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full technical review

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A time of change

Hello, and welcome to the May 1996 issue of Ham Radio Today. If you're a regular reader, you'll already know that we recently modernised the overall 'look' of the front cover of Ham Radio Today. My designer, Mark Thornicroft, has from this month's issue introduced a similar modern look to the internal design of the magazine, to reflect the 'Today' approach in Ham Radio. I hope you like it.

Also with this month's issue, you'll no doubt have seen the inclusion of the 'Super Morse' cover disk. Our pioneering move (the first ever ham radio magazine in the world with software attached?) has been extremely popular with Ham Radio Today readers in the past, when we've occasionally included a disk packed with superb software on the cover of some issues. We've further 'cover extras', planned for the future, and not just a PC disk, so keep a lookout on your newsagent's magazine shelf! Better still, why not place a regular order?

Again this month, besides reading about ham radio, and running the software, you've also the chance of winning a 2m handheld transceiver to actually have a few contacts with, in our free reader's competition!

Reviews

One of the consistently popular features of Ham Radio Today are our equipment reviews. These are invariably backed up with full technical measurements of the reviewed set, to show the *real* performance of the equipment, besides just the individual opinion of a reviewer. If you attended the *Ham Radio Today Reviews* lecture at the London Show last month, you'll undoubtedly have come away with a large list of past reviews, as well as other printed 'freebies'. Photocopies of past reviews are readily available of course.

If you missed it and you'd like a list in the post, just drop me an SAE at the magazine address and it'll be speeding it's way in the post to you. Alternatively you can retrieve it right now, plus lots of other information, by fax from our 24hr voicebank and fax-back info service, Tel. 01703 263429, or from the Ham Radio Today Internet web page; http://www.tcp.co.uk/~slorek/

No PC?

If you don't have a PC to use this month's cover disk with, it *does* make a nice heat-resistant coffee cup mat for your shack table! Or why not let someone with a PC who's currently learning, or wishing to improve, their code proficiency have it instead? I'm sure they'd appreciate it, as Super Morse is, in the Tech Ed's opinion at least, the very best currently available - he successfully used it himself a while ago to 'brush up' his code for a high speed test. Maybe I'd better get cracking with it as well?

THIS MONTHS COVER DISK

On this month's cover you'll find the latest version, V4.16, of *Super Morse*, written by Lee Murrah, WD5CID.

This is a superb learning aid for the code, which many prospective hams see as the largest obstacle in getting going on HF amateur radio. For those who already know the code, it's also a great aid in increasing your proficiency, right up to 20-30WPM and more, to help you get in with the 'big boys' on HF, especially 'rapid-fire' contest operation. The program can even, if you wish, introduce 'jitter' and 'interference' on the code, to help to gain experience in 'less than perfect' on-air conditions!

The minimum requirements to run the program are a simple IBM PC or compatible. There's no hard disk, colour monitor, Windows, extended memory, or whatever required. But if you *do* have these facilities, a sound card for example, the program will automatically make use of them to improve its 'user interactivity' with you!

Running the software

To run the disk-based software, then in DOS simply insert the disk in the 'A' drive of your PC, select that drive, (i.e. type A: followed by a press of your 'enter' key), then type GO followed by your 'enter' key. The program will also run under the DOS window in Microsoft Windows V 3.x and 95.

You'll then see a simple menu screen, from which you can enter an appropriate command to run either the Super Morse program, view program manual, etc. The documentation is in standard ASCII text form, which you can view on-screen from the menu, or print if you have a printer attached, either by your PC's 'print' command or from your favourite wordprocessor or other text editor.

The *Super Morse* program has been distributed on the front cover as 'shareware' with the full permission of the software author. It's fully functional, without any limited features. It's not a time-limited 'demo'. Use it in accordance with the on-disk information, and if you like it, then again please read the information on how to register.

On the disk, you'll also find a 'back-index' to popular articles in Ham Radio Today, together with plenty of software information from our friends at the PDSL and Venus Electronics, both firms being run by licensed amateurs.

Faulty disk?

If your cover disk is faulty, i.e. you see something like '*Data error reading drive A*', then for a free replacement just send the disk together with your name and address to; HRT Cover Disk Returns, Circulation Dept., Nexus Special Interests, Nexus House, Boundary Way, Hemel Hempstead, Herts, HP2 7ST, and we'll send you a new disk. (*Don't send faulty 'Software Offer' disks here - follow the instructions given on the leaflet provided with your disk for this*). Please note that, apart from replacing a faulty disk, we *cannot* help with any problems in running the software itself - please read the on-disk information files for help on this.

Icom IC-T7E

Chris Lorek G4HCL finds the perfect excuse for taking long walks away from the Editorial office, all in the course of rig testing, he says!

"OK, another dual band handheld to review" I thought, as I opened the parcel from Icom UK. "Hang on, what's this, it's a bit small, isn't it? Why is there no twin-band display?". The quoted price of the set was quite low as well, most dual-banders being £100 or so more expensive, I seem to remember.

No, Icom hadn't sent me a 2m-only rig by mistake, it really *was* a 2m/70cm rig. It just *looked* like a single band set, both in size and operating controls. It was only the 'band' button on the front panel that gives it away.

So small

So, how's it done? For a start, there's just one transmitter circuit, the 'secret' being that it works on both 2m and 70cm. Even the Motorola PA 'block' amplifies both bands - a probable 'first' in amateur radio!

On receive, there's also just one IF (Intermediate frequency) stage. This cuts down on size, but you can naturally then only operate one band at a time - there's no 'twin receive' or 'cross-band transmit' facilities here. The set uses an intelligent 'noise pulse count' squelch, which automatically lifts on a received signal. To keep things simple, there's no 'squelch control' as such, or any form of adjustment apart from a 'squelch defeat' button on the set's front panel.

Coverage

In normal use the set covers 144-146MHz and 430-440MHz on transceive, the 'band' button switching between the two. The

transmitter puts out around 3W on 2m and 2W on 70cm when using the supplied 7.2V battery pack, plugging in an external 13.2V DC supply boosts this to around 4W on 2m and 3W on 70cm.

A single click-step knob acts as the tuning control, a concentric volume control adjusting the receiver audio level. You can enter frequencies directly using the front panel keypad, and 60 memories, plus four pairs of 'scan edge' memories, and a call channel for each band, let you store

channels for quick recall or scanning. You can scan through the memory channels, a 'lockout' facility being available on a channel-by-channel basis, together with 'all band' scan or between any of the four 'scan edge' memory pairs.

Wideband receive

Now, hang on, after I'd pressed a couple of buttons on switch-on, the receiver was then capable of receiving a remarkably wide range, including VHF airband on AM.

The indicated tuning range covered four separate bands, 50-200MHz, 300-400MHz, 400-600MHz and 600-1000MHz. A quick test in my lab showed it could receive from 70-200MHz, 300-540MHz, and 600-1000MHz, with varying degrees of sensitivity. It was very 'deaf' around 70MHz (2mV), and 600MHz (20µV), although fine elsewhere, even around 120MHz where it had automatically switched to AM receive. Remember that not all countries allow you to listen to other radio users on these ranges. And before you ask, trying to transmit out of band gave me a large 'off' shown on the display with the transmitter being automatically disabled.

Tonal virtues

As well as a built-in 1750Hz toneburst for repeater access, the set has full CTCSS (sub-tone) encode and decode circuitry. Besides this being very useful for repeater access in encode mode, if your local repeater has this ability, it can also be used for 'quiet' monitoring of a given channel in encode/decode mode. You can also switch in a 'pocket beep' paging function, which alerts you when a signal with the correct CTCSS tone has been received. A 'CTCSS scan' function is also built in, where you can check a received off-air signal for CTCSS, the set showing you which, if any, tone is being used.

The set also has DTMF (touch-tone) encode via the keypad, plus 9 memories for DTMF 'autodialling', but no facility for incoming DTMF selective calling.
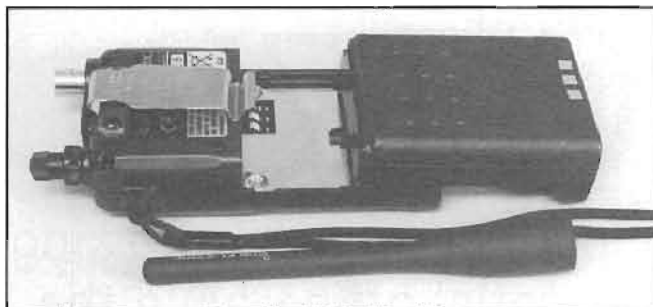
Optional supplies

The set will accept an external DC power supply of anywhere between 4.5-16V, the maximum transmit power varying accordingly. Plugging in a 13.2V DC supply automatically charges the nicad, and a suitable charger is supplied with the set as standard. Besides the supplied 7.2V 600mAh nicad pack, optional packs giving 4.8V and 9.6V are also available, plus a battery case for four AA cells.

A belt clip and wrist strap come supplied with the set as carrying aids. For belt-mounted portable, or even mobile, operation, you can also plug in an optional 'remote control' speaker mic. Besides the usual PTT, this has up/down buttons, plus VFO/memory and band change buttons. A 'simple mode' can also be programmed for this, which just allows selection of memory channels 1 and 2, the 'call' channel, plus receiver squelch override.

On the air

After an initial nicad charge and a brief memory channel programming session, I quickly went out and about with the set for a few hours, to get an initial 'feel' of its operation. Fortunately the review period also encompassed a week's 'semi-holiday' (where I'd promised myself a well overdue break from 9-5 work), hence long walks with the set, away from the office, were an added bonus! Along with the 31 page manual, a small fold-out 'quick reference' operating guide came with the set, which was quite useful.

I found the set's receiver,

using the set-top helical, had excellent sensitivity, a lot better than many handhelds I've tested over the last couple of years. This I usually find is down to the supplied aerial efficiency - many manufacturers 'skimp' on this, but a few extra pence (yen?) spent here can make several dB of difference.

There was just enough audio from the set's small built-in speaker for outdoor use in reasonably quiet locations, but in noisy areas, next to a busy main road for example, I invariably had to either hold the set to my ear or use an earphone. Likewise when operating the set mobile, although an extension

speaker plugged in gave enough undistorted audio, even for motorway speeds in the XYL's small XR2i Fiesta.

I usually found the S-meter indicated either full scale, or nothing, with little in between to give an idea of 'real' signal strength - something I often find particularly with Icom handhelds - I wonder why? When used both mobile and portable, the 'automatic' squelch worked very well. I hardly ever felt the need to disable the squelch with the front panel button, even to listen to extra-weak signals.

Using the set at home, connected to my rooftop 2m/70cm colinear, was rather a different story. Here I really did feel the need for an adjustable squelch, or even a receive attenuator. The reason for this was the set suffered, on number of channels, from paging and other unwanted signal pickup, usually from a 'mix' of a number of out-of-band signals. I'm surprised, as this is the first Icom handheld I've come across with this limitation. You should be

aware that I do live in a 'busy' RF area, and that I have found amateur handhelds that suffer far more. But, to cut a long story short, I just couldn't use the set for receive at home with an external aerial. I invariably ended up switching it off, to shut up the unwanted racket which I couldn't 'squelch out'.

Laboratory tests

The measured receiver sensitivity on both 2m and 70cm was very good, likewise the 'single strong signal' rejection, both the 12.5kHz and 25kHz adjacent channel, and blocking rejection. The image and even 'half IF' rejection was also very good. The intermodulation rejection, (where two off-frequency signals mix to cause an unwanted on-frequency signal), whilst being acceptable for a handheld of this size, was around the same as that of a low-cost handheld scanner. This probably explains the effects I encountered on-air using a rooftop aerial, rather than any other limitations. The s-meter dynamic range was rather limited, as found on air.

On transmit, the set gave a perfectly acceptable power output, with well-suppressed harmonics.

Conclusions

The IC-T7E is a lovely small rig, with quite simple operating controls. It isn't expensive either. I enjoyed using it immensely when out and about, coupled with the occasional spell of mobile operation using an extension speaker for receive.

I couldn't unfortunately use it at home with an external aerial attached, due to its limited intermodulation rejection coupled with no facility for squelch level adjustment or receive attenuation. To be fair, it isn't designed as a 'base rig' at all, but readers in similar 'busy RF areas' should be aware of this.

My thanks go to Icom (UK) for the loan of the review transceiver.

LABORATORY RESULTS:

All measurements taken using fully charged 7.2V nicad as supplied, high power TX, otherwise stated.

RECEIVER;

Blocking;

Increase over 12dB SINAD level of interfering signal modulated with 400Hz at 1.5kHz deviation to cause 6dB degradation in 12dB SINAD on-channel signal;

	145MHz	435MHz
+100kHz;	79.1dB	75.3dB
+1MHz;	92.7dB	78.4dB
+10MHz;	94.8dB	84.3dB

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;

	145MHz	435MHz
+12.5kHz;	30.5dB	39.6dB
-12.5kHz;	37.5dB	24.7dB
+25kHz;	67.7dB	64.3dB
-25kHz;	67.6dB	63.0dB

Squelch Sensitivity;

	145MHz	435MHz
Threshold;	0.12µV pd (14dB SINAD)	0.15µV pd (12dB SINAD)

Maximum Audio Output;

Measured at 1kHz on the onset of clipping, 8 ohm load;

145MHz	435MHz
562mW RMS	562mW RMS

Current consumption;

Measured with battery saver off

Standby, no signal;	45mA
Receive, mid vol;	85mA
Receive, max vol;	146mA

Sensitivity;

Input level required to give 12dB SINAD;

144MHz;	0.12µV pd
145MHz;	0.12µV pd
146MHz;	0.12µV pd
430MHz;	0.14µV pd
435MHz;	0.15µV pd
440MHz;	0.15µV pd

S-Meter Linearity;

	145MHz		435MHz	
	Sig Level	Rel. Level	Sig. Level	Rel. level
S1	Sq. open	-	Sq. open	-
S3	0.38µV pd	-9.0dB	0.57µV pd	-4.9dB
S5	0.47µV pd	-7.1dB	0.64µV pd	-3.7dB
S7	0.72µV pd	-3.4dB	0.73µV pd	-2.6dB
S9	1.06µV pd	0dB ref.	0.99µV pd	0dB ref.
S9+	1.50µV pd	+2.9dB	1.37µV pd	+2.8dB

Intermodulation Rejection;

Increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product;

	145MHz	435MHz
25/50kHz spacing;	59.0dB	54.9dB
50/100kHz spacing;	59.3dB	55.0dB

Image Rejection;

Increase in level of signal at 1st and 2nd IF image frequencies, and half 1st IF, over level of on-channel signal, to give identical 12dB SINAD signal;

	145MHz	435MHz
Half 1st IF	70.8dB	91.5dB
1st Image	88.0dB	84.8dB
2nd Image	78.2dB	>120dB

TX Power Output and Current Consumption;

Freq.	Power	7.2V (Nicad)	Ext. 13.5V
144MHz	High	3.24W/1.25A	4.34W/1.50A
	Low	1.35W/890mA	1.31W/940mA
145MHz	High	3.11W/1.21A	4.41W/1.51A
	Low	1.42W/900mA	1.35A/930mA
146MHz	High	2.78W/1.18A	4.29W/1.50A
	Low	1.45W/900mA	1.42W/930mA
430MHz	High	2.06W/1.27A	2.93W/1.26A
	Low	410mW/590mA	480mW/620mA
435MHz	High	1.97W/1.25A	3.19W/1.24A
	Low	430mW/590mA	540mW/620mA
440MHz	High	1.78W/1.24A	3.06W/1.23A
	Low	420mW/580mA	580mW/600mA

TRANSMITTER

Frequency Accuracy;

145MHz	435MHz
-183Hz	-608Hz

Harmonics;

	145MHz	435MHz
2nd Harmonic;	-73dBc	-76dBc
3rd Harmonic;	-78dBc	-81dBc
4th Harmonic;	-82dBc	<-90dBc
5th Harmonic;	<-90dBc	-
6th Harmonic;	-87dBc	-
7th Harmonic;	<-90dBc	-

Toneburst Deveation;

145MHz	435MHz
3.98kHz	3.81kHz

Peak Deveation;

145MHz	435MHz
5.60kHz	5.24kHz

AOR AR-7030 Receiver Review

Chris Lorek G4HCL finds no problems with night time listening on 40m

AOR are already well known throughout the world for their VHF/UHF scanners. They're now going to be rather well known for their latest HF receiver. Why? Well around 10 years ago, I was pleased to review a superb HF receiver, designed by a clever chap called John Thorpe. It became an international success, as did his subsequent receiver designs. His latest, you guessed it, is the AR-7030, a result of a combined project between AOR and John himself. I'm sure AOR UK in Derbyshire did rather a lot of the 'arm twisting'!

