Heber

Heber MultiPi JAMMA User manual

80-23323-1

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CONTENTS

1 INTRODUCTION

Thank you for your interest in the MultiPi JAMMA System, we hope you find this manual useful for both configuration and use of your MultiPi JAMMA.

If you have any questions about the Heber MultiPi JAMMA that are not covered by this manual, please do not hesitate to contact support@heberltd.freshdesk.com

Or visit the Heber website www.heber.co.uk

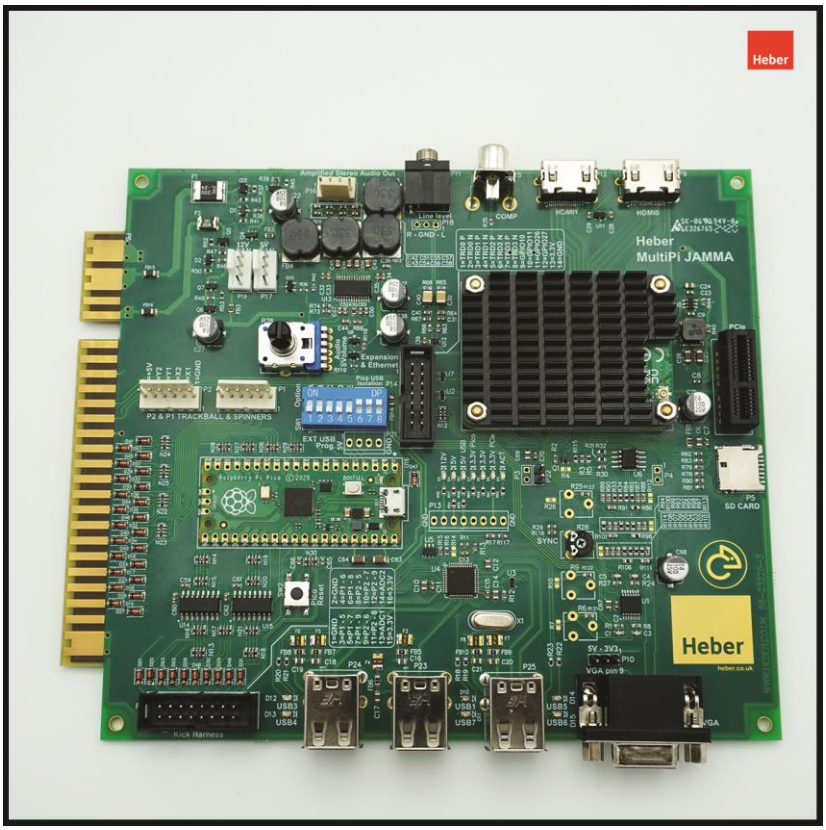
For orders and updates please see https://shop.heber.co.uk/Multi-Pi/

The Heber MultiPi JAMMA system is ready to use, fitted into a 3D printed enclosure, please see section below for setup of the operating system, game emulators and how to use.

2 MULTIPI ASSEMBLED SYSTEM CHECKS

Your MultiPi JAMMA system is assembled and ready be fitted into a JAMMA Arcade machine or JAMMA adaptor ('Supergun'), inside the 3D printed enclosure is the MultiPi JAMMA built board with a CM4 Raspberry Pi Module already fitted.

You may have a need to open up the enclosure, this can be done by removing the four M3 bolts on the underside of the enclosure.



The Heber MultiPi JAMMA system uses an embedded Raspberry Pi CM4 module with 4GB of RAM and onboard Wifi+Bluetooth. An external antenna is provided to extend the range of the Wifi.

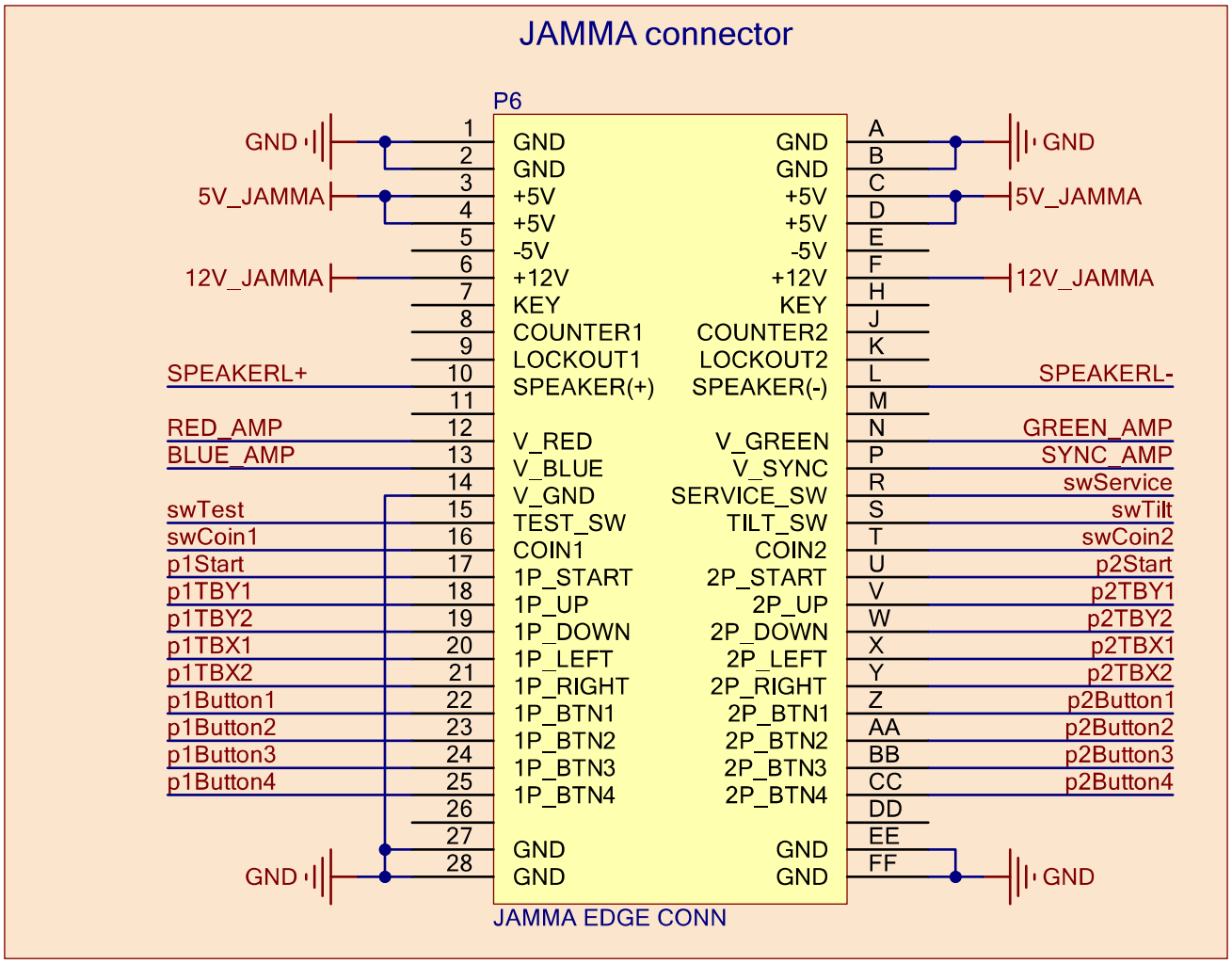
The CM4 module has a high quality heatsink with thermal pads.

