

HI-FI WORLD  
MAY 2015 – U.K



# Eastern promise

A pre-amp, headphone amp and general purpose analogue-to-digital recording device in one, Noel Keywood finds the ADL Furutech GT40 Alpha from Japan offers amazing value for money.

This is a fascinating little device from Furutech of Japan that allows you to make your own digital recordings. I was intrigued by their Esprit preamp and very impressed too, because it had an ADC on-board (Analogue-to-Digital Convertor) that allowed me to send whole LPs to computer in glorious 24/96 high-resolution digital. The new GT40 Alpha (aka GT40a) reviewed here builds on this by moving up a notch to 24/192 – top resolution digital – and adding an on-board phono stage so you can plug in a record deck direct. That makes it quite an unusual beast but there are a lot of difficulties in digital recording, so I peered at it closely and critically.

The new GT40a comes in the same small metal case as the old one, measuring 150mm wide, 111mm

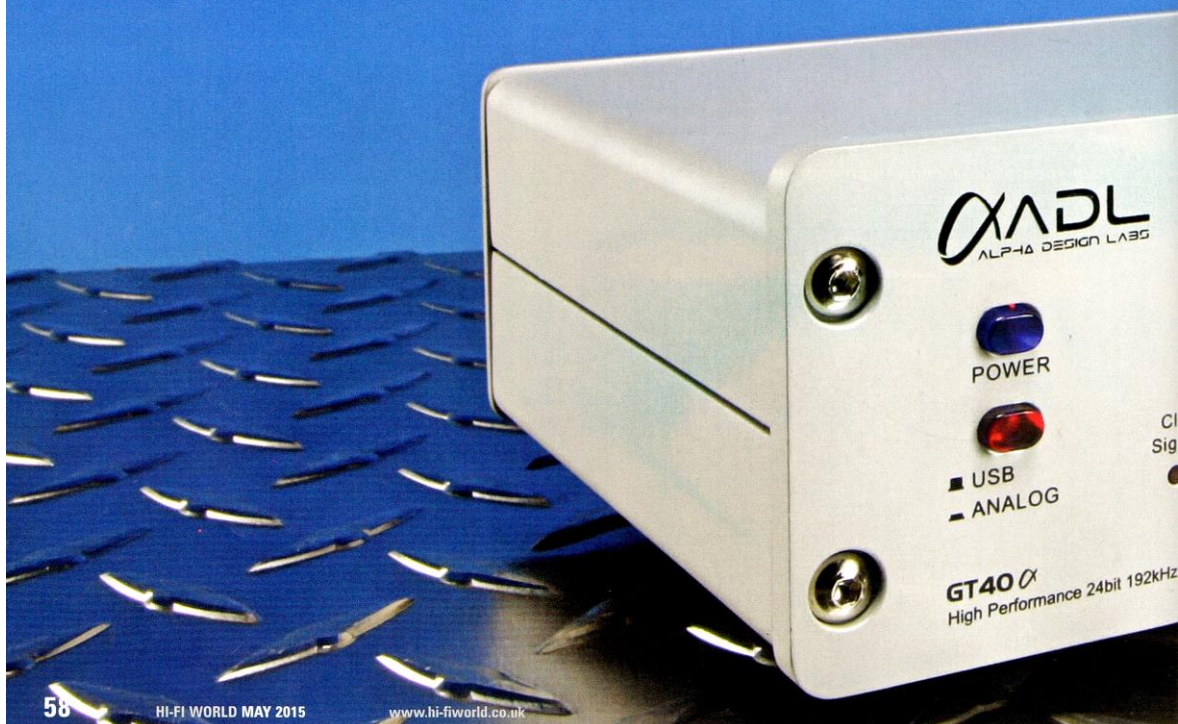
deep and 57mm high, weight 650gms. For a digital recording device it is disarmingly simple, two illuminated push buttons, one headphone socket and a volume control populate the front panel. There are no record-level meters, nor record level controls, because Furutech leave you to use the computer's controls. There is, however, a very important tiny red warning light that shows overload, meaning ADC overload. ADCs have a hard headroom limit: when the digital bits run out they distort badly. Where the bits run out is also peak record level – no margin is built in – so it is the same on the GT40a as an accompanying computer. I tested the unit in conjunction with a MacBook Pro, connected via USB, using the free Audacity music recording/editing programme, but Mac users also have Garage Band that comes free on

many Macs, or with an OS download.

