

55p

The SHORT WAVE Magazine

VOL. XL

SEPTEMBER 1982

NUMBER 7

LEICESTER 1982



11th
NATIONAL
AMATEUR
RADIO
SHOW

7, 8, 9th OCTOBER
A DATE FOR YOUR DIARY

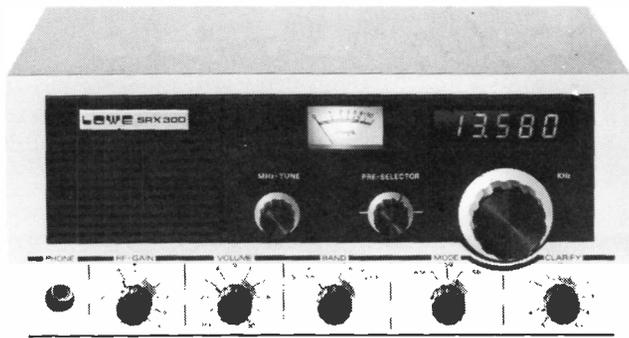
**THE
NATIONAL AMATEUR
RADIO SHOW
AT LEICESTER**

venue
GRANBY HALLS

open 10 am to 6 pm each day
ample car parking
admission £1.00

For parties of 15 and over, admission 75p
tickets by application
from ARRA, Box 36, Loughborough, Leicester LE11 1DW.

ok, it was always a good receiver,
but now with FM
the **SRX 30D**, today's rig, yesterday's price.



- Extended coverage 200 kHz-30 MHz.
- Digital readout in large green display units which give true unambiguous frequency information — even when you switch sidebands or use the clarifier.
- All new frequency synthesis using Plessey SL 1600 ICs for a new high standard of performance.
- All new audio system which produces outstandingly good quality on the built in speaker, and is capable of driving external hi fi speaker units for ever better sound.
- All new IF filters with optimum bandwidth for mode in use. Automatic filter selection from mode switch.

We predict that the SRX 30D will be a landmark in low cost, high performance SWL receivers. Just consider how much you should pay for a receiver covering 200 kHz-30 MHz with accurate digital readout; high performance FM USB/LSB/AM with switched filters; drift cancelling frequency synthesis; built in mains supply and built in speaker; high quality construction and advanced design — and so much more.

SRX 30D NOW WITH FM STILL £215.00 Carr. £5.00

The TR-2500 is a compact 2 metre FM handheld transceiver featuring an LCD readout, 10 channel memory, lithium battery memory back-up, memory scan, programmable automatic band-scan and Hi/Lo power switch.

TR-2500 FEATURES:

- Extremely compact size and light weight 66 (2-5/8) W x 168 (6-5/8 H x 40 (1-5/8) D, mm (inches), 540g, (1-2lbs) with Ni-Cd pack.
- LCD digital frequency readout, with memory channel and function indication.
- Ten channel memory, includes "MO" memory for non-standard split frequencies.
- Memory scan, stops on busy channels, skips channels in which no data is stored.
- UP/DOWN manual scan in 5kHz steps.
- 2.5W or 300mW RF output. (HI/LOW power switch.)
- Programmable automatic band scan allows upper and lower frequency limits and scan steps of 5kHz and larger (5, 10, 15, 20, 25, 30kHz . . . etc) to be programmed.
- Repeater reverse operation.
- Keyboard frequency selection across full range.
- Frequency coverage, 144.000 to 145.995 MHz.
- Two lock switches for keyboard and transmit.

TR 2500 Handheld £207.00 Carr. £5.00



handability
TR 2500

LOWE ELECTRONICS

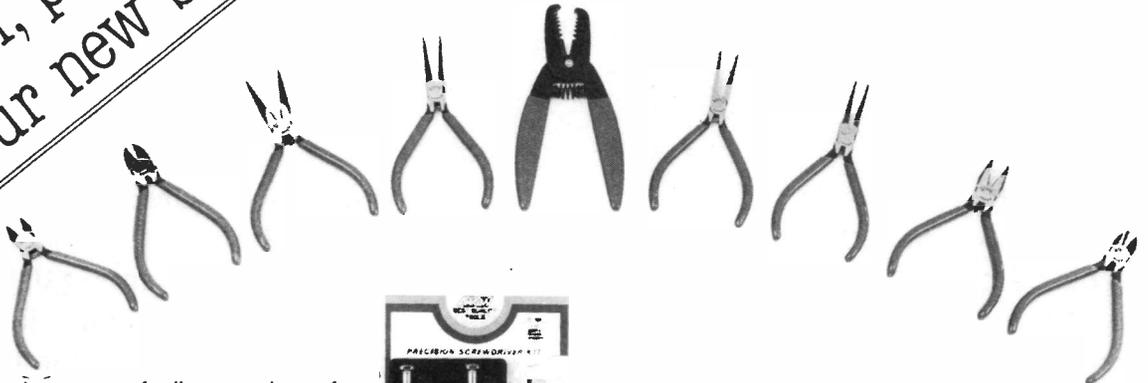
Chesterfield Road, Matlock, Derbyshire. DE4 5LE.
Telephone 0629 2817, 2430, 4057, 4995. Telex 377482.



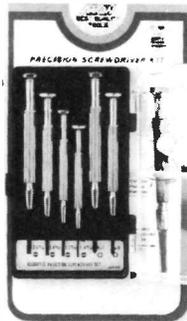
*You all know
about our shop in
London, please telephone
about our new shop in Glasgow.*

a new range of tools

For many of you who build your own pieces of equipment there has always been a shortage of good small tools. There have always been the very expensive tools which can only be owned and used by the wealthy amongst us and there are also those cheap but extremely nasty tools which we all avoid like the plague. So now after much searching we have come up with a good quality set of tools at a realistic price which



To compliment the range of pliers we have four screwdriver packs, each priced at £1.98. The sets are, six piece screwdriver, five piece hex key and Philips screwdriver, five piece nut driver and a six piece assorted screwdriver. Postage on the screwdriver kit is 75p. We also have a 21 piece tool set which contains precision wrenches, Philips screwdrivers, hex key wrenches, nut drivers and of course screwdrivers. This item costs £7.95 INC VAT. Carriage being £1.50.



all of us can afford. The pliers and cutters are available at £4.50 each which includes VAT. Carriage is 75p, if you are considering more than one item then please ring us to find out the correct amount of postage. The pliers are available in the following types, side cutting, long nose, diagonal cutting 100mm, diagonal cutting 115mm, plastic cutting, round nose, flat nose and bent nose. Also available is a wire stripper at the same price.

AF 606K

DAIWA ALL MODE ACTIVE FILTER £56.50. CARR. £5.00.



From Daiwa yet another aid to operating. In addition to the notch, SSB and CW filters, the AF606K is equipped with a PLL tone decoder; when the tone frequency of the CW signal and the free running frequency of the PLL tone decoder are the same a locked signal is generated. This locked signal keys an audio oscillator which then reproduces the received CW signal. However, there is a tremendous difference between the produced signal and the received one — no noise and, of course, no fading. **ANOTHER PIECE OF EQUIPMENT TO ENHANCE YOUR LISTENING.**



HK 702

MORSE KEY £24.50. CARR. £1.50.



With so many electronic keys and keyers on the market, it's hard to describe one that is better than the rest. Inevitably it is a matter of "feel", and the feel of the New Daiwa DK210 is superb. Being Daiwa, the quality of design and construction has to be of the best, but it's in use that the DK210 is so impressive. Designed to be used with an external paddle, to give greater personal choice, the DK210 is otherwise self contained, even to being battery powered (PP3). It offers a speed range of 10 to 50 w.p.m., built in sidetone, facilities for semi auto, or fully auto keying, and a tune position for adjusting your transmitter, but the outstanding feature is the adjustable "weight" control. This control gives an amazing improvement in the character of the sending, and completely removes that mechanical sounding "electronic Morse" characteristic. Those experienced CW users who have tried out the DK210, have all said how good it sounds — and have usually purchased one. So will you if you try it out.

DK210 from DAIWA — A truly nice Keyer.

DK 210

DAIWA ELECTRONIC KEYSER £42.00 less paddle. CARR. £5.00.

LOWE ELECTRONICS

Chesterfield Road, Matlock, Derbyshire. DE4 5LE.
Telephone 0629 2817, 2430, 4057, 4995. Telex 377482.



AMATEUR ELECTRONICS UK

Your number one source
for **YAESU MUSEN**



FT-ONE SUPER HF TRANSCEIVER

The ultimate in HF transceivers –
–the new FT-ONE provides continuous
RX coverage of 150KHz – 30MHz plus all nine amateur bands (160 thru 10m).
All mode operation LSB, USB, CW, FSK, AM, *FM • 10 VFO system • **FULL** break-in
on CW • audio peak filter • notch filter • variable bandwidth and IF shift • keyboard
scanning and entry • RX dynamic range over 95 dB! and **NO** band switch!!!

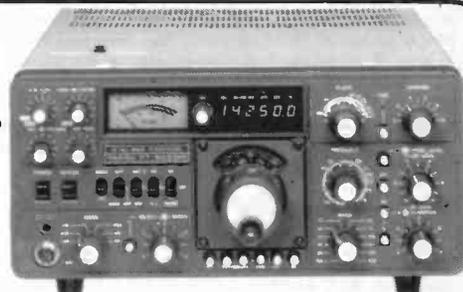
***OPTIONAL**

FT-101ZD Mk III



YAESU's FT-101ZD **WITH FM** is the
most popular HF rig on the market thanks
to its very comprehensive specification
and competitive price. Incorporates notch
filter, audio peak filter, variable
IF bandwidth plus many other features.

FT-902DM Competition grade HF transceiver



The YAESU
world famous
pace-setter
with the
acknowledged unbeatable reputation. 160 thru
10 metres including the new WARC bands.
All-mode capability, SSB, CW, AM, FSK **and FM**
transmit and receive. Teamed with the FTV-901R
transverter coverage extends to 144 & 430MHz.

FT-707 All solid-state HF mobile transceiver



The definitive HF mobile rig, digital, variable IF
bandwidth, 100watts PEP SSB, AM, CW (pictured
here with 12 channel memory VFO) Latest bands



FRG-7700 High performance communications receiver

YAESU's top of the range receiver. All mode capability.
USB, LSB, CW, AM **and** FM 12 memory channels with
back up. Digital quartz clock feature with timer.
Pictured here with matching FRT-7700 Antenna tuner
and FRV-7700 VHF converter.

KEEP AHEAD WITH THE NEW FT-102!

Once again YAESU lead the field with the exciting new FT-102 HF transceiver - no other manufacturer offers so many innovative features.



Better Dynamic Range

The extra high-level receiver front end uses 24 VDC for both RF amplifier and mixer circuits, allowing an extremely wide dynamic range for solid copy of the weak signals even in the weekend crowds. For ultra clear quality on strong signals or noisy bands the high voltage JFET RF amplifier can be simply bypassed via a front panel switch, boosting dynamic range beyond 100dB. A PLL system using six narrow band VCOs provides exceptionally clean local signals on all bands for both transmit and receive.

Total IF Flexibility

An extremely versatile IF Shift/Width system, using friction-linked concentric controls and a totally unique circuit design, gives the operator an infinite choice of bandwidths between 2.7kHz and 500Hz, which can then be tuned across the signal to the portion that provides the best copy sans QRM, even in a crowded band. A wide variety of crystal filters for fixed IF bandwidths are also available as options for both parallel and cascaded configurations. But that's not all: the 455kHz third IF also allows an extremely effective IF notch tunable across the selected passband to remove interfering carriers, while an independent audio peak filter can also be activated for single-signal CW reception.

New Noise Blanker

The new noise blanker design in the FT-102 enables front panel control of the blanking pulse

width, substantially increasing the number of types of noise interference that can be blanked, and vastly improving the utility of the noise blanker for all types of operation.

Commercial Quality Transmitter

The FT-102 represents significant strides in the advancement of amateur transmitter signal quality, introducing to amateur radio design concepts that have previously been restricted to top-of-the-line commercial transmitters; far above and beyond government standards in both freedom from distortion and purity of emissions.

Transmitter Audio Tailoring

The microphone amplifier circuit incorporates a tunable audio network which can be adjusted by the operator to tailor the transmitter response to his individual voice characteristics before the signal is applied to the superb internal RF speech processor.

IF Transmitter Monitor

An extra product detector allows audio monitoring of the transmitter IF signal, which, along with the dual meters on the front panel, enables precise setting of the speech processor and transmit audio so that the operator knows exactly what signal is being put on the air in all modes. A new "peak hold" system is incorporated into the ALC metering circuit to further take the guesswork out of transmitter adjustment.

New Purity Standard

Three 6146B final tubes in a specifically configured circuit provide a freedom from IMD products and an overall purity of emission unattainable in two-tube and transistor designs, while a new DC fan motor gives whisper-quiet cooling as a standard feature. For the amateur who wants a truly professional quality signal, the answer is the Yaesu FT-102.

New VFO Design

Using a new IC module developed especially for Yaesu, the VFO in the FT-102 exhibits exceptional stability under all operating conditions.

ANCILLARY EQUIPMENT

SP-102 EXTERNAL SPEAKER/AUDIO FILTER

The SP-102 features a large high-fidelity speaker with selectable low- and high-cut audio filters allowing twelve possible response curves. Headphones may also be connected to the SP-102 to take advantage of the filtering feature, which allows audio tailoring for each bandwidth and mode of operation to obtain optimum readability under a variety of conditions.

FC-102 1.2 KW ANTENNA COUPLER

FV-102DM SYNTHESIZED, SCANNING EXTERNAL VFO

NEW! FT-230R 25watt 2m FM mobile



- Two independent VFO's
- 10 memories ● Priority function
- Memory and band scan
 - 12.5/25 KHz steps
 - Large LCD readout.

FT-290R All-mode 2m portable



- 10 memories, 2 VFO's,
- LCD display, C size battery,
- easy car mounting tray, 2.5 watts out.

AGENTS

North West - Thanet Electronics Ltd, Gordon, G3LEQ, Knutsford (0565) 4040
 Wales & West - Ross Clare, GW3NWS, Gwent (0633) 880 146
 East Anglia - Amateur Electronics UK, East Anglia, Dr. T. Thirst (TIM) G4CTT, Norwich 0603 66189
 North East - North East Amateur Radio, Darlington 0325 55969
 Shropshire - Syd Poole G3IMP, Newport, Salop 0952 814275

or attractive H.P. terms readily available for on-the-spot transactions. Full demonstration facilities. Free Securicor delivery.

Amateur Electronics UK
504-516 Alum Rock Road - Birmingham 8
Telephone: 021-327 1497 or 021-327 6313
Telex: 334312 PERLECG
Opening hours: 9.30 to 5.30 Tues. to Sat. continuous - CLOSED all day Monday.

For full details of these new and exciting models, send today for the latest YAESU PRICE LIST & LEAFLETS. All you need do to obtain the latest information about these exciting developments from the World's No.1 manufacturer of amateur radio equipment is to send 36p in stamps and as an added bonus you will get our credit voucher value £3.60—a 10 to 1 winner!

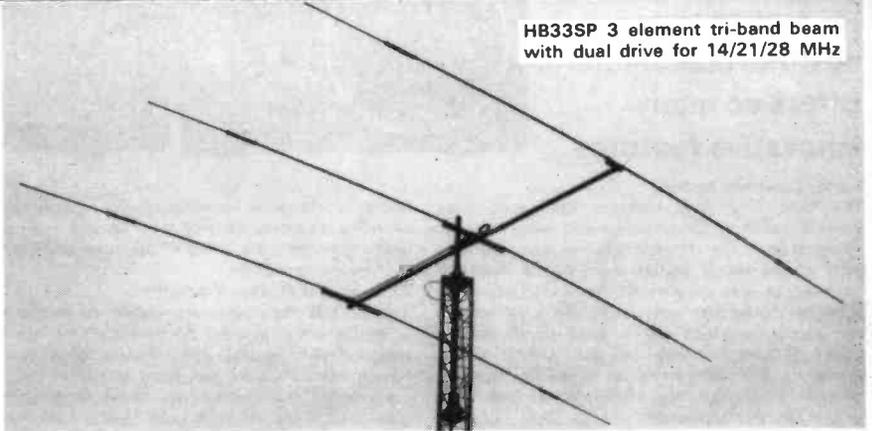
As factory appointed distributors we offer you - widest choice, largest stocks, quickest deal and fast sure service right through -

TET ANTENNA SYSTEMS

THE ANTENNA WITH THE DIFFERENCE

TET HF antennas are unique in that they employ dual driven elements with the following distinct advantages—

- Improved gain over conventional arrays.
- Broader bandwidth with lower SWR.
- Enhanced front to back ratio.
- Better matching into solid state transceivers without an A.T.U.
- High power handling capacity.



HB33SP 3 element tri-band beam with dual drive for 14/21/28 MHz

TET manufacture an exciting range of multi-element HF beams including superb monobanders plus HF verticals. Also there is a full range of VHF/UHF antennas most of which have multi-element drive or distinctive technical features.

Model	Description	incl. VAT	Carriage
HB10F2T	2 Ele. Mono Band Beams for 10 Meter Band	50.75	2.75
HB10F3T	3 Ele. Mono Band Beams for 10 Meter Band	73.79	2.75
HB15F2T	2 Ele. Mono Band Beams for 15 Meter Band	57.21	2.75
HB15F3T	3 Ele. Mono Band Beams for 15 Meter Band	88.49	2.75
HB34D	4 Ele. Tri Band Beams for 10/15/20 Meter Band	202.69	5.87
HB23SP	2 Ele. Tri Band Beams for 10/15/20 Meter Band	128.80	2.75
HB33SP	3 Ele. Tri Band Beams for 10/15/20 Meter Band	189.23	4.60
MV3BH	Vertical Antenna for 10/15/20 Meter Band	40.25	1.75
MV4BH	Vertical Antenna for 10/15/20/40 Meter Band	49.50	1.75
MV5BH	Vertical Antenna for 10/15/20/40/80 Meter Band	71.25	1.75
MLA4	Loop Antenna for 10/15/40/80 Meter Band	105.60	2.10

YOUR LOCAL TET STOCKISTS

Amateur Radio Exchange,
373 Uxbridge Road,
Acton, London W3

Amcomm Services,
194A Northolt Road,
South Harrow, Middlesex

Bredhurst Electronics,
High Street, Handcross,
Haywards Heath,
West Sussex RH17 6BW

Stephens James Ltd.,
47 Warrington Road,
Leigh, Lancs. WN7 3EA

Uppington Tele Radio,
12-14 Pennywell Road,
Bristol BS5 0JT

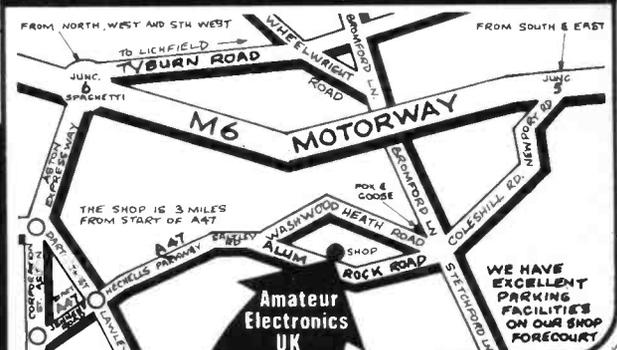
- Full range of VHF/UHF Beams now in stock — an S.A.E. for full details please

TET SOLE AGENTS



Amateur Electronics UK
504-516 Alum Rock Road - Birmingham 8
Telephone: 021-327 1497 or 021-327 6313
Telex: 334312 PERLEG G
Opening hours: 9.30 to 5.30 Tues. to Sat.
continuous - CLOSED all day Monday.

WHERE TO FIND US



DATONG

KEYBOARD MORSE SENDER - THE ULTIMATE "MORSE KEY"

MODEL MK



- **STRAIN-FREE** sending; Converts "hunt and peck" typing to perfect morse. Just plug into any key jack and type.
- **CONVENIENCE:** no need for a power cable, four internal pen cells last for 300 hours and give continuous memory back up.
- **EXCLUSIVE COLOUR CODED KEYBOARD DESIGN:** Separate key switches beneath a tough polycarbonate membrane combine excellent "feel" with a splash proof wipe clean surface.
- **LAVISH MEMORY:** four 64-character memories with auto-repeat and programmable "pause" function, for all the routine sending.
- **BUFFER MEMORY:** ensures perfect sending despite less than perfect typing.
- **COMPREHENSIVE CHARACTER SET:** includes punctuation, procedure signals, accented letters. Plus a "merge" key for making any non-standard character.
- **BEAUTY AND STYLE:** only one inch thin and with four-colour panel Model MK looks every bit the thoroughbred it is. Model MK is supplied with output leads and spare connectors but without batteries (four HP7 pen cells).

BROADBAND PREAMPLIFIER - MODEL RFA



- Wide bandwidth, 5 to 200 MHz, lets Model RFA replace a whole collection of single band amplifiers.
- Low noise figure, high intercept point (+20 dbm), moderate gain (9 db) make Model RFA ideal for improving the sensitivity of HF and VHF transceivers, scanner receivers, PMR, marine VHF, without difficulties with overload.
- RF switched for convenient use with transceivers.
- Solid construction (same die cast case as Models VLF and DC144/28) with SO239 connectors.

MODEL D70: THE GO-ANYWHERE MORSE CODE TRAINER



For building up your morse code reception speed there is no better method than the Datong "Morse Tutor".

You learn the code with the characters at normal speed but with an extra delay between each one. As you improve you reduce the "DELAY" control until, with it fully reduced, you find you are reading code at the chosen speed and with correct spacing.

An important feature is that the unit is completely portable. This allows you to practise wherever and whenever you find it most convenient. The all-CMOS design gives about 60 hours of practice from a lowcost PP3.

GENERAL COVERAGE RECEIVE CONVERTER

If you have a 2 metre all-mode receiving set up, just add Model PC1 in series with its antenna and you have a superb general coverage receiver. What better way to listen in to all the non-VHF amateur bands, not to mention everything else from 60 kHz to 30 MHz? For sheer value for money there is no better way to get high performance general coverage reception. After all what a waste it is if your expensive 2 metre all-mode rig covers one band only? Model PC1 will also extend the coverage of SX 200 type scanners to include all the long, medium and short wave bands as well. This is an excellent way to listen to your favourite short wave broadcast stations without the extra expense of a complete new receiver.



MODEL PC1

HIGH PERFORMANCE 2 METRE CONVERTER

Model DC144/28 is designed to overcome the overload and spurious signal problems experienced by conventional converters, it uses a Schottky diode balanced mixer with about 7 dbm of local oscillator drive. This, coupled with a 3SK88 r.f. amplifier, gives an excellent combination of low noise figure and strong signal handling capability. Its input and output gain controls also help you get the best out of your main receiver without flattening it with excessive gain.



MODEL DC144/28

Model DC144/28 is available either as a complete cased unit (die cast box, SO239 connectors) or as a ready built and tested PCB module.

MINIATURE RECEIVING ANTENNAS

If you don't have enough space to put up traditional receiving antennas, our active antennas are the answer. They need no tuning yet have constant sensitivity from 200 kHz to well over 30 MHz. Results are quite comparable to full size conventional antennas but the space saving is enormous. The indoor version (AD270) is 3 metres long and the outdoor version (AD370) is 2 metres long. A TV-type coaxial feeder cable of any reasonable length can be used yet because the antennas are balanced dipoles any interference picked up by the feeder is rejected. Because of their wide frequency coverage Datong Active Antennas are ideal accessories for modern general coverage communications receivers.



AD370

VERY LOW FREQUENCY CONVERTER MODEL VLF

Model VLF adds the missing bands below 500 kHz to your existing receiver. It also adds MW and LW coverage to amateur bands-only receivers for news, time checks etc.

Connected in series with the antenna Model VLF allows you to tune the 0 to 500 kHz range (and above at reduced sensitivity) using the ten metre band (28-30 MHz) on your normal receiver.



MODEL VLF

MULTI-MODE AUDIO FILTER MODEL FL2

Model FL2 offers audio filtering capability which is totally in a class of its own. Although connecting in the loudspeaker line from any rig, Model FL2 simulates the effect of fully variable IF selectivity complete with pass band edges even steeper than those of multipole crystal filters. You can remove interference in SSB and winkle out weak CW to a truly remarkable extent. No less than twelve poles of tuneable filtering in Model FL2 can be used in six different ways depending on the mode switch. For example, for SSB you have independent low and high pass filters, each a 5 pole elliptic function type for knife edge cut-off, plus when needed, a separate 2 pole notch filter. All three filters tune linearly and separately from 200 to 3500 Hz. For CW all 12 poles are combined automatically to give incredible skirt selectivity and with independent calibrated controls for centre frequency and bandwidth.



MODEL FL2

MODEL ASP - THE "INTELLIGENT" RF CLIPPER

Model ASP modifies your speech signal direct from the microphone and makes it more effective at modulating your transmitter. The effect is as if the transmitter peak power were to increase by 6 to 10 db.

"Intelligent" means that unlike other speech processors Model ASP automatically senses your voice level and reacts accordingly to always maintain the degree of true r.f. clipping selected (in decibels) by the panel push-buttons. Special circuitry does this without the undesirable side effects of simple a.g.c. devices. Adding a Datong r.f. clipper to a normal SSB transmitter has a similar effect to adding a linear amplifier but without the high cost and risk of TVI.



MODEL ASP

"CODECALL" SELECTIVE CALLING DEVICE

The Datong Codecall adds "selective call" to any radio voice channel. A single self-contained unit at each end of the link sends or receives a coded audio signal. When the correct code is received the receiver bleeps loudly.

The only connection needed to a transceiver is to the external loudspeaker jack. Sending is via direct audio into the microphone.



"Codecall" allows totally silent stand-by operation yet with confidence that when that specific call comes, you won't miss it.

Over 4000 different codes can be selected by internal link or by three 16-way panel switches, depending on the model. This practically eliminates false alarms.

NEW PRODUCT NOW AVAILABLE

MODEL DF1
Direction finder attachment for FM, VHF receivers - transceivers.

PROFESSIONAL QUALITY AT REMARKABLY LOW COST.

PRICES

All prices include delivery in U.K. basic prices in £ are shown with VAT inclusive prices in brackets

FL1	69.00	(79.35)	AD370	56.00	(64.40)	RFA	29.50	(33.92)
FL2	78.00	(89.70)	AD270+MPU	45.00	(51.75)	Codecall		
PC1	119.50	(137.42)	AD370+MPU	60.00	(69.00)	(Linked)	28.00	(32.20)
ASP	72.00	(82.80)	MPU	6.00	(6.90)	Codecall		
VLF	26.00	(29.90)	DC144/28	34.50	(39.67)	(Switched)	29.50	(33.92)
D70	49.00	(56.35)	DC144/28			Basic DF System	● 149.00	(171.35)
D75	49.00	(56.35)	Module	28.00	(32.20)	DF System	● 159.00	(182.85)
RFC/M	26.00	(29.90)	Keyboard Morse			Complete Mobile DF	● 214.00	(246.10)
AD270	41.00	(47.15)	Sender	119.50	(137.42)	System		

See previous advertisement or price list for further details.



ALL DATONG PRODUCTS ARE DESIGNED AND BUILT IN THE U.K.

Data sheets on any products available free on request - write to Dept S.W.

DATONG ELECTRONICS LIMITED
Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE, England. Tel: (0532) 552461

The professional

IC-Rx70. The very latest from Icom!

The New Rx 70 receiver from Icom is designed to provide a really stunning performance at a price not much greater than its inferior competitors.

It covers all modes (when the FM option is included), uses 2 CPU – driven VFO's for split frequency working, has 3 IF frequencies – 70MHz, 9MHz and 455KHz and a dynamic range of 100dB.

Other features are:-

Input switchable through a pre-amplifier, direct or via an attenuator.

Selectable tuning steps of 1KHz, 100Hz or 10Hz.

Adjustable IF bandwidth in 3 steps (455KHz)

Noise limiter. Switchable AGC. Tunable notch filter.

Squelch on all modes. RIT. Tone control.

Tuning LED for FM (discriminator centre indicator)

Recorder output. Dimmer control.

Separate antenna sockets for LW-MW with automatic switching.

Large front mounted loudspeaker - 5.8W output.

Frequency stability 1st hour ± 250 Hz, thereafter ± 50 Hz, sensitivity

-SSB/CW/RTTY better than $0.32 \mu\text{V}$ for 12 dB $S + N$.

Am - $0.5 \mu\text{V}$, FM better than 0.32 for 12 dB Sinad.

Built in mains supply - DC optional.

Size 286mm x 110mm x 276mm - weight 7.4Kg.

IC-25E, The Tiny Tiger

£239.inc.



Amazingly small,
yet very sensitive.

Two VFO's, five memories,

priority channel, full duplex and reverse, LED S-meter, 25KHz or 5KHz step tuning. Same multi-scanning functions as the 290 from mic or front panel. All in all the best 2M FM mobile ICOM have ever made.

Remember we also stock Yaesu, Jaybeam, Datong, Welz G-Whip, Western, TAL, Bearcat, RSGB Publications.

Agents (phone first - all evenings and weekends only, except Scotland).

Scotland - Jack GM8 GEC (031 665 2420)

Midlands - Tony G8AVH (021 32 - 2305)

North West - Gordon G3LEQ (0565 4040 AnsaFone available)

Introducing the NEW IC-740. £699.