Many high performance receivers we see nowadays are designed by RF engineers in countries such as Japan. But for the European market, we arguably need 'something different' for HF. Something designed with European HF conditions in mind, especially the 'rock crushing' signal strengths and high noise levels experienced. Not only is the AR-7030 the result of British design, it's also being manufactured in Britain, at AOR UK's new manufacturing location in Derbyshire.

Enough of the interesting 'background', let's get's down to seeing what the set is, and what it can do. Well, most things actually, short of making you a cup of tea. For example, let's say you fit an optional filter, for CW for example, sometime in the future. The receiver can automatically measure its

exact, i.e. 'real', bandwidth, under microprocessor control of the set's direct digital synthesizer, plus automatically 'centre align' and install that filter and its characteristics for you into its list of stored filter selections!

Modes and controls

The receiver covers from 0kHz (yes, zero) up to 32MHz, and modes fitted are USB, LSB, CW, AM, Synchronous AM, NFM and Data, i.e. virtually everything you'd need to tune into almost *anything* currently operating on HF!

There are four IF filters fitted as standard, nominally

2.2kHz, 4.5kHz, 7kHz and 10kHz, and there's room for up to two further optional filters. The set also has pass-band tuning (i.e. 'IF shift') of up to +/-4.2kHz, plus a variable BFO to give different audio pitch on CW and data modes. The AM synchronous detector is quite novel, in that it automatically tracks the signal, even as you tune it in, to give 'spot on' synchronous AM reception. You can also use the passband tuning in this mode, to give you synchronous USB, or LSB, or DSB, or indeed anything in between.

A master TCXO (Temperature Controlled Crystal Oscillator) is used as a

reference frequency for all the set's circuitry, and a single loop DDS (Direct Digital Synthesizer) lets you tune in 2.7Hz steps, giving very smooth tuning with no 'glitches' in between synthesizer steps. A double conversion superheterodyne circuit is used, with a high 1st IF of 45MHz for good image and IF rejection, and a 2nd IF of 455kHz.

Strong signals

The RF side of the set has been designed for excellent strong-signal handling, with a quoted 3rd order intercept point of +35dBm. The receiver's circuit uses a lateral
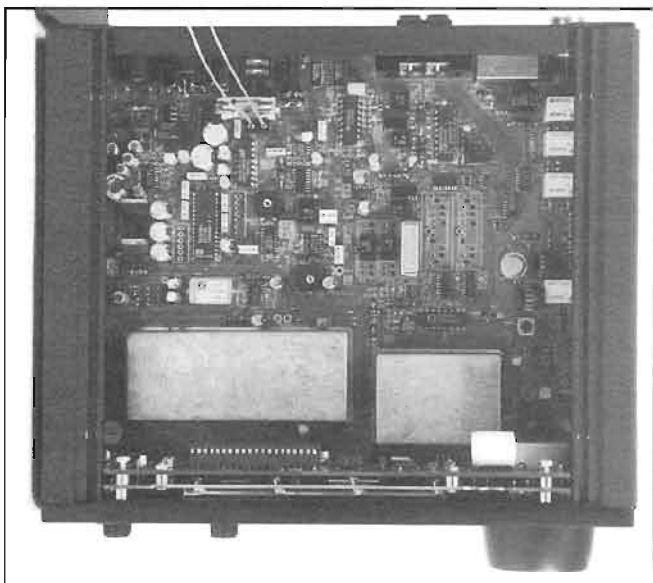
DMOS FET quad first mixer, and to remove any possibilities of front-end mixing in switching diodes, small relays are instead used for front end switching, together with screened inductors for low 'hop-over' signal leakage. The RF gain can be varied in 10dB steps in between +10dB and -40dB, plus a continuously variable IF gain control.

A comprehensive 'menu' system is used to give an uncluttered front panel, with two controls - a 'spin wheel' and an adjacent push button - being used for a variety of functions from the menu. A backlit 48 character dot-matrix LCD displays the usual frequency and mode information, together with the various 'menu' options and their adjustment modes. I could fill several pages on this, but the set uses this clever system to alter the passband shift, bass and treble tone control, filter selection, RF and IF gain, scan and squelch settings, timer modes, and so on. Bass and treble are a nice touch for what of course will be used as an entertainment receiver for broadcast reception by many users, there's also an add-on Band II wideband FM stereo option in the pipeline for the set. The lower section of the LCD also provides a bar-graph S-meter display, with 70 segments overall to give virtually a seamless indication.

A large speaker is fitted to the top panel, an optional external speaker can of course be plugged in as an alternative if you wish. The set provides a specified audio output of 2W, and a stereo 3.5mm jack socket on the front panel lets you plug in either mono or stereo headphones for speaker-less listening.

Rear panel

There are facilities for three different aerial types, selected by a rear panel switch. These can be either a coax-fed aerial via the set's SO-239 socket, a whip aerial, or a long wire plus ground, the set's internal circuitry matching these accordingly.

A 5 pin connector allows connection to your PC's RS-232 port for full remote control, and a specifically-written Windows based program should soon be available for this. If you fancy writing your own software, then AOR supply all the required binary command procedures in with the set's operating manual.

There's also an 8-pin accessory connector, giving left and right auxiliary audio outputs, relay contacts for tape recorder switching, a 455kHz IF output, and a receiver 'mute' input, e.g. for use with an external transmitter in your station.

Remote control keypad

Not content with the front panel controls and PC remote control capability, AOR also supply as standard a custom 32 button infra-red remote control. Besides giving the useful facility of direct frequency entry, it can also control virtually all of the set's front panel operating features, including tuning, volume, filter and memory selection, passband shift, and the like.

Besides having an infra-red sensor at the set's front panel, there's one at the rear as well, so you can operate the set from a variety of positions!

Case

The receiver comes in a rather stylish and extremely well-made cabinet, with a machined solid aluminium front panel and extruded aluminium sections for the remainder of the set. The receiver measures 900mm (H) x 240mm (W) x 255mm (D) and weighs 2.2kg.

The AR-7030 is supplied with an AC mains adapter to supply the required 15V DC to the rear panel power socket. It will however operate from a 12V DC external source as well, although AOR say the set might have an upper tuning limit of 30MHz rather than 32MHz with this voltage.

In use

My first received signals using the set were literally within a minute or so of unpacking the set - I just couldn't wait to try it out! On tuning around my favourite HF amateur band, 80m, I immediately thought how 'clean' the signals sounded. It's probably difficult to describe, but there just wasn't the 'raspiness' or even perceptibly slight 'roughness' I sometimes find on the audio from some receivers. Some could say I'm imagining it, but I know through experience that I can often aurally detect synthesizer-generated noise on an otherwise 'pure' off-air signal, whether this is generated in the transmission or from the receiver's local oscillator. Top marks for a very 'clean' receiver, AOR.

Similarly clean was the set's ability to cope with extremely strong signals. The 7MHz amateur band at night is a favourite 'testing ground', where relatively weak amateur signals live alongside the adjacent 41m broadcast band with its multiple 1MW ERP signals. I'm often complimented on my transmitted 40m and 80m signal strength, even when running low power (the 3-4km of copper earth mat buried in my garden beneath the multiple dipoles has a lot to do with it!). What works well on transmit usually also works well on receive, so this usually is as good an on-air test as any! Once again, the AR-7030 passed with flying colours. I had no problems at all, even up at 7.099MHz on SSB, i.e. right next to rather strong broadcasters at 7.100MHz upwards. AOR tell me the AGC design also has a special 'release' characteristic, which again makes for pleasant listening.
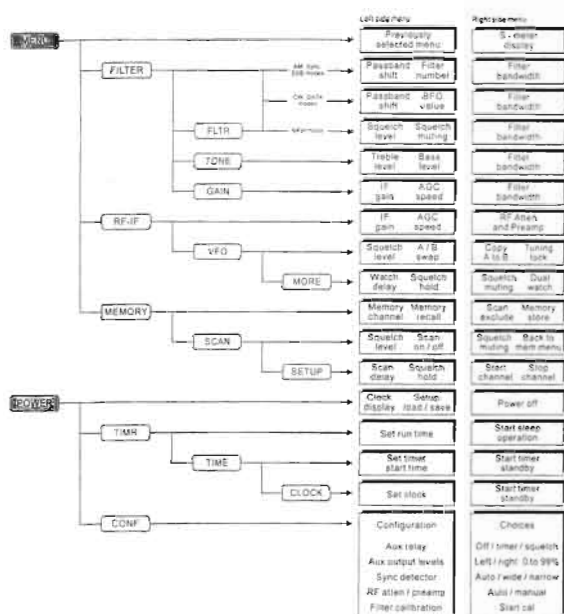
Read the book

After a period of enjoying the set's performance, using just the 'obvious' front panels controls such as the mode and filter buttons plus the nice large tuning knob, I thought I'd better have a read of the instruction manual, to learn how to use its many other facilities!

Here I found the small

AR-7030 'menu tree' commands

'spin wheel', which was in fact a click-step control rather than a 'freewheel' type, through the menu would control the passband shift, squelch, base and treble tone, memory channel selection, and IF gain. The adjacent button, which AOR curiously call a "sticky key", controls filter selection, VFO selection, memory recall, AGC speed, and scan start/stop. All these use the alphanumeric LCD to tell you what the controls do at any time

Another handy facility, which I quickly learned to use to very good effect, was that of three 'operating mode' memories, A, B, and C. Here, I could store my preferred settings, of, say, volume, BFO offset and passband shift for SSTV receive use with my computer-based decoder in one mode, RF/IF gain settings etc. for 80m grey-line DXing in another, and AM broadcast band settings such as squelch level and synchronous detection in the third.

However I found the set's 100 memories can also store all these, in fact virtually any settings of the receiver together with the 'usual'

frequency and mode. Then, after recalling any memory, I could also tune away from it easily, retaining the settings. Just like having 100 different operating modes!

The memory channels may also be sequentially scanned, the squelch setting being on a channel-by-channel basis. Depending upon whether squelch 'mute' has been enabled, this controlling whether the speaker is enabled or not when the signal level is below that desired for the scan to 'stop', I found I could perform a scan with the speaker unmuted, which besides being fairly novel (to me at least) I often found quite useful. Another handy feature was that of 'dual watch', where I could set the receiver to monitor, at low volume for 'background listening', a given broadcast station, but to quickly check, say for half a second every 10 seconds, a search and rescue frequency at a higher volume setting, thus being immediately alerted to any interesting activity.

On the broadcast bands, AOR's implementation of

synchronous tuning I found was very easy to use. On tuning around in synchronous AM mode, the set automatically switches to normal AM, until you're 'roughly tuned' to a signal. It then switches itself to synchronous mode, and automatically tunes the signal in for you, it even tracks it automatically to cope with any drift! This of course is also immensely useful for unattended tape recording using the set's built-in timer facility (international short wave broadcasters always seem to have the most interesting programs either when I'm asleep or when I'm at work). No more recording problems if the Synchronous AM signal is even slightly off-tune any more, with resultant awful audio!

Controls

I personally prefer a communications receiver to have individual controls for each function, maybe it's because I'm traditionalist, and although it's purely a personal opinion I didn't get on too well with the idea of going through a menu system. However, storing my preferred parameter settings in the set's many memories, then using these as separate 'mode VFOs', eased my initial feelings of disenchantment by a great deal! However everyone's different, and I believe this set will also be equally at home next to the living room hi-fi, video, and satellite receiver in many homes - it certainly nicely matches appearance-wise. The infra-red remote control also is a boon here, for changing channels or even tuning around, from your armchair!.

In this type of domestic use, a 'mission control centre' receiver with separate controls for everything could look very out of place, and would be difficult to operate as a 'switch between broadcast channels' receiver for family use. Hence overall I'd say AOR have looked at their market very carefully, and have come up with a great solution. I'm

told that a 'features kit' with an upgraded microprocessor, giving extended capabilities such as alpha-numeric channel naming and an extended timer for day, week, and year, is a planned option for the set.

Lab tests

Regarding the RF performance of the set, my measured results say it all. If you're not technically minded, just read these as 'superb'. The blocking performance was so good that I found it was simply noise limited by the source signals - after a while one wonders when it's the signal, or the set, being measured! The passband measurements were based on AGC level, the AR-7030 employs post-AGC filtering as well, so the ultimate rejection will be increased although the measured shape factor is correct.

Besides the RF measurements I've tabulated, for 'audio buffs' I also quickly measured the audio distortion, which came out at 1.3% on AM with a 50% volume setting and 1kHz tone, measured 'flat'. Placing a 300Hz high-pass audio filter in line brought the distortion down to an almost unmeasurable level, thus with a typical 'communications speaker' any distortion you'd probably hear would be only that on the transmitted signal.

Conclusions

If you're looking for a high-performance HF receiver, with enough operating features to please even the most discerning listener, the AR-7030 is a very, very serious contender. Its technical performance in my opinion is beyond reproach for its current price. Its cabinet style and control system means it could be equally at home in the family living room, as well as in the serious listener's station.

My thanks go to AOR (UK) for the loan of the review set.

LABORATORY RESULTS:

All measurements carried out in 2.1kHz bandwidth SSB mode, with 0dB RF gain setting (preamp/attenuator off), unless stated.

Sensitivity;

Input level in μV pd required to give 12dB SINAD;

Freq. MHz	SSB/CW (2.1kHz)	AM (6.4kHz)	NFM (9.5kHz)
0.5	0.48	1.18	0.62
1.8	0.52	1.37	0.69
3.5	0.48	1.23	0.61
7.0	0.51	1.34	0.67
10.1	0.62	1.44	0.76
14.0	0.65	1.51	0.79
18.1	0.66	1.55	0.79
21.0	0.64	1.48	0.76
24.9	0.64	1.45	0.77
28.5	0.72	1.66	0.88
29.5	0.76	1.80	0.93

Image Rejection;

Increase in level of signal at the first IF image frequency, and the first IF itself, over level of on-channel signal, giving identical 12dB SINAD signal;

Freq. MHz	Image Rej.	IF Rej.
0.5	96.5dB	>100dB
1.8	86.9dB	92.0dB
3.5	92.0dB	97.4dB
7.0	>100dB	95.5dB
10.1	>100dB	91.3dB
14.0	>100dB	97.0dB
18.1	97.7dB	92.5dB
21.0	95.5dB	91.8dB
24.9	94.8dB	88.6dB
28.5	91.8dB	85.8dB
29.5	91.1dB	84.9dB

S-Meter Linearity;

Measured at 14.25MHz;

Indication	Sig. Level	Rel. Level
S1	-	-
S2	1.09μV pd	-36.2dB
S3	2.67μV pd	-28.4dB
S4	4.26μV pd	-24.3dB
S5	7.40μV pd	-19.5dB
S6	10.0μV pd	-16.9dB
S7	19.2μV pd	-11.3dB
S8	40.7μV pd	-4.7dB
S9	69.9μV pd	0dB ref
S9+10dB	274μV pd	+11.9dB
S9+30dB	2.71mV pd	+31.8dB

Blocking;

Measured on 21.4MHz as increase over 12dB SINAD level of interfering signal, unmodulated carrier, causing 6dB degradation in 12dB SINAD on-channel signal;

+/-50kHz;	>105dB, noise limited
+/-100kHz;	>110dB, noise limited
+/-200kHz;	>110dB, noise limited *(see text)*

3rd Order Intermodulation Rejection;

Increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product, measured at 21.4MHz;

10/20kHz spacing;	84.6dB
20/40kHz spacing;	91.6dB
50/100kHz spacing;	96.6dB
100/200kHz spacing;	100.4dB

S-Meter S9 Level;

Freq. MHz	Sig. Level
0.5	56.7μV pd
1.8	62.9μV pd
3.5	57.5μV pd
7.0	64.1μV pd
10.1	64.7μV pd
14.0	69.9μV pd
18.1	75.2μV pd
21.0	67.2μV pd
24.9	68.9μV pd
28.5	80.9μV pd
29.5	80.0μV pd

Selectivity;

(see text)

	SSB (2.1kHz)	AM (5.4kHz)	AM (6.4kHz)	FM (9.5kHz)
-3dB	1.75kHz	6.08kHz	7.09kHz	8.75kHz
-6dB	1.98kHz	6.72kHz	8.17kHz	10.19kHz
-20dB	2.76kHz	7.76kHz	9.35kHz	11.97kHz
-40dB	3.05kHz	9.56kHz	11.08kHz	13.98kHz
-60dB	3.48kHz	11.31kHz	12.63kHz	16.03kHz

Realistic PRO-28

Our Consultant Technical Editor finds another bargain handheld scanner

and 30 memory channels are available for you to store frequencies into for scanning.