The volume control is for output volume, primarily to headphones, which the GT40a runs from its 6.6mm (1/4in) front socket. It also affects line output level too, so the unit could run a power amplifier direct because it has more than enough output.

The rear panel is puzzlingly simple. It has phono socket Line inputs and outputs, three small slide switches that set input attenuation, Line or Phono usage and MM/MC selection when Phono is used. Yes, the little unit even caters for Moving Coil cartridges – so Furutech have obviously spent time and effort on the phono side of things.

For computer connection there is a USB B socket, meaning a printer lead is used for what is bi-directional communication, since the GT40



Alpha doesn't just send data to computer, it also receives it simultaneously for monitoring purposes. Later uni-directional playback through the hi-fi also works through the lead of course. All of which is to explain one of the front buttons marked USB/Analog, that senses either the analogue input direct or the USB signal from a computer; once upon a time this role was defined as Tape/Direct! Generally it is best sensing from USB so it works from the record loop and Furutech say theirs is a low latency system to minimise time differences between the two inputs.

What puzzled me about the rear was its complete lack of digital inputs, apart from USB. I expected the usual duo of S/PDIFs: optical and electrical, but they don't exist. This unit is strictly for use with a computer communicating via USB, not other digital hi-fi items through S/PDIF.

Power is not on-board, but supplied by a small wall-wart with green On light, that delivers 15V at 0.8A (12W) to the usual co-axial power input socket at the rear through a lightweight d.c. power lead.

In place of an input record level control is a three position input attenuator switch, marked 0 6 12, meaning 0dB, -6dB (half) and -12dB

(half of half, or one quarter). The handbook suggests a Line input level of 2V is needed for 0dB to be reached at maximum gain (i.e. 0dB atten.) and the little red light to go on, but measurement showed an input of just 1.2V was needed. This is enough for modern line sources, meaning tuners and such like, most of which now produce 1V or more, but it is insufficient for older tuners, cassette decks, etc. that produced 0.3V out. All the same they will still peak at -12dB below full record level of 0dB and with 144dB of dynamic range theoretically available from 24bit resolution, this is seemingly no big shortfall.

I say "seemingly" because all that is the sort of theoretical view you tend to hear about digital; the truth is that ADCs are noisy and what you really get is a dynamic range of barely 90dB with the GT40 Alpha, our measurements showed, even less due to quantisation noise with a signal present. What is claimed on the tin with digital and what it actually delivers have always been two entirely different things. Furutech use a one-piece codec chip from Cirrus Logic, the CS4270, and the THD+N figures quoted by Cirrus Logic reveal this noise issue. Also Furutech quote, in their specification, a noise floor of

-90dB for Line, so they don't seek to mislead here. I measured the same with Line and less with Phono due to inevitable noise from the phono preamplifiers because their gain is so high.

So Line will cope with most sources, and it does not have to cope with the wildly varying gains/output of external phono stages, since there is one on-board. Set to MM it needs just 10mV to reach 0dB (i.e. overload) which is low but set to 12 it needs 40mV to hit overload and this is just enough; the most I have measured from a cartridge was 35mV from an Ortofon 2M Red. MC is usually a factor of ten down, and it was with the GT40 Alpha, all values being ten times less, MC needing ten times more gain, which it has on this little unit. The GT40 has an input impedance of 47k for MM, 100 Ohm for MC.

In addition to recording analogue, the GT40 can be used as a computer DAC of course, and a headphone amplifier.

## SOUND QUALITY

I hooked up our Timestep Evo Technics SL-1210 Mk2 Direct Drive record deck with Ortofon Cadenza Bronze MC cartridge and Ortofon 2M Black MM cartridge to the GT40



"the character of the recordings was identical to that of the record deck"



# Straight Record

Noel Keywood looks at what it takes to record to digital.