This latest transceiver contains all the most asked-for features, in the most advanced solidstate HF base station on the amateur market...performing to the delight of the most discerning operator.

Study the front panel controls of the ICOM IC-740. You will see that it has all of the functions to give maximum versatility to tailor the receiver and transmitter performance to each individual operator's requirements.

Features of the IC-740 receiver include a very effective variable width and continuously adjustable noise blanker, continuously adjustable speed AGC, adjustable IF shift and variable passband tuning built in. In addition, an adjustable notch filter for maximum receiver performance, along with switchable receiver preamp, and a selection of SSB and CW filters. Squelch on SSB Receive and all mode capability, including optional FM mode. Split frequency operation with two built-in VFO's for the serious DX'er.

The IC-740 allows maximum transmit flexibility with front panel adjustment of VOX gain and VOX delay along with ICOM's unique synthesized three speed tuning system and rock solid stability with electronic frequency lock. Maximum versatility with 2 VFO's built in as standard, plus 9 memories of frequency selection, one per band, including the new WARC bands.

With 10 independent receiver and 6 transmitter front panel adjustments, the IC-740 operator has full control of his station's operating requirements.

See and operate the versatile and full featured IC-740 at your authorized ICOM dealer.

Options include:

- FM Module
- Marker Module
- Electronic Keyer
- 2 - 9MHz IF Filters for CW
- 3 - 455MHz Filters for CW
- Internal AC Power Supply

Accessories.

- SM5 Desk Microphone
- UP/DWN Microphone
- Linear Amplifier
- Autobandswitching Mobile Antenna
- Headphones
- External Speaker
- Memory Backup Supply
- Automatic Antenna Tuner

Ask about the new range of **CUE DEE** antennas, the winners in recent tests!

Thanet ICOM **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM**

double act



The World's most popular portables
IC-2E £159. IC4E £199.inc.

and now the marine version
IC-M12 £199+VAT.



Nearly everybody has an IC-2E, the most popular amateur transceiver in the world, now there is the 70cm version which is every bit as good and takes the same accessories.

Fully synthesized – Covering 144-145.995 in 400 5KHz steps. (430-439.99 4E). **Power output** – 1.5W. **BNC antenna** output socket. **Send/Battery indicator. Frequency selection** – by thumbwheel switches, indicating the frequency. 5KHz switch-adds 5KHz to the indicated frequency. **Duplex Simplex switch** – gives simplex or plus 600KHz or minus 600KHz transmit (1.6MHz and listen input on 4E). **Hi-Low switch** – 1.5W or 150mW. **External microphone jack. External speaker jack.**

The IC-4E is revolutionising 70cm!

Multimode Mobiles
IC-290E £366. IC-490E £445.inc.



290E-144-146 MHz/490E-430-440 MHz. 10 W RF output on SSB, CW and FM. Standard and non-standard repeater shifts. 5 memories and priority channel.

Memory scan and band scan, controlled at front panel or microphone. Two VFO's. LED S-meter. 25KHz and 1KHz on FM – 1KHz and 100KHz tuning steps on SSB. Instant listen for repeaters.

IC-720A Possibly the best choice in HF. £883.inc.

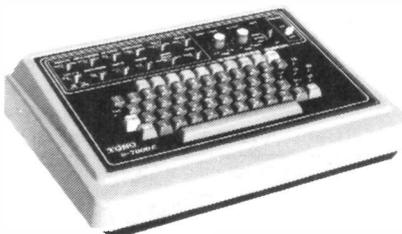


One way of keeping up with rapidly advancing technology is to look at what the IC-720A offers in it's BASIC form. How many of it's competitors have two VFO's as standard, or a memory which can be recalled, even when on a different band to the one in use, and result in instant retuning AND BANDCHANGING of the transceiver? How many include really excellent general coverage receiver covering all the way from 100KHz to 30MHz? How many need no tuning or loading whatsoever? and take care of your PA, should you have a rotten antenna. How many have an automatic RIT which cancels itself when the main tuning dial is moved? How many will run full power out for long periods without overheating? How many have band data output to automatically change bands on a solid state linear AND an automatic antenna tuner unit?

The IC-720A may be just a little more expensive than some, but it's better than most! Make your choice an IC-720A.

IC-PS15 Mains PSU £99.

Tono RTTY and CW computers
7000E £500. 9000E £650.inc.



The TONO range of communication computers take a lot of beating when it comes to trying to read RTTY and CW in the noise. Others don't always quite make it!

Check the many facilities offered before you buy – especially look at the 9000E which also throws in a Word Processor. Previous ads have told you quite a lot about these products – but why not call us for further information and a brochure?

IC-730 The best for mobile or economy base station £586.inc.



ICOM's answer to your HF mobile problems – the IC-730. This new 80m-10m, 8 band transceiver offers 100W output on SSB, AM and CW. Outstanding receiver performance is achieved by an up-conversion system using a high IF of 39MHz offering excellent image and IF interference rejection, high sensitivity and above all, wide dynamic range. Built in Pass Band Shift allows you to continuously adjust the centre frequency of the IF pass band virtually eliminating close channel interference. Dual VFO's with 10Hz, 100Hz and 1kHz steps allows effortless tuning and what's more a memory is provided for one channel per hand. Further convenience circuits are provided such as Noise Blanker, Vox, CW Monitor APC and SWR Detector to name a few. A built in Speech Processor boosts talk power on transmit and a switchable RF Pre-Amp is a boon on today's crowded bands.

Great base stations
IC-251 £499. IC-451 £569.inc.



ICOM produce a perfect trio in the UHF base station range, ranging from 6 Meters through 2 Meters to 70 cms. Unfortunately you are not able to benefit from the 6m product in this country, but you CAN own the IC-251E for your 2 Meter station and the 451E for 70 cms. Mains or 12 volt supply. SSB, CW and FM.



Thanet Electronics
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SMC SERVICE

Free Finance on most substantial items. Importer guarantee on all Yaesu Musen. Free Securicor on major Yaesu items. Access and Barclaycard over the 'phone. Biggest branch/agent/dealer network. Ably staffed and equipped service dept. Securicor 'B Service' contract at £4.49. Biggest stockist of amateur equipment. 24 years of communications experience.

FREE FINANCE

On *regular* priced items from: Yaesu, Ascot SMCHS, CDE, HyGain, Channel Master, Hansen, SMC, MFJ, KLM, Mirage and Hi-Mound, on invoices over £100 SMC offers Free Finance! How is it done? Simple, pay 20%, split the balance equally over 6 months or pay 50% down and split the balance over a year.

You pay no more than the cash price!!

GUARANTEE

Yaesu's *own* warranty does not extend outside Japan. Repairs are the responsibility of the UK retailer. SMC's guarantee is backed, as UK distributors, by daily contact with the factory and many tens of thousands of pounds of spares and test equipment. Avoid hawkers offering sets without serial numbers, spares, service or advice back-up.

NEW SHOWROOM:

Our superb new showrooms located within our new administrative headquarters in Rumbidge Street (abuts the Osborne Road Stores/Service/Manufacturing complex) is now *open six days a week 9 till 5-30*.

Six "Yaesu line up length" demonstration benches provide you with full "on the air" and "side by side" evaluation facilities. Check out a FT102, FT-ONE, FT230R, FT790R, KDK2030, plus all our standard goodies today.

SUPER SELECTION

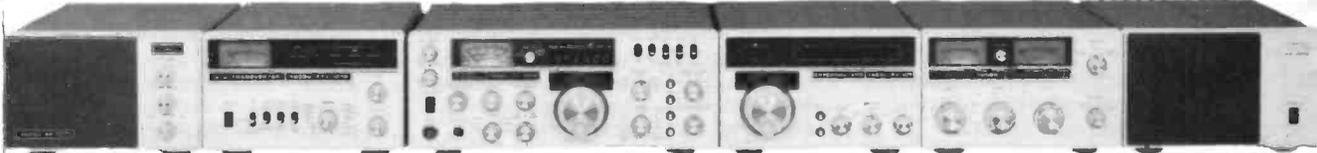
In our price list you will find the widest selection anywhere: — 200 stock lines of Yaesu, 600 different antennas, masts, rotators, coaxes, plus 300 items of communications equipment.

If that is not enough to tempt you into our showrooms as part of our inventory rationalisation scheme we are delighted to announce: substantial price reductions on the FT107 and accessories, added value on the FT902 plus a super sale!

— SUPER SALE!

- Bearcat 220 Scanner..... £195
- MMT432/28 70cm Transvertor..... £119
- 260V 145 % λ c/w gutter clip..... £10
- FT227RB Synth 2m Mic tune..... £175
- FT227RXS Synth 2m Scanner..... £195
- CPU2500RKS Synth 2m Keyboard... £205
- CPU2500RK Synth 2m 25W..... £210
- CPU2500RKst Synth 2m stepper... £220
- ME521 Digital Multimeter..... £39
- MD35FS Foot switch..... £ 5

All prices include VAT and carriage.



FT107M

SUPER RADIO — SUPER PRICES

If you have a yen for an all solid state HF transceiver with a "broad band" output that will deliver 75 per cent of maximum power into a 3:1 load, then look no further than this incredible value Yaesu. The FT107M covers 160-10M (all nine bands) and is fully equipped with: variable IF bandwidth, audio peak/notch filter, RF speech processor, variable threshold noise

blanker, full metering — including SWR, and boasts a schottky diode ring mixer for excellent receiver dynamic range. The optional memory system provides 12 stored channels (with fine tuning), scanning from the optional microphone and the exclusive DMS-digital memory shift. This system using a photo interruptor (with fine tuning) to control the 100Hz synthesizer to provide any offset — up to 500KHz! — from the memory channel. A full list of accessories is available to compliment the FT107M. Illustrated above (from left to right): the SP1010P

speaker/phone patch (normal speaker SP107 available); the FTV107R two band transvertor (two from 432, 145 or 70 or 50MHz); the FT107, itself, the FV107 remote VFO (with 5 crystal channels); the FC107 antenna coupler with twin VSWR/power meters, and the FP107E AC psu with speaker. Buy a FT107 and you can choose your accessories from the 'Line up' prices.

If sight of the full line up: (FT + FP + DMS + FV + FTV + 144TV + SP — List £1,267.30) is too much to stand, it's yours for **£999!!!**

	FT107M	FP107	FP107E	DMS	FV107	FTV107	SP107P	SP107
LIST	£ 725.00	£ 101.95	£ 113.10	£ 92.75	£ 98.50	£ 119.20	£ 57.50	£ 29.90
SALE	£ 625	£ 90.00	£ 100.00	£ 90.00	£ 80.00	£ 110.00	£ 55.00	£ 29.00
LINE-UP		£ 80.00	£ 90.00	£ 80.00	£ 60.00	£ 100.00	£ 50.00	£ 25.00

SOUTH MIDLANDS COMMUNICATIONS LTD



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SMC AGENTS

Edinburgh	Jack	GM8GEC	{ (031657) 2430 day (031665) 240 eve.	Bangor	John	GI3KDR	(0247) 55162	Neath	John	GW4FOJ	{ (0639) 55114 day (0639) 2942 eve.
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FT ONE £1,295 inc. VAT @ 15% & SECURICOR



*Option

FREE FINANCE

- ★ Rx: 150kHz-30MHz. Continuous general coverage.
- ★ Tx: 160-10m (9 bands) or 1.5-30MHz commercial.
- ★ All Modes: AM, CW, FM*, FSK, LSB, USB.
- ★ 10 VFO's!!! Any Tx-Rx split within coverage.
- ★ Two frequency selection ways, *no* bandswitch.
- ★ Main dial, velvet smooth, 10Hz resolution.
- ★ Inbuilt keyboard with up/down scanning.
- ★ Dedicated digital display for RIT offset.
- ★ Receiver dynamic range up to 100dB!!!
- ★ SSB: Variable bandwidth *and* IF shift.
- ★ 300* or 600Hz*, 2,400 → 300Hz, 6kHz*, 12kHz*.
- ★ Audio peak and notch filter. FM squelch.
- ★ Advanced variable threshold noise blanker.
- ★ 100W RF, key down capability, solid state.
- ★ Mains and 12VDC. Switch mode PSU built in.
- ★ RF processor. Auto mic gain control. VOX.
- ★ Last but not least *full* break-in on CW.

- ★ 160-10 metres including new allocations.
- ★ Variable IF bandwidth 2.4kHz down to 300Hz.
- ★ Audio Peak and independent notch controls.
- ★ AM, FSK, USB, LSB, CW, FM, (Tx and Rx).
- ★ Semi-break in, inbuilt Curtis IC Keyer.
- ★ Digital plus analogue frequency displays.
- ★ VOX built-in and adjustable.
- ★ Instant write in memory channel.
- ★ Tune up button (10 sec. of full power).
- ★ Switchable AGC and RF attenuator.
- ★ 350 or 600 Hz CW, 6kHz, AM filters.
- ★ Clarifier (RIT) switchable on Tx, Rx or both.
- ★ Plug in modular, computer style constructor.
- ★ Fully adjustable RF Speech processor.
- ★ Ergonomically designed with necessary LEDs.
- ★ Incredible range of matching accessories.
- ★ Universal power supply 110-234V AC and 12V DC.

SPECIAL
NOW WITH CW FILTER,
AM FILTER, CURTIS
KEYER AT NO EXTRA!
OFFER

FT902DM £885 inc. VAT @ 15% & SECURICOR



*Option

TD + DE MODELS

- ★ 1.8-3.5-7-10-14-18-21-24.5-28MHz
- ★ All modes: — LSB, USB. CW. AM±. FM±, (±Option board)
- ★ Front end: extra high level, operates on 24V DC.
- ★ RF stage bypassable. boosts dynamic range over 100 dB!
- ★ Variable bandwidth 2.7kHz → 500Hz *and* IF Shift
- ★ Fixed bandwidth filters, parallel or cascade configurations
- ★ IF notch (455kHz) *and* independent audio peak
- ★ Noise blanker adjustable for pulse *width*
- ★ External Rx and separate Rx antenna provisions
- ★ *Three* 6146B in special configuration — 40 dB IMD!
- ★ Extra product detector for checking Tx IF signal
- ★ Dual meter, peak hold ALC system
- ★ Mic amp with tunable audio network
- ★ SP102: — Speaker, Hi and Lo AF filters, 12 responses!
- ★ FV102: — VFO, 10Hz steps and readout, scanning, QSY.
- ★ FC102: — ATU, 1.2KW, 20/200/1200 W FSD PEP, wire.
- ★ FAS-1-4R: — 4 way remote waterproof antenna selector.

FT 102 £725 inc. VAT @ 15% & SECURICOR



"INSTANT" H.P.

- ★ 160-10 metres including new allocations.
- ★ Variable IF bandwidth 2.4kHz down to 300Hz.
- ★ Selectable CW fixed bandwidth CW-W and CW-N*.
- ★ Semi-break in with sidetone for excellent CW.
- ★ Digital plus analogue frequency displays.
- ★ 180W PIP and — 31dB 3rd order intermod.
- ★ RF speech processor fitted — adjustable level.
- ★ VOX built-in and is adjustable from the front panel.
- ★ Wide dynamic range for big signal handling.
- ★ High usable sensitivity, for those weak ones.
- ★ Superb noise blanker — adjustable threshold.
- ★ Attenuator; 0-10-20dB, AGC; slow-fast-off.
- ★ Clarifier (RIT) switchable on Tx, Rx or both.
- ★ Low level transvertor drive output facility.
- ★ Universal power supply 110-234V AC and 12V DC*.
- ★ Incredible range of matching accessories
- ★ 6 models: Digital/Analygue — AM/FM options.

FREE SECURICOR

FT 101ZD £635 inc. VAT @ 15% & SECURICOR



*Option

- ★ 80-10 metres (including 10, 18 and 24MHz bands).
- ★ USB-LSB-CWN-AM (Tx and Rx operation).
- ★ 100W PEP. 50% power output at 3:1 VSWR.
- ★ Full "broad band" no tune output stage.
- ★ Excellent Rx dynamic range, power transistor buffers.
- ★ Rx Schottky diode ring mixer module.
- ★ Local oscillator with ultra-low noise floor.
- ★ Variable IF bandwidth — 16 crystal poles.
- ★ Bandwidths 6kHz*, 2.4kHz-300Hz. (600-350) Hz*
- ★ AGC; slow-fast switchable VOX built-in.
- ★ Semi-break in with side tone for excellent CW.
- ★ Digital (100Hz) plus analogue frequency display.
- ★ LED Level meter reads: S, PO and ALC.
- ★ Indicators for: calibrator, fix, int/ext VFO.
- ★ Receiver offset tuning (RIT-clarifier) control.
- ★ Advanced noise blanker with local loop AGC.

*Option

FT707 £569 inc. VAT @ 15% & SECURICOR



PLASTIC BY PHONE

SMC FM MODIFIED VERSION AVAILABLE

WIDE COVERAGE ALL MODE Rx; FRG 7700 £329 inc. VAT @ 15% & SECURICOR

- ★ 30MHz down to 150kHz (and below).
- ★ 12 Channel memory option with fine tune.
- ★ SSB (LSB/USB), CW, AM, FM.
- ★ 2.7kHz, 6kHz, 12kHz, 15kHz, @ - 6dB.
- ★ 3 Selectivities on AM, squelch on FM.
- ★ Up conversion, 48MHz first IF.
- ★ 1kHz digital, plus analogue, display.
- ★ Inbuilt quartz clock/timer.
- ★ No preselector, auto selected LPF's.
- ★ Advanced noise blanker fitted.
- ★ Antenna 500Ω to 1.5MHz, 50Ω to 30MHz.
- ★ 20dB pad plus continuous attenuator.
- ★ Switchable A.G.C. Variable tone.



'7700 THE ONE WITH FM!

- ★ 110 and 240V ac, 12Vdc option.
- ★ Signal meter calibrated in "S" and SIMPO
- ★ Acc; Tuners, Converters, LPF, Memory.
- ★ FR7700; 150kHz-30MHz, Switch, etc.
- ★ FRV7700A; 118-130, 130-140, 140-150MHz.
- ★ FRV7700B; 118-130, 140-150, 50-59MHz.
- ★ FRV7700C; 140-150, 150-160, 160-170MHz.
- ★ FRV7700D; 118-130, 140-150, 70-80MHz.
- ★ FRV7700E 118-130, 140-150, 150-160MHz.
- ★ FRV7700F 118-130, 150-160, 170-180MHz.
- ★ FF5; 500kHz (for improved VLF reception).
- ★ MEMGR7700; 12 Channels (internal fitting).
- ★ FRA7700; Active Antenna.

FT207R: SALE!

£159 inc. VAT @ 15% & POSTAGE



- ★ 144-146MHz (144-148 possible)
- ★ 12.5kHz synthesizer steps
- ★ Keyboard entry of frequencies
- ★ Keyboard lockout safety feature
- ★ Digital display to hundreds of Hz
- ★ Display auto shutdown timer
- ★ Four Channels of memory
- ★ Memory back up disable switch
- ★ Up/down manual tuning



- ★ Bandscan for busy or clear channels
- ★ Memory scanning features
- ★ ±600kHz split built in
- ★ Any split + or - programmable
- ★ BNC antenna connector
- ★ "On Air" and "Channel Busy" LEDs
- ★ Built in condenser microphone
- ★ 200mW AF to internal/external speaker
- ★ 2.5/0.2W of RF output
- ★ Rx; 35mA squelch, 150mA full vol.
- ★ Tx; 250mA low, 800mA high
- ★ 0.3µV for 20dB quieting
- ★ External speaker/mic available
- ★ 1.7 (2.2)" D x 2.5 (2.7)" W x 6.7 (7.2)" H
- ★ C/w Easychange NiCad pack, case, helical

- ★ 144-146MHz (144-148 possible).
- ★ 25 watts RF output (Low 2.5W).
- ★ 150 (W) x 50 (H) x 176 (D) mm. 1.3Kg.
- ★ Selectable 12½ or 25kHz steps.
- ★ Up/down, memory/band scanning.
- ★ Ten Memories with priority function.
- ★ Easy "write-in" memory channels
- ★ Large illuminated "any angle" LCD display.
- ★ Display to 100's of Hz + special functions.
- ★ Two independent VFO's.
- ★ Operation between memory and "other" VFO.
- ★ Memory backup "5 year" lithium cell.
- ★ ± 600kHz and/or simplex.
- ★ Manual and automatic tone burst.
- ★ Large "full sound" speaker.
- ★ Concentric volume/squelch controls.

FT230R £239 inc. VAT @ 15% & SECURICOR



COMMUNICATIONS RX £995 inc. NRD515, 100kHz - 30MHz, Digital, Electronic tune, 100Hz VFO. SSB/AM/CW/RTTY.



£20 OFF

2m, 25W, FM, £179 inc. VAT @ 15% + SECURICOR
2025 MARK II full coverage 2M Transceiver, 12½ kHz (set 12½-200kHz), rapid tune, 10 "easy write" memory channels, memory or band-scan between programmable limits, auto scan stop dependent on squelch and centre zero.

KP202 c/w KCP2 £100 inc.

6 chnl, 2W, 144MHz Handheld c/w charger Telescopic ant S20, S21 etc., Extra crystals - stock items only - £1.00 each!!!



PA15/160 £175

2m linear. 10W-160W. over temp. RF and hard wire switch etc.



YC221 £83.38 - £35.00
 Digital readout for FT221(R)



£40 OFF

2m, 250W (+) PEP. £459
NAG 144XL LINEAR. 4CX350F tube, 10W nom. drive, switchable pre-amp. RF and hard switching. Thermal delay.

- ★ Multimode USB, LSB, FM, CW
 - ★ 100Hz backlit LCD Frequency display
 - ★ 10 memory channels '5 year' backup
 - ★ Any Tx/Rx split with dual VFOs
 - ★ Up/down tuning from microphone
 - ★ AF output 1W @ 10% THD
 - ★ Bandwidth 2.4kHz and 14kHz @ -6dB
 - ★ LED's; 'On Air', 'Busy' m/c meter; S, PO.
 - ★ 58 (H) x 150 (W) x 195 (D) (1.3kg)
- | | |
|--------------------------------|-------|
| SMC2.2C NiCad 2.2 A/hr "C" | 2.70 |
| SMC2.0C NiCad 2.0 A/hr "C" | 2.00 |
| SMC8C Slow Charger (220mA) | 8.80 |
| MMB 11 Mobile Mount | 22.25 |
| CSC1 Soft carrying case | 3.45 |
| FL2010 Linear Amplifier 2m 10W | 64.40 |
| FL7010 Linear Amplifier 70cms | 99.65 |



2 or 70!

FT 290R
£ 249 inc.

VAT @ 15%
& POSTAGE

- ★ 144-146MHz (144-148) possible
- ★ 2.5W PEP, 2.5W RMS/300mW out
- ★ FM: 25kHz and 12.5kHz steps
- ★ SSB: 1kHz and 100Hz steps
- ★ ±600kHz repeater split 1750kHz burst
- ★ Integral telescopic antenna
- ★ Rx, 70mA, Tx; 800mA (FM maximum)

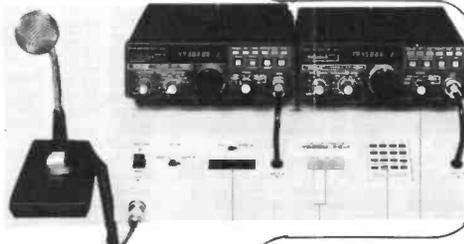
FT 790R
£ 299 inc.

VAT @ 15%
& POSTAGE

- ★ 430-330MHz (440-450 alternative)
- ★ 1W PEP, 1W/250mW FM/CW out
- ★ FM: 100kHz and 25kHz steps
- ★ SSB: 1kHz and 100Hz steps
- ★ 1.6MHz shift with input monitor,
- ★ 1750Hz burst
- ★ Rx; 100mA/200mA. Tx; 750mA max
- ★ BNC Mounting ½ flexi antenna

- ★ USB-LSB-CW-FM (A3, A1, F3).
- ★ 30W PIP A3, 10/1W out A1 F3.
- ★ Any Tx Rx split with dual VFO's.
- ★ Four easy write-in memory channels.
- ★ Memory scanning with slot display.
- ★ Up/down tuning/scanning from mic.
- ★ Priority channel on any memory slot.
- ★ Digital RIT. Advanced noise blanker.
- ★ Satellite mode allows tuning on Tx.
- ★ Semi break in with side tone.
- ★ Very bright blue 100Hz digital display.
- ★ Display shows Tx & Rx freq (inc RIT).
- ★ String LED display for "S" and PO.
- ★ LED's; "On Air" Clar, Hi/Low, FM mod.
- ★ Size (Case): 8.3" D, 2.3" H, 6.9" W.

2 or 70!



Ills. c/w SCL station console and YD148 mic

FT 480R **£ 379 inc.** VAT @ 15%
& SECURICOR

- ★ 144-146MHz (143.5-148.5 possible).
- ★ ±600kHz standard repeater split.
- ★ Excellent dynamic range and sensitivity.
- ★ FM; 25, 12½, 1kHz steps.
- ★ SSB; 1,000, 100, 10Hz steps.

- ★ 430-434MHz (440-445 possible).
- ★ GaAs Fet RF for incredible sensitivity.
- ★ FM; 100kHz, 25kHz, 1kHz, steps.
- ★ SSB; 1,000, 100, 10Hz steps.
- ★ FT780R 1.6 fitted 1.6MHz Shift £459 inc.

FT 780R **£ 449 inc.** VAT @ 15%
& SECURICOR

- ★ Keyboard entry of frequencies/splits
- ★ LCD digital display with backlight
- ★ Any split + or - programmable
- ★ Ten memory channels '5 year' back up
- ★ Up/down manual tuning. Memory scan
- ★ Manual or auto scan for busy/clear
- ★ Priority channel with search back
- ★ Scan between any two frequencies
- ★ Auto scan restart. 1.750Hz tone burst
- ★ Built in condenser microphone
- ★ 500mW to int/ext speaker
- ★ External speaker/mic. available
- ★ 168(H) x 61(W) x 39(D)mm
- ★ C/w Quick change NiCad pack, helical



2 or 70!

FT 208R
£ 209 inc.

VAT @ 15%
& POSTAGE

- ★ 144-146MHz (144-148 possible).
- ★ 12.5/25kHz synthesizer steps.
- ★ ±600kHz repeater split.
- ★ 2.5 or 0.3W RF output.
- ★ Tx: 20mA squelch 150mA max. AF.
- ★ Tx: 800mA at 2.5W RF.
- ★ 0.25µV for 12dB SINAD.

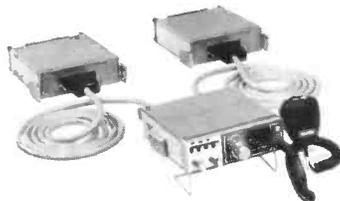
FT 708R
£ 219 inc.

VAT @ 15%
& POSTAGE

- ★ 430-440MHz (440-450 option).
- ★ 25kHz synthesizer steps.
- ★ ±7.6MHz EU split standard.
- ★ 1W or 100mW RF output.
- ★ Rx: 20mA squelch, 150mA (max AF).
- ★ Tx: 500mA at 1W RF.
- ★ 0.4µV for 12dB SINAD.

- ★ Four easy write-in memory channels
- ★ Rx priority channel (auto check)
- ★ Scanning band/memory empty/busy
- ★ Up/down tuning/scanning from mic.
- ★ Optically coupled tuning control
- ★ Manual and automatic tone burst
- ★ String LED's for 'S' and PO, 7 status LEDs
- ★ 1½ W of audio to internal/external speaker
- ★ FT720 Control Head
- ★ 3.3 (4.3) " D x 6" W x 2 (2.2) " H
- ★ S72 Switching box
- ★ Pushbutton band change Auto steps/spits
- ★ E72S Extension cable, 2m long
- ★ E72L Extension cable, 4m long
- ★ MMB3 Mobile Mounting bracket for deck

2 and/or 70!



Ills. c/w S72 and two E72S cables.

FT 720RV **£ 245 inc.** VAT @ 15%
& SECURICOR

- ★ 144-146MHz (144-148MHz possible).
- ★ 12½ kHz synthesizer, 600kHz shift.
- ★ 0.3µV for 20dB quieting.
- ★ Rx 0.5. Tx RV 3.5A, RVH 6.5A.
- ★ 5.8 (6.5) " D x 6" W x 2 (2.2) " D.

- ★ 430-434MHz.
- ★ 25kHz synthesizer steps, 1.6MHz shift.
- ★ 0.5µV for 20dB quieting.
- ★ Rx 0.5A, Tx 4.5A.
- ★ 5.8 (6.5) " D x 6" W x 2 (2.2) " D.

FT 720RU **£ 265 inc.** VAT @ 15%
& SECURICOR

SOUTH MIDLANDS COMMUNICATIONS LTD

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FT302DM	160-10m Band Transceiver	898.00	(-)
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FT102	160-10m Band Transceiver Digital R.O.	725.00	(-)
FT707	8 Band Transceiver 200W Pep	569.00	(-)
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FC707	Digital V.F.O.	203.00	(-)
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TS130V	8 Band 20W Pep Transceiver	446.00	(-)
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PB25	Spare Battery Pack	22.30	(1.00)
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UR76 50 OHM Coax – Per Metre		0.25	(0.05)
Please send total postage indicated. Any excess will be refunded.			

