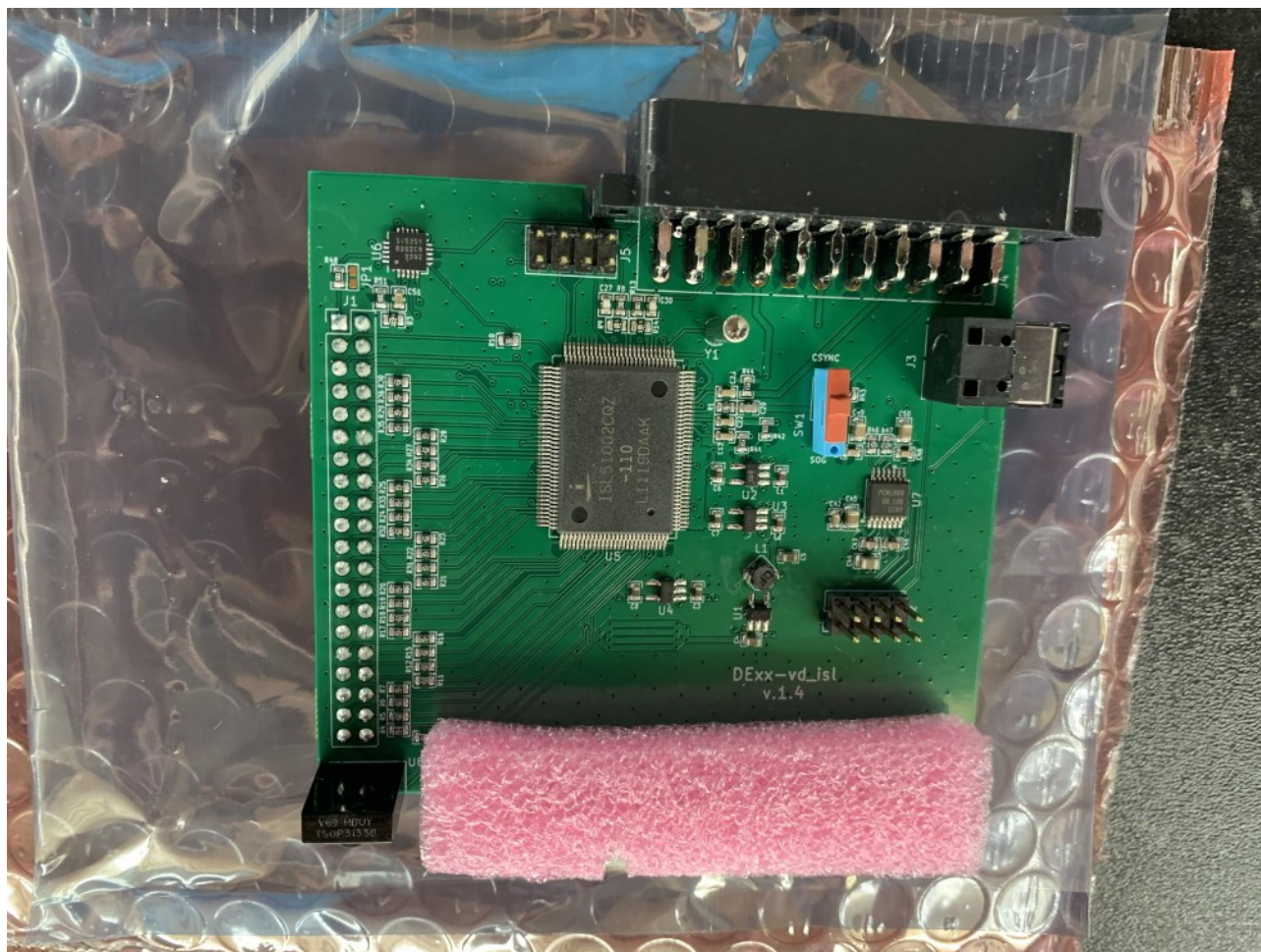


DExx-vd_isl

Quick Start Guide V1.11



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DExx-vd_isl – Quick Start Guide

Contents

Important safety information.....	3
Overview.....	4
Connectors and external controls.....	5
Remote control.....	6
Getting started.....	7
Preparing the SD card.....	10
Powering on and testing.....	14
Getting to know your DExx.....	16
One scaler, three modes.....	16
Changing modes.....	17
Connecting a console, PCB or other hardware.....	17
Scanlines.....	18
Setting output resolutions.....	18
Framelock.....	20
Scaling algorithm.....	20
Interlace video and the DExx.....	20
Fine tuning the image.....	21
Audio input and output.....	21
Firmware updates.....	21
Troubleshooting.....	22
More information.....	23
Disposing of your DExx.....	23

Thank you for purchasing the DExx-vd_isl board (DExx for short). Please take time to read through this short document before you start using the unit.

Important safety information

Please observe the following safety precautions when using your DExx-vd_isl board.

Follow the instructions for your DE10 Nano – Ensure you are using the correct power supply for your DE10 Nano and following all relevant safety guidelines as supplied with your DE10 Nano kit.

Turn off the power before connecting/disconnecting the board – To prevent damage to the DExx board or your DE10 Nano board, always turn off and disconnect the power before connecting or disconnecting the device.

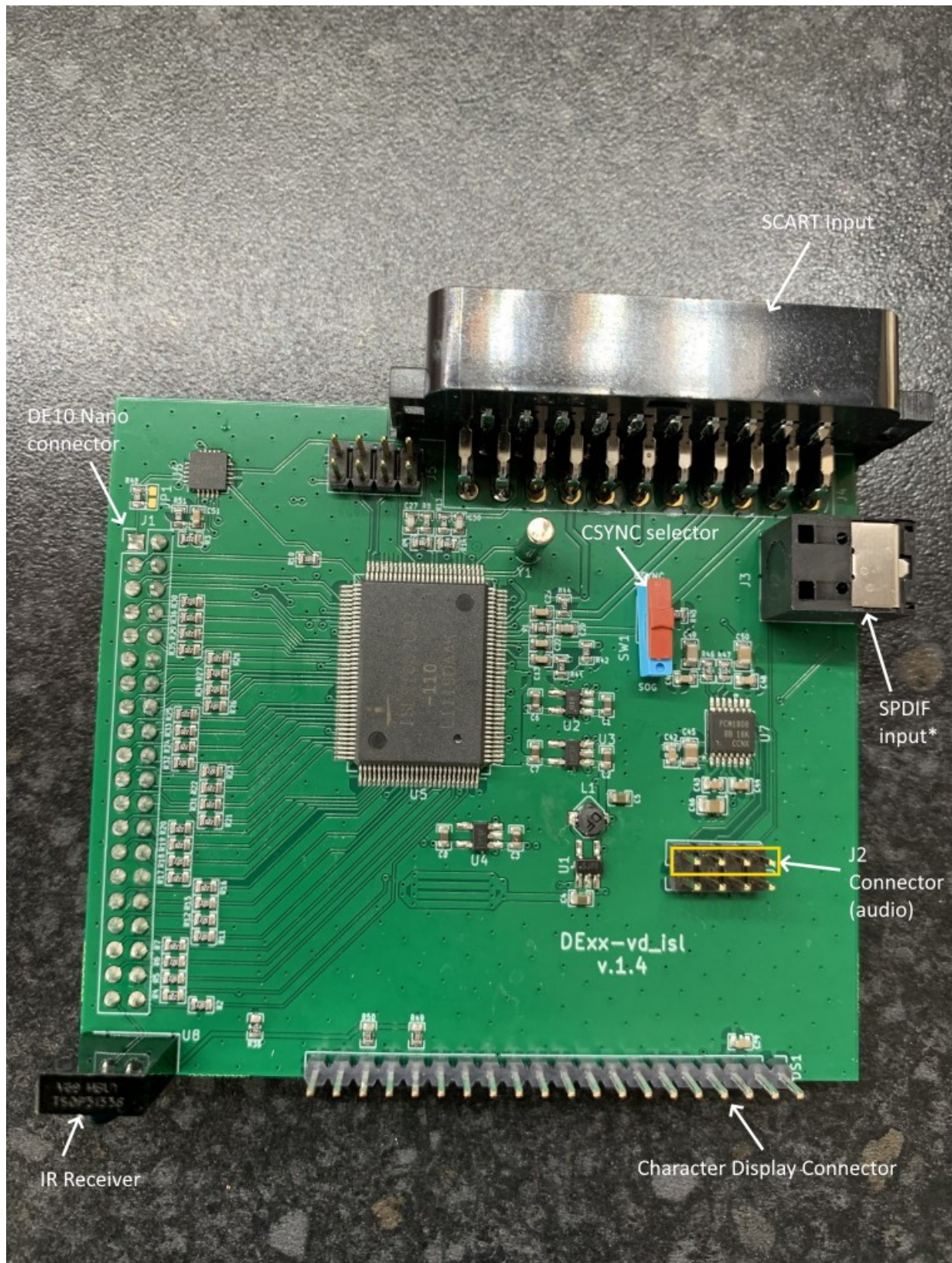
Turn off the power before connecting/disconnecting devices – To prevent damage to the DExx board always turn off and disconnect the power to both your device and your DE10 Nano before connecting or disconnecting any devices to the SCART port.

