



Heber

Super CTRLDock user manual and operational guide

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1 INTRODUCTION

Thank you for purchasing the Super CTRLDock (NES & SNES classic controller interface).

The Super CTRLDock adds low latency (around 2ms) support for NES gamepads, SNES gamepads, and the SNES Mouse to the Multisystem. Two NES and two SNES gamepads may be connected directly to the Controller Slice, and up to four NES controllers and eight SNES controllers may be connected at the same time using the Nintendo Four Score™ and MultiPlayer 5 accessories.

The Super CTRLDock and MiSTer Multisystem is brought to you by Heber Ltd and The Retro Collective. Additional testing and collaboration with RMCretro on the Multisystem range of products.

If you have any support questions or need any advice on using the system, please do not hesitate to contact The Retro Collective or your local supplier or distributor.

For technical questions about this manual, the Multisystem technology or for any queries that Heber can provide, please contact multisystem@heber.co.uk Or visit the Heber website www.heber.co.uk

For orders and updates please see www.rmcretro.store

The Super CTRLDock can be used with many different types of system, the MiSTer, Multisystem, Raspberry Pi, Windows, Linux and Mac OS will recognise this as a 12-port HID game controller device. The Super CTRLDock also works with the Nintendo Switch when the Super CTRLDock is programmed with the alternative firmware.

Nintendo®, Four Score™, Switch™, Hori®, Pokken™, NES & SNES are trademarks or registered trademarks of their respective owners. This product is not licensed or endorsed by Nintendo.

2 THE SUPER CTRLDOCK HARDWARE



The Super CTRLDock 'Controller Slice' PCB



The Super CTRLDock PCB in optional 3D printed enclosure (stand-alone USB)

1. SNES connector for control pad or SNES Mouse (Port 1)
2. NES connector for control pad (Port 3)
3. Mouse speed switch (Middle of above Image)
4. NES connector for control pad (Port 4)
5. SNES connector for control pad or SNES Mouse (Port 2)

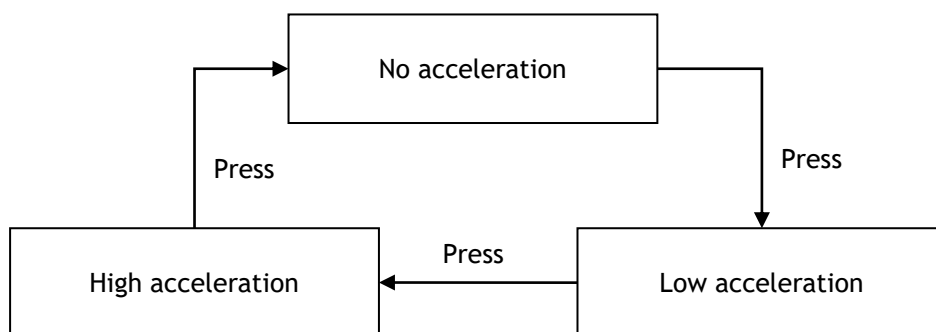
2.1 Controller port protection system

Each port is equipped with a 100mA resettable fuse on the 5V connection and resistors on the other signal lines to protect the Super CTRLDock and control system in the event of a short circuit.

2.2 Mouse speed switch

The mouse speed switch changes the 'speed' of the SNES Mouse. D1 will blink when the button is pressed to confirm the button press.

The speed control is implemented inside the SNES mouse and applies an exponential function to the number of units the mouse has moved between polls of the mouse. The polling rate of the controllers is reduced from 500Hz to 125Hz when the mouse is plugged in because the acceleration will not work correctly otherwise.



The initial acceleration setting when the mouse is plugged in is not defined.



SNES Mouse (use SNES port 1 or 2).

2.3 Multitaps



The Controller Slice is designed to work with multitaps for both the NES and SNES.