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MML144/100S	2m 40W Linear Amp (10W I/P)	77.00	(-)
MML144/100S	2m 100W Lin. Amp (10W I/P)	139.95	(-)
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MML432/50	70cm 50W Lin. Amp (10W I/P)	109.95	(-)
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A new high sensitivity circuit ensures that even the weakest of signals can be copied and there is an external aerial socket so that it can be used indoors as a base station monitor. Extensive fatigue-free monitoring is possible using the squelch control setting and a built-in earphone socket provides for private listening. Included with the set is a flexible rubber antenna, rechargeable batteries and AC mains charger.

Two models are available; the ATC720SP is designed for commercial and professional applications, housed in a metal case and built to a stringent specification to meet all kinds of environments; the model ATC720 uses plastic mouldings and is rated for normal domestic and flying club use.

Whether you're a pilot, engineer or aircraft enthusiast, you'll enjoy the performance of these monitors. Follow the action at air shows and listen to the skills of the air crews as they guide their aircraft through the air lanes and finally down onto the runway.

SPECIFICATIONS

Frequency range	:118-136MHz	Sensitivity	:0.5uv
Channel Steps	:25kHz	Selectivity	:8kHz/6dB & 25kHz 60dB
Mode	:AM	Antenna	:50 ohms.

FDK MULTI-700EX

2m 25W OUTPUT
+ PRIORITY SCANNING



NEW LOW PRICE £169 inc VAT

- Full coverage of the 144-146MHz band with facilities for 12·5kHz steps anywhere in the band.
- Large four digit LED frequency display tuned in 40 × 25kHz steps in each 1MHz range.
- A specially designed five stage helical-resonator assembly together with the latest dual-gate MOSFET front end ensures excellent cross-modulation characteristics.
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- Four additional priority channels — two diode matrix programmable in 12·5kHz steps and two crystal controlled for any frequency between 144-146MHz.
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- Continuously variable RF output control from 1-25 watts.
- Advanced PLL technology provides good stability with low spurious output; integral power supply noise filter eliminates vehicle line noise and an automatic protection circuit protects the RF output power module against poor SWR, open or short circuit.

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2m (& 70cm) ALL-MODE



AMAZING VALUE
£289 inc VAT

- Simple and smooth VFO control gives either 100Hz or 5kHz steps on both FM and SSB modes for optimum convenience.
- The large green fluorescent display tube gives full frequency readout to 100Hz and provides safe and clear readout for both night and day operation.
- Standard features include noise-blanker, RIT control with switch, RF attenuator gain control, automatic crystal controlled tone-burst, high and low power switching and remote up/down frequency control microphone unit.
- Compare its compact size and light weight, its smart appearance and comprehensive front panel controls. Simple and reliable operation is made possible by employing advanced solid-state and logic techniques.
- A dual VFO is employed for the selection of two independent frequencies anywhere in the band. This also enables split frequency operation, particularly useful when used in conjunction with the optional "UHF-EXPANDER" transverter. For normal repeater operation a pre-programmed shift is selected by front panel selector.

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AMATEUR RADIO EXCHANGE



Full details and prices in this issue of the exciting new-generation scanning receivers which we previewed last month... all synthesised and all with digital readout.

First, our scanning receivers, and to lead off, the **MAXIMAL MK-4000** (right) with FM coverage of 70-87.9875MHz and 140-175.9875MHz in 12.5kc steps on both bands. Sensitivity is 0.5µV S/N 20dB, and selectivity ±15KHz at -50dB, and its AF output is more than 1.3W. All that, plus a built-in digital clock, for just **£99.00**.

Next, two really first-class digital-readout scanning receivers, the **CORONA CD-3000** and **CD-4000** (pictured). Their identical format presentation conceals totally different specifications as follows.

CD-3000 Professional-standard air-band receiver covering 110-139.995MHz on AM in 5kc steps. With sensitivity of 0.5µV S/N 10dB, this is tremendous value at **£89.00**.



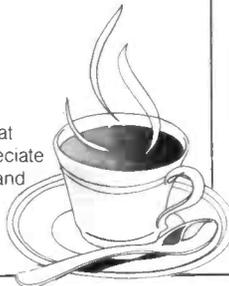
CD-4000 (left) For full coverage of public services, amateur and marine bands between 140 and 159.995MHz on FM at a price of only **£69.00**.



Finally, the **FAIRMATE AS-10960** (below), which covers VHF from 140 to 175.995MHz and UHF from 275 to 410MHz and is programmable to 10 selected frequencies in 5kc increments. Also featuring memory and priority channels, it is tremendous value at **£95.00**.



Reading specifications and looking at pictures are all very well, but the best way to appreciate the quality of these exclusive imports is to come and hear them if at all possible... and that way you'll get a cup of Brenda's coffee too while you're making up your mind which one (ones?) to buy!



Another item seen on our trip to Japan... the new **ICOM** general coverage receiver. Having tried it, we are convinced that this could well become the market leader in its field. With features like these, everyone who wants the best in today's receiver technology will now be asking for **ICOM**.



- ICR-70**
- Tunable from 100kc to 30MHz
 - AM/SSB/FM right across the range
 - Pass band tuning ● Scan facility
 - Notch filter ● Two VFO's

Whether you want to buy outright or part-exchange your existing receiver, phone or call in without delay and be one of the first to enjoy a remarkable new experience in general coverage radio reception.



Ever wanted to decipher all those funny morse code (CW) and radio teletype (RTTY) noises you hear on your communications receiver? Well, now you can - with the new **TASCO** Morsemaster **CWR-600**.

Simply connect the input side of the Morsemaster to your receiver or transceiver, and the output either to a domestic TV (UHF) or to a proper VDU which we can also supply. RTTY and CW will be automatically demodulated and displayed on the screen, CW at speeds of up to 250 characters per minute, RTTY between 45.5 and 110 Bauds.

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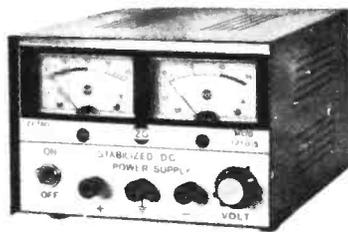


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FOR THE RADIO AMATEUR AND AMATEUR RADIO

The
SHORT WAVE
Magazine

EDITORIAL

Exhibition Time

October 7th, 8th and 9th are the dates to note in your diary for this year's A.R.R.A. National Amateur Radio Show, back once again at the Granby Halls, Leicester, venue.

We hope to be there, looking forward to renewing old acquaintances, making new ones, and all ready to listen to your comments — critical as well as favourable. See *you* there?

“Magazine” Articles

We are always on the look-out for good articles, brief or lengthy, and we pay a realistic price for all material used. The range of amateur-radio topics in which we are interested is as broad as it can be (humorous and historical, helpful and hyliteknical), so — why not have a go yourself?

Ed. Oliver
L3KFE.

WORLD-WIDE COMMUNICATION

VHF BANDS

NORMAN FITCH, G3FPK

THE volume of mail this month has been an all-time record as far as this conductor is concerned, reflecting the very rewarding conditions (sorry, G3KFE!) on VHF/UHF in the past month. It will be quite an effort to edit it all into the space available, so let us begin with:

Awards and Tables

Congratulations to Mick Cuckoo, G6ECM, from Herne Bay in Kent, who is the first G6 licensee to join the 2m. VHF Century Club. His certificate, no. 348, was issued on July 26. Licensed in September, 1981, his first station comprised an *Icom* IC-260E and 8-ele. *Yagi*. The current gear is a "muTeked" *Yaesu* FT-221R with external relays and the aerial an 11-ele. *H.A.G.* Future plans are to add another *H.A.G.*, and build a 4CX250B amplifier. After that, Mick plans to get on 70cm. and 23cm.

Sorry there was no Squares table last month. Several more readers have sent in entries for this popular item and three have been dropped as nothing has been heard from them for over a year in the way of updates. The Annual table is based upon all 78 U.K. and Ulster counties, plus all the 26 Irish Republic ones making 104 in all. The British Isles countries are: EI, G, GD, GI, GJ, GM, GM (Shetlands), GU and GW. Sark and Alderney are the same country as Guernsey but count as separate counties, as do the Isles of Scilly and the Isle of Wight. The counties are the *administrative*, like Greater London, Strathclyde, Powys, and *not* postal ones like Middlesex. The 23cm. All-time table is also based on the administrative counties so, if you worked someone years ago in St. Ives, Hunts., that now becomes Cambs. Similarly, Bath, which was in Somerset, now counts as Avon.

Beacons

Brian Bower, G3COJ, reports that the Wrotham 2m. beacon, GB3VHF, has now been modified for rack mounting and he has replaced the oven temperature sensing element with a Solid State Thermal Switch from *RS Components*. As of August 4, the Tx was ready to be sent back to site and installed in the new hut, but the new aerial system was not ready, so it may be

necessary to run the feeder to the old one for a time.

Satellite News

As far as could be gleaned from *AMSAT-UK* sources on Aug. 7, the latest attempts to regain control of *U-O-9*, or *UOSAT* by Stanford University in California, using their 150 ft. dish aerial, had not been successful. They had some mechanical and computer trouble, it seems, and a further attempt was due to be made on an overhead pass.

Concerning the maximum, theoretical ground range for *O-8*, mentioned last month, based upon the latest *apogee* figure of 939.41 kms., this works out at 6,531 kms. assuming the Earth's average radius to be 6,371 kms.

No word has been received from Jan King, W3GEY, of *AMSAT-USA*, about the technical data of the *Phase 3B* transponders. According to *World Radio* for June, testing of the power outputs and sensitivities of the two transponders was carried out in Germany and some very optimistic *e.i.r.p.* figures were quoted which your scribe does not believe, in common with many others who have done some fairly simple power budget link calculations. It seems that, to quote Richard Limebear, G3RWL, of *AMSAT-UK*, that the *E.S.A.* is playing "musical payloads", in that *Phase 3B* might go up in November this year. For once, our "bird" is ready, so an early launch would not be an embarrassment. However, it would mean that there is little time for potential users to get set up to operate either of the transponders.

The so-called "U" transponder will require transmit capability in the band 435.025 to 435.175 MHz., and receive capability on 145.975 to 145.825 MHz, which should not present any problems for those who used to use Mode "B" on *O-7*. The "L" transponder has an uplink band of 1269.050 to 1269.850 MHz and a downlink band of 436.950 to 436.150 MHz. Right-hand, circular polarisation is recommended for the aerial systems. It is understood that *Messrs. Microwave Modules Ltd.* are willing to modify their standard range of products for "Mode L", and no doubt other manufacturers will do the same.

An interesting piece of news is that the old *Oscar 7* satellite is reported to have been heard again. Since its failure last year, it has been in continuous sunlight, so it must be operating directly from its solar panels. The 10m. *telemetry* beacon is on 29.502 MHz and, since the orbit is a highly stable one, a reference orbit would be for August 1, no. 35270 at an equatorial crossing of 90.47° west, the time being 00h. 10m. 26s. The current period would now be 114.94095 mins. and the track separation 28.7371°W *per* orbit. The CW *telemetry*, if meaningful, would be in the form of 24 groups of three figures, four

starting with figure 1, four with figure 2, and so on. Please pass along any *TLM* received, with exact details of time and date.

Contest Notes

Sept. 4/5 is the weekend of the 144 MHz Contests. These are the *RSGB* and *IARU* ones which both start at 1400 and last for 24 hours. See p. 302 last month for details. The *B.A.R.T.G.'s* Autumn VHF RTTY Contest runs from 1800 on Sept. 11 to 1100 on the 12th but a four hours rest period must be taken and declared in the log. This is a 2m. event for stations in CQ Zones 14 and 15 and has Single-op., Multi-op. and *s.w.l.* categories, fixed or portable. Full details from G8CDW at 89 Linden Gardens, Enfield, Middx., EN1 4DX.

The final leg of this year's 10 GHz *Cumulatives* is on Sept. 19, from 0900 to 2000. Your choice of the best three periods and entries go to G3WDG at 46 Windsor Close, Towcester, Northants., NN12 7JB. Saturday, Sept. 25 from 1900 to 2300 is the period for the last of this year's *AGCW-DL* VHF-CW Contests, on 2m., 144.010-144.150 MHz. Scoring details as *per* the 70cm. leg covered on p. 673 in the February feature. On Sept. 26, 0900-1700, there is the *RSGB* Region 1 event in which any three bands out of 70, 144, 432 and 1,296 MHz may be used. Section 1 is Multi-op., fixed or -/P with simultaneous operation using different call signs permitted but no scoring QSOs within operator's own group, whatever that means. Section 2 is Single-op., fixed or -/P, one to three bands out of the four and -/P folk can go up to 20 miles outside Region 1. Section 3 is for those outside Region 1 who may work Region 1 stations for points. Very fiddly scoring system involving aerial *a.s.l.'s*.

The UHF/SHF part of the *IARU* Region 1 Contest runs from 1400-1400 on Oct. 2/3 and is in two sections: Single-op. by owner of call only, and All-others. Exchanges to consist of report-plus-serial number, and QTH locator. One point *per* kilometre scoring, multipliers being 1 for 432 MHz; 5 for 1,296 MHz; 10 for 2,400 MHz and 20 for higher bands.

Data Transmission

Data transmission is a mode not mentioned before in these columns, simply because nobody ever tells us what they have been up to. However, Angus McKenzie, G3OSS, (Finchley) and Alan Goddard, G3NQR, (Harrow) have had great success on 70cm. transmitting stereo digital audio in tests on Aug. 7. They used 16-bit sampling at 44.056 kHz and Angus reports a distortion below 0.01% over a 10 Hz to 20 kHz bandwidth, with a 90 dB. S/N ratio. Anyone with an amateur TV station could set up this system and so achieve the highest possible audio quality communication link. No doubt, interested parties will be discussing this on 144.750

MHz. Angus was assisted at his end by Simon Roberts, G8UQX, and Miles Capstick, G6BHY.

Four Metres

Bill Hodgson, G3BW, (Cumbria) says:— "I am now back on 4m. with a vengeance and have got the '6-40A amplifier stoked up . . ." Considering the activity on the band, he has not done too badly so far. Frank Howe, G3FIJ, (Essex) did well in VHF NFD weekend, adding another 12 counties, plus GM4DIJ (Lothian) on July 24. G3OSS operated in the *Aurora* on Aug. 7. Stations worked included EI6AS and EI6DT, both in Dublin, GJ3YHU and a-GU.

Tim Raven, G4ARI, (Leics.) uses a *Sugiyama* F-850 transceiver running about 5w. to crossed dipoles in the loft and NFD brought him another 16 counties. Paul Turner, G4IJE, (Essex) concluded another 4m/2m. crossband MS QSO with DK1PZ on July 20, receiving a 37 report. Arthur Breese's, GD2HDZ, list shows another 10 counties added in NFD, plus GI for a new, 1982 country. Now that G3BW is QRV again, the race is on!

Sporadic E

John Heys, G3BDQ, (E. Sussex) had an unexpected reply to his "CQ" call on 2m. at 1900 on July 7, from UB5EDT (RI05c), a distance of 2,446 kms. This opening lasted less than a minute, so perhaps it was due to ionization caused by a piece of re-entering space junk. Roger Thorn, G3CHN, (Devon) mentions a brief opening to the south at 1945 on July 9 when someone on YL square worked a CTI, but nil at Bolberry Down. EA9NL in North Africa, was heard very weakly and briefly. There was a short opening to Hungary on July 30 from I215 when the only station heard was HG0HO (KH) who seemed to be working DLs. Roger managed a QSO in spite of a duff coaxial cable connexion.

Dave Sellars, G3PBV, (Devon) only caught the July 17 event to Sweden between 1603 and 1635, a virtual repeat of the May 26 event. SM3COL (IW) was worked at 1623, others heard were SM2s BLD (JX), 'CKR (KX) and 'BYC (MZ). Mike Lee, G3VYF, (Essex) also caught the July 30 event to HG and YO at 1225 but says, ". . . nothing new in it for me!"

Ken Osborn, G4IGO, (Bristol) heard Spanish stations on July 9 between 1933 and 2010, plus EA9HG. He worked the three SM2s heard by G3PBV. Later, on 20m., SM3COL said he also worked G6CJW, G8MXE and G8LJW with 10 watts. SM2BLD used only 4¼w. and SM2CKR's power was 50w. Martyn Jones, G8CXQ, (Warks.) was tipped off about the July 30 event by G8BWR, the first DX being heard at 1200. He worked YU7AR (KF) and YU7POA (KE) and heard YU7NXA (KF) and HG8ET (KG). It was all over by 1225.

ANNUAL VHF/UHF TABLE

January to December 1982

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		23 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	
G2AXI	51	7	66	19	45	12	10	2	200
G4JZF	—	—	78	20	55	15	—	—	168
G8TFI	—	—	75	19	56	17	—	—	167
GD2HDZ	43	6	56	12	38	6	3	2	161
G3PBV	29	5	58	20	30	9	5	3	151
G8RZP	—	—	72	24	40	14	—	—	150
G8RZO	—	—	71	24	40	14	—	—	149
G3BW	29	4	58	19	31	5	4	5	146
G6ADE	—	—	60	14	50	14	—	—	138
G3FIJ	40	4	51	14	25	3	—	—	137
GW3NYX	—	—	81	27	19	7	—	—	134
G8VRJ	—	—	46	15	33	11	20	5	130
G4ARI	35	2	67	19	—	—	—	—	123
G6ADC	—	—	62	13	36	6	—	—	117
G8DEZ	—	—	76	39	—	—	—	—	115
G8HHI	—	—	52	15	18	7	9	2	103
G8VR	10	1	56	32	—	—	—	—	99
G4MUT	—	—	48	15	28	7	—	—	98
G6ECM	—	—	72	22	—	—	—	—	94
G3FPK	—	—	74	19	—	—	—	—	93
GW3CCF	—	—	42	8	23	4	10	2	89
GM4CXP	8	3	46	17	6	3	—	—	86
G8LFB	—	—	64	19	—	—	—	—	83
G8VFB	—	—	60	16	—	—	—	—	76
G4K LX	—	—	53	18	3	1	—	—	75
GW3GBY	10	3	42	12	3	2	3	3	73
G8KAX	—	—	40	9	13	2	8	1	73
G8WUU	—	—	41	10	17	4	—	—	72
G4MEJ	—	—	47	23	—	—	—	—	70
G4NBS	—	—	24	5	24	4	11	1	69
GM8OEG	—	—	51	14	—	—	—	—	65
G4NRG	—	—	34	14	12	4	—	—	64
G4FKI	18	1	23	10	9	1	—	—	62
G6AJA	—	—	49	13	—	—	—	—	62
G6FSH	—	—	51	11	—	—	—	—	62
GW8TVX	—	—	39	11	—	—	6	3	59
G6CGY	—	—	42	12	—	—	—	—	54
GW4HBK	31	5	11	5	—	—	—	—	52
G4BVY	9	2	—	—	29	11	—	—	51
G6HDD	—	—	40	7	—	—	—	—	47
G8XTJ	—	—	41	6	—	—	—	—	47
G8XHL	—	—	25	8	9	3	—	—	45
G8ZYL	—	—	35	8	—	—	—	—	43
GM4COK	—	—	21	15	1	1	—	—	38
G8LXY	—	—	18	1	12	2	—	—	33

Three bands only count for points. Non-scoring figures in italics.

George Cullis, G8MFJ, (Wilts.) was still awaiting his G4 call when he wrote. In the July 17 affair, he got SM2BYC (MZ01d) at 1626 and heard SM2BLD at 1631. The Brakespears, G8RZO and G8RZP, (Kent) scrambled QSOs with CT1AWD (VZ) on July 8 in a three minutes opening from 1942. On the 30th, both managed HG8CE (KG), HG0HO and YU7NXA.

Auroral Events

The historic *Aurora* of July 13/14 was triggered off by a huge, unexpected *proton* event. This flare phenomenon started around 0700 on the 12th, the *proton* count reaching quite staggering proportions. It was the largest recorded particle event since August, 1972. At the commencement, there were 2,900 *protons per square centimetre, per second, per steradian*. (A *steradian* is a solid angle of one *radian*, or 57.3°. Imagine a hollow cone with that apex angle with a 1 x 1cm. hole at the pointed end. Look through the hole, into the cone, then 2,900 is the number of particles collected by the cone, passing through that hole each second).

The flare area covered from 300 to 340° *heliographic* longitude. In addition, there

were two *coronal holes*, one in the Sun's northern hemisphere at 350° and the other, a huge affair, running from 20°N to 15°S, centred on long. 260° and 40° "wide." It was this combination which kept things on the boil between July 7 and 19. Throughout this entire period, there were some tremendous radio bursts recorded at 245 MHz. one of the largest being at 0557 on the 18th, of 23,000 *flux units!*

In such an intense *Ar* as the one on July 13/14, it is possible to make contacts on 70cm. Chris Bartram, G4DGU, (Devon) made 8 QSOs between 1802 and 1852 with: G3SHK (ZK01a); G3LQR (AM67h); DL7ZL (GM47c) at 1,231 kms. just 30 kms. short of the European DX record; G3WDG (ZM65d); G4KGC (ZM65d); G2CIW (AL53a); DL7QY (FJ61e) at 1,050 kms. and DJ5BV (DK26h). Signals were 40 dB. over noise at one stage and Chris has since heard his signals were heard by quite a few DLs. He suggests 432.050 MHz be monitored during major *Ar* events. Claus Neie, DL7QY, worked a UA3 on 70cms.

Obviously, by far the greatest interest was on 2m. and Pam Rose, G8VRJ,

(Lincoln) worked OE5OLL (GI) and F1CCG (CG) on the 14th. Welcome to *s.w.l.* David Whitaker, (N. Yorks) who uses a *Datong* converter, *Trio* JR-310 Rx and 8-ele. *Yagi* at 30ft. He copied a couple of GMs in XR and YP on the 12th, and GI, GM, GU and GW stations in the big event next day. On July 24, he heard another *Ar* and copied F1FHI (ZH), GIs and GMs, including GM8SAU (WR45d).

G3CHN missed the start of the first phase of the July 13 event which ended around 2040. QTFs were 50-60°. The next phase started at 2202 with EI6AS heard, and went on till about 0100. It was remarkable for the tremendous strengths of the G, DL and PA stations. Only GM heard was GM4CXM at S1, but Roger could not work much till 0030, after which he got DL5FT (EK) and OK2BFH (JJ) at QTFs 65-75°. At 2036, EA1QJ (VD) was worked with S1a reports exchanged and it must be very unusual to work Spain *via* an *Ar*.

G3PBV spent a lot of time just listening to the July 13/14 affair, which he found at 1845. He, too, heard EA1QJ but could not raise OK2TU (IJ) on CW. He came on again at 0000 when the band was full of very strong locals on SSB. Dave suffered a lot from QRN from distant thunderstorms but did get SM7DLZ (IQ) at 1,466 kms. It faded at 0310 but a few weak SMs were heard at 0330 when he went to bed. In the Aug. 7 *Ar*, your scribe heard UT5DL (LI) answer a "CQ" from G3CHN. Bryn Llewellyn, G4DEZ, (Essex) worked the UT5, also UC2ABN (MR) and some Ys. No LA or SM folk, best "gotaway" being a YO4!

Peter Etheridge, G4ERG, (Hull) worked 17 countries in the July 13/14 affair and lists best DX as:—I4XCC (GD), I1BEP (DE), I3TJQ (GF), YU2SFU (IG), UP2BJB (LP), UQ2GGG (LR), YU3ES (GF), OH5LK (NU), UR2EQ (NT) and OE6WIG (HG). G4IGO worked SMs and a GM on the 12th, from 1437-1615 and 1640-1835 at QTFs 30-50°. Ken reckons the one on the 13/14th was the best ever. Times were 1658-2015, 2155-2205 and 2309-0300 when he retired. The first phase gave Y22ME (HM), HG1YA (IH), YU3ES, HG0HD (KH), HG0HO (KH), OE6WIG and I1KTC (EF). The last phase brought F, I, OE, OK, SM, UP, UQ and YU stations.

Jon Stow, G4MCU, (Essex) missed the first part of the July 13 *Ar* due to *ASLEF* inaction, but eventually added Y22ME for a new one. He was too tired to stay up for the "midnight oil" part. G6ECM's only *Ar* was on the 12th, when Mick got GM4HKV (YQ). John Pilags, G8HHI, (Hants.) logged the start of the July 13 event at 1709 and fade-out around 1920 with G, GI and GM worked. From 2323, DL, EI, GM and PE stations were contacted at QTFs from 22-90°. He switched off at 0200. G8MFJ was in on the first phase on the 13th, his best DX being OK1MBS (HK).

G4DGU spoke to DJ9BV later and learned that Rainer had monitored EI6AS (Dublin) working F6KAW/EA6 in CZ square in the *Ar* of the 13/14th. He, DJ9BV, worked UB5s in PK and RI squares, a QRB of 1,900 kms. Chris also mentioned that G8MXE (XK08c) worked an OE on SSB in the later phase. G8RZP worked the elusive Co. Tyrone, GI6DRK/P, at 1835 on the 13th while wife Jackie, G8RZO, was out. Chris Easton, G8TFI, (Gloucs.) also worked the GI to complete all Ulster counties for 1982. In the late phase, he put out a "CQ" call and made 25 QSOs. The QTF did not seem to matter much as the signals were so strong, so 45° was adopted. Chris did not find much distortion of the speech, but the *Doppler* shift was 1.8-2.0 kHz. He worked EI2DW (WN), DD6IH (GM) and OE5OLL (GI) to illustrate all-round coverage.

Neil Clarke, G8VFF, (W. Yorks.) quotes F1CCG (CG) as best DX heard in the big *Ar*. At 0014 on the 14th, he contacted G6ABU (Notts.) who kept alternating from S9a to S5 on tropo. Walt Davidson, GW3NYY, (Swansea) reckons the July 13/14 *Ar* to have been his best ever with first phase from 1730 to 2040 and the final one 2315 to past 0300 when he "... finally collapsed into bed!" He made 78 QSOs in 48 squares in 15 countries, including F6KAW/EA6 (CZ) for the first GW/EA6 *via Ar*? Other fine DX included UQ2GLO (KQ), HG1YA, I4XCC, YU2SFU, OK2SBL (JJ), I4BXN (FE), I3LGP (GF) and OK2KZR/P (IJ). Walt subsequently learned that for 20 mins. from 0000, UA3LAW (PO26g) was copying him, the QRB being 2,336 kms! Walt's GB2XM trip to XM square started up in the middle of the intense *Ar* of Aug. 7 and he was a terrific signal at G3FPK throughout. Their best DX was UT5DL and HG8CE (KG) at 70° QTF. Fade-out was about 1715.

Your scribe spoke to Bob Nilsson, SM7FJE (GQ) on the 20m. VHF net about the 13/14th *Ar* and he said there was not too much activity from the U.S.S.R. considering the scale of the event. He worked about 20 UA3s in PO, QO and SS squares, a couple of UB5s in PK and RI, but no YOs were heard. Some HG, OE and OK stations were heard and Bob worked an F in CG. He runs 500w., to eight 9-ele. *Yagis*.

These *Auroral* events are caused by *solar* eruptions shooting out *protons* which reach the Earth in a day or two. The *NOAA-6* scientific satellite can measure the energy of these particles and figures are published in terms of Gigawatts of power. (A Gigawatt is one thousand, million watts, of course). The peak power output in this enormous magnetic storm was measured when the satellite was over the southern hemisphere at 2330-2400 on July 13. It was 773GW. To put this in meaningful perspective, that is twenty-four times the entire daily energy

consumption of the whole of the U.S.A.!

Two Metres Tropo.

This past month, the tropospheric openings have been just as spectacular as the *Auroral* ones with fine conditions, at times, in all directions. Sometimes, intense *Ar*'s have been in progress simultaneously with long distance tropo., an example being on the evening of July 13 when GM4LBE in Lerwick (ZU65f) was pounding in at G3FPK, but even so, being QRM-ed by other GMs in the *Ar*.

Ladies first. Pam Rose, G8VRJ, made the most of the lifts on July 8 through 12 and picked up LA8UU in CS, DT and CT squares. Other nice QSOs in the NE direction produced SM6CMU (FR), OZ3GW (FQ), LA9DI (FT) and GM4LBE. Jackie Brakespear, G8RZO, was working OZ6FH (ER) at 1535 on the 10th in a mixture of tropo. and *Ar*., also OZ1TR. At 1700, LA5XAA (CS) and LA1ZE (CS) were contacted. A nice one on July 19 was EI6DL (Roscommon) in VN50c. The 29th brought LA6VBA (ES) and LA9LS (DS) and infant QRM caused an early rise the next morning when SM4FVD (GU) and SM6JLZ (GS) were worked. Aug. 3 saw the last Danish square needed worked, thanks to OZ1EYE in FQ.

David Whitaker lists some choice DX heard on July 7, 8, 10, 12, 13, 19, 21, 24 and 28-30, from his Harrogate QTH. Some 60 squares were listed from WM in the west to IQ in the east, CU in the north to FH in the south-east. In just a year's listening, he has heard 22 countries and 103 squares. G3CHN, whose fine tropo. QSO with F6KAW/EA6 was squeezed in last month, reports on the fine tropo. in the July 7-9 period. He missed 4U1ITU, but did contact IW1AHH again, plus many DL, PA and HB9s. C31YQ was worked, "... ridiculously easily". However, Roger comments upon the declining operating standards compared with ten years ago.

