Optimising The iriver[1] H100 And H300 Series DAP for Recording DX

© Bjarne Mjelde
July 2007
www.kongsfjord.no

Introduction

I've been using the iriver H120/iHP120[2] and H320 for some time, with good results. These are old digital audio players (DAPs), introduced in 2003 and 2004 respectively. Definately stone age in the world of DAPs. But they, and especially the H320, provide good user interface, recording capability with a dedicated line-in connection and even a line-out, rarely if ever seen on today's DAPs. They use Toshiba 1.8" 20GB single-platter hard drives; the otherwise identical H140 and H340 have 40GB dual-platter storage.

Both are UMS devices; they are recognised by Windows as external drives which makes file transfer very easy – and exceptionally fast using USB 2.0. Well, not all. H320s sold in North America were in fact not UMS. They had a built in DRM key, which made them capable of playing WMA DRM protected music, but at the cost of not being fully UMS. The correct firmware will enable them for UMS though.

Both series were supplied with a wired remote control as an option. The remote has a small LCD and a subset of the main controls – much like the Sony portable MD players.

The older H100 series has a 160x128 pixels greyscale display, while the H300 series uses a 220x176 pixels 18-bit colour display.

I've recorded a few GB of DX to these devices, and never been let down. But they have room for improvement.

Noisy chargers

The chargers supplied with the H120 and H320 are small, switching devices with 5VDC output. And they are noisy. You will not want to DX with the original charger connected. You can of course run the recorders on battery, but recording will drain even a new battery in 12-15 hours, and if DX is hot you will enevitably reach a point where you want to record but the recorders will not. So I bought stabilised power supplies for them instead. Mine are multi-voltage and I have used both 4.5VDC and 6VDC without problems. And they are not noisy.

H100-series has poorly designed joystick

The designers obviously didn't want to add "unnecessary" height to the player so the joystick is quite flat, and unfortunately not very easy to manouver. I found transparent, self-adhesive rubber/silicone feet on Swedish ELFA, 7 mm diameter, 3 mm high. I fastened one "foot" on top of the joystick and that improved the joystick operation a lot. The top of the joystick is dented so you can't use the glue on the back of the rubber foot but have to apply some glue. Both the H300 series and the H100 series have even backsides, so I put four rubber feet to all my players. This is quite useful as they give a lot more friction when the players are put on a table, and they will not slip easily (like they used to). The overall height of the H120 is increased by some 6 mm which may, or may not be of importance.

---

1 Yes. That is how they write it nowadays. All lowercase. Used to be iRiver.
2 H120 is the later model. It was introduced as the iHP120 but rumours have it that Hewlett-Packard didn't like that.

Worn-out batteries

With old devices like this, there is a fair chance that the internal battery is either dead, close to death, or will be in the near future. Exchanging batteries is supposed to be done at an iriver service centre, but it's not too difficult if one is patient and careful. Here are links to two descriptions on how to do it:

Replacement of the H110/120/140 - iHP110/120/140 battery:

Replacement of the H320/340 battery:

There is a chance that H100-series recorders with Rockbox firmware won't light the display after changing the battery. If so, power up the recorder with iriver firmware and see that it lights, shut down and power up with Rockbox. It should work then (see last paragraph under "Rockbox" for more details). Also note that in order to disassemble your H100-series recorder you need a torx T5 screwdriver. It's quite a bit more difficult to remove and insert the connector into the socket on the main PCB. Patience is imperative.

So where do we buy batteries? The links above discuss that topic as well. I bought my replacements from a US web shop, and they are higher capacity (1700 mAh) than the original batteries (1300 mAh). I've heard of capacities up to 2300 mAh. The choice is yours.

If you're on an AC-less DX-pedition you may want to have battery back-ups – not in the form of internal batteries but battery packs in which you can place 4 alkaline or rechargeable AA batteries which can be connected to the DC-in connector. I've seen boxes like that on eBay and I bought one although I haven't had use for it yet.

But what happens if the battery goes flat while recording? Don't worry, the recording will be saved before the recorder powers down.

Hard drives

Single-platter 20GB drives can be replaced with single-platter 20 or 30GB drives, and dual-platter 40GB drives (H140/H340) can be replaced with dual-platter 40 or 60GB drives. Dual-platter drives are thicker than single-platter drives and won't fit in the enclosure of an H120 or H320. The 1.8" Toshiba drives are rather more costly than equal-capacity 2.5" and 3.5" drives though, so I'm not sure it's a good idea to upgrade unless your HDD is broken and you definately want to replace it. I've seen 20GB drives on eBay for around USD 50. Please observe that the Toshiba pin-out is differerent from other manufacturers (such as Hitachi), and you can't interchange them. Avoid so-called "ZIF" connectors. iPod HDDs will not fit.

Firmware

Updating the iriver firmware is a painless process that I won't describe in detail here. Iriver has update sites for the H100-series here, and for the H300-series here. In case iriver has ceased supporting these recorders when you read this, you can download the H100 series and H300 series firmware here. The latest H100-series firmware was released in 2005 and is Version 1.66 and ditto for the H300-series is 1.30 (North American version is 1.04). I recommend that you upgrade to the latest firmware if you use these DAPs for recording purposes. And I recommend that anyone using North American H300-series players change into an international firmware (European, Korean or Japanese. If you want the freedom to destroy your hearing, don't choose the European version since it has volume restrictions. Believe me; the EU version plays loud enough!).