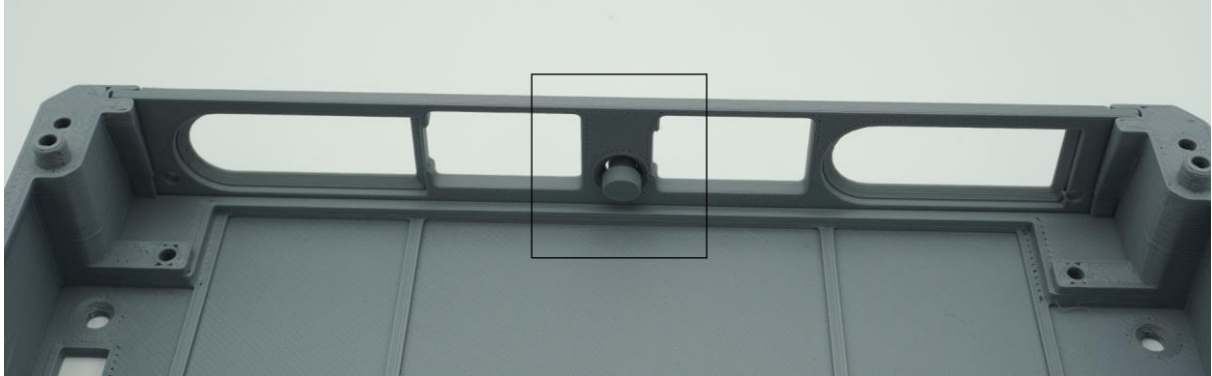




Branded or 3rd party unbranded MultiTap adaptors should be compatible.