Do not expose to moisture – Droplets of moisture may contact the PCB and cause a short circuit. Never submerge the unit in water.

Please supervise children – This product is not a toy and is not designed for use by children. Please supervise children if they use the DExx-vd_isl.

Beware of using the bob deinterlace mode on sources that display static graphics or text for a long period of time – This deinterlacing mode produces a constant flickering effect. This can cause image retention/burn-in to occur faster than normal. We recommend using the scaler mode and motion adaptive deinterlacing where possible, see page 20 for more details.

Overview



Connectors and external controls

In the overview picture you can see the following features on your DExx-vd_isl board.

SCART Input – Connect an RGB SCART source to this input. Note the input must be RGB or YPbPr, S-video and composite SCART sources are not supported and require transcoding into RGB first. Only European spec RGB SCART cables are supported, the less common Japanese JP21 cables must be used with a converter, a suitable one can be purchased here:-

<https://videogameperfection.com/products/jp21-to-scart-adapter/>

The SCART input is referred to as AV1 in the DExx's on screen menus.

CSYNC Selector – Choose between standard RGB with composite sync or sync on green (SOG). Note that you should use the SOG setting if connecting component video (YPbPr) via an adapter.

SPDIF Input – For connecting high quality digital audio input from compatible consoles or devices.

*Note, SPDIF input requires a hardware modification to the DE10 Nano board. Details of how to perform this modification are available here:-

https://github.com/marqs85/DExx-vd_isl/blob/master/board/de10-nano/README.md

J2 Connector – J2 carries digitized analogue audio and SPDIF and must be connected in order to get audio from your source device. The supplied jumper cable should be connected to the J2 pins highlighted in yellow in the picture.

Character Display Connector – Connect an optional character display to this pin header. The required components for the display can be purchased from the links below:-

<https://newhavendisplays.com/2x16-character-blue-slim-oled-module/>

<https://www.digikey.com/en/products/detail/sullins-connector-solutions/PPTC201LGBN-RC/775914>

The pin sockets must be soldered to the character display, this requires soldering skills and equipment.

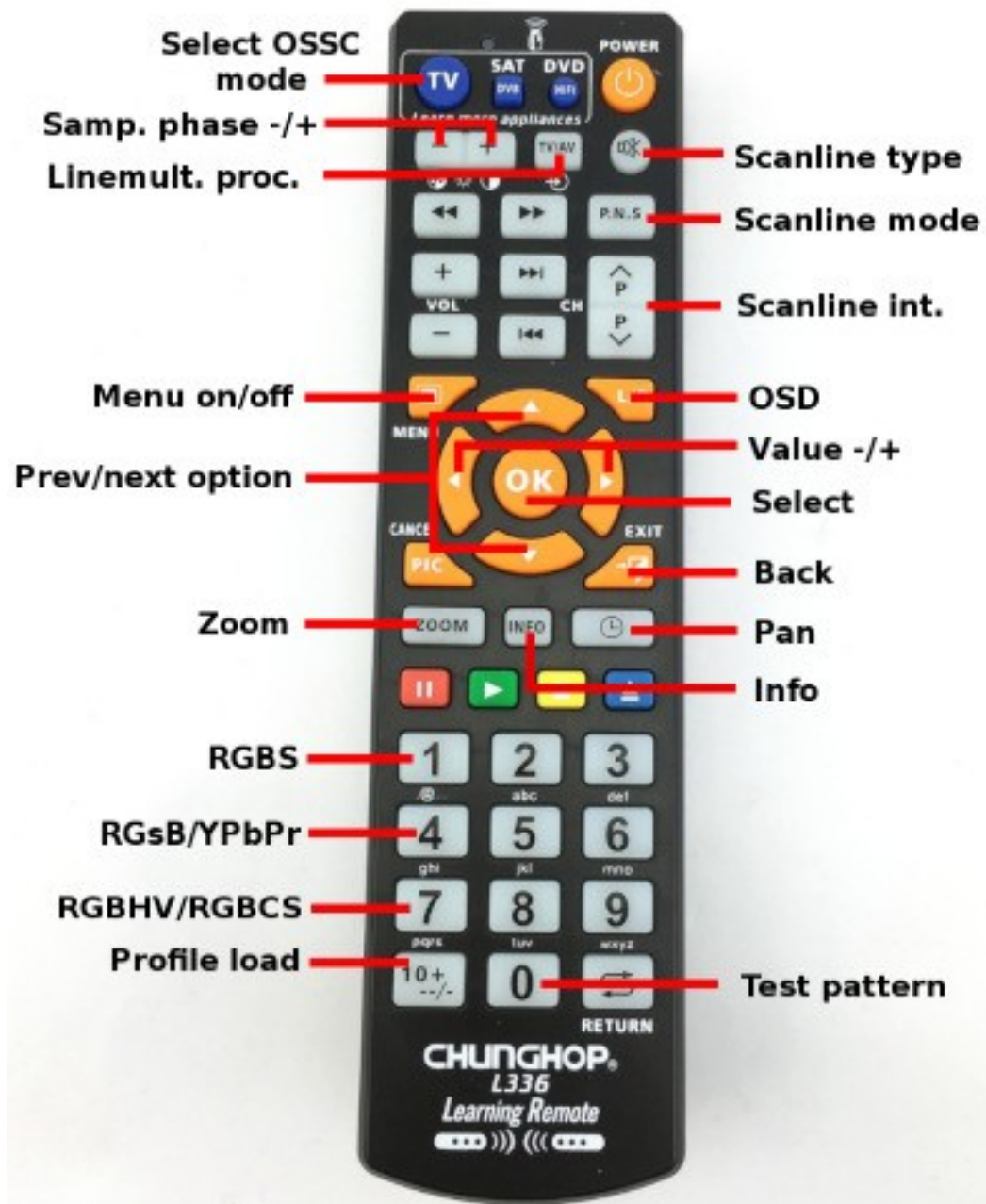
MicroSD Card Slot – For updating the devices firmware, see “Firmware Updates” on page 21.

IR Receiver – Receives commands from the remote control unit. Line of sight is required.

DE10 Nano Connector – Connect the DExx to the DE10 Nano using this connector.

Remote control

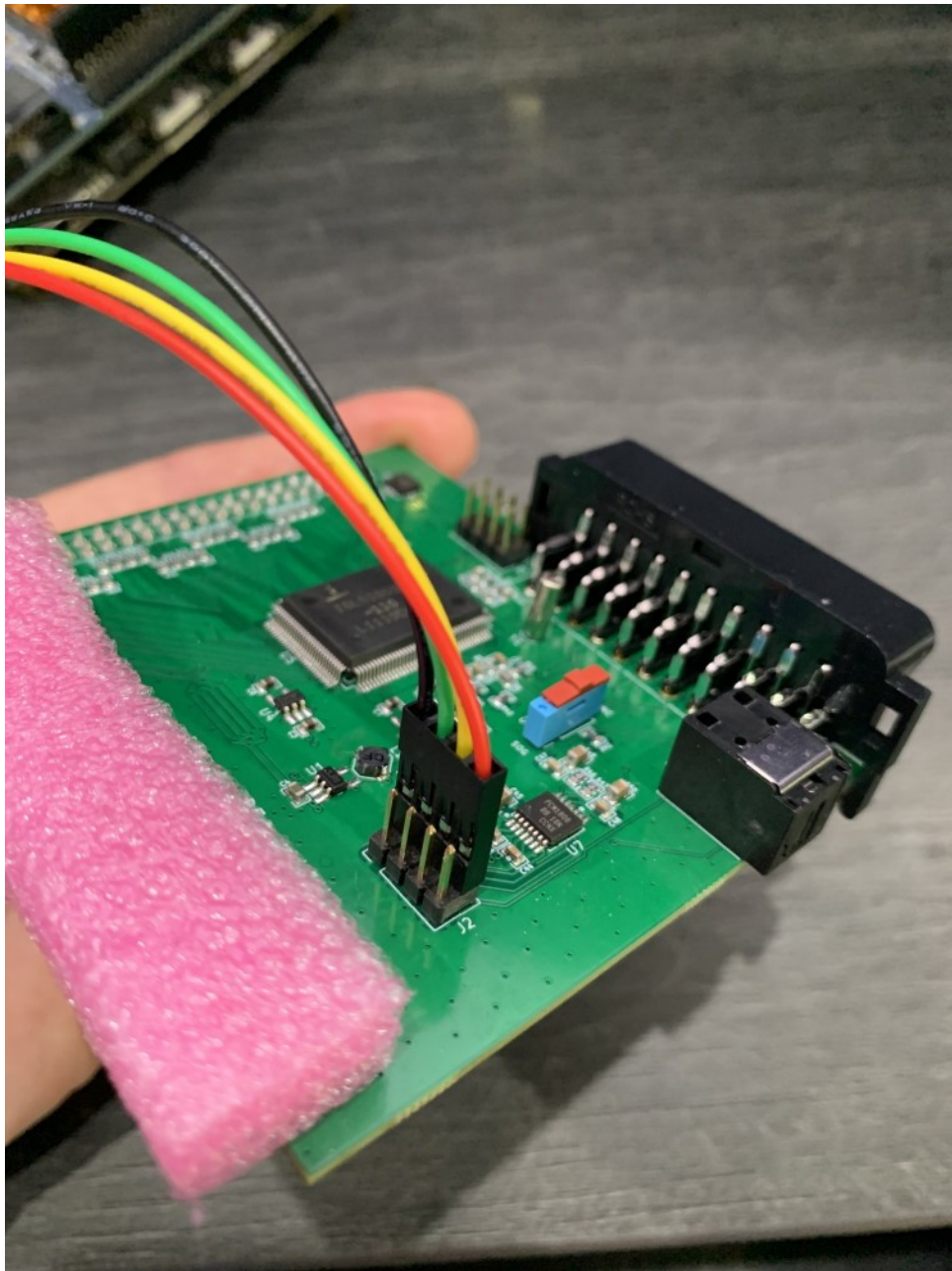
The DExx-vd_isl uses the same IR remote as the OSSC. The button mappings are very similar, and can be seen below.