G3PBV writes that the first lift in July started on the 6th with EA1ACD (VD) worked. The evening of the 7th found the band full of HB9s, but Dave could not get through to IW1AHH, the first Italian he has heard on tropo., or 4U1ITU. By the evening of the 8th, the lift had swung around to Germany. GB3ANG was copied for the first time ever on the 19th. LA1EKO, the *Ekofisk* station was causing a big pile-up which Dave could not crack. During this period, Y22SA (GN), Y38WA (HN), Y23BD (GM), DK5AN/OZ (EQ), DD0HR and 'HZ (FN), DF6LO (FO) and DL5BBL (EM) were worked. Just after an *Ar* on the 23rd, some LAs and SMs were worked, including SM6NET (GS68c) at 1,389 kms.

Geoff Grayer, G3NAQ, who now lives and works in Switzerland, sent a very long and interesting letter covering the early July opening in which he worked 29 G/GJ stations, most all by calling them. Most

QTH LOCATOR SQUARES TABLE

Station	23cm.	70cm.	2m.	Total
G3JXN	46	91	137	274
G3XDY	30	84	123	237
G3COJ	25	78	135	238
G8PNN	23	50	91	164
G8VRJ	16	38	101	155
G8FMK	16	57	71	144
G3PBV	15	71	142	228
G8ATK	13	68	124	205
G4NBS	13	57	89	159
GD2HDZ	12	44	90	146
G8KAX	12	48	80	140
G8ZSU	12	17	54	83
G8HHI	11	59	126	196
G4BYY	9	72	—	81
GJ8KNV	8	73	164	245
G2AXI	8	60	106	174
G4GFX	7	40	103	150
G4ERX	6	46	104	156
G3BW	5	31	191	227
G8KBQ	4	63	138	205
GW3CBY	4	15	77	96
GJ8SBT	3	—	145	148
GJ4ICD	1	99	215	315
G3VYF	—	102	292	394
G3POI	—	—	358	358
G3IMV	—	—	305	305
DK3UZ	—	—	294	294
SP2DX	—	—	280	280
EA3LL	—	23	243	266
G4IJE	—	—	265	265
G4ERG	—	16	235	251
G4IGO	—	19	229	248
G4DEZ	—	—	225	225
9HIBT	—	11	210	221
G3CHN	—	—	221	221
GW3NYY	—	42	169	211
G8VR	—	3	202	205
G4JZF	—	66	134	200
G8RZO	—	61	133	194
G8RZP	—	62	132	194
GM4COK	—	12	182	194
G3NAQ	—	58	128	186
G4MCU	—	42	142	184
G3FPK	—	—	184	184
G3KEQ	—	—	179	179
G8MFJ	—	28	150	178
GM4CXP	—	26	149	175
G4NFD	—	36	138	174
G4OAE	—	18	148	166
G8CXQ	—	32	132	164
GW4EAI	—	—	158	158
G4NQX	—	46	111	157
G4AWU	—	22	130	152
G4HFO	—	57	92	149
G4HMF	—	13	116	129
G8ULU	—	45	80	125
G6ADH	—	22	103	125
G8LFB	—	—	124	124
G3FIJ	—	29	90	119
G6ADE	—	54	64	118
G8TGM	—	—	111	111
GM4IPK	—	—	111	111
G6ECM	—	—	107	107
G8SRL	—	21	83	104
G6DDK	—	10	93	103
G4MEJ	—	—	102	102
G4GHA	—	—	99	99
G4MUT	—	38	60	98
G8KPL	—	7	91	98
G4MJC	—	12	85	97
G8JAG	—	7	81	88
G4IRX	—	—	85	85
G4KLX	—	5	74	79
G4NWT	—	22	55	77
G6ADC	—	24	53	77
GM8BDX	—	24	53	77
G8WUU	—	20	56	76
G8VVF	—	—	76	76
G8RWG	—	—	71	71
GM8OEG	—	—	69	69
G6CNX	—	—	63	63
G8XMP	—	—	62	62
G4NRG	—	9	51	60
G8XIR	—	—	60	60
G4GXL	—	4	52	56
G8LXY	—	20	34	54
G6ABB	—	—	49	49
G8XQS	—	—	47	47
G8ZYL	—	—	46	46
G4LDY	—	3	41	44
G8MBI	—	—	40	40.

Starting date January 1, 1975. No Satellite or repeater QSOs. "Band of the month" 23 cm.

were quite weak, only five being S6-7. The beam was optimised off the great circle bearing by up to 30°, since Mont Blanc seems to affect propagation. Best DX was G4DHF (ZM19f) at 866 kms. G3MOU (AL) was the first station worked at 2015 on the 7th, by 4U1ITU. A CW sked. with G3FPK at 2300 produced nothing detectable, SE being a very poor direction from ZL60j. All QSLs were sent within days via the RSGB bureau.

The foregoing has indicated the sort of conditions that prevailed in July and there just is not enough space to mention everyone's, detailed achievements. Interesting reports have been received and studied from the following readers: G2AXI, G3s BW, FIJ and VYF, G4s ARI, DEZ, ERG, FKI, JZF, GHA, IGO, MCU, MUT, NBS and NRG, G6s ADC, ADE, ADH, AJA, CNX, DDK, ECM and HDD, G8s ATK, CXQ, HHI, KAX, KBQ, LFB, MFJ, PNN, SRL, TFI, ULU and VV and GD2HDZ, GW3NYY and GW8TVX.

To pick out a few of the "better" QSOs made by some of the above, there is: G4IGO, July 19, OZ1CSI (HP); G4MCU, 21st, OZ1CSU (HP) and Y22SA (GN); G6DDK, 7/8th, 4U1ITU (DG), IW1AHH and OE2CAL (GH): G6ECM, 7/8th, DL1MAX (FI), OE5FPL (GI), F6FOB (AD), FIDQK and C31YQ (AC), 21st, Y38WA (HN); G8HHI, 21st, Y23BD (GM); G8KBQ, 20th, Y38ZA (HN), 8th, C31YQ; G8LFB, 30th, SM0IGU/4 (GU); G8MFJ, 8th, C31YQ; G8SRL, 8th, 4U1ITU; G8TFI, 22nd, Y23SB (FN) and G8ULU, 22nd, Y38WA.

Meteor Scatter

As more 2m. buffs get going on MS, a controversial view from Mike Lee, G3VYF, is that, "... MS is all but played out now, apart from expeditions". The older hands, who have now worked most all the squares they need, do not seem to get on the 20m. net now, presumably because they are not too keen to make skeds. with folk in the squares they have already worked!

Johannes Baardsen, LA6HL, has been popping up from several squares in Iceland lately. Bryn Llewellyn, G4DEZ, worked him on July 8 in SY square. Ken Willis, G8VR, (Kent) worked him from RY square. Paul Turner, G4IJE, had skeds lined up for the *Perseids* shower with stations in 12 new squares. His recent successes were: July 10 and 17, DJ5MS (GI); 10th, SM1BSA (JR); 11th, LA6HL/TF (RY); 12th, YU2ZN (IE); 18th and Aug. 2, I6WJB (HC); 22nd, HG8ET (KG); 28th, YO7VS (LE); Aug. 4, on random CW, OK3YCM and YU3TTL (HG); 5th, GM4DHF/P (XS) and 6th, SM5BEI (JU).

GW3NYY mentioned QSOs with DF6OB (FM) on July 9; OE3CEW (II) on the 12th, and YU1EV (KE) on Aug. 1. As this is being compiled, his GB3XM expedition to XM square was under way.

In the first 24 hours, they had worked 500 stations via Ar and tropo, in 59 squares and 16 countries. Walt was amazed to have to sort out a pile-up at 0200!

Seventy Centimetres

A great wad of reports this time, reflecting the superb tropo. conditions in July. Jackie, G8RZO, and OM John, G8RZP, had a go on the band in the evening of July 10 and worked LA8AE (FT); SM6HYG (FS) and LA8AK (DS). On the 22nd, DC7PV and Y23BD in GM; DD3KF (DK); DK5AI (FL) and SK6AB (FR). On the 30th, LA6CU/M (DS) was worked, the mobile using 10w. and a whip aerial. But of course, for the low power contest on Aug. 1, no such luck. Jackie's comment on this event: "Whoever thought this up should be shot at dawn with a 70cms. Yagi!"

Pam Rose, G8VRJ, got ON and OZ for two all-time new countries in the July 8-12 lift. She lists: DF9CY (EL); OZ1DL (EP); OZ2KO/A (ER) and DF5LQ (EO). Syd Harden, G2AXI, (Hants) added another three 1982 countries: HB and ON on July 7 and LA on the 24th. G3PBV says that HB9AMH/P at the HB9HB beacon site, was a phenomenal signal in Newton Abbot on July 7, when HB9MTY (DG) was also worked. A QSO with DF7VX (EL) happened on the 8th, while on the 21st, OZ1EKI (EP); DL3UZ (FN); DF5LQ (EO); DF1OH (EM) and DB6BX (DM) were contacted.

Roger Dixon, G4BYY, (Worcs.) uses 50w. and a 16-ele. Yagi. July 7/8 brought DL, F and HB9 QSOs, and a couple of OZs were worked on the 12th. Another OZ and 6 DLs were contacted on the 21st. The 24th brought SM6HYG and SM6GWA, both in FS, and the 28/29th, SK6AB and SM6CMU (FR); SM6CKU and SM6DHD (GR); OZ3GW (FQ) and LA8AK. On the 30th, from 0630 to 0800, SK4UHF (HT55j) was S3 at 1,340 kms. but sadly no stations heard. Roger worked many other stations in these periods. In the Aug. 1 contest, he reports that G4MHC, using 15w. to a pair of 21-ele. *Tonna* aerials, fed with *Helix* and with a DJ7VY masthead preamp., worked 73 stations, best DX being DF4KT at 667 kms. G4MHC is the Malvern Hills R.A.C. call operated by Roger and G4GFX.

Graham Taylor, G4JZF, (Staffs.) aptly describes conditions as "fantastic" since the period brought him 18 new squares and five new countries, viz: GI, HB9, ON, SM and Y. He found the contest "quite lively" but could not participate fully, making 51 QSOs. Jon Stow, G4MCU, (Essex) lists HB9s, F and DL on the 7th, OZs and GM4OBD/P (YR) on the 12th, OZ2OE (EP) on the 21st, SM6GWA on the 28th. and SM6MLY (FR) on the 29th but who insisted on giving a measly RS40 report! Terry Hackwill, G4MUT, (Berks.) got HB9MTY/P on July 8.

Tony Collett, G4NBS, (Berks.) did not operate from home till Aug. 1 this year. He



"... your signal is quite punchy. ..."

used the *Trio* TS-780 and was very impressed with its performance. His comments on the contest: "It was a very nice contest with weak signals abounding to test the operators, and no wide signals to muck up the DX! Conditions weren't good, but activity wasn't bad". Tony made 61 QSOs in 24 counties and four countries, best DX being DJ9DL at 534 kms. Roger Greengrass, G4NRG, (Essex) worked F1DMG/PHB9 (DG); HB9AMH/P (DH) and F5ID (BK) on July 7 with 10w. and a 19-ele. *Tonna*.

Adrian Chamberlain, G6ADC, (Coventry) has added a *muTek* preamp. now. As 2m. was so busy, he concentrated on 70cm. adding nine new squares, plus DL, HB9 and PA. New countries in July for Cliff Jeffery, G6ADE, (S. Yorks.) were HB9AMH/P on the 7th., E12DW on the 14th and GD4KMI/P on the 4th. 16 more squares were added. Welcome to John King, G6ADH, (Surrey) a new correspondent, but who has been a reader since issue no. 1, pre-WW2. His 70cm. station now consists of a *Trio* TR-9500, *Microwave Modules* MML432/100 amplifier and 88-ele. *Multibeam* at 16m. John enters our table with 22 squares on the band.

Graham Owen, G6DDK, (Ipswich) is interested on ATV and says there are four stations QRV in the city with several others awaiting their Tx's. He uses a *Fortop* Tx and 48-ele. *Multibeam* at 16m. Mike Harsey, G8ATK, (Surrey) lists OZs and an LA worked on July 12, in rather selective conditions. On the 21st, he got 10 DLs in EO, FM, FN, GM and DL, plus OZ7IS in GP. G8CXQ was rather disappointed with his results, due to suspected high feeder losses. Nevertheless, Martyn managed HB9AMH/P on the 7th, and SK6AB and SM6DHD on the 29th.

July 8 brought a lot of nice DL, F, HB9, ON and PA DX to G8HHI, and in the

Scandinavian lift on the 12th, John hooked OZ1DLD (EP). On the 21st, DF5LQ (EO) and ten minutes later, DK1KR (FN) were worked to bring the squares tally to 62. John Lemay, G8KAX, (Essex) added GW6AHX/P (XL) on the 19th, along with EI9Q (WM) the latter now having 400w. on the band. On the 22nd, DK5AI (FL) was worked. John makes a plea that stations move off 432.200 MHz after establishing contact, so that others calling "CQ" will have a chance to make a QSO.

John Moxham, G8KBQ, (Somerset) has added 12 more squares and HB9. He also got EA1ZK (VD58b) on July 6. Gordon Emmerson, G8PNN, (Northumberland) is up to 50 squares now and on July 18, worked his first GI, but still no EIs heard. Welcome to Michael Wright, G8SRL, (Surrey) who passed the *R.A.E.* back in 1959, but then lost interest for twenty years. He is QRV on the band with a *FDK* Multi 750E and 430 *Expander*, 15w. to a 19-ele. beam. The 7/8th July lift brought HB9AMH/P, F1DMG/P/HB9 and F1CCC/P (CG). The 21st, brought DL contacts into EM, EO and FN squares, plus OZ7IS (GP). The morning of the 22nd, brought Y23BD (GM).

Chris Easton, G8TFI, made 50 QSOs in the period July 7-9 in the evenings. The 12th brought a couple of OZs, a very difficult direction for him. On the 19th, a couple of EIs were worked and on July 21, 30 QSOs were completed with OZs and DLs, including DC7PV in West Berlin at 1,040 kms. More Scandinavians were worked on the 28th. Chris was QRV from South Wales in the contest, using 8w. RF to four 16-ele. *H.A.G. Yagis* stacked four-in-line. 110 stations were worked for about 900 pts.

Pete Godfrey, G8ULU, (Kent) is yet another new correspondent and has been

on 70cm. since the beginning of the year with an *Icom* IC-202S, *MM* transverter, 50w. amplifier and 21-ele. *Tonna*. He seems to have worked most of the choice stuff listed by previous reporters. He enters our squares list. G4DGU welcomes skeds. any time with "reasonable stations up to 1,000 kms". He can be dialled up on 0409 24543. On July 22, Chris worked DK5AI at 1,040 kms., plus lots of Germans over 800 kms. QRB. He mentions that GU2FRO (Sark) is a "regular" on the band now. GW3NYY lists EI5DD/P (VN) on July 3 and DL, HB9 and ON on the 8th.

On the *E-M-E* scene, G4DGU has received his own echoes using four 16-ele. *H.A.G.'s*.

Twenty-three Centimetres

Brian Bower, G3COJ, (Bucks.) worked DF9LN (FO61a) on July 15 with a very temporary lash-up, for a new square. John Tindle, G3JXN, (London) added SM6HYG and SK6AB. G3PBV managed HB9AMH/P on the 7th. Not bad for 3w.! G8ATK, using a mere 1w. output, nevertheless raised DB4LT (EO); DD2EK (DL); DJ8XO (FN) and DF3XU (FN) on July 21/22. G8HHI has a 100w. cavity amplifier on the stocks. G8PNN is disappointed at the lack of activity generally, particularly when he hears the beacons well up. Gordon's list shows SM6ESG (GR) on July 13 and OZ1HDA (ER) on the 30th, though. G8VRJ has only 1.3w on the band but has worked some DLs and her first ON recently. Using an aerial on a chair on a flat roof 15ft. *a.g.l.*, Andy Renouf, GJ8SBT, worked HB9AMH/P on July 7, getting S3. Russ Clarke, GW3CCF, (Clwyd) got his 1½w. to some PAs on July 29, so is quite pleased. GW8TVX has got his HB9 QSL already and has completed an MS-style QSO with G4KGC, helped by aircraft scatter. Richard has 1w. out to four 23-ele. *Tonna Yagis*.

Final Miscellany

Welcome to new contributors Gary Underwood, G4MEJ, Olney, Bucks., and John Goodwin, G6CNX, Sheffield. Still time to book for the Midlands VHF Convention on Oct. 9 at the Wolverhampton Polytechnic. Full details from Peter Burden, G3UBX, 28 Coalway Road, Wolverhampton, WV3 7LX. The death of Basil Quentin, G6OX, a very keen CW DX-er on 2m., on July 22 has been reported.

Deadlines

A most rewarding month. All your reports, particularly in the *Perseids* shower, for the October feature by the very earliest date of **Sept. 1**, and for the following month by **Oct. 6** to: "VHF Bands", *SHORT WAVE MAGAZINE*, 34 High Street, WELWYN, Herts., AL6 9EQ. *73 de G3FPK*.

AN EXTERNAL VFO FOR THE YAESU FT-707

ANOTHER USEFUL ADDITION TO THIS POPULAR TRANSCEIVER

IAN KEYSER, G3ROO

HAVING built and cased the 160m. transverter for the FT-707 (*Short Wave Magazine*, June 1982), work was commenced on the external VFO. Within a few minutes of starting the final drawings it was realised that, in a way, the 'metal bashing' for the transverter had been somewhat in vain, because the two units combined in one cabinet would make a much neater system; also, switching could be included to control other converters or transverters. The final switching system enables the VFO to be switched to all the usual functions: Internal VFO, External VFO, Transmit Internal/Receive External, and Transmit External/Receive Internal. The transverter switch enables four external transverters, or three external transverters and an external QRP PA, to be controlled. The QRP PA is required for contest and QRP/QRP QSO's, as reducing the power of a QRO rig is not acceptable under the rules.

by moisture absorbed by the paxolin. This has not been fully explored, but it seems a logical explanation (my junk box is in the attic, and therefore damp . . . correction, my junk box is the attic!)

Temperature compensation is achieved by adding NTC capacitors across TC1, see Fig. 1. As capacitors are added, TC1 is reduced in value until the frequency is corrected. Start with few picofarads and increase slowly until long term thermal drift is cancelled; this can take many hours of fiddling, but careful use of a hair dryer can be of great assistance. Heat the outside of the box and draw a graph of the shift against time, change capacitor and

Table of Values
Fig. 1

R1 = 100K, 1/4 W	C6 = 1 μF (C 280)
R2, R3 = 47K, 1/4 W	TC1 = 30 pF airspaced trimmer
R4 = 22K, 1/4 W	VC1 = 25 pF airspaced tuning capacitor
R5 = 1K8, 1/4 W	TR1, TR2, TR3 = BC108 or similar
R6 = 120K, 1/4 W	L1 = 30 turns 28 s.w.g. on 1/2" dia. former with slug
RV1 = 1K, min. vert. preset	RFC1 = 1 mH.
C1, C2 = 2000 pF poly	
C3, C4, C5 = 0.01 μF ceramic	

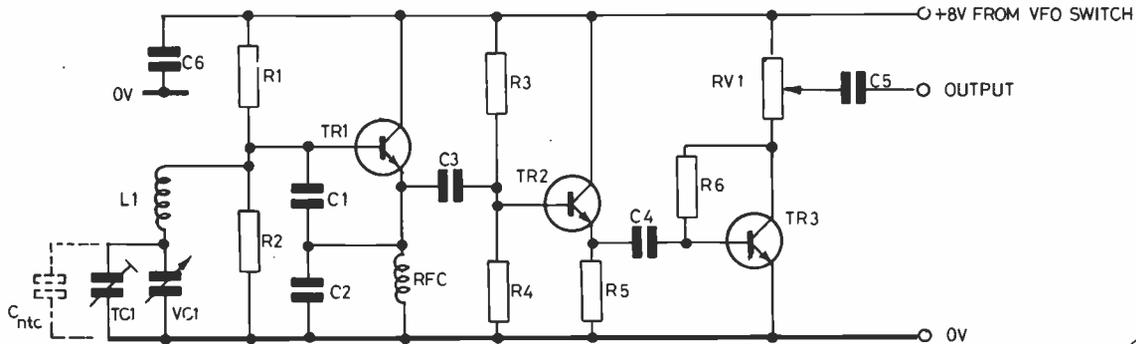


Fig. 1 VFO CIRCUIT

D 905

The VFO

This unit has to run between 5 and 5.5 MHz, be mechanically stable and thermally compensated. A Clapp VFO, TR1, was decided upon (for no particular reason!), this buffered by TR2, an emitter follower, and amplified by TR3. The output level is adjustable by the preset in the collector of TR3; more than sufficient output to drive the FT-707 is obtained. The coil was wound on a ceramic former, complete with slug, that was found in the junk box. Any modern plastic former could be used, but experience has shown that paxolin formers should not be used in VFO's — it seems that the long term stability could be degraded

try again, but make sure that sufficient time is allowed for soldering heat to dissipate — at least fifteen minutes is required.. For each test apply heat for the same duration, in the same direction, and at the same distance, otherwise false readings will complicate the tests.

Power Supply

Although Tx + 8v. was available from the FT-707, there is no similar switched supply on receive. This is required in the VFO switched mode for split frequency working, and for the +8v. on receive a UA723 regulator is used. Having played with this device in the past, it had been noted that if the frequency compensation pin (pin 9) was earthed the output voltage reduced to zero. No internal circuit of the device was available at the time, so a circuit was built and the compensation pin earthed with a link. The supply current was measured at 2 mA, so it was left for an hour to ensure that no damage would occur; the test proved satisfactory. In the final design the Tx + 8v. supply from the FT-707 is used to turn on a transistor (see Fig. 4); this reduces the voltage on pin 9 sufficiently to reduce the output of the regulator to zero.

Switching the VFO

The switching is very straightforward and is carried out by S1, a 3-pole 4-way switch, two poles only being used. The 120 ohm resistor from the output of the VFO to its own power input is to supply the bias to turn on the Ext. VFO diode gate in the FT-707 (D45, RF unit circuit), and to light the 'Ext' LED on the front panel.

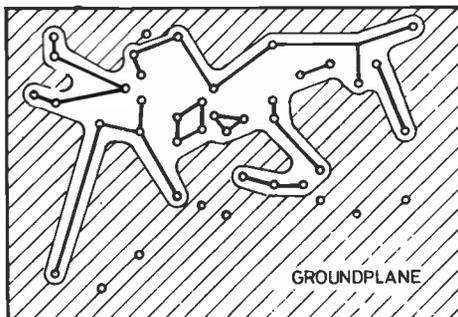


Fig. 2 VFO PCB. Double sided board. Top side used as earth groundplane, shorted to lower groundplane at various points

D 906

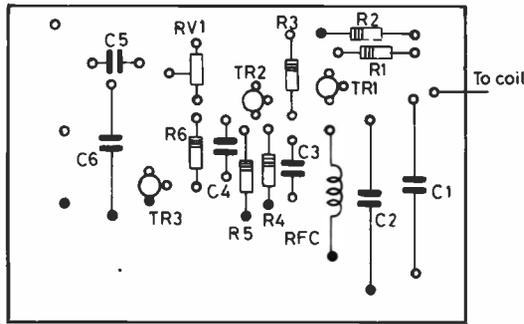


Fig. 3 VFO COMPONENT OVERLAY

D 907

Transverter

This is a little more complex, but still fairly straightforward. S2, a 5-pole 6-way switch is used. All DC switching is carried out with normal 'hook up' wire, and low level RF signals with miniature audio screened cable; with the mass of wires around this switch the fineness and flexibility of this cable is an asset, and as the runs are so short the losses can be ignored. In the case of the FT-707 aerial switching, the wire used was high quality co-ax 3mm. in diameter, and this has proved satisfactory. The prototype employed a standard R.S. 'Make-a-switch', and although this has not caused any problems it is strongly recommended that a wafer with a higher working voltage is used for the high power RF switching; failing that, use a separate wafer on the rear of the assembly to facilitate easy changing in the case of a 'burnout'.

Mainframe

Layout is not critical, and there is plenty of room in the 'standard' G3ROO box (6 in. x 4 in. front panel, by 9 in. deep) to enable variations to suit other components used. The back-drop of the case is fairly cluttered, and to enable all sockets to be accommodated standard Belling-Lee co-ax sockets are used (these are used all the time at G3ROO on the grounds of cost). Signals and supplies to the external transverters are all routed by 5-pin DIN sockets, these allow close packing and are very durable in use.

Table of Values
Fig. 4

- R1 = 2R2, 1/4 W
- R2 = 200R, 1/4 W
- R3 = 8K2, 1/4 W
- R4 = 33K, 1/4 W
- RV1 = 2K2 min. horiz. preset
- C1 = 560 pF, ceramic or poly
- C2 = 0.01 μF (C280 or ceramic)
- TR1 = BC108 or similar
- IC1 = UA723 HC

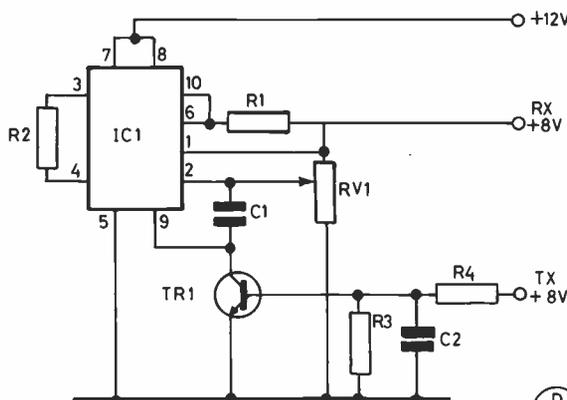


Fig. 4 PSU FOR EXTERNAL VFO

D 908

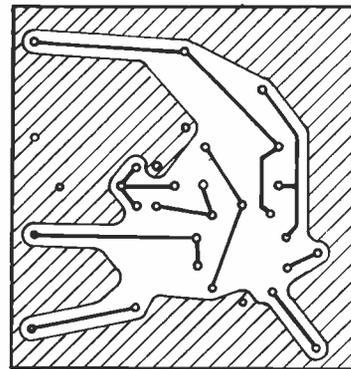


Fig. 5 PSU PCB

D 909

The mainframe circuit diagram is in two sections, the external VFO and the transverter switching. This increases clarity, and makes it simple for the constructor who is interested only in the VFO section.