3 SETUP AND INSTALL INTO ENCLOSURES

3.1 Enclosure installation

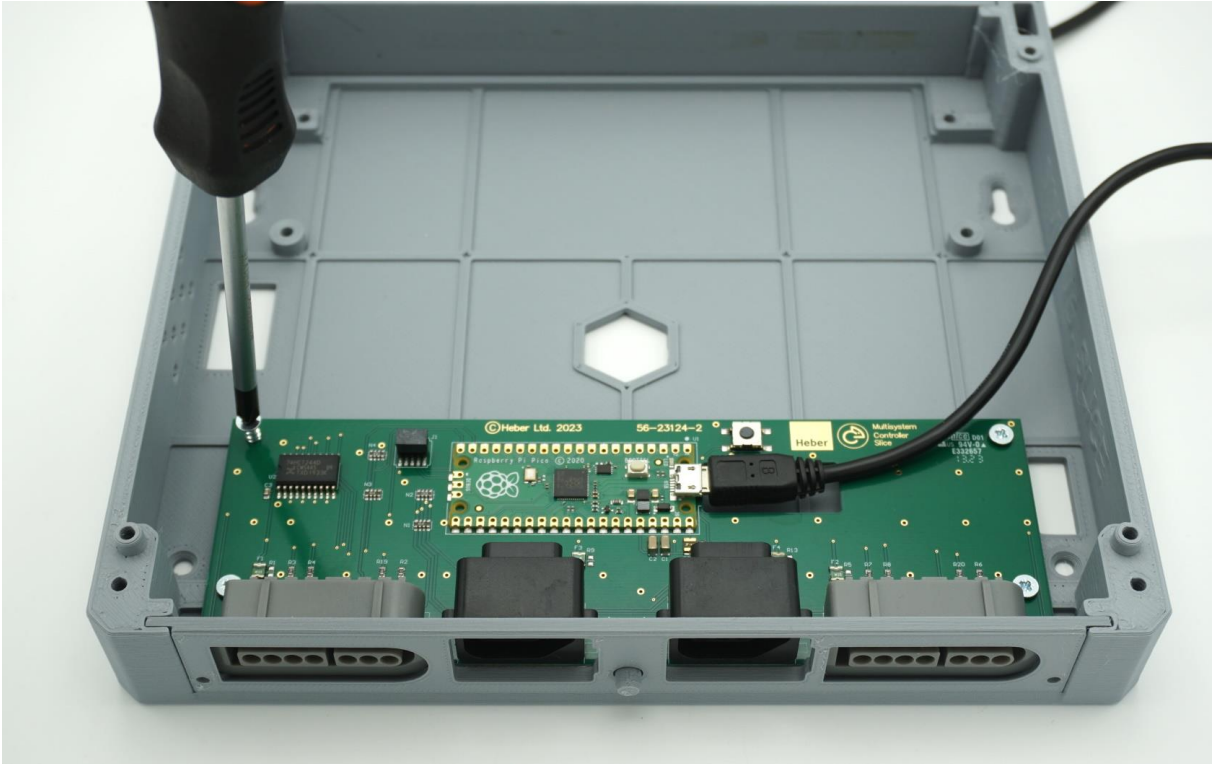


Make sure to install the connector panel and button as shown above.

If you purchased the optional enclosure or Slice tray, please follow the instructions below.



The Slice can be used without an enclosure, but it is highly recommended that the optional 3D printed stand-alone case or the Multisystem Slice tray is used.



Fitting into the Multisystem Slice tray is straightforward and only requires 4 x M3 self-tapping screws and a micro-USB cable. The micro USB cable is plugged into the onboard Raspberry Pi Pico.



The standalone enclosure design also only requires 8 x M3 self-tapping screws and a micro-USB cable.

The enclosure has a cable exit, this can also accept a tie-wrap if you wish.

The Super CTRLDock / Slice can now be used as a high speed, low latency USB controller interface for your classic game controllers.
No USB drivers should be required.

The Slice can be used in any USB 2.0 controller port on the Multisystem or other USB based gaming system.



Two slice modules can be fitted, or the remaining internal space and removable back panel can be used for an optional SDD/HDD or other storage device or additional controller connection.



Connect the Super CTRLDock / Controller Slice to the USB port on the Multisystem (not SNAC/USER port). The USB port 7 is ideal for connection of the USB cable from the Slice to the Multisystem.



The Slice tray is designed to be fitted directly under the Multisystem console case. Alternatively, you can also stack multiple slice trays and add more CTRLDock interfaces to your Multisystem.

The Multisystem dust cover, or cartridge cover can be fitted and other Multisystem cartridges can also still be used with the Slice tray fitted.



Or you can use any USB 2.0/3.x port for connection.

3.2 MiSTer / Multisystem controller setup

Connect the controllers to the Controller Slice and press a button on the controller. Controllers are assigned to players in the order in which buttons are pressed. Multiple Controller Slices or USB controllers will be recognised as additional players.

Check that the button mapping is satisfactory for each core which is to be used. Each controller type can be used with any core; controllers are not restricted to use with their original system's core, but it may be necessary to remap some of the buttons for the best experience when using a certain controller with a certain core. To remap the controls for the currently running core, open the Menu by pressing the yellow button on the Multisystem, press Right to switch to the System menu, press Down to reach 'Define <core> buttons' and the Enter key on the keyboard or main action button on the controller to remap the controller.

No setup is required for the SNES Mouse. Simply connect the mouse to either SNES port, and the mouse should work with any core that supports USB mice.

3.3 Using the Super CTRLDock with systems other than MiSTer/MMS

The Controller Slice also works with Windows and Linux, so can be connected to a PC or Raspberry Pi. No drivers are required.

Mice are supported as well as controllers, but the SNES Mouse was originally designed for a system with a very low screen resolution, so movement of the cursor will be slow on modern high-resolution systems, although it performs reasonably well if the highest mouse speed setting is used.