Besides these, the PRO-28 has 7 'search ranges', these being; 68-88, 137-144, 144-148, 148-174, 406-450, 450-470, and 470-512MHz, to let you to find new signals in these bands, which you can of course then store into memory for subsequent scanning.

Keypad

A rubberised front panel keypad lets you enter frequencies directly for monitoring, and you can also search up and down in frequency by using the small up/down arrow keys. The set then continues searching up or down until the receiver squelch opens, resuming when it closes unless you press the 'Mon' button to continually monitor that frequency.

The 'Band' button on the keypad is used to cycle through

the seven pre-programmed bands as above, the LCD showing the range selected each time for a couple of seconds prior to again automatically searching across that band looking for signals.

Power source

For portable use the scanner needs four AA sized batteries. Either standard or nicad types are fine, depending on your preferences. You can also power the set from an external 12V DC supply, a side-mounted socket is provided for this. Alongside this external DC socket is an identical connector, this time accepting a charger input so you can charge your nicads without the need to take them out of the set.

The top panel of the PRO-28 has the usual on/off /volume and rotary squelch controls, plus a 3.5mm socket for an earphone or external speaker. A BNC aerial connector lets you attach external aerials, such as a

It had to happen, didn't it? Just as soon as I thought I'd found a great 'beginner's scanner' at an economic price, another comes along! Mind you, they're both from Realistic, who've been very successful in the scanner market for longer than most people would care to

remember, so they've naturally had experience in producing what people would want!

Their 'latest kid on the street' is the 30 channel PRO-28 handheld scanner, which comes in a stylish dark-grey plastic case sized at 65mm (W) x 36mm (D) x 160mm (H). An LCD panel gives a full frequency display,

rooftop discone or mobile whip, as an alternative to the supplied wideband helical aerial.

On the air

Each time the set is switched on, it automatically scans through the memory channels. This is a handy touch, as this is the mode that most people would use the set for. Programming the channels was very simple - just select a memory channel by pressing the 'manual' button, key in the frequency, and press the 'E' enter key. Each channel can also be optionally programmed with a 'delay', where after finding a signal it pauses for a couple of seconds after the signal disappears before resuming scanning - e.g. to wait for a reply on that frequency from another station. There's also an individually programmable 'lockout', where any of the programmed channels can be individually 'locked out' of the automatic memory scan (for example, busy repeaters) but still allowing manual selection.

Searching

The set normally searches at around 30 steps per second, using fixed steps of 5kHz on VHF, and 12.5kHz on UHF. A 'Search Speed' button can be pressed to slow this down a little if you so wish, although I found the fast search never missed a signal. However, epecially on

VHF, it did often halt on unwanted carriers floating around, e.g. from computers etc.

It's a great pity that 12.5kHz steps aren't programmed on VHF (as used throughout the UK) in the set, as this, besides speeding the search up even more by skipping unused and thus unwanted frequencies, would also get rid of many of the unwanted 'spurious halts' I found. One day, Realistic might hopefully *do* something about this, if they feel it's commercially viable. This is a very common failing with their budget sets which are primarily designed for the North American market, as the PRO-28 appears to be.

Overall, I found the set was quite sensitive, picking up distant signals without too many problems of unwanted off-channel reception. Its rejection of 12.5kHz adjacent signals wasn't too good, although by a little manual 'fiddling' with the +/-5kHz steps on VHF, I could improve this somewhat when a problem occurred. I did also note a number of unwanted 'image' signals, especially on UHF, where the set picked up signals which weren't operating on that frequency at all. Again, this is a common limitation with lower priced scanners, so I can't complain too much.

I found there was plenty of audio from the set's internal speaker for general listening, both indoors and outdoors, although an earphone certainly helped in noisy surroundings.

The PRO-28 comes supplied with a belt clip, I found this handy when using the set out and about, listening in 'covert' mode with an earphone even when I was doing the shopping down at my local supermarket. I wonder if the store's security personnel thought I was listening to them?

Lab results

The measured results show the PRO-28 to be reasonably sensitive. It has reasonable strong signal rejection, apart from the poor image rejection and mediocre 12.5kHz channel spacing selectivity. The battery drain was quite low, thus allowing a set of nicads to last for at least a day's worth of normal listening before a recharge becomes necessary.

Conclusions

If you're after a 'first' scanner, and don't want to invest a large amount of cash, then yes, the PRO-28 could be an ideal contender. It isn't the 'bees knees' in terms of performance and facilities, but bearing in mind its 'target buyer' appeal it doesn't have any great limitations either! It certainly gave me many hours of happy and interesting listening over the review period.

My thanks go to Link Electronics in Peterborough for the loan of the review scanner.
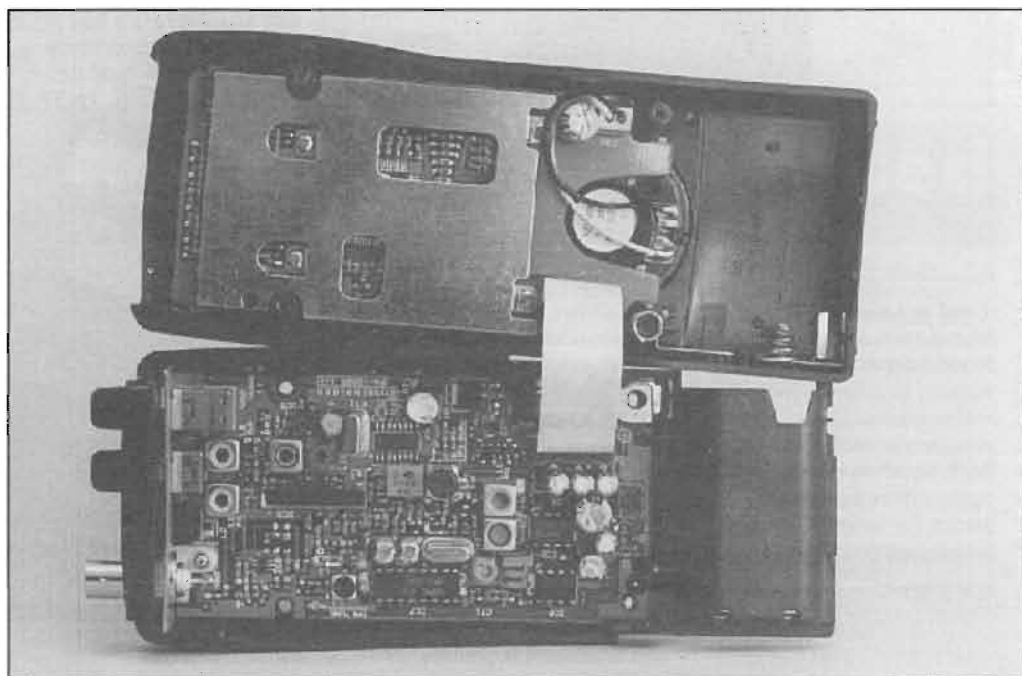
LABORATORY RESULTS:

All measurements taken at 145MHz, NFM, unless stated.

Sensitivity;

Input signal level in µV pd required to give 12dB SINAD;

Freq.	Level
68MHz	*0.26*
78MHz	*0.37*
88MHz	*0.39*
137MHz	*0.25*
145MHz	*0.27*
155MHz	*0.29*
165MHz	*0.32*
174MHz	*0.40*
406MHz	*0.38*
435MHz	*0.33*
450MHz	*0.33*
470MHz	*0.26*
512MHz	*0.40*

Intermodulation Rejection;

Measured as increase over 12dB SINAD level of two interfering signals giving identical 12dB SINAD on-channel 3rd order intermodulation product;

25/50kHz spacing;	*52.1dB*
50/100kHz spacing;	*60.3dB*
100/200kHz spacing;	*58.0dB*

Squelch Sensitivity;

Level of signal required to raise receiver squelch

Threshold;	0.18µV pd (7dB SINAD)
Maximum;	0.61µV pd (24dB SINAD)

Image Rejection;

Difference in level between unwanted and wanted signal levels, each giving 12dB SINAD on-channel 145MHz FM signals;

	70MHz	*145MHz*	*435MHz*
1st Image;	31.1dB	19.8dB	6.1dB
2nd Image;	73.2dB	73.1dB	61.6dB

Blocking;

Measured as increase over 12dB SINAD level of interfering signal modulated with 400Hz at 1.5kHz deviation to cause 6dB degradation in 12dB SINAD on-channel signal;

+100kHz;	*65.3dB*
+1MHz;	*84.3dB*
+10MHz;	*93.1dB*

SUBSCRIPTIONS AND
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01858 - 435322
LINES OPEN 9am - 6.30pm

Maximum Audio Output;

Measured at speaker/earphone socket, 1kHz audio at the onset of clipping (10% distortion), 8 ohm resistive load;

212mW RMS

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;

+12.5kHz;	*10.3dB*
-12.5kHz;	*8.0dB*
+25kHz;	*56.7dB*
-25kHz;	*61.6dB*

Current Consumption;

Scanning, no signal	*41mA*
Receive, mid vol;	*71mA*
Receive, max vol;	*91mA*

SCANNERS

Mr Houlker from Nelson in Lancashire writes in to say he has a Commtel 200 channel scanner, model No. COM203, which covers 68-88, 108-136, 136-174, 380-512 and 806-960MHz. He believes this is a 'Realistic' scanner, but he's not sure which model, and asks if there are any known modifications such as frequency extensions etc.

The current Commtel scanners are the 102, 202, and 204 handhelds, plus the 202 and 205 base models, all of which are indeed 'badge engineered' versions which are aesthetically similar to some of the Realistic and Netset ranges of scanners. All these sets are, to my knowledge, manufactured by firms such as Uniden (who also make scanners under the 'Bearcat' name), hence many scanners are examples of such 'badge engineering'!

However with this type of set, the frequency limits are usually 'hard programmed' into the operating system of the scanner, which is why the AM airband range on such early sets ceases at 136MHz rather than at 137MHz as found on later models. Usually, all that may be done is a change to a different pre-programmed range, i.e. from 68-88MHz to the 'alternative' of 29-50MHz as found in the same scanners but sold on the US market.

I described a modification for just this for the Realistic PRO-43 200 channel handheld scanner in the March 96 *Scanners* column, although the COM203 is an earlier model than this. Can any reader help, either with the 'alternative' model number or with modifications? I'll be pleased to pass the information on.
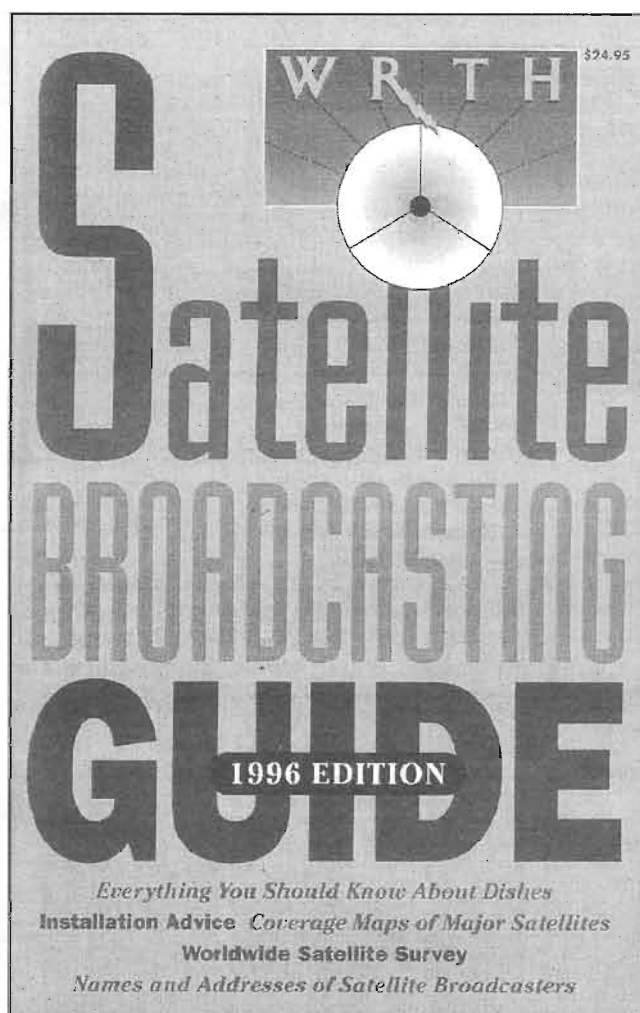
The 1996 Satellite Broadcasting Guide

Brian Gaff, who is a visually impaired scanner user, says he currently uses an 'ageing' SX200 scanner that has a bright display which is readable from close up. But he asks if anyone knows of a scanner that uses a similar type of bright fluorescent display, or a voice chip for frequency readout. He knows the Realistic PRO-2006 has a backlit screen, but says this has a gap from 520-760 MHz in its frequency coverage. I'd suggest one idea could be to use a scanner with an RS-232 port under PC control, where the PC's screen brightness can be turned up or even a speech readout used via a sound card. However, if anyone has some information on bright readouts, or of course suitable programs, I'll be pleased to pass it on.

Dave Thomas asks why he seems to be able to pick up Vodafone calls between 470MHz and 582MHz on his Yupiteru MVT-7100 handheld scanner. The answer here is that although the MVT-7100 uses a high first IF (Intermediate Frequency), and the image rejection is quite good on such models, it can still occur. Which is exactly what's happening on the set, with strong 900MHz cellphone base station signals coming through on the lower image frequency of the scanner.

On a related subject, Simon in Bridlington says he's suffering badly when trying to listen on VHF airband from high-powered VHF pager transmission on 139MHz. He finds this on his AOR2700 using just the built-in telescopic aerial, although he gets fewer problems with his PRO-2006 base scanner. He offers the suggestion to similarly-affected scanner users to try a bandpass filter, like the AOR ABF125 airband filter available from AOR UK (Tel. 01773 880780).

Mir space station reception

A message from Mr. Parsons says that, after months of trying, he recently heard the *Mir* space station for the first time, using just his Realistic PRO-26 handheld scanner. He punched the frequency of 143.625MHz FM in, and there it was! He heard the cosmonauts talking for around a minute, and then lost the signal.

