

RADIO

TODAY

OUT OF THE ORIENT

1st review of the latest HF rig from Kenwood

Bearcat low-cost channel scanner on test
Magnetic Loop Aerial construction project



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24-page SATELLITE TV SUPPLEMENT



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Come and see the NEW ICOM IC781 HF Professional transceiver with built in Band Scope, Auto ATU and PSU, the new KENWOOD R21 Mobile Scanner, the new YAESU VHF Base Station and Mobile, and the new FOX mobile Scanner . . . because of our purchasing power and overseas contacts we get the new models first! And offer the best introductory prices!

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YAESU

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Raycom offer our own improved version of this fabulous HF-UHF transceiver, we fit a small SMD chip component mod board in the VCO to improve the RX dynamic range by up to 20dB, FOC when purchased new from us. If you are lucky enough to own the FT767 already, send your unit + £59.50 and we will fit it for you! (inc. return carriage). Also available at some Yaesu dealers. **YAESU HAVE ADOPTED OUR UP-GRADE IN CURRENT PRODUCTION MODELS.**

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- Yaesu FRG9600/RWC MK3 HF 100KHz-950MHz plus Mk2 Spec. £595.00
- Yaesu FRG9600/RWC Mk5 HF 50KHz-950MHz Active Mixer £625.00
- Icom ICR7000 25M-2GHz superb quality professional Rx £859.00
- Icom ICR7000/AH7000 Receiver plus Matching Discone £937.50
- Kenwood R21 New 25-905MHz Mobile Wide and Narrow AM/FM POA
- Fox VHF-UHF Multi Function Mobile Scanner FM only £139.00
- Uniden-Bearcat UBC 50XL VHF-UHF 10ch. H/held Scanner £99.50
- Uniden-Bearcat UBC 70XL VHF-UHF 20ch. Miniature H/held £199.00
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- Uniden-Bearcat UBC 175XL VHF-UHF-Airband Desk-Top £175.00
- BJ200 Mk2 VHF-UHF-Airband-Military Airband H/held £220.00
- AOR 2002 25-550, 800-1300MHz Desk-Top/Mobile AM/FM £469.00
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SHORT WAVE RECEIVERS

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- Yaesu FRG8900/FRV8900 as above with VHF Conv. fitted £679.00
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- Sony 2001D Short Wave/Airband DE IIXF RX with ANI kit £395.00

Many more makes and models in stock, PLEASE CALL FOR PRICES. DELIVERY COSTS and any advise or information, or send large SAE. (Insured post and packing £10.00. Carrier £12.50).

HANDHELDS

* = Extended Receiver coverage available, call for details.

- YAESU FT727R/FNB4A 2.5W (5W) DUAL BANDER. C/W CHRGR £395.00
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- *YAESU FT73R/FNB10 2.5W (5W) 70CMS C/O CHARGER £259.00
- *ICOM MICRO 2E 2.5W 2MTR HANDHELD WITH CHARGER £209.00
- CTE1600 (SAME AS ICOM IC2E) C/W NICAD CHARGER £179.00

Many other types of handheld stocked, please enquire.

PORTABLES

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- FT690RMK2 6MTR 2.5W MULTIMODE STANDARD ACCES. £429.00
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- FT790RMK2 NEW 70CM 2.5W MULTIMODE DUE OUT SOON £499.00

MOBILES

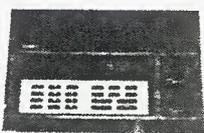
- YAESU FT211E 45W 2MTR MOBILE WITH FREE 1/4 WAVE ANT £299.00
- YAESU FT212RH NEW 45W 2MTR MOBILE DVS FEATURE OPT. £349.00
- *ICOM IC28E 2MTR 25W MOBILE WITH FREE 5/8 ANTENNA £359.00

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Opening hours 9am-5.30pm 6 days, late nights Thursday & Friday till 7pm.

SCANNERS

Bearcat by uniden



UBC 175XL



UBC 100XL

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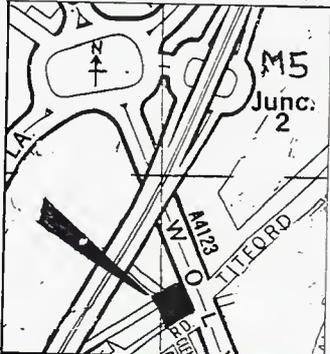
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HAM RADIO CONTENTS

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ICOM

THE NEW



IC-761, HF TRANSCEIVER with General coverage receiver.

The new ICOM IC-761 H.F. Transceiver has many features making it probably the best top of the line Amateur transceiver available today. This all mode transceiver features an internal tuning unit and A.C. power supply. The A.T.U. boasts a 3 second band selection and tune up with a VSWR matching of less than 1.3:1. For the serious operator the 100kHz-30MHz general coverage receiver and 105dB dynamic range make it ideal for DX chasing. Frequency selection is by the main VFO or via the front panel direct access keypad. And for when reception is difficult, pass band tuning, I.F. shift, notch filter, noise blanker, pre-amp and attenuator should enable you to copy even those weak DX stations whether amateur or broadcast. The C.W. operator will appreciate the electronic keyer, 500Hz filter and full break in (40wpm) other filter options are available. The IC-CR64 high stability crystal is standard as is the CI-V communications interface for computer control. Twin VFO's and split mode for cross band contacts, the IC-761 features program scanning, memory scan and mode select scan and the 32 memories can store frequency and mode. The transceivers operating system is held permanently in ROM and is not dependant upon the lithium battery. The cell is used for memory back up only. A new style meter gives P.O., A.L.C., IC, VC, COMP and SWR readings.

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FACE OF HF.

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IC-751A.

Features:

- All mode.
- 100kHz-30MHz General Coverage Receiver.
- 100 watts.
- 12v Operation.
- 105dB Dynamic Range.
- 32 Memories.
- Electronic Keyer.
- Full Break In (40wpm).
- 500 Hz CW Filter.
- HM36 Microphone.

IC-735.

- Small Compact Size.
- 100kHz-30MHz General Coverage Receiver.
- 100 watts.
- 105dB Dynamic Range.
- FM Standard.
- 12v Operation
- Large LCD Readout.
- 12 Memories.
- CI-V Communications Interface
- HM12 Microphone.

STOP PRESS. Later in 1988 Icom are launching a terrific new HF transceiver, similar in size to the IC-735 but simpler to operate. This new HF rig is also realistically priced and aimed at a large section of Ham operators. The introduction of this new HF transceiver emphasises Icom's positive approach to market requirements.

Helpline: Telephone us free-of-charge on 0800 521145, Mon-Fri 09.00-13.00 and 14.00-17.30. This service is strictly for obtaining information about or ordering Icom equipment. We regret this cannot be used by dealers or for repair enquiries and parts orders, thank you.

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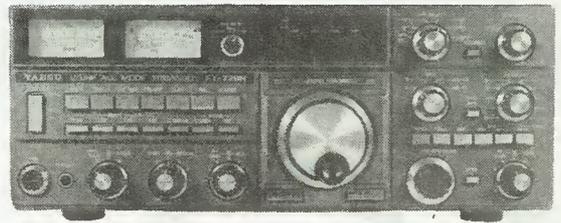
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COMPARE THE COMPETITION

The FT726R 2m base station, at only £699, is £240 cheaper than its nearest rival. Add 70cms at £199, you now have 2m & 70cms capability for less than the oppositions 2m bases.

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and FT711RH
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- ★ Switchable 12.5/25kHz steps
- ★ Priority channel monitoring
- ★ CCC/w Hand mic and mobile mounting bracket

THE FT211RH
THE FT711RH
and the NEW FT2311R



*FT711RH \$FT2311R

OPTIONAL ACCESSORIES

SP55	External Speaker	£19.55
YH1	Headset (C/W Mic)	£19.99
SB10	PTT Switch Unit	£22.00
MH 10F8	Speaker/Mic	£25.00
MH 14A8	Speaker/Mic (C/W Tone Burst)	£23.00
MF 1A3B	Boom Mic (Via SB10)	£25.00

TOP BAND TO 70CMS* TRANSCEIVERS



- ★ ALL MODE LSB/USB, CW, FSK, AM & FM
- ★ All BAND Transmit, General Coverage Receive
- ★ Optional VHF/UHF units (6M, 2M & 70cms)*
- ★ 100% DUTY CYCLE (Key down CW for 30 mins)
- ★ Built in AUTOMATIC ATU (One memory on each band)
- ★ Computer & Packet radio compatibility

OPTIONAL ACCESSORIES

50/767 6M Unit 10W O/P	£169.00	FL7000	500W PEP HF Linear	£160.00
144/767 2M Unit 10W O/P	£169.00	SP767	External Speaker	£69.95
430/767 70cms Unit 10W O/P	£215.00	FIF232C	Computer Interface	£75.00

FT767GX RRP £1550 inc. VAT

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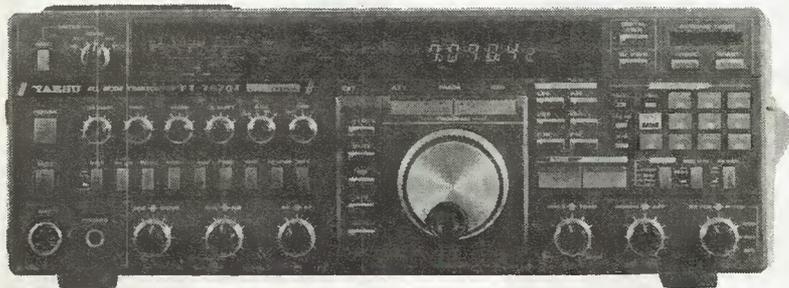


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INTRODUCING THE FT736R FROM YAESU



The FT-736R is a solid-state, frequency-synthesized VHF and UHF amateur transceiver incorporating up to four band modules covering the 50, 144, 430 and 1200 MHz amateur bands. The standard model provides 25 watts RF power output on the 144 and 430 MHz amateur bands in SSB, CW and FM modes, with any two of the remaining three bands installable as options (10 watts output on the 50 and 1200 MHz bands).

An 8-bit CMOS main microprocessor and 4-bit i/o coprocessor provide exceptional digital integration and control: including selectable tuning rates or mode-dependent channelized tuning selectable steps for each mode.

Operating conveniences usually found only HF transceivers, such as front panel adjustable IF shift and IF notch, a noise blanker, all-mode VOX and three-speed selectable AGC are included. GaAs FET receiver RF amplifiers are provided in the 430 and 1200 MHz band modules.

The innovative memory system includes one hundred general purpose memories plus ten full duplex cross-band memories, all of which store mode and receive and transmit frequencies independently. In addition, fourteen vfos are provided: two general purpose plus one PMS (Programmable Memory limit Scanning) on each band, two special-purpose full duplex vfos, and up to four clarifier (receiver offset) memories, one per band.

Each of the two full duplex vfos can be selected so that its receive and transmit frequencies and modes can be displayed and turned independently, or linked to tune synchronously in opposite directions for satellite operation. You can retain twelve satellite uplink/downlink modes in the special vfos and ten full duplex memories at all times. Of course, metering of either transmitter or receiver parameters is selectable during full duplex communications. For CW operators, the FT-736R offers quick-changeover semi break-in and includes provisions for an optional internal electronic keyer and narrow (600 Hz) CW crystal filter.

Naturally, with FM the predominant mode on the VHF and UHF bands, the FT-736R includes all manner of convenient features for both FM simplex and repeater operation, special narrow FM mode (to cut adjacent channel interference in crowded areas), Automatic Repeater Shift when turned to 2-meter repeater subbands and a 1750 Hz Burst Tone Generator is installed as standard.

An enhanced CAT (Computer Aided Transceiver) System allows addition and customization of features and user-designed controls from an external computer. The FT-736R also includes a t/r-switched DC supply line for masthead preamplifiers, activated from the front panel, and digital input connection directly to the modulator for high performance packet radio tnc interfacing.

Optional add-on accessories include the TV-736 Amateur Television Modulator/Demodulator for ATV operation, FIF-series CAT Interface Units, SP-767 External Loudspeaker, FMP-1 AQS Message Processor, and FVS-1 Voice Synthesizer and FTS-8 CTCSS Tone Squelch Unit (both mount internally).

OPTIONAL ACCESSORIES

FEX736/50	50MHz module	TBA	XF455MC	600Hz CW Filter	£ 60.00
FEX736/1.2	1.2GHz module	TBA	SP767	External Spkr c/w Audio Filters	£69.95
FMP-1	AQS Message Processor c/w display	TBA	MD-1B8	Desktop Microphone	£79.00
FTS-8	CTCSS Tone Squelch Unit	£45.00	MH-1B8	Hand Scanning Microphone	£21.00
FVS-1	Voice Synthesiser Unit	£33.00	FIF232Cvan	CAT/TNC Interface for Packet & CAT	TBA
Keyer Unit B	Internal Lambic Keyer Unit	TBA	FIF232C	CAT Interface for RS232 O/P	£75.00
TV-736	Fast Scan TV (ATV) Mod/Demod Unit	TBA	FIF65A	CAT Interface for Apple II series	£60.00

See inside front cover for more details.

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LR2/2M	Vertical omnidirectional	£28.18
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LW16/2M	16 Element Yagi 13.4dbd	£42.44
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D6/2M	8 over 8 slot fed Yagi 11.1dbd	£42.38
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JAYBEAM 4M/6M		
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4Y6M	6M 4 Ele 7dBd	£36.63
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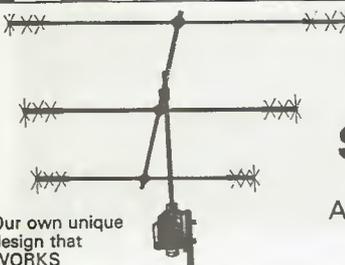
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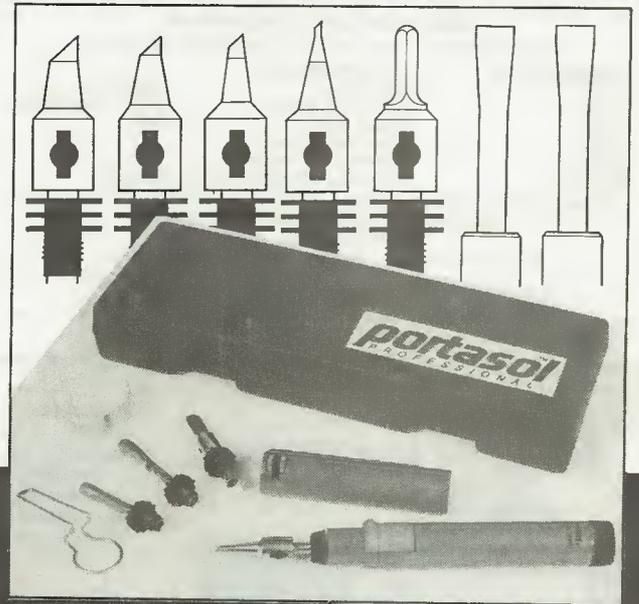
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LETTERS

RAE Too Complex?

Dear HRT, I feel I must put pen to paper with regard to the contents of the radio amateur exam. On the 7th December 1987, I retook part one of the exam and was amazed to find that this latest exam contained so much gobbledegook. I appears that now it is necessary to have some form of masters degree in English before being able to even decipher the questions let alone knowing what the answer is. Surely the purpose of the radio amateur's exam is to set an aptitude level for potential radio users but obviously this is not the case.

Having the use of various books on the subject, in particular one which was highly recommended by our tutors was the "How to pass the radio amateur exam" edited by G Benbow G3HB which gave questions and answers from previous examinations. It

is a pity that these books recommended bore absolutely no resemblance to the actual exam itself. Whilst the questions in the book were clear and precise the exam questions were utter drivel. I can only sit with fingers crossed until the end of January when I hope my approximate calculation of 62 per cent will be enough.

Having gone through the question and answers book enough times to make me sick and obtaining an average pass rate of 85-89 per cent one feels a little sick to find after checking with our tutor, (all credit to him Mr Colin Desborough G3NNG) my approximate result was far lower than that expected.

Perhaps you or your readers have any views on the matter or whether any others who have taken the exam like me feel that they have been duped.
R Wastney

Share An Aerial?

Dear HRT, Yes, Hurray, I've passed the RAE, I must buy an antenna to go with my FT480R.

So off I went to the shops and bought the biggest 2m beam that I

could afford. Unfortunately it was raining that day and I could not put up my beam — damn!

Oh yes I could — temporarily — just for the day anyway, I started to knock the 30ft scaffold pole into the ground with the beam on top (Oh what a mistake!).



"Let's face it, Amateur Radio is meant to be FUN!"

Well I got indoors and turned on the radio — magic, it works! I'll have to save up for a rotator and then I'll be off. After about two hours I was fed up so I switched off and went to bed. When I awoke I turned on the set, not a thing — problems.

I got dressed and went outside and to my shock I realised that John, my neighbour had taken up amateur radio — with my antenna. My beam was nicely placed on top of John's greenhouse — boy was his greenhouse a mess!

So be warned — **SECURE ANTENNAS EVEN IF ONLY FOR ABOUT ONE HOUR'S USE!**

Neil Houlker (with a displeased neighbour)

Blinkered Editor!

Dear HRT, When you are 70+ as I am, and happened to be QRT from 1952 to 1983, I will expect that your blinkered viewpoint will be amended.

We are not all geriatric, thank heavens, but like to enjoy what is after all a very definite hobby. Not a dedicated career. Please let's all, young, middle aged, old and geriatric enjoy this hobby, and help one another in the true spirit of Amateur Radio. I love my CW, did not touch a key for over 30 years, but seldom use SSB on the bands.

I also have had so many QSOs with old timers, ex RAF army and many types of my own age groups. I find a slow morse op on the band, who has just obtained his 'A' licence by sheer persistence, then I enjoy a slow speed QSO with him also, that's what it's all about dear Editor, having a common interest.

I like your mag though.
A Jeffrey, G3HWD

Ouch! — The point I was really trying to make was that if we want to encourage the computer generation of youngsters to participate in our hobby then we will have to make it more attractive. If the price of avoiding deserted bands is a novice licence then so be it.

No-use Novice Licence

Dear HRT, Once again I have been motivated to put pen to paper (well, finger to keyboard actually!), this time in response to E Greenhaugh's letter re



the 'Class B and HF' argument.

It seems to me that the protagonists of both sides of the argument miss the point about the CW test, which is that it does not merely show that the licensee can send and receive Morse at 12 words a minute, but it also demonstrates a commitment to the hobby over and above that of taking and passing the RAE.

The beauty of the Morse test is that it is something which can be taken by all amateurs, regardless of technical ability. But those who have made the effort to learn the code and pass the test are unlikely to be those to whom ham radio is no more than a passing craze. They like as not will have spent time listening on the bands before even deciding to go for the 'full' licence, and their operating practices are likely to be the better for it.

One other reason for retaining the CW test is that it keeps alive a skill which has undoubted advantages even in today's hi-tech amateur radio world. I admit that I myself am in that category of Class A's who would probably have difficulty if forced to re-take the Morse test. I appreciate the benefits of CW over other modes, and have used it on a handful of occasions to work DX I would not otherwise have done, but copying the darned stuff just gives me a headache! However, friends of mine having mastered the code have learned to love it, and have made good use of it on both HF and VHF after obtaining their new calls. Would they have discovered this facet of their hobby if not forced to learn it by the licensing authority?

As to G4IRQ's comments about the lack of new blood entering the hobby, it appears to me, among my work colleagues for example, that few people have any sort of a hobby these days. There could be many reasons for this, such as domestic finances heavily committed to paying mortgages and the like, lack of space in modern houses,

and competition from TV, video and leisure activities that all the family can participate in.

I do not think a novice licence will make the slightest difference to the number of newcomers coming into the hobby. It is significant that in the USA, where there has been a novice licence for years, the ARRL is also lamenting the lack of young people obtaining amateur licences.

If you want to encourage more people to become amateurs, publicise amateur radio. Put on displays at town shows and country fairs and schools all over the country! But leave the licensing structure as it is. The RAE and the Morse test are easy enough for anyone with sufficient interest in ham radio to pass already!
Julian V Moss, G4ILO

2m-Lazy Band?

Dear HRT, I buy this magazine for informative projects but it makes my blood boil when CB is constantly knocked by an amateur (see Feb '88 'Letters') who should know better — after all he was a novice at one time or other with a G0 callsign. There are a number of G4s who use 934MHz as well as G1s. As far as I am concerned the only lazy bands I have heard are 2m and I have the facilities to hear them all. I second G4IRQ in that novices should have assistance even from

someone like yourself who is so superior in experience but obviously lacks understanding.

A Cann, SWL

Even Better Service

Dear HRT, I can claim even better service than Colin G1NPK (HRT February 1988). On Tuesday 6th October last year I sent Datong Electronics Ltd a faulty AD370 for repair (my fault!).

It was repaired and returned to me by post by Friday 9th October so full marks to Datong. The pity is that so few others emulate their efficiency.

Michael O'Bairne, G8MOB

Offensive Language

Dear HRT, I like Ham Radio Today. However I must call to your attention the word *sod* in this current month's issue in the cartoon 'Squelch.'

Such bad language is totally unnecessary — and bearing in mind your wide range of readers (eg school youngsters, lady radio hams etc). I must plead with you for better language in the future.

J Owen

I do think that you are being a little over-sensitive, after all the language used on most repeaters can be quite 'educative' at times. Will civilisation collapse because of one word? I think not! G4IRQ

£10 FOR THE LETTER OF THE MONTH

You've got a gripe about the bandplans, or you're sick of being wiped out by next door's microwave. Or maybe you've been bowled over by the excellent service from your local radio shop.

Whatever you've got to say about amateur radio say it here in the letters column and you could win yourself £10 for writing the letter of the month.

Send your epistles to: Letters Column, Ham Radio Today, ASP Ltd, 1 Golden Square, London W1R 3AB.

Q R Z



There were rumours of a mid-winter DXpedition to Market Reef, OH0M. This is what the island looks like on a calm and warm summer's day: in winter it can be -30°C with howling gales.

Although this is the April edition of *Ham Radio Today*, many of you will be reading this in March, so there is just time to remind you of what is for me one of the two biggest operating periods of the amateur radio year.

cannot see a full set of the rules here is a brief resumé: the object is to contact as many stations as possible within the 48 hour period, with as many different *prefixes* as possible. You may use the 1.8, 3.5,

exchanges given are a report and serial number, starting at 001.

One of the attractions of the CQ WPX contest is that, like its big brother the CQ World Wide contest in the Autumn, it always encourages a lot of DXpeditions to countries only rarely activated at other times of year. The WPX always tends to bring out the "weird prefix stations" who may be in quite ordinary countries, from an amateur radio and DXCC point of view, but which have persuaded their licensing authorities to issue them with special callsigns for the duration of the contest. For example, the Portuguese often come on with CQ, CR or CS prefixes instead of the usual CT (last year one station was heard *calling CQ, CQ, this is CQ8CQ calling CQ. !*) and sometimes causing older DXers to think they have logged a station in Mozambique or Angola. The British licensing authorities have, in the past, always refused to issue special prefixes for these contests,

From the frozen wastes of Market Reef to propagation from Oz – Steve Telenius-Lowe, G4JVG, goes walk-about!

This is the CQ WPX Contest, the SSB leg of which this year is to be held over the weekend of 26th-27th March, from 0000 GMT on the Saturday to 2400 GMT on the Sunday, ie for 48 hours. Even if you cannot spare enough time to operate for the whole weekend, it is still worth switching on the HF rig and firing up the antennas for some time during this weekend.

CQ WPX

For those of you who are not regular contest operators and

7, 14, 21 and 28MHz bands only (not the WARC bands), either any one single band of your choice or all six bands. If you enter as a multi-band entry, you get double the points for QSOs on the three lower frequency bands. For every different prefix worked, you get a multiplier: a prefix being defined as that part of the callsign with the location information in (so the prefix for GJ0AAA is GJ0, but the "prefix" multiplier for W1XXX/YV5 is YV5, not W1). You only count a prefix once, no matter on how many bands. The

although a keen contester could always apply for a GB callsign from the RSGB. This year, however, is the 75th anniversary of the RSGB and it could be that for such a historical event for all British radio amateurs some special callsigns will be issued — we will have to wait and see.

The tremendous profusion of American prefixes (with almost any letter and any number combined with an initial A, K, N or W) is further added to this year, with several stations using the 200 prefix: W200GSA was heard at the beginning of January on 14238kHz, asking for QSLs to be sent to PO Box 34, Fairhaven, NJ 07704, USA.