All CTRLDock Firmware can be found on the Heber Github - [Heber-co-uk \(Heber Ltd\) \(github.com\)](https://github.com/Heber-co-uk)

Super CTRLDock (Standard) firmware is here - [Heber-co-uk/SuperCTRLDock: Super CTRLDock firmware - NES & SNES retro controllers via Low latency USB interface \(github.com\)](https://github.com/Heber-co-uk/SuperCTRLDock: Super CTRLDock firmware - NES & SNES retro controllers via Low latency USB interface)

The alternative firmware must be programmed for Super CTRLDock to work on the Nintendo Switch. Super CTRLDock (Switch) firmware - [Heber-co-uk/SuperCTRLDock-Switch: Super CTRLDock firmware to allow retro controllers support on the Nintendo Switch console \(github.com\)](https://github.com/Heber-co-uk/SuperCTRLDock-Switch: Super CTRLDock firmware to allow retro controllers support on the Nintendo Switch console)

3.3.1 Programming the firmware

To change the firmware on the board:

1. Hold down the BOOTSEL button (pictured) at the same time as either plugging in the USB connection to a computer or pressing the Reset button on the board



2. The board will show up on the computer as a USB Mass Storage device. Drag and drop the new firmware (.uf2 file) onto this drive. The board will be immediately reprogrammed with the new firmware.

On Nintendo Switch, Super CTRLDock can be plugged into the dock when playing on the TV, or it can be plugged directly into the tablet part of the system when playing undocked using a USB type C On-The-Go adapter.

3.4 Other controller arrangements



The Nintendo Four Score adaptor can be used with the Super CTRLDock but requires the use of NES extension leads as this device has a single plug with both ports fixed next to each other.



Standard NES and other compatible joysticks such as the QuickShot also operate with the Super CTRLDock.



The Nintendo NES Advantage 2 player joystick has been tested. The player select switch works as expected if both plugs are connected.



The Super Famicom controllers and also generic 3rd party SNES pads should also work with the Super CTRLDock.



We hope you have fun and let us know if you discover a controller that is not supported.

4 CONTROLLER MODES

4.1 Firmware comparison

Feature	Standard firmware	Firmware for Nintendo Switch
Works on PC	Yes	Yes
Works on MiSTer	Yes	Yes
Works on Nintendo Switch	No	Yes
Multitaps supported	Yes	Yes
SNES Mouse supported	Yes	Yes
USB PID and VID	Heber VID and Super CTRLDock PID ensures that MiSTer won't mix up the button mapping with other products	Same VID and PID as Hori® Pokken™ controller means it wouldn't be possible to have separate button mappings for these on MiSTer
Controller to USB report mapping	Each port has a fixed report number per section 4.2	Plugged in controllers are allocated to report numbers sequentially per section 4.3
D-pad mapping	Analogue stick axes	Hat switch
Special button combos	None	Home, ZL + ZR

4.2 Controller mapping (standard firmware only)

On MiSTer systems, controllers are assigned to players in the order that each controller receives a button press for the first time after starting a new core or resetting controller assignments in the menu, so users do not need to worry about which controller number corresponds to which control pad.

On other systems, the controller may need to be selected manually. The Nintendo Controller Slice will enumerate as 12 joysticks, detailed in the table below. Please note that on Windows, the name of the first joystick will be used for all 12 joysticks, and the order that they appear in the Game Controllers Control Panel may not be correct; this is down to how joysticks are implemented in Windows and not a fault of the Controller Slice.

Report number	Report string	Controller
0	Retro Mouse	SNES Mouse on any port
1	Joy 1	SNES control pad connected directly to Port 1 or to the first port of a multitap connected to Port 1
2	Joy 2	SNES control pad connected directly to Port 2 or to the first port of a multitap connected to Port 2
3	Joy 3	NES control pad connected directly to Port 3 or to the first port of a multitap connected to Port 3
4	Joy 4	NES control pad connected directly to Port 4 or to the first port of a multitap connected to Port 4
5	Joy 5	SNES control pad connected to the second port of a multitap connected to Port 1
6	Joy 6	SNES control pad connected to the second port of a multitap connected to Port 2
7	Joy 7	SNES control pad connected to the third port of a multitap connected to Port 1
8	Joy 8	SNES control pad connected to the third port of a multitap connected to Port 2
9	Joy 9	SNES control pad connected to the fourth port of a multitap connected to Port 1
10	Joy 10	SNES control pad connected to the fourth port of a multitap connected to Port 2
11	Joy 11	NES control pad connected to the second port of a multitap connected to Port 3
12	Joy 12	NES control pad connected to the second port of a multitap connected to Port 4

4.3 Controller mapping (firmware for Nintendo Switch only)

The Switch will only use the first 7 USB report IDs. Any after that are ignored, which means that with the original controller mapping scheme, the last port of the SNES multitap (MP5) and the extra ports on the NES multitap (FS) don't work. To work around this problem, the firmware identifies which controllers are plugged in and assigns them to the lowest numbered record IDs.