Mir orbits the Earth, and you'll usually find it's in range for around 10 minutes or so on
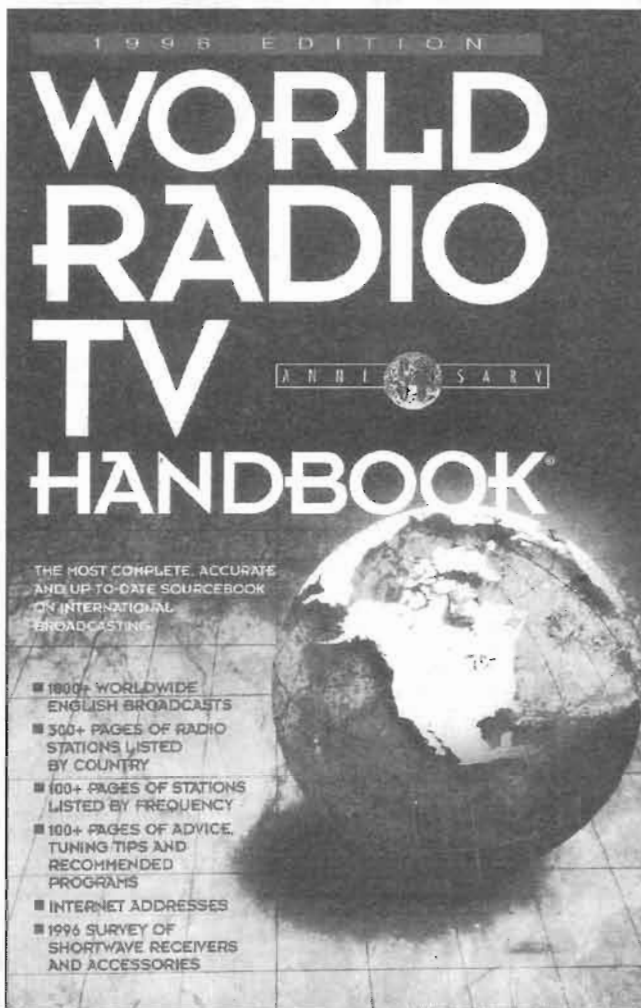
The 1996 World Radio TV Handbook, now celebrating its 50th anniversary

each 'pass' in range, although you *do* need to know when to listen (orbits usually repeat around every 90-100 minutes. By using a suitable satellite tracking program, such as *PC-Track* (from the Ham Radio Today software service), and the latest Kepler information (for an SAE to the Editor or instantly by fax from the 24hr Ham Radio Today info line; 01703 263429) you'll be able to predict, to within a second or two, the exact times you'll be able to receive the station each day.

More on numbers

A packet bulletin I read described a received HF signal, on 9.251MHz USB, with a female voice giving strings of 5 number groups, usually audible during the early evening hours. The groups of numbers are reportedly sometimes interspersed with a few notes of music which sound very much

like the beginning of the tune 'The Lincolnshire Poacher'. This signal is described as having a very impeccable English accent, rather than the common foreign language 'numbers' stations usually found. If you've also heard the station (I haven't despite listening!), I'd be interested to hear more. I do know the so-called 'Lincolnshire Poacher' has been a famous (infamous?) 'numbers station' in the past!

WRTH books

If you're a keen HF broadcast band listener, then you'll certainly be aware of the *'World Radio TV Handbook'*, which is an indispensable guide for both newcomers and 'old hands' alike. The 1996 edition, which I've received for review, is the 50th anniversary edition, and contains the usual extremely comprehensive and authoritative guide to broadcasting stations

around the world including details of station addresses, transmitter locations and of course broadcast schedules.

The WRTH 'Equipment Test Bench' gives a very detailed insight to the performance and features of a number of new receivers, and the 'International Broadcasts in English' section gives a quick guide to stations to tune into, in chronological order.

As well as this, several articles on HF broadcasting are contained within the book, and an interesting insight is given to stations presenting information also on the Internet - showing how you can even download short programmes via your computer!

Satellite listening

As many of us know, international radio broadcasters are increasingly joining their TV counterparts on broadcasting satellites, some even totally giving up HF radio broadcasting in favour of satellites. 'Broadcasting DXing' suddenly takes on a new meaning! The WRTH *Satellite Broadcasting Guide* compliments its 50th anniversary 'older brother' by giving a superb amount of information in this field. Not only does it give station and satellite transponder 'footprint' details and coverage maps, it also provides a very useful introduction as to what's needed in terms of equipment, dishes, and comprehensive background information on satellite broadcasting techniques, both technical and practical. I found it a most informative read, and would highly recommend it if you're interested in getting into this aspect of receiving.

The 1996 *WRTH* has 608 pages, 230mm x 145mm, ISBN 0 8230 5927 8. The1996 *Satellite Broadcasting Guide* has 352 pages, 230mm x 145mm, ISBN 0 8230 5957 X, both are published by Billboard Books and Edited in Amsterdam. The books are each priced at £19.95, and you should be able to obtain them from your local bookshop or specialist radio dealer. My thanks go to Windsor Books International (Tel. 01865 203240) who supplied the review copies.

PRO-60 scanner

It seems like Realistic are going into overdrive with their new handheld scanners! Their latest is the PRO-60, a 200 channel scanner covering 30-512 and 760-1000MHz, with switchable AM, FM, and WFM modes. Triple conversion circuitry claims to virtually eliminate IF images, so it'll be interesting to see what it's like - no doubt you'll see a review in these pages soon. Destined to sell for £270, you can get more details on this, or indeed all the Realistic range, from Link Electronics in Peterborough (Tel. 01733 345731)

Bill Robertson is pleased to hear from readers and will answer queries through this column - address your letters to; Bill Robertson, c/o HRT Editor, Nexus, Nexus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST, or by fax or email to the Ham Radio Today direct Editorial contact points.

Please remember that reception of some services may not be permitted without appropriate authority. The RA's information sheet on 'Scanners' has full information for the UK.


Another new offering from Realistic, the PRO-60.

Aerial Reviews in Ham Radio Today

Missed that review? Here's a list of the very large number we've featured!

Description	Issue
Altron HF Compact Yagi	Apr 87
Ant.Products Silver-70 70cm Yagi Beam	Dec 83
AOR DA3000 discone and WA5000 active aerial	Jun 92
AOR LA320 HF loop aerial mini review	May 93
AOR WA7000 base receiver aerial	Jun 93
Comet CHL-21J/CHL-23J dual band mobile aerials	May 89
Comet CX-902 2m/70c/23cm aerial and diplexer	Jan 92
Create CLP-5130 Log Periodic Yagi	Apr 89
Direction Finder Aerial Kit	Feb 96
Force 12 C-3 HF Beam	Aug 95
Garex Portable Scanner Aerial	Jan 94
Hustler 6-BTV HF Multiband vertical	Oct 94
Jaybeam DB4-4/6 4m/6m dual band yagi	Sep 87
Jaybeam MM3 Minimax HF Beam	Oct 87
KLM KT-34A HF Beam	Jun 92
MFJ HF Loop Aerial	Jan 94
MFJ-259 Aerial Tester Review	May 94
Outbacker Mobile HF Aerial	Jan 94
Phoenix 2m Beam	Jun 93
Pro-Am GM270 2m/70cm glass mount mobile aerial	Mar 94
Pro-Am TGSBNC glass mount wideband aerial	Mar 94
Royal 1300 Discone	Sep 88
SRW 'Cobwebb' HF multiband aerial	May 95
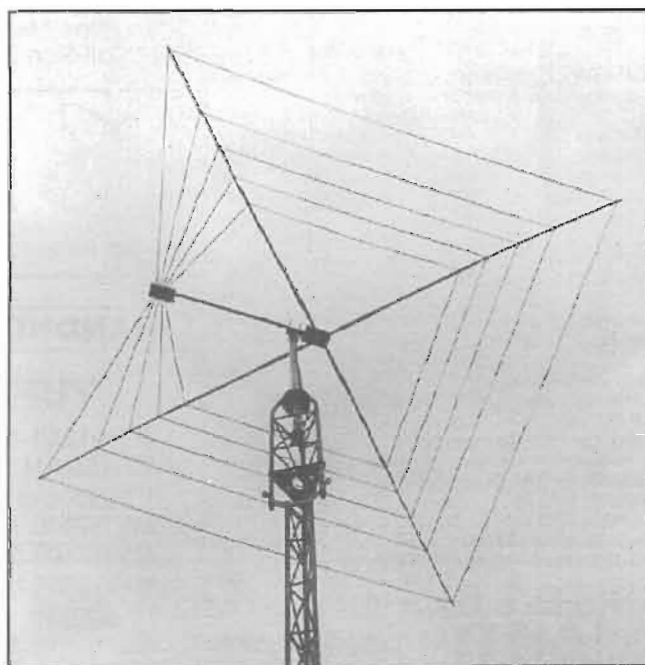
Back issues of the magazine for the last twelve months are available from: Ham Radio Today Back Issues, Nexus Subscription Services, Tower House, Sovereign Park, Lathkill Street, Market Harborough, Leicestershire LE16 9EF, Subscriptions Hotline; 01858 435344, Enquiries Hotline: 01858 435322. Please telephone first to ensure the availability and price of the issue you require, as copies of some magazines, and of early issues in particular, have run out due to popularity.

Photocopies of earlier articles are normally available from the Photocopies Dept, Nexus Special Interests Ltd., Nexus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST (we are sorry but we are unable to accept telephone orders and enquiries for photocopies), at a cost of £2.75 plus £1 UK P/P (overseas plus 20%) for the first article, £2.00 for follow-up articles, cheques payable to Nexus. When writing state HRT Magazine, article title, and issue it appeared in. Please allow up to 28 days for delivery.
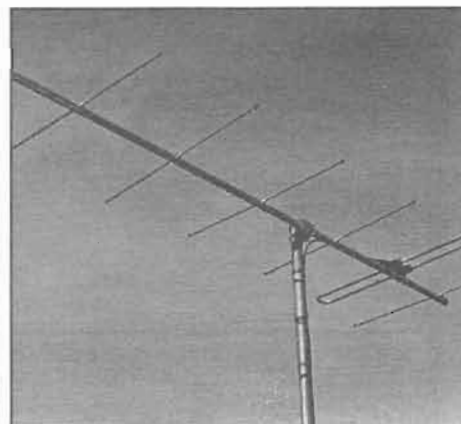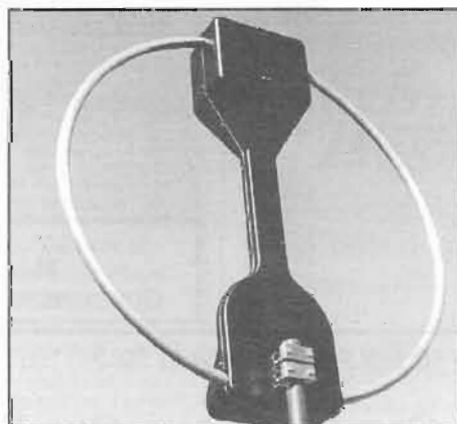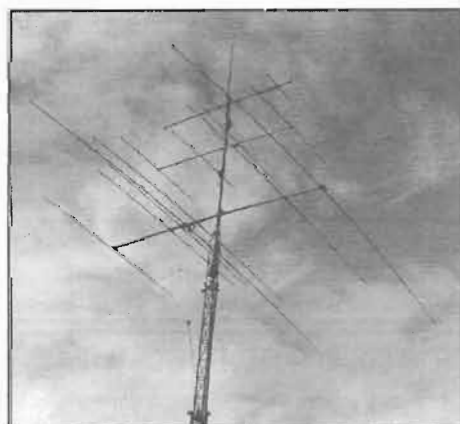
Keep The Beam Turning

Dick Pascoe G0BPS asks
"Is your rotator in good condition?"

We all take it for granted, once it has been placed in position, sat at the top of the pole or tower. But is your rotator in good condition?

There are very many types of rotators on the market, each at a different price. The mind can be boggled when trying to decide which one to use. When trying to get your first small 2m or 70cm beam up in the air, one of the very cheap TV rotators may be suitable. But don't expect it to last too long with a couple of aerials on it, most certainly not any time at all with an HF beam!

I used a small Hirchman 250 rotator for some eight years without problems, and it was obtained second hand at that! At one point it was carrying two 8 element 2m beams and a 70cm beam.

Asking these rotators to carry more than their fair share is really asking for trouble though. When looking at buying a rotator, look first at what the wind loading of the aerial is, and check that the rotator can carry it. It's better to have a slightly larger rotator than required, it will last a great deal longer that way.

How do they work?

Having got the rotator, it will be seen that it falls into three distinctive parts. The rotator head, the control box and the cable. Let's first look at the control unit.

All rotators work on roughly the same system, where mains voltage is fed to the control unit via a step-down transformer. This power is usually fused at both the plug and inside the unit. In addition to this fuse, the system may also have a thermal switch embedded in the transformer, this will shut down the power when the transformer overheats due to excessive use. If this 'fail safe' does operate, the rotator should be left to cool off for at least 10 to 15 minutes. It will automatically reset when the unit is cool.

Take a look at Fig.1, where you'll see one style of system for a control unit. There will of course be variants of this, but they will differ in principle only. Two windings may be used, one to provide a voltage to the meter circuitry and the other to provide the voltage to turn the rotator. Let's first look at the meter circuitry.

When the control unit if first turned on, usually an indicator lamp will light. The voltage will be rectified by D1, filtered by C1 and regulated by D2. This will thus provide the required DC voltage for the meter feed. Looking at Fig.2, it will be seen that by varying the potential of the pot R3, a varying voltage will be fed to the meter M1. The switch S2 is used to calibrate the meter.

The cable

With the usually offered rotator cable, the lightweight

A selection of rotators, shown from left to right.. AR30 (lightweight use, i.e. VHF/UHF array). Daiwa heavy duty rotator (suitable for large VHF arrays or for HF tribander types). CDE heavy duty rotator (as Daiwa). KR500 elevating rotator (ideal for satellite arrays, relatively light weight only).
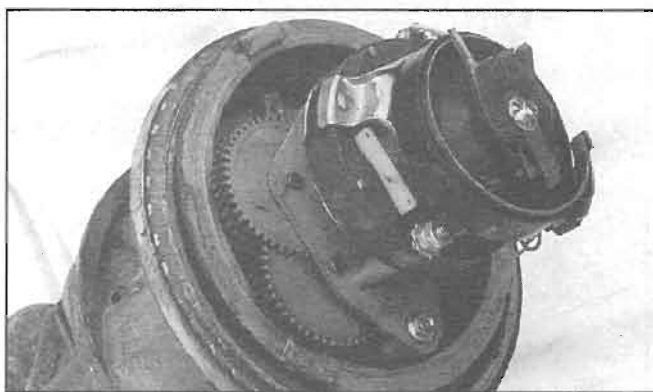
Main gearing turning the rotator. At the top right is the indicator pot that fits into a recess in the bell housing. As the unit turns this pot varies the voltage fed to the meter at the control head in the shack

rotators can get away with lightweight cable. But as you move towards the heavy duty rotators, you'll will need heavier duty cable to carry the power needed to rotate the head. The other cables can however be lighter, i.e. for the direction indicator etc.

Inside your head!

If you now take a peep at the rotator head you will usually
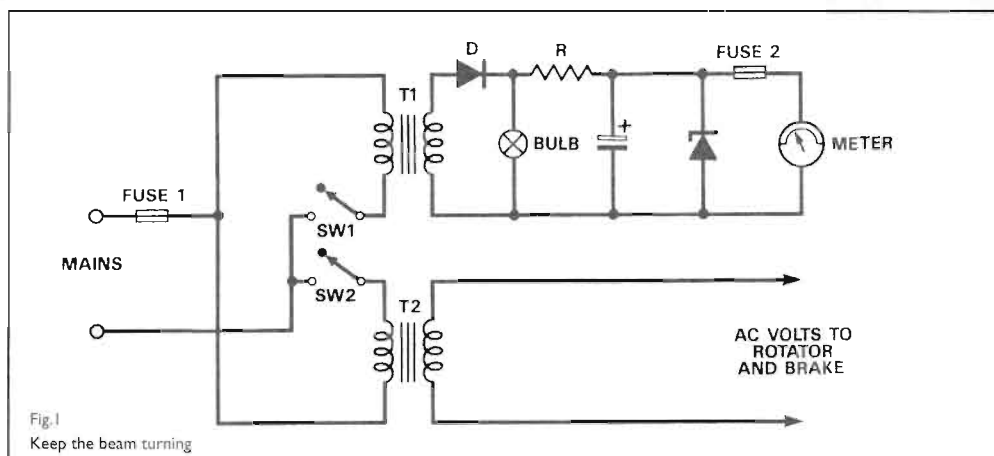
Fig.1
Keep the beam turning

find an aluminium casting, often in two halves in the shape of a 'bell housing'. The lower half carries the lower mast clamp, the split AC phase motor unit and in some cases the brake unit. The upper case will carry the upper mast clamp, the rotator gearing, the drive gears and the indicator pot (R3).

Fig.3 shows a typical diagram of a split phase motor, fed from the control unit. You can see here the two stator windings, which are shown as L1 and L2, these are connected in series via C2. Each stator winding produces a separate stationary magnetic field which alternates with the applied electromagnetic force, these are 180 degrees out of phase with each other. Each produces a magnetic field which induces a current in the rotor, this in turn develops its own magnetic field. This then interacts with the stator fields, resulting in a turning movement, or motor torque. The motor will continue to run until the current is stopped.