Getting started

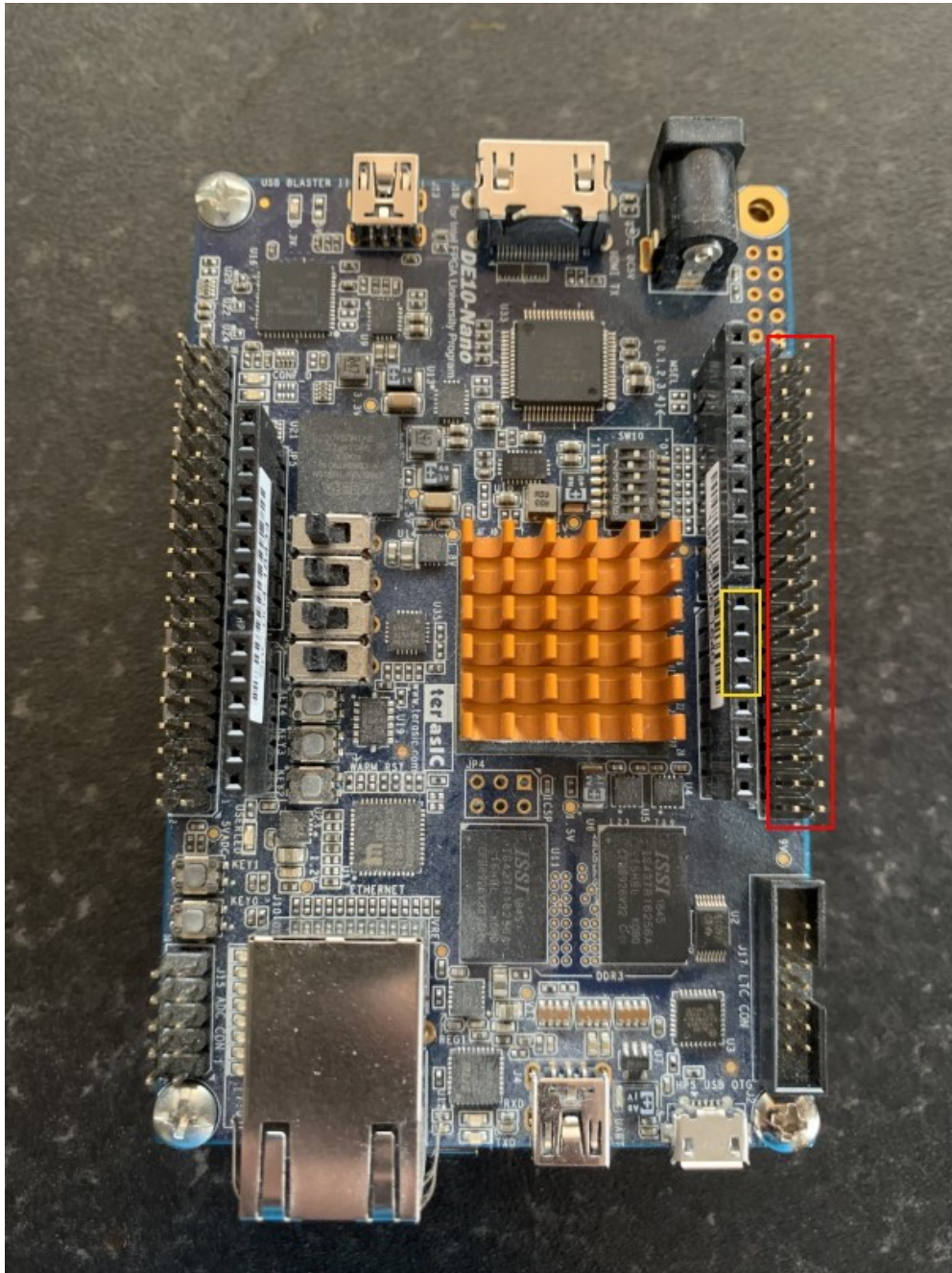
Start by carefully removing any add on boards or MiSTer components from your DE10 Nano board, if applicable. A USB hub expansion such as the BlisSTer can be left in place but please disconnect all cables. Disconnect any Ethernet or USB cables and, if MiSTer software is installed, remove your MiSTer system SD card and store it away safely.

Insert the female end of the supplied jumper cable onto the connector labelled J2, as shown in the picture below.



Note the orientation of the jumper cable. J2 has two rows of 4 pins, the jumper cable should be placed at the back, that is, on the row of pins that is closest to the SCART connector. This row of pins is highlighted in yellow on the overview picture. The red cable should be on the right (with the SCART connector at the back of the board).

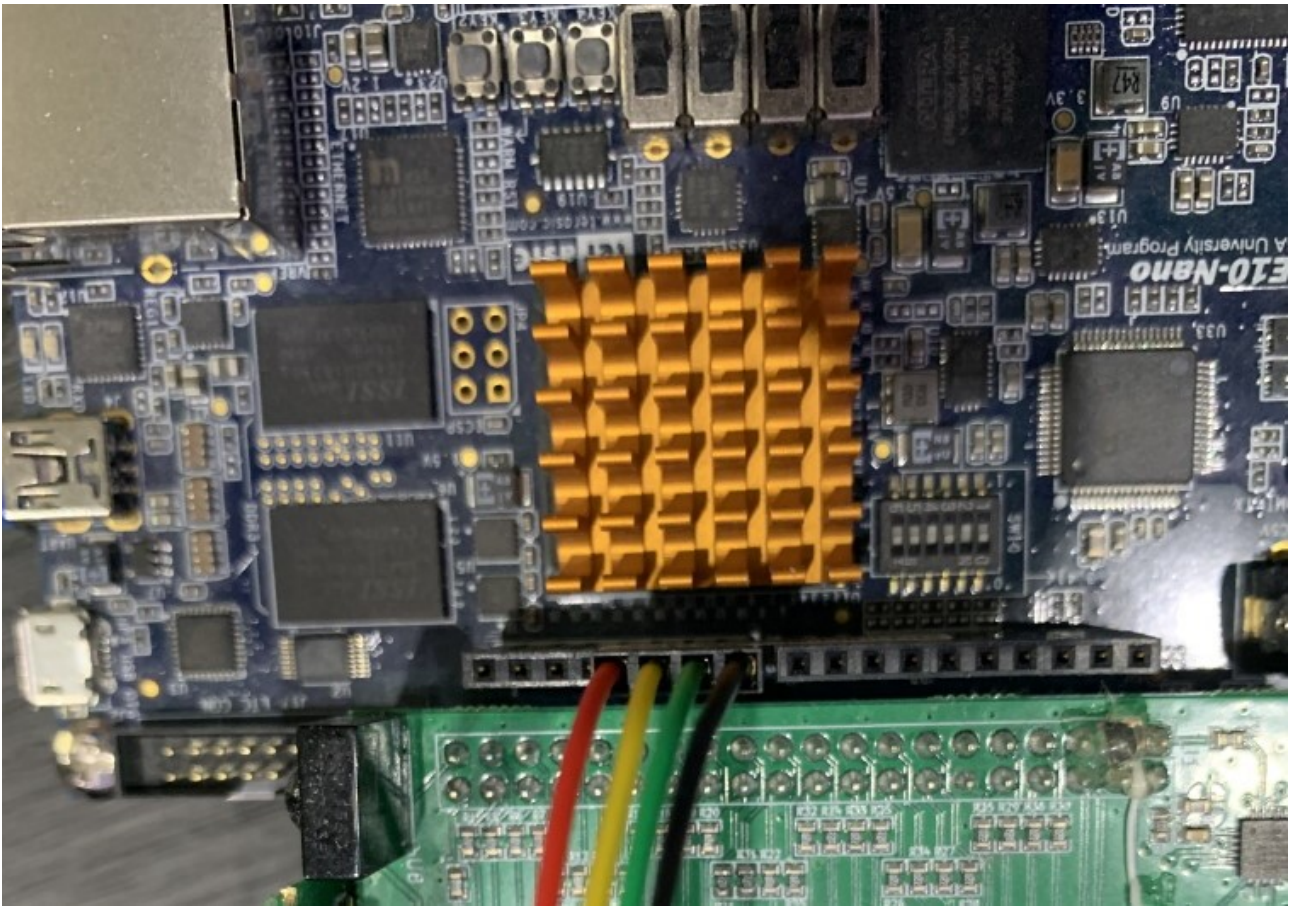
Orient your DE10 Nano board so that the Ethernet connector is at the front, and the HDMI and power connectors are at the back. Leave the video and power connectors disconnected for now. Note the pin sockets highlighted in yellow, we will need those later.