The scheme has been implemented so that the data from the controllers that are actually plugged in are copied into the lowest numbered joystick reports. Unused ports on the MultiPlayer 5 are skipped. Unused ports on the NES Four Score are not skipped but that's fine because you just leave the unneeded half of the Four Score unplugged in the case of needing to use three NES controllers with Super CTRLDock. Super CTRLDock does not need to be power cycled when plugging controllers; the controllers are instantly rearranged when connected or disconnected. This scheme ensures that no matter what combination of controllers you want to use on Nintendo Switch, you can have 7 working controllers. On the Nintendo Switch itself, controllers are detected in the order that a button is first pressed on each one, much like on MiSTer, so the user does not need to think about the controller report mapping.

4.3.1 Examples

Left SNES port: None

Left NES port: Controller

Right NES port: Controller

Right SNES port: Controller

Reports:

Joy 1: Controller plugged into right SNES port

Joy 2: Controller plugged into left NES port

Joy 3: Controller plugged into right NES port

Joy 4+: Nothing

Left SNES port: Controller

Left NES port: Controller

Right NES port: Controller

Right SNES port: Controller

Reports:

Joy 1: Controller plugged into left SNES port

Joy 2: Controller plugged into right SNES port

Joy 3: Controller plugged into left NES port

Joy 4: Controller plugged into right NES port

Joy 5+: Nothing

Left SNES port: MP5 with 4 controllers

Left NES port: Controller

Right NES port: Controller

Right SNES port: None

Reports:

Joy 1: Controller plugged into MP5 port labelled 2

Joy 2: Controller plugged into left NES port

Joy 3: Controller plugged into right NES port

Joy 4: Controller plugged into MP5 port labelled 3

Joy 5: Controller plugged into MP5 port labelled 4

Joy 6: Controller plugged into MP5 port labelled 5

Joy 7+: Nothing

Left SNES port: MP5 with 2 controllers

Left NES port: Controller

Right NES port: Controller

Right SNES port: None

Reports:

Joy 1: Controller plugged into MP5 port labelled 2

Joy 2: Controller plugged into left NES port

Joy 3: Controller plugged into right NES port

Joy 4: Controller plugged into MP5 port labelled 3

Joy 5+: Nothing

Left SNES port: MP5 with 3 controllers

Left NES port: Four score with 1 or 2 controllers

Right NES port: Controller

Right SNES port: None

Reports:

Joy 1: Controller plugged into MP5 port labelled 2

Joy 2: Controller plugged into FS port labelled 1

Joy 3: Controller plugged into right NES port

Joy 4: Controller plugged into MP5 port labelled 3

Joy 5: Controller plugged into MP5 port labelled 4

Joy 6: FS port labelled 3 (regardless of whether a controller is plugged into it)

Joy 7+: Nothing

4.4 Controller button mapping

Button number	Standard firmware		Nintendo Switch firmware	
	SNES button	NES button	SNES button	NES button
1	B	A	Y	
2	A		B	B
3	Y	B	A	A
4	X		X	
5	L		L	
6	R		R	
7	Select	Select	Simulated ZR	
8	Start	Start	Simulated ZL	
9			Select	Select
10			Start	Start
13			Simulated Home	

4.4.1 Nintendo Switch firmware simulated button presses

These special buttons can be activated by holding the below combinations of buttons on the retro controllers:

- ZL + ZR
SNES controller: L + R + Select
NES controller: A + B + Select
- Home
SNES controller: L + R + Start
NES controller: A + B + Start

5 NOTICES

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.