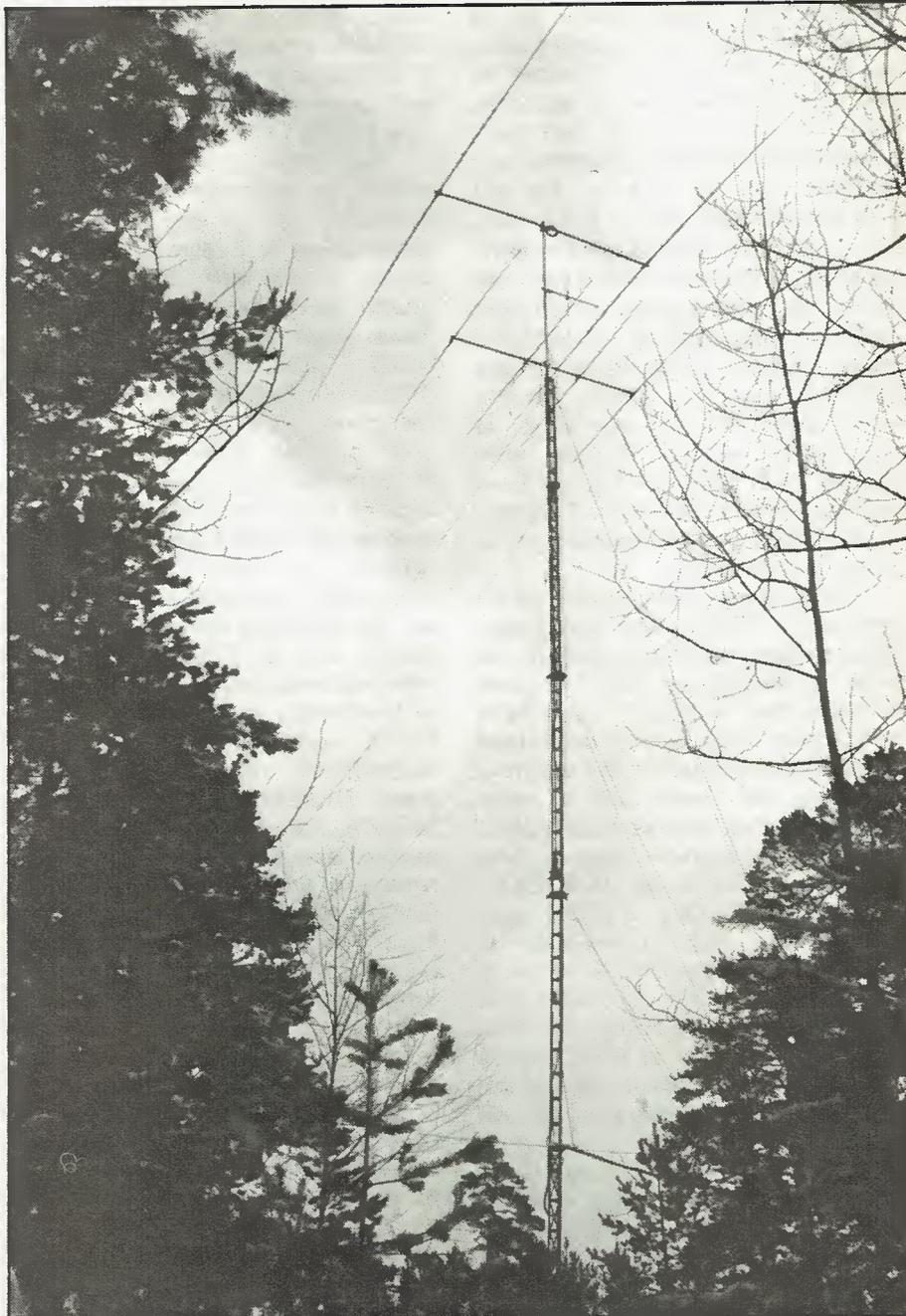
One station which is on in almost every WPX contest is the club station SLOZG, operated by John SMODJZ and Leif SMOAJU. Despite limited operating facilities on 15 metres due to a TVI problem, they usually make about 3000 QSOs during the weekend and are in the top few multi-operator entries in Europe. This is due to good operating and good antennas (see photo) and *not* excessively high power.

Please send me your reports of what you work or hear in this contest and elsewhere on the bands. There are bound to be several DXpeditions, especially by Americans to the Caribbean and Central American countries, so good DXing.

DXpeditions

I said in the first *QRZ* two months ago that there are few Britons participating in DXpeditions these days. As if to prove me wrong, G3AAG, Vic, was active from the Cocos-Keeling Islands as VK9YV around the turn of the year. Steve, G3YDV, reports working Vic on 21005 CW with good signals both ways and that Vic was always well audible on 15 metres during his stay on Cocos Keeling. Vic has apparently also operated recently from Hong Kong, Macau, Hawaii, the Australian mainland and California, and all QSLs for all these operations are being handled by G3TBT.

Meanwhile, Bruce Smith, G3HSR, (whom I had the pleasure of meeting a few years ago in Sweden of all places) has been active from Norfolk Island as VK9AD with a



Club station SLOZG is almost bound to be participating in the WPX contest at the end of March. Their big signal comes from these antennas: 2 elements on 40m and 4 elements on 10m. There is another tower supporting antennas for 15, 20 and 80m.

super signal around 14200 SSB around 0830 GMT, so I take it all back about British amateurs not being enterprising and going on DXpeditions!

One DXpedition that should (unfortunately) have come and gone by the time this is read, is that to the very rare Auckland and Campbell Islands, ZL9. I heard Ron Wright, ZL1AMO a few mornings ago on 40 metres reporting that he and Wayne, N7NG, should be operating

from ZL9 by the second week in February. Ron said that Wayne would be using a ZLO callsign with a /ZL9 suffix. ZL1AMO operates almost exclusively CW during his DXpeditions, but they have promised roughly equal CW and SSB for this trip, so possibly Wayne will be the main SSB operator.

Vietnam?

There are rumours about the first authorised operation from

Vietnam for many years, by a Russian operator, so be on the lookout for an XV callsign: it *could* be genuine. Another rumour about at the moment is of the imminent possibility of another DXpedition to Market Reef, in time for the CQ 160 CW contest. If this is so, they are hardy men indeed, as the temperature in that part of the world in winter can drop to a brain-numbing -30°C . Having been to Market Reef twice myself, both times in the height of summer, I wish the ops luck. One of the operators is reported to be Lars, OH0RJ, who has his own personal Market Reef callsign, which I believe is OH0MB, so this could well be the callsign the group will be using.

I recently put up a quarter-wave vertical for 7MHz and now have about a dozen radials draped around what is laughingly called a lawn beneath the antenna. Conditions must have been very good indeed during the week when the antenna went up, for I was able to work various ZLs as late as 0830 GMT, ZL7AA on Chatham Island, who was about RS56 at 0750GMT, YN3EO, HJ7MQC, FJ5BL, and several other more run-of-the-mill DX stations such as PYs, East Coast W's, 7X5AB and ZB2AZ. One station worth mentioning, was Bill, K4XS near Tampa in Florida, who was active almost every day at the beginning of January with an enormous signal. He was transmitting on 7203-7209, frequencies which are almost always clear of broadcast stations until about 0900 GMT, and announcing a clear listening frequency in the European SSB part of 40 metres (7040-7100 kHz). K4XS was such an enormous signal because he was running a kilowatt from an Alpha linear to a pair of stacked 4 element yagis at 185 and 85 feet. I dream about a single four element yagi on even 10 metres...

Broadcast Stations

Many radio amateurs only think of broadcast stations as being a menace with the QRM they cause in and around the 40 metre band and, occasionally, other bands as well. But they can perform a useful function as well, as beacons or propagation indicators. In the depths of winter, the appearance of

Radio Vila in Vanuatu (YJ) on 3945kHz or New Caledonia (FK) on 7170kHz can mean that there is a very good chance of working some rare Pacific DX on 80 or 40 metres.

Guy Dean, writing from Ringwood in Hampshire, has also reminded me of the very useful propagation forecasts put out by a couple of stations. These can be heard daily except Sundays on Radio Australia at 0827 GMT on 9655, 15395 and 17715kHz (with 9655kHz often providing the best reception), and at 1627 and 2027 GMT both on 6035 and 7205kHz. On Sundays, a propagation forecast is given at the end of Radio Australia programme called 'Communicator,' which is about radio and electronics, starting at 0730 GMT on the morning frequencies listed above, and at 1730 GMT on the evening frequencies. Finally, Radio Netherlands, in co-operation with Radio Australia, also gives a propagation report and forecast every Thursday at the end of the 'Media Network' programme, around about 1215 or 1220 GMT, repeated at about 1515 or 1520 GMT, both on 5955kHz and audible here with exceptionally strong signals. All these propagation reports give a summary of how propagation has been for the last few days, a forecast for the next week, and the A index and numbers of sunspots visible, as well as any reports of coronal holes, solar flares or any other events likely to affect HF propagation on Earth.

10m Opening

Guy Dean also reported a good opening on 10 metres at the beginning of January: on 2nd January, he heard such prefixes as J87, J39, 8P6, NP4 and YV6, around 1400-1500 GMT. I have also heard SORASD in the Saharan Arab Democratic Republic on 28475 around 1200 one afternoon



recently. I mentioned this station in the first QRZ two months ago: after the highly-successful expedition, there, the operators left equipment behind to be operated by the locals. I gathered the intention was for the local operators to use callsigns such as SOAA, SOAB etc., but it seems as if they are still using the original SORASD callsign. I heard rumours on the International DX Bulletin net (which meets on Saturdays at about 1400 on 14212kHz, with EA6MR and/or OH1PY in control) that the ARRL is expected to vote in favour of accepting the Saharan Republic as a separate DXCC entity in about May this year. This remains to be seen, however: even after the ARRL's DX Advisory Committee has voted in favour of a new country becoming acceptable, it still has to be voted on by the ARRL board.

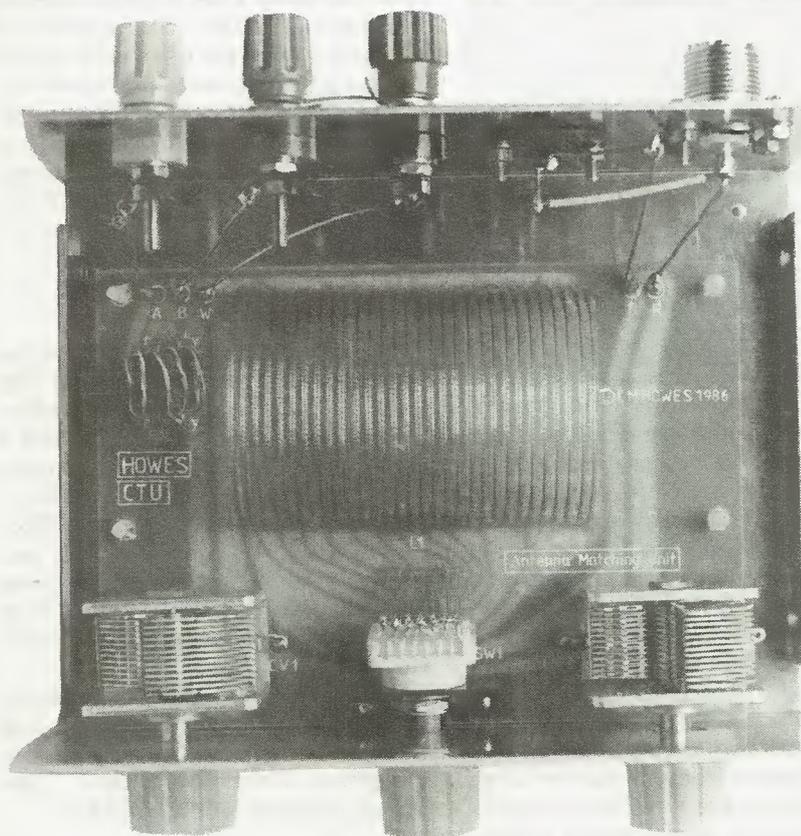
I would be very pleased to receive your reports on DX stations, DXpeditions or contest activity for use in QRZ. Please send reports direct to me, Steve Telenius-Lowe, G4JVG, "Penworth," Tokers Green Lane, Tokers Green, Reading, RG4 9EB.

QSL Corner

CT3EU	QSL to	G3PFS
FJ5BL	QSL to	F6AJA
IY5MR	QSL to	I5KQA
VK9AD	QSL to	G3HSR
VK9YV	QSL to	G3TBT
W200GSA	QSL to	POB 34, Fairhaven, NJ 07704, USA
YN3EO	QSL to	Y32KE
ZB2AZ	QSL to	POB 292, Gibraltar
ZL7AA	QSL to	ZL1AMO
7X5AB	QSL to	POB 137, Biskra, 07010, Algeria

HOWES CTU~30

REVIEW



Howes kits of Meopham have included an Antenna Tuning Unit in their range of kits for a considerable length of time. Until recently the ATU kit was called the CTU and has since been replaced by the CTU 30.

Howes ATU and its operation and to outline its theory. Whilst an experienced constructor may be able to complete the kit in under one hour, excluding fitting the PCB into the case to a newcomer this kit may

***QRP work demands the best aerial match you can get.
Colin Turner, G3VTT, reviews the Howes CTU30
ATU kit.***

The earlier kit consisted of a simple 'T' network suitable for tuning either end fed long wire or coax fed antennas on any frequency between 1.8 and 30MHz, the later kit is identical but now includes a balun transformer to allow operation with open wire line or ribbon feeder antennas.

The purpose of this article is to describe the construction of a

be a little daunting. Nevertheless the CTU 30 is to be recommended as a first effort in home construction. My own kit was built in just an hour on a pouring wet English summer's evening on holiday in Norfolk.

Theory

Let us consider why we need an ATU. The antenna, be it a dipole or end fed wire, may not present a 50

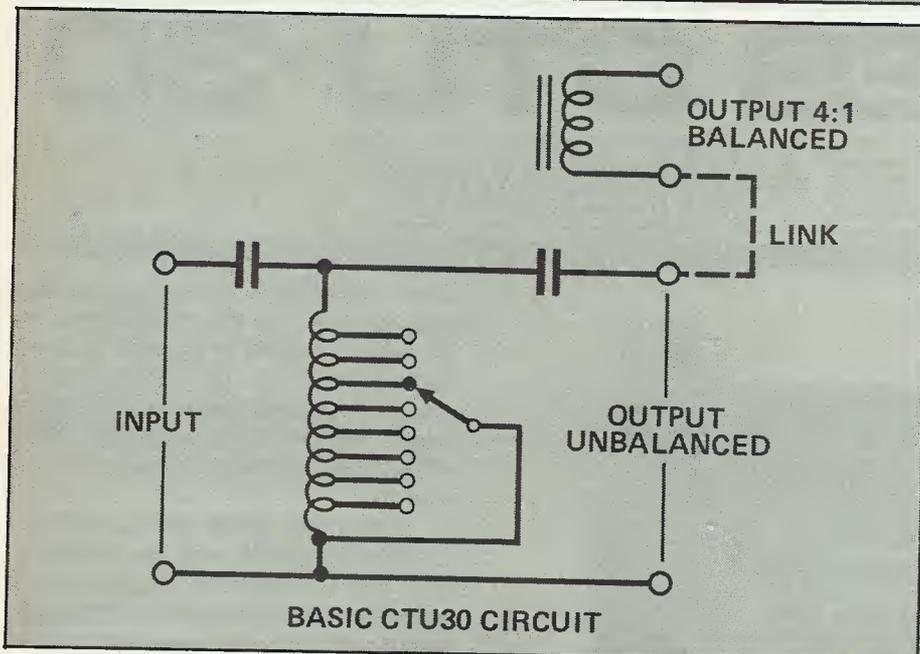
ohm impedance on all operating frequencies yet the transmitter is usually designed to have an output impedance of 50 ohms, and maximum power transfer will occur when the antenna presents a 50 ohms non-reactive impedance to its output.

Antennas such as the G5RV multiband dipole will be coaxially fed and present a reactive impedance on some bands, inhibiting maximum power transfer apart from matching a further benefit of an ATU is in harmonic suppression and a carefully designed ATU such as a 'pi network' type may offer an extra 20db of extra harmonic rejection to the transmission system.

The Howes CTU 30 is not of the 'pi' configuration but is a 'tee' type and will therefore not exhibit as much harmonic suppression as the 'pi', however its main benefit is in its ability to tune a greater range of impedances and reactances so allowing greater operational flexibility than a 'pi' network ATU.

Circuit diagram

A balun is supplied with the kit and is a small device suitable for 30 watts or so for open wire line operation having a step up or step down ratio of 4:1. It is constructed on two half-inch diameter ferrite rings using two bifilar wound wires. It should be stressed that the two factors which determine the maximum operating power levels of this ATU are the power handling abilities of these ferrite cores and the spacing of the two tuning capacitors plates. Powers in excess of 30 watts under normal conditions will no doubt cause flashover of the two capacitors and consequent overheating of the ferrite balun. I did manage to put 100 watts through the CTU 30 for a few hours but I suggest you do not try it. I have been in the business a while, have green fingers and more importantly a handy fire extinguisher! Like other Howes products this is a QRP kit although the true QRP operator will



not class 30 watts as QRP. There is little difference between running 30 watts and 100 watts on the HF bands and there are plenty of transceivers in operation at these lower power levels. The Howes CTU 30 is certainly a lot cheaper than commercially produced matching antenna tuning units designed for these transceivers and kit construction is better than signing cheques. For the true QRP'er with an Argonaut or HW8 the CTU 30 is more than adequate.

The Kit

As usual with Howes, the kit is supplied with explicit instructions to aid the builder and is full of useful tips on construction methods. The coil construction is unusual in that it utilises a multi wire flat ribbon to make each of the three coil sections but otherwise is a conventional design. The instructions detail how to use long nose pliers to straighten out any mistakes and soldering instructions are given to aid the first time constructor. Using multi core ribbon is a neat and tidy method of obtaining the individual coil turns with printed circuit tracks being used to complete each winding. I have never seen this technique before and it is both practical and simple — I like it.

Balun coil winding can sometimes cause confusion to the newcomer and the instructions give two clear diagrams showing exactly how this should be done. The individual components are of high

quality, in particular the tuning capacitors which are quite capable for powers of 30 watts or so, and all wire and cabinet hardware is also supplied. The only extra components required for the kit being the external plugs and sockets and the case. For the case I used a small box which I have had around the shack for quite a while which measured $3\frac{1}{2}$ in(H) \times 5in(D) $6\frac{1}{2}$ in(L). This size is a comfortable fit for the CTU 30 printed circuit board and is quite different from the earlier CT30 which allowed only vertical mounting, tending to waste space a little.

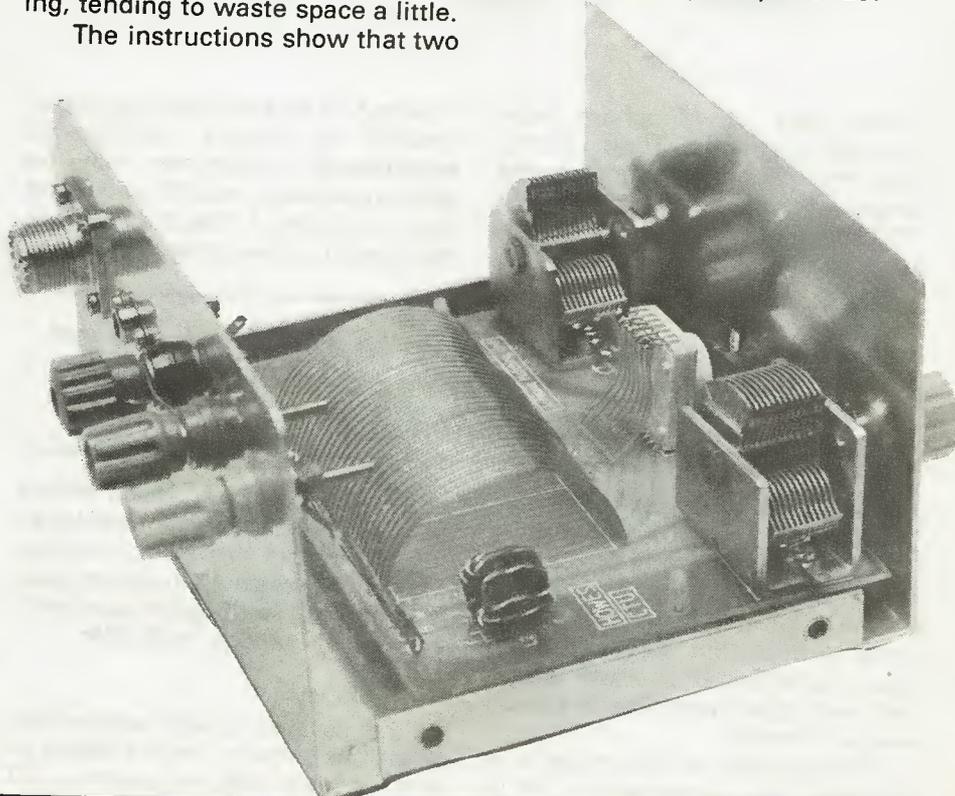
The instructions show that two

coaxial sockets and four terminals are needed to complete the kit — like many QRP'ers I tend to use 'phono' plugs and sockets for low power RF and for DC supplies. I built my kit with both SO234 and phono sockets in parallel box coax connections to allow flexibility with connecting leads. One of the terminals is used for an earth connection and the other three are used with an end fed wire or open wire line such as a centre fed dipole or the G5RV multi-band antenna. A link is required to couple the balun into circuit when open wire feed is required and this is fitted across two of the terminals as shown in the diagram.

Results

I have yet to find an antenna that this ATU will not tune. It has been used extensively on an end fed 90 foot wire against ground and a G5RV multiband dipole. Tests have been carried out on all bands from 160 to 10 metres including 10Mhz the band without problem. If you want to make an antenna tuner which works, this is it! The CTU30 is available either built at £29.90 or in kit form for £24.90.

The Howes CTU30 Antenna Matching Unit is available from C M Howes Kits, 139 Highview, Vigo, Meopham, Kent, DA13 0UT. Telephone Fairseat (0732) 823129.



RADIO TODAY

RSGB AGM

Compared with previous years, the 1987 RSGB AGM and Open Meeting were something of a non-event — there were some lively discussions, but none of the shouting matches, interruptions and general excitement which one has come to expect over recent years.

The AGM itself went very smoothly and the Secretary had thoughtfully provided a list of proxy holders stating the number of votes held by each one, so there was no need for anyone to demand a poll just to find out how many proxies the President held this year (she had 811).

The EGM

Two motions were presented at the EGM which followed the AGM. One was a minor amendment to the special provisions regarding Council members over the age of 70 and the other was the long-awaited amendment to the Constitution which would at last give members the right to instruct their proxy holders on how to vote on each issue instead of 'devolving' the decisions to their proxy were passed without a hitch. The usual Open Meeting followed the (usual!) tea break and as is

customary, the meeting started with the formal presidential address, which this year included the announcement of a newly-launched award for the 'Young Amateur of the Year,' which will be sponsored by the DTI.

Discussions at the meeting seemed to centre around the same old familiar topics like the novice licence, third party traffic, interference problems regarding the slow morse transmissions and GB2RS news broadcasts, and the usual complaints about some people receiving their RadComs earlier than others. On the subject of the CEPT licence (another regular favourite) we were given the same reply as last year — "give it another 12 to 18 months." (Unfortunately we've had the same story from the DTI — Ed).

There was some discussion about possible ways of getting young people interested in amateur radio, and some interesting suggestions were made including the introduction of a separate RadCom for junior members which would contain hints on simple home construction instead of adverts for rigs costing thousands of pounds.

The meeting itself finished around 7pm, but 'informal discussions' continued for several hours afterwards in nearby pubs and restaurants!

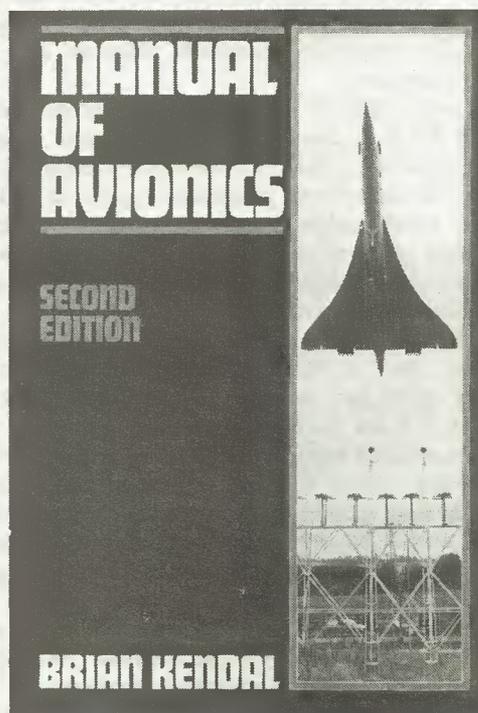
Manual of Avionics

Despite its rather forbidding title, this book should be of interest to virtually all radio users. Although not falling into the usual realm of amateur radio publications, 'Manual of Avionics' is a detailed and yet easy to under-

stand historical and technical treatise on the pivotal role which radio occupies in air safety. Although dealing with the voice communications aspect of flying, an area which in itself has become increasingly popular since the advent of scanning receivers; a substantial portion of the book deals with an even more important area — that of knowing where you are!

The days of a compass, an altimeter and a pair of crossed fingers in aero-navigation have long since gone and the development of modern navigational aids (nav-aids) is technically quite fascinating in itself. What will no doubt surprise many readers will be the level of sophistication and sheer technical ingenuity employed by radio engineers in the early days. One example springs to mind in the design of a radio 'light house' which had to send 'N' in morse when the rotating radio beam was pointing north, 'E' when pointing east and so forth. In the days when contemporary mechanical systems couldn't guarantee accuracy, and the use of RAMICs was decades away the engineers simply constructed the letter codes out of metal strips and a pick up wiper 'read' the morse as the beacon rotated. 'N' was transmitted when the beam was pointed north, and so on.

The book is written by Brian Kendal, a name which should be recognised as that of a frequent contributor to HRT, and his objective of covering the middle ground between the overly simplistic and the mind-bogglingly mathematical approaches to the subject is certainly achieved. At £17.50 for a 290 page paperback it may seem a trifle expensive, but it is a specialist area . . . and there are always public libraries! 'Manual of Avionics' is published by Blackwell Scientific Publications.

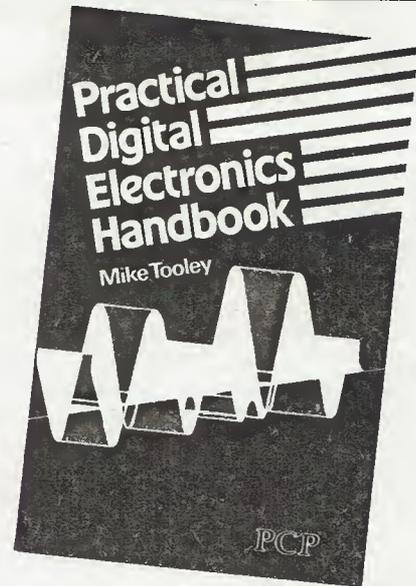


Practical Digital Electronics Handbook

Traditionally, radio amateurs have tended to shy away from digital electronics, but with the now standard micro-processor controlled equipment and the advent of packet radio, a knowledge of digital electronics, although perhaps not essential, can be very useful.

This book aims itself firmly at the reasonably experienced enthusiast and such basics as the ability to identify components etc, are taken for granted. It is divided into nine chapters with appendices, starting with an introductory chapter on (digital) ICs, moving on to basic logic gates in Chapter 2, Monostable and bistable devices in Chapter 3, Timers (Chapter 4) and Microprocessors in Chapter 5. It is in Chapters 5, 6 and 7 where the nitty-gritty appears as the constituent parts of a micro-processor system are described, building on the work covered in the earlier chapters.

