, good, £12. Carriage or delivery extra by arrangement. — Michaelson, G3RDG, QTHR. (Tel: 01-455 8831).

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For sale: Codar CR-70A Mk.II, with manual and matching speaker, all as new, £36. **Wanted:** Manual or circuit diagram for Lafayette HA-350; buy or borrow, desperate. — Ring Saunders, Newbury 49395.

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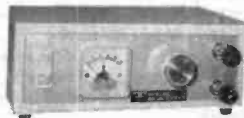
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Printed by The Courier Printing Co. Ltd., Tunbridge Wells for the Proprietors and Publishers, The Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts., AL6 9EQ. The Short Wave Magazine is obtainable abroad through the following: Continental Publishers & Distributors, Ltd., William Dawson & Son Ltd.; AUSTRALIA AND NEW ZEALAND — Gordon & Gotch, Ltd.; AMERICA — International News Company, 131 Varick Street, New York. Registered for transmission to Canada by Magazine Post. October, 1976.