MultiPi JAMMA can boot from either USB (any port), Micro SD or the PCIe X1 slot.

It is recommended to use MicroSD or the first setup, then decide if you wish to use a PCIe mass storage 'cartridge' or a USB drive for user content. If you are using a PCIe boot device, please make sure the Micro SD card is removed.

2.1 MultiPi JAMMA Connectivity – JAMMA connector

The JAMMA connector is the main interface for connecting the MultiPi JAMMA to an arcade cabinet and providing power to the board. The pinout of this connector is shown below:



2.1.1 Power

MultiPi JAMMA uses the 12V and 5V rails. Both rails include overvoltage and overcurrent protection, plus ferrite beads for EMI suppression.

For testing purposes, it is acceptable to power the system from only the 5V rail; any components that require the 12V rail will of course not work. Beware that if you inject power through any connector other than the JAMMA connector (e.g. the fan header) then the protection will be bypassed!

The 12V rail powers the following:

- 12V rail of the PCIe connector
- Audio amplifier
- 12V fan header

The 5V rail powers everything not powered from the 12V rail, including the following:

- Raspberry Pi
- +3V3 rail for the PCIe connector
- 5V fan header
- On-board CTRLDock Arcade

The 5V output of the power supply in the cabinet should supply at least 1A. This is enough to power the board with the Raspberry Pi under full load and no USB devices connected except for the on-board CTRLDock Arcade.

The 12V output of the power supply in the cabinet should supply at least 2A to drive stereo speakers at full volume.

2.1.2 Video

MultiPi JAMMA provides buffered analogue video signals at a suitable level for standard JAMMA cabinets. The VGA666 driver should be used on the Raspberry Pi and setup is identical to the MultiPi Analogue cartridge for the MultiPi; consult the MultiPi manual for instructions on setting this up for various popular operating systems.

2.1.3 Audio

Like the MultiPi Analogue Cartridge, audio comes from pins 18 and 19 of the Raspberry Pi I/O outputs.

The JAMMA connector has a standard mono output. Since stereo is not standardised across all cabinets, we have opted to only provide a standard mono output on the JAMMA edge connector, and stereo is available on a separate 4-pin KK header P16.

A class D amplifier with push-pull outputs is used to efficiently drive speakers at high volume. The negative terminal of the speaker must therefore never be connected to GND. The amplifier includes output protection, and shorting out the connector will activate this protection.

If only using the mono output, the sound should be set to mono in any retro gaming OS that offers the option. If using Raspbian OS, then mono output can be configured by doing the following:

Please see section 2.4.1 for details on configuring the audio output.

2.1.4 Joystick connectivity

The standard set of JAMMA joystick controls is connected to the on-board CTRLDock Arcade.

2.2 MultiPi JAMMA Connectivity – external ports and expansion

The MultiPi JAMMA is designed to be used as a classic arcade machine, but it is also a fully configured Raspberry Pi computer, almost anything you can do with a Raspberry Pi 4, you can also do with the Heber MultiPi. The MultiPi has a number of upgrades over the standard Raspberry Pi 4 –

A PCIe X1 expansion port is included – this port can be used for many different expansion upgrades, including high speed mass storage (PCIe M.2 NVMe SDD or a USB 3.0 PCIe expansion card.
Many other PCIe x1 cards are also available. We recommend using the PCIe slot for a mass storage boot device in the form of a front cartridge.

A 3D printed enclosure for a standard NVMe to PCIe x1 slot is available from our Printables account - https://www.printables.com/@Multisystem/models

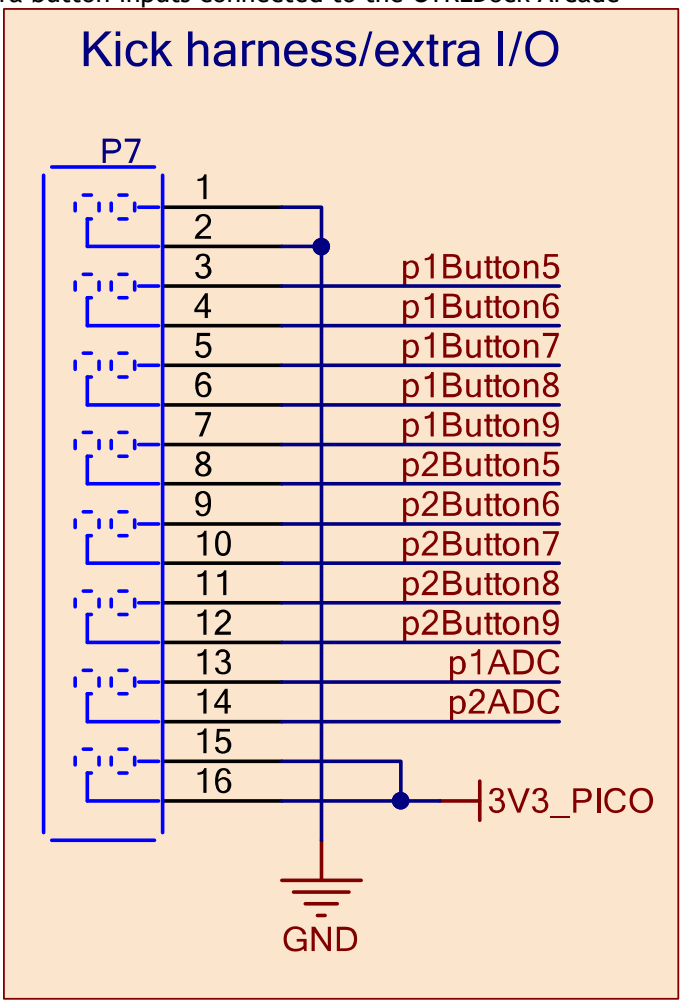
You can select and use your own M.2 PCI SSD in this adaptor.