Micro-processor systems aren't a lot of use unless they can be connected to the outside world and the remaining chapters deal with I/O (input/output) devices. RS232 and related interfaces and the standard IEEE-1000 data bus. The very substantial appendices cover TTL and CMOS device pin-outs; ASCII, hexadecimal and binary conversion in part 1 and a selection of digital test gear projects such as a bench PSU, logic probe and DFM in the closing page of the book.



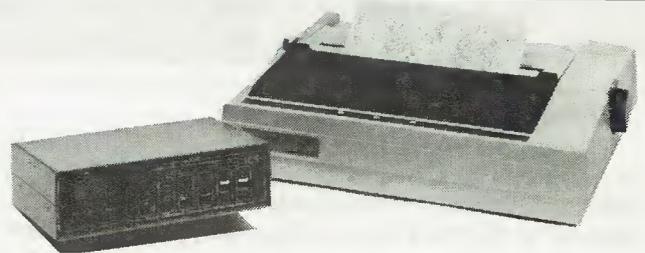
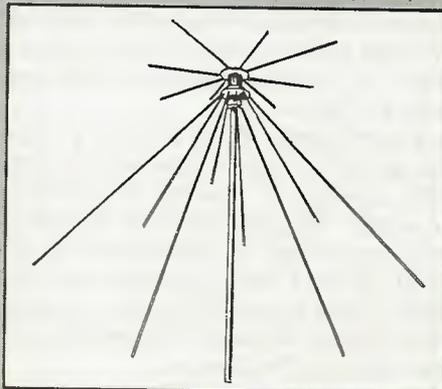
As an introduction to the binary world this book is certainly worth considering. It is professionally produced, provides the basics to understanding the field and then builds on that to give a greater understanding of digital techniques. The 'Practical Digital Electronics Handbook' by Mike Tooley is published by PC Publishing for £6.95.

New discone from SMC

SMC has announced the launch of a new discone antenna which is claimed to offer an improvement on quality, performance and price compared with Japanese equipment. The DSC770 offers a frequency coverage from 70 to 700MHz (wider than the GDX series) and has a slightly better gain of 3.5dB compared with a 1/4 wave dipole.

The aerial is designed for use on both receive and transmit, being able to handle power levels of up to 500 watts pep. The construction of the discone is such that the screw-in elements are less prone to vibrating loose in high winds than their wingnut attached counterparts and both cone and elements are made from high grade aluminium alloy. The aerial is supplied with a 1 1/2in diameter stub mast and a clamp to fit 1 1/4in to 2in masts. The stub mast is designed to protect the input connector from moisture ingress.

The DSC770 costs £55.75 including VAT and is available from South Midlands Communications, SM House, School House, Chandlers Ford Industrial Estate, Eastleigh, Hampshire SO5 3BY. Tel: (0703) 255111.



ICS Wefax, Navtex & RTTY Package

ICS Electronics Ltd have announced a low cost package for Weather Facsimile, Navtex and Radio Teletype reception.

For only £399.95 inc VAT, ICS will provide their enhanced FAX-1 decoder, a mains power supply, an Epson compatible printer, all connecting leads, paper and a ribbon. The user simply plugs the supplied cable into the extension loudspeaker socket of any HF SSB communications receiver to obtain superbly detailed weather maps, satellite cloud pictures, navigational warnings and news bulletins from around the globe.

The FAX-1 incorporates a built in tuning indicator and timer, and is fully automatic in operation. No computer skills are needed to operate it. The prices offered by ICS are dramatically lower than those for any other comparable equipment — even from South East Asia and the FAX-1 is British designed and built.

The system components are available separately if required, and ICS can also offer a complete DC powered marine system with in built Navtex receiver. This permits concurrent Navtex and Facsimile reception.

Many hundreds of FAX-1s are already in use around the world by amateur and professional weather forecasters, yachtsmen, aviators and enthusiasts.

Further details from Alan Clemmetsen, ICS Ltd, PO Box 2, Arundel, W Sussex, on 024 365 590.

Young Electronics Design Awards

The 1988 Young Electronics Designer Awards Scheme was officially launched today with renewed sponsorship from electronics distribution company Cirkuit Holdings PLC and leading semiconductor and computer manufacturers Texas Instruments Ltd.

Governed by the YEDA Trust, a registered charity, and organised under the chairmanship of John Eggleston, Professor of Education at Warwick University and a member of the Council of Europe, the Awards Scheme offers exciting prospects for young people in the junior (under 15), intermediate (15-18) and senior (19-25) age groups, who attend educational institutions in the United Kingdom.

To enter the Scheme, students must provide an electronic device of their own which is original, effective and has a useful application in everyday life. A prestigious trophy and valuable cash prizes are presented to the winners in each category and in the senior age group there are the prospects of a job in electronics and of course sponsorship.

Each secondary school or college with one or more entrants reaching the regional judging states in May qualifies for a special award of useful electronic equipment from Cirkuit, for example multimeters, furthermore the finalist whose project is judged to have the most commercial potential will win a sophisticated computer system and software valued at around £10,000 from Texas Instruments for his or her educational institution. Every finalist wins a personal prize as does their teacher and there are many more attractions for the successful entrant.

The YEDA Scheme was launched four years ago with the objective of encouraging the development of practical electronics at the educational level. It was devised in response to repeated criticism by industry that school leavers were not adequately prepared for the commercial world. It was also designed to create an increased awareness in the critical need for Britain to produce more world beating products using electronics, if the country is once again to become a major force in international markets.



Announcing the new scheme, Professor John Eggleston said, "YEDA has undoubtedly become one of the most important technological incentive schemes in education. It is an illuminating and highly encouraging indicator of progress being made in schools, colleges and universities.

"Since the commencement of the scheme in 1983 we have noticed not only a steady increase in the level of entries, but also dramatic improvements in standards and in the understanding of the nature of electronics and its importance to the modern world. I am more optimistic than ever about the outcome of this year's contest."

For further information and entry forms contact: The YEDA Trust, 24 London Road, Horsham, West Sussex. RH12 1AY. Telephone: (0403) 211048. Fax: (0403) 210770.

New Crystal Catalogue from IQD

IQD, purveyors of pieces of wobbly rock, have just announced the publication of their 1987/88 quartz crystal catalogue. New products occupy nearly 50% of the catalogue and in addition to a larger range of surface mounted devices the technical applications section has been expanded to offer detailed coverage of typical applications for quartz devices. Further information can be obtained from: IQD Ltd, North Street, Crewkerne, Somerset TA18 7AR or by phone on 0460 74433.

DTI Annual Report

In the financial year 1986-87 236 people were prosecuted and convicted under the Wireless Telegraphy Act for offences concerned with legal CB — not many people know that. And how many for amateur radio related offences? Four!

Morse For Radio Amateurs

The West Bristol Adult Education Area, in responding to the needs of local amateur radio enthusiasts, has arranged a second Morse Class which will be held at the Stoke Lodge

If you are the sort of person who just loves to plough through the finances of the DTI Radiocommunications Division then the DTI RD Annual Report is your idea of heaven. On the other hand, if you simply have a healthy interest in radio generally and want to get up to date on anything relating

to our hobby then the report is your idea of heaven too!

The report is available from: DTI Radiocommunications Division, Information & Publicity Section, Room 605a, Waterloo Bridge House, Waterloo Bridge Road, London SE1 8UA or telephone 01 215 2368 for a copy.

Adult Education Centre, Stoke Bishop, Bristol. The course will be held on Monday evenings, 1900-2100 and will start on 11th April, 1988 for three terms. The test will be taken during March, 1989.

The cost of the course will be at the County's

standard rates but normal concessions will apply. At the time of writing the course fee will be 57p per hour and the full fee for the first term will be £11.40. For further information contact: Mr L Woodward, Stoke Lodge, Shirehampton Road, Bristol BS9 1BN.

PSU FUSE-SAVER

Fuses are useful little devices, but a bit of a nuisance when they blow. And toroidal transformers, such as are found in high-current power supplies, are very good at blowing

It was when the author noticed that a piece of his own gear, that normally drew just about an amp from the mains needed to have a thirteen amp fuse and even eight

even at very low phase angles — coming through to the transformer. The safest approach was judged to use a relay as the switching element, but this necessitates a transformer supply; fortunately small transformers cost little more than a pound and are quite suitable.

Does your 20A PSU need to have a 13A mains fuse because of the switch-on surge? Dave Bradshaw, G1HRT, describes a retro-fitable soft-start unit that will increase safety margins all round

mains fuses. Unless the circuit they're part of has some form of soft-start mode, the size of fuse needed to avoid failure at switch-on can be anything up to ten times the rating of the fuse needed for proper running protection — resulting in a considerable reduction in safety margin, even with anti-surge types being used.

amp fuses being blown that the Fusesaver was conceived. It uses a circuit quite similar to that employed in the 20 amp PSU (*HRT Jan 1988*), but with a couple of additions.

It would have been nice to have employed a triac-based circuit, but I was unhappy with the consequences of any switching pulses —

The Circuit

There isn't much to the circuit really, so why don't you just skip this section and go on to the next, but wait until I've told you that the capacitor and resistor values aren't that critical, but have been chosen to make sure that if someone switches off then immediately on again, the circuit will still react and force a soft start.

So, for those readers who haven't skipped over, here's the circuit action: when the mains is first applied to the circuit, the relay

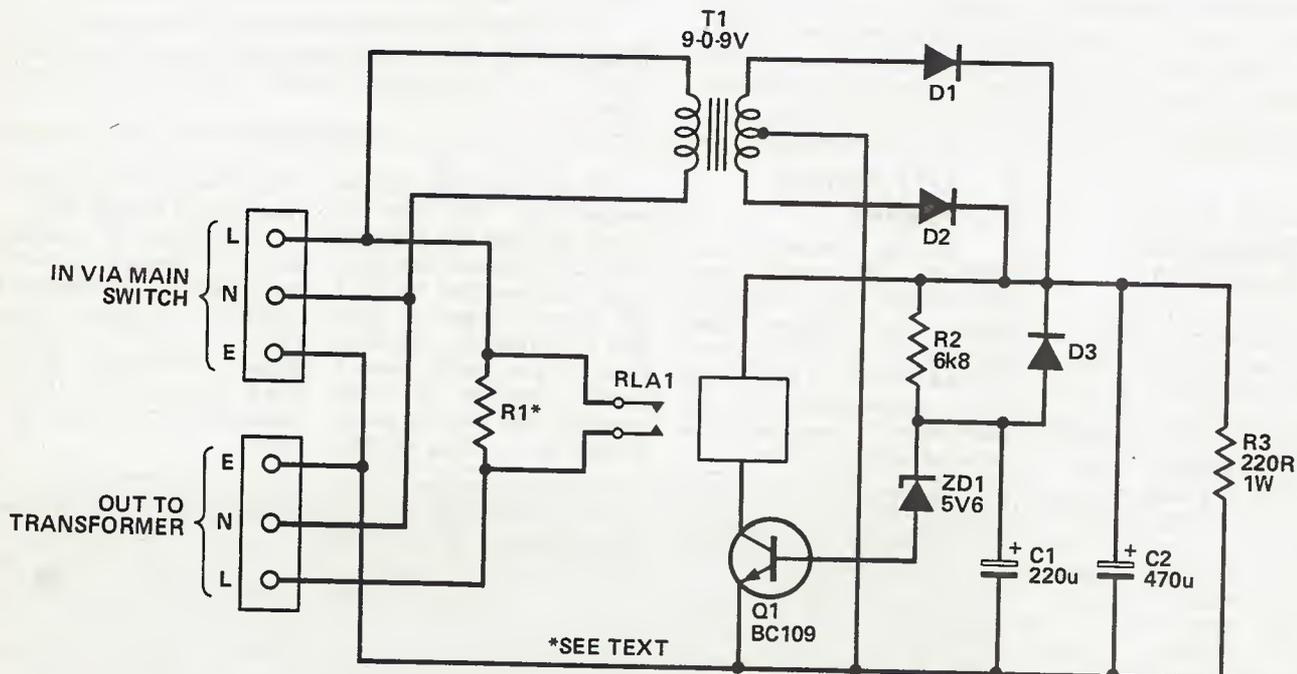


Fig. 1 The circuit diagram.

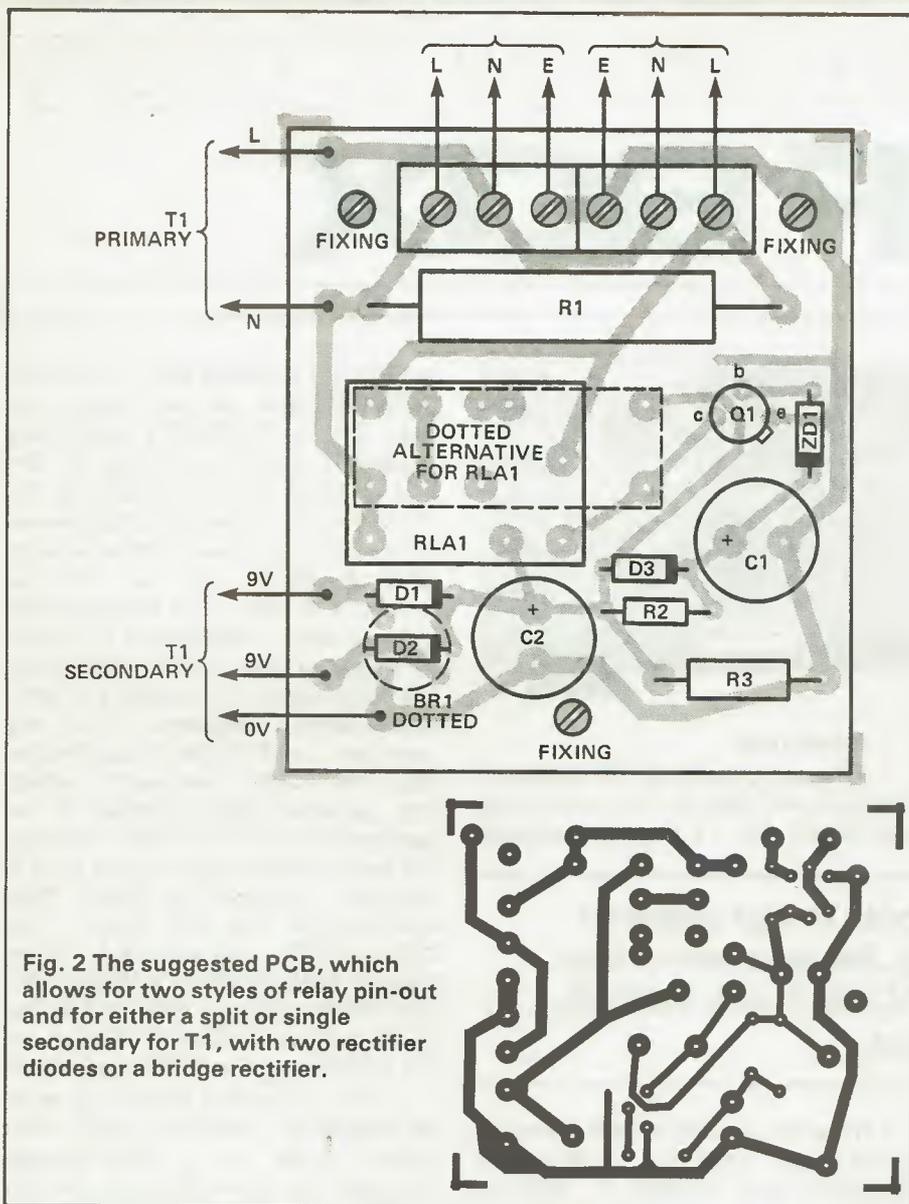


Fig. 2 The suggested PCB, which allows for two styles of relay pin-out and for either a split or single secondary for T1, with two rectifier diodes or a bridge rectifier.

contacts are open and the transformer primary current flows via R1, which limits it to a reasonable level. The power supply of D1/D2/T1/C2 provide approximately 10 to 12 volts more or less immediately, with an acceptable ripple of about 2 volts P-P. C1 charges via R2 until it reaches about 6 volts, at which point ZD1 conducts to the base of Q1, bringing the transistor Q1 on and powering the relay coil. The relay contacts close and the primary current flows through it. This all takes about a second, but this is ample to make sure that the worst of the surge current is averted.

On switch-off, the charge on C2 and C1 (via D3) is dissipated in a fraction of a second by R3, so that the circuit will reset in less than the time it takes to move the mains switch from on to off and back to on.

Choosing R1

The rule of thumb I would suggest for deciding the value of R1 is as follows: $R1 = 125/I$, where I is the normal (ie after start-up) current of the supplied unit, in amps. This will give an absolute maximum start-up current of approximately twice the normal running current. Chose the resistor you can obtain that is nearest in value to this. And I would suggest using at least a 10 watt type. (I have used 100R/10W with a pair of unregulated supplies producing over 500W out, so I reckon this should do for most 13.5V/20A types used to supply rigs).

Construction

A special PCB has been designed, this is shown in Fig. 2. Whatever method of construction is employed, I would urge readers to remember that much of the circuit is at mains live potential and should be treated with considerable respect. To save board-space, the transformer is mounted off it. Two different pin formats for relays are allowed for, which will account for the perhaps confusing tracking on the PCB. The use of a single rather than split secondary type for T1 is also taken into account by provision for use of a bridge rectifier.

One vital point on installation — the unit must go between the mains switch and the transformer primary. It will do no good if placed before the mains switch!

Components List

RESISTORS

R1	See text
R2	6k8, 0.25W
R3	220R 1W

CAPACITORS

C1	220µ 15V single ended electrolytic
C2	470µ 15V single-ended electrolytic

SEMICONDUCTORS

Q1	BC109 or similar
ZD1	5V6 zener diode, 400mW
D1, 2	1N4000 or similar
D3	1N916 or similar

MISCELLANEOUS

RLA1	12V relay with mains contacts (eg Maplin type YX97F, YX98G or FJ43W)
T1	9-0-9V mains transformer, 100mA
	Connector blocks; PCB; case (if appropriate).

KENWOOD BUDGET HF BOX



If you wanted to get going on HF a few months ago, you had the choice of several rigs. If your eyes gazed longingly at the latest commercial equipments you had little choice

Features

The set covers all HF amateur bands from 160m to 10m (including the WARC 30, 17 and 12m bands)

Kenwood seem to be reacting to high quipment costs with their new HF rig. But does cost-cutting mean corner-cutting too? Chris Lorek, G4HCL, finds out.

below the £1000 mark, and the newly licensed amateur would either have to start saving hard or pay a visit to his friendly local bank manager! It has long been said that amateur radio is increasingly becoming a cheque book hobby, but lately there has been a trend on VHF towards *less* expensive rigs, could the same now be happening on HF?

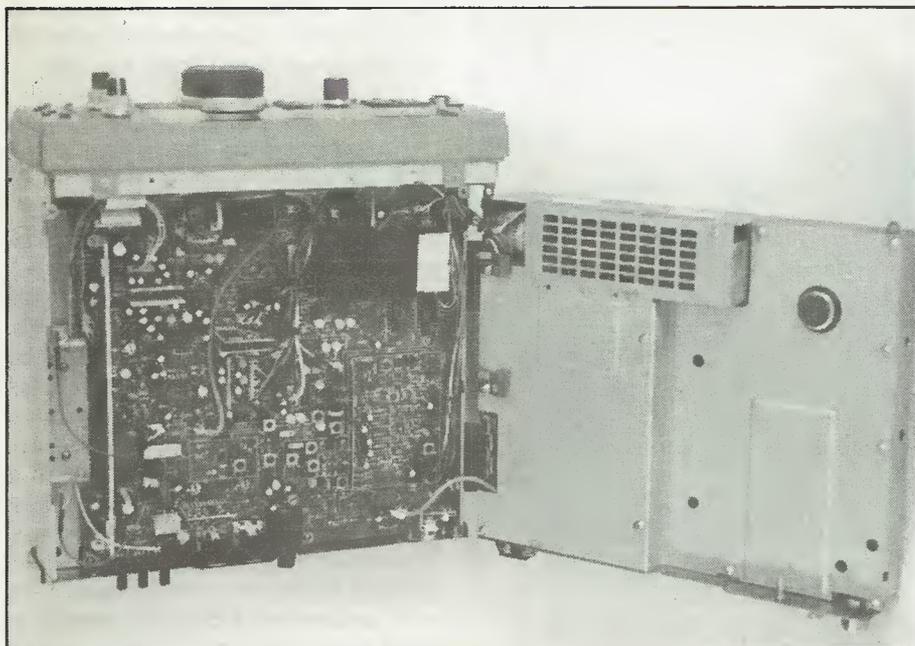
The Kenwood TS140S has just been introduced at a selling price of £862, making it cheaper than its predecessors while still offering similar features, but does this mean corners have been cut? A glance at the front panel shows a less cluttered array of knobs and switches than usual, but don't let this fool you, the set actually has many more features than it would seem, including a novel built-in morse code indicator system that tells you what's happening, and an optional computer control interface for the whizz-kids who let their fingers do the talking.

on transmit, coupled with general coverage receive operation specified over 500kHz — 30MHz, although the actual tuning range is a very wide 50kHz — 35MHz. USB, LSB, CW, FM and AM modes of operation are catered for, with each mode change being accompanied by a short morse code identification corresponding to the first letter of mode selected. The transmitter output power is specified at 110W PEP for SSB, 100W CW, 50W FM and 40W AM with a slight reduction on 10m, the set operating from a 13.8V DC supply and drawing 20A maximum on transmit with 1.5A nominal on receive. The TS-680S adds transceive coverage of 50-54MHz with 10W transmit power.

When operating in SSB mode, LSB or USB is automatically selected as you switch from the LF to the HF bands in accordance with normal amateur practice, the changeover occurred at 9.5MHz. A VOX facility (Voice-operated Tx

switching) is fitted with VOX gain, delay and anti-vox controls on the rear. On the TS-680S a switchable receive preamp operating on 6m and 10m is fitted in place of the VOX. For the CW addicts, full break-in keying may be selected as well as semi break-in, and an optional narrow CW filter may be fitted and independently selected as required, in place of the 2.2kHz SSB filter normally used, by pressing a front panel button. Separate filters are provided for AM (6kHz bandwidth) and FM (12kHz bandwidth) which are automatically switched in as appropriate for the mode selected. For noise-free monitoring on 10m, a variable squelch is fitted that operates in the FM mode. Two digital VFOs are provided, these tune in 10Hz steps on SSB and CW, and 100Hz steps on AM and FM, the VFOs may be used independently or for split frequency Tx/Rx operation.

Your operating frequency may be varied by using the large VFO tuning knob or by microphone mounted up/down buttons, and an adjacent 'VFO CH' click-step knob provides 10kHz steps for fast frequency shifts or channelised operation. A switchable RIT (Receiver Incremental Tuning) with a ± 1.2 kHz range is provided to cope with drifting stations after establishment of QSO, an indication of the offset and direction being shown on the set's main display. To suit different uses such as base station, mobile or whatever, the tuning knob 'stiffness' may be varied by a friction adjustment around its outer perimeter, and to prevent accidental QSYs a frequency 'lock' button is provided on the front panel. Band changes are made by using a pair of large up/down buttons next to the tuning knob, these step either between amateur bands or in 1MHz steps for general coverage receive as required.



Top view of the TS-140.

QRM Rejection

As the HF bands become more and more crowded, the performance of a receiver depends not so much as to how sensitive it is, but on how it stands up to rejecting stronger unwanted signals. These may be either from a stronger signal on a closely adjacent frequency where selectivity is important, from a number of stronger signals either within the frequency band or indeed from an adjacent broadcast band all mixing together in the first stages of your receiver, where strong signal handling comes in, or indeed from other man-made interference such as next door's chainsaw or a little further afield from over-the-horizon radar such as the American 'Pave Paws' system.

With all this in mind, as well as employing careful circuit design, Kenwood have provided the usual QRM fighting circuits such as a 20dB front-end attenuator and slow/fast switchable AGC (Automatic Gain Control) coupled with a manual RF gain slider control, together with an IF shift that moves the crystal filter passband either side of the tuned frequency. A dual-mode noise blanker is also provided, one mode for pulse suppression such as ignition interference, the other for longer pulse widths such as radar, a variable threshold level control gives you a degree of control to prevent the wanted signal

deteriorating. As a 'fighting back' measure, a built-in speech processor may be switched in to give your SSB (or even AM) transmit signal more punch. A variable power output slider control lets you continuously reduce your transmit power down from 100W to around 10W for when things aren't tough going or for those who enjoy a challenge.

Multiple Memories

A total of 30 memory channels are provided in 3 blocks of 10 each, selected by the rotary 'M.CH/VFO CH' knob. Apart from allowing you to quickly recall Radio Tirana's frequency for easy bed-time listening a couple of useful features are provided. Memory channels 1-10 may store frequency and mode, and memory channels 11-20 may store split Tx/Rx frequencies as well as the operating mode. A push of the 'M>VFO' button then allows you to transfer the memory channel information into the operating VFO(s) as required if you wish to tune around for other activity.

Memory channels 21-30 however are designated as 'Programmable Band Markers,' these store an upper and lower frequency limit as well as a programmed mode of operation. Once selected, you may QSY or change mode as you wish within the frequency limits you have programmed by a twist of the

main tuning knob, the memory channel storing the last tuned frequency and mode in each case. As such, they may be used to store amateur or broadcast band frequency limits together with appropriate modes of operation.