**R**ecording music to digital is getting progressively easier, or so I think. It could just be that I'm becoming more familiar with the whole business, in particular the free software music editor Audacity that I use and find works well.

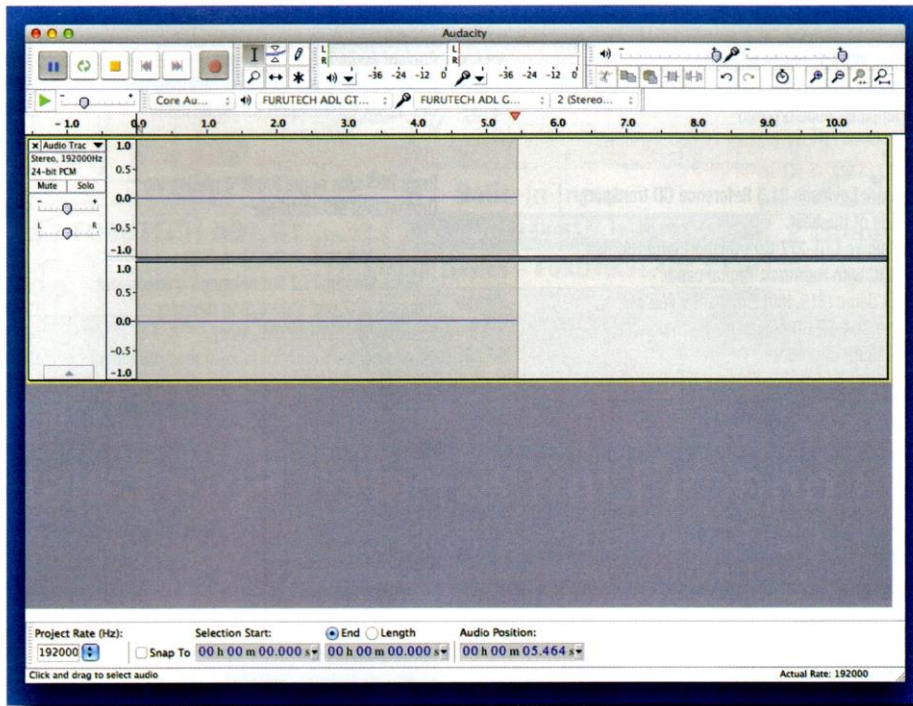
Music editor? Yes, the days of the red record button and record level sliders are over, in physical form at least, even though Audacity has both

in symbolic form. But whilst there is some fiddling to do in this software editor to get started, it isn't that difficult, nor daunting. Here's how...

You'll be recording to computer, Mac or PC. PCs still need to have ASIO (Asynchronous In/Out) drivers installed, because Windows lacks this ability, whereas Macs do not. No surprise then that a Mac is the weapon of choice for music recording – and commonly a portable MacBook Pro if you have to carry the

hardware to the recording location. There are no hardware issues I have encountered or know of and a Mac has enough processing power – typically in an Intel i5 CPU – to run 384kHz sample rate music without smoke issuing from the USB socket.

The arrival in this issue of a product incorporating an Analogue-to-Digital Converter (ADC) – still rare in domestic audio – in Furutech's GT40a, together with MusicScope software billed



*Audacity's user interface. Press the red button at top left to start recording – it's as simple as that. Set record level with the sliders, just like a cassette deck! The music signal is shown as two horizontal blue lines, seen to stretch halfway across the time scale here. Best to set sample rate and bit depth in Audacity's Preferences first, in the Quality tab, but there are also on-screen tabs for this.*

*Final format is set when Exporting (not Save As) a file. Choose WAV, FLAC or ALAC, or a myriad other formats. Audacity has 'em all.*

*Read the on-screen manual if you want to go dizzy.*

as suitable for vinyl LP analysis, suggested we should explain just how to use these items with Audacity to make recordings. It isn't as easy as pressing the Record button on a cassette deck and ending up with a half-decent result; the days of easy analogue are over; digital is here to torture us. But it is slowly getting easier and more bull free as the mystery dissipates.