One of the things that can fail in a rotator is the linking capacitor which is essential to the workings of the rotator, so in many cases it is situated in the control unit. This helps to account for two of those extra wires you always wondered about.

Note that in Fig.2, the regulated 13V DC supply is applied across the dividing potentiometer R3, located in the rotor head. The electrically grounded wiper arm (R3) is mechanically positioned through 360 degrees by the rotator (this pot is usually of at least 380 degrees). Note that R3 is marked 0, 180 and 360 degrees, these are occasionally interchangeable.

Most of the larger rotators are of the two-housing type, with some form of seal or bearing in between. The more usual 'AR' series have a flange that carries a rubber or plastic seating, which has about 10 ball bearings situated in it. The more expensive have forty or more. If you have bought one of these rotators (AR40 etc.), buy some more ball bearings and fit them, your rotator will last much longer. When greasing these bearings, use an aluminium grease, *not* the normal motor grease.

Installation

Having mounted your mast in a suitable position, lower it to shoulder height, fit the aerial and wire it up to the control unit temporarily. Switch on and see where it indicates. Turn it to north and check that the rotator is also facing north. Most rotators have a small bead, mark, or line, indicating the half way point between north and south.

Having found this half-way point, using a compass, turn the rotator housing on the mast until it lines up with north. If you don't have a compass, wait until noon (GMT), check the sun, it will be due south. Ex-Scout readers will of course be able to find true north with the use of an analogue watch.

Looking up into the bell housing, you can see the recess for the indicator pot. The three lugs on the rim are the locating slots for the lower power unit.

Clear view of the locating slot and ball bearings. In cheaper versions of this same rotator only a few bearings will be found.
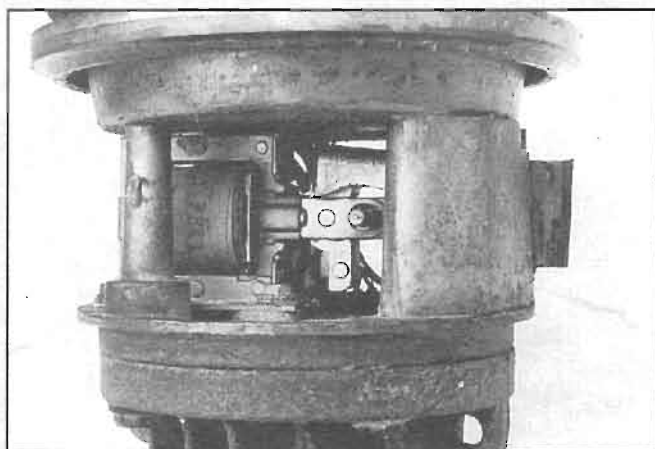
Any good heavy duty rotator will be fitted with a braking system. This usually comprises of a set of ridges inside one part of a bell housing and the brake unit. This photo shows the brake wedge on the outside of the ring. The solenoid control can be seen inside the housing. Supply power and the wedge is withdrawn and the rotator can turn
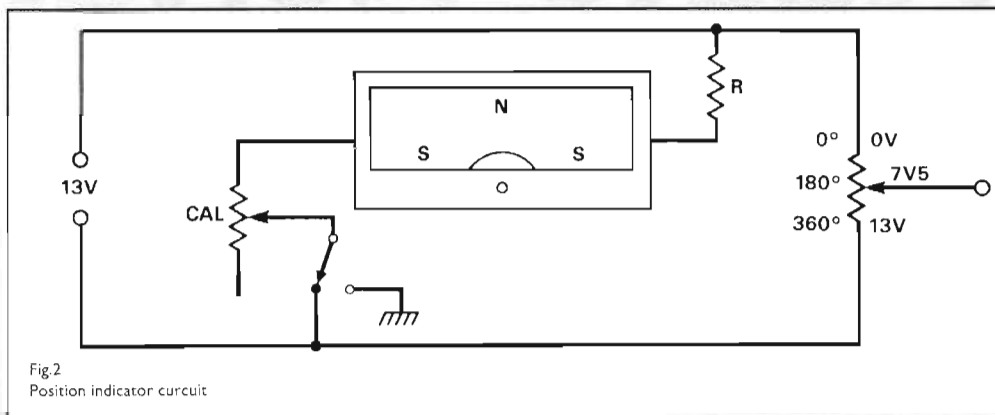
Fig.2
Position indicator curcuit
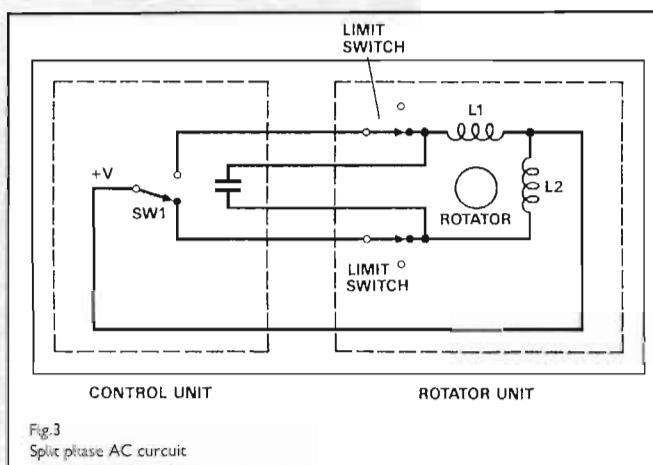
Fig.3
Split phase AC curcuit

multimeter, think rotator and check for obvious faults. Think Ohms Law. Try to disconnect wires mentally, do it, but replace them one at a time. Sit down quietly and think through the problem, it will make sense eventually!

Having looked at the diagrams given, it will be seen that many paths will be found for the odd volts to vanish. Remember that Ohms Law is right (well nearly) and that a piece of dirt can cause havoc!

Fault finding

If it does fail, and they all do at the point in time when that rare DX call is just in the null of the beam, don't panic! Switch off the power and check for blown fuses first. Open the control unit and check for obvious damage. If a fuse has blown, find out *why* before replacing it.

Next check the cable, old cable will have worn out where it bends. Look for frayed ends, broken shielding etc., anything that may give a clue. Only then, go in with a

Finally

We all remember to disconnect our aerial systems before a thunderstorm, don't we? But what about our poor rotator? It will still have volts on it (or will it?). It will still be connected to the household mains! And we expect it to live?

Oh well, all's well that ends well. Most rotators last for many, many years without problems, I hope your's does too....

Portable Aerial
For Holiday Use

Ben Nock G4BXD describes how you can build a low cost aerial for temporary location use on 2m or for VHF air and marine band listening

With a planned holiday abroad a while ago, I found a need for a portable aerial for 2m for use with a handheld transceiver. It needed to be lightweight, but robust enough to survive the baggage handlers at the airport. As it was envisaged that such items as soldering irons, tools etc., would be unavailable, a simple construction was needed. I decided to fabricate the base myself, but to use a commercial whip that could be disassembled for transport. Whilst the original was required for the 2m band, the same technique could be used for listening on the marine or air bands. The required dimensions for all these are given at the end of this article.

The whip

I had a spare 7/8th wave mobile whip of standard design in my 'junk box'. A small Allen key is used to strip the whip down into its four components; the base unit, the lower whip, the centre coil, and the upper whip. The longest whip was some 860mm long, just fitting into a suitcase diagonally, the other sections fitting easily into the case. The base coil and middle coil I put inside shoes to give some protection against knocks. Don't forget to take along the grub screws and the Allen key! These I put in a small plastic bag and stored in the base. See Fig.1.

Using the commercial whip reduced the possibility that any home made coil etc., might fail on site. The construction and

rigidity can never seem to be achieved in a home made whip, despite liberal amounts of epoxy resin.

I considered taking either a 5/8 whip or a 1/4 wave. The 1/4 wave would have been easy to carry in the case but would give no gain, the 5/8 whip would have a longer whip section and would need bending in the case. As my actual holiday location was not known, the extra gain of the 7/8 was worth the slight trouble of disassembly.

The base

I now required some sort of base to hold the whip at the holiday site. I considered a car gutter mount or mag mount, but there might not be a suitable edge or lip on which to fix a gutter mount, or metal surface for the mag mount. Some sort of free standing base was needed that would prove usable in most situations.

I found a suitable lightweight base in the form of a shortbread cake tin, the sort that comes with the pretty tartan picture on the front. A second tin I also had once held some delightful liqueurs! But the contents are not too important. The good thing about these types of tins are they are easy to work, cut etc., and one can solder to

them. The size of the tin was some 190mm diameter by 30mm deep.

Tin bashing

I made a hole big enough to take a SO239 socket in the centre of the tin. There are two types of this socket, either a bulkhead fitting or a panel fitting. The bulkhead socket needs a 13mm hole and can be purchased with cable connected, it is the type usually fitted to gutter mounts. The bulkhead fitting requires a hole larger than the panel fitting, but does not need the four holes for the bolts etc. With the hole made, the socket can be firmly attached. If the cable was already attached then the shield of the coax is now in contact with the tin case. If fitting the cable separately, then the centre can be soldered to the socket and the braid or screen of the coax soldered to the tin directly. A hot iron, or a solder gun, would be best here. The screen should be pig-tailed into two halves and soldered each side of the socket. See Fig. 2.
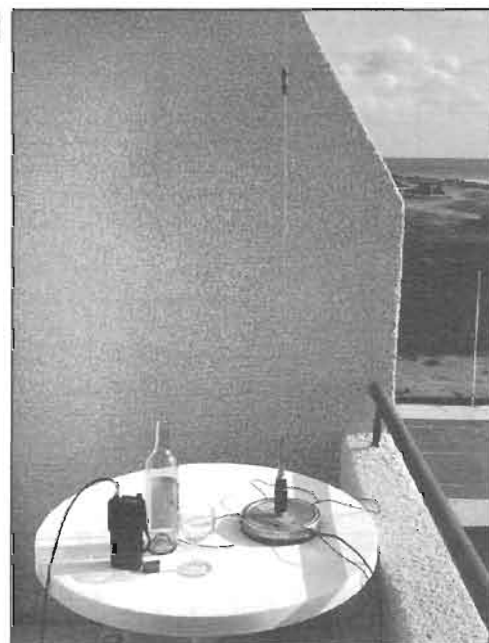
At four points around the case wall, you should drill small holes to allow the radials to go through. Taking four lengths of multi-stranded plastic covered wire 500mm long, one end of each should be soldered to the case near to the socket hole. The wire can be threaded through each of the holes and fanned out to act as radials. During transit, both the radials and the coax can be rolled up and stowed inside the tin with the lid in position. This makes for a neat self-contained unit that can easily be carried in a suitcase. With the above tin dimensions, 4.5m of RG58 coax is easily accommodated. A small grove will be needed in the side of the case to allow the coax to emerge and the lid to be replaced.

SWR check

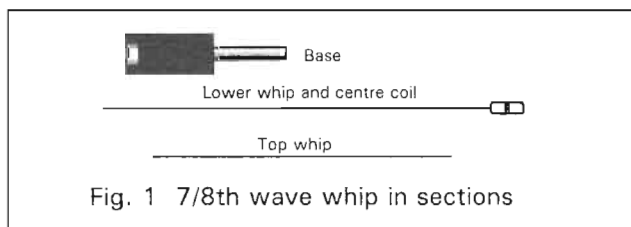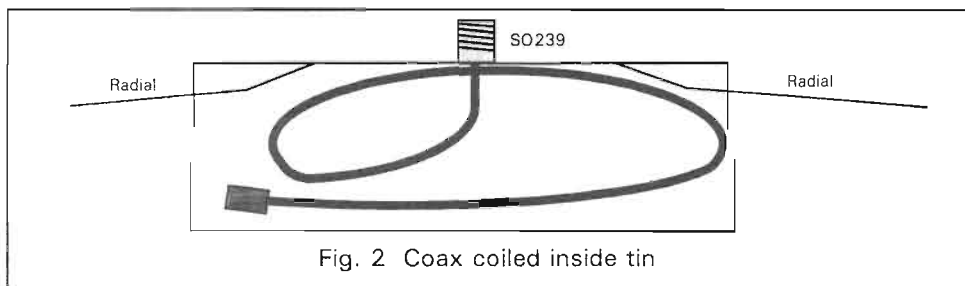Before departure, set the base and whip up in a clear area,

Fig. 1   7/8th wave whip in sections

Fig. 2 Coax coiled inside tin

with your 2m rig attached via an SWR bridge. Adjust the whip lengths in and out of the coil assemblies until the lowest reading is obtained. A small piece of tape around the whip will mark the position for easy reassembly at the holiday site.

In use

At my holiday location in Cyprus, I assembled the whip, and the base had its radials passed through the holes and splayed out, the coax extended through the grove and played into the room. The base I placed on the table on the balcony of my hotel room. Being on the top floor of the

four story building (a request made at the time of booking - a good tip for all radio enthusiasts!), the aerial was now some 12m above ground level.

With the aerial at about 13.5m above sea level the nearest repeater, some 64km away, came in at 59+, being accessible with 80mW from my hand held. I also made direct contact with 5B4 stations some 96km away with 57 reports using the 6W or so available on high power with my Icom IC-2GAT. The receiver was capable of tuning over 138-174MHz, so I managed to also listen on the marine band, with ships at sea and in Larnica harbour

some 32km away being easily copied.

Despite the worst storms for 35 years, the wind and the sea air, the whip and base worked very well. The whole assembly gave sterling service over my two week holiday, with no problems in transportation or use. Upon return the whole assembly I simply whipped down, coiled the coax up inside the tin, and stored the assembly away ready for the next trip.

Marine and Air bands

The requirements for different bands are simply an alteration to the radial length

and the whip size. If a commercial whip is available then it can be used on the mount, otherwise the simplest action is to use a 1/4 rod at the required frequency. For the marine band, on 156.00MHz the length of a 1/4 whip is approximately 430mm with the radials the same length. For VHF airband, based on 124MHz the whip would be approximately 580mm , with the radials being the same length. A simple compromise aerial for several bands would be to have more than one vertical rod and several radials cut to the different lengths. Given this simple arrangement a useful portable aerial can be taken on holiday and give extra coverage to your listening pleasure.

If you have any queries regarding this project, please contact the author, Ben Nock, c/o the Ham Radio Today Editor, enclosing a stamped self-addressed envelope (or sufficient IRCs if outside the UK) if a reply is required.

Letters

—— Letter of the month ——

Dear HRT,

I have recently retired and have more time to listen to radio, it seems that callsigns have been abandoned. Here is a recent conversation I had with another station on a 70cm repeater:
"G0HUB, welcome to the hobby. I hope you get as much fun and joy as I have done, my name is Bill and I live 200 yards from the repeater – G0HUB".
"Thanks Bill, Bla, Bla, Bla, etc., etc."

"G0HUB – Thanks for a nice chat, can I have your callsign please – G0HUB".
"I only have to give my call every 15 minutes". True
In the licence regulations under the heading 'Identification' it says: "The Licensee shall transmit the call sign specified in paragraph (b) of the Validation Document at the beginning and at the end of each period of communication with a licensed amateur and when the period of communication

is longer than 15 minutes, at the end of each interval of 15 minutes". Maybe readers can define "period of communication"?
Keep up the good work with the magazine
Bill Hubbard, G0HUB

Editorial Comment

The beginning and end of communication with "a licensed amateur" used to read, many years ago (if my memory serves me correctly), "each separate station". This caused great fun

during large net operation, with stations logging in and out of the net all having to identify themselves to each other individually. The idea now of course is that we should be sensible, and in the past this was usually achieved after having been a listener for some time before coming on the air. But then, maybe this had its 'down side' as well! Have any other readers had experience of similar 'funny stories' on the air, maybe we'll be able to compile a selection for the next issue?

No RAE opportunities?