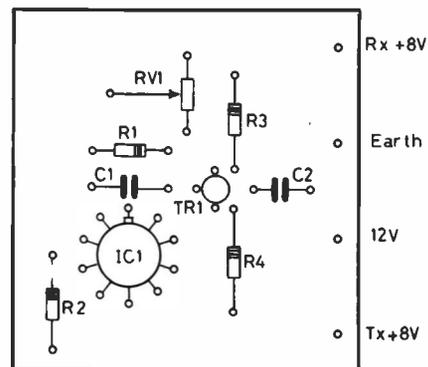


Fig. 6 VFO PSU COMPONENT OVERLAY

D 910

Conclusion

In the prototype an integral 6:1 drive in the tuning capacitor is used; this is sufficient for frequency setting, but too fast for tuning the band. For this purpose a much greater reduction in

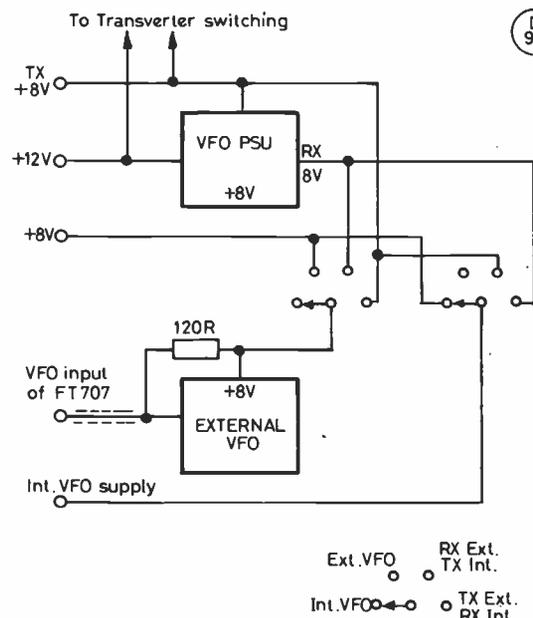


Fig. 7 MAINFRAME WIRING - VFO SECTION

D 911

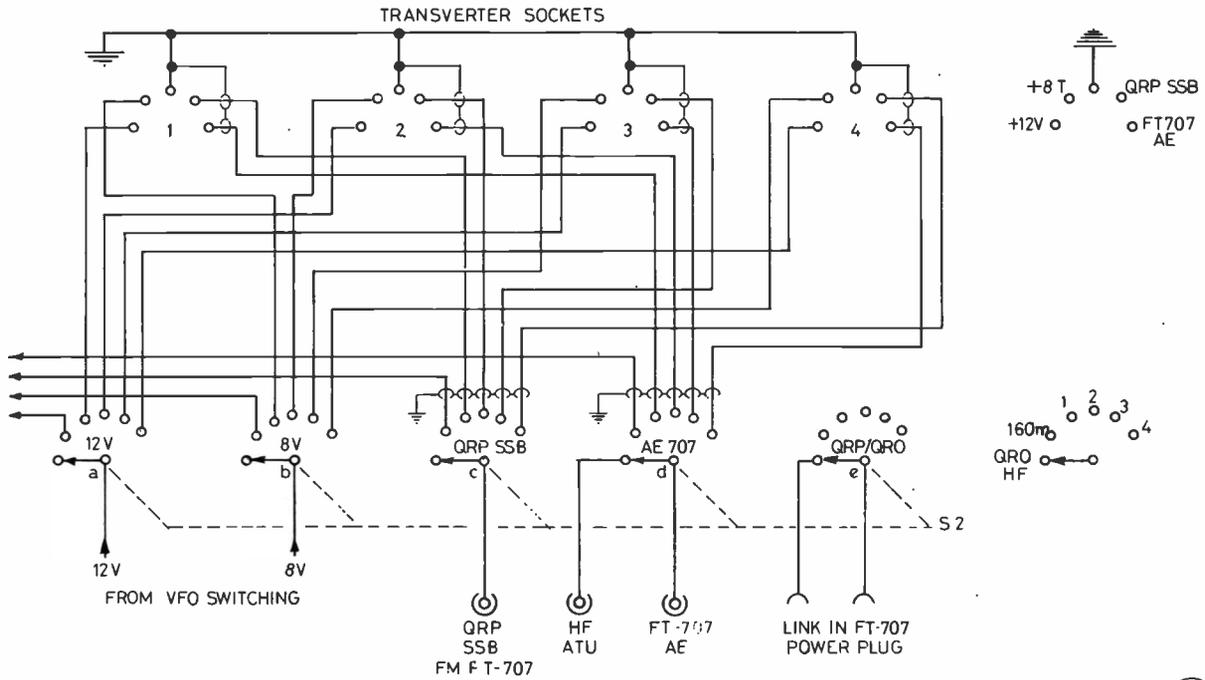


Fig. 8 MAINFRAME WIRING FOR TRANSVERTER SWITCHING

D 912

tuning rate is really required. Experiments were carried out with an epicyclic drive in tandem with the slow drive in the tuning

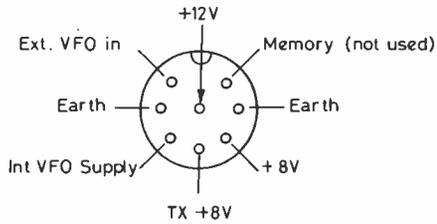


Fig. 9 REAR VIEW OF EXT. VFO PLUG

D 913

capacitor, but 'slip' made a dial very inaccurate. A digital dial was considered, but as the VFO tunes 'backwards' the problems in the

design detracted from the desirability of the idea!

The unit has been in use for three months or so, and has proved to be a very valuable asset to the station. Not only can split working be done with ease, but other frequencies can be monitored while in QSO without missing too much!

Metalwork for this and other G3ROO projects can be obtained from *H. L. Smiths*, 287-289 Edgware Road, London W.2. It is also worth noting this address for other projects as the standard of workmanship is high, but the price reasonable. All that is required is a neat, clear, drawing of what is required, with all the dimensions, and *H. L. Smiths* will do the rest.

Correction: the value for C17, C19, was omitted from the Table of Values in G3ROO's transverter article in the June issue (p. 201), and should be 1250 pF silver mica — *Ed.*

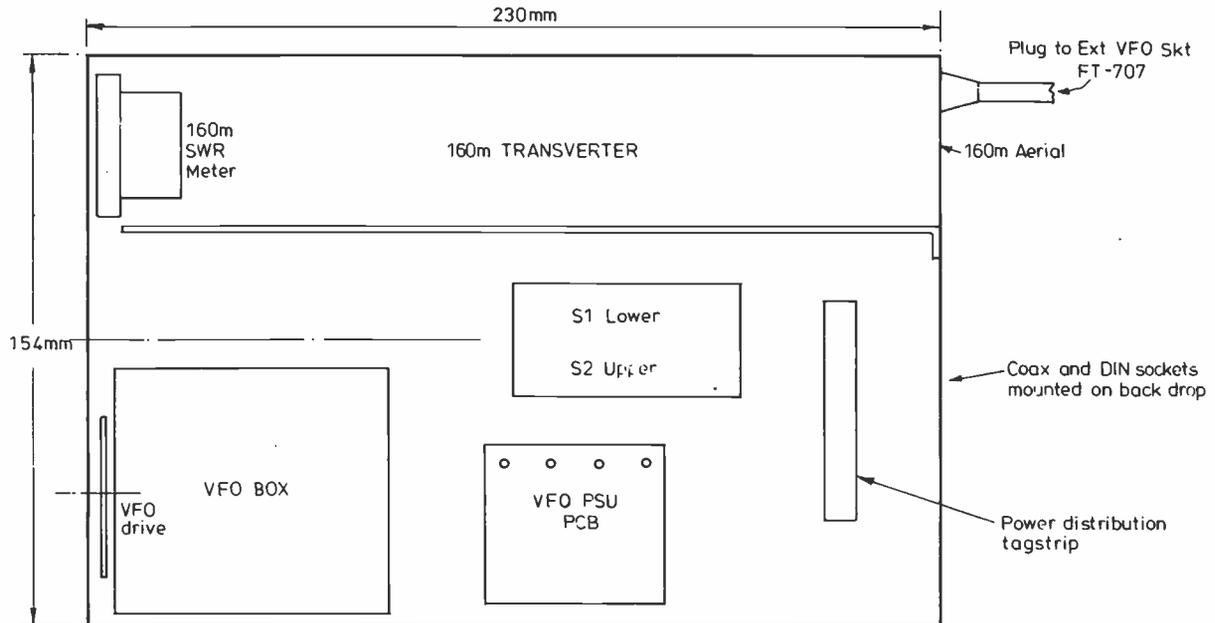


Fig. 10 CHASSIS LAYOUT

D 914

• • • SWL • • •

SHORT WAVE LISTENER FEATURE

By Justin Cooper

C. M. Lindars (Wallington) starts us off with the Big Question this time — spurious responses in receivers. We touched on the edge of this last time, but seem to have 'touched a sore spot'. Forget for a moment a receiver with an aerial, just imagine a simple superhet receiver with IF of, say, 450 kHz, and a BFO which can be tuned between 447 and 453 kHz. Now consider how we can 'mix' two signals such that the output comprises not only the originals but the sum and difference products of the originals and harmonics . . . this will occur at any time when the signals are fed through a network which in any electrical manner behaves in a non-linear manner. (This means that the man who talks about 'linear mixing' in an SSB transmitter — and knows what he means — is using very loose terminology). Now, our non-linear element in the simplest case is a diode, so clearly detection in the old-fashioned manner as well as the modern way is still a question of this process of mixing — even though we use it, as it were, for 'un-mixing'.

Now let's look at the frequencies we may have kicking around inside. For any given signal frequency setting, there will be the mixer local oscillator, which will be at a frequency 450 kHz higher than the signal frequency setting, and we will have a BFO which for the sake of argument we will say is sitting on 451 kHz. The BFO harmonics will appear for certain at 902, 1353, 1804 kHz, with the one at 2255 kHz being pretty weak, and higher harmonics in a good design all but inaudible. Just imagine we try to set the receiver at a frequency of 1803 kHz; we now have a 1 kHz beat note from the incoming signal, and the fourth harmonic of the BFO just as soon as we hang on the aerial, plus a direct audio beat of 2 kHz between the BFO fifth harmonic and the local oscillator fundamental — and we haven't started to do any real sums yet, nor even tried to tune the damn thing! However these whistles will be *tunable* with the main tuning dial and/or the BFO tuning dial; and usually, with the sort of simple superhet we are talking about, they will be evident to the educated ear because they tune at a different 'rate' to a normal response.

A special case of a tunable spurious response, still of this general type, is the so-called 'image' of second channel frequency. Imagine your receiver as above is tuned to 14.000 MHz, so its local oscillator will be at 14.450 MHz. Now imagine a signal on 14.900 MHz and man enough to reach the mixer input alongside the wanted one. Now, $14 + 14.45 = 450$ kHz, as we want, but $14.9 - 14.45 = 450$ kHz also, and this one we *don't* want. But, we are stuck with it, because the process of mixing will have inextricably combined it with the wanted signal. The only way to keep this menace down is to make the image frequency as far away from the signal frequency as possible, and to use ahead of the receiver such things as ATUs and selective aerials. The old-fashioned solution was, in the HRO, AR88, and other such good receivers of their day, to use two RF stages in front of an IF of around 455 kHz to give a good image rejection at medium wave and a barely fair one at 30 MHz. The alternative was a higher first IF, followed by a second conversion down to a low IF; this meant an extra oscillator, and in the case of the general-coverage receiver the number of extra beats which could be found by just tuning the bands without an aerial connected would have made such a double-conversion design a doubtful seller — although the writer recalls the Eddystone 750 as a good one. For amateur bands only, double-conversion has much to commend it as KW, Collins, and umpteen others soon showed, since with some care they could arrange the design such that the really nasty beats occurred at frequencies outside the receiver's normal coverage.

Then along came frequency synthesis; and now you have so many beats that they all combine together to yield a *noise* which is audible across the band and which makes a receiver that much less

sensitive 'on paper'. But, of course, one must be wary, as below 30 MHz the usable sensitivity of the receiver is, in any normal site and band condition, limited by the extraneous *noise* reaching the aerial, whether man-made, static, or of extra-terrestrial origin.

But — what about the signal which is just *there*, and *can't* be tuned out? First of all, the reason it can't be tuned is that either it is reaching the detector and being demodulated there, or it is reaching the audio and the detection process is either being achieved by one junction of a transistor in the audio, or by rectification in the mains supplies, or by a 'dry' joint. Take out all the receiver inputs and accessories, switch on and gradually add the various bits back until you find which accessory brings on the trouble. If none, keep going and you will end up by putting on the aerial and getting the problem right back again. Does the preselector tune? If you reduce the RF Gain does the unwanted signal drop out suddenly as compared with the others? If it does, you have been inflicting too much signal input on your poor receiver, and you should learn to drive your rig in accordance with the philosophy that you want (and hope you have!) an aerial which can give you far more signal than your receiver can handle, but that you accept that you have a receiver incapable of coping with such big signals and needing to be 'nursed' to get the best from it.

And, at this point in time, turn a thought or two to the aerial, and the earth. There is a phenomenon called 'electrolytic corrosion of dissimilar metals'; and for amateur sailors and amateur radio types it is a curse! Apart from the offending piece just rotting away, it is very good and capable of becoming a noise generator in its own right, and taking it into its head to act as a diode (see mixer, above . . . twig?). J. C. has some ground rules for this: firstly, never a soldered joint in the aerial or earth system beyond the ATU that isn't completely covered with some waterproof sealant goo, such as RTV or black bitumastic. Secondly, it must be attached to an earth spike or similar, by way of solder-tags and nuts and bolts. Again cover each one individually and carefully — you should be thinking when all is done that in seven years the lot should be *perfect!* Then, and especially if your house is past the first flush of youth, you could give your household wiring a complete overhaul and clear out a lot of problems of safety in the process. Next to the prime offenders, which are the TV and VHF aerials, and set them to rights or replace; and while you are up there, volunteer to do the other chap's aerial — it will probably help a bit more, too!

If all that fails, list all your tests and what results they achieved and get the receiver checked and aligned properly, and don't begrudge the cost. Probably all will be found to be well, and then you can continue the exercise — but we think that after you have come down to the 'cleanest' site you can get, the rest will turn out to be a matter of driving the receiver so as to avoid receiver overload and yet get the best performance from it.

The Mail

We got a bit windy there, didn't we — sorry, folks! However, it is nice to try and cover a subject in a bit more depth once in a while.

E. W. Robinson (Bury St. Edmunds) mentions the EJ8DO station operating from Saints Island in Lochree in the River Shannon, and also TYA11 who does seem to have been much more active than for a time past from Benin, calling for QSLs to W2TK; operator Karl is the one in question here.

P. D. Hunt (Woolwich) says he has been suffering from too much work, both of the domestic and of the salaried variety, which has somewhat limited his activities.

A. Pyne (Bradford) has returned to SWL-ing after a lapse of several years and a short foray into CB — which projected him back in our direction! Alex has started again from scratch with a new list, and memory says his handwriting is just like before(!) — but we hope it is just the strain of preparing for the RAE studies.

By the time this comes to be written, J. Dunnett (Prestatyn) will have started work at Bletchley Park, and so will be running a /A station there but without the RTTY facility and its noise. On a different tack, Jim was on the 70cm band NFD logging seat for a while and wonders just how many points their masthead pre-amp lost them which was giving something like an S7 noise level and very definitely degrading the dynamic range of the receiver. The problem is that a receiver may be, by good and valid instrument measurements, 'deaf' as compared with another one. What is not taken into account is whether the 'deaf' receiver has in fact adequate sensitivity for the NFD aerials-and-noise environment and whether the loss of dynamic range might not be more important by far in the hill-top conditions of a /P NFD site. The answer, of course, may be totally different if one is looking up into the sky and searching for E-M-E contacts!

Our next is a new chum, namely A. Pilkington (Chesterfield) who has an R-820 connected to an HF5V vertical, plus a Datong two-metre converter which is fed either from a vertical for FM or an eight-element Jaybeam to listen to the SSB. David put in a nice starter list which was notably easy for checking.

HPX RULES

- (1) The object is to hear and log as many *prefixes* as possible; a prefix can only count once for any list, whatever band it is heard on.
- (2) The /M and /MM suffixes create a new series: thus G3SWM, G3SWM/M and G3SWM/MM all count as prefixes, and where it is known to be legal, /AM also.
- (3) Where a suffix determines a *location* the suffix shall be the deciding factor, thus W1ZZZ/W4 counts as W4. Where the suffix has no number attached, e.g. VE1AED/P/SU, VE3UJ/P/SU, they are arbitrarily counted as SU1 and SU2 respectfully, and the same holds good for similar callsigns.
- (4) When the prefix is changed both the old and the new may be counted; thus VQ4 and 5Z4 both count.
- (5) The object is to hear *prefixes* not countries, thus there is no discrimination between say MP4B and MP4K which count as one prefix.
- (6) Only calls issued for Amateur Radio operation may be included. Undercover and pirate callsigns will not be credited, nor any MARS stations be claimed.
- (7) G2, G3, G4, etc., all count separately, as do GW2, GW3, GW4, etc., and in the same way K2, W2, WA2, all count separately even though they may be in the same street.
- (8) Send your HPX list, in alphabetical and numerical order showing the total claimed score. With subsequent lists, it is sufficient to quote the last claimed score, the new list of prefixes, and the new total. Give your name and address on each sheet, and send to "SWL", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ, if possible to arrive before the SWL deadline for that particular month.
- (9) Failure to report for two consecutive listings, i.e. four months, will result in deletion from the Table, although there is no objection to a "Nil" report to hold your place.
- (10) Starting score 200. Phone Table is mixed AM/SSB, with a separate CW Table. No mixed Phone/CW Table, nor will AM-only or SSB-only entries be accepted.
- (11) Lists will be based on those shown in the current "Radio Amateur Prefix-Country-Zone List", published by Goeff. Watts (see Advertiser's Index in any issue of SHORT WAVE MAGAZINE).



S.E.M. announce the availability of the 'Visa', their new receiver for the amateur. Priced at £39.00, it is intended as a receiver for the beginner or as an additional shack Rx. Measuring only 2½ x 6 x 3 inches, coverage is 3.5 to 3.8 MHz (80 metres in three 100 kHz bands), audio output 2 watts, selectivity ±2 kHz, and sensitivity 1 μV. Full specifications are obtainable from S.E.M., Union Mills, Isle of Man.

It's been a pretty lean period since his last letter, says H. M. Graham (Chesham), with not a lot heard on Ten since May, Fifteen giving the best results, and only short-skip, JY and the odd East Coast W on Twenty, and nothing to report at all on the HF Bands. On the receiver front, the Drake SSR-1 has gone in favour of an FRG-7700 plus FRT-7700, with which Maurice is very pleased except that, as he puts it, the S-meter is "very Scotch!" However, the old FR-50B still gives yeoman service after ten years of steady usage.

N. E. Jennings (Rye) has come out of the bandage works after a second eye lens implant, and so he is hoping in a couple of months to once again have two eyes to use. On a different front Norman has been having a lot of fun with his CW Telereader, which reads out on a TV screen, and is a good silent way of taking RTTY, for which a starting list is hoped fairly soon. Another interesting session was on the land-line having a chat with P. Lincoln of Aldershot, who would appreciate any calls or contacts in the vicinity as he is housebound — he is on Aldershot 317870 if you can spare time for a call while in the area.

Our very next letter is the one from P. Lincoln himself, and it does seem as though the call from Norman Jennings chuffed him a lot. Peter says he can be reached on the Aldershot number most times of the day, so if anyone is after information from the current *Call Book*, they can ring him there and he will do his best to help. On the RTTY front, there has been copy from South America and ZS, but not so much joy out to the East, where HA seems to have been about the limit. The business of logging RTTY is a bit frustrating, say Peter, because once it has been garbled there isn't any way of regaining copy — at least with SSB a tape-recording can be replayed several times until one has extracted the necessary.

Another new one is I. Blair (Swansea) who is 14 years old and has been SWL-ing for some six months. He has a TS-520 without a mike, a Realistic DX-100 for Top Band, and a KDK-2025 for VHF. On the aerial front the 'farm' comprises a 60-metre wire for Top Band, a forty-metre wire for 80 and 40, an HF5V for the HF bands and, coming shortly, a Slim-Jim for 144 MHz. Ian wants to know if anyone has the circuit of a SS/TV monitor; we suggest the three part article by John Brown, G3LPB, which we ran in the March, August and November 1979 issues (copies can be obtained from the office at Welwyn), and we know G3LPB as the sort of chap who one can talk to if one gets a bit stuck — which is easy when one is penetrating a new field.

Funnily enough, in the very next letter, from T. Kirby (Cheltenham), we hear that Tim spent his holiday in Falmouth, and we wonder whether he ran across G3LPB, maybe without knowing it! Tim says his Morse is coming along still — slow but steady is the motto!

Yet another to head down to the West Country was B. F. Hughes (Worcester) who clearly needed some thinking time — he has the possibility of a move of house to a place where the front garden is 70 feet long, the back 98 feet, with a width of around 18

feet and a much higher location — a mind-boggling thought when one starts to consider the aerial possibilities, especially as it does rather look to be approximately N-S.

The CW list from *A. F. Roberts (Kidderminster)* is over the 1000 mark now, without any great deal of time having been available for the receiver. The more the merrier!

And, talking about the more the merrier, we have two letters from *Barry Ward (Nottingham)*. In the first one, Barry wonders whether the all-time CW HPX record was that of Noel Phelps of Devizes (now G4HJA) at 1410 back in 1978, because he intends to beat it himself. Good thinking, and Noel will doubtless be pleased to see someone else at The Top. On a different tack, Barry was very pleased to receive from his wife a Datong FL1, and while it takes some driving to get the best out of it, there can be no doubt that the improvement obtained from the combination of FL1 and FRG-7 is quite spectacular. Another improvement is that there is now a little corner in the dining-room "all to myself and rig" with only the proviso that it mustn't be out of keeping with the rest of the décor — so some woodwork and care has been lavished on that corner. Surprising how one's hobby becomes more tolerable as you rise up the HPX Ladder! Another tack for Barry is kite-borne aerials — a subject on which he should be corresponding with G3MWF who is also very much addicted to them.

J. Goodrick (Newport, I.o.W.) was just in the throws of moving QTH at the time of his letter, so things have been pretty quiet there, radio-wise, but a few more are added to the lists.

R. Wooden (Staines) reckons he heard EI7CC/J on June 20 for some fifteen minutes, but didn't manage to get the significance of the suffix /J — anyone any ideas?

Congratulations are due to *D. Casson (Earley)* who is awaiting his G4 callsign, having passed the Morse test — he says largely due

HPX LADDER (All Time Post War)

SWL	PREFIXES		
<i>PHONE ONLY</i>			
B. F. Hughes (Worcester)	2547	N. E. Jennings (Rye)	919
S. Foster (Lincoln)	2262	Mrs. J. Charles (Colchester)	760
Mrs. R. Smith (Nuneaton)	2162	B. L. Henderson (Salisbury)	708
E. W. Robinson		J. Dunnett (Prestatyn)	703
(Bury St. Edmunds)	2080	K. Cooke (Cardiff)	654
J. Worthing (Shrewsbury)	1668	J. Hayes (London N9)	628
H. M. Graham (Chesham)	1491	R. Everitt (Bluntisham)	620
G. W. Raven (London SE3)	1426	P. Lincoln (Aldershot)	573
M. Rodgers (Harwood)	1367	<i>CW ONLY</i>	
M. Toms (Barkingside)	1360	E. B. Ward (Ruddington)	1202
M. Law (Chesterfield)	1242	J. Goodrick (I.o.W.)	1126
N. Askew (Coventry)	1226	J. M. Dunnett (Prestatyn)	1049
J. Singleton (Skelmersdale)	1127	A. F. Roberts	
D. C. Casson (Reading)	1089	(Kidderminster)	1007
J. Doughty (Bloxwich)	1069	P. L. Shakespeare (Foulness)	624
D. J. S. Williams		N. I. Neame (Lancing)	508
(Wednesbury)	1024	D. J. S. Williams (Romsey)	262
B. A. Payne (Leeds 18)	970	<i>RTTY ONLY</i>	
Mrs. T. Parry (Blackpool)	968	J. M. Dunnett (Prestatyn)	264
L. Stockwell (Grays)	952	P. Lincoln (Aldershot)	245

Minimum score for an entry: 200 for CW or RTTY, 500 for Phone. Listings to include only recent claims and be in accordance with HPX Rules, p. 367.

ANNUAL HPX LADDER Starting date, January 1, 1982

SWL	PREFIXES		
A. Pyne (Bradford)	457	A. Pilkington (Chesterfield)	284
D. McKinney (Portadown)	392	C. N. Woods (London W3)	267
R. Wooden (Staines)	385	I. Blair (Swansea)	263
A. J. Hall (Alvaston)	369	Mrs. C. Law (Chesterfield)	247
T. Kirby (Cheltenham)	358	P. D. Hunt (Woolwich)	233

200 Prefixes to have been heard since January 1, 1982, for an entry to be made, in acceptance with HPX Rules, p. 367. At score 500, transfer to the All-Time listings is automatic.

to the efforts of Harold, G2HLU, in keeping the nose to the grindstone and pushing him out good readable Morse for practice; so this one will be his last entry to HPX — let's hope he joins G2HLU with reports to CDXN at regular intervals.

J. Williams (Romsey) sealed his envelope first and noted his HPX claim was *not* in the envelope just after; we suspect this is due to his confusion over the weird and wonderful collection of prefixes and suffixes the Spanish stations have been using of late — the World Cup football seems to have been the prime reason for the prefixes; but the suffixes . . .!

Once in a while we get a letter without a signature, which causes a bit of head-scratching — this one turned out, after a bit of researching into the typewriter style, to be *M. Toms (Barkingside)*. The new receiver seems to be working well, with VK6HD heard on Top Band SSB as proof of the pudding. However, from the time of writing, activity will be much reduced as the club gets ready for the regular stint in the Dagenham Town Show at about the time this comes to be written.

The Ladies

Mrs. T. Parry (Blackpool) writes from a new QTH in Blackpool which she hopes will be more permanent than all the previous ones put together — we know the feeling, and it grows as you get older! Another hold-up to the SWL-ing is the OM — Tina says he is A Pest because he has built a two-metre converter and it *works*, so he spends the evenings listening to it and she can't get near to the receiver to tackle her preferred HF bands activity. She'll have to retaliate by building a receiver — the G3RJV series will doubtless come to that in due course.

Mrs. R. Smith (Nuneaton) has a relatively short list this time, as she has been QRT for much of the time due to thunderstorms, when the OM insists on QRT for safety's sake; and from the time of her letter domestic matters were going to be rather demanding right up to deadline time, and obviously prevented much more listening.

Finally, *Mrs. J. Charles (Colchester)* who has a problem in understanding just what the significance of the Italian IK0, IO0, and IR0 prefixes is — anyone any ideas? We could both do with some enlightenment!

Finale

We seem to have covered the clip again for another SWL and so it remains to wish everyone the best of DX, to remind that the autumn lift in conditions is almost upon us, and to ask for your letters to arrive by **September 16th**, addressed as ever to your scribe, "SWL", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ. Good Hunting!

PLUG IN YOUR SOLDERING IRON AND BEGIN HERE, PART IV

A GUIDE FOR THE INEXPERIENCED
IN THE METHODS, TECHNIQUES,
PITFALLS AND FOLKLORE OF
BUILDING EQUIPMENT, WITH
PRACTICAL PROJECTS TO BUILD
ALONG THE WAY

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ISN'T it a funny world we live in? My motley collection of poles and wires strung across the garden bring quite a few people to my door, thankfully so far no one from the local planning department. Not so long ago my door bell croaked. It does that — though with its two unijunctions back-to-back to a BFY51 feeding a speaker it's supposed to warble. Standing at the door were three West Indian youths. One of them cautiously looked up and down my clerical black and said, "Are you Banana Man . . .?" But we are not here to discuss cases of mistaken identity, we are exploring the avenues of electronic construction.

In *Part III* we looked at methods of building equipment using a printed circuit type layout on perforated board. We now go a stage further and consider the simplest ways in which printed circuit board can be used to build circuits. First a word about printed circuit boards and how to obtain blank board. Most people will have seen printed circuit boards used in equipment: These are insulated boards with holes through which the components leads pass with the interconnection between the components being made by patterns of copper tracks underneath the board. The process begins with a blank board of insulating material which is coated with a thin layer of copper; the pattern of tracks is produced by etching away the copper not required in the pattern of tracks. The remaining copper pattern is left after the etching process because of an etch resistant applied to the board. For the projects in this part of the series, and the ones to follow, blank printed circuit board is required — that is, board with the copper coating intact.

Such board is supplied in a variety of types. It can have a coating of copper on both sides (double-sided board) or only one side (single-sided board); it is usual to assume that the board is single-sided unless the double-sided board is specified. The insulating material can also vary but the best for our purposes is fibre glass board. Printed circuit board (PCB) can be quite expensive and the amateur is advised to look for outlets of offcuts either from a surplus store or a radio rally. These can be very inexpensive, although many offcuts are small. This is no real problem as the best method of construction for the amateur is to build up equipment in small sections each on its own small board. So hunt the radio rallies and surplus electronic shops for offcuts of fibre glass PCB. Single-sided board is the more useful and aim for the thicker, better quality board buying several pieces when you spot a bargain.

The conventional printed circuit construction method accepts the components in a series of small holes on the plain side of the board. This involves making the pattern required in etch resistant, etching the board and drilling the holes. For our first introduction to PCB techniques we will reverse the board to mount the components on the copper side, thus avoiding the drilling. It is also possible to use the board without having to etch away any copper and this will be our first method. This is a method beloved of WIFB and the QST team and they usually call it "breadboard construction". The term goes right back to the early days of radio construction when valve circuits in the 1920's were often built on a wooden board, sometimes literally a breadboard, by screwing the parts on the top of the wooden surface. Our method consists of using copper clad board and separating the board into isolated squares by gently sawing with a hacksaw blade across the copper, cutting away just enough to remove lines of the copper coating. This leaves square islands of copper and these are used for mounting the components. No holes are drilled since the components are soldered onto the copper side of the board.

RF Probe

At the end of this part a simple low power transmitter will be described, so the first two projects we are building are items of test equipment to be used in testing this transmitter. They are also items which will be useful around the station especially if low power operation is contemplated (is there any other?)

Fig. 1 shows the circuit of a simple RF Probe. This is a small piece of circuitry to place ahead of a multimeter to measure radio frequency voltages; a very useful item of test equipment which can be used to measure RF output from oscillators, low power RF amplifiers and low power (QRP) transmitters. The probe tip is placed on the required point for measurement and the RF voltage is coupled to the circuit via C1. The radio frequency signal is rectified by D1, D2 and C2 and voltage appears across the terminals marked "To Multimeter".

Construction

Fig. 2 shows the construction of the RF Probe using the breadboard PCB method. The circuit is laid out on the board exactly as shown in the circuit diagram. Having obtained an off-cut of PCB from a suitable surplus emporium, but a piece to the size 6cm by 3cm. (This is beginning to sound like *Blue Peter!*) I wonder how long it will take to convince me that metric measurements are sensible — but it just so happens that 1cm squares are easy to manage in this project. Mark out the copper side into 1cm squares with a pencil and ruler. The gaps now have to be cut with the hacksaw blade. There are various methods of holding the board so that the sawblade can make gentle cuts flush with the surface of the copper. One of the simplest is to use the four holes which are drilled in each corner, shown in Fig. 2. These are drilled to accept 6BA bolts and can be used to screw the board for sawing to a piece of scrap wood using small wood screws; the sawblade is then gently drawn across the surface of the copper.