And nowadays the recordings you can make in glorious, 24/192 top-resolution digital are very, very good – as well as transportable – just. I say that because files sizes are enormous, but I will come to that later. I will quickly mention here that you can record music and speech to iPad or iPhone (iOS) and there are various associated apps like WavePad, but it's less flexible and sample rate on iOS is 48kHz maximum, WavePad running at CD quality, or 44.1kHz maximum.

## GETTING STARTED

The main difficulty in digitally recording audio is learning Audacity – or any other music editor, such as Mac's own Garage Band. Like most computer software, such as Photoshop, it has a user interface that can be confusing, especially when it comes to selecting bit depth and sample rate, for which there are multiple menus. Audacity also gets into digital obscurities like floating point files and dither, all of which I will ignore! This piece is about the nuts and bolts of recording.

You will find Audacity at <http://>

[audacity.sourceforge.net](http://audacity.sourceforge.net). It is a quick download, occupying just 66MB on disc, the programme alone needing a measly 33MB. All the same it is powerful and sophisticated. SourceForge recommend 2GB RAM/ 2GB processor and OS-X 10.7 (Lion) or later, but it will run on 10.4 or after, including Leopard

Audacity and set it to link with both input and output too, which you do by going to the top toolbar where, at centre, there is an input selection tab with a microphone symbol at its left end, and an output tab with a loudspeaker symbol at its left end. Set both to the Furutech.

One small confusion on a Mac

"A set-up like this, although simple and inexpensive, may well be of interest to young people wanting to learn about music, recording techniques, audio and what have you"

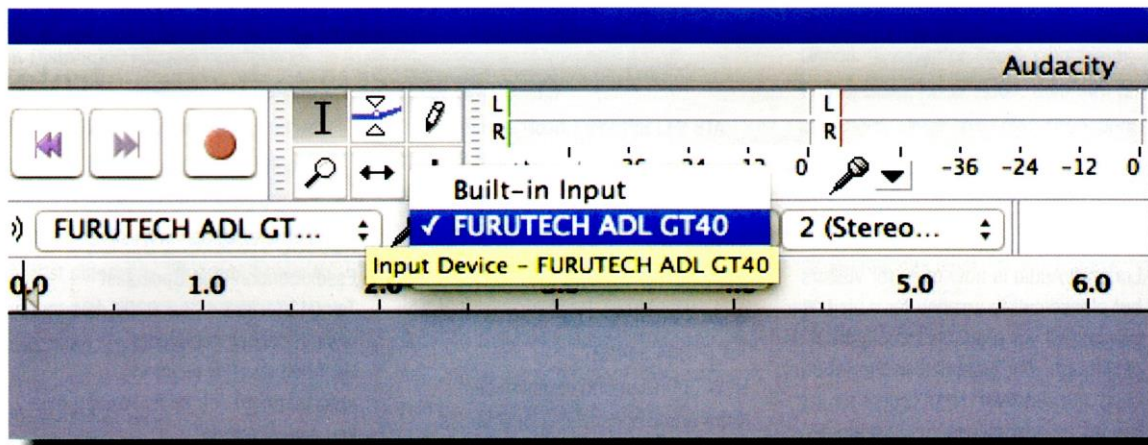
and Snow Leopard, but max sample rate is 96kHz. I ran Audacity on Mavericks for this article and the comments relate to this pairing alone, although newer Yosemite is unlikely to be much different.

First, connect the Furutech GT40a to Mac with a USB lead. When the Mac polls its ports, as it does continually, the Furutech will identify itself and appear in the Sound menu found in System Preferences (the grey box with gear wheels). You must select it as the input and output device/route for audio. This will link the computer to the Furutech. You must then run

is the presence of the Audio/Midi control panel hidden away in a Utilities folder, where sample rate can be set. This should auto-set to 24/192 and not be a problem, but always best to inspect it I find. You will find Utilities in the Applications folder, at the bottom of the file list.