At the top edge of the MultiPi JAMMA are the following ports:

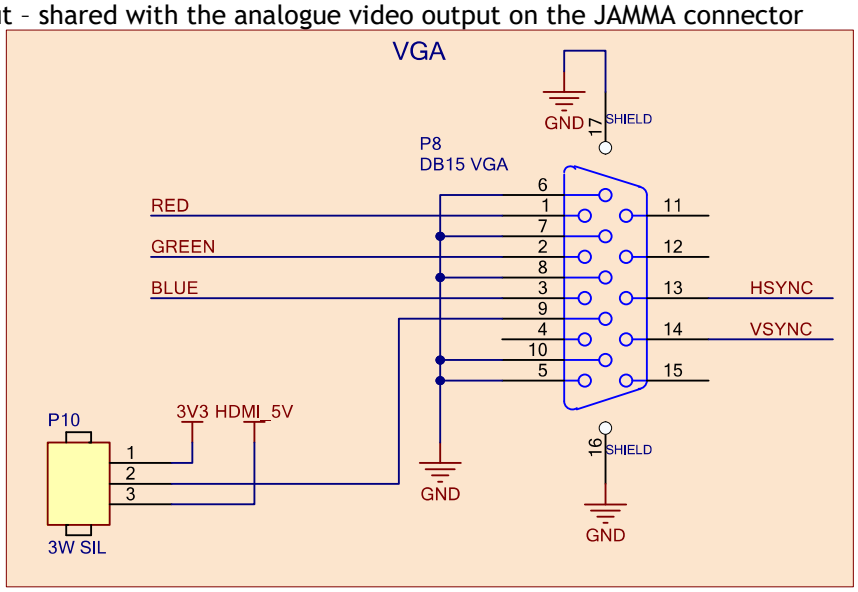
- HDMI0 – Default Digital HDMI video output.
- HDMI1 – Second screen, span or clone HDMI video output.
- Composite video output – can be configured for use in Raspberry Config file.
- Unamplified stereo audio output – P18 and P11.
- Amplified stereo audio header – P16.

The bottom edge of the MultiPi has the following ports:

- Kick harness – extra button inputs connected to the CTRLDock Arcade

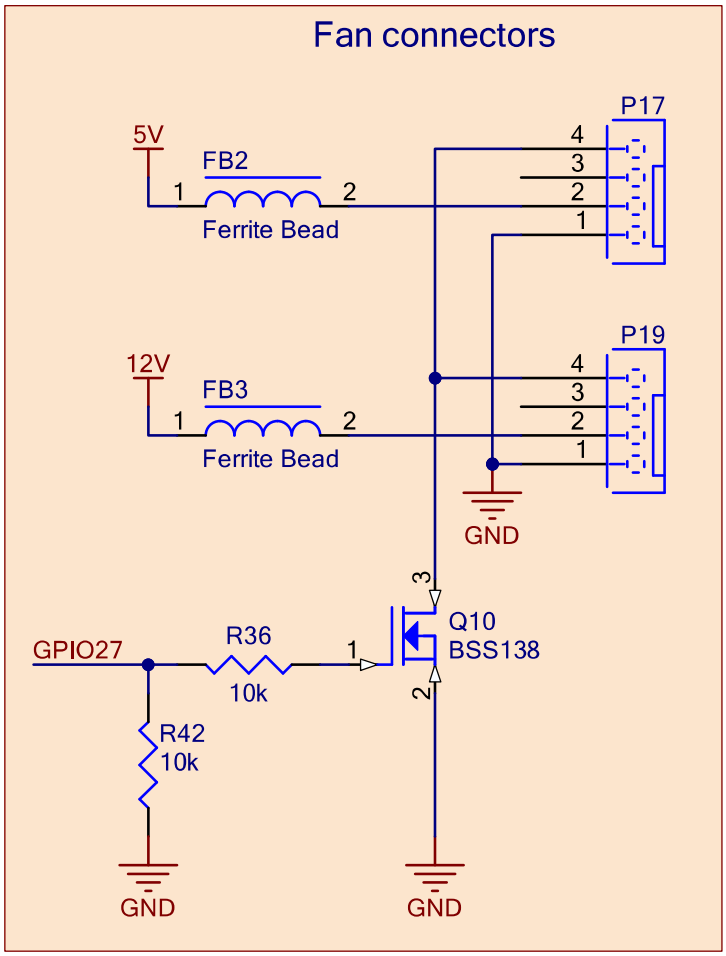


- 6 USB 2.0 ports
- VGA output – shared with the analogue video output on the JAMMA connector



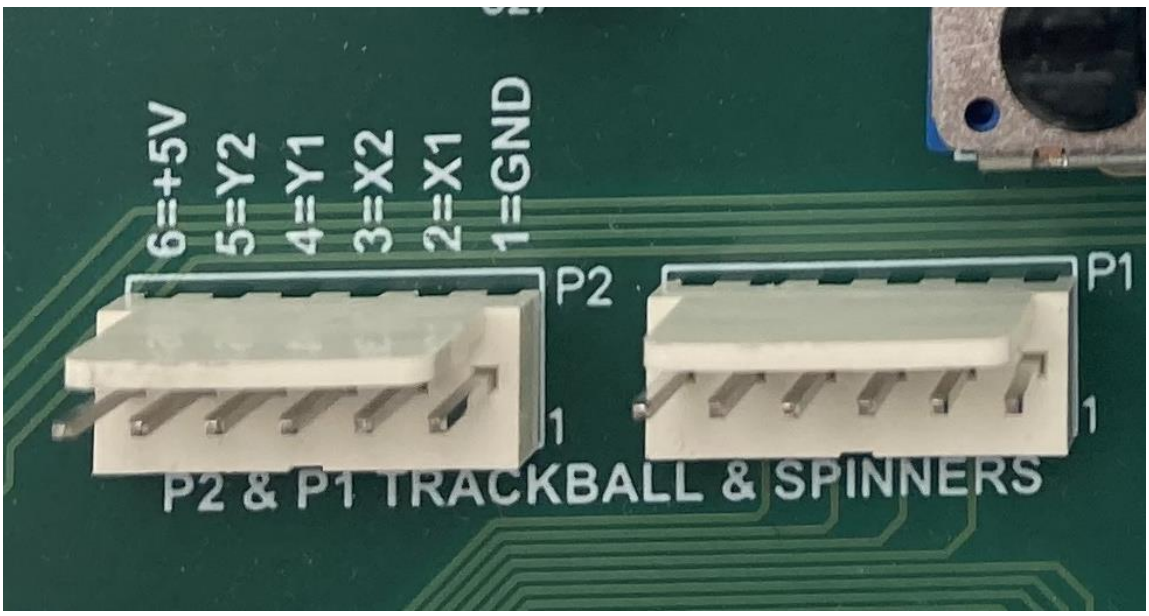
Other headers on the MultiPi PCB:

- P19 – 12V PWM fan header following the Intel PWM fan specification controlled via GPIO27
- P17 – 5V PWM fan header following the Intel PWM fan specification controlled via GPIO27

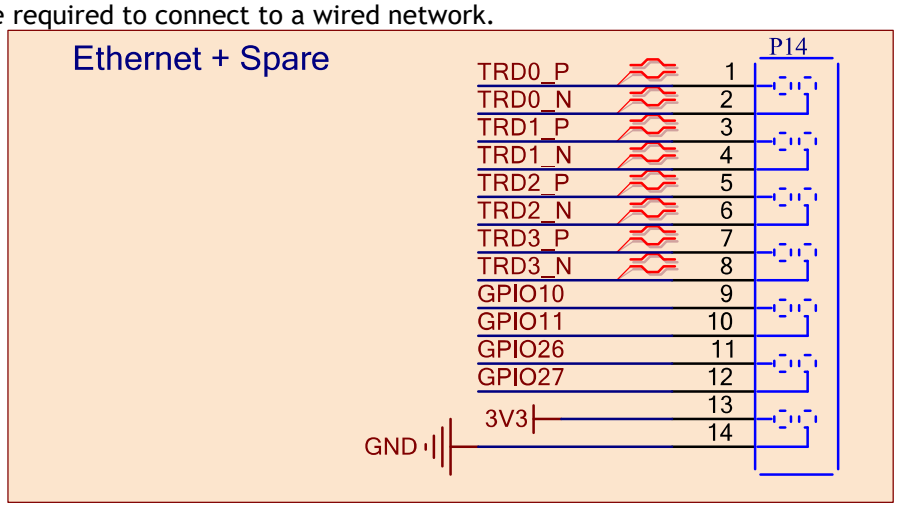


The Intel specification calls for a frequency between 21kHz and 28kHz; the software PWM function in RPi.GPIO can generate a 25kHz signal with minimal CPU overhead. Note that the duty cycle is quite inaccurate and can only be set in the range of about 30% (when set to 1) to 70% (when set to 99) or of course 100% or 0%. Most users will probably not need a fan.

- P1 and P2 – separate headers for trackballs/spinners in case they are not connected to the JAMMA harness; these pins are shared with the X1/X2/Y1/Y2 pins on the JAMMA connector

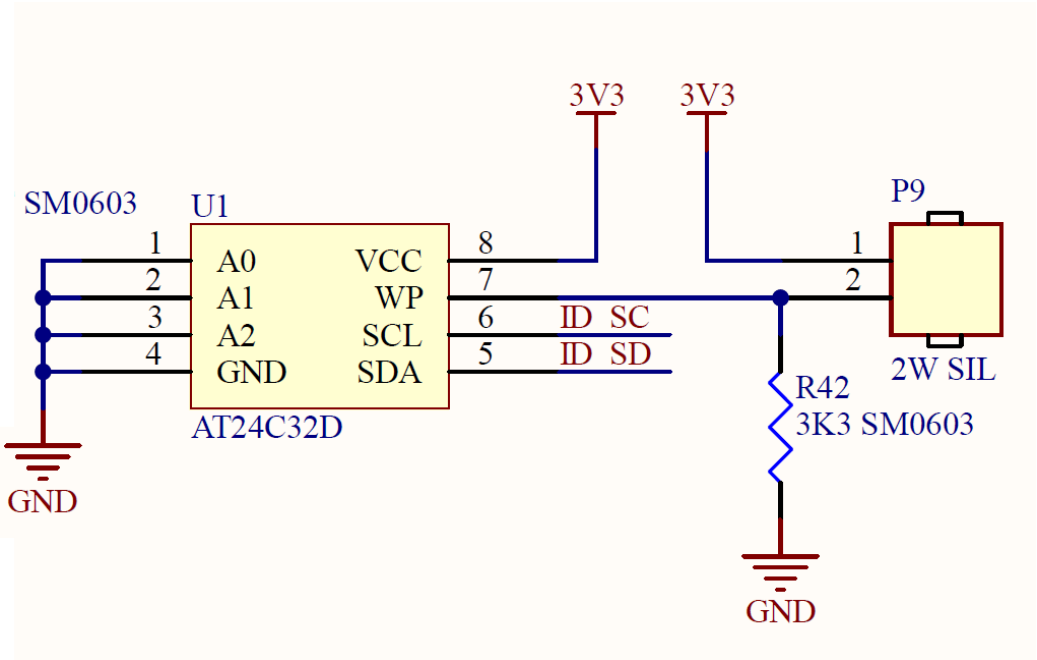


- P21 – USB header for the CTRLDock Arcade; this allows the Pi Pico to be programmed or the joysticks to be tested using a separate computer by switching off positions 6, 7 and 8 on SW1.
- P14 – Ethernet and spare GPIO – breaks out the Ethernet pins from the CM4. A magjack would be required to connect to a wired network.



- P22 – write protect for the ID EEPROM.

The MultiPi JAMMA has an identification EEPROM (24C32 – 32Kbit) fitted for detection of the Analogue output from an O/S or emulator, this configuration can be read or written to this EEPROM.



2.3 Connecting up for HDMI Output (recommended for first setup)

Install the MultiPi JAMMA in the arcade cabinet.

If starting with a fresh unconfigured operating system then the system must be configured to use the analogue video output.

Connect up a HDMI screen to HDMI 0 and a USB keyboard and optional USB mouse to any two USB ports.

You are now all ready to use MultiPi JAMMA, but first you will need to setup an SD card.