Carefully place the connector from the DExx on to the connector on the right of the DE10 Nano board, as highlighted in red in the picture above, with the SCART socket on the DExx pointing to the back. Check the alignment of the pins before gently pushing the board down into place. The connector on the DExx matches the connector on the DE10 Nano exactly, one pin for every hole,

meaning there should be no exposed pins at either end.

Connect the male end of the jumper cable to the DE10 Nano as shown in the picture below.



Check that the jumper cable is inserted into the correct place. Refer to the previous picture where the correct pin sockets are highlighted in yellow. From the front of the board, there should be four vacant holes in front of the jumper cable and ten behind.

The hardware is now assembled, system software for the DExx should now be copied to a MicroSD card.

Preparing the SD card

The DExx requires operating software/firmware to be installed on an SD card. This SD card needs to be prepared with a bootloader the first time you use it. Start by downloading the latest version of the bootloader and firmware from the link here:-

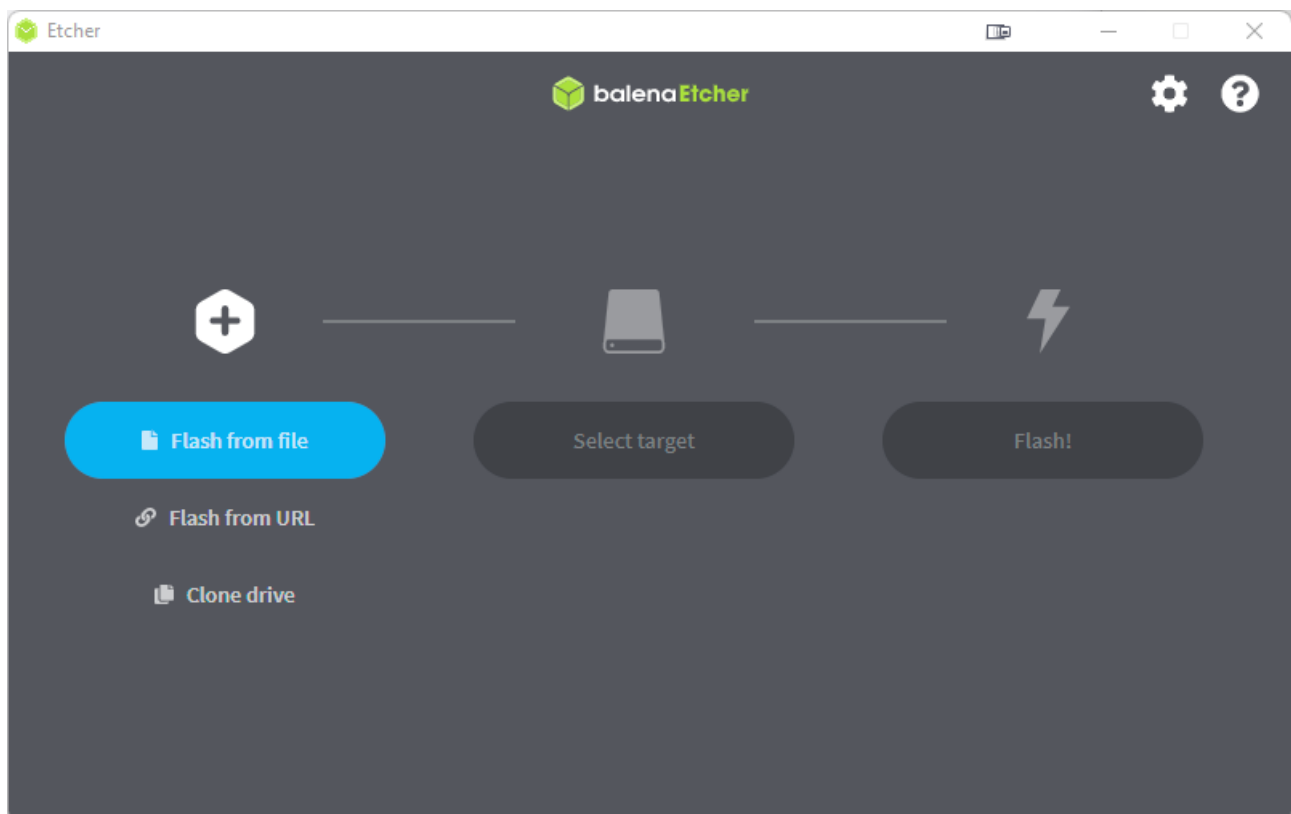
https://github.com/marqs85/DExx-vd_isl/blob/master/board/de10-nano/software/bootloader/sd_image/sdcard_cv.img.zip?raw=true

You will need to un-zip the downloaded file before proceeding to prepare the card. To prepare the SD card we recommend the program “Balena Etcher” which is available here:-

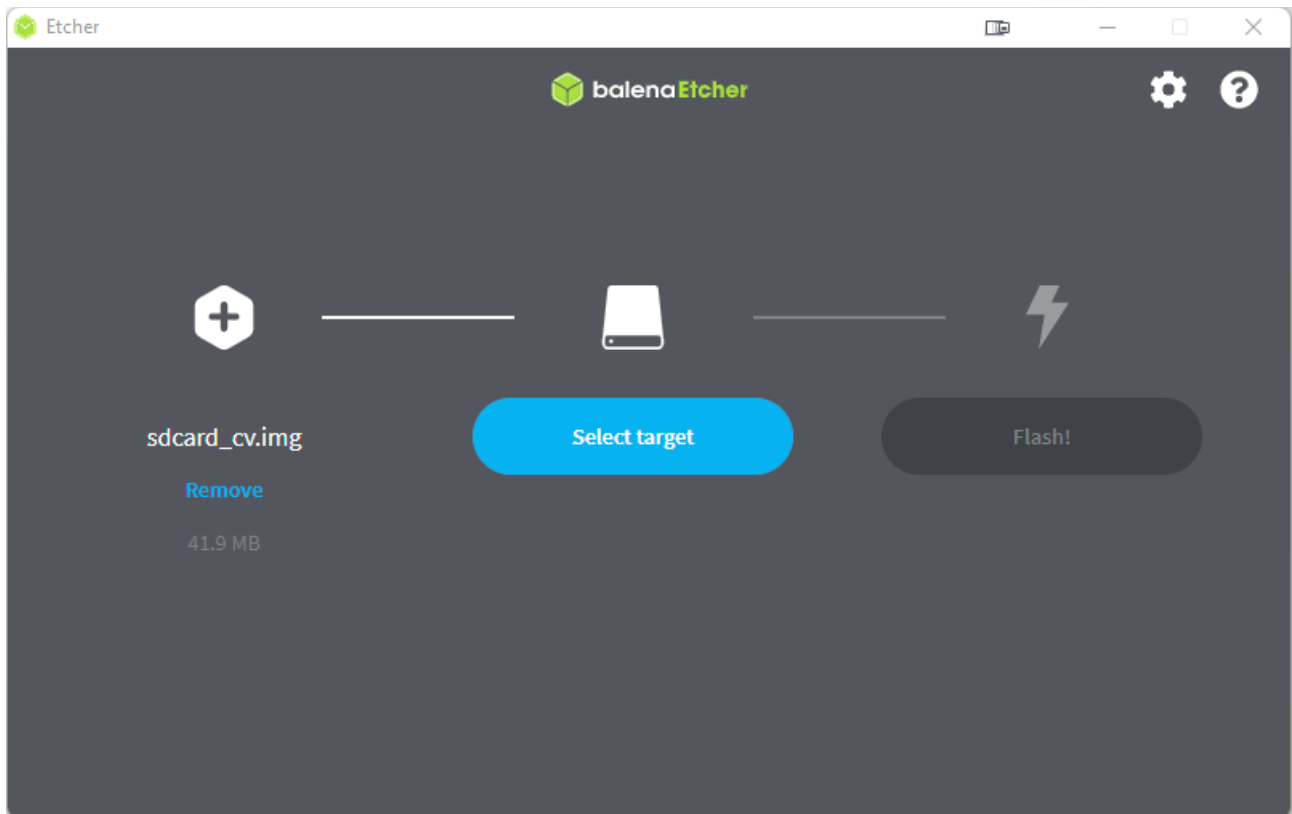
<https://www.balena.io/etcher/>.