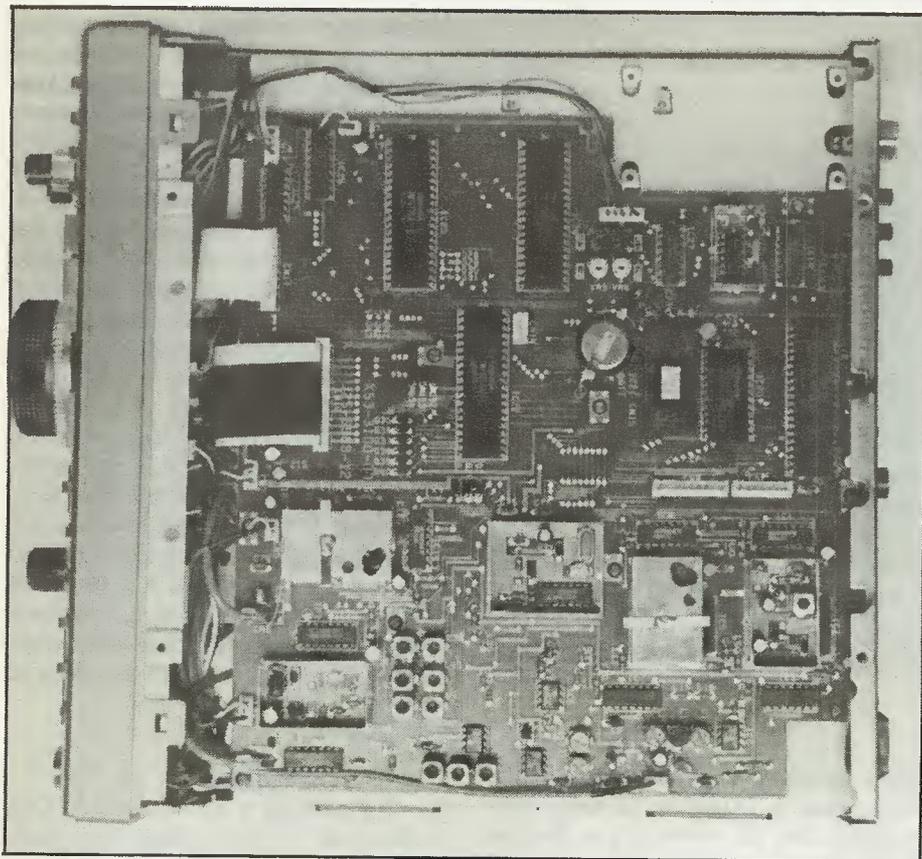
Memory channels may be sequentially scanned, the RIT knob allowing you to alter the scanning speed and hence the amount of time spent sampling each channel, any of the channels may be locked out of scan mode if desired. A programmable band scan is also available, this normally searching between the limits programmed in memory channel 30. If this channel is empty, then the entire range from 50kHz to 35MHz is searched, or if the scan is initiated outside these limits then the channel 30 range is excluded. Again the RIT knob may be used to alter the scan rate.

Dah Dit Dah

As well as a short audible CW indication of the mode selected, several other CW messages emanate from the set's speaker, apart from those received off air. For instance, if memory scan is initiated while all memory channels are either vacant or locked out of scan then a 'Check Memory' message in CW is produced, similar indications of 'Full' or 'Empty' are given when checking memories with the '1MHz' step switch selected. Other indications such as 'Reset' and 'Unlock' are given as alarm indications. All the above may be changed to simple bleep tones in case CW sends you round the twist!

Interfaces

A large fluorescent display shows the operating frequency to a resolution of 10Hz or 100Hz as desired, together with LED indicators displaying the operational mode and VFO. A backlit analogue meter shows receive signal strength and selectable indications of the relative output power or ALC level on transmit. Round the back of the set are four accessory sockets providing a multiplicity of functions. The ACC2 connector is designed for RTTY/AMTOR/Packet controllers, providing receive audio output at a fixed 300mV level, squelch control output, Tx AF input, and Tx keylines



Underside of the new Kenwood.

(one of which disables the microphone). ACC3 provides an inter-connection to the optional AT-250 automatic aerial tuner, and a further 'Remote' socket provides for external linear amplifier Tx/Rx switching, a PTT footswitch, and a speaker audio output.

For the computer-control buffs, an optional computer interface may be fitted with the ACC1 socket connecting to the outside world, but the manual states that you'll have to write your own computer program! The set comes supplied with 7 and 13 pin DIN plugs to suit the accessory connectors, a heavy duty DC cable fused in each lead with a spare fuse provided, and an instruction manual giving operating details together with circuit and block diagrams. The set measures 281mm(W) × 107mm(H) × 305mm(D) and weighs 6.1kg.

Technicalities

The set is constructed on a metal chassis with a 'hinge-open' arrangement where after removing the covers the set literally opens up like a book, to expose all the innards in their glory, this of course makes

access for servicing very easy. On receive, the aerial signals pass through the appropriately selected low and high pass filters, broadcast band and IF traps, then into the balanced FET mixer without an RF amplifier being used (although switchable ones operating on 10m and 6m are fitted to the TS680 model, not tested here). This enables the best possible blocking and intermodulation performance to be obtained without degradation by due to the gain of the RF stage.

A first IF of 40.055kHz is used, a monolithic crystal filter being used here to obtain roofing selectivity. Individually switched filters are used for SSB, AM and FM, together with the optional CW filter, at the 455kHz IF. A quad-loop synthesiser controlled by a single reference oscillator provides the local oscillator signals common to receive and transmit. On transmit the DSB signal is generated at 455kHz, filtered to obtain the required sideband, amplified and mixed to 40.055MHz, filtered and mixed again with the VCO signal to achieve the final RF frequency. On FM, the first mixer oscillator is

directly modulated. A pair of 2SC2879 PA transistors provide the 100W output level from the set.

On The Air

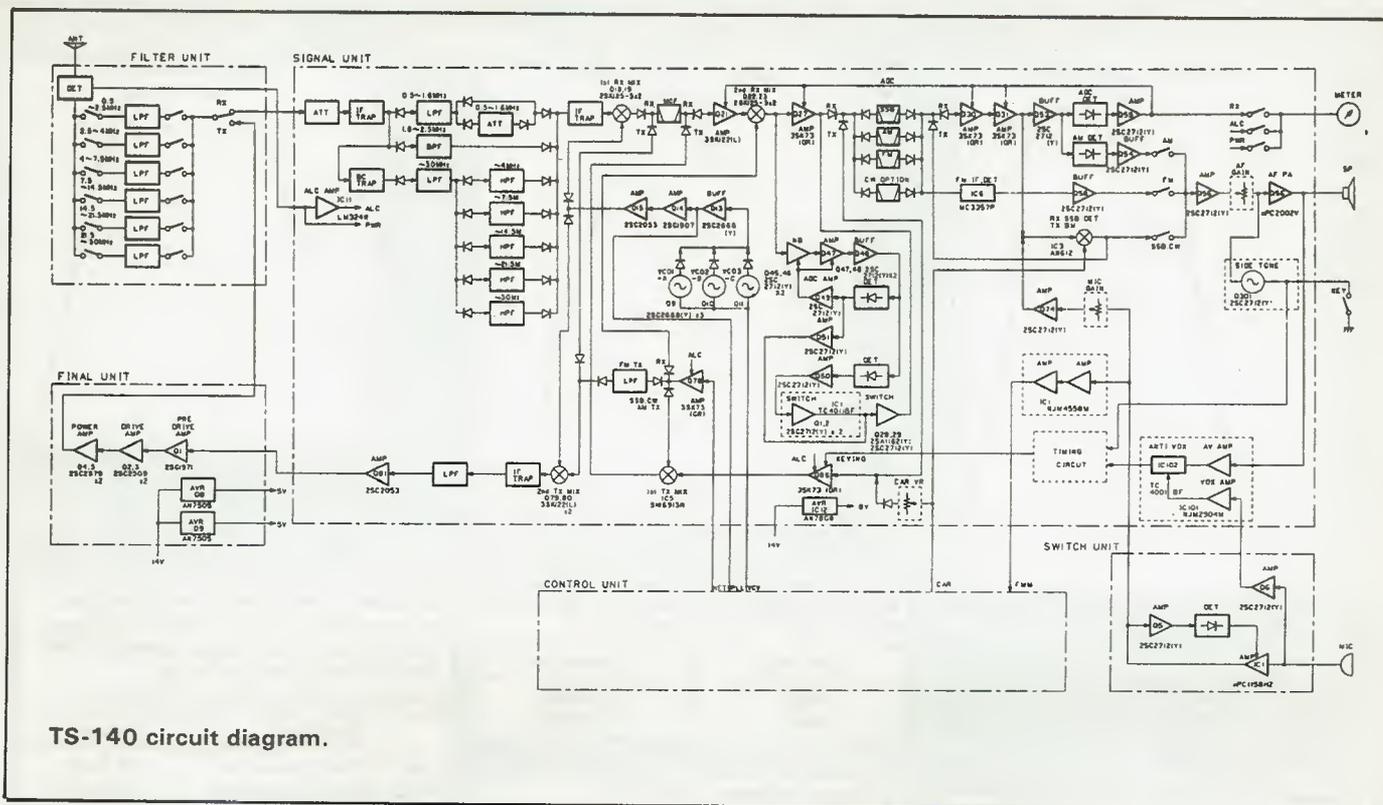
After coupling the set up to my 25A DC power supply unit and HF aerial system, I busied myself tuning around the bands to get a general 'feel' of the set, and I must say I was pleasantly surprised to find the set was quite versatile despite its 'simple' control appearance. I found the programmable band memories very useful, in fact after programming my favourite amateur band segments and modes, together with a couple of broadcast bands, I used these memories in preference to the band change switch for normal use. This way switching from one amateur band to another always placed me in the portion I required, rather than the set just changing the MHz digit as appropriate and requiring yours truly to perform a QSY job each time.

I had several pleasant QSO's on the amateur bands, both on SSB and using AMTOR and Packet modes with the set coupled up to my KAM unit. As a microphone is not supplied with the set, a quick wiring job was performed to couple my usual desk and fist mics up. In asking for audio reports, little difference was noted between the TS-140S and my usual 'top performance' equipment, although reports received when using the speech processor were a little indifferent from stations who were receiving me at a reasonable strength.

Testing the set on AMTOR, at least with the European and American stations heard over the review period, showed it to be adequately fast in its Tx/Rx change-over without further modifications being required. I appreciated the accessory Tx keying line that muted the microphone on transmit, using this for data communications means that you don't need to remember to unplug the mic each time for fear of corruption. This was a limitation with the TS-440S (reviewed *HRT Aug '86*) so maybe someone out there in the land of the rising sun did their homework!

Around The Bands

Around the amateur bands I



TS-140 circuit diagram.

found the receiver to be very 'quiet,' not through lack of sensitivity but due to the absence of all the burbly 'rumbles' one often hears on the LF bands, such as 40m, at night on less-than-perfect receivers caused by internal mixing products. I found that by switching the attenuator in provided no discernible improvement apart from giving my ears the occasional rest, showing the front end was not being driven into non-linearity through overloading. On my 160m/80m/40m trap dipole at least (over 200ft long in all) I encountered no blocking problems from the many high-powered broadcast stations to be found on the bands. I did however note a 'glitch' in tuning through 50kHz steps in the frequency ranges, in the presence of strong AM broadcasters this would often bring about a sudden decrease in sensitivity as the S-meter deflected almost fully for an instant whilst tuning. This is due to the now common multi-loop synthesiser approach being employed in many sets, the 'glitch' occurring as one sub-loop takes over from the other, but nevertheless I still found it annoying.

Laboratory Tests

The receiver sensitivity results on SSB did rather surprise me as I would have expected a slightly

deaf set due to the absence of an RF amplifier stage. The AM sensitivity was a little poorer but still acceptable in view of the power race that occurs on the HF broadcast bands. Of note though was the extremely good strong signal performance measured, so good in fact that I believe the set is in a class of its own at this price level.

I tried very hard to find traces of reciprocal mixing from the synthesiser when measuring the selectivity of the set with my low-noise cavity tuned signal generators, and although I *did* find a slight increase in noise centred around 6kHz HF of the wanted signal frequency, I had to increase the unwanted signal fed through a hybrid combiner by over 80dB over the S3 level to show up on an adjacent S3 strength received SSB signal. To put this in 'real' terms, this would just start causing problems only when receiving a very weak signal (S4-S5) a few kHz away from a horrifically strong signal absolutely taking the S-meter off the scale (S9+70dB approx.).

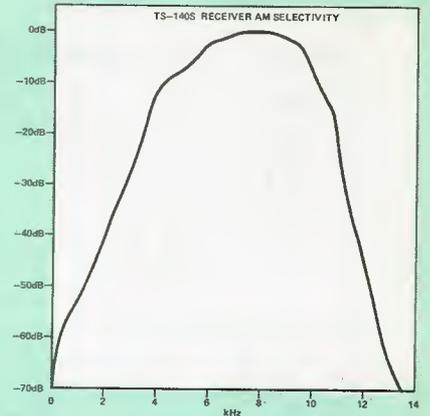
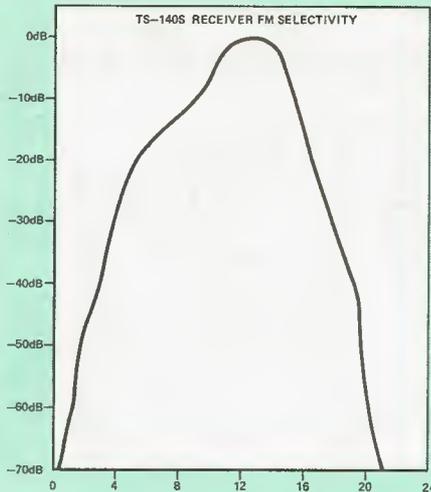
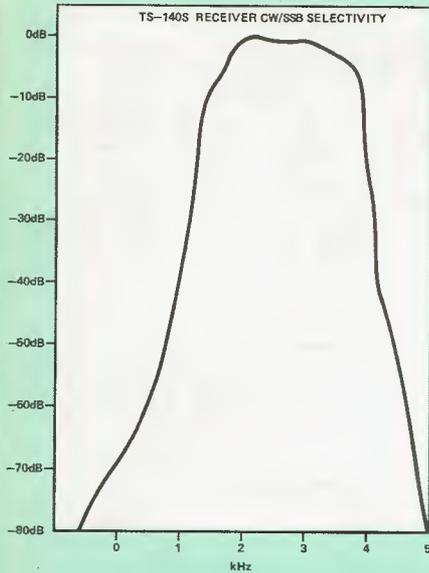
As a result the measured SSB selectivity did not artificially 'widen out,' however the AM and FM selectivities measured were a compromise I believe between price and performance. Totally adequate for the general listener, the 10% measured distortion is also cer-

tainly good enough amongst all the fading and processing encountered on most broadcast signals, and one must remember that it is an amateur band transceiver after all! In tuning across the entire 50kHz-35MHz with a 50ohm load connected to the aerial socket I found only six weak 'birdies,' none of which were strong enough to lift the S-meter, which is very good when you consider all the internally generated oscillator frequencies.

On Transmit

On transmit, the higher order harmonics were generally well filtered, I did notice a few spurious separated from the main carrier at intervals of $\pm 3\text{MHz}$ on 40m, $\pm 2.6\text{MHz}$ on 30m, and $\pm 11\text{MHz}$ on 12m and 10m, which appear to be internal mixing products. The two-tone SSB IMD performance, that is the amount of 'spreading' of the signal due to non-linearities in the PA, was acceptable but not of the class of higher priced sets, often with PAs running from higher than 13.8V supply and hence achieving greater linearity for a given power output. The 'splatter' was lopsided on all the tests, changing the audio frequencies of the applied tones made little differences.

As data communication is becoming more and more popular,



LABORATORY RESULTS RECEIVER

Sensitivity: Input level in μV pd required to give 12dB SINAD

Freq. MHz	SSB/CW	AM	FM
1.8	0.164	2.40	—
3.5	0.123	2.12	—
7.0	0.110	1.96	—
10.05	0.123	2.23	—
14.0	0.108	1.98	—
18.0	0.114	2.09	—
21.0	0.126	2.18	—
24.5	0.168	2.53	—
28.5	0.136	2.26	0.286
29.5	0.141	2.33	0.290

Blocking: Measured as increase over 12dB SINAD level of interfering signal, unmodulated carrier (SSB/CW), causing 6dB degradation in 12dB SINAD on-channel signal.

Spacing	Level
$\pm 50\text{kHz}$	107dB
$\pm 100\text{kHz}$	113dB
$\pm 200\text{kHz}$	117dB

Image Rejection: Increase in level of signal at the first IF image frequency, and the IF frequency itself, over level of on-channel signal to give identical 12dB SINAD signals.

Freq. MHz	Image Rej.	IF Rej.
1.8	74.6dB	107.5 dB
3.5	78.6dB	112.0
7.0	81.8dB	117.7dB
10.05	108.9dB	121.8dB
14.0	90.5dB	111.3dB
18.0	80.4dB	94.8dB
21.0	77.2	93.6dB
24.5	71.0dB	88.7dB
28.5	73.7dB	89.9dB
29.5	73.2	89.5

AM Distortion: Measured at 1kHz audio freq, $100\mu\text{V}$ pd received signal

Mod tech	Distortion
30%	9.03%
60%	10.30%

S-Meter Linearity, (SSB/CW, 14.25MHz).

Indication	Sig Level	Rel. Level
S1	1.19 μV pd	-22.7dB
S2	1.45 μV pd	-21.0dB
S3	1.89 μV pd	-18.7dB
S4	2.40 μV pd	-16.6dB
S5	3.17 μV pd	-14.2dB
S6	4.43 μV pd	-11.3dB
S7	6.32 μV pd	-8.2dB
S8	9.57 μV pd	-4.6dB
S9	16.3 μV pd	0dB ref
S9+20	0.134mV pd	+18.3dB
S9+40	0.924mV pd	+35.1dB
S9+60	5.24mV pd	+50.1dB

S-Meter S9 Level (SSB/CW)

Freq. MHz	Sig. Level
1.8	14.7 μV pd
3.5	11.8 μV pd
7.0	21.1 μV pd
10.05	18.4 μV pd
14.0	16.3 μV pd
18.0	11.9 μV pd
21.0	13.5 μV pd
24.5	18.5 μV pd
28.5	13.5 μV pd
29.5	13.5 μV pd

Harmonics/Spurii

Freq. MHz	2nd	3rd	4th	5th	Spurii
1.8	-63dBc	-56dBc	<-70dBc	<-70dBc	<-70dBc
3.5	-63dBc	-65dBc	<-70dBc	-63dBc	<-70dBc
7.0	-53dBc	-54dBc	<-70dBc	<-70dBc	-54dBc
10.05	-52dBc	-46dBc	<-70dBc	<-70dBc	<-70dBc
14.0	-52dBc	<-70dBc	<-70dBc	<-70dBc	-52dBc
18.0	-51dBc	<-70dBc	<-70dBc	<-70dBc	<-70dBc
21.0	-58dBc	<-70dBc	<-70dBc	<-70dBc	<-70dBc
24.5	-56dBc	<-70dBc	<-70dBc	<-70dBc	-51dBc
28.5	-57dBc	<-70dBc	<-70dBc	<-70dBc	-52dBc
29.5	-56dBc	<-70dBc	<-70dBc	<-70dBc	-49dBc

3rd Order Intermodulation Rejection: Increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product (SSB/CW).

Spacing	Level
50/100kHz spacing	91.5dB
100/200kHz spacing	92.0dB

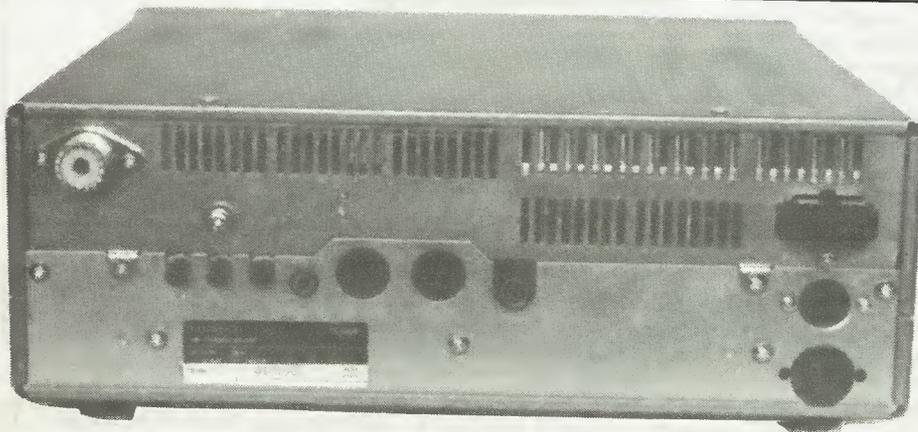
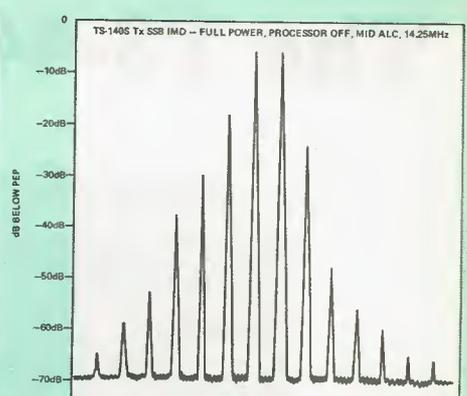
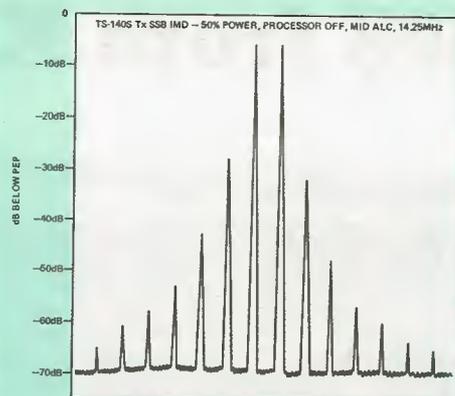
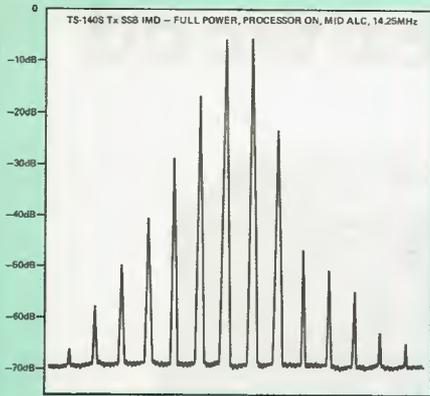
Transmitter

Operational Frequency Range

1.60-2.00MHz
3.00-4.00MHz
6.50-7.50MHz
10.00-10.50MHz
13.50-14.50MHz
18.00-19.00MHz
20.50-21.50MHz
24.00-25.00MHz
27.50-30.00MHz

Max Tx Power

Freq MHz	SSB PEP	SW/AM	FM
1.8	113W	90W	47W
3.5	114W	91W	49W
7.0	114W	91W	49W
10.05	117W	93W	49W
14.0	112W	89W	48W
18.0	111W	88W	47W
21.0	108W	86W	46W
24.5	105W	83W	45W
28.5	101W	81W	43W
29.5	100W	80W	42W



AMTOR users may be interested to note that I measured the Tx switching time at 11.5mS (Carrier), with full RF SSB single tone output occurring 21mS after the Tx key command. The Rx recovery time following full power transmit I measured as 24mS.

Conclusions

The set I believe is an excellent rig for the amateur HF bands at the price, its performance on receive exceeds many sets at over twice its cost. Kenwood never fail to surprise me with the standard of technical performance achieved from their latest equipments, and the TS-140S is no exception. The set is deceptively versatile, having several useful features of which the programmable band limits were my personal favourite. It is light and small enough to carry around with you for a spot of portable operation (but don't forget the power requirements!), and could certainly find a place in the odd mobile installation or two.

There is no transverter facility coupled with no apparent external ALC input for automatically switched output reduction, hence its suitability as a driver rig for transverting to other bands could be limited. Remember that a DC power supply capable of giving 20A is required, this must be budgeted for when considering purchase if you do not already have one.

My thanks go to Lowe Electronics Ltd for the loan of the review set.

The TS-440S from Kenwood



As many of you know, Kenwood have a current policy of running three HF lines; the '1' series which started with the TS-120, went on to the TS-130, and now crowned by the TS-140; the top of the range '9' series having the TS-930 and TS-940; and the '4' series which began with the TS-430 and is now completed with the TS-440S.

The TS-440S is designed to be a compact version of the TS-940S, and in RF performance it proves to be so. Chris Lorek, when reviewing the TS-440S said "There was no suggestion of the dreaded reciprocal mixing..." and went on to say "Trio engineers have done well considering the standard TS-940S performance - the TS-440 actually outperforms it in this respect." What this means in down to earth listening terms is that the receiver presents you with a quiet background, with signals simply appearing and disappearing when you tune across them, with none of the "sharsh" noises as you approach a strong signal. Kenwood engineering at its best.

Whilst on the subject of the receiver, Geoff Arnold said in his review in Practical Wireless, "The receiver in particular is a joy to use, with clever use of spare microprocessor power to give automatic bandwidth selection according to mode." Again this typifies the Kenwood belief that their equipment is designed to be used as a human being, and they want to make it as easy as possible for you to enjoy your hobby.

Of course not everyone wants to use their amateur licence for actually communicating with other people, and if you want to sit and count control knobs then Kenwood is not for you. I have just been looking at a colour spread picture in an American magazine which shows the very latest HF transceiver to appear on the market. It has 84 push buttons and 30 control knobs - and that is just on the front panel. You chaps with 10 fingers on each hand should be well pleased. Mind you, the TS-440 has 37 buttons so even we mortals with 5 fingers will be occupied fully.

As a radio amateur, there are other excellent design features to which your attention should be directed. Amongst the most obvious of these is the frequency readout and the way it behaves.

Sounds silly? Then consider tuning to 3750kHz and chatting on lower sideband to Fred. The readout on the transceiver reads 3750 (of course). Then Fred says "Check me on upper sideband", and you move the mode switch to USB. If you are using a Kenwood rig, the readout still shows 3750 and you are indeed listening and transmitting on 3750 upper sideband. BUT - many other transceivers leap sideways by 3kHz and you then have frantic retuning to find Fred. Small point you may say, but it is intensely irritating in use, and Kenwood make sure that it does not happen in their equipment; not HF, not VHF, not UHF.

By now you are probably thinking "The geriatric idiot is meandering again", but it never ceases to amaze me how lessons learned long ago need re-teaching at regular intervals, and minds need opening to old truths. That is, after all, what education is all about. Enough - back to the TS440S.

I absolutely guarantee that you will be impressed by the TS-440S when you sit down and use it; and that is best accomplished by going to one of our branches or your nearest Approved Kenwood Dealer. Don't bother with any of the shady sources of equipment, they don't have the background or connections to understand what the equipment is all about.