Dear HRT,

I am writing in response to the letter headed "No RAE opportunities?" in HRT November 1995. The Tresham Institute has run an RAE for the past 8 years at an economic price – £53 this year. Last year the number of students applying for the course exceeded the number of places available, resulting in 4 potential students being disappointed. This year,

however, we have struggled to gain enough students to make a viable class and, as far as I know, this is the only Further Education or Higher Education establishment in Northamptonshire to offer the RAE.
A major cost factor is that of the examination. The City and Guild Examining Body charge £18.45 per paper, i.e. a total of £37.50 (inclusive of postage). This is surprising, as both papers are multi-choice and hence one would assume marked by an OCR linked to a

computer, when papers such as CG2240 Control Systems Technology which is a written paper and thus has to be hand marked by a qualified examiner costs only £12.60.
Additionally, this Institute supports the Northamptonshire Adult Education Provision by having devised, produced and delivering a Radio Amateur Practical course which is so poorly supported this year (only 8 students) that it almost closed. It is true that we charge a nominal fee for

external students who wish to take the RAE, to cover our administrative costs, but should the course be cancelled due to lack of numbers the course fees are refunded.
I hope this does show that there is at least one organization within the FE/HE system which is actively trying to support both potential and active Radio Amateurs.
Yours sincerely,
RAE Course Tutor, G E Brutnall G4PAV ex G8COM

£10 for letter of the month

"TONE" BURST By G6MEN

This advert says: "The Big BEAMS are back"!

uh-huh!

Bad practice on the bands

Dear HRT,

Much has been said about bad practice on the bands, bad manners, not observing proper procedures, etc. Yet what do the ones who teach the RAE do about it? Whilst I had a very good tutor at the Grappenhall Club, Warrington, I cannot say this is true of all. At the college where I am studying electronics as a mature student, it is generally accepted that tutors are there *not* to teach you to be a professional in your field, but to teach you how to pass the exam, learning is done once you have your piece of paper. This is also true of the RAE in many colleges.

At my college, the tutor who until last year taught both the RAE and TV & Radio servicing, stated many times, both to the TV class and to the RAE class, that he was *not* there to teach you how to do your job, or how to become a good amateur operator, and that you could learn this once you had your licence. This is what is wrong with both amateur radio and industry as a whole, *not* ex-CBers etc.

When I first studied for my novice licence, then for my technician in the USA, though they could have taught us in a few weeks how to pass the test, to pass the test was *not* the objective. To learn what it took to become a competent operator, who could put together a station safely, without causing interference and an understanding of good manners on the band, plus a good section on electronic practice and principles of radio, *was* the objective. To the American, the bands are not the place to learn, if you don't know how to be a polite operator *before* you get your licence, you don't deserve it.

73, Dennis Barber
G0UFS/KB8GCF

Traditional values

Dear HRT,

John Davies-Bolton G4XPP says in his letter (Jan HRT), "All you have to do is go to the local college, study for, sit, and pass the RAE, at the same time learn Morse Code, go to a rally and pass the 12 WPM test, purchase a licence and radio gear and away you go!" Is that all? My cat's doing that next week! Seriously, though, is it so long since John sat the RAE and CW tests that he's forgotten what they were like? Unless electronics is your profession the RAE isn't the walkover that many people would have us believe. My friend Adrian, with his two degrees in electronics, read my RAE Manual and confessed he couldn't pass the exam without some extra study.

I agree with John that the 'traditional' RAE doesn't teach, or examine, much in the way of operating skills, but the 'time served/QSOs made' system isn't as easy as he seems to think either. Who is going to check the thousands of QSL cards involved? If volunteers, where are they going to come from, and how are they going to find the time? And if not volunteers, then they're going to have to be paid somehow. What price an amateur licence under John's system?

Before it's too late!

Dear HRT,

I wholeheartedly agree with Dr. George Brown, G1VCY. The ideas expressed in his article I believe reflect the feelings of the silent majority. I also believe that the business of amateur radio will decline if something isn't done to the licensing of amateurs. Here are some pointers that we need to take notice of before it is too late;
1) Young Novices with the 5 wpm are rare.
2) Radio clubs where the number of novices form a third of the club membership are rare.
3) Radio clubs in general have a 50/50 split between A and B class licenses.
4) The average age of most radio clubs is over 50.
5) A radio club of long standing in the London area closed in October '95. Most of the club members were in their 70's.
6) Old fuddie duddies with a two letter call sign, who openly admit that in their youth all that was required for a licence, was an idea for an experiment with wireless and the ability of 12 wpm Morse. Great in the days when the mode was AM and drift was acceptable, EMC probably meant something else!
If I had a say in the matter of

licenses I would limit HF to 100W or less, that would encourage careful use of aerials and reduce bandspread / splatter. Those hard to hear or difficult to confirm contacts could then be done by Morse or any other binary code.

Morse is a language and is probably learnt best like any other language, with real contacts (possible on 2m), those who are keen enough will soon learn. That would be better than the present situation where many of those who do pass their Morse, get their 'A' class and never use Morse again!

I think Morse should be replaced with a better structured approach to the 'A' class licence. With a greater emphasis on technical and practical knowledge that would include such subjects as EMC.

My only comment to G.P. Hamblin, G4VBB is that if he thinks that £100, at the very least, will encourage amateur radio, then perhaps he would like to set up a charity to fund those who cannot afford the licence they have worked so hard for. Remember amateur radio operation is a non pecuniary activity. US operators I believe get their licence effectively free!

Your sincerely,
Paul Bradfield, G1GSN

Perhaps we're lucky here in the South of England - but when I started in ham radio, I found plenty of helpful, friendly amateurs on the air and at the local club, who'd offer advice for the asking - and plenty of people willing to point out the error of my ways if I transgressed, straying onto their club net frequency or accidentally ignoring the unwritten courtesies of our hobby. But it says on my licence (and, I'm sure, on John's) that I'm allowed to operate "for the purposes of self-training in radio communication". If he's expecting the holder of a 'full' A licence to be fully trained in all he needs to know - then what else is there left to do?

P. D. Duell, G0TLG

From
my notebook

Geoff Arnold G3GSR describes a few of the tools most useful for any work on electronic or radio equipment

A couple of months back, I was talking about various ideas for making use of bits and pieces, junk even, in applications which bear no resemblance whatever to what their original designer and manufacturer had in mind.

Several of these were to produce useful tools or fixtures (the posh name for devices that hold something while you are working on it), but of course there are plenty of clever tools in manufacturers' and stockists' catalogues, or on sale in supermarkets or at radio rallies.

Some of these tools are very useful, and once you've got them you wonder how you ever managed without. Others look to be a really bright idea, but after you invest your hard-earned cash you find they either don't do the job anywhere near as efficiently as first appeared, or else they are so specialised that you may only find the opportunity to use them once in the proverbial blue moon.

I must admit that I used to be a compulsive buyer of tools and the like, not just for radio and electronics uses but also for domestic DIY, the car, the garden, etc. Eventually, I had no room left for any more, and also realised that some of them were really a waste of money, for either (or both) of the reasons I gave above.

So, this month, I want to talk about a few of the tools I consider most useful for any work on electronic or radio equipment.

Screwdrivers

Without any doubt at all, I have a larger assortment of screwdrivers than any other single tool. I've talked before about all the different varieties you need to cope with, slot-heads; cross-heads (Phillips and Pozidriv/Supadriv); socket-heads (Allen, Torx, Bristo, etc.), and so on. I seem to have accumulated a number of each.

Useful for any type of screw is a means of retaining it safely on the end of the screwdriver whilst either inserting it into, or taking it out of, the depths of a piece of equipment. If you are going to drop a screw, Murphy's Law dictates that it will always come to rest out of sight beneath a component, printed circuit board or bracket. There are a number of ways of keeping safe hold of it.

The first of these, the magnetised screwdriver,

(a)   **(b)**

Fig. 1

obviously only works for steel screws. It can be quite efficient, but it has the big disadvantage that there are times when it will insist upon removing a screw from where you have carefully placed it. In other words, the problem is your lack of control over the magnetism. Although it's a useful method for general DIY work around the house, especially in conjunction with a powered screwdriver, I personally don't favour it for work on electronic or radio equipment.

Purpose-made screw-holding screwdrivers come in two varieties. One has a blade which is split at an angle, as shown in Figure 1a. When pressure is applied to the edges of the blade (by sliding a metal sleeve down towards the tip), the tip is effectively made narrower but thicker (Figure 1b), gripping the sides of the slot in the screw-head. I have a couple of this type - small and medium size - and they work very well. The important thing to remember is that splitting the blade into two weakens it considerably, and you need to use an ordinary screwdriver to tighten up a newly inserted screw, or to loosen a screw which you want to remove. If not, the blade sections will bend and you will no longer be able to make the screwdriver grip the slot.

The split-blade screwdriver will of course only work for slotted screws. Another type which will hold all types of screw has some form of claw fitted over the blade-end. The prongs of the claw are slipped over the sides of the screw-head and hold it there, by the pressure of a built-in spring at the tip (Figure 2a), or at the handle end of the blade in another (Figure 2b). The claw type, although stronger than the split-blade variety, cannot be used either to fully tighten or to initially release a screw, simply because you can't then have the prongs under the screw-head. This type also works well, although in some particularly confined situations the claw mechanism can foul on components or parts around the screw as you try to turn it.

Incidentally, a 'makeshift' screw-holder can be made by pushing a short length of rubber or plastic tubing of suitable diameter over the screwdriver blade and the screw-head. The biggest problem usually is laying hands on tubing of the right diameter, but it's an idea worth remembering for an emergency. Other possibilities for the panic 'I keep dropping this blankety-blank screw' situation are things like Plasticine, Blu-Tack, sticky tape, or even some nice 'gungy' glue or grease.

Nuts

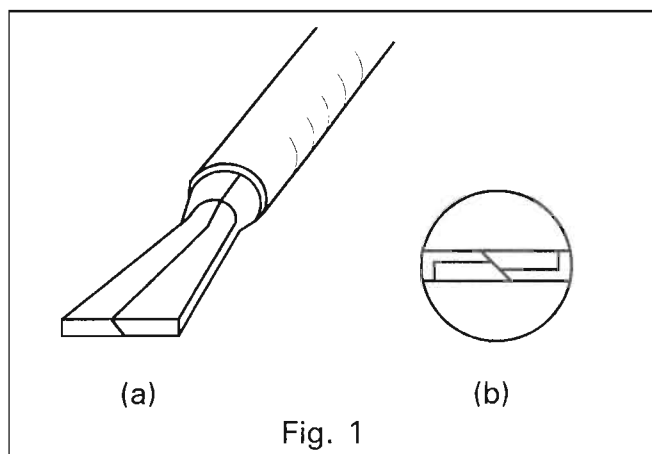No, that's not a comment! Nuts, of the hexagonal variety, are just as easily dropped as
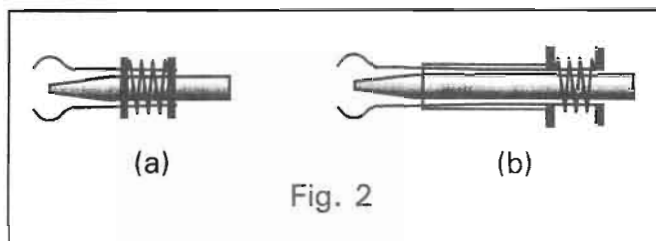
(a)   (b)

Fig. 2

screws, and usually even more difficult to retrieve. If you have clear access to the end of the screw-thread you are trying to fit the nut to (or even remove it from) a device called a nut-runner is useful. This is a tubular plastic tool which slips over the nut, with the slight springiness of the plastic holding it firmly and squarely whilst you offer it up to the screw and engage the first couple of turns of the thread. You used to get a nut-runner free with some Heathkit projects   that's where I got my first one - and in the days when oil (and therefore plastics) was cheap, some of the radio hobbyist magazines even gave them away as cover-mounted gifts.

In the absence of a proper nut-runner, a short length of thick-wall polythene tubing can be used. The problem here is that any plastic tubing is formed into coils immediately after it is manufactured, and the curve of the coil is permanently implanted into the molecular 'memory' of the plastic used. The result is that the nut you've jammed in the end of the tube doesn't stay square to the screw-thread as you turn it, so that it either fails to engage and falls off, or else cross-threads itself.

A nut-runner, as just described, is not the same as a nut-spinner, which is best described as a socket-spanner or box-spanner with a handle attached. However, if you have a good-quality, tight-fitting spinner you can sometime persuade the nut to stay in its end long enough to manoeuvre it into place. Application of one of the gungy substances mentioned above may help.

If the only approach to the screw under attack is from the side, rather than the end, there is no tool I've ever seen which is ideal for the job. My method

is to 'fiddle' it, perhaps placing the nut on the end of the screw-thread with a pair of pliers, then applying end-pressure with one screwdriver tip and gently pushing the nut round with another, until the thread is safely engaged. Obviously it is a considerable help if you can place the piece of equipment at such an angle that natural gravity assists you in the job, rather than hinders.

Work-holders

If you've got a nice hefty mechanic's vice bolted to your workbench in a convenient spot, you're a lucky person! Most hobbyists have to make do with a more temporary and portable solution to the problem of holding things steady while working on them. If you are interested in heavy-duty metal-bashing, drilling, sawing and the like, then it's back to the mechanic's vice. For holding components, circuit boards, etc., while you solder connections there are several alternatives.

One which I have used for some years is what is known as a drilling vice, a clamp intended to be bolted to the platform of a vertical drill-stand to hold the workpiece being drilled. A good-quality example is heavy enough to stay where it is put on the bench-top while you do light work on something clamped in its jaws. One jaw can often be swivelled sideways, so that it will grip a slightly irregularly shaped object, which is useful.

Another useful gripping tool is something variously termed a hobby vice, table vice or watchmaker's or instrument vice. It's really a miniature version of the mechanic's vice, but with extra features. Mine has two sets of jaws, one grooved, one plain, either of which can be swivelled around to hold things vertically or

horizontally. It also has a built-in suction base so that it can be 'stuck' anywhere required on a smooth bench-top or even, with domestic approval, on a kitchen table or worktop.

For detailed, lightweight work the device known as a 'Helping Hands' is very useful indeed. This consists of a weighted base on which two large crocodile clips are mounted by means of multiple ball-joints, allowing them to be swivelled in all directions, to grip components or even small printed circuit boards while they are worked on or inspected. The finishing touch is a magnifying glass, similarly swivel-mounted. It can sometimes be a fiddly job adjusting the croc clips to exactly the right positions, but nevertheless I'd recommend the Helping Hands as a worthwhile purchase.

They are available from mail-order component stockists or at many radio rallies, where you will often pick them up at bargain prices, through saving on substantial postage and packing costs for a fairly heavy yet potentially fragile item.

Inspection

The magnifying glass on the Helping Hands is helpful for fine work, but sometimes something more powerful is needed, and here a watchmaker's eyeglass or loupe is useful. They come in various 'powers' (focal lengths). Something between 2-inch (5cm) and 4-inch (10cm) focal length is about right, with the longer one definitely recommended if you intend to use it to peer into live equipment! Watchmaker's eyeglasses are available from larger opticians, but also sometimes from tool stalls at radio rallies.

Being able to inspect something from a different angle, perhaps even from behind, can be useful. The obvious solution is a mirror, but this generally needs to be quite small, rather like those used by a dentist when peering into your cavities. Such devices

are manufactured as general-purpose inspection mirrors, coated with an insulating layer for safety reasons, and available in either plane or concave (magnifying) varieties. For electronic inspection, the magnifying type is fairly limited in its usefulness, and I'd recommend the plane one. Sources of supply are the same as for watchmaker's eyeglasses.

Wire-stripping

Anyone involved in radio or electronic construction, installation or repair work is sooner or later going to have to remove the insulation from some wire ends. Leaving aside teeth (back to the dentist again), knives (difficult not to damage the conductor) or brute force with a pair of pliers or cutters (same problem), the only solution is a proper pair of wire strippers.

These come in two basic varieties - side action or end action. The side action type, where you hold the tool at right angles to the wire being stripped, is the less expensive of the two, and once you get the knack of adjusting and using it, very effective. I am still using a 'cheap and cheerful' Bib wire stripper and cutter, made by the Multicore Solder people, which I must have bought around 45 years ago. They don't make 'em like that any more!

I also have a pair of self-adjusting end-strippers, which will simultaneously strip all cores of a twin or multi-core cable, but I've never been entirely happy with their operation, and they are permanently tucked away in a drawer. Having watched our wiremen using end-strippers with great skill and effectiveness when I worked in industry, I know that they can function very well. Possibly the answer is that, as in any sophisticated self-adjusting device, quality is everything and it's not worth buying one unless you can afford a top-quality, professional-grade example. Maybe it's just that I don't know how to set them up properly in the first place. Perhaps I should try again!