This program is available for Windows, Linux and MacOS. The instructions that follow are for Windows operating systems specifically, but the process should be very similar for Linux and MacOS too.

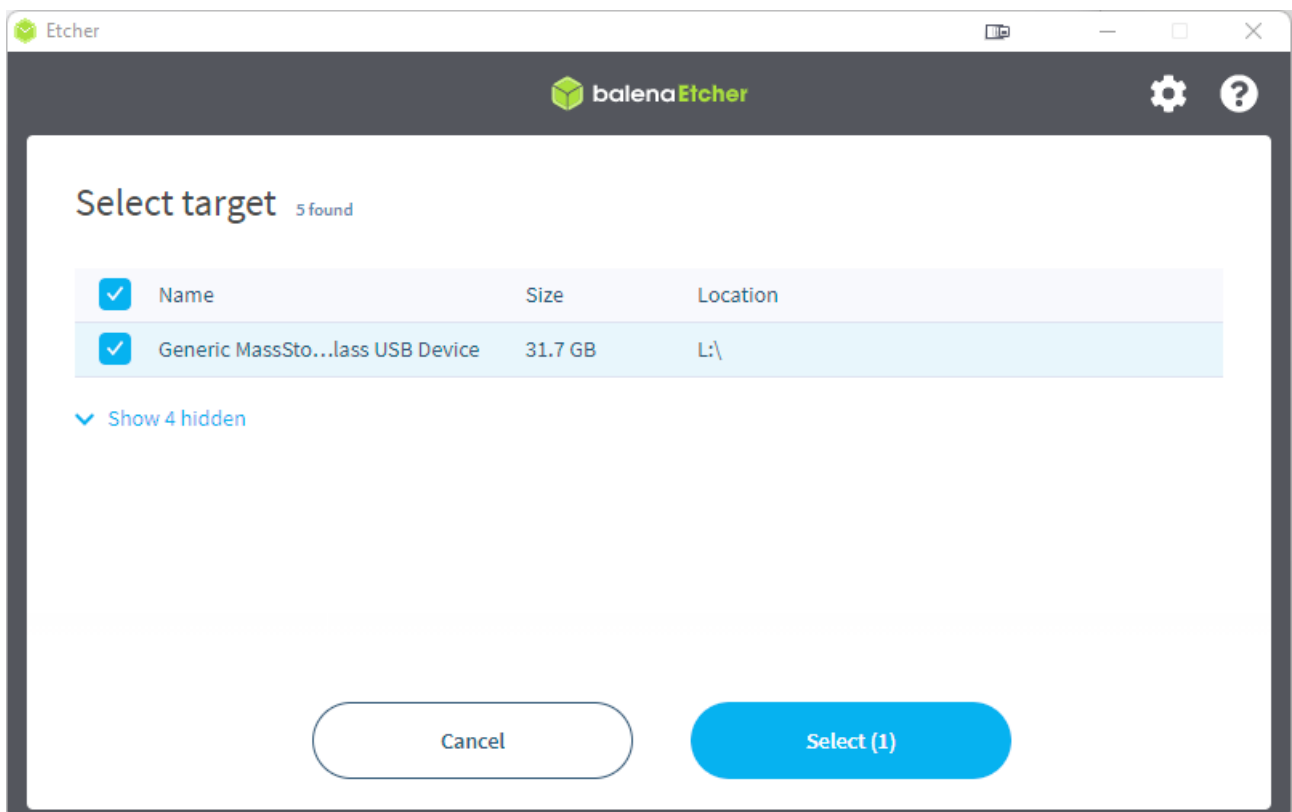
Download and install the Balena Etcher software and run it, you should see a window like the one shown below.



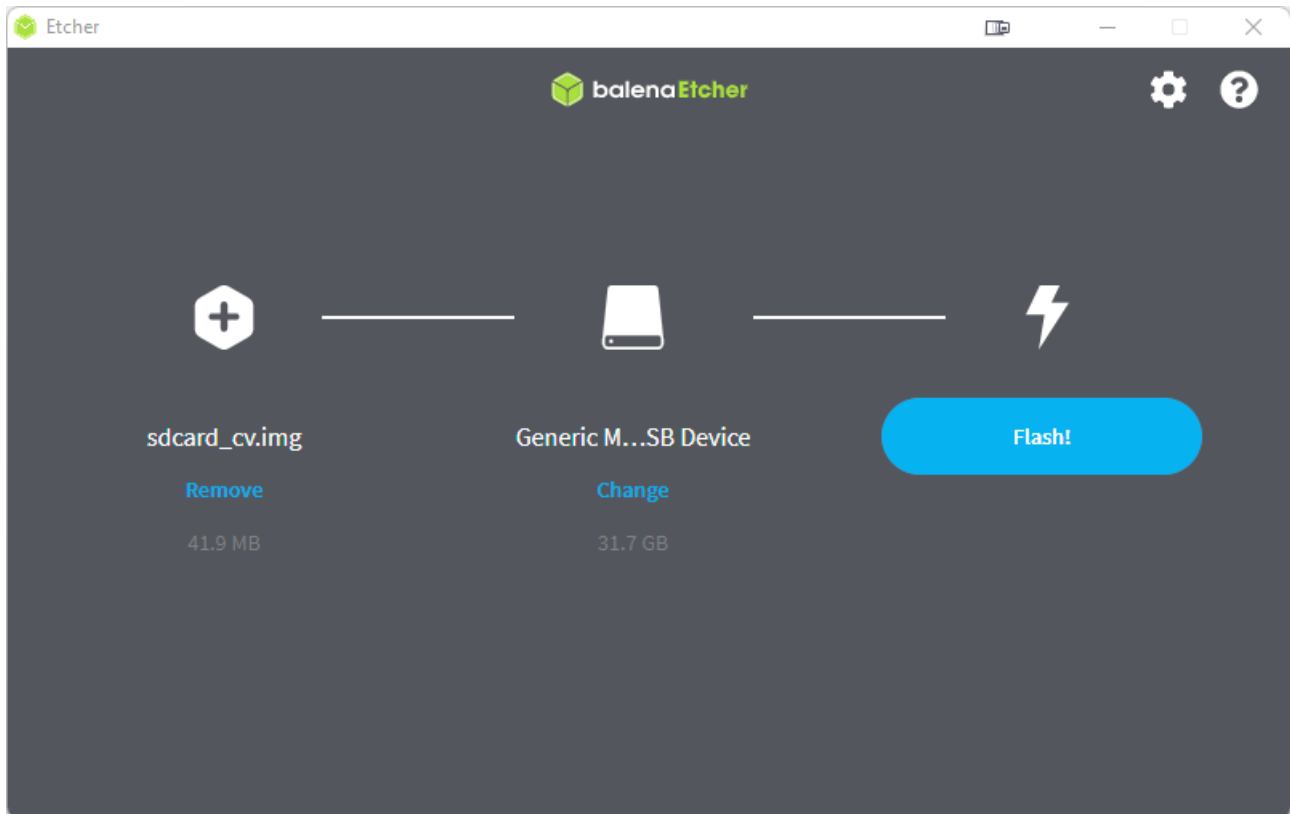
Click on “Flash from file”. A standard file requester window should appear. Navigate to your download folder and choose the unzipped SD card image file. It should be named “sdcard_cv.img” or “sdcard_cv”.



Insert your MicroSD card into your PC's card reader and make a note of the drive letter or assignment. Now, in the Etcher software, click on "Select Target". The window shown below will appear.