Note that if Audacity opens to a blank screen, go to File in the top menu bar and select New.

Above the input and output selection tabs there are input and output selection signal-level sliders: move them to maximum. With inputs correctly selected and level controls at max, Audacity will show



*It is important to set Audacity to see the computer's inputs and outputs, to avoid silence. This is done in the top bar where external devices will identify themselves over USB: here you can clearly see the Furutech has declared its presence to the Mac and to Audacity. Don't forget to go to Sound in the Mac's System Preferences and set its Input and Output to the external source too.*

an input signal in its red input meter and green output meter when the dull red Record button at top left of screen is pressed. Best to press Pause first to go into record-pause.

Two horizontal boxes then appear on screen, containing left and right channel audio waveforms, but they will be blank when no actions have been initiated. You can import a music file into these areas, in order to edit it, or you can create audio by recording either an external signal or generating an internal one. They are general purpose visual containers for the audio, as it were, showing amplitude against time.

At this point you can lower the stylus onto the groove and if all is well the red input level display will light up. It will be high and likely going into occasional overload, because the Furutech is gain-set to match real life cartridges that typically output 4mV from a standard 3.54cms/sec/5cms/sec peak test tone, output being related to stylus velocity in electromagnetic generators.

Moving coil cartridges typically generate 10x less signal, and when you switch to MC on the Furutech it increases gain by this amount to compensate.

The Furutech's rear attenuator switch must be set to avoid its front panel red overload warning light coming on; if it does this severe distortion is generated on short term peaks.

The red light is effectively synchronised with 0dB in Audacity's record level indicator, both registering overload when all bits in the bit word have been used

up, meaning there's nothing left to describe the signal. Audacity has small black peak level bars that will tell you if overload has occurred during a recording, meaning the GT40's attenuator must be switched to 6 or 12.

If you hear hum try either connecting or disconnecting the turntable's earth lead to the GT40's earth terminal.

## PROCESSING

Once you've recorded an LP you may want to split it into tracks and/or process it in other ways – and for this you need to read Audacity's on-line tutorial.

So far I have said nothing about file type or size because this comes last, after you have got the whole shebang working and made a successful test run. Then it is time to take stock.

The first thing to note is that 24/192 generates huge files, 1.4GB for an LP side lasting 20 minutes. You can halve this by selecting 96kHz sample rate in Audacity; hearing any degradation is difficult I find.

You may even decide upon 48kHz sample rate: again, listen and see because hearing differences will hinge upon the abilities of your replay equipment.

I have assumed you will be recording in WAV format, which is basic PCM. But most people choose FLAC (Free Lossless Audio Codec) that halves file size, includes meta-data (accompanying data such as artist name, genre etc), cover artwork etc. You may want to store master files on a huge 5TB hard drive and chop them down in size to

suit external devices, so for example an iPad can run 24/48 ALAC (Apple Lossless Audio Codec) and will sound better for it.

Don't forget also that once you have digitised an LP, you can change its tonal balance, remove noise, analyse it with MusicScope, distribute it to various players, fixed and portable and what have you. And not wear out the original LP.

However, as I note in the Furutech review, whilst 24/192 might sound like the dog's doo-dahs, it isn't. Analogue-to-digital converters are residually noisy and also introduce quantisation noise, both of which degrade sound quality. You don't see this in their spec unless you study the data sheets, or measure them as I do.

By way of contrast, a moving coil cartridge has a vast dynamic range because it is almost noise free, so the two don't yet compare, but the gap is closing. And of course you can record radio programmes from a hi-fi tuner, or even song from an external mic running through a preamp feeding the Furutech's line input.

One small last note is that digital recording opens a lot of doors to modern music recording and a set-up like this, although simple and inexpensive may well be of interest to young people wanting to learn about music, recording techniques, audio and what have you.

Working with digital hands-on like this is a great way to learn about music recording, not just LP recording. So the Furutech opens doors to a potential audience beyond just us audiophiles.