QRP corner

Dick Pascoe GOBPS shows how to 'pull' your rock-bound QRP rig

After the QRP 'Winter Sports' ended, there was much discussion once more about the band conditions and the increasing QRM found on the parts of the bands where low power types tend to gather. It should be remembered that those not interested in our part of the hobby may know little or nothing about us. Thus when they ask if the frequency is in use, and hear an extremely weak reply, they may think that the other station is a long way away and will not be intimidated by their 400W! We of course know different, but the high power operator sitting a few tens of kHz up from us can cause havoc.

Many of the comments made about these problems were made by operators who insist that 7.030MHz is *our* frequency, saying it is the QRP frequency and not for QRO use! Of course it is none of these, it is the *centre of activity* for QRP operators and if a CW station sits there with his 400W we can only politely request him or her to move. We do not own these frequencies. Look again at my statement.
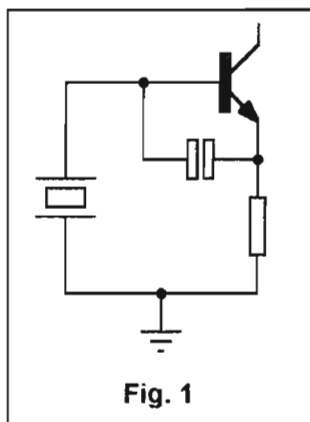

Fig. 1

Centres of activity

The frequencies we often quote are just that, they are *not* calling frequencies. QRP operators will be found at up to 10kHz up or down from these. Take the 40m band for instance. Our American cousins sit on 7.040MHz, so we should be able to find activity between 7.020 and 7.050MHz. A lot of it will be higher power of course, but what a chance to do some courting.

I've also heard comments about being 'rock bound', but no-one with a crystal controlled set need complain. These crystals can often be pulled off their designated frequencies. It is easy too.

Take a look at this simple crystal oscillator 'as is' (Fig.1). The frequency is fixed by the operation of the crystal and in this application cannot be changed. If we now look at Fig.2 where a variable capacitor has been added, we can now move the frequency of the crystal. The bad news is that we can only move the frequency high. If no small variable capacitor is available then it may be replaced by a set of switched capacitors as in Fig. 2b. Each capacitor will increase the frequency by a small amount. Typically a maximum of 1kHz, but slightly more may be obtained on some crystals.

As we can only pull these crystals high with the use of a change of capacitance, we can only tune the section of the
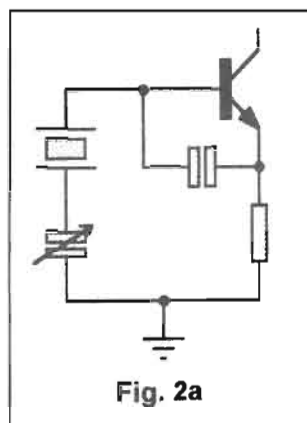

Fig. 2a

band above the centre of activity. Wouldn't it be nice to go low a little too!

We can of course, and Fig.3 shows how. By the addition of an inductor we can pull the crystal low of the centre frequency and then use the capacitors to swing over the centre and move away from others. We could vary the inductor of course, but there is no need. Put the inductor in the circuit and let the capacitor do the swing.

OK, I hear you, you don't have an inductor. So make one. Find a high value resistor, about 1M or so and wind as many turns of fine enamelled wire on it as you can. Start at one end, solder the wire to the resistor leg and start to wind. When you have a pile, solder the other end to the other resistor leg. Cover with beeswax to stop it unravelling, and you have the inductor. I know you don't know what value it is, but does it matter? It will have pulled the crystal a bit and given you some swing.
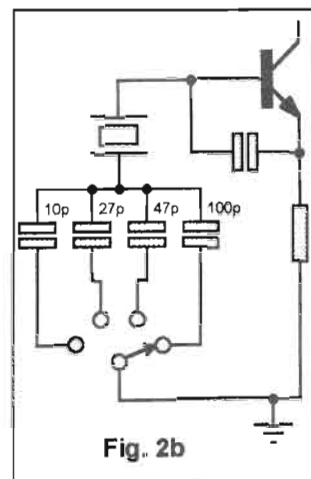

Fig. 2b

Try it out, just add more turns for more inductance if needed.

Aerials for QRP

There has been a lot of discussion on loops lately and other forms of aerials for QRP work. One amateur asking me what was the best aerial for use with the ONER transmitter. Of course a good aerial will work well with any rig. I consider that the aerial is the sole most important part of any amateur station. I currently use a doublet because that is all I could get up at the time.

I recently acquired a plot of land next to my house to give me a quarter of an acre in total. I shall be putting up a horizontal loop for top band very soon. Of course with the ATU it will be usable on all other bands too. Pity about the power lines surrounding the house! Experiments will

continue with my flea power on HF, but now with a much better aerial I should get more ERP for my fleas. For others interested in top band working, there is a new group on the Internet. Send in the body of the text "subscribe" and send the request to: topband-request@frontier.net, or you can send mail to "listadm@frontier.net with the following in the body of text "subscribe topband dick@kanga.demon.co.uk" just change my email name and address to yours.

Power sources

In the summer (when the rain is warm) many operators go backpacking, walking, or just drive out into the country to operate for a couple of hours. How to power the rig is often a problem. The car owner will of course have resource to the car battery. If too prolonged a session is planned then a separate battery may be the answer. Some years ago I had a battered old VW Camper. In it I had a separate 12V van battery

charged by the engine in the normal way except that some heavy diodes ensured that when starting the engine the power was taken from the van battery only.

At the power levels we QRPers prefer, power is not too much of a problem, but batteries are heavy. Nickel-Cadmium batteries can be recharged up to 1000 times if handled correctly and several of these can be stacked for our use. Lead acid batteries are heavy but easily recharged and often are of 12V rating. Remember a battery rated at 12Ah should mean that it will supply 12A for one hour when fully charged. It also means that it will supply 6A for two hours, 3A for four hours etc.

Natural sources of power are also available. The sun can power solar cells, and a bank of these may be used to give the required current rating. If the spot you have chosen is windy, try a wind generator. Next to a river? What about a water powered rig? The potentials are endless but often fun. Until recently it was difficult to obtain solar cells and wind generators,
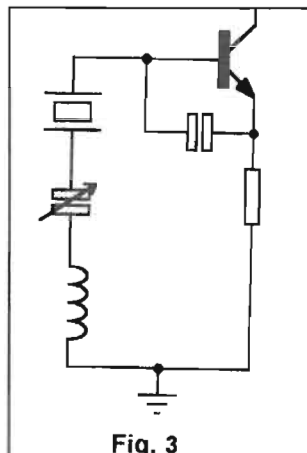

Fig. 3

but one amateur saw the gap in the market and now attends many rallies and sells good quality equipment. Keysolar systems of Newport Gwent may be contacted on 01633 280958.

QRP nets

One way of getting more experience on the air with low power is to join in on one of the QRP nets. There are several to be found but here's a couple that may be of interest. TUE-QRP-NET, the coordinator is DF0UT and he may be found on or

about 10.123MHz +/- QRM. The net starts at 2100 UTC on both Tuesdays and Thursdays. Other operators that may be heard are Gerhard DK6TP and HaJo DL1SDZ. The language will be both German and English, with CW speed being that of the slowest operator on the net. Discussions about technical topics, rigs, aerials, QRP and DX news will be the norm.

The other Sunday net caused problems initially as it sat on 3.560MHz. This was not a problem for us, but the net meets at 0300 UTC on Monday mornings. The net is the 'Knightlights' and will now be found on 3.710MHz. This has been running for several months now and should prove very interesting. The main operator is Paul AA4XX. They encourage any operator to check in with their night-lite power. Many of them are milliwatters but I am sure that a huge 5W from the UK will be accepted. Remember, these stations will be listening for the weak ones so you will have an excellent chance of 'jumping the puddle' over to New England.

VHF/UHF
message

Geoff Brown GJ4ICD brings VHF/UHF news from around the world

Neil, G0JHC has plans to visit Cuba during 1996. Although not a DXpedition it is hoped to meet up with a number of active 6m operators including CO2KK and CO2OJ. Due to the fine work of the Havana Radio Club, 6m is becoming ever more popular in Cuba and a number of new amateurs are showing keen interest in obtaining equipment. Unfortunately radio equipment is hard to come by and imports are difficult.

This is an ideal opportunity to clear out those old redundant transverters or radios which a newcomer would be happy to use. Arnie, CO2KK would appreciate any items which could be used to get other club members on the air. Technical knowledge is available and items not working are still welcome, as repair facilities are on hand. If you think you might be able to help with any redundant shack equipment, please contact Neil G0JHC on 01772 742710 (after 6.00pm).

Patrick F1DPX

It is with sad news that I have to report the passing away of Patrick F1DPX.

Patrick passed away at the age of 40 due to a heart attack, he was an avid 50MHz DX'er during cycle 22. In fact, many of us used to use him as a 'beacon' for activity to South Africa/South America during those great TEP openings. I visited Patrick's house south of Rennes in Brittany many times where the hospitality was always superb. Patrick is sadly missed by many friends around the world, but we will always remember him as a *real* VHF man. He was many people's one and only contact on 50/432/1296MHz.

Overseas activity

At the time of writing this column I was informed by Felix DL8OBC that the Icom 736 located at the 3V8BB club station had gone QRT. Even more bad news was that difficulties were being encountered in obtaining an export licence for the radio to be repaired. Felix also reported that Enno PA0ERA is trying to get permission to operate the club station in June this year. Enno will concentrate on 50MHz if plans come off (could be the first legal operation!).

Regarding 3V8BB, here is a reply from ARRL; "The 3V8BB licence is restricted. No WARC or 6 metres. Cards will not be accepted for 6 metres. 73, Bill K5FUV: DXCC Desk". Ah well there we go, work first worry later!

News has it that SU2MT has 50MHz equipment and at present is *not* permitted on 50MHz. However this may soon change as he is trying to get a permit for 10MHz and 50MHz. *Watch this space!*

Tom SP5XMU reports that approximately 120 6m permits have now been issued in Poland, with a possibility to rise towards 200 later this year. Many new stations have been worked from JO94.

A packet bulletin from SM7FJE sends the following recommendation: Rather than sending packet bulletins out

50MHz legal limit amplifier. there's a full construction article on the way for Ham Radio Today!

under 6m, 50MHz, 50Mc, Six, VHF etc, please try and stick to '50MHz or SIX'.

Beacon news

Kim OZ5IQ has confirmed that both Danish beacons are QRT: OZ7IGY has a feedthrough of milliwatts, but OZ6VHF is totally inoperational due to fire. It is hoped that OZ7IGY will resume full power by the summer, but OZ6VHF may not return for some time.

Pete VK3AMX reports that the P29 beacon is off the air and may not return until the end of the year. Pete will try to build another beacon and install it towards the end of 1996.

BV2FG's frequency has been confirmed as 50.001MHz and not 50.003MHz. This should be a good beacon to watch for as cycle 23 approaches.

Jimmy ZB2BL reports that the ZB2VHF 50.035MHz beacon is off the air. This is due to the unit having an overhaul and then it will be relocated at a new site: Jimmy will advise us when it comes back on air but may not be before the summer of this year.

The VK3RMV/SIX beacon has been reconfigured as follows. 50.0535MHz CW mode and with 15W to a nine element yagi at 37 metres above ground level (and not two nine element yagis as reported).

The TR0A beacon (in Gabon) has been installed on 50.047MHz. It runs 15W output and a five element beam looking north.

Jim KD4LP reports a new beacon on 50.067MHz. The call is KD4LP in EM-86 with 10W output to a vertical.

1996 transatlantic VHF warning system

As the main Sporadic 'E' season approaches, those of you with Internet connections maybe interested in a new innovation. If you log on to http://user.itl.net/~equinox you will see that in the first set of 'tables' a new block has appeared as 'ES' WARNING.

This houses an input form, to input data of a possible opening between the US and Europe. It is more than likely that the first inputs will come from the USA as they copy the 48.250MHz video from Europe. The form has a 60 second refresh rate, and, it takes under one minute to send a message to the USA or visa versa. I now have the Unix software and may well modify it for UK use.

Cycle 23

Steve, VK3OT issued the following by packet, which has also been reported by SM7AED, VK5LP and others. A total of three sunspot groups potentially belonging to cycle 23 have now been observed at

Learmounth Solar Observatory. The major significance of new cycle spots lies in their prediction value for solar minimum. Typically, minimum does not occur until at least 12 months following the appearance of the first spot group of the cycle. Details for the last three cycles are:
Cycle # 20; first spot, Sept 1963, minimum Oct 1964, Latency 13 months.
Cycle # 21; first spot, Nov 1974, minimum Jun 1976, Latency 19 months.
Cycle # 22; first spot, Mar 1985, minimum Sept 1986, Latency 16 months.

On the basis of past behaviour I would thus expect solar minimum to occur between June and December 1996, and the duration of cycle 22 to lie between 9.7 and 10.3 years. Steve reports an update: The regression model (SESC) of cycle 23 has been revised (don't they always). The curve has been steepened and will be one third of the way to the peak by the beginning of 1998. It will depart from the projected curve about midway through next year with an SSN expected to be approx 75. The SSN at present SSN is 20 so its going to go up quickly. This projection is a mean approximation.

Expedition news

Frank DL9YHR sent in information that he will be in Tunisia at the end of June with 144MHz equipment. He will be active on EME and via Sporadic 'E', meteor scatter, and satellite. Frank's equipment was due to be shipped into 3V8 in early February, and he is currently in touch with the club station 3V8BB. The news from ARRL regarding 3V8 for 144/432 is good news, and I can confirm that 144 and 432MHz are legal in Tunisia (see this month's HF Happenings also - Ed).

The Northern VHF Activity Group once again have planned an expedition in 1996 to Scotland. The operators will be G0NES, G7BXA, G7DKX and G7HSP. The expedition will take place between June 29th

to July 7th, and they have planned to use the following frequencies; 144.222MHz and 50.122MHz, plus operation on WAB and IOTA frequencies.

The areas to be covered will be; South Walls IO88KT ND38 ORK, Hoy, Flotta, South Ronaldsay, Burray, Lamb Holm, Glims Holm and Hunda. From July 3rd the areas covered (weather permitting) will be Orkney Mainland, Westray, Graemsay, Hld, Grn, Tys, Bds, Nld, and Lth. Possible operation could be on 432MHz if suitable equipment is found, and HF operation will use the callsign GM0NES/P.

Nordic meeting

The 1996 Nordic VHF/UHF/SHF meeting will be held on June 7-9 in Espoo, Finland. The resort of 'Nupurin Kartano' is located about 25km west of Helsinki at the beautiful lake of Nupurinjarvi. Indoor accommodation is available in 2-4 person rooms, campers and caravaners are welcome. The program will follow the traditional pattern starting with barbeque on Friday, followed by lectures, flea market, Ham dinner etc on Saturday. The meeting will be arranged by Radio Amateur Technical Society (RATS), OH2NXX. Mark the date in your calendar, if you are interested then contact Jukka OH6DD who is in the callbook or via Email at jsi@hut.fi

Coming soon

I've arranged with the Editor for a superb winter project to be lined up for you later this year in Ham Radio Today. A full legal 50MHz amplifier with PSU (see photo). Don't miss it!

Please send your news/views and photographs to: Geoff Brown, GJ4ICD,TV Shop, Belmont Rd, St Helier, Jersey. C.I. or fax them to 01534 877067 anytime. Email is also available at equinox@itl.net. You can also log on to my WWW pages at http://user.itl.net/~equinox where you will find a large collection of amateur radio information and the latest

DATA
connection

Chris Lorek G4HCL finds ex-PMR information is readily available on packet

If you're a Windows PC user, you may have read that V5.4 of the superb WinPack packet program from Roger G4IDE is now available. I'm using this myself right now for an auto-BBS session to download my mail as I'm typing this column.