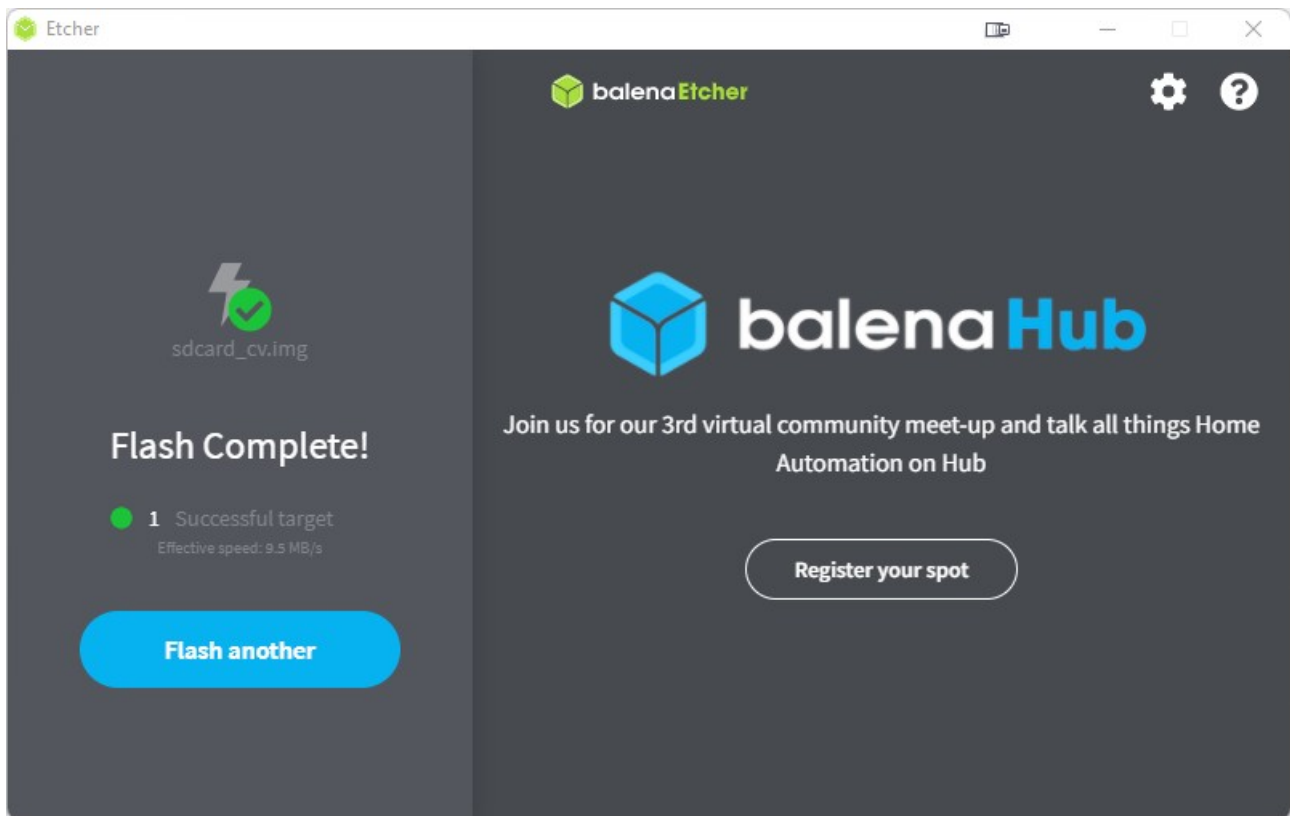


Be sure to select the correct destination drive from the list. All data on the destination will be erased, so triple check that you have the right one before clicking on “Select (1)”.



Now, click on “Flash!”. Depending on your OS and how your computer is configured, you may need to grant permission for the file to be written or enter your administrator password.

The process should only take a moment. When it is completed, the Etcher window will look like the one shown below.

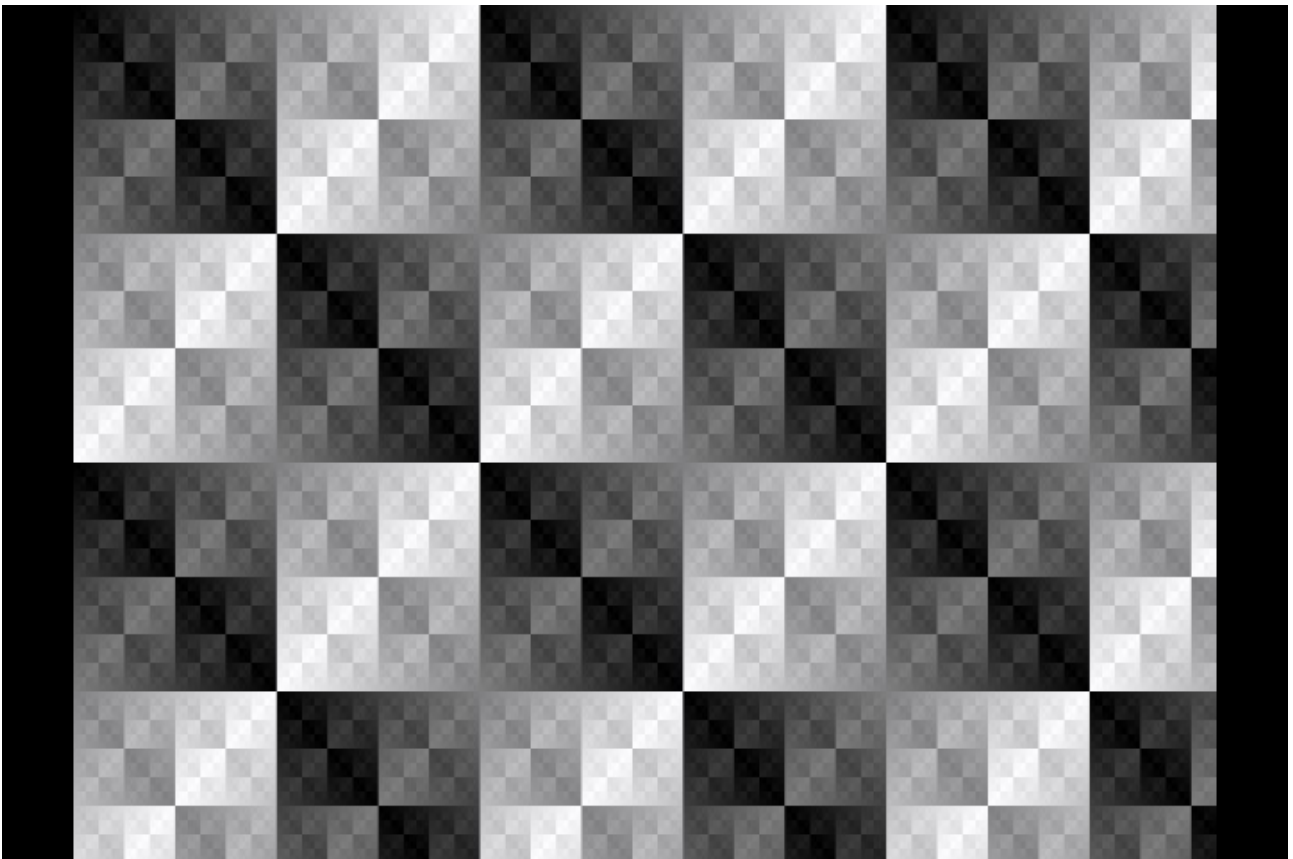


You can now remove the MicroSD card and insert it into the SD card socket on the DE10 Nano board.

These steps to prepare the SD card only need to be done once per SD card. Future firmware updates can be copied directly to the SD card using your operating system of choice. See “Firmware Updates” on page 21 for more information.