For full details of the TS-440S, Kenwood produce an 8 page brochure which is yours for the cost of postage and packing. For full details of all the Kenwood range, simply send £1 and we will fill an envelope with info. and send it right back. If it takes 8 pages to describe the TS-440S there is no way in which I can adequately cram it into this space - send for the brochure.

73 John Wilson G3PCY/5N2AAC

TS 440S £1138 inc. VAT

Glasgow: 4/5 Queen Margaret Road.

Darlington: 56 North Road.

Cambridge: 162 High Street, Chesterton.

Tel. 041-945 2626

Tel. 0325 486121

Tel. 0223 311230

Cardiff: c/o South Wales Carpets, Clifton Street.

London: 223/225 Field End Road, Eastcote, Middlesex.

Bournemouth: 27 Gillam Road, Northbourne.

Tel. 0222 464154

Tel. 01-429 3256

Tel. 0202 577760

Note: All our shops open Tuesday to Saturday inclusive.

FREE Information is free; only the Post Office demand payment for handling it - and the Penny Black is no longer used. Send us £1 to cover Post and Packing and we will return not only the full colour Kenwood catalogue, but details of any particular rig you mention and lots of other information including latest prices.

KENWOOD TM-221E TM-421E



I really do not know how they do it. Do what? Condense so much power and performance into such incredibly tiny packages. The TM-221E and TM-421E represent the sensible and well considered use of technology by Kenwood to give the user probably the best 2 metre and 70 centimeter FM mobile transceivers that it is possible to buy.

The technology in question is the use of surface mount (sometimes called 'chip') components wherever possible. These tiny things are mounted directly on the surface of a printed circuit board, minimising space and wiring. They also have an incidental advantage in that the use of fully automatic assembly techniques gives cost savings for the customer. The surface mount components are not simply resistors and capacitors, but include integrated circuit packages and transistors, so everything is reduced in scale.

The end result in the case of the TM-221E and TM-421E is a package measuring only 140(W) x 40(H) x 179(D) mm; or if like me you are using a wooden ruler dated 1941 5.5 x 1.6 x 7 inches. In this package lurks a receiver section second to none (see the Chris Lorek review in HRT, July 87), and a transmitter which shoves out 45 watts on 2 metres, or 35 watts on 70cm in the case of the TM-421E.

The transceivers, in true Kenwood style are extremely easy to use, with all information displayed on a bright orange backlit LCD, and control operations which are delightfully simple and logical. 14 memory channels are provided, and each memory holds not only the frequency but also any repeater shift required and even whether or not you require a tone burst. If you live in the Great Wen and want to try out 12.5kHz channel spacing, it is all provided - 5, 10, 12.5, 20 and 25kHz at the touch of a button; and of course the receivers are fitted with the recommended "F" filter bandwidth to handle 12.5 and 25kHz channel spacings. Attention to detail is Kenwood's hallmark.

If you want to go the whole hog, you can mount the TM-221 and TM-421 together in a common bracket to make a terrific dual band station, and go even further by using the RC-10 remote controller (which really needs an advertisement of its own). Best of all, since it is impossible to adequately describe this equipment in a few lines, why not send off for the Kenwood catalogue, making a specific request for the brochure on the TM-221E. (see box on other page).

TM-221E ... £317 inc. VAT. TM-421E ... £352 inc. VAT

HF125 HF all model receiver



Why did we design and produce the HF125 receiver? Simply to provide the keen short wave listener with a receiver which offered not only all the facilities he or she needed in an HF receiver, but to give at the same time a level of performance which would cope easily with HF conditions likely to be encountered in Europe.

You all know the problems, high power broadcast stations pounding in at night, blotting out the weak signals you wanted to hear - and many of the unwanted signals were generated in your receiver itself. That we succeeded in designing a receiver which could solve the listening difficulties is obvious from comments from reviewers, but we also did it at an attractive price.

The HF125 performance ranks equal to or better than imported receivers at twice its price, and its success stretches around the world.

So what did the reviewers say. I'll give you a few comments, but for the full story why not send a stamped addressed envelope marked "HF125" and we will return a fully descriptive brochure with all the review comments included.

Quotes:

"What is particularly important is the fact that so much attention has been paid to RF and IF performance, areas so lacking in many Japanese sets. Short Wave Listeners will be particularly pleased about the many choices of selectivity on AM." Angus McKenzie

"I tuned straight to the 40 metre amateur band to see how it stood up to the battering from high powered propaganda broadcasters when attempting to resolve relatively weak amateurs striving to get contacts. The simple answer was, no problem." Chris Lorek

"After an hour, drift was less than 50Hz in each instance. This is comparable with receivers in much higher price classes." World Radio and TV Handbook

"It's refreshing to find a receiver that does exactly what it claims." World Radio and TV Handbook

The HF125 costs £375 including VAT. Need I say more?

packet radio from Kantronics



When I first heard of packet radio, I said "What?", and that is the reaction of many radio amateurs. However, I never expected it to be so much fun, and judging by the demand and the queue to get at our demonstration station here at Matlock, a lot of other people are also finding it truly fascinating.

There are several companies offering ready made packet systems, and the descriptions are usually full of terms you don't understand (including some of our own ads in the past). What for example is "enhanced generic command structure"? Sounds very much like something taught at Sandhurst or West Point.

From the equipment available, we chose to represent Kantronics, because their units are sheer delight to see, to use, and to enjoy. For full information on this most interesting aspect of our hobby, just send a couple of first class stamps and ask for "Kantronics".

Prices range from £159 to £298, and I know I haven't told you what packet radio will do - send for the info . . .

LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE

Telephone 0629 580800 (4 lines) Fax 0629 580020



DIY

Magnetic Loop Aerial

Magnetic loop aerials have been mentioned from time to time in radio magazines, but I must admit, having a good multi-band dipole outside, I have never paid much attention to them — until recently, when I had an RST 599 contact both

on the value of tuning capacitor used, but should be somewhere within the range of 7 to 28MHz.

In my own case, a capacitor with a maximum value of 110pF allows me to cover 10, 14 & 18MHz in the tuning range; adding another 100pF

floor of our loft; then lightly tapped in panel pins every few inches around the circumference. It was then a simple matter to bend the copper tubing round the pins to form the basic loop. The total length is cut so as to leave a $\frac{3}{4}$ in gap between the ends of the tubing when it is arranged in a 3 foot circle.

The support was a piece of flooring timber 4 feet long, by 4in wide, mounted on a wooden base using two aluminium brackets. In fact the base was a section of kitchen worktop which had been removed for the fitting of an electrical hob — so you can see that any odd pieces of suitable lumber can be brought into service! To clamp the loop to the support, I used ordinary nylon cable clips which are made in a variety of sizes, so it is easy to pick ones which are exactly the correct size to grip the $\frac{3}{8}$ in. tube. Note that the loop is mounted with the $\frac{3}{4}$ in gap at the top. Although the copper tube is quite malleable, it is self-supporting when held in this manner and quite suitable for an indoor system.

If aerial planning is a problem maybe Tom Hall, GM3HBT, can offer a solution with his HF magnetic loop aerial

ways on 7MHz with a station using just such a system.

In conversation it turned out that the loop in question was only 3 feet in diameter, and was sitting on the floor of the shack, and was easy to construct . . . and I was hooked!

Results have been so dramatic that, encouraged by local amateurs, I decided to spread the news, mainly for those folk who would love to work DX, or even put a good HF signal into Europe, but who live in a flat or in an area where external aerials are forbidden. It should also appeal to those like me, who have an inexplicable urge to "have a go" at yet another project just for the interest of experimenting.

Loop Aerials

In this article there is no intention of delving into the deep theory of the operation of loop aerials; for those who wish to, they could do no better than to read the excellent article by W5QJR in *QST* magazine for June 1986, as long as it is remembered that the design parameters found there are meant for powers of 500 watts or so! With a few simple tools, and the facility of raiding your own junk box — (or, even better, someone else's!) — a very small aerial can be knocked together very easily indeed. With a basic loop diameter of 3 feet, the frequency range which can be covered depends to a large extent

in parallel gives 7MHz and if I had chosen a capacitor with a lower minimum value, I could probably have managed 24.9 and 28MHz. If interest is mainly in the higher bands, then a slightly smaller loop, say 2.75 feet could be tried. This is a great project for further experimentation, depending on individual requirements.

Construction

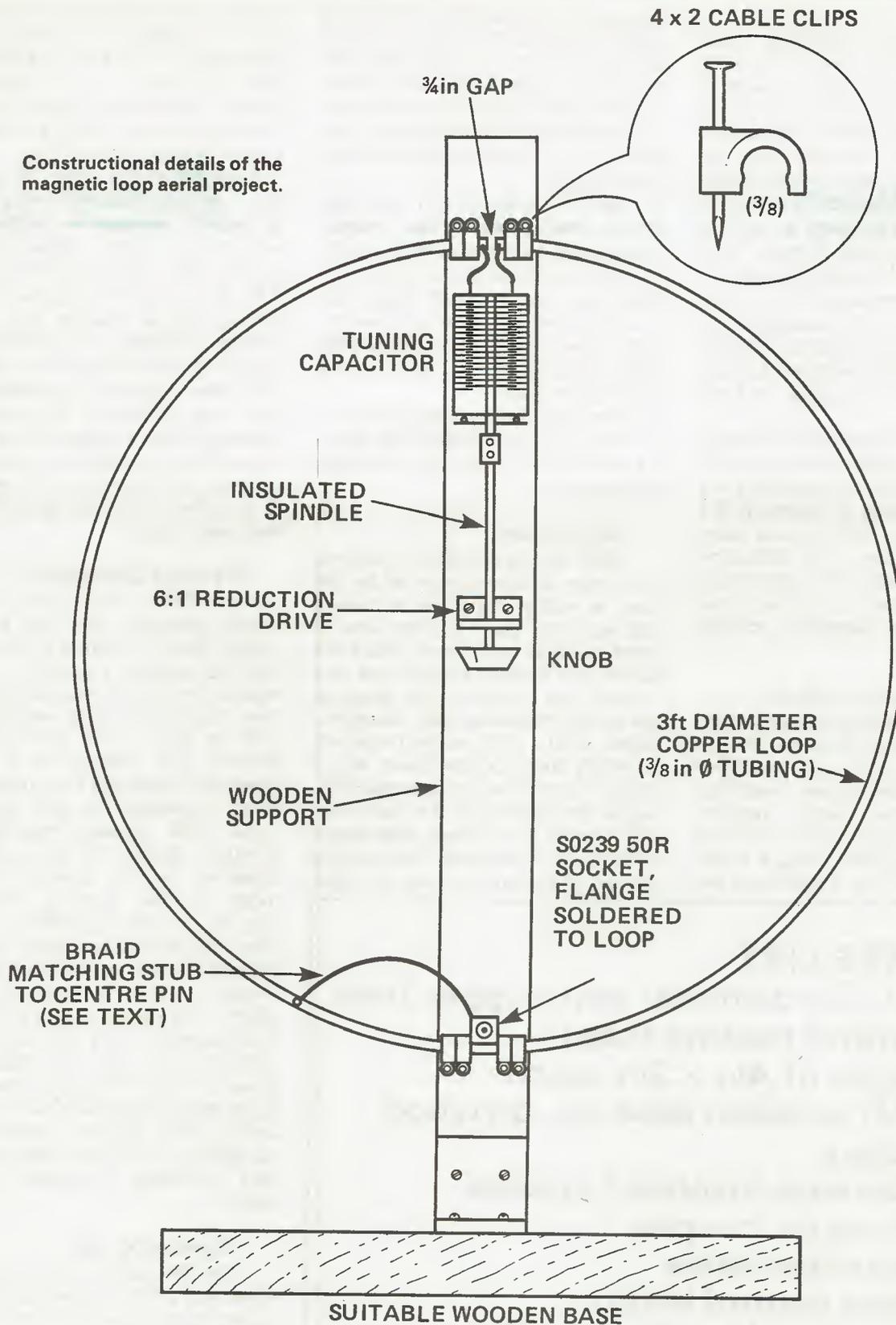
The loop was made from a 10 foot length of $\frac{3}{8}$ in diameter soft copper tubing such as is used in small bore central heating systems, and cadged from my local friendly plumber! Using a nail and piece of string as compasses, I drew a circle 3 feet in diameter on the chipboard



Capacitor

The capacitor is the only critical component in the whole project. The tuned loop is a very high Q circuit and so high RF voltages appear across the capacitor vanes, with a power output of 100 watts, it can be in excess of 1000 volts. This means that a wide spaced capacitor must be used because a standard twin gang broadcast type used with the gangs in series will flash over at under 20 watts. Now, it so happens that the ideal capacitor must still exist in thousands over the country in countless junk-boxes — the kind used in the WW2 surplus tuning units type TU5/6/7B (from BC610 US-made transmitters). These came in various values, were mechanically excellent, had bonded vanes, and wide spacing. I used one

Constructional details of the magnetic loop aerial project.



of these which had a measured maximum capacitance of 110pF. Because of the variety of sizes available, it makes quite an interesting experiment in itself checking any

which may be available to you to discover exactly what tuning range they provide. Of course, if these units are not available, then over types can be tried up to a maximum

capacitance of around 200pF, whilst remembering the trade-off of vane spacing versus power levels. The surplus type of unit described can easily operate at the full 100

watts output.

The chosen capacitor was mounted on the support upright, just underneath the gap at the top of the loop, and connected across it by short pieces of braiding stripped out of a coaxial cable, making sure that the joints were good mechanically and well soldered. Then, to minimise hand-capacity effects, a length of insulated spindle was used to extend the distance from the tuning knob to the capacitor, using a $\frac{1}{4}$ in coupler — my insulated extension was a 6mm knitting needle, beheaded and de-pointed but do make sure that it is plastic and not metal!

Because the tuned loop is a high Q circuit which means that tuning is quite sharp, I further extended the spindle by adding a standard 6:1 reduction drive, which made spot-on tuning simple. The reduction drive will require a little aluminium bracket to support it at the same height as the capacitor spindle centre.

The Matching Stub

Some loop aerial designs show a separate small coupling loop at the base of the main loop, but I have used a much simpler and much less critical gamma match system, favoured in the QST article which is very simple to build. Using a heavy duty soldering iron, I soldering the

flange of a standard 50 ohm SO239 socket to the centre of the base of the loop and its centre pin was connected to a piece of stiff coax braiding about 8in. long. This is bent over in a semicircle to a point on the loop about 6 to 7 inches away from the 'open' end.

As the exact spot for the best match compromise for several bands must be found by experiment, I initially soldered a croc-clip to the braid so that I could move the tapping point about to achieve the match and then finally soldered the braid directly to the loop at the appropriate spot.

Now all that is required is to connect the loop aerial to the rig via a length of 50 ohm coax, and tests can begin!

Operation

With the rig initially on receive, the range of bands covered by the loop is easily identified as tuning the capacitor gives a sharp rise in band noise at resonance. Once the bands are known, choose the one nearest the centre of the range to set up the matching stub. Using low power with a SWR meter in circuit, carefully tune for *minimum dip*; if this is not as near unity as possible, adjust the position of the stub croc-clip slightly up or down, and repeat until a null is reached. Keeping this setting of the stub, repeat for other

bands, and adjust until a satisfactory compromise is obtained. My loop covers 10, 14 and 18MHz and achieves nearly a 1:1 SWR (so called!) on all three. Finally, remove the croc-clip and solder the gamma match braiding to the loop.

Because of the high "Q" again, the loop does not have very broad tuning and moving around the band will require more adjustment of tuning than with a normal aerial/ATU. But if like me, you can have it sitting beside you in the shack, tuning is simple, and I have been able to dispense completely with an ATU when using it. Remember also that the direction of maximum radiation from a loop aerial is *in the plane* of the loop and not broadside-on. Now all that remains to be done is to point it the way you want to, and have a go!

Results Obtained

On 10MHz, I found very little to choose between the loop and my indoor dipole. Leaving the loop in a NW/SE position, I was able to have reports from EA in the south to SM near the Arctic Circle, varying from 569 to 599+, and never lost a contact. On 14MHz on a recent weekend, although I am no contest buff, I jumped in and had the usual 599 contest reports from several dozen W/VE stations, observed by an amazed visiting local. If one ignores the 599 reports, it was important to note that, in a very busy contest, my loop signals had not one single "QRZ?", which I think is significant. On 18MHz, all I need to say is that my first contact using the loop aerial with 10 watts, was with VE2LI, who gave me RST 579, and I have had quite a few European QSO's on that band, with signals again comparable to my dipole. Apart from 18 and 24.9MHz, I normally run 25 watts.

Summing Up

For the small amount of cost, time, and effort involved, I think that experiments with loop aerial systems are very worthwhile. And with my own results in mind, I think there is really no excuse for any operator in an area restricted for aerial erection, or for a flat dweller, not to be able to transmit a good readable signal on the HF bands.

PARTS LIST

10ft of $\frac{3}{8}$ in diameter soft copper tube
(eg. central heating tube)
4ft length of 4in \times 2in wood
2ft \times 2ft wooden base eg. plywood
2 brackets
 $\frac{1}{4}$ in diameter insulated spindle
 $\frac{1}{4}$ in diameter coupler
6:1 reduction drive
Insulated control knob
 $\frac{3}{8}$ in plastic cable clips (4 off)
6:1 reduction drive
110pF wide-spaced variable capacitor
SO239 socket

BC50XL Channel Scanner REVIEW

Fancy a handheld VHF/UHF FM scanner for under £100? In the past you couldn't get one for less than around £200, and the inquisitive VHF/UHF listener was often limited to a fixed base scanner for his

button. To prevent accidental frequency shifts whilst carrying the set around, a slider switch allows you to inhibit the keyboard whilst still allowing the 'Man' and 'Scan' button to be used.

A hand held channel scanner for under £100? We take a look at the latest price breaker.

listening pleasure rather than a top-pocket model that could serve a number of purposes. A small portable scanner may of course be used at home, in the car, at the office or just wandering around shopping so with this in mind we wasted no time in taking a look at Uniden's latest offering!

Features

The scanner covers 66-88MHz, 136-174MHz, and 406MHz-512MHz, with direct frequency entry via the facia mounted keypad. This gives coverage of the 4m, 2m and 70cm amateur bands, plus rather a lot of other frequencies we're not supposed to listen to! You can programme channels on any frequency within the coverage range, the set automatically storing these to the nearest 5kHz step on VHF and the nearest 12.5kHz step on UHF. Up to ten memory channels are available for storage of frequencies and these may be scanned for activity or manually selected at will. A 'lockout' button allows you to inhibit any channel from automatic scan whilst still allowing manual selection, the 'Manual' button stepping through the channels one by one. This 'manual' facility also allows you to access a channel directly by first pressing the keypad number corresponding to the memory channel number, followed by the 'Manual'

When the set is initially switched on, scan mode is automatically selected which cycles through the channels at around ten per second, the scan halting on a busy channel. The 'Manual' button in this mode halts the scan as required in case you find an interesting conversation going on, otherwise the scan resumes three seconds after the squelch closes. This preset delay allows you to monitor simplex QSOs having a short pause between transmissions without the set jumping off to another channel when the carrier drops.

A two-digit LCD (Liquid Crystal Display) gives an indication of the channel number, in use, and by pressing the 'Review' button the programmed frequency is displayed, digit by digit, followed by the channel number again. A small 'Lockout' display indication is also given where appropriate. The set measures 68mm(W) x 170mm(H) x 35mm(D) and weighs 300g, and comes supplied with a separate belt clip which may be fitted if desired, an optional carrying case is also available to protect the plastic case from the odd scratch or two. As well as the internal speaker, a 3.5mm jack socket is provided for external speaker or earphone use. A BNC aerial socket is fitted to the top of the set, allowing you to connect external aerials as well as using the



Scanning Around

I already use a portable scanner, the BC100XL 'Big Brother' to the BC50XL, as such I must confess I took to the BC50XL like a duck to water. The instruction leaflet gives clear and concise details on programming frequencies into the memories together with worked examples, and as with the 100XL (reviewed *HRT April 87*) I found these were very easy to follow. After programming the set up with my favourite frequencies, I was happily monitoring all sorts of interesting things in seconds! However this is where the new scanner user may find a serious limitation, as it is *only* possible to listen to pre-programmed frequencies. The more nosey amongst us or users with no knowledge of what's around and where to find it, will not be able to search out new frequencies by 'scanning' across a pre-defined frequency range.

The 5kHz steps on VHF were a bit of a nuisance and I feel that 12.5kHz steps as provided on UHF would have been far more suitable, but I found the bandwidth of the receiver wide enough to overcome the odd 2.5kHz frequency error without any audible distortion. The keyboard did not have a 'positive' feel to it, the keys felt rather rubbery in fact, however after the initial programming was completed I found I made little further use of these. There was plenty of audio available from the internal speaker, walking around the city centre using the set in an inside jacket even gave the odd passer-by the occasional fright as the receiver burst into life! The standard rubber duck aerial was a VHF helical with a UHF whip inside the winding, this combination performed very well on most frequencies and was only marginally improved when tested on 2m by replacing it with a resonant helical. Even so, I did find that I could certainly hear weak stations on my 2m and 70cm handhelds that the BC50XL had a job to receive, but then it *is* a wideband scanner so possibly I'm expecting a little too much.

I found no problems of spurious signal reception in use, either from internally generated 'birdies' or from receiving signals where I shouldn't have due to image fre-



The rather mysterious battery switch.

wideband 'rubber duck' supplied with the set.

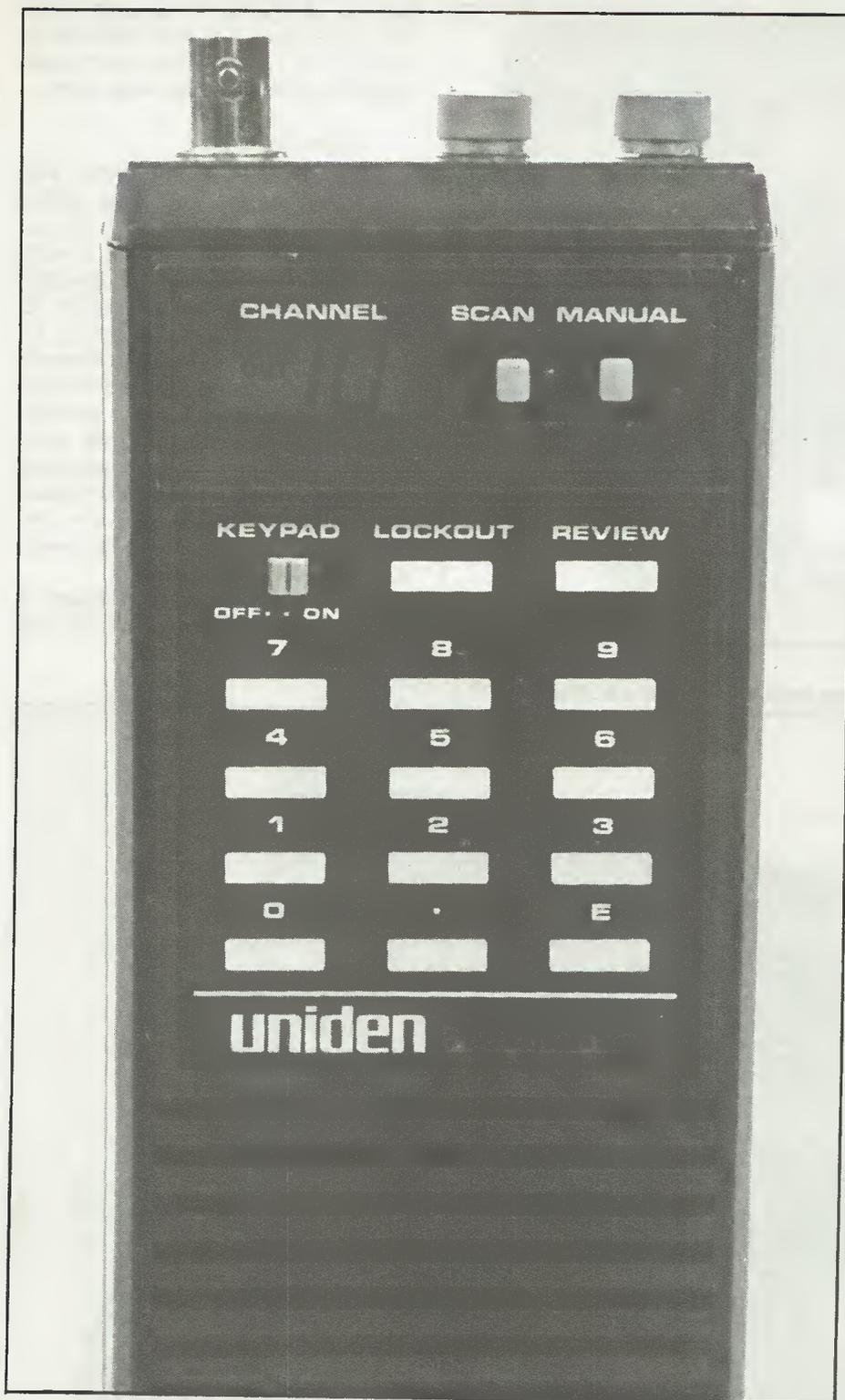
No Nicads?

Five AA size batteries are required to power the set, these fitting in a small compartment at the rear. The instruction leaflet strongly warns that the radio will not work if you install rechargeable batteries, but looking inside the battery compartment shows a slider switch labelled 'ALK BATT./NI-CAD BATT.', with a small instruction label stating that the Nicad position must be used for Nickel Cadmium batteries, very strange!

A purpose-designed pack is however mentioned, but no further details were available. An external DC supply socket is fitted on the side of the set to allow you to operate the set from an external 13.8V DC source, for example in a car via an optional adapter lead plugged into

the cigarette lighter socket. To warn of the impending demise of your batteries, an audible 'bleep' repeating every 30 seconds emanates from the speaker, warning you that it's battery replacement time. A memory back-up battery is not used, but operating frequencies are held in the unit whilst the operator changes the internal batteries.

