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FAIRHAVEN RD500 Radio Database Receiver Owner's Manual

Contents

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INFORMATION

John Wilson has been longing to get his hands on the new Fairhaven RDS00 receiver to see just how it stacks up against the opposition.

have sat in front of many receivers in my long career in h.f. communications, particularly in the last. two years, and can now reflect a little on what I have seen and experienced. When I pushed through my original decision to manufacture a shore wave receiver – the HF-125 – in the UK, I based my insistence on a belief that the Brits are pretty inventive people and can take imaginative steps in directions of design which startle and surprise other nations. I also like to think that this first receiver lit a small fire in the bellies of British designers. Perhaps the appearance of new British designed and built receivers, such as the AR7030, the AKD Target HF-3 and now the Fairhaven RD500, is partly the result of my arguments against the "If we want another receiver we'll have it designed and made in the Far East" syndrome. The four receivers I have mentioned so far represent the thoughts and ideas of individual designers, and illustrate quite well that there are many different opinions about what constitutes a good design and what should be the overall 'package' of features and facilities offered to the end user. These designs are the antithesis of the 'Corporate' approach, where the marketing men analyse competitors' products and build a paper design in committee. The result of the corporate decision making is that many designs produced by this process all appear to be the same … just like the politics of the centre, or the current crop of cars on the road – can you really tell the difference between a BMW, Nissan, Ford or General Motors product when you see them from a rear three quarter view? The point of this philosophical introduction is to prepare you for my review of a very interesting receiver; so individual that the designer calls it a 'radio database', rather than a 'radio receiver'.

Cunning Plan

When I received the Fairhaven RD500 and unpacked it my first impression was "It's a v:h.[scanner" because the receiver front panel seemed full of multi-titled push buttons, After the utterly simple front panel appearance of other receivers I had recently sampled, the RD500 looked over populated, but as I began to use the facilities offered I realised that here was a designer making his own statement about what a receiver should do, and I can now appreciate his thinking. I have a theory that the editorial staff at Short Wave MagaZine have a cunning plan (to quote Baldric) to test my ability and patience by removing the handbooks from any equipment that they send to me for review. Certainly the RD500 was no exception to this rule because once again I was cast upon an open ocean without a paddle, but I found that using the RD500 became very easy in a relatively short time. and by the time a replacement handbook had arrived on my doormat I no longer needed it apart from checking details of the memory functions (and was I surprised!). The receiver itself is quite small (205 (w) x 65 (h) x 193mm {d)) and weighs only 600g. It is finished in the inevitable black and constructed as a front and back panel mounted on side rails which carry separate top and bottom covers. Inside the receiver is a single horizontal board occupying the underside of the side rails, with obvious provision for another board to fit in the top position of the side rails which makes me wonder what accessory facilities are to be provided in the future . Just visible behind the front panel are three vertical boards carrying all the control processors, the display drivers and a huge amount of computer memory. I'll mention this in greater detail further down the review.

Busy Look

As I have said, the front panel looks busy, having no less than 22 keys, three rotary controls for Volume, Filter and Squelch, a headphone jack and a main tuning knob as well as the main display panel. The rear panel is equally well populated with two 50-239 antenna sockets and a three position s,itch to select antenna functions, the power input socket, external loudspeaker jack, a pair of gold plated phono sockets for left and right stereo output and two 7-pin DIN sockets, one for cassette control and the other serving a dual function as keyboard connector and RS-232 input/output. Don't you by now get the feeling that there is more to the RD500 than was at first apparent? Let's use the RD500 as a straightforward receiver. Switch on using the squelch control – ha,ing of course connected the 12Vd.c. supply from the power unit which is pro,1.ded with the receiver – and you can begin tuning around. The full frequenty coverage is 40kHz to 40MHz and the reception modes pr0\1.ded are l.s.b., u.s.b., a.m., c.w., n.b.f.m. and Synchronous a.m. Very comprehensive, but there is again more to this than meets the eye because you can select the c.w. mode to operate with a shift above or below the centre frequency, and this can be a big advantage in rejecting adjacent signals when using the mode; also, the synchronous a.m. system allows you to select upper or lower sidebands as well as both sidebands as the occasion demands.
As I investigated each mode I found other facilities which demonstrated the designer's clear intention to put as many operating features as possible into the radio, such as the provision of pseudo stereo c.w. reception. Now for

those of you who don't listen to c.w. this may not be of overwhelming importance, but what happens is that a stereo image is constructed \\1th low frequencies on one side of your head and high frequencies on the other, with all the panoply of signals spread across the vinual sound stage. Not a new idea, but it's the first time I've encountered it in a receiver and it works very well – you do of course need stereo headphones, but who has anyrhing else these days? Havel said too much about c.w.? Then what about tuning the RD500?