2.4 Installing OS and retro game emulation software.

You have a choice of a large number of ready-made Raspberry Pi installations, both for computing and also specifically for Retro Gaming, classic Arcade emulation and various dedicated systems etc.

The analogue video output uses the VGA666 driver and OS setup procedures are identical to those for the MultiPi Analogue Cartridge; consult the MultiPi manual (80-23322) for these.

The on-board CTRLDock Arcade should be automatically detected as joysticks and as mice if configured to use trackballs.

Once the video output on the MultiPi JAMMA is set up, use a test pattern to fine tune the cabinet's monitor's picture adjustment controls.

2.4.1 Audio configuration

For the audio, the configuration is also the same as the MultiPi Analogue Cartridge. If using the stereo output, or using the mono output but only with games using mono output, then no further setup is needed. If stereo games are to be used with an arcade cabinet featuring a mono speaker, then the operating system should be configured for mono output.

On most dedicated retro gaming OSes, the audio output should be an option in the settings.

On Raspbian, some editing of a configuration file is required to mix the stereo output into mono.

```
$ sudo nano /etc/asound.conf
```

Add the following:

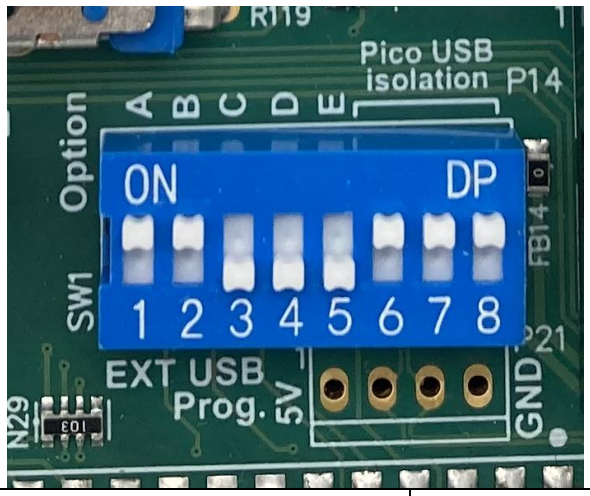
```
pcm.card0 {
  type hw
  card 0
}

ctl.card0 {
  type hw
  card 0
}

pcm.monocard {
  slave.pcm card0
  slave.channels 2
#  type plug
```

```
  type route
  ttable {
    # Copy both input channels to output channel 0 (Left).
    0.0 0.5
    1.0 0.5
    # Copy both input channels to output channel 1 (Right).
    0.1 0.5
    1.1 0.5
  }
}

ctl.monocard {
  type hw
  card 0
}

pcm.!default monocard
```

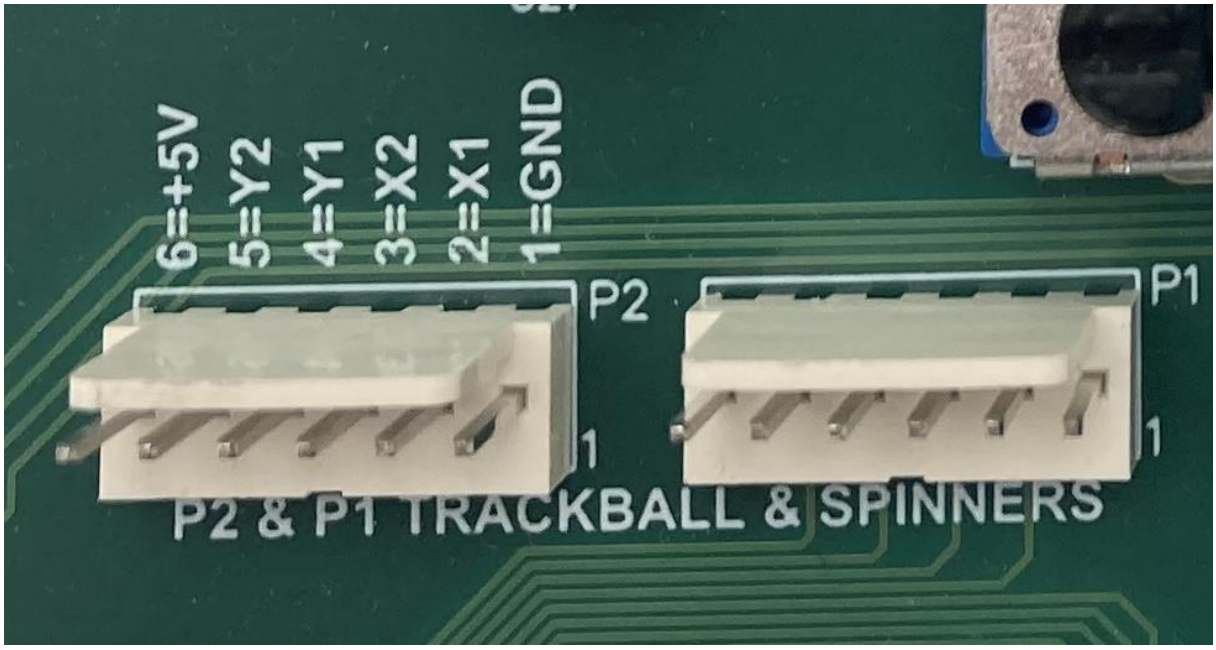
Press Ctrl+X to save and exit then reboot the Pi.

2.5 CTRLDock Arcade setup

CTRLDock Arcade supports a joystick or 2-axis trackball, start, coin, and 9 action buttons per player, plus service, test and tilt switch inputs. These inputs include protection against being connected to the power supply and are suitable for use with both 'open drain' drivers such as a button connected between the input and GND and 'push pull' drivers such as the outputs of many trackballs. A button is detected as pressed when it is shorted to GND.



Switch number	Down (OFF)	Up (ON)
1	P1 Joystick	P1 Trackball
2	P2 Joystick	P2 Trackball
3	Buttons are mapped to joystick, even for players with trackball enabled	Buttons are mapped to mouse buttons for players with trackball enabled
4	Trackball operates at normal speed	Trackball operates at double speed
5	Analogue input channels on the kick harness are unused	Analogue input channels on the kick harness are used – full scale voltage range of 0V to 3.3V, one per player.
6	CTRLDock Arcade USB interface is disconnected from the CM4. The USB interface is accessible via P21 and can be used to connect CTRLDock Arcade to another computer.	CTRLDock Arcade USB interface is connected to the CM4 – use this position for normal operation.
7		
8		



P21 pinout:

1. 5V
2. D-
3. D+
4. GND

A reverse diode is fitted between 5V and GND which should protect CTRLDock Arcade from accidental reverse power connection to this header.