Despite dire warnings to the contrary in the instruction leaflet, the review equipment supplier stated the set would operate from ni-cads, and in testing I found the set operated perfectly well after installing 5 AA size ni-cads in the battery holder, using the external DC input socket with a constant-current charger for overnight 'top-ups.' Possibly Uniden had second thoughts after printing the instruction leaflets, as I would imagine the vast majority of users would prefer this method of powering the receiver.



Close-up of keypad and display.

quency breakthrough. A valid explanation for this of course is that without a 'search' facility the chances of running into problems are considerably reduced, but on the common FM channels on the amateur bands I ran into no problems.

At first I found the absence of a

continual frequency readout a bit disappointing, but after a few presses of the 'Review' button I soon learned which channels corresponded to what. As there was no LCD backlight facility, you could not read the display at night — of course this is inexcusable on a handheld transceiver, but on a

receiver such as I believe it's a case of getting what you pay for!

Insides

The set is built inside a dark brown two-section plastic case; opening the set up shows a twin-board construction has been used with the digital control circuitry on the front panel mounted PCB, and the analogue circuits including the synthesiser being mounted on the other, the two being linked by ribbon cable. A custom made Uniden microprocessor handles all the digital goings-on, a 470 μ F capacitor appearing to provide charge retention for memory back up in the absence of a battery supply. Only a single crystal is used inside the set, providing the synthesiser reference and local oscillator injection frequencies, serving to considerably reduce the number of internally generated spurious frequencies. A double conversion superhet is used, with intermediate frequencies of 10.850MHz and 450kHz, IF selectivity being obtained by a monolithic dual crystal filter at 10.850MHz and an SFP450D filter at 450kHz.

Laboratory Tests

The sensitivity measurements confirmed the set wasn't as sensitive as a dedicated portable transceiver, but nevertheless still usable, the 'low' VHF range in fact being quite reasonable and hence reducing any inefficiencies of an electrically short aerial. The current consumption was very low, this should provide a normal day's listening on a set of 500mAh ni-cads and several days worth on a set of Alkaline batteries. The measured battery voltage indicator threshold and minimum operational voltage of the scanner confirm that it should quite happily operate using a set of 1.2V ni-cads as well as 1.5V secondary cells. Removing the battery supply for 2 hours retained the operating frequencies in memory showing the backup circuitry to be doing its job.

The image rejection was the usual poor figure associated with wideband sets of this type, an example of the effect of this would be to receive local 2m amateurs apparently transmitting on 167MHz as well as on 145MHz. The measured adjacent channel rejection



tion at 25kHz spacings was quite adequate given the intended use of the set, but I found little rejection of 12.5kHz offset signals was given.

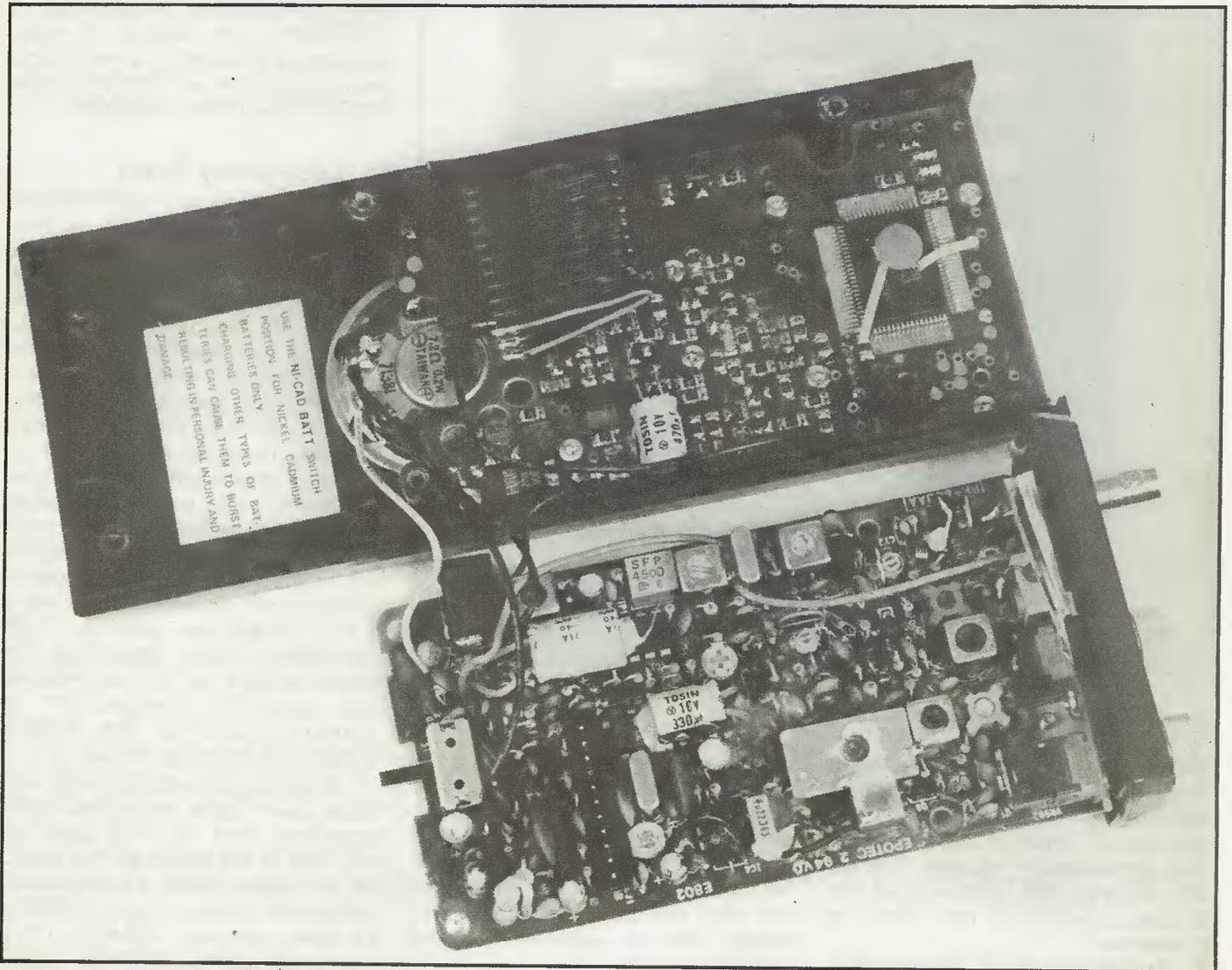
Conclusions

The set is small and light, and I'm sure that together with these factors its low selling price of just under £100 should make it very popular. The absence of a 'search' facility could be a limitation to listeners who wish the set to be used as a main receiver, but it would still be attractive for amateurs seeking a second set for general monitoring to carry around with them. Personally, I was impressed and so too were two of my amateur friends who, after seeing the set, went out and ordered one for themselves! Need I say more?

My thanks go to R Withers of Raycom Ltd for the loan of the review receiver.

Top panel controls.

Internal view showing the SMC synthesizer board (left) and the analogue PCB.





Laboratory Results

Sensitivity: Input level required to give 12dB SINAD:

Frequency	Sensitivity
66MHz	0.195 μ V pd
70MHz	0.200 μ V pd
80MHz	0.205 μ V pd
88MHz	0.210 μ V pd
136MHz	0.43 μ V pd
145MHz	0.465 μ V pd
160MHz	0.665 μ V pd
174MHz	0.970 μ V pd
406MHz	0.740 μ V pd
430MHz	0.740 μ V pd
440MHz	0.730 μ V pd
450MHz	0.720 μ V pd
460MHz	0.615 μ V pd
470MHz	0.465 μ V pd
500MHz	0.710 μ V pd

Adjacent Channel Selectivity: Measured as increase in level of interfering signal, modulated with 400Hz at 1.5kHz deviation, above 12dB SINAD ref level to cause 6dB degradation in 12dB on-channel signal

Spacing	Level
+12.5kHz	5.0dB
-12.5kHz	7.5dB
+24kHz	45.0dB
-25kHz	43.0dB

Squelch Sensitivity:

Threshold	9.5dB SINAD
Maximum	18.0dB SINAD

Maximum Audio Output: Measured at 1kHz on the onset of clipping

Load	Output
3 ohm	155mW RMS
8 ohm	195mW RMS
15 ohm	165mW RMS

Image Rejection: Increase in level of signal at first IF image frequency over level of on-channel signal to give identical 12dB SINAD signals

Frequency	Level
70MHz	29.0dB
145MHz	13.0dB
435MHz	5.5dB

Current consumption

No Signal, scanning	39.5mA
Receiving, mid volume	134mA
Receiving, max volume	176mA

Low Battery Indication:

Threshold: 5.73V DC

(Receiver continues operating to <5.0V DC)

ATTENTION ALL WRITERS . . .

...or just readers who sometimes think "I could write that!"

We're looking for authors to help us keep 'Ham Radio Today' at the forefront of the radio scene. So if you've designed some novel or cost-effective gear, you've done something that is of interest to other amateurs, or you've got a controversial axe to grind, we'd like you to contact us!

If you're interested in writing for us, send us an outline of any ideas you might have and tell us a little about yourself. Write to: The Editor (submissions), Ham Radio Today, ASP Ltd, 1 Golden Square, London W1R 3AB.

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TOP BAND SSB

PART 3

In HRT February '87 we covered the final part of construction and alignment of this project including the addition of a CW sidetone feature making use of the carrier

beat with the C10 and generate a 1kHz audio tone. The receiver AF stages are kept energised whilst transmitting with this design and

operate. The tuning rate has been reduced by using a 36:1 epicyclic drive unit salvaged from an old piece of equipment but one alternative may be to use a pair of 6:1 reduction drives in tandem, ie. one drive connecting to the other which in turn is fixed to the main tuning capacitor. These are readily available from the usual suppliers if the junk box or local rally doesn't turn up trumps.

The third and final part of our 160m project - PCB Foils & Reduction Drives

insertion oscillator (C10) to generate a CW sidetone. Two outputs are available from the C10 board and second is used to generate the sidetone by injecting the signal into the input of the receiver balanced modulator where it will

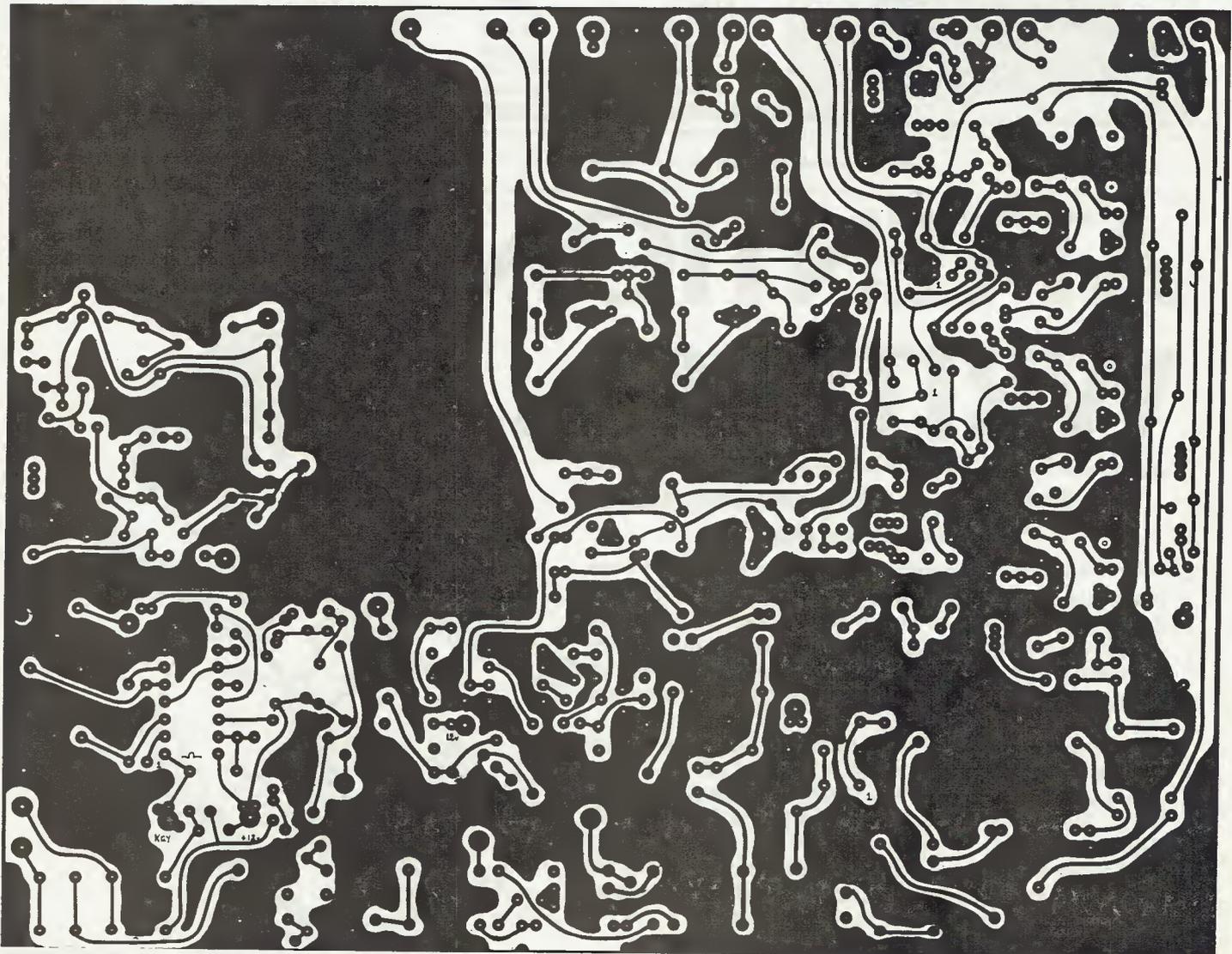
the tone will thus be available for phones or loudspeaker output.

Final comments

The signal radiated on 160m has attracted many favourable comments and the set is simple to

Please note that a couple of errors crept into the diagrams in the January '87 (part 2) section of the project. In Fig. 11 the +5V and 'input from VFO' labels were shown the wrong way round and in Fig. 12 we

Topside PCB Foil — copper areas shown in black



TRANSCEIVER

seem to have invented a two-legged transistor! There should be a third leg coming from the centre of the transistor which must be connected to the junction between the wire coming from Q13 and the 10n capacitor.

A partial kit of parts for this project is available from: Kanga Products, 3 Limes Road, Folkestone, Kent CT19 4AU, for £49.50 including VAT and P and P. This kit includes the PCB, Rs and Cs and the majority of the semiconductors but does not include the single gang tuning capacitor, coil, SL600/1600 series ICs (2 x SL16010, 2 x SL1640, SBL1

mixer, filters, resonators, or the PA module, DFM unit, case, etc.

As some will not have the components omitted the kit includes order forms, including the stock numbers, for these components. All you have to do is to cross off those not required, total and include cheque and send off to the supplier.

The SL 600 devices are the classic junk box component, many constructors have ZVC or CLF PCB's from old projects and the required devices can be salvaged from these. An alternative is J Birkett this firm supplies these devices for 27 pence plus VAT untested instead of the new price of about £4.00, repre-

senting a considerable saving indeed.

Untested SL600 ICs: J Birkett, The Strait, Lincoln;

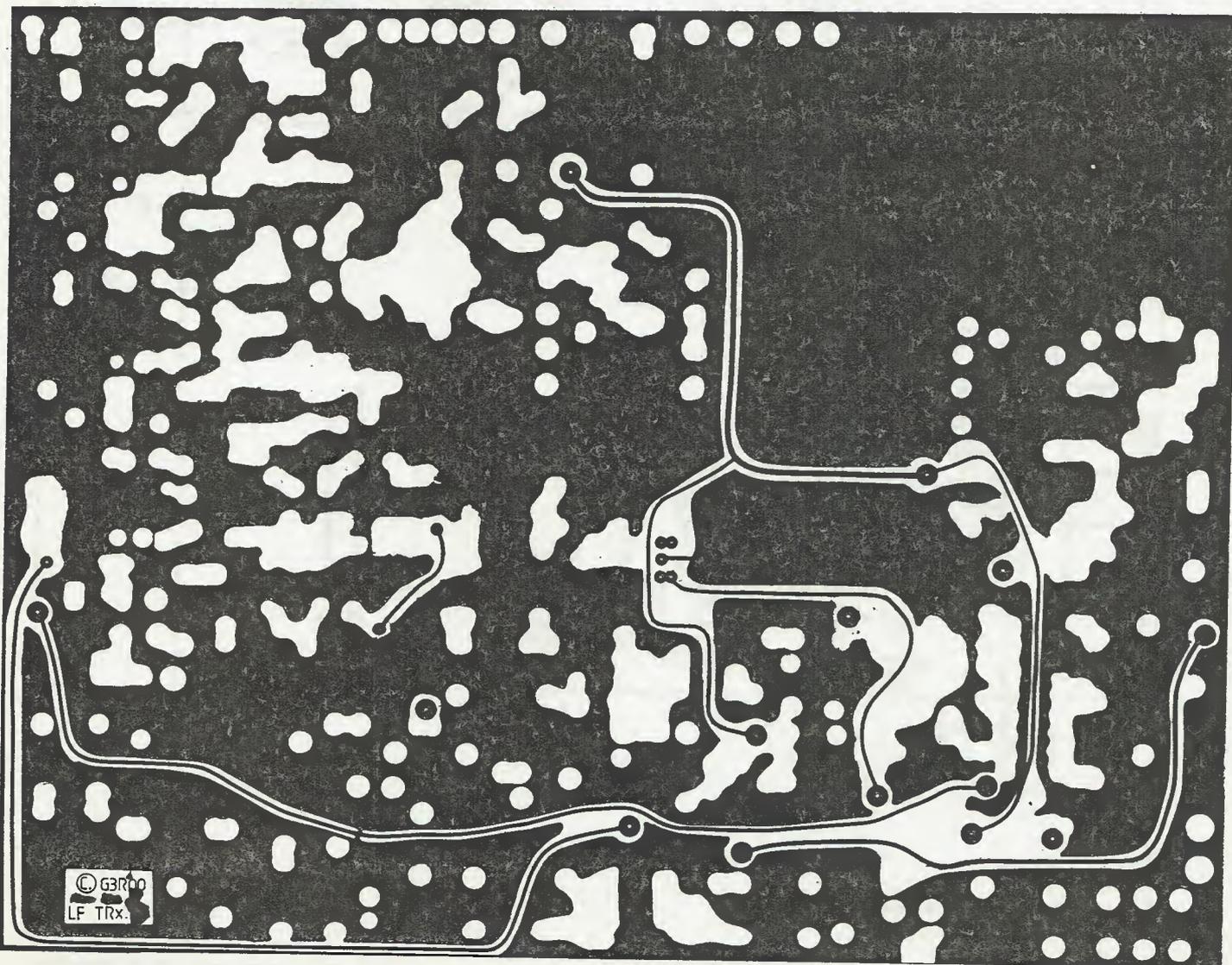
Filters and resonators: ILP Ltd, North Street, Crewkerne, Somerset, TA18 7AR;

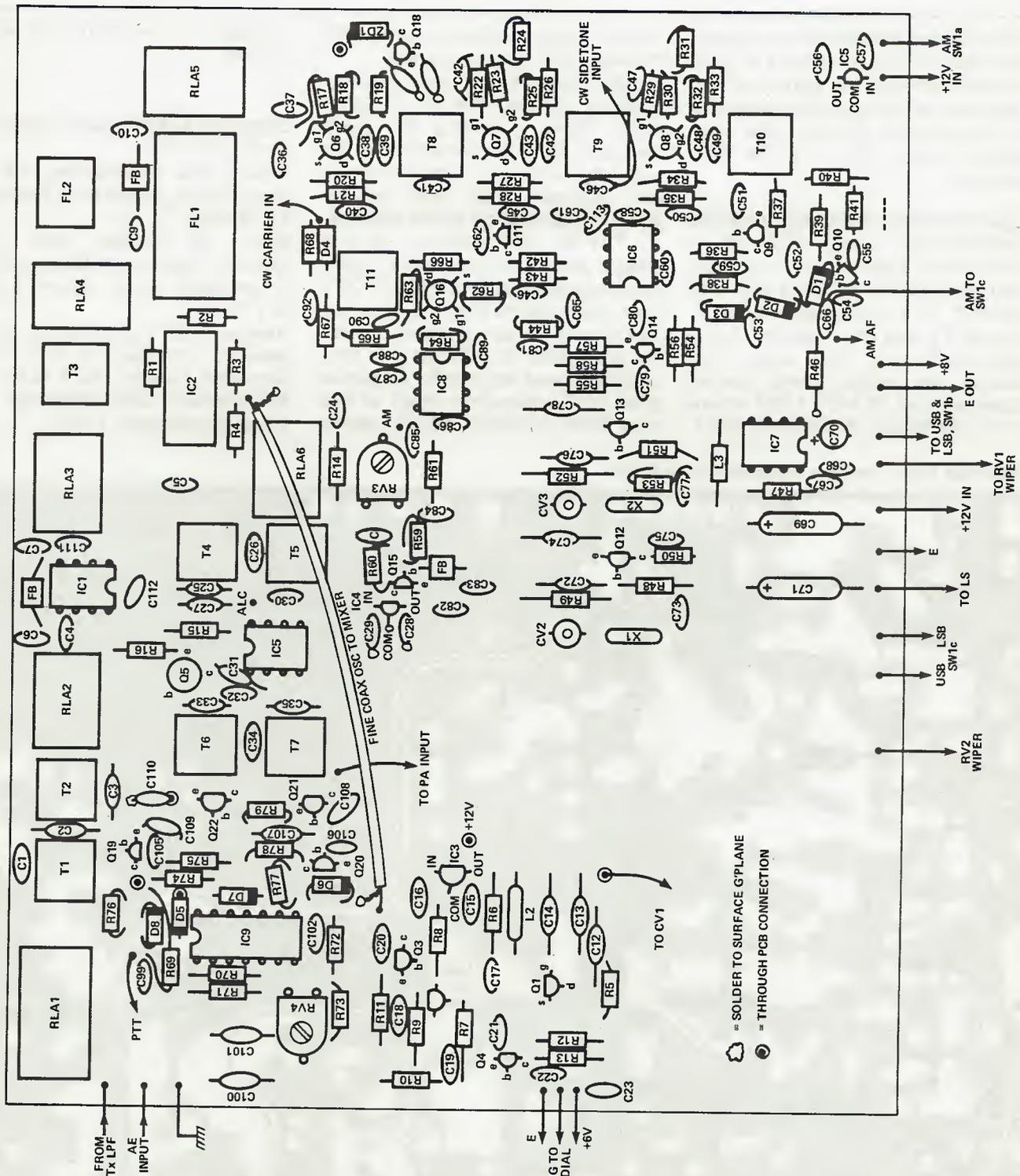
SBL1, RF Chokes, Toko Transformers, Regulators: Bonex Ltd, 102 Churchfield Road, Acton, London W3 6DH;

Relays: M.S. Components, Zephyr House, Waring Street, West Norwood, London SE27 9LH;

PA Module: Cirkit Holdings, Park Lane, Broxbourne, Herts.

Underside Foil — copper areas shown in black

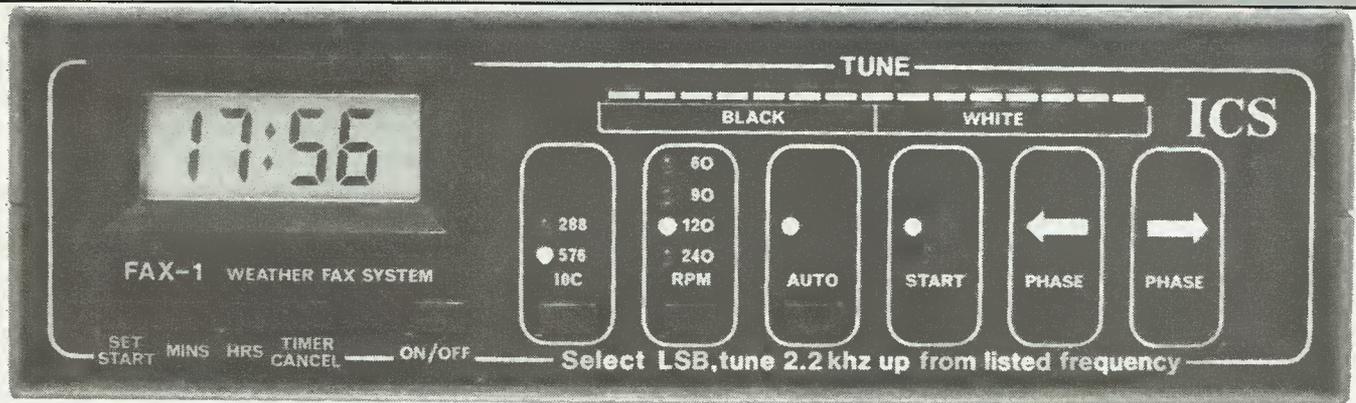




Main PCB Component Placement Overlay

REVIEW

ICS FAX-1



There is an increasing interest in the reception of weather maps — perhaps now spurred on by the failure of the 'weather men' to predict the hurricane that swept southern England in October 1987

taking its input either from the 'tape' or 'ear' socket of the receiver. If the latter cuts off the internal speaker, you can plug an external speaker into a socket on the FAX-1, though you may come to prefer silence

attached by two white plastic bolts either side, for the purpose of mounting the unit when using it under mobile conditions, such as in a car or on a yacht.

Receiving weather maps is strictly for the rich, isn't it? Not any more, as Ken Michaelson, G3RDG, finds out.

Hitherto, the choice has been between buying a very expensive piece of 'do it all' gear or using an RTTY set-up to attempt to decode the five-figure groups sent out by the various 'met' stations. A new product from ICS, the FAX-1, fits into the middle of this gap, and at a cost of a bit over £300, looks to be very attractive.

The FAX-1

FAX-1 is a dedicated microcomputer, containing a Z80 processor, a PIO and it has its program stored in on-board ROM (actually, an EPROM on the review sample). For once, high-tech has been used to make the unit's operation extremely simple, and all you need to do most of the time is to set it to 'auto' and let it get on with turning out the maps. However, allowance has been made for you to intervene in exceptional cases — but more of that later.