After cutting clean up the surface with fine emery paper. This cleans the board ready for soldering and also helps to clean out the gaps made by the sawblade, but check to see if there are complete gaps or channels between each square of copper. The components are then soldered onto the board squares. Cut the component leads to the required lengths and bend them so that a small length of component lead is flush with the copper square on which it is to

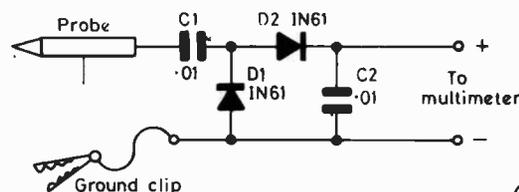


Fig.1 RF PROBE CIRCUIT

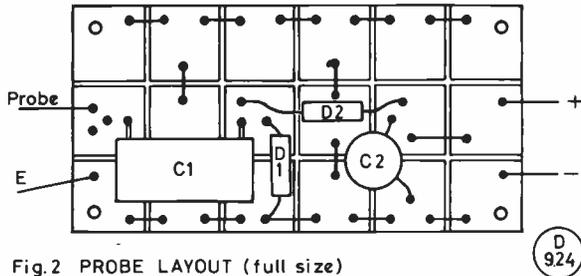


Fig. 2 PROBE LAYOUT (full size)

be soldered; tin the copper first then solder the lead to the copper square. Several shorting links will be noticed on the layout in Fig. 2. These, if they are not wires to join various squares in the circuit, are links to join up the spare copper square to form an earth mat around the circuit. So the bottom row of squares, which forms the earth side of the circuit, and the top row of squares are all joined in line.

The probe tip is just a piece of stiff copper wire soldered to the square pad which forms the input to C1. The ground clip, required as an earth return lead during measurements, is a short length of PVC covered copper wire, multistrand flexible wire is best, terminated with a small crocodile clip. A red wire and a black wire take the output from the probe to a suitable termination for the multimeter to be used. The four 6BA holes can be used to mount the probe into a small metal box, but on the prototype the housing was made from more pieces of scrap PCB. Two extra pieces were cut to the size 6cm by 3cm with similar holes in each corner and placed either side of the probe board, the whole arrangement being held by four 6BA nuts and bolts. The outer pieces of PCB were mounted with the copper sides facing outwards and spacers were placed between these boards and the probe circuit board.

The complete probe is then ready for use. It can be used with any average station multimeter; if your meter happens to be a high impedance FET meter or a digital meter so much the better, but ordinary general purpose meters will serve for most purposes. The probe gives peak voltage readings and since its chief task will probably be to aid in the tune up of circuits, relative readings are good enough. The probe is connected to a low milli- or micro-amp current range. When built the probe is a useful addition to the amateur station multimeter, and it will be used in the setting of the simple transmitter described later in this article.

A Low Power RF Wattmeter

Those who have followed the saga of the recently developing interest in amateur radio circles of QRP operating, will know of the controversy over whether to measure low power transmitters in terms of DC input power to the final stage, a simple task with DC metering, or use RF output power. The DC measurement is preferred in the UK and the RF output measurement is preferred in the U.S.A., the latter requiring a RF Wattmeter. Whichever standard one chooses to use, a simple RF Wattmeter is a useful item to have around the station. The simplest way to measure RF power is to feed the signal into a resistive load, rectify it, as per the RF Probe, and measure the voltage on a calibrated meter. Fig. 1 shows a simple circuit for such a power meter. An RF voltage is developed across R1, which is 50 ohms to match the usual transmitter output impedance, and rectified by D1 which charges C1 and C2 to the peak voltage. The purpose of C2 is to act as a "storage capacitor" to lengthen the time constant of the circuit and aid accuracy. The meter (M1) and R2 form a voltage measuring circuit, the value of R2 being such that M1 can be calibrated with a direct reading of RF power. The formula used to calculate DC voltage against watts is:

$$\text{Average power output, } P_0 = \frac{E^2}{2R}$$

$$\text{Transposed as: } E = \sqrt{P_0 \times 2R}$$

M1 is calibrated to read the required voltage by alteration of R2 to obtain a suitable voltage range. This all sounds a bit like mathematics so for the wary, or the idle, values have been worked out for a 1mA meter. This excludes all the niceties such as the internal resistance of the meter and so on, but for a reasonable moving coil 0 - 1 mA meter the circuit will give results accurate enough for the average amateur.

Construction

The Wattmeter is built on a piece of printed circuit board using the technique of isolating solder pads with sawblade cuts described above. This board is somewhat simpler and only three saw cuts are required. The layout is shown in Fig. 4. The whole board is mounted on the back of the meter using the screw terminals on the meter. What happens if the positive and negative terminals on the meter are the other way round on your 1mA meter? Well — just build it as a mirror image of the prototype with the components to the other side of the meter.

Both resistances, R1 and R2, require a special mention. R1 should be 50 ohms and capable of handling the total amount of power applied to the meter; some 5 to 6 watts. I happened to have two 100-ohm 5-watt carbon resistors so the problem was solved by using them in parallel. The resistance used for R1 must be non-inductive because it handles RF signals and wirewound resistors may act like coils at these frequencies. Various combinations can be used to achieve the required resistance and power handling capability, a good Ohms Law exercise! For example five 2-watt 270-ohms resistors would do the job; or nine 470-ohms 1-watt resistors — not a common find. In the prototype I used a combination of a fixed resistance and a preset to get the required value. In my case an 18K fixed resistor with a 10K preset, but other values could be used as long as the total value can be set to the required 25K. This can be set up with an ohms range on a multimeter. The components are simply soldered on the copper side of the board as for the RF Probe circuit.

If you have a rich friend the meter can be calibrated accurately using his commercial wattmeter. Failing that the calibration offered in Fig. 5 should be near enough for most meters. This was originally made by W9SCH, an old QRP friend of mine, and proved very accurate with the prototype. The meter can be left with its existing scale and a graph may be used, or the meter face can be removed and new calibration added. There are several ways to do this. The simplest is to stick some thin typing copy paper over the old scale which allows the old calibration to show faintly through the paper. The new calibration is then added, guided by the old markings. A light spraying of white car paint can achieve the same results. The new numbers may be added with a thin felt pen, or the fastidious can use *Letraset* numbers. The meter ought to go into a box, a metal box is best, and when the meter casing has been fixed in place the rest of the circuit just fits onto the back of the meter. You now have a QRP Wattmeter.

A Simple Low Power Transmitter

The dramatic increase of interest in low power radio communication (QRP) in the last five years has thrown up many circuits or simple transmitters all of which are capable of good results on the high frequency bands. Are there still people about who doubt that transmitters running powers of five watts or less are capable of reliable communications on the amateur bands? One of the most popular low power transmitter circuits in the UK has been the JU6. This is a circuit by John McDonnell, G3DOP,

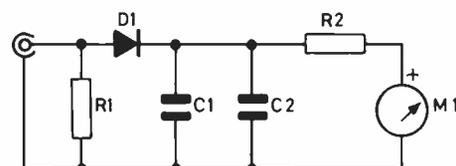


Fig. 3 RF WATTMETER CIRCUIT

D 925

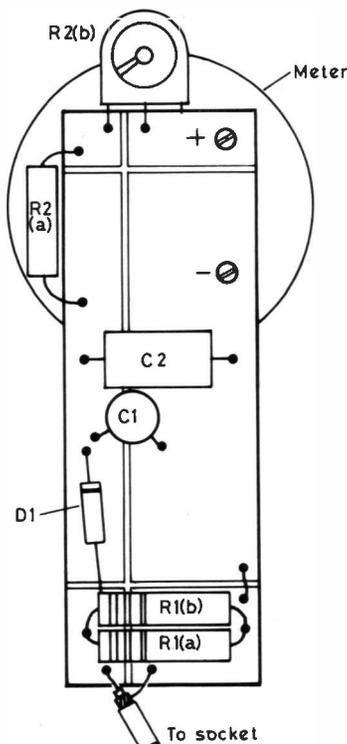


Fig. 4 WATTMETER LAYOUT (full size)

which first appeared in the *SPRAT*, the journal of the G-QRP Club, in the Autumn of 1979. It appeared as a complete simple transceiver and proved so popular that G3DOP was awarded the G2NJ Trophy for the best article in *SPRAT* over a three year period. The JU6 — it means a JUNK box transceiver using 6 active devices — was itself based upon several earlier circuits from the U.S.A., in fact a whole series of simple little transceivers for portable operation by backpackers. The JU6 was built and amended by so many people that the G-QRP Club repeated the circuit in 1981 with a collection of suggested modifications. With the agreement of John, I am about to offer one of my versions of the JU6 with possible ideas for further experimentation. The circuit is for the transmitter only because the JU6 makes an ideal transmitter to match an existing station receiver. A fine way to try out low power operation at little cost and effort.

The complete circuit for the transmitter is shown in Fig. 6. This circuit is for a 7 MHz (40 metre) band version. This band has been chosen because the transmitter is crystal controlled, or rather VXO controlled, and there are still surplus crystals around for the 40 metre band. Also, in spite of what some may think, 40 metres is a good band for QRP operation. The circuit consists of a Variable Crystal Oscillator (VXO), TR1, feeding a Power Amplifier (PA), TR2, which is keyed with a transistor TR3. The crystal oscillator could be fixed in frequency, in which case X1, the crystal, would go directly to ground, not via VC1; VC1 allows slight variation of the frequency of the oscillator. Several types of transistors can be used for the PA, all of which allow a DC input power of around 2 watts. The transmitter is designed for a fixed output impedance of around 50 ohms.

The VXO transistor TR1 forms a simple Colpitts Oscillator circuit, with VC1 in series with the crystal to provide some frequency shift. The amount of shift should be from 2 to 4 kHz depending upon the crystal in use, its mounting and degree of activity. C1 and C2 provide the feed back loop to maintain oscillations. VC1 is a nominal 60pF variable capacitor but values around this can be used; less capacitance, less shift — too much capacitance and oscillations may cease. A cheap way to achieve this capacitance is to use a Mullard semi-airspaced trimmer with a value of 3 - 60pF. It is quite simple to convert this into a knob control: take a piece of plastic quarter-inch shafting, a bit cut off

one of those extra long potentiometer shafts that seem to be the order of the day is ideal, and carefully drill a recessed hole into one end to accept the small screw adjuster on the trimmer. Fill the hole with *Araldite* or *Superglue* and push it into the screw adjuster on the trimmer. When this has set the shaft should be firm enough to take a small standard knob. There are various ways to mount the trimmer as a control. Notice one side goes to ground and this may be soldered, using the side of the trimmer that bears two tags, to the circuit board or stiff copper wire supports. Let ingenuity take over here, that's what its all about. you have a nice neat airspaced capacitor of about the correct value? Save it for a more important and critical circuit!

The output from the VXO is tuned for 40 metres by L1 and CT1; L1(b) couples the signal into the PA transistor TR2. A ferrite bead is slipped onto the lead between L1(b) and the base of TR2; this helps prevent VHF parasitic oscillations, one of the nasties of transistor PA circuits. A wide variety of transistors will do duty for TR2. In the prototype a surplus transistor from an old computer board was used. This was a core driver transistor from the days when information 'bits' were stored in cores. These were on a rather useful ex-computer board which contained 40 such transistors. Imagine that, 40 PA transistors all on one junk box board! Other suitable transistors which were tried with success for TR2 include 2N3053, 2N3553, BLY33 and BSX61. Some samples of BFY51 and 2N3866 worked well but at slightly reduced power. A TO-5 heatsink is required for TR2. The output from TR2 is coupled via C5 to a simple fixed pi-network L2, C8 and C9. Running about 2 watts DC power into a PA gives near enough an output impedance of 50 ohms, so the pi-network is a simple 50 ohms in and out RF filter. It is fixed tuned because the frequency range of the 40 metre band is narrow enough to allow us to get away with it.

A homemade Radio Frequency Choke, RFC, provides the load for the PA transistor. This is just seven, or more if you can get them on, turns of 32 s.w.g. enamelled copper wire wound through a ferrite bead. Take care; the edges of the feed can scratch the enamel off the wire and cause shorted turns. TR3 allows the PA to be keyed. This transistor is something of a luxury and could be omitted and replaced simply by the key between the 12 volt line and RFC; it is added because it allows keying with one side of the key connected to ground. TR3 is just a DC switch circuit used to control the supply to TR2; it also includes some shaping of the keying characteristics. The combination of the network R5, C6 and C7 give a time constant to the keying which takes the sharp edges off the keying action and helps reduce keyclicks on the transmission. It is possible to further shape the keying by

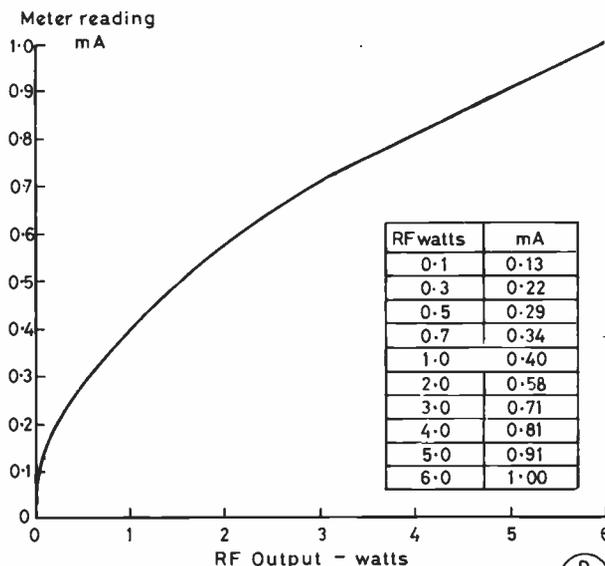


Fig. 5 RF WATTMETER CALIBRATION

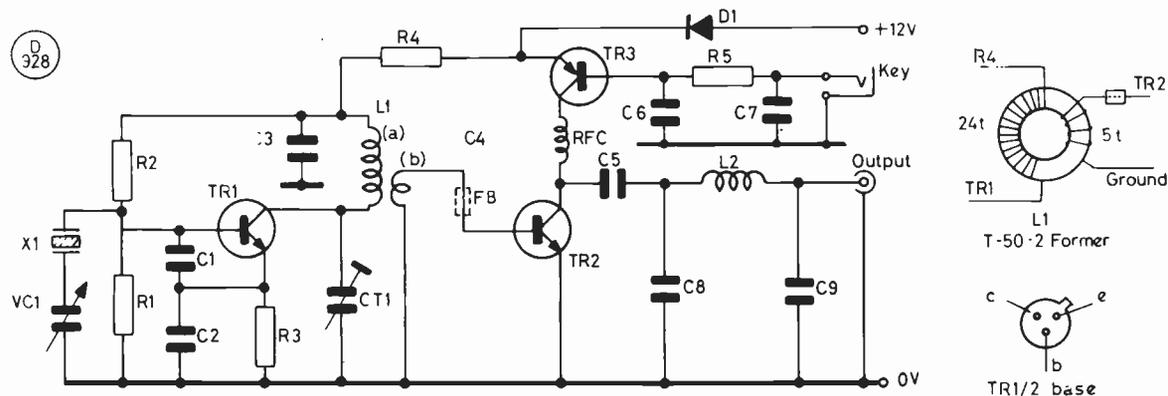


Fig. 6 SIMPLE TRANSMITTER CIRCUIT

increasing the values of C6 and C7, but too much 'softness' of the keying characteristics will give a mushy, weak sounding note. A sharp, but click free note, is the aim of the filter.

The action of TR3 is very simple. When the key is open the transistor does not conduct and no voltage reaches the collector of the PA transistor, TR2. TR3 could be left out and a key inserted directly between the top of the RF choke and the 12 volt line, but the key is then live when in use. The diode D1 is added to the 12 volt line to give simple polarity protection. Connecting the supply the wrong way round is a good way to ensure that the PA transistor curls up its toes and dies: D1 will only pass current if the supply polarity is correct.

Construction

The transmitter uses yet another method of construction with printed circuit board. This is sometimes called the 'Island Method' of construction. It is rather like the conventional printed circuit board construction in that the board is etched to carry the component interconnections, but again there are no holes as in the PCB breadboard method. The etched board is made up of 'islands' of copper onto which the components are soldered on the copper side of the board. A detailed use of this method was described in the SCD Transceiver by the author in *Short Wave Magazine*, January 1980.

Some amateurs are wary of etching printed circuit board, but the process used to produce this type of board is very easy. The acid resist material is plastic adhesive backed sheet of the 'Fablom' variety. To make the prototype I covered the piece of unetched printed circuit board material with white 'Fablom' and sketched the circuit directly onto the plastic with a pencil. This is convenient because the component spacing can be adjusted by rubbing out the lines with a normal pencil eraser. The solder pads required are then sketched in and tidied up with pencil and ruler.

For this transmitter the construction can follow my layout as shown in Fig. 7. This shows the layout used in the prototype. The positions of the components between the pads are shown; note that each pad is in fact a small 'island' of copper and as much copper as possible is left on the board in the non-etched portions to form an earth mat. This not only acts as effective screening, but also provides convenient earthing points close to all the components for short earth returns when required.

To duplicate this board, the constructor will need to cover a suitable piece of single-sided PCB with adhesive plastic sheeting. The layout of Fig. 7 can then be copied or traced onto the plastic. The actual lines can be firmly pencilled in with the aid of a ruler. The areas which are to be etched are then removed by carefully cutting along the lines with a modelling knife and ruler; the plastic not required can then be peeled off. This may sound a rather fiddly job, but completed boards have been made by this method from the circuit drawing to the completed etched board in under an hour. The surplus copper is etched away in the usual ferric chloride solution. If the plastic has been evenly stuck down a very neat board can be obtained with good straight edges.

Table of Values Fig. 3

R1 = 50R, see text	C2 = 0.1 μ F paper
R2 = 25K, 1 watt	D1 = 1N34A or similar
C1 = 0.002 μ F d/c	M1 = 1mA meter

Fig. 6

R1 = 4K7	CT1 = 140 pF compression trimmer
R2 = 10K	RFC1 = 7 turns on ferrite bead
R3 = 270R	L1(a) = 24 turns, 26 swg, on T-50-2 core
R4 = 82R	L1(b) = 5 turns, 26 swg, over L1(a)
R5 = 2K2	L2 = 14 turns, 22 swg, on T-50-2 Amidon toroid core
C1 = 79 pF	FB1 = ferrite bead
C2 = 150 pF	TR1 = BFY51
C3, C4 = 0.01 μ F	TR2 = see text
C5, C6, C7 = 0.1 μ F	TR3 = BCY39, or similar pnp type
C8, C9 = 470 pF	D1 = 1N4001 or similar
VC1 = 60 pF, see text	

Fig. 8a

C5 = as Fig. 6	C9 = 1000 pF (2 x 500 pF variable)
C8 = 100 pF airspaced variable	S1 = single-pole switch

What about the etching, then? This is perhaps, for the beginner, the most daunting part of printed circuit board construction. The commonest etchant for the amateur is ferric chloride. There are others, but ferric chloride is cheap and easy to obtain and reasonably easy to use. The first thing to say about ferric chloride is it stains . . . my word, it stains! With careless use it can be a divorce maker — it marks sinks, worktops and containers, stains clothes and writes off towels with a vengeance. So use it somewhere where it can do least harm. I use a workbench in my garage; some people do the etching of boards outside but that cannot be much fun when its snowing. It is possible to buy the solution ready made up, but I buy the crystals, usually from the surplus market in polythene packs. The etching kits are normally very expensive for what they contain, just try to get some crystals as cheaply as possible. The bags sold on the surplus market are industrial grade crystals which produce a muddy solution but they seem to work very well. The solution does not store well for long periods of time and I prefer to make up the solution at the time, and in the quantities I require. The textbooks seem to recommend a solution of about one part ferric chloride to two parts water, which would appear to be about right. I have never measured quantities in my solutions, I just add a lot and stir until it seems very strong. Warm water aids the etching action and also allows the water to take up more of the crystals if a really strong brew is wanted. The warmer and the stronger the quicker the action. I'm afraid that I am a non-scientific etcher! If you want the textbook methods there are plenty of precise directions to be found. Some

people prefer slow etching, but I believe it is better to etch reasonably quickly so that the process can be monitored to prevent over-etching. Over-etching can be a problem in that the etchant eats underneath the etch resistant material and begins to reduce the pads of copper required for the finished work.

The vessels used for the etching process must be made of plastic or glass. Many people use special little trays like those used for photographic chemicals, others use a variety of plastic containers such as empty ice cream cartons, food containers or shallow plastic dishes. These containers mean that the boards must be etched horizontally and this is common, with the copper side uppermost. I prefer to etch boards vertically in a variety of jam jars and coffee jars I keep for the job. I find this allows me to agitate the boards easily and the waste from the etching action does not form a film on top of the board and slow down the etching rate. I attach a clip clothes peg to one end of the board, drop it vertically into a suitable sized jar of etchant and from time to time give the peg a quick spin to aid the action. The peg sticks out of the top of the ferric chloride so not only can the board be spun around to aid etching but it can be removed without fiddling about with plastic tweezers. Briefly, such an etching process goes like this . . .

The board must be prepared with a good cleaning prior to the etch resistant, in this case 'Fablon', being applied. A good scrubbing with a common household scouring powder does this well, followed by a wash in warm soapy water. The board must be dried before the 'Fablon' covering is applied. Cover the board and overlap the edges a little to prevent the edges of the board being etched. The portions to be etched are then cut away as described in the method above, taking care to avoid finger contact with the copper to be etched. Find a suitable container for the etching and make up a ferric chloride solution to fill the container high enough to totally immerse the board, but not too deep as the top of the peg should be clear of the solution. Attach the clip peg to a part of the board edge which is covered with the plastic coating and immerse the board in the solution. Go and do something else. Make a cup of tea, sort out the components or even talk to your spouse, but keep returning to agitate the board and check the progress of the etching.

When small areas of the copper begin to disappear monitor the etching more frequently and try to stop the process when the board is just etched to avoid over etching. If the process appears to be taking a really long time, for example if there is little progress after an hour, more ferric chloride needs to be added to the solution. Using a warm solution is a great help in speeding up the process. A good etching time is 15 to 30 minutes for a small board. Remove the etched board with care to avoid stray drips and then

wash all the surplus ferric chloride off the board. Try to avoid getting ferric chloride in the waste trap of a kitchen sink; I often give a first wash with the garden watering can outside before a final wash in the sink. The 'Fablon' covering can now be pulled off and the board cleaned again with household scouring powder. The board is now ready for use as this particular board requires no drilling.

The simple transmitter is built following the layout in Fig. 7(b). The components are bent to fit the board as for the breadboard method described earlier. L1 and L2 are wound on toroid formers. The ones required here are the Amidon iron powder cores, cheap surplus cores are not really suitable as these will probably be ferrite cores. The toroid cores are small rings a bit like those well known mints with holes in the middle. Winding coils on these cores is quite simple, the only complication being that it is impossible to wind using wire directly from the bobbin — it will not go through the hole! The required length of wire has to be taken off the bobbin and then wound upon the core. How do we know how much wire to use? Well, the easiest method is to wind a few turns on the core, say about five, unwind and check how much wire was required for this number of turns, multiply up for the required total number of turns, add a bit, and cut off that amount of wire. In winding the coils every time the wire passes through the hole is one turn. Hold the start of the winding firmly between the forefinger and thumb and begin threading on the turns; as the wire is pulled around the outside of the core give a little tug to tighten each turn. The aim is to fill most of the core with the required number of turns on the main winding. Linking windings, like L1(b), occupy less space and are wound over the main winding. The inset drawing on Fig. 6 gives a good idea of how L1 should look when completed. The enamel covering is scraped off the ends of the wire to be soldered, a small ferrite bead is slipped onto the lead to the collector of TR2 and the wires are soldered into place.

The rest of the construction is quite simple and follows Fig. 7(b). L2 is a single winding coil wound in the same way as L1. The pinetwork components, L2, C8 and C9 have no copper pads on the circuit board because of possible later experiments, so these are wired in the point-to-point method and suspended above the copper. The grounded leads on C8 and C9 should be rigid enough to support the pinetwork filter above the copper ground. Some kind of termination is required for the output from the transmitter, and for low powered RF work I use phono plugs and sockets; these are cheap, easy to obtain and work well at low power up to 30 MHz. The transmitter may be put in a small metal case or just mounted on an aluminium base plate with a front and back panel to take the connections, crystal holder and VC1.

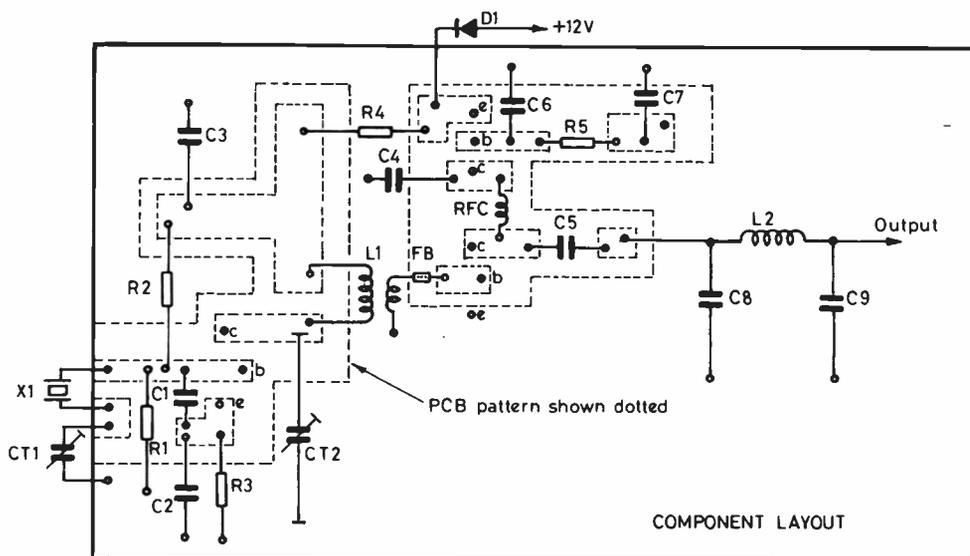


Figure 7

Setting Up

The transmitter can now be set up using the two items of test equipment, the RF Probe and the Wattmeter described earlier in this part. Check over the wiring with great care. The transmitter could be built and tested in two sections; as far as L1(b) and tested, and then the rest added. I advise this stage-by-stage approach for construction, but this board is very simple and should work first time without problems.

Connect the 12 volt supply and plug in a suitable crystal, but do not key the transmitter yet. The RF Probe is attached to the output from TR1, the most suitable place being the wire from L1(b) that goes to the base of TR2. The tuned circuit L1/CT1 must now be tuned for maximum RF output. Choose a suitable range on the multimeter for the RF Probe and adjust CT1 until a peak occurs in the output and finely adjust for the highest reading. Before the transmitter is keyed a dummy load must be added to the output; a non-inductive load of some 50 ohms is required. It is possible to do a check with the RF Probe at the output of C5 to see if the PA is working, but we have our Wattmeter which has a dummy load; so the Wattmeter can be attached directly to the output from the pinetwork and the transmitter keyed. For most PA transistors described above the reading should be some half to one watt of RF output. Remember this is RF output and the DC input will be at least twice this power level.

Transistor PA stages are not the most efficient little circuits. It is possible to measure the DC input power by breaking the lead to the collector of TR2, above the RF choke, and inserting a milliampmeter. Assuming that 12 volts is present on the collector, in practice because of TR3 it will be a little less, 166mA of current in the collector lead indicate a DC input of two watts. A simple Ohms Law exercise again for those who want to work out their DC input power.

The transmitter is designed to match into a 50-ohm load so therefore requires an aerial impedance of this figure; any aerial system with 50 ohms impedance will work. A 7 MHz dipole is the obvious simple solution, but unless the operator happens to use one the chances are that an ATU (Aerial Tuning Unit) will have to be used to match up the transmitter. For random bits of wire a simple ATU such as an L-Match will probably do the job well, the match being checked with a Standing Wave Bridge (SWR meter).

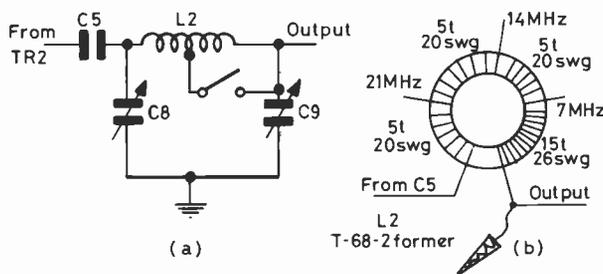


Fig. 8 ALTERNATIVE COILS

L1	a) 11 turns b) 5 turns over (a)	28swg	1/4" former + slug
L2	20 turns tapped at 10t	22swg	1" former See Fig. 8a
L3	15 turns +5 +5 +5	26 swg 20 swg 20 swg 20 swg	Amidon T-68-2 Toroid core See Fig. 8 b

D 930

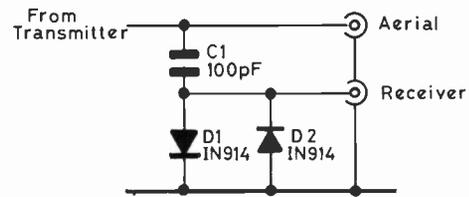


Fig.9 SIMPLE ELECTRONIC CHANGE-OVER CIRCUIT

D 931

This little transmitter is capable of good contacts with a reasonable aerial: I used the prototype with my full size 'G5RV' via a Z-Match and worked four countries in the first hour of testing the transmitter.