3 EXAMPLE O/S RETRO ARCADE EMULATOR - RGB PI

The MultiPi JAMMA is software compatible with the Multi Pi (Console version) so the following is an extract from the MultiPi (console) manual as an initial guide for setting up RGB Pi emulation.

One of the many alternative operating system for retro gaming is RGBPi and it's designed to run with the MultiPi JAMMA. If you want so switch between HDMI and Analogue video, then Recalbox or AdvancedMAME may be better software for you. However, if you only want to run all original analogue resolutions of the original hardware using an Arcade monitor, CRT or VGA, then RGBPi O/S is a really great choice.

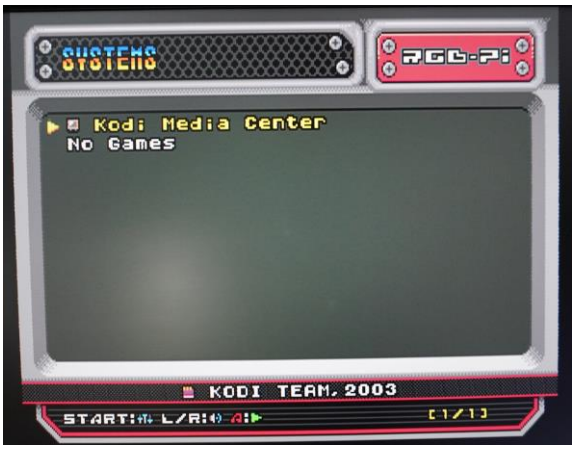
It's also super easy to setup and use on MultiPi JAMMA–

All you need to do is download the RGBPi O/S - https://www.rgb-pi.com/#os

Install the image onto a micro SD card, size of your choice with a suitable imager software.

Then after the image is completed, insert into the MultiPi system and power on –

You will get analogue 240p video output on the RGB JAMMA output along with amplified audio. This is designed to be used on a 15Khz RGB Arcade monitor or VGA multi-sync CRT.

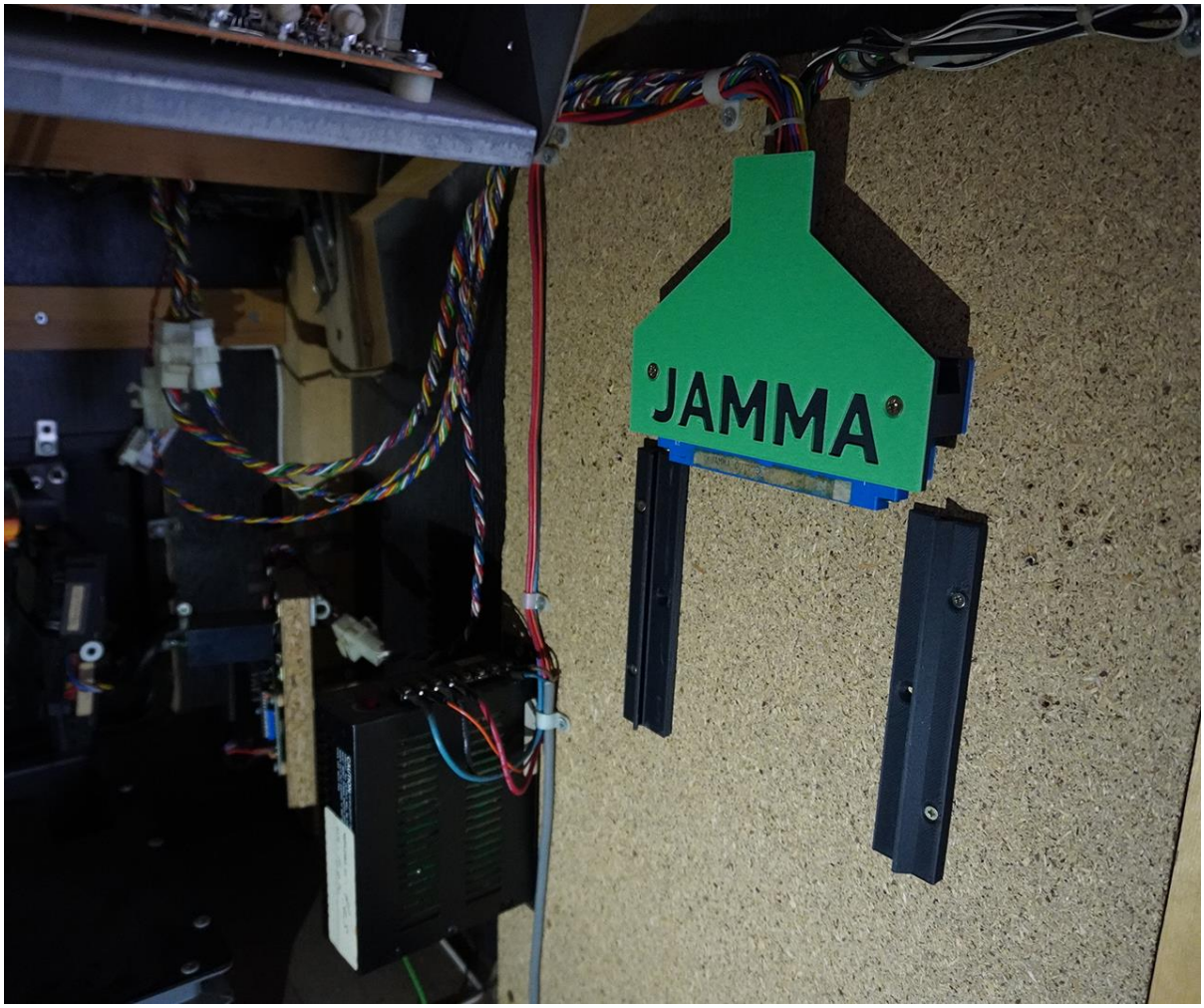


Setup via the options menu, including the option to use Kiosk mode (handy for Arcade machines).

RGBPi supports a lot of different consoles and computers, including MAME Arcade game emulation. You will need to add your own retro-games, then enjoy!