Tuning

The main tuning control is positioned at the right hand edge of the panel which is line for right handed operators but a mite awkward for others. The knob spins smoothly without too much drag, and the usual 'speed up' operates unobtrusively in all modes. Basic tuning steps are 5Hz in s.s.b., c.w. and Sync. a.m., changing to lO0Hz in normal a.m. mode, and these represent ideal tuning rates in practice. However, a range of other tuning rates is provided using the 'Step' facility, and with a simple button press you can have 1, '5, 9, 10, 12.5, 25 and S0kHz seep sizes. This comprehensive selection seems to cover any tuning increment an operator could wish for, and includes the important (for Europe) 9kHz step for Medium \\.'ave listening. But the RDS00 has more; with another single button press you can move a cursor underneath the frequency display and select tuning rates from l0Hz co 1 :v!Hz as you step the cursor along. Note char these functions are available at the press of a button and are therefore very easy to use. Below the frequen91 display is the signal strength meter, which appears as a horizontal row of segments behind a printed legend numbered 3, 5, 7,9, and then + 10. 30 and 50dB. The calibration of the meter as far as one could read it was good, and is based on 6dB per s• point, or in this case 12dB per numbered segment. However, before going on to the more general performance of the receiver, let me describe some of the facilities available from the from panel keypad. Anyone who has used a calculator, FAX machine or video recorder will be familiar with the concept of doubling or tripling the functions of a press button by providing a 'second function' key. In the RD500 the primary keypad functions are alpha-numeric covering 1 to 0 and A to Z (boch upper and lower case). the decimal point, scan, cancel and enter. The second functions are extensive and interesting, so read the next section with care. I can't list every second function because that would mean reproducing the operating manual, but here are the most significant: Shift '.AUX' brings up an auxiliary function screen covering r.[attenuator (single 20dB step); cassette recorder control via the external recorder socket, and which S\vitches on the recorder whenever the squelch opens; insertion of an audio low pass filter; a.v.c. {nice to see the term a.v.c. rather than a.g.c.) which adds audio derived a.v.c. co rhe r.f-derived control when using synchronous a.m.; and a simply labelled '.AUX' function which brings in a high impedance preamplifier on the second antenna input for use wfth a shon whip or wire. So what? Many receivers have a high impedance input preamplifier, but the RD500 designer has made the two antenna inputs combine in anti-phase, and by using the '.AUX' function you can thus create an antenna nulling system co cancel out local interference. All you need is a l0kll pot, or Fairhaven can provide a nulling box already made up. This is a very elegant facility and demonstrates the work.of an inventive mind in the designer. And if chis is not enough, a final function on this first button reserves memory space for recording. Recording? Well, believe it or noc, the RDS00 incorporates a digital recording and playback system which can run all the time in the background and store the preceding few minutes of audio on the signal to which you are listening. This means that you can go back if you missed something, and there it is carefully preserved for you. Brilliant feature accessed at any time the receiver is in use by the Shift 'REC/PB' key. Shift 'BPFILT' introduces you to six different functions relating to c.w. filtering and a selection of filter characteristics all of which work well, but the c.w. stereo function I mentioned earlier is outstanding. Switching between com·entional filtering and the stereo filter is quire an experience, and I'm completely hooked. How can I ever listen co c.w. again without the stereo facility? Shift 'VFILT' gives you a notch and peak filter, both tuneable by the centre knob on the front panel labelled 'Filter'. Both notch and peak filters introduce a 'phaser' type of noise which is typical of this type of filter and sounds as though you are listening at one end of a long drainpipe. However, although not as outstanding as the c.w. stereo filter, they work passably well, with the peak seemingly more effective than the notch, and they are available in all reception modes, not just c.w. Shift ½.GC' (why a.g.c. this time and not a.v.c.?) allows you co select three a.g.c. speeds and tie them co each mode so that, for example, if you have chosen slow a.g.c. and a.m. mode, that speed will be called up each time you subsequently use a.m., although you can change the relationship at any time by using the Shift i\GC' function. This is a very flexible arrangement and a well thought out feature. Shift 'NB' lets you switch an i.f. derived noise blanker on and off, whilst Shift 'PBS' brings up a pass band shift system, the use of which I have covered in many other miews. Whilst this works quite well in the RD500, it is nor a fully variable shift, having fixed steps of 200, 600H, 1100 and l 700Hz up and down in frequency relative co the centre of the i.f. and lacks the 'fine rune' effectiveness of a fully variable control – but it's a useful thing to have included in the overall specification. The remaining second functions include 'VFO' which gives access to 26 (A to Z) scores, each containing frequency, mode, auxiliary settings and a 20 character text string. These are intended to be used as a 'notepad' facility for quick access to favourite

frequencies or bands: 'CLK' which accesses a very comprehensive clock and timer setup including local and time zone information, time and date format (yes, date is included), and five timers with four having a one-year look ahead for controlling both the receh·er and external cassette recorder, and the fifth being a sleep timer which will switch the receiver off after a preset rime.