FAX-1 connects between your SSB communications receiver (which will need to be of fairly good quality and stability) and a printer,

instead! The printer should be Epson FX compatible, and the cable needed (not supplied) is the same as that for connection to an IBM PC; alternatively, ICS can supply a mains or battery-powered ink-jet printer (the FAX-1A) which opens up the possibility of mobile or portable use; thus it comes supplied with cable.

Appearances

The unit's appearance is most attractive, being finished in matt grey grained plastasol paint (a very good choice as this type of finish resists the odd chip caused by an accidental knock), with the front panel in black having white lettering. The case is steel and is of the form of two 'U' shaped pieces lengthways so that the top cover may be removed by removing two screws at either end. It measures 200mm wide by 160mm deep by 70mm high and it weighs approximately 1.3g. There is a horizontal bracket over the top of the case covered in the same material and

the front panel has a four-digit LCD clock display which is used for the timer; the controls for setting up the timer are directly beneath this display. To the right of these is the on/off control. At the top of the right hand part of the front panel, in a horizontal line, are 15 LEDs which form a frequency analyser; this is used to tune in the communications receiver on to the met station's signal.

Below these LEDs are a number of controls and indicator LEDs

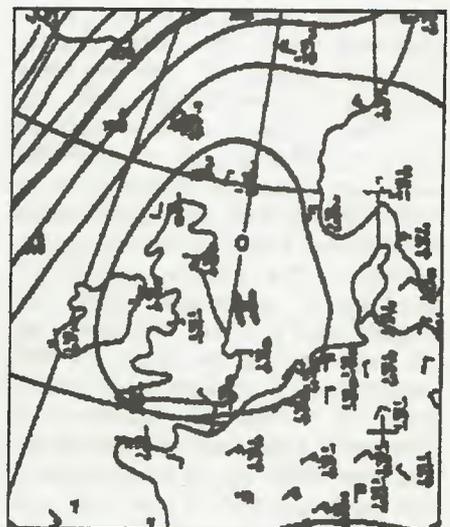
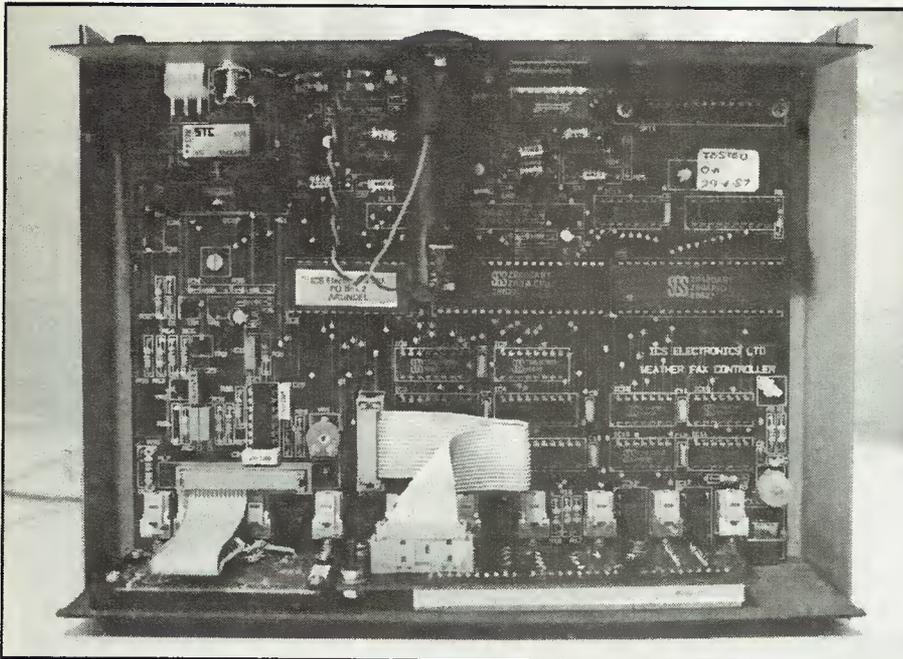


Fig. 1 Detail taken from a Deutscher Wetterdienst European map.



Internal view of the FAX-1.

which are used to set up the unit; some explanation of how the unit is used is necessary before these make any sense.

Met maps

Generally, the transmission of a map starts with a 'header' which gives the parameters used in the scanning of the map. Because the map is mounted onto a drum and scanned as it rotates, one of the figures has to be the drum speed, or RPM — which gives the number of lines the receiver will get per minute. The other figure, the first to be transmitted, is the index of co-operation (IOC) which gives the aspect ratio of the map (don't ask me why it's called index of cooperation); it is the product of the drum diameter and the line density (forward speed of the scanning head as it moves along the drum).

The majority of met stations work at 120 lines per minute (RPM) with an index of cooperation of either 576 or 288, though there are exceptions. This information is contained in the header and FAX-1 working in automatic mode will adjust itself to them. However, not all stations are as fussy as they might be about radiating the header info, so it may be necessary to intervene and manually select the IOC and RPM; this is the purpose of the push-buttons in the 'IOC' and 'RPM' sections on the front panel. With the mode taken off auto (also selected or deselected by a push-

button), pushing RPM successively will make the unit cycle between the different number of lines that can be received per minute (60, 90, 120 or 240). With a little experience, you will quickly identify which settings are correct from the resultant output after a few lines have been printed off.

The other situation which requires intervention is when you tune into a broadcast part way through the transmission of a map. Normally, the FAX-1 will wait until the start of a new map before commencing printing, but you can force it to begin printing immediately with the 'start' button. Not only will you have to set the IOC and RPM manually, because the header has been missed, but the printing of the start of the lines could begin at any point on the page. This is where the phase buttons are

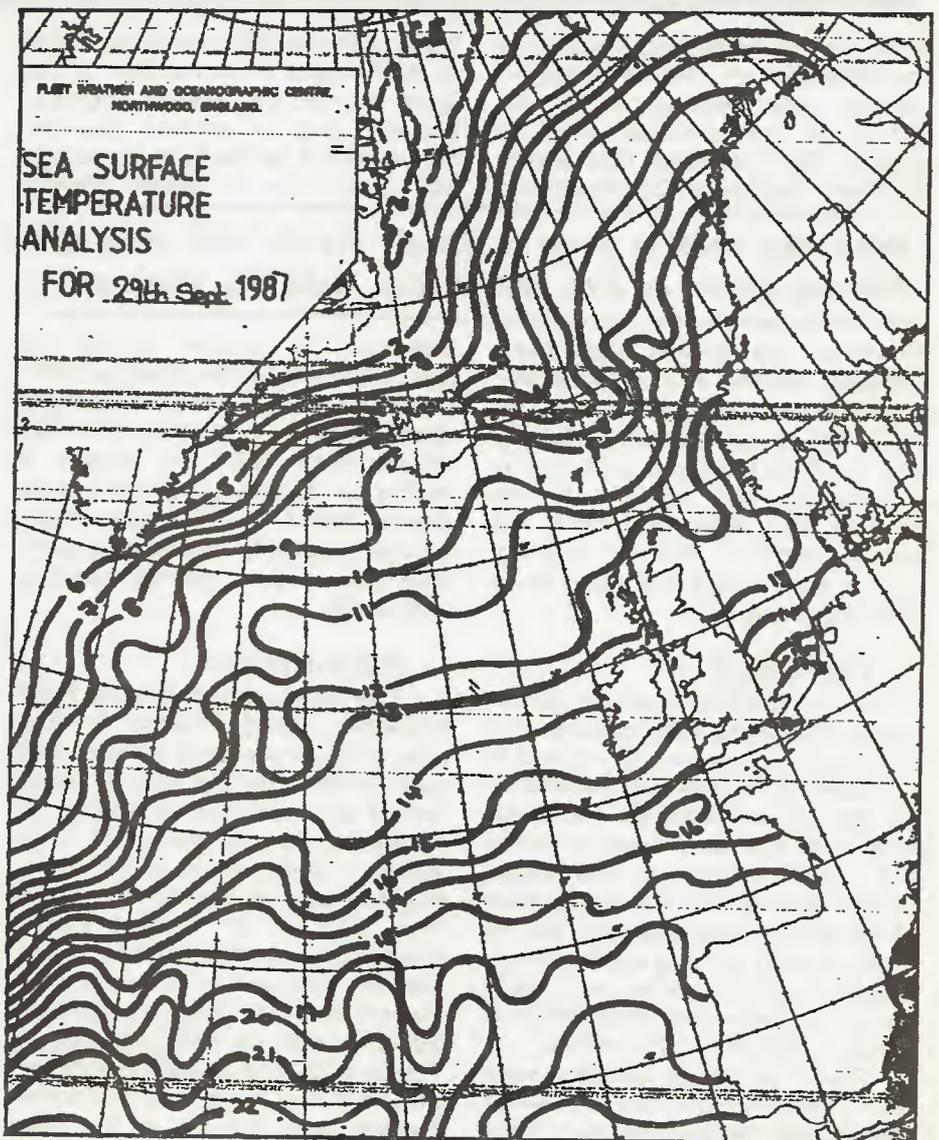


Fig. 2 Sea surface temperature map from the Fleet weather centre.

used, to re-centre the map: pushing the button for the appropriate direction moves the start that way. In order to minimise the guesswork, FAX-1 prints a scale on the printer output when first switched from auto to manual, which can be used to tell how many button-pushes are necessary.

Moving round to the back of the unit, on the rear panel at the lefthand side is the printer port, a 25 way IDC female socket. Next towards the right is an eight way DIP switch unit. The various switches control the 'timer on' interval A, the 'timer on' interval B, the timer enable function, type of printer (Epson FX80/FAX-1 printer), upper sideband/lower sideband choice, and 'form feed' at the end of a map print (the other switches are not used). At the centre on the upper level is the battery container for the clock; a single AA size battery is required for this.

Continuing along the rear panel, there are three phono sockets, one for the audio input, one for audio output (to an external speaker if required) and one labeled 'external'; this is connected to the contacts of an internal relay, so that the internal timer can be used to control external equipment. However, the contacts are only low-voltage low-current types, though adapters making it possible to switch AC mains or high-current DC are available from the manufacturer.

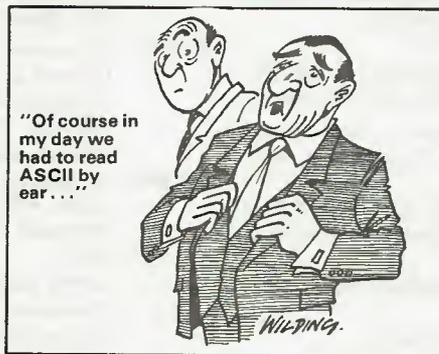
The last two items on the rear panel are the connector for the 12V DC input (actually 10 to 15 volts is acceptable) and a 1 amp fuse holder.

The interior of the unit has a pleasing appearance, being designed in a thoroughly workmanlike manner. There are twenty integrated circuits, and the two most important ones, the Z80 EPROM and the Z80 PIO, are inserted into holders. Polystyrene capacitors with a tolerance of plus/minus 2.5% are used in sensitive sections of the circuitry. There are also four transistors and, since the voltage input is DC, an LM340T5 voltage stabiliser is used to provide the 5 volt supply rail. The clock unit with its timing facility is a separate entity, its power supply being one AA cell as mentioned above.

In Use

I had no difficulty in getting FAX-1 to work with my Epson RX-80 F/T printer, and used the 'record' output from my Yaesu FRG-8800 to provide the audio input, thus removing the need for an external speaker. However, the signal itself can best be described as a cyclic grating sound, interspersed with regular tones. As far as I was concerned, once I had become used to adjusting the receiver using the LED tuning display, it was unnecessary to hear the signal; indeed it was a blessing to experience silence after the extremely irksome continuous carrier note transmitted between pictures.

I had the FAX-1 running continuously during the period of review, and must say that it did everything that the manufacturers



claimed for it. I used the timer to set the equipment to operate at a predetermined time without any trouble, but mostly I turned it on when I came into the shack in the morning, and it remained on as long as I was in the room.

I copied a number of met stations, amongst them were Bracknell, Hamburg, Offenbach, Paris and Moscow, without trouble and with complete satisfaction. I considered the clarity of the printout excellent, comparable in my experience, to units costing three to four times the price of the FAX-1.

I have, in my time, attempted to decode the five figure groups sent regularly from met stations and received as RTTY, but it really is too time-consuming. This unit works automatically and does it all for you!

A further use for the FAX-1 must be for 'people who mess about in boats'. Yachtsmen should find it a boon, particularly in view of the fact that a battery driven printer may be obtained, also running from 12 volts DC. I would think that farmers

would have a use for weather forecasting equipment to plan their operations.

As far as I am concerned, it is a little Magic Box and I endorse it thoroughly; for amateurs interested in weather and its vagaries, this unit is a 'must'!

Special Licence

It is necessary for listeners based in the United Kingdom to obtain a licence from the Department of Trade and Industry which will allow them to receive the broadcasts described as 'Listed World Meteorological Stations'. This is a once and once only application and costs £5.00.

Application should be made first to: Meteorological Office (Licensing), Met O 17, London Road, Bracknell, RG12 2SZ, giving the following information (but not sending any money):

1. The proposed frequency or frequencies to be used for reception;
3. The apparatus to be used for reception;
4. The location of the apparatus;
5. The purpose for taking the broadcasts (in the case of a radio amateur it would be amateur interest in the weather, but in other cases, such as for example yachtsmen, the applicant would have to describe his/her own interest).

Provided that the purpose for taking the broadcasts does not involve any commercial use of the information but is solely for your own interest or assistance. This permission will be granted.

When you have received the letter of permission, you then send it to: Department of Trade and Industry, Radio Licensing, Waterloo Bridge House, Waterloo Bridge Road, SE1. They will then request the fee, and having received it, in due course will issue your licence.

The cost of the FAX-1 is £279.95 including VAT. Further details and prices of accessories and packages, from: ICS Electronics, PO Box 2, Arundel, West Sussex BN18 0NX. Telephone 024 365 590. My thanks go to them for the loan of the FAX-1 for the purpose of this review.

Since this review was written, FAX-1's software has been modified to include the facility to receive RTTY.

RADIO Tomorrow

- 1 Mar** Rugby ATS: Craft Fair planning night.
Worksop ARS: Magazine sale.
Ealing DARS: Committee meeting. 7.30pm. The Community Centre, 71a Northcroft Road, Ealing.
East Lancashire RC: Surplus equipment sale.
Stevenage DARS: Construction evening. Sitec Ltd, Ridgmond Park, Telford Ave., Stevenage.
Delyn RC: Open night. 8pm Daniel Owen Centre, Mold, Clwyd.
Chichester DARC: Talk 'HF propagation predictions using Commodore 64' by Dr H P Williams. 7.30pm. St. Pancras Hall, St. Pancras, Chichester.
S. Powys ARC: Talk 'Meteors Part 3'
- 2 Mar** Cheshunt DARC: Talk 'Data transmission' by G41JE. Church Room, Church Lane, Wormley, Nr. Cheshunt.
S. Bristol ARC: Microwave workshop — Glen Ross with G8MWR/G0FGZ Whitchurch Folk House, East Dundry Rd, Whitchurch, Bristol.
Fareham DARC: Talk 'Radio security service Par 2 by Hugh. Portchester Community Centre, Westlands Grove, Portchester, Hants.
- 3 Mar** Bredhurst RTS: Talk 'The new collectors' by Tony Cockle G3IEE.
Salop ARS: Video night — circuit design.
Horsham ARC: Spring junk sale. Guide Hall, Denne Rd, Horsham.
Vale of Evesham RAC: Talk by Microwave Modules, The Round of Gras, Badsey. 7.30pm. Info — Mike G4UXC on Evesham 831508 or Peter G6JNS on MBX 219999979.
East Kent RS: Annual Junk sale. 7.30pm. Parkside Lodge, Kings Road, Herne Bay. Info from Brian Didmon, G4RIS. Whitstable 26042.
North Wakefield RC: Visit to Birkenshaw Fire Station. Details — Steve Thompson, G4RCH. Leeds 536633.
Yeovil ARC: Talk 'Aerial Matching' by G3GC. 7.30pm. Recreation Centre, Chilton Grove, Yeovil. Details from David Bailey G1MNM on (0935) 79804.
- 4 Mar** Coventry ARS: Surplus Equipment sale. 8.00pm. Baden Powell House, 121 St. Nicholas, St. Radford, Coventry.
Harrow RC: Activity night. 8pm. Roxeth Room, Harrow Arts Centre, High Rd, Harrow Weald.
- 5 Mar** Blue Star Rally, Newcastle. Venue — High Gosforth Park Racecourse (5mils N. of Newcastle upon Tyne). Trade stands, morse tests, bring & buy, refreshments. Talk in on 2m with GBOBSR. Details from Terry G8VEG on 091 2866 908.
- 6 Mar** Barry College of Further Education RS: 8th Annual Welsh Amateur Radio Rally. Opens 11am (10.30am for the disabled). Trade stands, bring & buy, RSGB book stall & morse testing facilities. Leisure centre facilities (swimming pool, bar, cafeteria) also available. Barry Leisure Centre. Tel. (0446) 744770. Enquiries — Mike Adcock GW8CMU: (0446) 711426.
- 7 Mar** Sheffield ARC: Talk 'Principles of Aerials' by Barry Chambers G8AGN.
Stourbridge ARS: Informal meeting.
- 8 Mar** Keighley ARS: Natter night.
Wakefield DRS: Talk 'Morse adaptors for FM and other TXs' by G1PNV.
Worksop ARS: Natter nite.
Ealing DARS: Morse Training with Bill G3SGT. 7.30pm The Community Centre, 71a Northcroft Road, Ealing.
Verulam ARC: Activity evening. 7.30pm RAF Assoc HQ. New Kent Rd, off Marlborough Rd, St. Albans.
- 9 Mar** Cheshunt DARC: Natter evening. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm.
S. Bristol ARC: QRP activity evening with John G4YQH. Whitchurch Folk House, East Dundry Rd, Whitchurch, Bristol.
- 10 Mar** Bredhurst RTS: Construction & natter night.
Salop ARS: Natter night.
Edgware DRS: Informal with training for great erg race.
North Wakefield RC: G4NOK on air. Details — Steve Thompson, G4RCH. Leeds 536633.
Southgate ARC: Formal meeting 7.45pm Holy Trinity Church Hall (upper), Winchmore Hill, London N21.
Yeovil ARC: Talk 'Oscillators' by G3MYM. 7.30pm. Recreation Centre, Chilton Grove, Yeovil.
- 11 Mar** Wimbledon ARC: Talk 'The Metropolitan Railway' by G1ADW. Herbert Rd, Wimbledon, London SW19. Info from David Love (0737) 51559.
Itchen Valley RC: AGM.
Loughton DARS: Informal evening. Loughton Hall, Rectory Lane, Loughton, Essex.
Coventry ARS: Night on the air & morse tuition. 8.00pm. Baden Powell House, 121 St. Nicholas St, Radford, Coventry.
Harrow RC: Talk by Dennis, G3MNO. 8pm. Roxeth Room, Harrow Arts Centre, High Rd, Harrow Weald.
- 12 Mar** Cheshunt DARC: Commonwealth contest. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm. Also 13th March.
- 13 Mar** Bury Radio Society Annual Rally at the Castle Leisure Centre, Bolton Street, Bury, Lancs. Opens at 10am. Many stalls, bring & buy, displays & trade stands. Ample parking & refreshments available. Talk in on S22. Further details from G1VQE QTHR.
Wythall RC: 3rd Annual Wythall RC Rally. Opens 12 noon. Admission 50p (OAPs & accompanied children free). Trade stands, RSGB morse tests, junk, flea market, bar & snacks. Free parking. Wythall Park, Silver Street. S. of Birmingham on A435, 2 miles from Junction 3 on M42. Talk in on S22. Stand bookings & info from Chris G0EYO on (021) 430 7267.
Derby DARS: National 144MHz Contest.

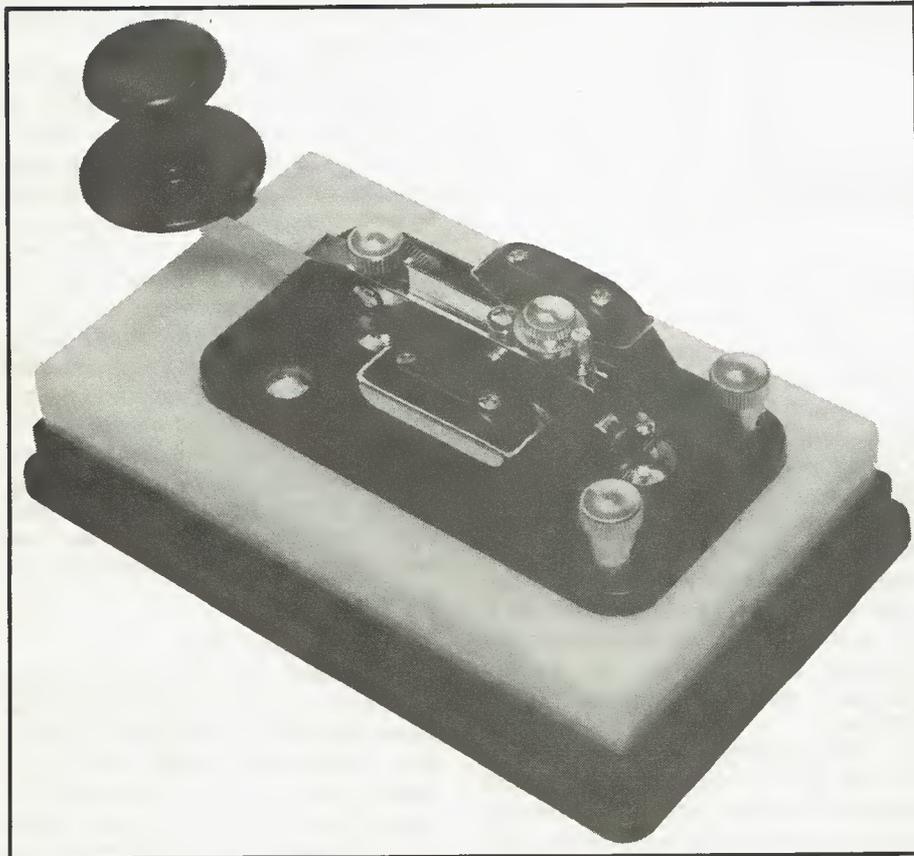
- 14 Mar** Llanelli Coleshill ARS: Talk 'Fault-finding' by Mike Rosier, GW4XLE. Coleshill Disabled Centre, Llanelli.
- 15 Mar** Wakefield DRS: Club project — surgery.
Halifax DARS: Microwave Modules demo.
Workshop ARS: Official Club Meeting.
Ealing DARS: Preparation for BARTG Spring Rally
RTTY Contest with G8MPP-G1ZTN. 7.30pm The Community Centre, 71a Northcroft Road, Ealing.
Stevenage DARS: AGM. Sitec Ltd, Ridgemoor Park, Telford Ave, Stevenage.
Delyn RC: AGM. 8pm Daniel Owen Centre, Mold, Clwyd.
Midland ARS: Talk 'Earthing' by Frank Fear, G8CVR.
Chichester DARC: Club meeting. 7.30pm St Pancras Hall, St. Pancras, Chichester.
S. Powys ARC: Social evening.
- 16 Mar** Cheshunt DARC. Talk '50MHz One year on' by G3WFM. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm.
S. Bristol ARC: Inter-club contest — 'Bullseye.'
Whitchurch Folk House, East Dundry Rd, Whitchurch, Bristol.
Lough Erne ARC: Talk 'RSGB' by GI4TPI. 8pm. Railway Hotel, Enniskillen, Co Fermanagh.
Fareham DARC: Talk 'FAX' by Mike G3SED. 7.30pm. Portchester Community Centre, Westlands Grove, Portchester, Hants.
- 17 Mar** Bredhurst RTS: AGM.
Salop ARS: DH hunt.
Vale of Evesham RAC: Natter night. The Round of Gras, Badsey. 7.30pm. Info — Mike G4UXC on Evesham 831508 or Peter G6JNS or MBX 219999979.
North Wakefield RC: Club project night. Details — Steve Thompson, G4RCH. Leeds 536633.
Barry College of Further Education RS: Video 'Amateur TV as used in our hobby.'
Porthmadog DARS: Homebrew kits & projects.
Yeovil ARC: Talk 'Propagation predictions' by G3MYM. 7.30pm Recreation Centre, Chilton Grove, Yeovil.
- 18 Mar** Sutton & Cheam RS: Construction contest.
Coventry ARS: An illustrated on astronomy. 8.00pm. Baden Powell House, 121 St. Nicholas St, Radford, Coventry.
Harrow RC; Junk sale. 8pm. Roxeth Room, Harrow Arts Centre, High Rd, Harrow Weald.
- 20 Mar** Tiverton SWRC Mid-Devon Rally. At the Pannier Market, Tiverton from 10am. Eight mins from Junction 27 of M5; free parking, two halls of trade stands, bring & buy, refreshments. Talk in on S22. Further info from: Mid-Devon Rally, PO Box 3, Tiverton, Devon.
Cambridgeshire Repeater Group: Junk Sale Rally Extravaganza. All day event from 10.30am.
Philips RCS (Pye Telecom) Canteen. St. Andrews Road, Chesterton, Cambs. Free parking, bring & buy, trade stalls & refreshments. Talk-in on S22 & RB14 (GB3PY) by G5PI. Proceeds to finance 6 local repeaters. Details: G8XMS, QTHR. Tel: 022-023-3362.
Pontefract DARS: 8th Annual Components Fair, Carleton Community Centre, Carleton, Pontefract. 11am-4.30pm. Trade stands, bar, bring & buy, prize draw & space for car boot sales. Free admission. Talk in on S22. Info from Colin Miles GOAAO on (0977) 43101.
- 21 Mar** Stourbridge ARS: AGM.
- 22 Mar** Fylde ARS: Informal natter night.
Workshop ARS: Natter nite.