Limitations

But there are limitations to the original firmware. The H100/H300 series will only let you record in

MP3 format, and the lowest bitrate is 48 kbps while many prefer lower bitrates, down to 16 kbps (personally I don't see the point but to each his own). A single recording session has a maximum length of 5 hours, so you can't monitor a frequency over a long period of time, say overnight or over the weekend. You can't change line-in levels while recording. And how often haven't you been caught off-heals when a station IDs with the recorder in Pause mode? Well there is a way to make these recorders better.

Rockbox
Rockbox is an open source replacement firmware for DAPs. It runs on a number of different models, including the iriver H100/H300 series. The DX-er will benefit from:
- MP3 recordings with bitrates from 16 to 392 kbps.
- WAV recordings. Yes, WAV recordings take up a lot of space, but it's easier to run noise reduction algorithms in programs like Adobe Audition etc on uncompressed files. And if you limit the bandwidth to 11025 Hz the size isn't really that bad.
- Running long recording sessions, and auto-splitting them into manageable sizes by time or file size. Maximum file size is 2 GB.
- Greater variety of AGC settings.
- Changing line-in levels while recording.
- Date/timestamped filenames (applies only to the H300-series; the H100-series does not have a built-in clock) – the syntax is yymmdd-hhmmss.

And maybe the most valueable of all – the prerecording buffer. Up to 29 seconds of audio will be buffered when you set the recorder to idle. You should never again lose a station ID because you hit the Rec button too late. I first found this feature on Sony Minidisc decks (not the portable players) some years ago; Sony called it "Time Machine". Huh? Total Recorder, the PC recording software, also supports a prerecording buffer. Once you've learned to appreciate this feature, you don't want to go back.

Doing the firmware upgrade is not difficult but involves a few processes. You should download the upgrade manual for the H120 and the H320 first. The manuals have links to the files you need to download and how to proceed. They are a little less than 1 MB each.

Operation is straightforward and mostly intuitive. The manuals explain this in detail but here's how the recording process is: You can set the recording display to open on power-up. If you haven't, you will choose "Recording" from a menue: the recorder is idle and the prerecording buffer builds up. Pressing the Record button starts the recording. The Stop button stops the recording, and the recorder is again idle and builds another buffer. Pause/Play pauses the recording and it keeps the file name on resuming. Which is a bit of a problem if you repeatedly pause and resume the recording, because on later playback if you rely on the filename to tell you when you started the recording, you will not know the time of the portion you monitor after a Pause. Also, if you Pause the recording, there is no buffer to help you if you miss that ID again. So I would not use the Pause/Play button while recording DX.

If, while recording, you press the Record button again, the recorder will start a new recording with a new filename (based on the time of the new recording). The process is rather seamless and makes later analysis a lot easier. Say if you're running a long recording, you can start a new file if you expect that an ID is about to come. The anticipated ID will then be at the beginning of the new file, not something like 3 hours and 22 minutes into the old one.

You may want to change recording settings now and then. While in recording mode (idle) push the A-B control to enter the settings menu.

You will lose irivers graphical user interface when you Rockbox it. The default fonts will appear rather small on the display, but there is a font package available from which you can pick and choose among a large variety of fonts and font sizes. However for some reason the recording display does not benefit from that. There are also various graphical interfaces available, alas only for Playback. So the recording window is rather small, and those who need reading glasses will definately need them to see the recording display properly. However, especially on the good quality H320 display the contrast is excellent. I prefer to set the display as "Always on" otherwise it will go dark (to preserve the battery) after a pre-determined amount of time (10 seconds by default).

Reverting back to iriver firmware is easy, just copy the appropriate .hex file into the root of the recorder and do the firmware routine. Actually, Rockbox has implemented a dual-boot function so you can alternate between iriver and Rockbox firmware: Press and hold the Rec button when you power on and it will load the iriver firmware. Please observe that the displayed remaining disk space in iriver mode will not reflect deletions of files done while in Rockbox mode. If you had 13GB free when you installed Rockbox, and you delete a number of files (say 6 GB), the iriver firmware will tell you that you still have 13GB free, not 19. You will still see the deleted "files" in iriver mode.

It is important to emphasise that Rockbox is voluntary work and the builds are not necessarily fool-proof although current builds seem to be very stable. Rockbox has a FAQ you may want to read before upgrading your iriver.

Warranty – can something go wrong?
Yes, doing these mods will void your warranty. Technically speaking. Being discontinued for several years, I doubt there are any H100 or H300 series irivers left under warranty. But yes, "something" can go wrong when doing modifications that the manufacturer has not warranted or supported. Perform at your own risk etc. As far as I have been able to test my four recorders though, with various recording settings like prerecording buffer, split time and split file size etc, they seem to work well. Before putting these devices to work, which is recording DX, you should test them thoroughly. If you are not satisfied and don't feel you can trust them, go back to iriver firmware.

What if the iriver dies...
containing 19 GB of recordings from your two latest DX-peditions? Basically two things can go wrong; either the recorder itself dies, or the hard drive dies. If the hard drive dies, the value of the content would need to be very high indeed to justify professional retrievement. Now, if the recorder dies the hard drive itself should be ok in most cases. In order to copy the content to another media, you would need an adapter which connects to the Toshiba drive on one end and a USB cable or 3.5" type IDE cable on the other. The Toshiba-to-USB adapter is probably the one to choose. These adapters are available on eBay, most often together with an enclosure for the hard drive.

Availability
Judging from eBay, there aren't many available of the H100-series, but I see a few every day. The H300-series seem to be more abundant, but the majority of them appear to be North American versions. Not that it matters – both my H320s are NA versions.