Roger has made a number of small but very useful upgrades, and the program will now also work with BPQ Network Switch software running on your PC - useful for TNC card users. You'll be able to get a copy as usual from the distributor, Mike

G0OPC, by sending him a formatted 1.44Mb disk plus return SAE. All requests from the Ham Radio Today software service for this program, since early February (when V5.4 was first available) have, as always, been supplied with the latest version. But if you'd like a copy this month and don't wish to send a disk and SAE off, it's available as a service to readers for £1.00 totally inclusive of disk and UK p/p by requesting the 'WinPack' disk (see below for address), no 'corner flash' or coupon etc. required.

BayCom packet with Win95

Jon G7JJF tells me he is currently writing a multi-port AX25 driver, which should allow Windows 95 packet software to work with BayCom type modems. The driver is multi-port, and will support multiple KISS TNC's and a single BayCom modem (multiple soon) at the same time. It has built-in node and loopback ports for self connects to the node etc. The driver has a configurable number of virtual TNC's which have the familiar 'cmd:' prompt interface and support the usual command set. Jon tells me it is all experimental at the moment, but that it currently works fine on his P90 system. He'd like to know how reliable the BayCom side is when running under Win95 on different machine configurations, and has created a simple Win 95 TNC driver program which will allow Ham Radio Today readers to try out the AX25 driver. You can download this via the Internet from Jon's software support site; *http://ourworld.compuserve.com/homepages/jwelch* together with shareware versions of all of Jon's packet software which have been featured in the Ham Radio Today software collections. You can also contact Jon on packet with a message to G7JJF @ GB7MAM.#23.GBR.EU

If you don't have web facilities and you'd like to try this, or any of the G7JJF DOS software for use either with a standard TNC (TNCV142), a BayCom modem (MUBAY102), or BPQ (MUTNC205) then I've arranged these to all be available on a single 1.44Mb disk as a service to readers. Ordering details as usual (see past issues

of the magazine or call the 24hr info line 01703 263429 for more info); the cost is £1.00 fully inclusive of disk and return UK p/p to you, cheques payable to Mr. S. Lorek (not any other name or person) and requests sent to; *HRT Software Service, PO Box 400, Eastleigh, SO53 4ZF*, (overseas; Europe - three US $1.00 notes, airmail rest of world four US $1 notes), ask for the "G7JJF software collection from HRT May 96".

Transfer problems

I've read a number of packet messages from amateurs having problems with FBB compressed mail sessions, and YAPP (Yet Another Packet Protocol) transfers, with the latest Windows based packet programs. Here, it's important to understand that this system uses the 'full' 8-bit set of ASCII characters. If any of these are interpreted by your TNC as 'control' characters, or software flow control commands, they won't be passed successfully and you'll find a transfer error occurs. So, make sure you set your TNC and packet program to 8-bit data, and hardware (*not* software XON and XOFF) flow control.

Ex-PMR info on packet

I receive many, many messages each week asking about ex-PMR conversion information. I'm always glad to help if I can, but readers may like to know that the PMR User Group (UK) have a large amount of stored ex-PMR conversion information that's readily available on packet.

The group's database at GM7DUG.GB7AYR.#78.GBR.EU is continually increasing in size, and as I type this it has around 270 files on PMR equipment. There's recently been an alteration in the directory

G7JJF software available online

Fed up with virtual realty games? Then visit virtual radio rally!

structure due to the amount of data files in different sub-directories, the old PMR-MODS <DIR> has been altered to the PMR <DIR> and a few of the sub-directories removed. You can get further information and details on how to automatically request lists, files, etc from Steve GM7DUG @ GM7DUG.GB7AYR.#78. GBR.EU

Steve is also putting together a list of people who have circuits and alignment details for various ex-PMR radios etc. with a view to coordinating a 'help' service with photocopies etc. He'd undoubtedly like some feedback from you, so drop him a packet if you feel you may be able to help.

Hampshire TCP/IP gateway

If you're interested in trying TCP/IP but currently only have 'normal' AX25 packet facilities, then the gateway run by Andy G7EYV@G7EYV.AMPR.ORG could be of interest to you. Andy tells me he set up the gateway [44.131.17.124/247/248] so that amateurs could try TCP/IP, and if they liked it then they had someone at hand to ask for help. It's become so popular that the HIPUG (Hampshire IP Users Group) has been formed, who try and assist all their

newcomers with the software and the hardware involved.

Andy's gateway system, G7EYV-8, consists of 4 ports run under multidrop BPQ, one of which is set for TCP/IP only and allows telneting to GB7HIP, which is a full TCP/IP BBS and hub, run by Steve G7PEW. The gateway has AX25 ports on 433.675 MHz (port 2) and 144.650 MHz (port 3). It then allows users to automatically change from AX25 to datagram mode (which is what TCP/IP uses) by connecting to G7EYV's PMS, this link then allows users to operate as if they were truly TCP/IP from his system. Likewise TCP/IP users can telnet to G7EYV, and connect to his BPQ AX25 node via the internal link between the programs, thus allowing them use of AX25 as if they were on it.

At this moment, Andy is supporting three BBS's with linking and is looking at a possible site for converse links to Kent. From the gateway it's possible to connect to GB7HJP and GB7XJZ (both AX25), and also GB7HIP (TCP/IP) with simple connect commands. There are currently 56 registered users of Andy's gateway system.

TCP/IP PMS's and BBS's all use a low level password system, so when a user logs on he will give a login call (his callsign) then a password (his name e.g. JIM), thus allowing him to enter the system. Once in, the

'ftpusers' file is scanned and his 'permissions' sought. This is a value e.g. 59 which allows him to read a file, write a file, telnet, FTP a program, join the converse server (a chat system for all to join in on a 'net') and generally use the entire BBS and its facilities.

The founder members of HIPUG are G7PEW, G7EYV, G0SMB and G7OAH, who say that new members to the group are more than welcome. Any any questions can be directed to these callsigns by leaving a message at GB7HIP.

Virtual radio rally

Many of us like bargain-hunting around radio rallies, and I suppose the following just had to come! Yes, we've had electronic shopping for a while with 'virtual stores', online, accessible from your computer via a modem. We now have a 'virtual radio rally'! Information from the organiser, Mark G8HLC, says that it's open 24 hours a day, with free entrance. You'll find talk-in at *http://www.ukinternet.com/ham*

Unusual node problem

Here's something I read the other day from John GM0OPS, which describes the efforts some node SysOps have to go through to keep our network running;

"When we arrived at the site to inspect the node which had went off the air the night before we found that power LED was off. We checked the mains supply it was still on, checked the fuse not a problem, so we took the node out and opened it up. Phew!!!!!! What a stink! Arg! The other chap said. What had happened? Had the node blown up and melted the chips? *No.* A couple of mice had decided to make a home in the nice warm node and even had a section marked out in their new detached home for a toilet, yep you guessed it they did it all over the TNC. The board was removed, washed and it was also cleaned using ultrasound cleaning process. The board is now back in use. The morale is don't leave holes in your node cases."

Dayton PacTOR forum

If you'll be at the Dayton Hamvention in Ohio next month, then on Saturday May 18th between 12:45pm and 2:45pm Eastern time you'll find the PacTOR forum in meeting room No. 5 at the Hara Arena. Currently scheduled to speak are Gwyn Reedy from PacComm, Rod Proctor from AEA, Phil Sussman, KB8LUJ from PacTOR News, and Dr. Tom Rink, DL2FAK, who will host a 'question and answer' session on recent packet to PacTOR protocol developments as well as to answer questions from the audience. There will also be an 'open forum' at the event. You can get further information from KB8LUJ @KB8LUJ.#DAY.OH.USA.NOAM, or by post: P.O. Box 31 - Clayton, Ohio 45315 USA (remember to enclose sufficient IRCs for reply), or via Email: pactor@dnaco.net

Commodore and Spectrum packet

An email message I read said that Mike G7EUL has seen BayCom running on a PC, and asks for information on running this on a Commodore 64, particularly with the use of a ROM cartridge.

The good news here is that J&P Electronics in Kidderminster offer such a system, which I've mentioned in earlier columns. They also offer a packet system for the Spectrum if a microdrive is fitted. J&P can be contacted directly on 01562 753893.

CTRL-Z, end of message

That's it for this month. As always, please do let me know what you're up to in the ham radio data communication side of things, or indeed what your local group are doing. Likewise if you'd like a specific topic covered in this column, or a question you'd like to ask, just get in touch and I'll try and help. You can contact me either direct via packet, or via post, fax or email c/o the Ham Radio Today Editor. Until next month, 73 from Chris G4HCL @ GB7XJZ.#48.GBR.EU

Satellite rendezvous

Richard Limebear G3RWL shows that Oscar 10 is still alive in this month's AMSAT-UK news

Some people have been wondering if AO-10 is dead because they could not hear it. AO-10 appears to have bad solar panel angles at present. Because command was lost when the computer memory failed several years ago, it is not possible to alter the attitude of the spacecraft so that the solar panels receive maximum sunlight.

Consequently there are times when the sun is above or below AO-10 (or, in fact, anywhere except in sight of the sides). At these times, the satellite switches off because of low voltage. When the voltage is low, but not too low, some instability can be heard on transponded signals; most people describe this as "signals are FM'ing". Once the sun shines on the solar panels again, AO-10 returns to life. Indications are that AO-10 could carry on in this way for several more years. These eclipses (of the solar panels by the spacecraft body, not by the Earth) happen twice in the yearly cycle, so listeners can expect AO-10 to return to better health around the time you read this. Similar effects can be expected in six months time.

There is another occasion when listeners may not hear AO-10. The computer sometimes tries to run from the corrupt memory, and erratic commands might then be sent to the different modules on-board. It is possible that the beacon or transponder may be commanded *off* in this way, and then the only way to see if the transponder is working is to try sending a signal through it. The only control that the command station can do is to send a computer-reset command, which restores Mode-B *on* and beacon *on* with omnidirectional aerials.

When AO-10 is properly illuminated, the transponder works well, but many stations don't use it because of the unreliability discussed above. As a result of this the transponder is only lightly used and good QSO's can be had.

Oscar 13

Around the first quarter of 1996 Oscar 13's perigee height will be such that atmospheric drag will start to cause apogee height to reduce, tending to circularise the orbit, so predictions will begin to diverge considerably from reality. The burn-up is expected in the last quarter of 1996 (see Table 1).

Russian Satellites

A couple of months ago I made mention that the Russians were in financial trouble, and then had to retract it the following month. In fact the only problems in FSU were caused by internal politics rather than cash; they still had a wish-list, however, and recently one of these wishes was fulfilled when a laptop computer for launch-site operations was successfully delivered to UA3CR. This was donated by G3AAJ (thanks Ron!) Work continues among the AMSATs to fill some of the other requirements.

Pat G3IOR reported about RS-15 eclipse periods which finished about 23 January (until the next eclipse season).The transmitter was only on for about one second in ten. Pat has received information from the Russians that they are aware of the problem; it is because the solar panels and battery were fairly old (rather than new) when procured for the project.

The cosmonauts on Mir have unpacked their new equipment and are expected to place it on the air shortly. The new equipment includes a 70 cm FM transceiver along with some 9600 baud packet radio equipment. Apparently the power supply used for some of the amateur radio equipment on Mir has failed. An old power supply was installed, but it is only capable of handling the old Icom transceiver and one TNC. The Digital Voice Module has also failed, so there will be no more automatic voice recordings in the near future. All four fuses in the two connected transceivers blew, and only two spare fuses are left to run the Icom rig.

I'll mention later about the next Shuttle/Mir flight, which takes place a few days after the docking of the new Priroda module. During this mission Astronauts will make an EVA to work outside the complex. Also one of the American astronauts, Shannon Lucid will be added to the Mir crew and return to earth by Atlantis during the docking mission in August.

Microsats

There was a problem with KO-23 at the beginning of January with many stations reporting poor data quality. This appears to have been one of those times when several factors combine to make life difficult. The Koreans said they

Date	Orbit	Hperi	EC	INCL	ArgP	RAAN
Apr 14	6000	322.3678	0.7403	57.2392	36.8860	123.4535
Jun 01	6100	289.5279	0.7416	57.2186	41.0400	113.8575
Jul 19	6200	215.6571	0.7445	57.2790	45.3100	104.2525
Sep 05	6300	168.2873	0.7464	57.1382	49.8205	94.2223
Oct 22	6400	137.9038	0.7476	57.0235	54.3602	84.0321
Dec 09	6500	72.4282	0.7501	57.0592	58.8067	73.9416

Table 1 Oscar 13 predictions

believed the TX efficiency had gone down because of the present orbit configuration. At that time there were no eclipse periods and this heated up the satellite, resulting in a degradation in efficiency. At the same time some major propagation anomalies appeared, which conspired to make matters worse.

It should be noted that, according to information published at the time of launch, radiation was expected to be the deciding factor in determining KO-23's life. According to that information KO-23 may only be serviceable for another year or so.

The Koreans also had some problems with KO-25 which now seem to have been resolved. The OBC crashed at the end of last year and they spent a long time testing the system. The BBS is now open again, using the 145.980MHz uplink.

Dove also crashed, came back, and then crashed again over the Christmas period. They are investigating a possible hardware problem.

Short Bursts

The next Japanese amateur satellite is apparently scheduled for launch in August or September. According to a ESA/CNES joint press release, the second and final qualification test on the cryogenic main stage of the Ariane-5 launcher was carried out in Kourou at the beginning of January. This successful operation, lasting 9 minutes 53 seconds, completes the series of hot tests carried out on the ground on the Ariane-5 launcher's propulsion units. This has cleared the way for confirmation of 21 February as the starting date for the first Ariane-5 launch campaign, with 7 May as the target for the launch itself (flight 501).

UoS news: probably the Thai microsatellite (TMSAT) will not carry any amateur radio equipment, but an amateur radio transponder for the minisatellite (UoSAT-12) is being discussed; expect further news in a few months.

AMSAT-NA has already

received a number of 'Best Fist' nominations from the 24th annual Straight Key Night on OSCAR, held 1st January. If you participated and haven't yet nominated someone you worked for 'Best Fist' honours, please let them know soon. Nominations should be addressed as follows: via Internet, to w2rs@amsat.org; via packet radio, to W2RS @ GB7HSN.#32.GBR.EU or W2RS @ WA2SNA.NJ.USA.NA, whichever is closer to you; or via 'snail-mail' to W2RS' Callbook address. Thanks to all who participated.

The 1996 AMSAT-NA Symposium is scheduled for November 8 -10 in Tucson, Arizona. Plans for the meeting are proceeding on schedule with a planned tour of the radio telescopes at nearby Kitt Peak. Would anybody care to place bets on the launch date for Phase 3-D?

We sadly report the passing of John W. Browning, W6SP, who died on January 3rd. John was Chairman of the

Board of AMSAT-NA in 1982 and led the organization in the period when the first Phase 3 satellites were being developed. We also hear that Nick Marshall, W6OLO, president of Project OSCAR has also passed away.

AMSAT-UK news

This year's Colloquium is booked for 25th to 28th July 1996. It has been decided that the first day, i.e. Thursday, will be dedicated to administrative (political) affairs with the other days being used for all other subjects. The price will be the same as 1995. There will be a barbecue on the Friday night. We are starting to organise the events for this year and Fred, G6ZRU, or myself would be grateful for any suggestions for subjects to be covered. An official 'Call for Papers' will be going out soon.

For further information about AMSAT-UK contact: AMSAT-UK, c/o Ron Broadbent MBE, G3AAJ, 94 Herongate Rd., London. E12

5EQ. A large SAE gets you membership info. SWL's are welcome. All new joiners get the USAT-P tracking program on 5¹/₄in disk. G3RWL can be reached via Internet as g3rwl@amsat.org.

Latest Keplers

AMSAT-UK Keplers are put out on packet fortnightly, sent to *KEPLER @ GBR*. The latest satellite Keplers as supplied by AMSAT-UK are also available by automatic fax retrieval from the 24hr Ham Radio Today fax-back line, 01703 263429 *(use with a personal DTMF, i.e. 'touch-tone', phone/fax keypad - follow the voice menu)*, request fax document 24 from the satellite menu for this month's. You can also get a copy in the post by sending an SAE together with the corner flash from this page to the Ham Radio Today Editor, marking your envelope 'Keplers' and stating whether you want *all amateur satellites* (one A4 page) or *all satellites* (10-15 A4 pages).