4 ARCADE CABINET INSTALLATION

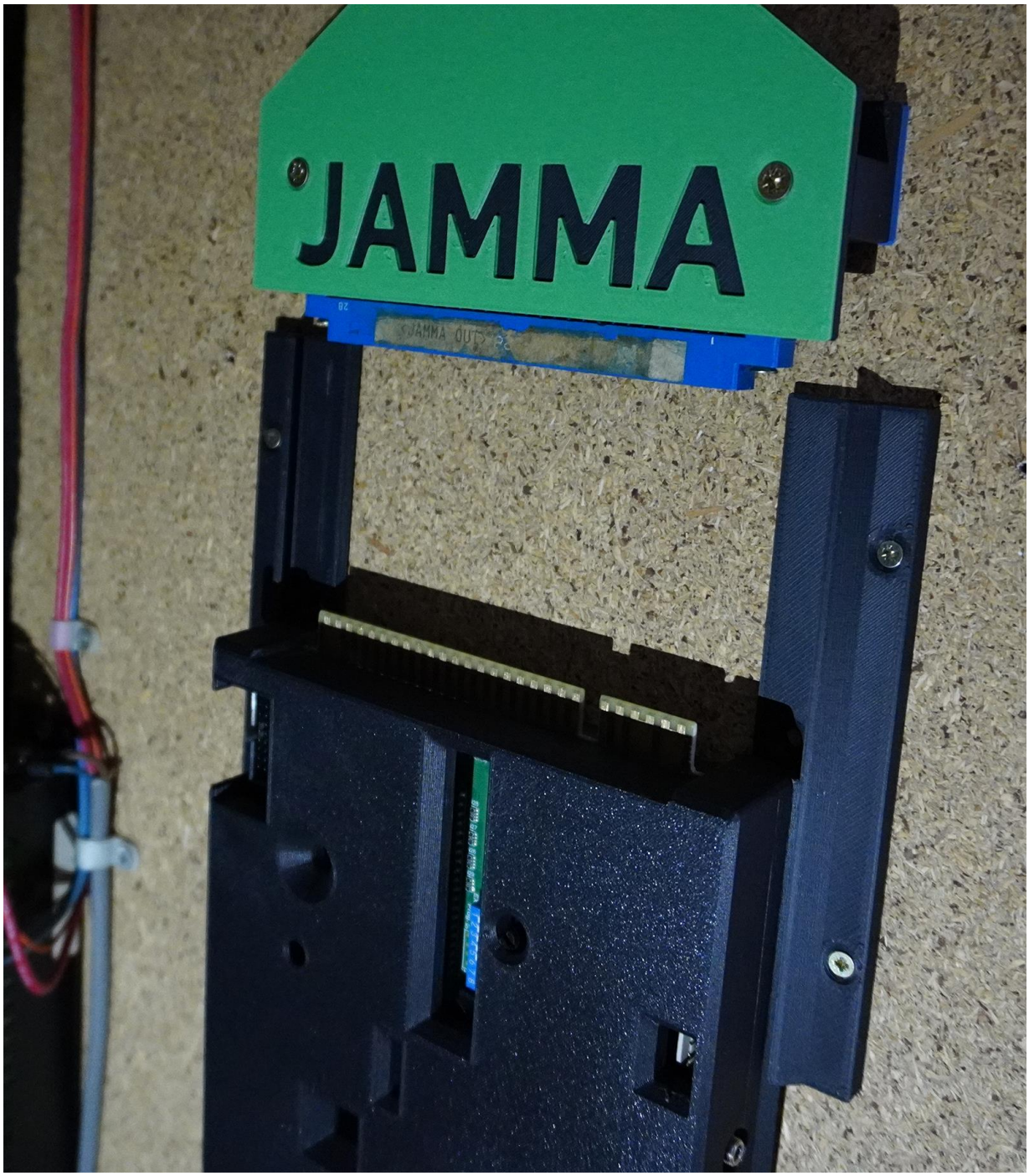
The MultiPi JAMMA system comes with two mounting rails that can be fitted into your Arcade machine or on a suitable non-conductive surface for using the MultiPi JAMMA system.



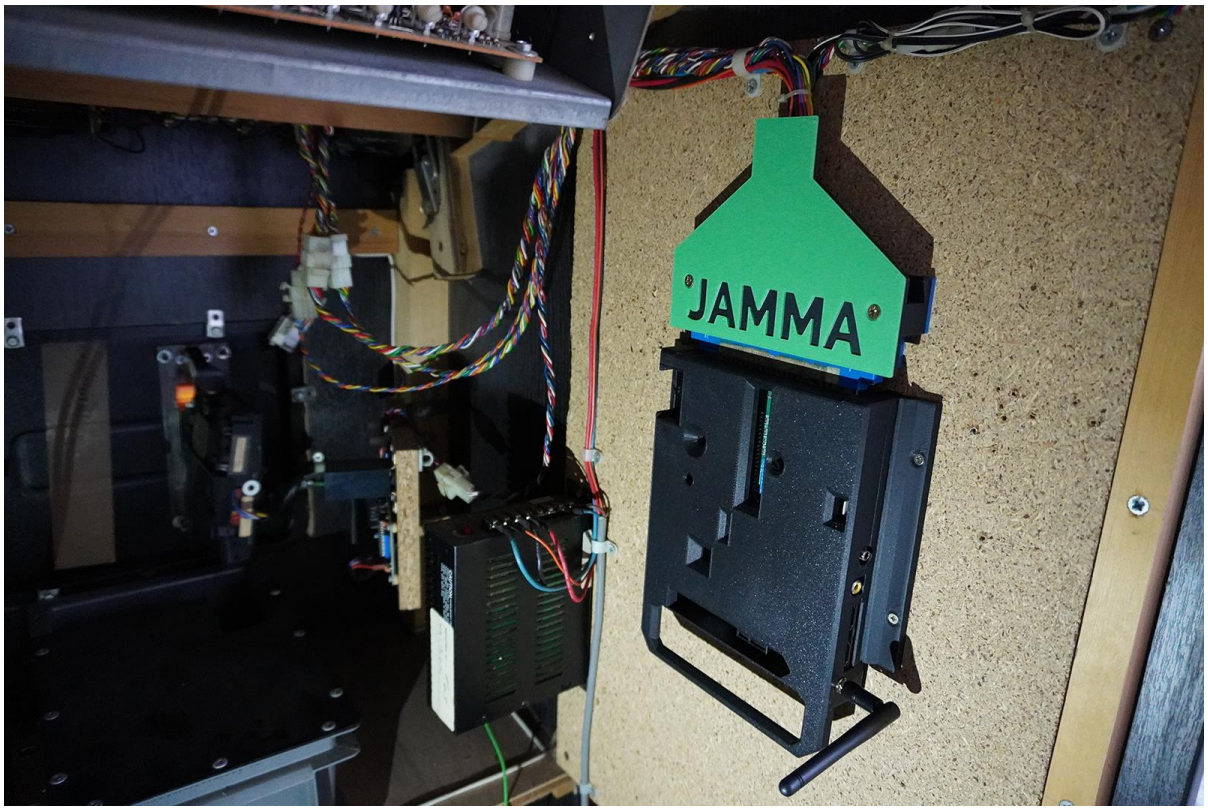
A typical JAMMA wiring loom will consist of a 56 way edge-finger connector that is expecting to connect to a JAMMA board with matching edge fingers.