Some Further Experiments

It was mentioned above that this simple transmitter is a version of the JU6 circuit of G3DOP. The original JU6 circuit, designed for use on more than one band, did not have the coils we have used for L1 and L2. The table in Fig. 8 shows the original coils used by G3DOP, and suggests another JU6 modification by G3IEB. In the original JU6, L1 was wound on a quarter-inch diameter normal coil former with a ferrite slug to the specification in Fig. 8. There is space to use this coil in our layout and it does mean that special toroid formers are not required. Toroid formers are expensive relatively speaking — relative to spending next to nothing for quarter-inch formers! — although they have the advantage that the RF field around the coil is very small. This makes them very useful for coils in small transmitters without the risk of stray RF fields on the board.

The G3DOP original also had an adjustable coil for the L2 pinetwork. This is wound on a one-inch former with a switch tapping for 14 MHz and 7 MHz use; the specifications are again given in Fig. 8. G3IEB had good results with the JU6 on 7, 14 and 21 MHz using a multitapped coil, wound on a toroid core, for L2 as per Fig. 8(b). Many good contacts were had on 21 MHz using 7 MHz crystals and tuning out 21 MHz in L2. I suggest that such experiments are only done through a good ATU as there is probably quite a lot of 7 MHz fundamental still coming out of the PA stage. The G3IEB coil had tapplings for the three bands made with a crocodile clip, although a switch could be used. G3DOP has recently pointed out to me that he has used the JU6 on the new 10 kHz band with this coil for L2 and an extra tapping midway between the 7 and 14 MHz taps.

This transmitter is designed for use with a receiver so some kind of changeover is required for the external receiver; Fig. 9 shows what must be the simplest possible electronic changeover. C1 allows the signal from the aerial to reach the receiver, but on transmit the signal goes directly to the aerial and the signal through C1 which will reach the receiver is reduced in amplitude so much by the two diodes D1 and D2 that no harm can come to the receiver front end. Very simple — and it works — but it is a good idea to turn down the receiver audio gain when transmitting to stop nasty key thumps. This arrangement could be wired into the case with the transmitter thus requiring only leads to the aerial and to the receiver input socket. Naturally a simple changeover switch could be used, but I feel sure that a couple of diodes and a capacitor is *cheaper!* The value of C1 may require some adjustment; use the lowest value that will allow enough signal to reach the receiver, the smaller the value the less RF power D1 and D2 have to handle.

So we have built a complete transmitter; simple isn't it! Next time onto a complete receiver, and real PCB construction . . .

CLUBS ROUNDUP

By "Club Secretary"

The Mail

As usual, our first hint of September's doings is from **Acton, Brentford & Chiswick**; they are at Chiswick Town Hall, High Road, Chiswick, on September 21 for a discussion, to be opened by G3IGM, on oscillators.

Atherstone have a place at Tudor Centre, Coleshill Road, Atherstone, on the second and third Thursdays in each month; on September 9, they have G3RJV to talk about Home Construction — lucky people!

On to **Aylesbury Vale**, which means the Stone Village Hall, Stone, on the A418 a couple of miles west of Aylesbury, once every four weeks. September 7 is set down for G3RZP to talk about frequency synthesizers.

For **Barking** members there seems to be lots of things to do; Westbury Recreational Centre, Westbury School, Ripple Road, Barking, is booked for four evenings each week; of these, the two of most interest to this piece are Wednesdays and Thursdays, respectively, for operating/construction and the main meeting.

BATC covers all the activities under the umbrella title of Amateur Television, and it seems they are to have their Annual Convention once again at the Post House in Leicester on September 5. It is free entrance and in general terms organised a bit like a rally, with trade stands, an exhibition plus full lecture programme and video show. Details from the Hon. Sec. — see Panel.

The resumption of meetings at **Biggin Hill** is on September 21, at the Memorial Library, and the speaker will be G2MI, his theme "Running a QSL Bureau".

Turning to **Bournemouth** the Hq is at Pelham Community Centre, Millhams Lane, Kinson, Bournemouth, on the first and third Friday in each month. For September they had hopes of a talk on Prestel for the first date and a talk and demonstration by SMC for the second; both were still not confirmed when they wrote.

Activities for **British Rail** over the past months have concentrated on the World Congress of Firac; the 21st of these events, at which railwaymen from all over the world get together, is being run in U.K. and the Hon. Sec., for one, is working very hard indeed — and we suspect rapidly becoming multi-lingual! Details from him at the address in the Panel.

We head now for **Burnham Beeches**, and their Hq at the St. John Ambulance Hq in Slough, where they foregather on first and third Mondays.

September 14 is the date for the **Bury** main meeting, for G8LIR to talk about radiography; but there are informals on the same evening of each week, at the Mosses Community Centre, Cecil Street, Bury.

The **Cambridge University** group is still very much a part of the current scene, and they will be holding meetings on most Mondays during term at a venue to be announced. The main thing, though, is the 'recruiting campaign' at the Societies' Fair in Kelsee Kerridge Hall on October 5 and 6. Meantime, the contact is G8TUG, either at the address in the Panel, or at Churchill College.

Cheltenham continue to thrive; the main meeting is on the first Thursday of each month, and the less formal affair is on the third Friday; both at the Old Bakery in Chester Walk, Clarence Street, Cheltenham.

The weekly Wednesday evening sessions at **Cheshunt** are at the Church Room, Church Lane, Wormley; in September there are natter evenings on September 1, 15 and 29, plus an open discussion on "Amateur Radio — a very special hobby" on

September 8; on 22nd G6BTQ will present an evening of RF measurement techniques.

On September 6 the **Chichester** club have their last meeting at the Spitfire Club, Tangmere, as they then are moving to Fernleigh Centre, North Street, Chichester, where their first date is September 16, when they will be in the Green Room for a talk by Graham Swann on maritime communications concepts. This means a reversion to the old routine of the first Tuesday and the third Thursday in each month.

On September 23, **Colchester** members will be getting some instruction in building a microcomputer, from G8CKW, at Colchester Institute in Sheepen Road.

It's the second Thursday in each month for the **Conwy Valley** crowd, at Green Lawns Hotel, Bay View Road, Colwyn Bay; as they have just had the AGM we expect the programme details have been delayed this time.

Deadlines for "Clubs" for the next three months—

October issue — August 27th
 November issue — September 24th
 December issue — October 29th
 January issue — November 26th

Please be sure to note these dates!

Copeland have their base at the Market Hall, Egremont, West Cumbria on the first and third Wednesdays; and if you are in the catchment area, or visiting, the Hon. Sec. says he wants to be hearing from you!

Your scribe received his up-dated issue of the programme for **Cornish** along with a big pot of ale, direct from the P.R.O. of the club — initiative, we call it! They will be in session on September 2, when G8XNT will be talking about the Coastguard and illustrating the talk with films. The Hq is, as ever, the SWEB Clubroom, Pool, Camborne.

That goes also for the **Cray Valley** — but since they have only just had their AGM, perhaps things may be sorted out soon. Meantime the Hon. Sec. can provide the details — see Panel.

The subject on September 18 is "to be confirmed" says the Hon. Sec. of **Crystal Palace** — doubtless by now he has his victim well ensnared, and preparing for his trip to the new Hq at All Saints Parish Rooms, Beulah Hill, which lies at the top of South Norwood Hill opposite the old ITA transmitter.



The first and (almost certainly) last MCC Cup. At a recent ceremony Plymouth Radio Club, the 1981 winners, celebrate their success. On the left is G2DFH, the club President, with their Publicity Officer, G4KXQ. The particularly happy-looking member on the right is G3ULN. Better hang on to that Cup, chaps, its uniqueness will make it valuable!

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Turning to **Denby Dale**, the gang have their base in the **Pie Hall**, and we understand they are to be found there on Wednesday evenings; the routine being to have an alternation of natter-and-noggin evenings and more formal events such as talks, films, and so on. In addition they seem to like a fair amount of 'communal fresh air' which they get by way of various outside events.

Derwentside is based on the R.A.F. Association Club, Sherburn Terrace, Consett, where they are to be found every Monday evening. Consett, of course is Co. Durham.

Now on to **Douglas Valley**, where the local gathering is at Shevington Conservative Club, on Thursdays, *except* the second one in each month. On September 9 they have a talk "Sun, Earth and Radio", and on 16th a sale of surplus equipment.

Dudley says the handout, foregather at Central Library, St. James Road, on the second and fourth Tuesdays; if you want the details, the Hon. Sec. will be pleased to pass them on if you contact him. See Panel for his details.

Our congratulations are due to the Hon. Sec. of the **Dumfries &**

Galloway, he having become GM4NNC. He says that they are at the Cargenholm Hotel, New Abbey Road, Dumfries, on the first and third Mondays. During September they have another bit of excitement, over September 9-12, when the Robert Burns Federation World-Wide will descend on the city — and the club will have GB4RB on the air to attract attention to amateur radio.

The **Edgware** group are at 145 Orange Hill Road, Burnt Oak, Edgware, on September 9 for an informal, and on 23rd, for which the programme was still to be settled at the time they wrote.

Farnborough have their corporate being at the Railway Enthusiasts Club, Access Road, off Hawley Lane, near the M3 bridge, Farnborough. September 8 is down for a pre-AGM discussion, and on 22nd they have the annual construction contest.

GB3CH Repeater Group is based on Holsworthy, Devon, and they indicate that apart from new members, they would not object to any donations towards keeping their machine running from the many holiday-makers and transients who use it. Those not involved with a repeater group would be surprised at the amount of time and money which can be involved in the running of one in top-line style as this one is. Details from the Hon. Sec. — see Panel.

The **Greater Peterborough** group seem to have had some unwanted publicity during VHF NFD when they found themselves in the middle of a demo. on some non-radio matter — Rent-a-Mob is everywhere! For details of the club and its doings in September/October, contact the Hon. Sec. — see Panel.

On to **Guildford**, where the venue is the Model Engineer's Club Hq in Stoke Park; on September 10 they will be discussing both HF and VHF contest arrangements for 1983, but we don't have the latest details on their other meeting.

Harrow now have some 128 members, who are to be found on meeting nights at Harrow Arts Centre, High Road, Harrow Weald. These are on Friday evenings, and we note September 3 as a talk on radio journalism, and on 10th the construction contest.

Wednesdays — the third one in each month, that is — are the main meetings of the **Hastings** club, at West Hill Community Centre, but in addition they are to be found every Friday evening having a chat night at 479 Bexhill Road.

We now go over to **Havering** where the September programme is something like this: September 1, "Recent Goings-On in the shack at G8IXC"; September 8, informal; September 15, G4ERX on the RSGB Mast-Planning Panel and its work; September 22, informal; September 29, a talk by Mr. L. Lambert on practical meteorology.

We must now prepare for the cider-apple season by heading for **Hereford**, and their Hq at the County Control Civil Defence Hq, Gaol Street, Hereford; they are booked in on the first and third Friday of each month.

We have a little run round the country now, heading first for EI and **IRTS**; this is the place for all the first enquiries about Amateur Radio in EI, and the details of various local clubs around the country. The group are saddened to record the death of EI4S, an old friend and amateur for some 50 years, who will clearly be much missed.

The next meeting of the **Jersey** crowd is at Communicare, St. Brelades, on September 8, subject not given. Details may doubtless be obtained from the Hon. Sec. — see Panel.

The move of Hq for the **Meirion** crowd seems to have been a great success with the attendance almost doubled; the first Thursday in each month at the Nannau Country Club, Llanfachreth, Nr. Dollgellau; September 2 is down for a Quiz, with GW3KOR doing the honours:

G8GAZ, the P.R.O. of the **Midland** club has some pertinent remarks to make on the matter of his trying to off-load his post at each AGM without success; however, he tells us that on September 21, G2RQ will be talking about the antennascope and other items of test equipment. The venue is their own place, 294A Broad Street, opposite the Birmingham Repertory Theatre.

Mid-Ulster will re-convene on the second Sunday in September at the QTH of GI4BAC, for the first of the winter meetings; this is



Some members of York A.R.S., G3HWW, aboard the yacht *Meander of York*. Les Mason, G4MIY, is soon to be /MM with her "gadding about the world chasing the sun for a couple of years or so". Les has done it before and as he built the boat himself, to quote again the words of G3WVO who sent us this photo, "who would dare to say home-brew is dead?" In the picture are, left to right, SWL John, SWL Jim, G6HJZ, G3WHH, G4ESU, G4MIY, G4EMA, G3WVO and G3FTS. The York gang are hoping to contact Les during his voyages, and anyone wanting a copy of the sked times for the /MM expedition can have one in exchange for an s.a.e. to G3WVO (QTHR).

a change from the usual first Sunday arrangement, specially to avoid the SSB Field Day.

Now we head for **Norfolk**, and that means the Crome Centre, Telegraph Lane East, Norwich, on Wednesdays. Our programme runs out at August-end so we suggest you either just visit "on spec", or that you contact the Hon. Sec. for the latest details — see Panel.

The **Northern Heights** crowd still seem to be happily settled at the Bradshaw Tavern, Bradshaw, Halifax, on Wednesday evenings. Programme details from the Hon. Sec. at the Panel address.

September for **North Wakefield** at Carr Gate Working Men's Club is mapped out like this: Thursday, September 2, the first AGM; September 9 the junk sale; September 16 club meeting, and September 23 a Natter Nite.

Down to the West again now, to **Plymouth**, and here we must refer you to the Hon. Sec. as the sheet passed to us gives no details of the venue; his address is in the Panel.

Pontefract next, and here we have Carleton Community Centre as the Hq; September 2 for G4DAX to talk about RSGB, and on 16th a talk by Malcolm Ramskill on industrial control systems. September 23 is down to the Hon. Sec. (they've nailed him at last!) and he is to bring along some films and add his own talk about power stations. September 30 is a night-on-the-air, and on October 7, the G4ISU talk is turned into practice when the gang go to Ferrybridge 'B' power station, where we have the whisper that shovels will be issued to them on the door!

Almost everyone knows of the work of **RAIBC** among blind and invalid amateurs and SWLs — if you know a potential member you should put him in touch with the Hon. Sec. — see Panel.

At **Reigate** the group meet on the third Tuesday of each month in the upstairs meeting room of the Constitutional and Conservative Centre, Warwick Road, Redhill, Surrey.

Rhyl will be found at the Rhyl Ambulance Station on September 9 for a normal meeting and 23rd for the AGM.

We now turn to **South Birmingham** who head for West Heath Community Association, Hampstead House, Fairfax Road, West Heath, Birmingham 31; the formal session is on the first Wednesday, but in addition the shack is open on each Thursday and Friday evening for operating.

On the first Monday in each month the **Southdown** group all set out for the Chaseley Home for Disabled Ex-Servicemen, South Cliff, Eastbourne. Details of what's on for September 6 may

be obtained from the Hon. Sec. — see Panel.

The new season of the **Spenn Valley** club starts at Old Bank Working Men's Club, Mirfield on September 2, with a night-on-the-air. On September 16, G3HCW will be talking about aeriels, and on 30th they have G3SDY to talk about operation in the /M fashion. The intermediate dates are down for a noggin-and-natter at the same spot.

The first and third Thursdays in each month are the ones for **Stevenage** with the Hq being at British Aerospace Dynamics, Plant 'B', in Argyle Way. September 2 sees a talk on RSGB by G3OUF, no less, and on 16th there will be a talk by G4BGP.

Turning now to **Stourbridge**, we note with some pleasure that they have gone back to using the rather nice cover for the newsletter designed by Nick Hingley; inside we find that they foregather on the first and third Mondays of the month at Longlands School; September 6 is down for a constructional evening and on 20th they have a talk on microwaves.

The **Sunderland** crowd are to be found at "The Brewery", Westbourne Road, Sunderland, bewailing the fact that its only output these days is RF signals! Find them there on Monday and Thursday evenings, and also on Sunday mornings at 10 a.m. On the first Thursday of September there will be a talk on RTTY.

There is now a club for the **Surrey Constabulary**; the present membership is 28, and membership is open to serving and retired police officers of this force, or civilian employees in the same categories. Details from the Hon. Sec. — see Panel.

The **Surrey** club is based on *TS Terra Nova*, 34 The Waldrons, South Croydon, on the first and third Mondays. Details from the Hon. Sec. — or just turn up!

At **Sutton Coldfield** they have a "Natter Night and Welcome" to new members on September 13, while on 27th there will be a talk on communication by satellites. The venue is the public library in Sainsbury Centre.

If you are within striking distance of Sittingbourne in Kent, the **Swale** club would like you to swell their numbers at Sittingbourne Town Hall; September 6 and 30 are the current dates.

Now to **Thames Valley**, which means the first Tuesday of each month at Thames Ditton Library Meeting Room, Watts Road, Giggs Hill, Thames Ditton. On September 7, G3TXF and G3SXW (ex-EP2IA and YA1R) will get together to give a talk about DX working.

Thanet have their home at Birchington Village Centre; September 10 is a talk on construction, and on 24th there is a talk on RTTY, which leads to the AGM on October 1.

There is a rather nice cover on the **Thornton Cleveleys** newsletter — a pity it doesn't tell us where the Hq address is, so we must refer you to the Hon. Sec. — see Panel.

Down at **Torbay** the Hq is at Bath Lane, rear of 94 Belgrave Road, Torquay, and the group have informals every Friday evening, plus one formal business-and-lecture on the last Saturday of each month.

A pity the **Tynedale** Hon. Sec. "missed the bus" for the August issue — and even when it did reach us we had an awful job to decide just which club the letter was from! Meetings tend to be irregular, and the next one is on September 14; the Hon. Sec. suggests a phone call to him at any time, which will give the latest details and venue.

The **UK Horizontal FM Group** seem to be going great guns, with members all over Europe as well as in the UK. Details from the Hon. Sec. — see Panel.

University of Kent at Canterbury club meet on Tuesday evenings during term-time, at the shack which is atop the highest hill in East Kent and contains gear for all bands from 1.8MHz to VHF. Details from the Hon. Sec. — see Panel.

We reckon that **WACRAL** must have had its best publicity ever in the correspondence we published in "Word in Edgeways"! The details of this group of Christian amateurs can be obtained from the Hon. Sec. — see Panel.

Wakefield have September 7 and 21 booked, the former for a "homebrew equipment evening", and the latter for a talk by G4DXA on interference. The Hq is at Room 2 (or 3), Holmfild

House, Denby Dale Road, Wakefield.

The autumn programme of **West Kent** starts with a Fox Hunt on September 17, starting from the Hq address at the Adult Education Centre, Monson Road, Tunbridge Wells. There are also informals on the intermediate Tuesday evenings at the Drill Hall, Victoria Road. Details from the Hon. Sec. — see Panel.

If you want to meet the **White Rose** crowd, then you must look for Moortown Rugby Club, Leeds, on any Wednesday evening, albeit the clubhouse facilities and bar are available to members every evening and Sunday lunchtimes.

A new Hon. Sec. takes over at **Wimbledon**, where the gang are to be found on the second and last Friday of each month at the St. John Ambulance Hq, 124 Kingston Road.

September for **Wirral** means September 8 and 22, for the two parts of a talk by G3LEQ entitled "Sun, Earth and Radio", at Irby Cricket Club.

Turning now to **Worcester** they will be at the Oddfellows Club on September 6 for an RSGB talk by G3VPE; then on September 20 they have a members' projects and natter evening at the "Old Pheasant" in New Street.

On Tuesdays the **Worthing** crew get together at the Amenity Centre, Pond Lane; September 7 is "Feedback on Field Day", and on 14th G8VEH shows a film of *Ragchew* in the making. September 19 is down for a members field day, and on 21st they will have some feedback on how that went down. On September 28, G4FUJ will be talking about Marine Electronics Today.

At **Yeovil** the group have Building 101, Houndstone Camp as their Hq; every Thursday evening. On September 2 they will have an RSGB tape on the history of radio, and on 9th G3MYM talks about how to build your own equipment; he follows this up on 16th by talking about how to wind your own coils. On September 23, G3DSS goes into the question of VHF receiver noise factors, and on 30th there is a construction night and committee meeting.

Our last stop is at **York** which means the United Services Club, 61 Micklegate, York, where the lads are booked in every Friday evening.

Deadline

The arrival deadline is as shown in the 'box' in the piece, and coincides with our publication day; thus you can recall that if your 'gen' arrives on publication day for, say, the September issue, then it should contain all the programme details, venue and so forth, for your *October* activities. The address, as always, is "Club Secretary", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.

Welsh Amateur Radio Convention

This year's Convention is to be held at the usual venue — Oakdale Community College, Blackwood, Gwent — on September 26. Doors open at 10 a.m. and admission will be £1. Refreshments will be available and there will be an interesting programme of lectures and films, plus talk-in on S22. Details from R. B. Davies, GW3KYA, QTHR (tel: Blackwood 225825).

Charles Denny, G6DN

The Fylde has lost one of the pioneers of Amateur Radio on the death of Charles Mark Denny, G6DN, who died on June 29 aged 90 years. He had held the call for many years, and was the Secretary of one of the earliest amateur radio clubs, the Newcastle-upon-Tyne Wireless Society, in 1911.

On the outbreak of the 1914-18 war he was a telegraphist in the Royal Navy; commissioned in the Royal Flying Corps on its formation, he was engaged in the development of early aircraft radio. Of recent years he had been President of the Thornton-Cleveleys Amateur Radio Society and will be sadly missed by the members, and his friends world-wide.

TESTING HF AERIALS

P. C. Cole, G3JFS

ALTHOUGH the aerial is probably the most important part of any amateur station its performance is always very difficult to assess, particularly at HF where one is primarily concerned with long distance communication *via* the ionosphere. Useful measurements of feeder matching, line losses and local radiation can be made with quite simple test equipment but the most important characteristics of an HF aerial — its gain and radiation pattern — cannot easily be checked. By all accounts it is difficult enough to make accurate measurements of DX signal performance on an aerial test range, so at best local tests of a backyard installation can only be used to establish that an aerial is working approximately to theory. Final evaluation must then be done by more practical means.

Perhaps the most practical way in which to assess a new aerial is:—

1. To use it over a period of time and judge its performance by comparison with, and in competition with, other stations. Even though amateur reporting procedures are far from ideal, especially in regard to signal strength estimation, one can soon build up a good idea of performance relative to other stations. Here, even the number swapping marathons, with their guaranteed 59/599 reports, give much useful information as there is a great variety of stations to work and lots of competition. It soon becomes clear that something is amiss if you are not collecting your share of these outstanding reports. (However it must be stated that operating technique does count for a lot in major contests and so the less experienced operator should not be put off by poor results under these conditions.)

STATION WORKED	RECEIVE		SEND	
	DIPOLE	L/WIRE	DIPOLE	L/WIRE
Y 31 PA	59	<u>59+</u>	<u>59+</u>	59
OE5CG	<u>59</u>	58	<u>59</u>	58
OZ1FKU/SM7	<u>59+</u>	59	59	59
ED3UV	57	57	57	<u>58</u>
CY1FG	59	<u>59+</u>	58	<u>59</u>
DF9AR	559	579	589	589
JF 2 KNT	<u>559</u>	539	<u>539</u>	no copy
PS8AEU	<u>579</u>	569	559	559

Fig. 2 21 MHz BAND

D 940

Fig. 2. Results should be clearly tabulated like these typical reports received in 21 MHz tests of a 150-ft. long wire and a full-wave reference dipole, both at 30-ft. above ground. These were from a series of tests to investigate various ways of feeding the long wire aerial. Final analysis of the large number of reports needed to reach any useful conclusions will be made easier if the best reports for each contact, here underlined, are 'picked out' with a textmarker pen.

2. To compare it regularly both on transmit and on receive, with another aerial used as a standard of reference. This can be a simple dipole or even a ground plane against which the effect of alternations and adjustments to the new aerial may be judged. Ideally, both aerials should have similar vertical radiation patterns, but as this may not be possible for most amateurs some inconsistencies in results must be expected. These are most likely to happen when band conditions are unstable and due allowance will have to be made for these, as well as for inaccurate reports, in the final analysis.

Aerial Changeover

Because of the wide, and often rapid, fluctuation in the level of signals propagated through the ionosphere the changeover from one aerial to the other must be effected quickly if an accurate comparison of their outputs is to be made. This can be done with a simple relay as shown in Fig. 1a, but the more versatile arrangement of Fig. 1b is to be preferred as it allows the rapid selection of either of the two aerials, or of a dummy load for tuning up the transmitter. It is important that the loading of the transmitter PA should be constant so, if necessary, separate couplers or matching units should be used with each aerial so as to avoid having to retune the transmitter when changing from one aerial to the other.

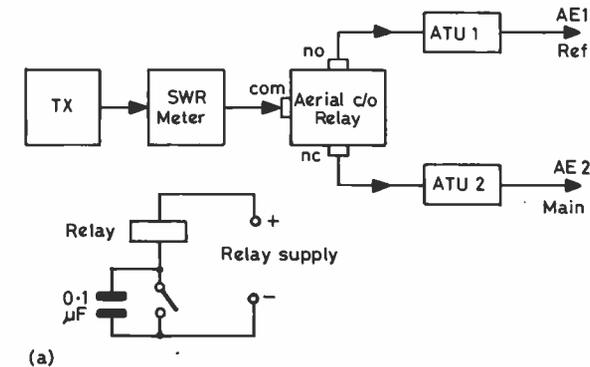
Results

Signal reports should be collected from as many different stations as possible and tabulated in some easy-to-follow form such as that suggested in Fig. 2. Final evaluation of these records will be made easier if the best report for each contact is clearly marked in some way, such as with a text marker pen. Other information, *e.g.* notes on band conditions, could be included to suit individual needs but it is better if the records are kept as simple as possible.

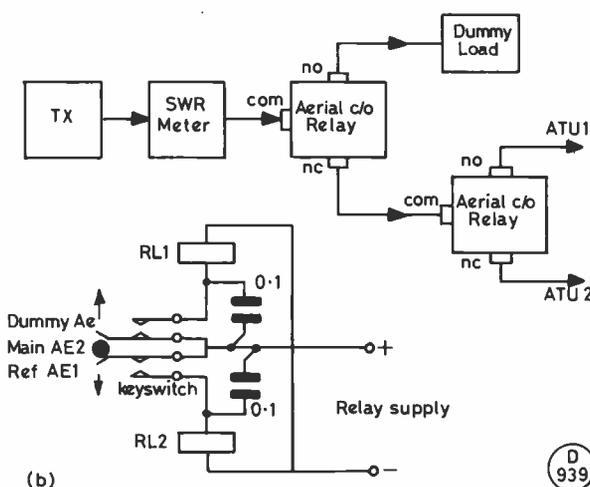
It must be appreciated that band conditions do affect the results at any given time so it is important that the collection and evaluation of reports is done with an open mind because it is very easy to convince oneself that the aerial which should in theory be the better one, is the best, when in fact it really isn't! The test procedure is, after all, only an elementary exercise in statistical analysis — averaging the results of a large number of observations — and as is well known, statisticians can prove anything if they want to.

In Conclusion

It is impossible to judge the performance of a new aerial by a single test and it should never be condemned because it does not give immediate good results. HF conditions are variable at the best of times but they can always be guaranteed to go through a particularly bad spell just as a new aerial is put up. Extended testing as suggested will quickly give a good idea of the general behaviour of an aerial and may avoid the scrapping of a system on the basis of a few bad reports during a spell of bad conditions.



(a)



(b)

Fig.1 AERIAL SWITCHING ARRANGEMENTS
(a) using a single switch and relay for simplicity and
(b) a more versatile system to include a dummy load.

D 939

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

THE general consensus of opinion about the conditions on our bands is that this has been the longest spell of 'duff' for years — G3NOF, for instance, says it is the longest since he started back in 1935, and both G2BON and G2HKU agree; indeed the latter has a word for the sheer depth of awfulness reached at times!

However, as always, if there is a will there is a way, and so we have had reports of contacts on almost every band and mode. And for the less stout-hearted who deserted the shack — more time for gardening and decorating! Dread to think what G3FPK's garden is like — consoling thought!

KV4AA

Readers will recall the somewhat hard things we have been saying about the *Guinness Book of Records* and their heel-dragging over the record number of contacts made by KV4AA each year recently: we have had four letters on this topic this month — and one particularly sad one. A reply from *Guinness Book of Records*, a letter from KV4AA, a note from W1WY; and a note in G2HKU's letter that KV4AA died as a result of a heart attack on July 30. Dick was one of the 'characters' of our hobby, and a very fine operator too — his steady signal on CW pounding in here was a model to all young operators of just what a good CW signal should be like and how it should be used — the operator always a jump ahead of the QRM. We shall all miss Dick Spenceley, KV4AA, and with good reason.

The Bands

On the low bands static has been the main nuisance, while 14 MHz and above have suffered as much as anything from plain bad conditions; indeed about the only band to have been worth trying here has been Forty, where some of the CW was strong enough to make the static less of a nuisance — but it wasn't rightly what you'd call *DX* working!