The 'button-bristling' infra red remote control unit - about which nothing is said in the handbook!

Future Upgrades

More facilities are being planned for the future, and these will be included in firmware upgraqes from time to time (another weak pun). Shift 'COMM$' takes you into a control menu for the serial RS-232 link between the RD500 and a computer, and-enables transfer of data in both directions so that you can, if you wish, download complete databases of information from the computer or upload from the receiver to the computer. Powerful stuff this, but simply executed and easily understood. Shift 'SCAN'. This opens up a full range of frequency and memory scanning facilities, and although lacking the ultimate scanning requirement for an h.f. receiver, that of having the squelch setting st0red uniquely in each memory, the RD500 provides everything else. by the user, and auco tune in which the receiver automatically tracks drifting signals to ensure accurate iuning, and displays a centre zero tuning meter in place of the 'S' merer on the main display to show the auto tune in action. Finally the priority frequency can be enabled so that the receiver automatically checks this at intervals during scanning. The actual priority frequency and mode are set by the user using another function (Shift 'PRIO'). Mode selection is via a single button, which brings up a numbered screen display showing all the modes available – "USB", "LSB". "C\VL' (c.w. on l.s.b.), "CWU" (obvious), •NFM" (narrow band f.m.), "ASD", 'i\SL', "ASU", covering all the options for synchronous a.m.), "AMW" and •N" (\\ide and narrow filtered a.m.). Listening in all modes produced pleasant

results, although the lock range for the synchronous a.m. detector is narrower than on other comparable receivers. However, the RD500 never lost synchronous lock whilst I was using it, and the ability to switch modes at the push of a button made it easy to check which a.m. mode was producing the best audible results.

Radio Database

And so to the memory system, which requires a review article co itself. The storage capability of the RD500 is huge, which is why the receiver is called a 'Radio Database'. I mentioned earlier that there are 26 'v.f.o.' stores for instant access to favourite frequencies, but there are also 99 band setups which can be programmed by the user to store band start and end frequencies, tuning step size, reception mode and a 20-character text string to identify the band – for example you can programme a band ro start at 3.5MHz, end at 3.8MHz, tune in l0Hz steps in lower sideband mode and show a text message saying "80 metre amateur band". When you press the 'BAND' button the band number is displayed cogerher ,vith the start frequency, mode and text identifier. You can then tune around using the normal tuning knob within the band edge limits, and the receiver will 'roll over' at each band edge to start again. Selection of the band in use can be done either by entering the band number using the keypad, or the easier method of using the UP/DOWN buttons above the tuning knob. This 'Instant' access to any band you choose to put into the system is an excellent feature and well engineered. But the real power comes into play when you start to use the database: The RDS00 comes with 512Kb of database which can be expanded to 2Mb. Some of this is used by the digital recording system but the remaining memory can store 13290 channels with 512Kb or 54681 channels with the 2Mb extension. You didn't read that incorrectly, that's fifty four thousand channels. Whilst this may seem totally silly, just think of the possibility of having an entire Kli11ge11f11ss Guide (or even a Fm-ell's Confidential Frequency List Ed.) at your fingertips scored within your receiver – quite a thought. Of course, any memory system has to be capable of being accessed sensibly, and this is why the memories have been arranged in groups so that you could store all frequencies of common interest within a group, and label the group with a text string. When I received the RD500 I found that group Al was designated "LW /MW Broadcast" and the display told me that there were 33 entries already in it. By using the main tuning knob I could step through the entries, with each one coming up with frequency, mode and a text identifier such as "BBC Radio 4", or "Denmark Radio 1" and so on. By pressing the 'GROUP' button and using the tuning knob I could step through the groups, with each group title appealing as I turned. \\'hen a group of interest came along, such as "Misc. Com ms." all I had to do was press 'ENTER' and I was then back to using the tuning knob to scan the frequencies within the group. And talking of scanning, I could also use the scan facility to scan all the recorded channels in the group for activity. All this is very well organised and carefully arranged 10 be easy to use, and I enjoyed it immensely. Using the database as a 'lookup' is also easy, because you can ask the RD500 to search the memory titles for words, such as "BBC' or "USAF" or "France· and so on, using the alpha numeric keypad to enter the text you wish to find. Having found matching emrtes, you can look at them and select the one you wish to use, or you can transfer them from one group to another to build up new groups. In addition to all this, you can down load the entire memory contents to a computer using the RS-232 facility, or construct a database on a computer and up load the lot into the RD500. It doesn't end here either, because the RD500 comes complete with a package of floppy disks containing data base software and a ready constructed database. Installing this into my computer took only a few seconds and I then had an easy to use Windows data base in from which I could select and use the RD500. The whole memor y/database system has been carefully thought out and developed, and there are still facilities I'm sure I didn't investigate fully. In the owner's handbook the descliption of the radio receiver side of the RD500 occupies but one paragraph, which maybe shows the designer's thoughts on the