Please do check carefully that your arcade machine or arcade equipment is fitted with a JAMMA wiring loom before connecting the MultiPi JAMMA.

You can fit the side rails as shown above.



Slide the MultiPi JAMMA system into your JAMMA connector and check that it’s fitted tightly.



If you have an SD card fitted or an optional mass storage SSD (PCIe X1 M.2 SSD cartridge) you can now secure your arcade cabinet doors and connect power.

Note that many Arcade cabinets will not power up without all doors fitted and secured or locked. This is an electrical safety feature of most Arcade machines.

5 GENERAL ADVICE & WARNINGS FOR OPERATION

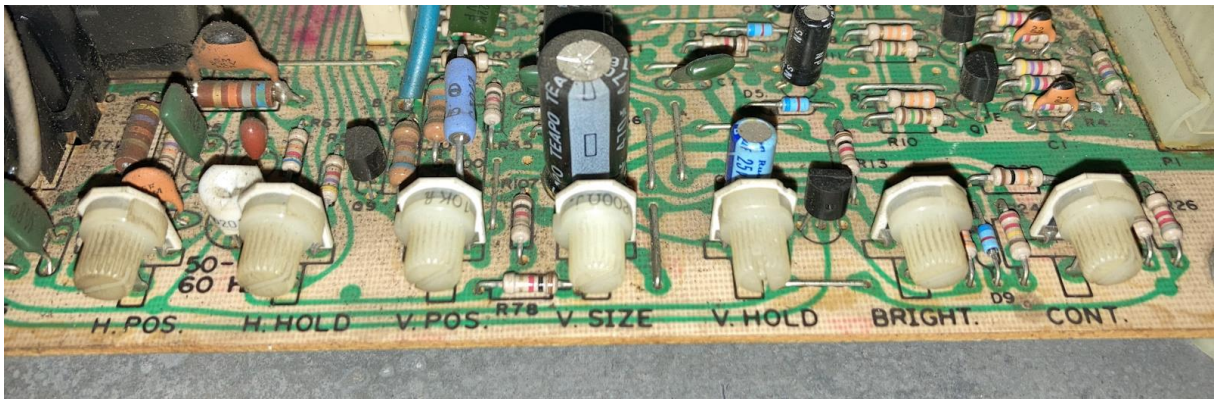
You should already be aware of the dangers inside a vintage arcade cabinet and with an open-frame arcade CRT display, power supplies and mains wiring. Please do be careful if/when adjusting arcade monitor controls or generally using & operating an old or new Arcade machine.

5.1 FAQ

5.1.1 Sync issues with JAMMA monitors

R28 can be used to adjust the sync voltage level to suit picky monitors, this should help you lock in a signal, but be aware your arcade monitor also will have some level of video controls.

Most Arcade monitors have full controls over both Horizontal and vertical sync adjustments along with frequency, width, height, brightness and contract adjustments.



You may need to adjust these for the various frequencies and resolutions that the MultiPi JAMMA can output. These output resolutions are either defined by the emulator or as a function of the specific arcade game or system that's being emulated.

5.1.2 Analogue Audio sound output is not working or too loud

First check if your arcade cabinet has a volume control on the speakers, this may just be turned down too low or alternatively may be very loud.

MultiPi JAMMA is designed to drive a 4Ohm or 8Ohm speaker rated to around 10W.

It is quite normal for a new O/S install to default to digital HDMI sound output.

The Raspberry Pi CM4 does not have a dedicated analogue audio output, but it can be configured to use Pins 18 and 19 of the GPIO. We have connected up the JAMMA audio output via these pins. They must be configured in the config file to work.

If you can't get analogue audio from the JAMMA output or vis the 3.5mm jack, please check you have the following commands in the config.txt

```
# Enable audio (loads snd_bcm2835)
dtparam=audio=on
dtoverlay=audremap,pins_18_19
```

You may also need to select the analogue audio output in your O/S or emulator application, this is usually ‘headphones’ but can be also listed as other analogue outputs.

5.1.3 I have installed a different operating system or emulator and now USB is not working

If you install an operating system, emulator or software package and the USB ports do not light up with green LED’s when devices are connected (not operating), then it’s probably that the software is not designed for the CM4 version of the Raspberry Pi.

Add the following into the config.txt and that should enable the USB and USB Hub on the MultiPi.

```
[cm4]
# Enable host mode on the 2711 built-in XHCI USB controller.
# This line should be removed if the legacy DWC2 controller is required
# (e.g. for USB device mode) or if USB support is not required.
otg_mode=1
```

5.2 General feedback and contact us

We want to hear any ideas or feedback you have for the MultiPi range of systems.

That can include thoughts on the 3D printed enclosure, design usability and general enjoyment of the system, whatever you want to say, please feel free to get in contact. support@heberltd.freshdesk.com

Or visit the Heber website www.heber.co.uk

For orders and updates please see https://shop.heber.co.uk/heber-multipi-jamma-arcade-system/

If you need any community support you can visit the RMCretro community Discord chat server at https://discord.gg/RMCretro - This is a wonderful community that can help answer questions from other MultiPi owners and people using other Heber products.

Tweet us @MultisystemFPGA Show us your setup and how you are using the MultiPi JAMMA.

5.3 declarations of conformity

"Hereby, Heber Ltd declares that the radio equipment type 01-23378-3 is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address: https://heber.co.uk/standards/

"Hereby, Heber Ltd declares that the radio equipment type 01-23378-1 is in compliance with S.I.2017/1206. The full text of the UK declaration of conformity is available at the following internet address: https://heber.co.uk/standards/

Retro Collective