- Ealing DARS: Talk 'Innovations in Japanese Equipment' by Martin G4HKS. 7.30pm The Community centre, 71a Northcroft Road, Ealing.
Verulam ARC: 1988 G3PAO Memorial lecture — 'Pan-European cellular radio network' by Chris Morcom, G3VEH. 7.30pm RAF Assoc HQ, New Kent Rd, off Marlborough Rd, St. Albans.
- 23 Mar** Willen Hall DARS: AGM Cross Keys Inn, Ashmore Lake Rd, Willenhall, W. Midlands. Info — Dave Jackson, GOEGG (0902) 734475.
Cheshunt DARC: Natter evening. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm.
S. Bristol ARC: Contest planning evening. Whitchurch Folk House, East Dundry Rd, Whitchurch, Bristol.
Banbury ARS: AGM. 7.30pm. The Mil Club, Spiceball Park, Banbury. Details from Bryan G1IIO or on Banbury 51774.
- 24 Mar** Bredhurst RTS: Construction & natter night.
Salop ARS: Talk 'All at sea' with GW4XXF.
North Wakefield RC: Talk 'Power generation & Dinorwig' by Trevor Parkinson, GEGB. Details — Steve Thompson, G4RCH. Leeds 536633.
Southgate ARC: Informal meeting 7.45pm Holy Trinity Church Hall (upper), Winchmore Hill, London N21.
Yeovil ARC: Talk 'Sines & cosiness' by G3MYM. 7.30pm. Recreation Centre, Chilton Grove, Yeovil.
- 25 Mar** Itchen Valley RC: Talk 'Build your own black box' by GOAMS.

- 25 Mar** Loughton DARS: RSGB film night. Loughton Hall, Rectory Lane, Loughton, Essex.
Coventry ARS: Night on the air & morse tuition. 8.00pm. Baden Powell House, 121 St. Nicholas St, Radford, Coventry.
Harrow RC: AGM. 8pm. Roxeth Room, Harrow Arts Centre, High Rd, Harrow Weald.
- 26 Mar** Sutton & Cheam RS: 39th Annual dinner at the Stoneleigh Inn.
- 29 Mar** Keighley ARS: Talk 'The USA in Space — the first 25 Years' by G4ZVD.
Wakefield DRS: Club activities on video & film.
Ealing DARS: Junk sale. 7.30pm The Community Centre, 71a Northcroft Road, Ealing.
Delyn RC: Talk on model engineering. 8pm. Daniel Owen Centre, Mold, Clwyd.
- 30 Mar** Cheshunt DARC: Talk by G30JL. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm.
S. Bristol ARC: RSGB Films & videos. Whitchurch Folk House, East Dundry Rd, Whitchurch, Bristol.
Fareham DARC: Talk 'Radio measurements' by Steve G4VNM. 7.30pm. Portchester Community Centre, Westlands Grove, Portchester, Hants.
- 31 Mar** Salop ARS: HF night on the air.
North Wakefield RC: Monthly meeting. Details — Steve Thompson, G4RCH. Leeds 536633.
Yeovil ARC: Natter night. 7.30pm. Recreation Centre, Chilton Grove, Yeovil.
- 1 Apr** Coventry ARS: Night on the air & morse tuition. 8.00pm. Baden Powell House, 121 St. Nicholas St, Radford, Coventry.
- 4 Apr** Burnham Beeches RC: Easter Monday family foxhunt. Haymill Youth & Community Centre, Burnham Lane, Slough.
- 5 Apr** Wakefield DRS: Night on the air.
Fylde ARS: Visit to Lancs County Fire Brigade HQ, Garstang Road, Fulwood. 7.30pm.
Ealing DARS: Morse Training with Bill G3SGT. 7.30pm The Community Centre, 71a Northcroft Road, Ealing.
Chichester DARC: AGM. 7.30pm. St. Pancras Hall, St. Pancras, Chichester.
S. Powys ARC: Talk 'Practical satellite TV, Part 1.'
- 6 Apr** Cheshunt DARC: Natter evening. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm.
- 7 Apr** Bredhurst RTS: Construction & natter night.
Horsham ARC: Open meeting. Guide Hall, Denne Rd, Horsham.
Salop ARS: Construction contest.
North Wakefield RC: Talk 'Cavity wavemeters in 3 easy lessons. Details — Steve Thompson, G4RCH. Leeds 536633.
Yeovil ARC: Talk 'Transequatorial Propagation' by G3MYM. 7.30pm. Recreation Centre, Chilton Grove, Yeovil.
- 8 Apr** Loughton DARS: AGM. Loughton Hall, Rectory Lane, Loughton, Essex.
Coventry ARS: Night on the air & morse tuition. 8.00pm. Baden Powell House, 21 St. Nicholas St, Radford, Coventry.
- 10 Apr** Lough Erne ARC: Mobile Rally, Killyhevlin Hotel.
- 12 Apr** Keighley ARS: Natter night.
Rugby ATS: AGM.
Wakefield DRS: AGM.
Ealing DARS: Talk 'The Radio Interference Service' by L Nobotham G8KLH. 7.30pm. The Community centre, 71a Northcroft Road, Ealing.
Delyn RC: Quiz — vs. Alyn & Deeside ARS. 8pm Daniel Owen Centre, Mold, Clwyd.
- 13 Apr** Willenhall DARS: Project night. Cross Keys Inn,
- 13 Apr** Ashmore Lake Rd, Willenhall, W. Midlands. Info — Dave Jackson, GOEGG (0902) 734475.
Cheshunt DARC: Talk. 'Satellite TV' by G4VBN. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm.
Fareham DARC: Demonstration of measurements. 7.30pm. Portchester Community Centre, Westlands Grove, Portchester, Hants.
- 14 Apr** Bredhurst RTS: 'Surprise event' by Trevor G6YLW.
Salop ARS: Natter night.
North Wakefield RC: On the air. G4NOK. Details — Steve Thompson, G4RCH. Leeds 536633.
Barry College of Further Education RS: Video 'The Story of electrons.'
- 15 Apr** Sutton & Cheam RS: Junk sale.
Coventry ARS: Mini lectures. 8.00pm. Baden Powell House, 121 St. Nicholas St, Radford, Coventry.
- 18 Apr** Midland ARS: Talk 'Chassis bashing' by John Harris, G8HJS.
- 19 Apr** Rugby ATS: Construction competition judging.
Ealing DARS: Open evening. 7.30pm. The Community Centre, 71a Northcroft Road, Ealing.
Burnham Beeches RC: Quiz — vs. Maidenhead ARC. 8pm Maidenhead Club QTH.
S. Powys ARC: Social evening.
- 20 Apr** Cheshunt DARC: Natter evening. Church Room, Church Lane, Wormley, Nr. Cheshunt, Herts. 8pm.
Lough Erne ARC: Talk 'Secure your rig.' 8pm, Railway Hotel, Enniskillen, Co Fermanagh.
- 21 Apr** Bredhurst RTS: Construction & natter night.
Salop ARS: Video night — basic circuitry contd.
North Wakefield RC: Natter night. Details — Steve Thompson, G4RCH. Leeds 536633.
- 22 Apr** Loughton DARS: Club project. Building night. Loughton Hall, Rectory Lane, Loughton, Essex.
Coventry ARS: Night on the air & morse tuition. 8.00pm. Baden Powell House, 121 St. Nicholas St, Radford, Coventry.
- 24 Apr** Swansea ARS: 7th Annual Rally. Traders, bring 'n' buy, bookstall, refreshments, bar, HF station. Talk in by GB2SWR 10.30am-5pm. Venue — Swansea Leisure Centre on A4067 Swansea-Mumbles coast road. Details from Roger Williams, GW4SHS on (0792) 404422.
BATIC: Crick Rally. Talks & demos including 'Satellite TV.' Marquee trading. Bar & restaurant. Free admission. Venue — Northampton/Rugby Hotel (few hundred yds along J18 off M1). Details from Trevor on (0532) 670115.
- 26 Apr** Ealing DARS: Talk 'Operating new equipment' by Martin G4KHS 7.30pm The Community Centre, 71a Northcroft Road, Ealing.
Delyn RC: Demonstration & talk — 'Computers in Radio.' 8pm Daniel Owen, Mold, Clwyd.
- 27 Apr** Cheshunt DARC: Construction contest. Church Room, Church Lane, Wormley, Nr Cheshunt, Herts. 8pm.
Fareham DARC: Talk 'HF Aerials' by G3SED. 7.30pm. Portchester Community Centre, Westlands Grove, Portchester, Hants.
- 28 Apr** Bredhurst RTS: Inter club quiz.
Salop ARS: Junk Sale — venue to be decided.
North Wakefield RC: Monthly meeting. Details — Steve Thompson, G4RCH. Leeds 536633.
Barry College of Further Education RS: Tape slide presentation — 'DX-Pedition to St. Pierre et Miquelon Island.'
- 29 Apr** Coventry ARS: DF Finding contest (Cup qualifier). 8.00pm. Baden Powell House, 121 St. Nicholas St, Radford, Coventry.
- 30 Apr** Burnham Beeches RC: Spring DX Picnic till 2nd May.

MORSE FORUM



*There's more to morse than an army surplus tapper.
Ian Poole, G3YWX, looks at other means of keying
the rig.*

What attracts people to CW? There is certainly something about it which people enjoy otherwise they wouldn't use it. However, there probably is not a simple answer and each individual will have his own reasons for using it. Obviously there are some technical advantages. It is possible to copy a CW signal at much lower strengths than any other mode. It also occupies a small bandwidth and therefore it can be filtered out of the QRM. Then it must not be forgotten that the equipment can be quite simple making it easier to construct or cheaper. Even so it is not only because of the technical reasons that it is used. There are people's own preferences. Maybe it would be interesting to find out why it appeals to people. If you have any thoughts on the matter (or anything

else to do with CW) drop me a line, then we can see what the consensus of opinion is.

Which Key?

The choice of what type of key to use is very much a matter of personal taste. Some people stick to straight keys. Other people prefer to use semi-automatic mechanical keys, like the famous Vibroplex, and there are those who think the fully automatic keyers are best.

Obviously the straight key is the easiest to get to grips with first, but when using it one has to be disciplined, otherwise it is easy to slip into bad habits. Once this has been done the morse will be more difficult for others to read and the habits will be very difficult to break.

The next type of key is the

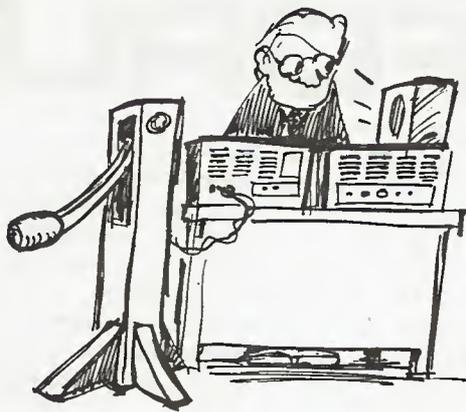
mechanical semi-automatic key or bug key. These generate a series of dots by pressing a paddle to the right, whilst pressing it to the left the dashes have to be made manually. Several years ago these keys were all the rage, providing an increase in sending speed without having to spend too much money.

These keyers are fine in many respects but there are one or two points to watch when using them. The first is that they cannot pass large currents. This is because the dots are generated by a slowly vibrating arm which has a contact which makes and breaks with the main body of the key. This contact is obviously not particularly good, and will spark if any significant current is passed. In turn this will mean that the contacts quickly become pitted and they have to be reground. In addition to this the dot contacts generate a lot of contact bounce which leads to key click. To overcome this a good key click filter is needed. Finally, when using a mechanical bug there is a great tendency to make the dashes too long. Because of this it is usually possible to identify people over the air who are using mechanical keyers.

Having said all of this, mechanical keyers can work very well if they are treated properly. In fact many people will not change to anything else once they have started using them.

The next stage up from a semi-automatic keyer is a fully automatic one. These are invariably electronic and they generate both the dots and the dashes. However, they vary considerably in looks and the functions they offer. Basically they have a paddle similar to that of a mechanical bug and they generate both the dots and the dashes. Some keyers have two paddles close together. One generates the dots, the other the dashes and if they are squeezed together they generate a series of dots and dashes interspersed. A keyer which does this is known as an lambic or squeeze keyer.

Fully automatic keyers, whether



1
".... VY GLD AM IN QSO WID PUMP HANDLE USER..."

lambic or not, have several advantages. Firstly, as the period of the dots and dashes is accurately controlled these keyers generate correctly spaced morse which is easy to read. They also enable people to send at much higher speeds, particularly over long periods of time. The main disadvantage is that they are more difficult to control and mistakes are easily made, particularly if one is tired.

So what is best? Personally I use a fully automatic lambic keyer for most of the time, but occasionally I have a bash on a straight key to keep my hand in. But as I said before, the choice of key or keyer is purely a matter of personal preference.

A New Club

Over the years there have been a number of clubs devoted to CW.

Some of these are still going strong, whilst others have disappeared from sight. One of the most famous, and healthy, must be FOC (First Class Operators Club). However, as the name implies, membership is not open to anyone. Not only do members have to be able to 'chin wag' in CW at very high speeds, but also they have to be sponsored. As if all of this was not enough there is a limited membership so it has become quite an elitist organisation.

Unfortunately quite a number of these CW clubs have an elitist element to them and this obviously bars the newcomer who ought to be encouraged. So I was very glad to see a new club which has been formed — Fists CW Club. The idea of the club is to encourage the use of CW on all amateur bands. As such the club is directed towards the

newcomer or novice as much as the experienced CW operator. The requirement for the club is not a certain CW speed or any other attainment. Instead it is a genuine enjoyment of CW. In addition to this veterans must be prepared to have the patience to help and encourage newcomers.

Essentially the club is open to veterans as they will be able to encourage the newcomers. Newcomers are also welcome as they will become tomorrow's veterans. In turn they will be able to pass on their knowledge so that CW will continue to be a major force in tomorrow's communications. G3ZQS is running the club and he hopes to be publishing a newsletter six times a year. He does add that if there is enough in the way of letters and news that the number of newsletters could be increased to twelve. The club sounds a good idea and I wish you every good fortune with it, and that it continues to grow.

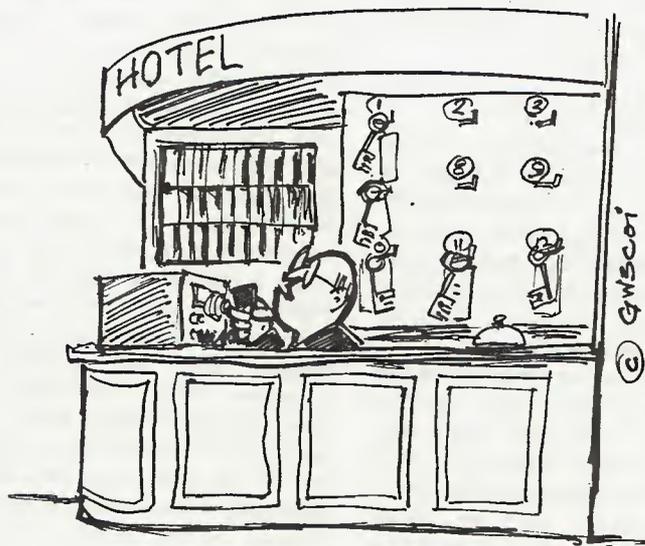
Hints and Tips

It is often helpful to share ideas which have come in useful over the years. Harold Bent **G0EZW** wrote to give some ideas which he found useful. First of all he mentions his experiences whilst taking the morse test. He says that for people like himself with hearing defects it is much easier to use headphones than the loudspeaker. Using the phones eliminates distracting background noises from the surroundings, including clicks from the key itself.

Another idea he has dates back to the early days of the War in 1940. At this time he was a soldier in a tank regiment and his signals instructor gave him some tips about remembering various letters. The main idea was to use the natural rhythm of small phrases to help in remembering the rhythm of letters in Morse. For example Q became 'Here comes the Queen', F 'Did it hurt yer' and C was 'Charlie Charlie'. Maybe if other people can remember any other letters it would be possible to compile the whole alphabet!

Sign-Off

That's it for now. Please remember to write in with your news, views or anything that is associated with CW.



"VERY SELDOM USE A KEY..."

CITIZENS' BAND— An Amateur Viewpoint



Licensed amateurs have always held strong views about citizens' band radio, ever since the early days of illegal operation. However, since 1981 there has been legal CB in the UK. And amateur radio has had the benefit of a regular stream of 'converts' from CB, so it can't be all that bad, can it?

At the moment, there are two frequency allocations for CB: 27 MHz and 934 MHz, and we shall start by looking at each in turn.

934 MHz

Although reliably estimated to be used by only three or four thousand 'good buddies', this band has, in its own way, been highly successful. Rumours of radiation health hazards (just like 1296) and the high price of rigs has kept people away, but the licence conditions allow some scope for experimentation (such as home-brewing antennas) and it seems likely that a large number of the users of this band are also licensed amateurs.

Transmitter output is limited to eight watts, and the maximum number of elements in the antenna, though initially limited to four, has now been increased to 12, giving an ERP of 60 W. There are 20 channels at 25kHz spacing, so there is little adjacent channel interference, and confirmed copies in excess of 20 miles were not infrequent even with

just four elements. 934 MHz users are not slow to take advantage of lift conditions, and 'Dxing' seems as popular as on the amateur bands.

The final attraction is that 934 MHz is notably free of abuse, which is probably attributable to the high cost of rigs (typically around £300 for the rig and £70 for a beam or colinear).

there was initially what might seem a slightly potty restriction on antenna height, to 7 metres above ground level. If you wanted to go above this level (for example, if you lived in a flat above the second or third floor) the rig's output had to be attenuated by 10dB. This regulation proved to be universally ignored and was hard enforce, and so this rest-

Love it or hate it, it's been with us for more than five years.

27MHz

Initially, due to the region of the 27 MHz spectrum allocated to CB in most other countries being already occupied over here, the allocation was for 40 channels of 10kHz spacing running from 27.60125 to 27.99125 MHz; as far as the DTI was concerned, this had the added advantage of restricting contact between British users and Europeans, who were predominantly to be found between 26.965 and 27.405 MHz. As from September 1987, this section of the band will become available, the former users having moved away (possibly in disgust at their new neighbours . . .) which extends the number of useable channels on 27MHz to 80. However, it will not be permitted to have one rig with all 80 channels, for reasons which we will come to later; and 'roger bleeps' are not permitted on the newer allocation either.

Antennas are restricted to a single element of 1.5 metres or less, which, although initially could be only base-loaded, can now be centre or top-loaded, both of which offer a lower angle of radiation. The use of beams, linear amplifiers ('burners') or any other means of increasing the power from the maximum permitted four watts or concentrating it in a given direction are strictly prohibited.

Due to the DTI's overwhelming desire to restrict the range of CB,

restriction has been dropped.

The abuse of the 27 MHz band was much talked-of amongst amateurs who were against CB in the first place; and it is true that all sorts of 'illegal' gear, particularly linears and beams, were in widespread use to start off with. Despite an early rush to go legal, many operators, particularly those using SSB, were slow to make the change and the CB lobby split into two camps. The number of prosecutions soared as attempts were made to get people to comply with the regulations.

Licensing

To amateurs, the CB licensing conditions appear somewhat strange. The licence permits the holder and his/her immediate family to operate any number of rigs (from September; it was initially restricted to a maximum of three rigs), and can be bought for a fee of £10 from any post office. Initially the licence covered the use of rigs by friends and even when hired out to strangers, but this was found to be wide open to abuse.

Transmissions are limited to speech, and, despite the Citizens' Band Association favouring the use of auto-identification, there is no form of user identification, though users invariably adopt 'handles'. There is no embargo on third-part messages.

Since 1981, the DTI have added a specific ban on the playing of music through CB radio, and made 14 the minimum age for holding a licence, though youngsters may still operate under the supervision of the licensee. The number of prosecutions for using illicit equipment has dropped considerably, but there are still quite a number for operating without a licence — a strange fact when getting one is so simple.

The European Factor

Unlike the amateur scene, where the frequency allocations are broadly similar over Europe (one might even say, over the world), there has until recently been chaos, with every country doing its own thing. Although CB was only ever meant to be a local service, its international aspect comes in when travellers from one country to another find themselves unable to take their rigs with them. For example, Irish truck drivers heading for France found themselves unable to take their rigs across the UK, even though they were legal in both Ireland and France.



It soon became obvious that standardisation was in everyone's interest and that was where the CEPT (the European Committee on Post and Telecommunications) stepped in with proposals designed to lead eventually to a common European CB licence.

A number of the changes already mentioned have been as a result of the DTI's adoption of the CEPT proposals, mostly those that take effect this September. The restriction on the number of channels available on one rig on 27MHz is another result, because the section of the 27MHz band originally allocated (27.60125 to 27.99125 MHz) is not used else-

where in Europe, and even if a common European licence is introduced, those rigs will not be usable in Europe. In any case, it is possible that the DTI may eventually take back this section of the spectrum, leaving just the lower 40 channels newly granted, if CB usage falls off significantly.

The Future

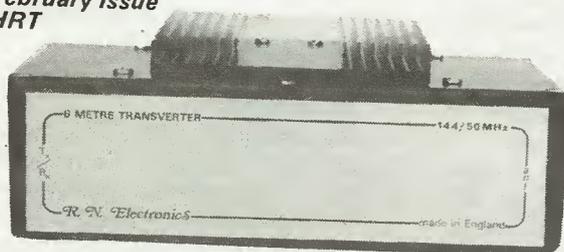
There is no doubt that CB is here to stay, though there is also no doubt that there has been a considerable fall-off in interest since the halcyon days when CB was first introduced. As a token of this, the only remaining CB magazine is *Citizens' Band*, a sister publication of *Ham Radio Today* (and CB's editor would be very grateful if you'd all rush out and buy a copy . . .).

What seems to have happened is that, after the hype, CB usage has settled down to a relative 'hard core' of users, many of them either long-distance drivers or people tied to the home for one reason or another, for whom it is a daily, routine but much appreciated part of their lives.

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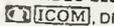
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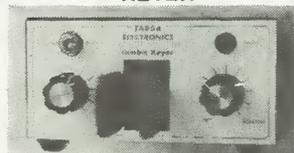
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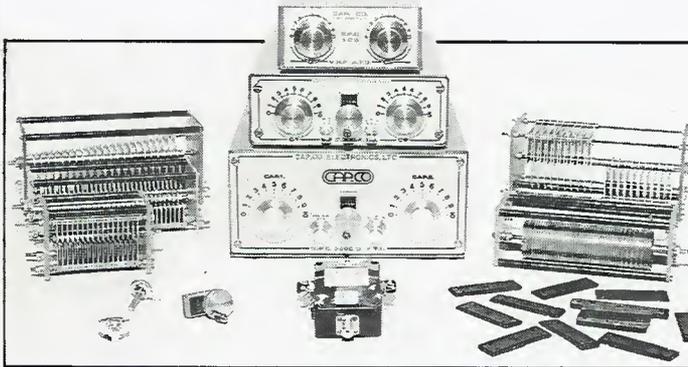
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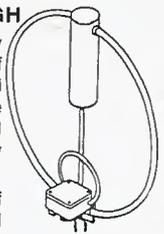
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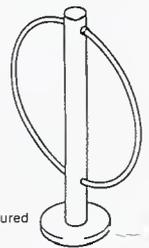
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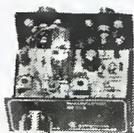
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TRANSMIT CONVERTERS 4 or 6m variable power 80mW to 2.5W, 2m or 10m drive 10mW to 100mW. Local oscillator input matches receive converters. Types TC4-10H, TC4-2H, TC6-10H, TC6-2H. PCB kit £27.50, PCB built and tested £37.75, boxed kit £39.50, boxed built and tested £53.00.

TRANSCEIVE CONVERTERS Single board version of receive converter and 500mW transmit converter. 10m drive 25mW to 500mW. Types TRC4-10 and TRC6-10. PCB kit £39.00, PCB built and tested £54.00, boxed kit £54.00, boxed, built and tested £83.25.

TRANSCEIVE CONVERTERS Separate receive converter and 2.5W transmit converter in a single boxed unit, 2m or 10m drive 10mW to 100mW only, requires r.f. sensing switch and attenuator for use with 2.5W 2m rigs. Types TRX4-10H, TRX4-2H, TRX6-10H and TRX6-2H. Boxed kit £60.00, boxed and built £99.50.

TRANSCEIVE CONVERTERS As above but including an interface providing RF sensing attenuation and PTT switching. 1/2W-5W 2M drive. Types TRX4-2I and TRX6-2I. Boxed kit £68.00, boxed and built £115.00.

CB to 10m

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The TS140S from Kenwood

Every once in a while, something comes along which marks a true turning point in amateur radio equipment. Such was the case when **Trio-Kenwood** introduced the **TS120** series; the first of the small solid state transceivers to appear.

Following the trends of the last few years towards more "sophisticated" equipment (really meaning more and more complicated), we have seen Kenwood engineering directed more towards better performance, particularly in HF transceivers; performance which has become a standard of excellence for others to try to match.

Well, the chaps at Kenwood have not been asleep, and they have come up with a new transceiver which I believe will mark another turning point in HF equipment. This is the **TS140S**, and I can tell you that having read the **Chris Lorek** review in this magazine you will see what I mean.

The new **TS140S** continues the successful "1" series, which began with the **TS120S**, developed into the **TS130S** and has now reached what I consider to be that new direction in amateur radio equipment. In the **TS140S**, Kenwood designers have given the user a receiver section with real performance which matches today's expectations, and remember that Kenwood have consistently set the standards for the last few years.

It is almost impossible for any manufacturer to give every potential customer everything that the customer wants, but there is little doubt that many people have been asking for "simplicity". However, it is also possible to carry the "simplicity" concept too far, resulting in a transceiver which is certainly low priced but lacks facilities which many users see as essential. I happen to believe that Kenwood have achieved the right balance in the **TS140S**. It will be interesting to see what you, the users think.

Obviously it is difficult to describe all the features and facilities of the TS140S in a few paragraphs, and if there are any questions remaining after reading the review why not drop us a line and ask for complete information.

In my opinion, the **TS140S** in combining performance with simplicity at an attractive cost will give real satisfaction to the radio amateur who wants to enjoy his hobby of communicating, rather than counting the buttons on the front panel. And who am I to make this pronouncement? Well, I'm John Wilson and I am one of the original gang of three which became Lowe Electronics Ltd. I haven't written for the magazines for many years, but the **TS140S** really attracted me so I thought I should tell you about it rather than bore you with a specification. Hope you like it too.

73. G3PCY/5N2AAC

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