Powering on and testing

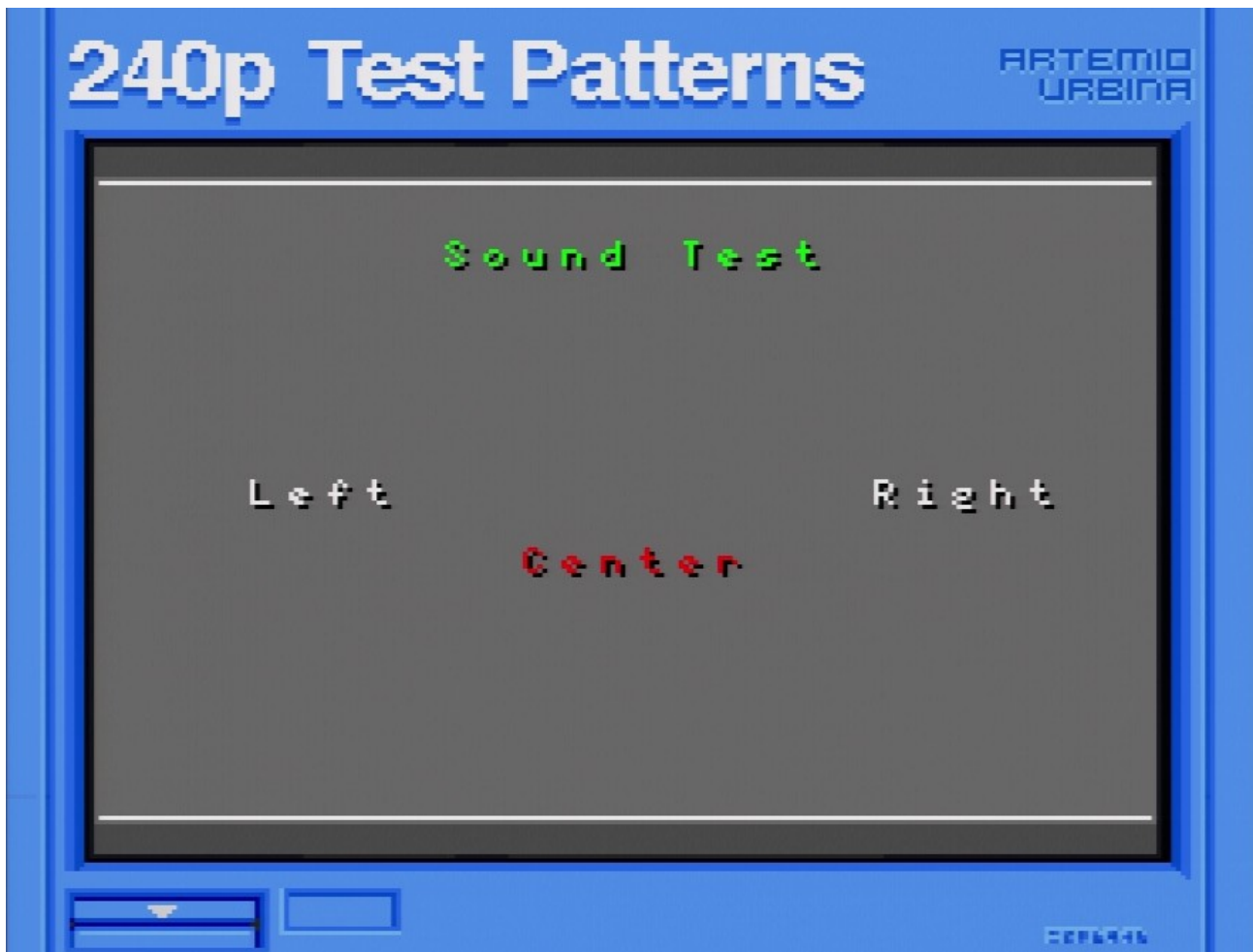
With the software installed and the hardware assembled, we can now perform a functional test of the DExx. Start with all of your devices powered off. Connect the SCART input cable between the DExx and your retro console or computer and the HDMI cable between the DE10 Nano and your display. Now, power on your display and set to the correct input. Next connect the power supply to the DE10 Nano board. If you programmed the MicroSD card correctly, you should see a grey test pattern on your TV.



Finally, power on your retro console and press the menu button on the OSSC remote. Use the menu navigation buttons and OK to choose “Input Select” and then select the relevant input for your console. For standard RGB SCART devices, choose “AV1_RGBS”.

You should now see a picture from your analogue video device. Verify that audio is working correctly by starting a game or test software. We recommend Artemeo's 240p test suite which is available for several retro video games consoles and includes a useful audio test. You can download this software here:-

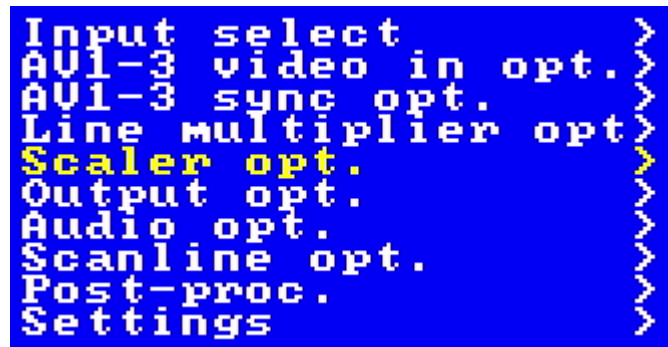
https://junkerhq.net/xrgb/index.php?title=240p_test_suite



Congratulations, you have now set up your DExx-vd_isl board and you can start experimenting with its features.

Getting to know your DExx

All settings for the DExx are configured using the on-screen menu. To call up the menu at any time, press the Menu On/Off button on the remote. The root or top level menu is shown below.



You can return to the top level menu at any time by pressing the “Back” button on the remote (multiple presses may be required).

One scaler, three modes

The DExx-vd_isl shares much of the same code and design as the upcoming OSSC Pro. The device has three operating modes.

- Pure line multiplier
- Adaptive line multiplier
- Scaler

Pure and adaptive line multiplication modes offer a lag free scaling solution for retro video consoles, while the scaler mode offers more flexible output options, at the expense of some input lag.

We recommend users choose either adaptive line multiplication mode or scaler mode. Adaptive line multiplication offers many more options over the old, pure line multiplication that also featured on the classic OSSC. Theoretically, the pure line multiplication mode has slightly less input lag than the adaptive mode, but in practise this difference is so small that it is imperceptible.

Changing modes

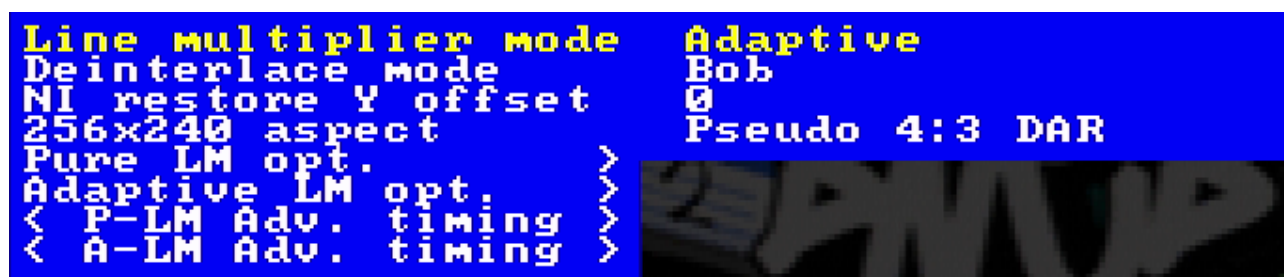
To change between line multiplier and scaler mode, navigate to the top level menu and then select “Output opt.” and press “OK”. you should now see the options shown below.



Use the left and right navigation buttons on the remote to change between “Line multiplier” and “Scaler”.

To change between adaptive and pure line multiplier mode, first choose Line multiplier mode by following the steps above, then use the back button on the remote, if necessary, to get back to the top level menu.

Now, navigate to “Line multiplier opt” and press “OK”.



You can now use the remote to choose “Pure” or “Adaptive” mode. Adaptive mode is recommended for most users.

Connecting a console, PCB or other hardware

Power your DExx off and connect a suitable source to the AV1 SCART connector. For most systems, using a properly wired RGB SCART cable connected to the AV1 input is the best and easiest option. To connect component video, a passive adapter cable is required. Y connects to green, Pb connects to blue and Pr to red. The sync selector switch must also be set to SOG.

You can connect either 15khz or 31khz sources to the DExx, if you need to connect an RGBHV signal, a special adapter will need to be built. More information on connecting different types of hardware [is covered on the wiki](#).

Once you have connected your hardware, power on the DExx and select the appropriate input using the remote. Now, power on your console, PCB or vintage computer hardware. You should now see it displayed on your TV or monitor.

Scanlines

Vintage games consoles such as the Sega Megadrive and Nintendo SNES used a special screen mode which resulted in alternating lines on a CRT display being left blank. Typically when people in the retro-gaming communities refer to scanlines, they mean the blank lines between parts of an image on a CRT that were a result of this screen mode. DExx allows you to simulate these scanlines, making the image look more authentic. You can enable or disable post-processing scanlines on the DExx by pressing the Menu button on the remote and navigating to “Scanline opt.”

You can also configure scanline strength by using the Scanline Int button on the remote.

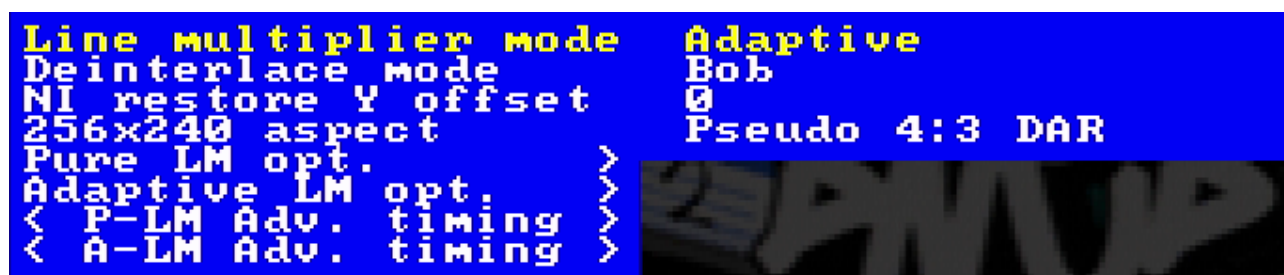
In scaler mode, the DExx also supports custom scaling algorithms (see page 20 for more information). Some of these may add scanlines to the image as the image is scaled. In this case, post-processing scanlines should be turned off.