relative importance of the Database compared to the Receiver.

Performance

But at £799 it still has to perform as an h.f. receiver, so I ran it through my usual r.f. performance tests. How did it do? Surprisingly well, with a noise floor of -12 ldBm and an s.s.b. sensitivity of -11 ldBm (0.7μV p.d.). The synthesiser was quiet, with a decent reciprocal mixing performance as shown in Tobie 1. This is very similar to the Drake SW 2 and somewhat better than theJRC NRD-345, so it's not bad at all. When I came to measure the 3rd order intercept point I came across a curtous anomaly using the standard 20kHz spacing for the rwo input frequencies. The RD500 handbook quotes an intercept point of + l0dBm, which is about the limit of performance of the Plessey first mixer used in this recei\'er. However, my fust measurements came up with -3.SdBm which was a long way (13.SdB) down on the specification. I then took measurements at 50kHz and lO0kHz and got + 9.5dBm which was nearer the mark, and it was not until I checked both (2Fl-F2) and (2F2-Fl) products that I realised that the first i.f. filter at 45MHz was not sirring symmetrically across the receiver passband and it was the second mixer which was generating the poor intermod performance. In other receivers I have tested, the second mixer device was often the same as the first mixer, thus ensurtng that signals getting through the first i.f. filter did not generate higher intermod levels in the second mixer, and this should be addressed by Fairhaven, because it compromises the receiver's performance in the presence of close by strong signals such as those found in short wave broadcast bands. Don't get me

Tong, this is a better result than at least one recently tested receiver gave, so keep this in mind when mentally evaluating the RD500, but at the same time, there is a receiver in the same price range as the RD500 which provides a remarkable + 2 ?dBm intercept point at the same signal spacing.

Final impressions

The RD500 is a different and very individualistic receiver which demonstrates the thoughts of a designer who has chosen a new path and knows where he is going. Within a small box he has built a receiver with most of the operating functions and facilities anyone could demand, but in the 'Database' concept he has clearly developed an approach which I think has great melit, and as Fairhaven progress it will be most interesting to see what.comes next. The handbook needs some serious attention as there are significant gaps in the information it contains Gust what is the function of those gold plated stereo phono sockets on the rear panel?), but the r.f. performance is better than the front panel would suggest and the inclusion of neat ideas such as the use of the second antenna input as a noise cancelling system and the inclusion of a digital audio recorder shows real initiative. Well done the Brits, and well done Fairhaven.

Post Script

And just as a final taster, the RDS00 comes complete with a button bristling infra red controller, which seems to do everything one could do from the front panel, but about which the handbook says absolutely nothing!
The Fairhaven RD500 retails at L799 inc.
P&P direct from the manufacturer Fairhaven Electronics Ltd.,
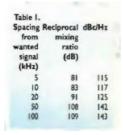47 Dale Road,
Spondon,
Derby DE21 7DG.

Tel: (01332) 670707.

We have also been informed, just as we went to press, that Waters & Stanton, 22 Main road, Hockley, Essex 555 4QS

Tel: (01702) 206835 have just been appointed as a Fairhaven dealer in the UK

Table I.

Spacing from wanted signal (kHz)	Reciprocal mixing ratio (dB)	dBc/Hz
5	81	115
10	83	117
20	91	125
50	108	142
100	109	143

Documents / Resources

The Fairhaven RD500 Radio Database	**FAIRHAVEN RD500 Radio Database Receiver** [pdf] Owner's Manual RD500, Radio Database Receiver, RD500 Radio Database Receiver, Database Receiver, Receiver