Top Band

G4AKY (Harlow) mentioned in conversation that he had actually been sufficiently off-put to once go QRT and earth the aerial, and once to QSY to 14 MHz — this last occasion we suspect he was in the doghouse and just *had* to stay in the shack! Anyway, the CW managed to find LU9EIE, OK1JDX/P, OL5BEG, OL8CNT, OL2VAG/P, OK1KPA, OL4BDY, OL4BEW, OL2VAG, UA3RAU, UA3YAJ, EZ4CCB, UT5AB, EZ5FAI, EZ3FCM, UA3QGO,

UK5IBM, SM6LAZ, SM4KL, SM3CRY, SM7ABO, SM5FUG/OY, SM7WI/OY, EA7BDL, EA3VY, EZ7AAF, WA2SPL, LZ1KSN,, C31JX, PY1MAG, PY1DOQ, PY1ZAE, GI3OQR, GI4MCV, OZ7HAM, and OZ1APA. Heard but not worked, VE1CER, and known to have been on the band but missed included VE1SPI, CX8IB, PY7WAD, 5B4PW, and HZ1AB. Both VE1CER and VE1SPI were calls from the group who went to St. Paul Is., *not* Sable. QSLs to Garth Hamilton, VE3EUP.

Our other Top Band reporter is G2HKU (Minster, Sheppey) who offers his Sunday morning SSB with PA0PN and PA0RTR, plus CW contacts with SM5ACQ/OY, SM6EHY, and SM0AJU.

Futures

Firstly, the noises about a ZA Albania operation continue unabated. EA8AK and a group are at one end, and EA8AK himself is reported as having been in Tirana recently for further negotiations; and OH2BH reported to *TDXB* that two Albanian nationals are to visit him in the autumn to be trained in the tricks of the trade, after which they will return to ZA with a complete station in their baggage — this seems to be a change from the original plan for the OHs to do the training on the spot in ZA. We recommend a lifted ear on this one and its possibilities, just ten years after the last legal operation which signed ZA2RPS.

China operation continues, albeit on a somewhat low key; and we hear that possibly a BY7 callsign might be added to the ranks. Word goes round that the first BY1PK QSL cards are appearing, too.

If you haven't yet worked the S.M.O.M. station 1A0KM for a new country, then keep the ears alert this month, around weekends — the *TDXB*, taking its cue from I0MGM, known to be a sound source of gen where this one is concerned.

We hear a little buzz that plans are afoot for Malpelo — but no need for panic as it's not likely before 1983, and autumn at that!

Turning to history, although many have worked YI1BGD, YI1AS and LU3ZY, none of them seem to be very forthcoming with the QSL cards; the last-named was patently a pirate, despite his political acceptance by ARRL for DXCC, and we suspect that numbers of people who think they worked a YI in fact were entertaining a pirate.

Turning to Geoff Watts, he has it that FB8WG is to be found from noon zulu

daily, around 14010 to 14020 kHz, his QSL address being F2CL. Geoff also notes that while the BY1PK cards are being accepted, the JA1DNG/YI and DF8MP/XZ ones are not acceptable for credit.

“CDXN” deadlines for the next three months—

October issue — September 2nd
November issue — September 30th
December issue — November 4th

Please be sure to note these dates.

Eighty

Only two reporters on this band — not very surprisingly in view of the noises from the heavens. As far as the writer was concerned, even on the dummy load, while experimenting with an LED tuning indicator, we found the thing was being shock-excited almost continuously, and eventually we ended up going right to the upper end of Ten and using a calibrator signal. Even with the protective diodes in the headphone leads it was hard going on Eighty, and with only one working lug-'ole (and hence no spare!) we are inclined under these sort of conditions to give it best!

G2NJ (Peterborough) mentions the cracking signal put out by G3PKS from the latter's /A station at Kenilworth. Nick also mentions a QSO with an SM maritime mobile; and a bit farther away YO4CTO/MM, Roel, was worked near midnight one night when the ship was near S.W. Africa.

G3PKS wrote a most interesting letter about what he called his 'antics' on the bands from Kenilworth. The most notable thing about the /A site was the low level of local noise. For aerial, Jack had two 145-foot pieces of wire hung from the bedroom window-sill, with the far ends tied to 4' 6" fence posts, to give an *average* height of about seven feet. The site, of some ¾-acre, was well enclosed with tall trees and houses. This set-up, centre-fed from a Z-match was used for the first week, but on the second, the far ends were brought together to form a multi-sided loop, with a series capacitor in one leg of the feed; results for the two configurations were virtually similar. Looking at the log of contacts, the aerial mentioned, used with the old HW-101, seems to have yielded

contacts at good strength all over the U.K. and lots of Europe, between Edinburgh and Penzance and including one on Eighty with G3NOF.

Ten

G4LDS (Chelmsford) was having to replace the wooden shack floor due to rot at the time of his letter, so his 'shack' comprised one chair for him to sit on and one for all the gear to be piled on so as to keep G4LDS on the air! Not much was recorded in the way of 28 MHz QSOs, but Chris does mention DJ0FL, I5KAP, DL3MBH/HB0, and PP7GAG.

G3OUC (Newbury) makes a welcome return; Pat uses a home-brew rig mobile with some 15 watts p.e.p. output into a one-metre length centre-loaded whip on the roof rack of his Ford Escort. Mainly the short-skip, of course, but some DX; we note UK9UCZ, PR7SM, RK7PAL, YU2LH, K4AGI/MM (which was the missile tracking station ship *Redstone* off Cape Canaveral), AM1BPT, 4Z4QK who came back to a CQ on a dead band, UA3TDX/U6F, AM01ACH, PY7AW, GI4MKC, and lots of DLs and SMs. Several times while working into Europe, Pat has had CB-ers call his contact, but in most cases the continentals told the pirate to QSY back to 27 MHz; one of these piratical types was using the call UK6! SM6LRR was a sufferer from this sort of thing and was being QRM-ed deliberately by the CB-er after he had very pointedly told the chap to go back to his 11-metre lump. On a different tack, G3OUC enquires as to whether anyone else has noted the QSY of CB-ers to the area of 6.66 MHz SSB — we in turn wonder just when the authorities are going to take some action on this problem.

We have two letters from G4HZW (Knutsford); the first one is dated March 2 and deals with his June DX (crystal ball?), and the second one covers the period of this piece. In the first letter, Tony notes the typical June conditions, with some openings to Africa and South America and long-path openings twice to VK, plus the usual short-haul European contacts. Turning to the second letter, in July he noted openings to Africa and South America, short openings to East Coast Ws, one opening to UAO-land, one super *Ar* opening, and of course the short-skip Europeans. This came to 5H3DM, PY7EC who was QRP with 6 watts, ZC4GO, YV5HYV, KA1IK at 2300z, HC1EA, UL7QF, UAØSAU, UA9HAB, VE1SPI (St. Paul expedition), A4XIU, 9K2BE, TYA11, SVØAU, RH8HCV, and 9U5JM. Among the auroral signals noted on July 13 GB3SX was RS52A, and G3WFM was worked; the event petered out and then re-appeared around 2300 until midnight, with EI5EF, G3UUUV, EI8DO, GM4HRJ, with all the usual beacons audible by *Ar*, except that LA5TEN was strong but not auroral.

G2BON (Aldridge) mentions just two QSOs on Ten: 6W8AR for breakfast and TYA11 for tea!

G4MVA (Scarborough) says there's not much happening on the band unless you happen on an opening, which in Glynn's case meant contacts with UD6FDY and HG5A, with 4U1ITU heard but calling CQ DX, and so not hailed.

We have already indicated what G3NOF (Yeovil) thought about the current spell of conditions; Don noted the odd opening to here and there, including one to W4 on July 17, but he didn't think it good enough to fire up the rig and make any contacts.

Our last reporter on this band is G3PKS/A, who used the aerial set-up already mentioned to work 4N4LL who gave Jack a 599 report and a couple of SMs who faded out during the QSO, after exchanging reports, and were never found again.

What About 7 MHz?

G2HKU took a little time out from the static and the gardening to work his SSB out to UL7PBE and EA9KN, while the CW worked UM8PAC.

Just a couple of contacts are offered by G2BON (Aldridge), both SSB, in CP6EL and WB8ZJW/8P6.

A really good band from about 2130z onwards, says G4MVA, though he admits a good filter does help with the unwanted noises. Glynn doesn't say so but we assume he used CW to work LX2TN, EJØRTS on Aran Island (not Arran which is in GM, and which was an IRTS effort), GB4FIR who was running 5 watts to a long-wire from the Shetlands, JW6MY who called CQ for quite a while after the QSO with G4MVA but got no takers for Svalbard, F61PA/3A, CX5AO, 8P6JA, LA5EBA/OH0, and VQ9XX; plus a good crop of gotaways including VE1CER/1 on St. Paul — which must have caused a spot of wailing and gnashing of teeth.

The odd aerials of G3PKS/A seem to have managed to cover most of Europe at good strengths, both on SSB and of course the favoured mode of CW. Whatever the rights of it, the low local noise pleased Jack no end and he says "I don't wanna go home!"

Here & There

First a note from W1WY who notes that in the 1981 WPX contest results the CW section gremlins somehow got in and deleted G3FXB's single-op all-band score of 1,902,930 from the World listings, in which he should have appeared at 8th high. Congratulations to G3FXB.

We turn now to a release about the Kansas DX Association's 'Buffalo Award', for which you are to be resident outside U.S.A. Work some 20 Kansas stations, plus five members of Kansas DX Association, contacts to be dated

September 1, 1980 or later, using any amateur band or mode. Applicants to submit normal log information, QSLs are *not* required. A list of the 80 members of Kansas DX Association can be obtained for an s.a.e. and one IRC; the award application should be sent, with 4 IRCs or one U.S. dollar to: KDXA, Box 454, Salina, Ks 67401, U.S.A. The award is open on a similar basis to SWLs.

That 'Four Points of Scotland' expedition we mentioned recently has now sent in details of the Award. Class 1 requires confirmed contact with all four locations, and Class 2 confirmed contact with at least one of the locations. Applications to include date, time GMT, frequency — plus IRCs as follows: overseas (surface mail) 4; overseas (air mail) 8; U.K., 60p in stamps. All QSLs are to go *via* RSGB's Bureau. If you want any more details, GM3ULP is the man.

Two reporters mention with some disgust that KA0NEX/MM, on a Viking sailing ship, which has had wide publicity in the press in Holland and the rest of Europe, has all but failed to even rate a mention in this country, saving for a corner note in one of the sailing magazines. It's a bit off that someone who goes genuinely venturing should not be given some publicity in the general media.

Twenty

G3PKS/A clearly gave his new aerials a work-out on most bands; for 14 MHz CW we notice a UA4, and LZ1LKR, the latter notable for an outgoing report of 529 while the G3PKS HW-101 clearly rated the 599 it got. Perhaps the LZ was using QRP.

As far as G2HKU went, the QRP CW rig managed to get out to VK3VJ with four watts, while the big rig, again on CW, took in OY7ML, WA6CLK, AM2AKB/VI (?), W9KNI, IT9AF, UM8PAC, FM7WD, VK5YD, VK3YW, ZL4CO, and FØFWW/FC. That left the SSB mode to deal with LZ3FV and KA0NEX/MM, the Viking ship *Hjekomst* just mentioned in this piece.

A nice long SSB list comes in from G2BON; Tom made his number with WB6LED, KA5KZF, HC1CP, KA5LBM, ON6BC/ST4, TI2CCC, KB5FY, K5QY, both in Texas, WB8ZJW/CP6, KØVCD, TG9EW, 4X4VE, 9K2BE, VK9YA (Cocos-Keeling), VK2LX, CPIOX, NP4FR, KA0NEX/MM, V2AZE, and VK1WB.

A new aerial has gone up at G4MVA, the animal the books call a 'guy wire doublet', which in essence is a 14 MHz dipole fed with 300-ohm ribbon and loadable quite nicely on 14/21/28 MHz. This yielded N5RM/C6A, EM1W, 4S7WP, K5YY/8, KT5B in New Orleans, HV1CN, DL7HZ/IMØ, DK3GI/HK1, K6CYX for a first Californian QSO, FC9UC, FM7WD, and UG6GDS, not to

mention various contest QSOs.

The two chairs at G4LDS seem to be holding up the works while the shack floor gets its rebuild, with 4X6GE, IJ7ET (St. Peter Is.), DL3MBH/HB0, XE1FFA, 9Y50FS (=9Y45S), VK5QV, VU2MKS, UK2DAR, 7X5KCG, OA4AEW, VK3DN, VO1FG, JL1LTO, JA9YBA, VK3VQ, VK5OU, and VK5BZA.

Just a very brief note from G3NOF; Don says that he has heard little on this band, and found conditions poor. As for the morning openings they have been well down on previous seasons. Hence, no QSOs to report!

21 MHz

A rather chuffed letter comes in from G4FPB in Wallasey. Colin had been firmly screwed to the paint-pot for some days, while in the shack, and tempting him, were some 100 watts of DC input, with a Joystick hung vertically from the picture rail fed through a Partridge ATU and about 8 feet of feeder. On the evening of June 25, after a heavy evening, a quick spin round at 2045z raised WB3FKP for a good QSO despite much QSB on CW, and it was followed by another with PY4AZ. On the following evening it was later before Colin got into the shack, and at 2140z it was PY2CQM who came back with a nice 579 report. Then, under rather poorer conditions, on the evening of July 3, PY2ZEB was worked. In view of the

punk band conditions we have been having of late, this is a timely reminder that the simpler rigs of some years ago are still well able to hold their own when driven well.

G2BON offers JA4QVO/MM in the Indian Ocean, EA9KQ, JH4JWI, PP2ZDD, EA9KN, and P29WT.

As a result of the new aerial, G4MVA now has the choice on 21 MHz of using either the 7 MHz inverted-V or the new ribbon-fed device. Glynn used them to net FP8EA, TI2TAO who was very quick with the return QSL card (*via* Box 772, San José), a long QSO with YV6ABM, OZ7GI/5N9, 9VITL, SP5IXI/OE6 who wants his QSLs *via* PA0NOL. In the contests, Glynn tripped over 9K2BE, UD6, UF6, UI8, VE1SPI, and SL5ZZQ.

On to G4LDS who offers VE7DGI, PY4BB, ZP5ZAL, W2QWS, 5NØATW, OEs, DJ5GI/EA6, UA6NQ, EA9KS, A4XGI, F6BJY/ST2, KD4UH, WA4FBH, AP2SQ, VE3KTT, JA2YKA, JA0WRF, TU2JD, VS6CT, A4XJO, VS5GA, A4XYB, OH6VM/OHØ/P, an assortment of Ws, G14MMM, 5N8HEM, and C53CC.

10 MHz

Almost forgotten again by the reporters, sad to say; but it is nice to hear again from G4CCB (New Ollerton), who writes to comment on the modification to the KW-2000A for 10 MHz, as written up

in May *Short Wave Magazine* by G3JFS. Tony set to work on his '2000A and did the mod, the only differences being to change the oscillator coil LX4 to 13 turns and capacitor CX1 to 15 pF, as the original ones seemed to be resonating at about 16 MHz according to the GDO. All the other coils dipped nicely at 10.1 MHz and needed little setting-up. Perhaps the change needed to Tony's crystal oscillator coil and capacitor were the result of some change in the production run of this long-lived equipment, but anyway the results have been pretty good. With a KW trap dipole, and an E-Zee Match on the LF tapping, things loaded up nicely and the very first venture on the band brought back VE1CEG. Subsequently, QSOs were made with VE1ASJ, VE1BHA, VE1CEG, VO1AW, VE2DLC, VE2KN, VE3CKR, VE3QU, VE3UT, VE3WQ, VK3MR, ZL2AWW, ZL3AAM, and ZL3GQ.

Finis

That's it for another month; reports have been a bit sparse for the past couple of months, doubtless due to conditions; but we would like to have *more*, both from New Chums and OT's. The dates are in the 'box', and are to arrive, addressed to 'CDXN', SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ. And — where's that autumnal lift, then?

“A Word in Edgeways”

Letters to the Editor

The views expressed here are not necessarily those of the Editor, nor should they be taken to represent any particular SHORT WAVE MAGAZINE policy.

Dear Sir — With regard to the letter from Peter Jackson, G3ADV, in the August issue of *Short Wave Magazine*, I am “the gentleman” he so kindly refers to. And indeed, when I have heard an amateur discussing an aerial problem he or she has (TVI, RFI etc.), I have sent literature containing a guide on TVI — often with a note suggesting possible ways of curing their troubles on their existing installations — without thought of selling them one of my aerials.

The “sheaf of literature” referred to contains information on how anti-TVI and anti-QRN properties are achieved; there is one of the nineteen pages sent showing costs of ready-built aerials. Mr. Jackson has written to me pointing out that I have sent him three lots of literature in twelve months — so I must have heard him with troubles three times during that period!

I do not spend all day, every day, monitoring for QSO's concerning aerial problems, but I have been able to help many amateurs, both newcomers and OT's, in the true spirit of Amateur Radio, and I have had many, many, letters containing their thanks (and the 22p postal costs refunded). I do not deny that I have also sold an anti-TVI aerial now and again, with improved results — as the copy testimonials, enclosed with this letter, bear out.

R. Benham-Holman, G2DYM

Dear Sir — I became acquainted with your magazine a few months after moving to the U.K. A friend from the U.S. asked me to get him the December, 1981, issue containing *Part II* of G3ROO's article on the “Tunbridge” transceiver. While in London on business, my friend had read *Part I* of the article and was much impressed by the “Tunbridge” design, and wanted to build one. I read your magazine before sending it on to my friend, and have since become a regular reader.

In April, on rather short notice, my family and I decided on a holiday trip to Guernsey, and some friends suggested that I should operate from there. As there would be no room in the car for my large transceiver, I called George Dobbs, G3RJV, of the G-QRP Club to see if he could help out with a QRP rig. George referred me to G3ROO, and Ian kindly sent me a 10 MHz CW version of the “Tunbridge”.

I operated this transceiver, using the lamp-cord dipole that Ian suggested, from Cobo Bay as GU5EFL/A from 7th to 14th April. Seventy-one contacts with 13 countries resulted. For those interested in statistics, the breakdown by calls was: DJ-DL, 21; EA, 1; F, 3; G, 14; GI, 1; GM, 4; HB9, 5; LA, 4; OE, 5; OK, 3; OY, 1; OZ, 3; PA, 6; heard but not worked, GD and HBO.

Ian Keyser's transceiver was a pleasure to use, bringing in fine reports. I enjoyed myself so much that I joined the G-QRP Club, and hope to build a transceiver soon.

Please continue to print more projects by designers of Ian's calibre.

Larry Cohen, G5EFL

Dear Sir — Is there such a thing as a “not QSL” Bureau? Some while ago I was touched to hear about hundreds of QSL cards languishing uncollected in sub-bureaux, each representing a disappointed amateur or SWL. Accordingly I sent off a few envelopes — and have uncovered the operations of as motley a bunch of pirates as ever sailed under the Jolly Roger.

Chief offender seems to be a “Trevor” who swans about mobile in an effort to avoid capture — but there are several others.

I have informed Waterloo House, but only for form's sake: there is not a lot they can do. How about *S.W.M.* offering a certificate with a difference; to any station or SWL who can glean information from overheard QSO's to sink a pirate?

Ian Moth, G4MBD

Dear Sir — Although I read with pleasure the praise of G4HLJ for my humble ramblings in the pages of this learned journal, may I

point out to him that the only way that I, a Church of England clergyman, can enter the Peerage is by being made a bishop. May I suggest he speaks to people in higher places about this matter — although reading the recent letters on this page relating to Christians and their supposed status in certain amateur radio circles, perhaps he had better not seek my preferment.

Sadly, like convicted felons and the certified insane, I am also barred from entering the House of Commons. It's easy for some of us to be humble.

Rev. George Dobbs, G3RJV

Address your letters for this column to “A Word in Edgeways”, SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.

COURSES FOR THE R.A.E., 1982-83

Barking: Barking Radio & Electronics Society, at the Westbury Recreational Centre, Westbury School, Ripple Road, Barking, commencing in October, Mondays 7-10 p.m. Morse classes on Tuesdays. For full details contact Alan Sammons, G8IZN, QTHR (01-594 2471).

Borehamwood: De Havilland College, Elstree Way, Borehamwood, Herts. (01-953 6024), Mondays 7-9 p.m., commencing Sept. 27, enrolment 2-8 p.m. Sept. 13/14. Lecturer, G. L. Benbow G3HB.

Bracknell: Bracknell College, Church Road, Bracknell, Tuesdays 7-9 p.m., commencing Sept. 21. Course tutor, G. Readman.

Bristol: Thornbury Adult Education Centre, The Castle School, Park Road, Thornbury, Bristol, class starts Sept. 28, enrolment Sept. 16. Further details from course tutor, Alan Jones G8AZT (Thornbury 416381).

Canterbury: Canterbury College of Technology, New Dover Road, Canterbury (0227-66081), course commences Sept. 20, enrolment 8.30 a.m. to 7 p.m. Sept. 13. Lecturer, D. J. Bradford, G3LCK.

Dudley: Dudley College of Technology, The Broadway, Dudley, West Midlands, Tuesdays 6.30-8.30 p.m. enrolment and class commencement Sept. 7. Course lecturer, J. R. Raby G8RF.

Durham: Contact J. Greenwood, G3ZJY, QTHR (tel: 0385-66773).

Farnborough (Hants): Oak Farm Centre, Chaucer Road, Farnborough, Hants, commencing Sept. 23, enrolment Sept. 14. For further details ring 0252-515045.

Hastings: Hastings Electronics & Radio Club, commencing in September. Further details from Ron Fulton, G8BUD, Hastings 752877.

Hemel Hempstead: Dacorum College, Marlowes, Hemel Hempstead, Wednesdays 6.30-9.00 p.m., starting Sept. 22, enrolment Sept. 6. Course tutor, C. B. Burke G3VOZ. Further details from the college, ring 0442-63771.

Hoddesdon: East Herts. College, Turnford, starting in Sept. details from Jim Sleight G3OJI (Ware 4316), or the college (Hoddesdon 66451).

Kirkcaldy: Glenrothes & District A.R.C., Balwearie Community School, Kirkcaldy, Tuesdays (Morse) and Thursdays (Theory), enrolment 7-9 p.m. Sept. 20.

Leamington Spa: Mid-Warks. College of F.E., Warwick New Road, Leamington Spa, Thursday evenings, starting Sept. 16. Enrolment Sept. 2/3 9-12 a.m., 2-4 p.m., or 6-8 p.m.

London (Beckenham): Beckenham Adult Education Centre, 28 Beckenham Road, Beckenham, Kent, Morse only, course starts Sept. 21 at 7.30 p.m. Course tutor, Steve Palmer. Ring 01-650 1383 or 01-650 4208 for details.

London (Islington): Organised by Grafton R.S. and Islington Institute, at Starcross School, Rising Hill Street, London N.1, Mondays 6.30-9.30 p.m., starting Sept. 20/27. For further information contact course lecturer, B. C. Bond G3ZKE (QTHR or 01-485 7065).

Manchester (Swinton): Pendlebury High School, Cromwell Road, Swinton, Thursdays at 7.30 p.m., commencing late September, registration details available early Sept. from course tutor, P. Whatmough G4HYE, 061-794 3706.

Melton Mowbray: Melton Mowbray College of F.E., Asfordby Road, Melton Mowbray, Tuesdays 7-9 p.m., enrolment Sept. 1/2. Details from the college or course tutor, K. Melton G3WKM (Melton Mowbray 68810).

Newcastle-upon-Tyne: Gosforth Adult Association, Gosforth Secondary School, Gosforth, Newcastle-upon-Tyne, Tuesdays 7-9 p.m. starting in Sept. Course tutor D. R. Loveday, G3FPE. Enquiries to The Principal at the above address, or ring Newcastle 668439.

Northampton: Duston Upper School, Tuesdays at 7 p.m., commencing early Sept. See local press for details.

Northampton: Kingsthorpe Upper School, Mondays at 7 p.m., commencing early Sept. See local press for details.

Redhill: Reigate & Banstead Adult Education Institute, Redstone School, Redhill, enrolment Sept. 7 at Castlefield School 7-9 p.m. Further details from course tutor, J. H. Backus, Reigate 40574.

Seaton: Axe Vale Adult Education Area, St. Clare's Centre, Fore Street, Seaton, East Devon, Thursdays at 7.30 p.m., starting Oct. 7, enrolment Sept. 21. Course tutor, G. R. Smith G8AOJ. Further details from the Warden, 0297-21904.

Slough: Langley College of F.E., Station Road, Langley, Slough, Thursdays 5.30-7 p.m. (Operating Techniques) and 7-8.30 p.m. (Morse), Wednesdays 7-9 p.m. (Theory), enrolment Sept. 7/8 12.30-8 p.m. Contact senior lecturer, E. Palmer G3FVC, for further details (Slough 49222).

Stevenage: Stevenage & District A.R.S., starting in the autumn, details from Terry Bailey, G6CRF, 187 Archer Road, Stevenage, Herts.

Welwyn Garden City: De Havilland College, Applecroft Centre, Applecroft Road, W.G.C., Thursdays 7-9 p.m., starting Sept. 30, enrolment Sept. 13/14 2-8 p.m. at De Havilland College, The Campus, W.G.C. (Tel: W.G.C. 26318 or 31344). Tutor G. L. Benbow G3HB.

Westerham: Course to be held at Charles Darwin School, Jail Lane, Biggin Hill, Westerham, Kent. enrolment Sept. 14 7-9 p.m. Course tutor, R. W. Jones G3YMK.

Wirral: Burton Manor College, Burton, South Wirral, Cheshire, introductory short course only, Feb. 4 to Feb. 6 1983, tutor D. J. Bradford. Ring college for details, 051-336 5172.

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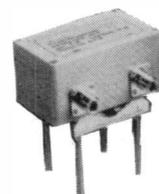
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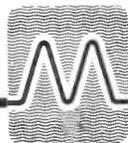
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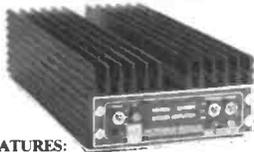


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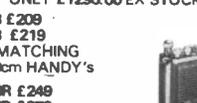
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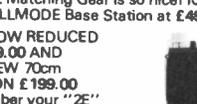
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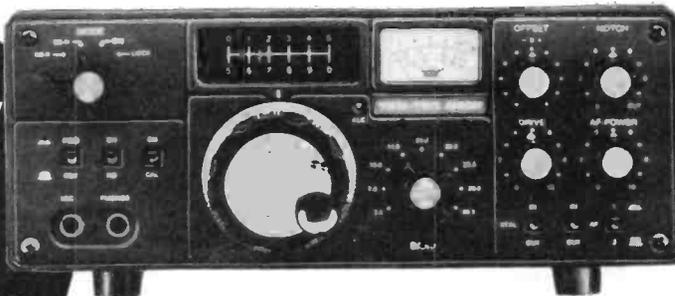
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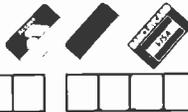
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R2	4.0291	8.0583	12.0875	14.9944	18.1312	44.9833
R3	4.0298	8.0597	12.0895	14.9972	18.1343	44.9916
R4	4.0305	8.0611	12.0916	15.0000	18.1375	45.0000
R5	4.0312	8.0625	12.0937	15.0027	18.1406	44.0083
R6	4.0319	8.0638	12.0958	15.0055	18.1437	45.0166
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S8	—	—	12.1000	14.9444	18.1500	44.8333*
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S16	—	—	12.1167	14.9667	18.1750	44.9000*
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S18	—	—	12.1208	14.9722	18.1812	44.9166*
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	6	10	1.50 to 1.999MHz	£4.75 £4.40
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	8	10	2.60 to 3.999MHz	£4.55 £4.10
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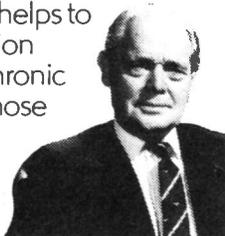
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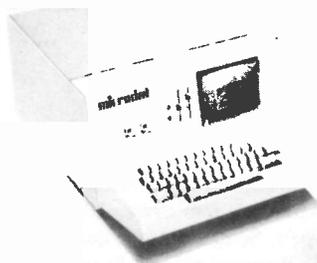
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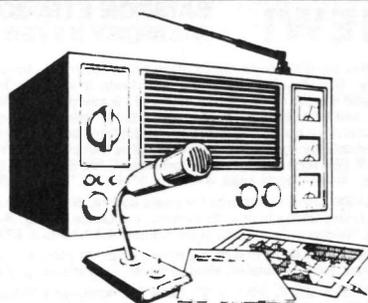
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October issue: due to appear September 24th. Single copies at 80p post paid will be sent by first-class mail for orders received by Wednesday, September 22nd, as available.—Circulation Dept., Short Wave Magazine, 34 High Street, Welwyn, Herts. AL6 9EQ.

Selling: TS-830S and SP-230, £550. Trio R-1000 Rx, very good condition, £195. Daiwa CN620A cross-power/SWR meter, £40.—Chalkley, G4BXR, QTHR. (Tel: 0908-566266).

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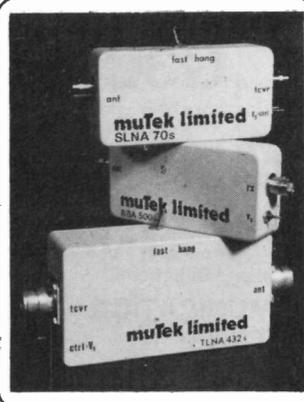
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