How pronounced the scanlines would look on a real CRT varies greatly between displays, so set the scanline strength to your taste.

Setting output resolutions

In line multiplication mode the DExx takes in one scanline and outputs two or more, resulting in a lag free conversion of 240p to 480p, 720p or higher.

To change the line multiplication output resolution, press the Menu on/off button so that the on screen menu is displayed and use the back button if necessary to navigate to the top menu. Select “Line multiplier opt” and press “OK”. The menu shown below will be displayed.



Choose “Pure LM opt.” or “Adaptive LM opt.” depending on the mode you are in, for this example we will assume adaptive mode. The menu shown below will then appear.

240p proc	>	1280x720 (Line3x)
288p proc	>	1920x1080 (Line4x)
350-400p proc	>	1280x720 (Line2x)
480i proc	>	1920x1080 (Dint+L4x)
576i proc	>	1920x1080 (Dint+L4x)
480p proc	>	1920x1080 (Line2x)
576p proc	>	720x576 (Passthru)
720p proc	>	1280x720 (Passthru)
1080i proc	>	1920x1080i (Dint+L2x)
240p/288p mode	>	Generic 4:3
350-400p mode	>	Generic 4:3
480i/576i mode	>	Generic 4:3
480p mode	>	Generic 4:3
576p mode	>	Generic 4:3

You can now choose the output resolution based on the input resolution. The most common input resolutions are 240p for NTSC region retro consoles and 288p for PAL/European region consoles.

There is no right or wrong setting for the output resolution, results will vary based on the scaler and processing in your television or monitor. Some users prefer a softer, more natural CRT type look while others prefer a sharper image.

You cannot damage your display by trying the different line multiplication modes. If your display refuses to show a picture, simply use the remote to change to a different mode again.

If the DExx is set to scaler mode, the range of output resolutions is more flexible. Again, some experimentation may be required to find the best looking or most compatible modes for your display.

Changing resolution in scaler mode works in much the same way, but is done by accessing “Scaler opt.” from the top level menu. This menu is shown in the picture below.

Output resolution	>	1920x1080 (50-120Hz)
Frame lock	>	On
Aspect ratio	>	4:3
Scaling algorithm	>	Auto
Edge threshold	>	7
Deinterlace mode	>	Motion adaptive
Motion shift	>	3
240p/288p mode	>	Generic
350-400p mode	>	Generic
480i/576i mode	>	Generic
480p mode	>	DTV 480p
< Adv. timing	>	

Again, use the left and right or “Value” buttons on the remote to change the resolution. You can also press “OK” to see a list of all supported resolutions.

Output resolution	
720x480	(60Hz)
720x576	(50Hz)
1280x720	(50-120Hz)
1280x1024	(60Hz)
*1920x1080	(50-120Hz)
1600x1200	(60Hz)
1920x1200	(50-60Hz)
1920x1440	(50-60Hz)
2560x1440	(50-60Hz)

Usually the best results in scaler mode are obtained by choosing the highest resolution supported by your display. If you do not get a picture, or the picture intermittently disappears or blanks, choose a lower resolution.

FrameLock

FrameLock is an important option to understand. When FrameLock is on, output refresh rate is matched to the input. This results in a smooth image with no judder. While this is desirable, it may be necessary to turn FrameLock off for the purpose of compatibility or if your game title uses multiple screen modes (such as a game which uses interlace in the menu screens but progressive modes during gameplay). In these cases, choose “Off (50hz)” for PAL material or “Off (60hz)” for NTSC.

In line multiplier modes, frame lock is always on and cannot be disabled.

Scaling algorithm

You can use this option to change the appearance of the scaled image. Generally, it is just a matter of choosing which option you personally think looks the best. For more information on these options or to use the custom scaling algorithms, [please visit the wiki](#).

Interlace video and the DExx

Certain retro consoles and computers (e.g Sony PS2, Nintendo Gamecube) output in interlace modes. These modes send alternating scanlines to the display in each frame and were how standard definition analogue television was broadcast. To display interlace video on modern displays, it must be deinterlaced first.

In line multiplication mode, the DExx can deinterlace content like this with no input lag. However, the image that is produced tends to exhibit some flickering and combing artefacts.

If the flicker is distracting, we recommend you use the scaler mode and the motion adaptive deinterlacer. To activate the motion adaptive deinterlacer, follow these steps.

- 1) First ensure you are in scaler mode. See “Changing modes” on page 17 to confirm.
- 2) On the main menu, navigate to “Scaler Opt.” and press OK.
- 3) Navigate to “Deinterlace mode” and choose “Motion adaptive”.
- 4) If your game changes between interlace and non-interlace during play, you may also need to disable Framelock, choose “Off (50hz)” for PAL material or “Off (60hz)” for NTSC.

Try to avoid interlace software and modes where possible. If your software title supports progressive or 480p mode then be sure to enable this. **Beware of using the DExx bob deinterlacer on sources that display static graphics or text for a long period of time.** The constant flickering can cause image retention/burn-in to occur faster than normal.

Fine tuning the image

Just like with the OSSC, it is possible to fine tune image settings using the advanced timing options. For most sources, fine tuning the image is not necessary and you will get excellent results with the defaults, but if you are interested in learning more about fine tuning, please [visit the wiki page](#) and also our support forums here:-

<https://videogameperfection.com/forums/forum/osscc/osscc-discussion-support/>

Audio input and output

Analogue audio input on the DExx is processed through the AV1 SCART socket and digitised automatically.

Digital audio input via the SPDIF socket requires a small hardware modification to the DE10 Nano board. [Details of this modification will be available on the wiki.](#) Please note that doing this modification may invalidate the warranty on your DE10 Nano and VideoGamePerfection.com/VGP Media cannot be held responsible for this.

Remember, routing your DExx’s video output through equipment such as home theatre receivers or video processors can in many instances add input lag. Routing the signal through home theatre receivers, switches, splitters, audio integrators or other video processors can also increase the time it takes to re-sync the signal on game titles which switch between 480i and 240p screen modes.

Firmware updates

New features are periodically added to the DExx in the form of firmware updates. The devices firmware can be updated using an SD card. If you have firmware version 0.59 or later you can update simply by replacing the firmware file on the SD card. To update the firmware, remove the prepared Micro SD card from the DE10 Nano board, insert it into your computers SD card reader and then copy over the new DE10-Nano-vd_isl.rbf file, overwriting the old one.

To check for the latest firmware, visit this page:-

https://junkerhq.net//xrgb/index.php?title=DExx-vd_isl#Firmware_update

Troubleshooting

Symptom	Possible Cause	Solution
Image has a vertical flicker/shimmer effect	Interlace source connected	Set deinterlace mode to motion adaptive, see page 20.
Horizontal jitter/wobble on image	Fine tuning required	Try adjusting low pass filter settings. See the wiki for recommendations
Missing pixels in the image	Wrong optimal mode selected	Use generic 4:3 or Generic 16:9 mode instead
No audio	Display incompatibility	Use a different display or choose a different output mode
No audio	Sample mode incompatible	Change the Sampling format under “Audio options” to 24bit/48kHz
No image	Sync mode set wrong	Press the source button again to change sync mode. Most common sync type is RGBs for SCART, YPbPr for component and RGBHV for DSub15/VGA
No image	Incompatible output mode selected	Switch to a compatible mode. If the menu cannot be navigated, power cycle the DExx.
No image	HDMI/DVI handshake failed	Power cycle the DExx
Black screen and NO SYNC message	Source not powered on	Check power to source device
Black screen and NO SYNC message	Source not outputting RGBs or YPbPr	Make sure your source device outputs RGB and your SCART cable is wired for RGB. If using YpbPr, set the sync switch to SOG.

More information

For more information on using your DExx, see the DExx Wiki page here – https://junkerhq.net/xrgb/index.php?title=DExx-vd_isl

For technical support, visit the support forums here - <https://www.videogameperfection.com/forums/forum/osscc/>

Disposing of your DExx



If your DExx malfunctions, please contact us via e-mail or through our website to arrange repair or replacement. All DExx units sold by VideogamePerfection.com/VGP Media come with one years warranty. Outside of warranty, we can service and repair most faulty units.

Please consider contacting us before disposing of your DExx, even if you no longer want it. If you do need to dispose of the unit, in most countries you can recycle the unit for free at your local recycling centre. To find your nearest centre in the UK, visit the Recycle More website at <http://www.recycle-more.co.uk> and type in your postcode. In the Republic of Ireland, visit <https://www.weeeireland.ie/household-recycling/where-can-i-recycle/>

If you live outside of the UK or ROI, please check with local authorities or contact us to arrange for a return of your unit.