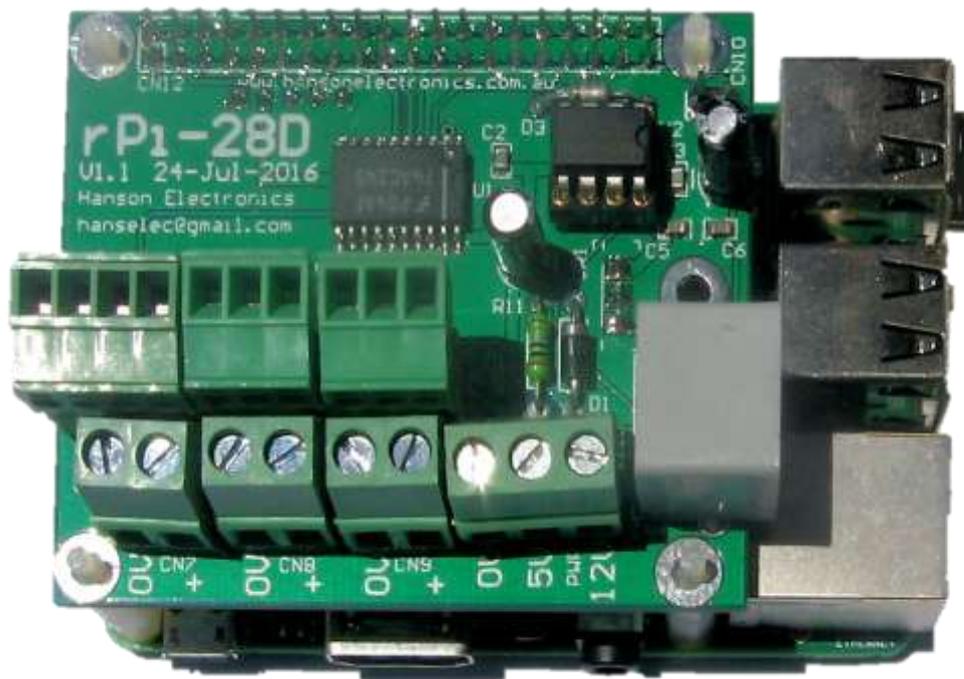


HANSON ELECTRONICS



rPi-28D USER MANUAL

Features

- Suits Raspberry Pi 2, 3 and Zero
- 2 WS281x compatible outputs (WS2811, 2812, 2813, INK1003 etc)
- 1 WS2801 compatible output
- 1 DMX output. Can be software configured for DMX, Renard, LOR
- 1 GPIO input that can be configured in software for triggers
- Real time clock to allow standalone scheduled playback
- 5V or 12V power (12V is 12-24V tolerant)
- 3 unfused power inputs for 3 pixel outputs
- PCB size is 67mm x 56mm

Revision 1.1
Suits PCB revision 1.1
23 January, 2018

The rPi-28D is a cape/hat that is designed to add pixel and DMX (RS485) capability to the Raspberry Pi series of single board computers. The hat mounts to the 40 way male header of the Raspberry Pi 2, Raspberry Pi 3 or Raspberry Pi Zero and attaches via the supplied nylon M2.5 screws, nuts and standoffs. The rPi-28D powers the Raspberry Pi so there is no need to supply power to the Pi separately. The rPi-28D is controlled by Falcon Player (FPP) running on the Pi. FPP downloads and it's documentation is at falconchristmas.com .

Using the WS2811 outputs disables the onboard audio and external usb audio must be plugged in and configured if needed.

The DMX output is designed for the RJ45 connector to be placed along the same axis as the Ethernet connector for the Pi.

The power and pixel data connectors are located on the same side as the Pi audio and video output connectors.

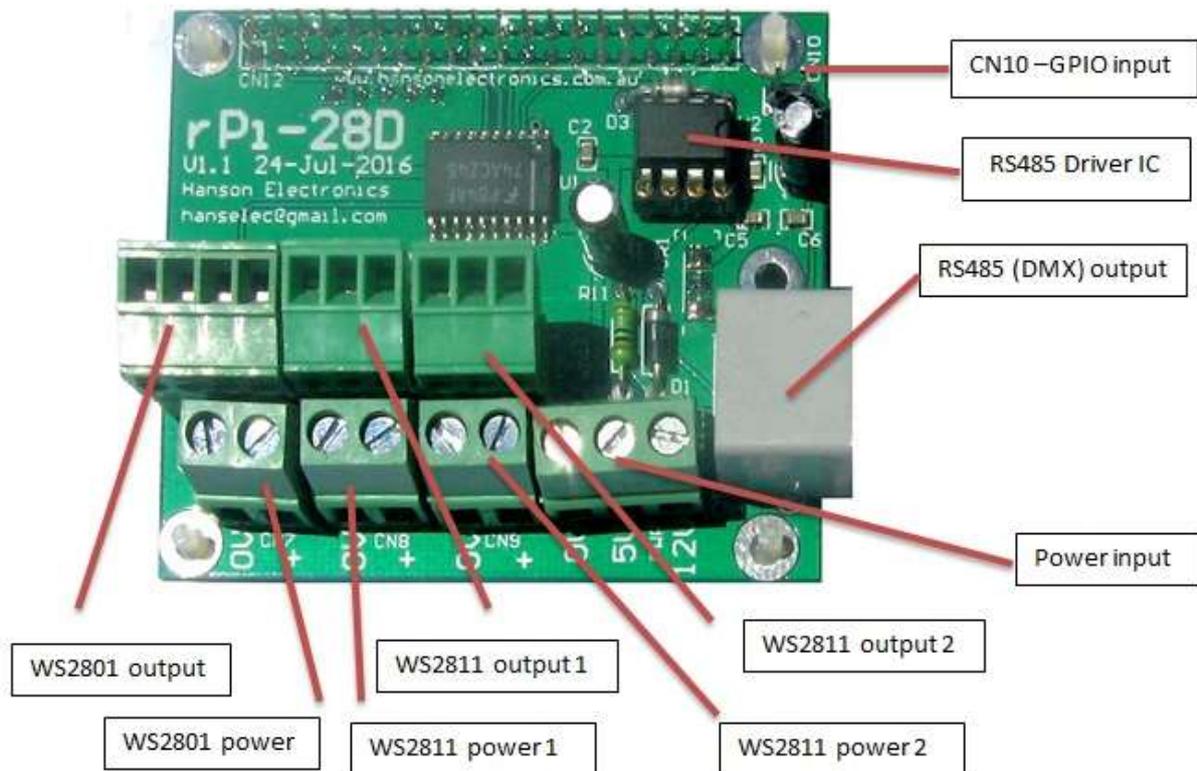
Note:- The rPi-28D is supplied as a board only with mounting hardware. The Raspberry Pi, USB thumbdrive and SD storage device and any cables are not supplied.



rPi-28D mounted to a Pi.
M2.5 nuts not installed



Underside of rPi-28D.
RTC uses CR2032 battery (not supplied or installed)



The 3 pixel connectors are pluggable and the function of each of the pins is labelled on the pcb. The 3 connectors for the pixel power are simple pass through to the matching pixel output connectors. The power connectors are each labelled with 0V and +.

Power

The rPi-28D can be powered from either 5V DC or 12V DC although the 12V is actually tolerant of any voltage in the range of 9V to 24V. The connected Raspberry Pi is powered from the same power source. You can power the rPi-28D off the Raspberry Pi's power input if absolutely necessary or desired.

If running the rPi-28D from 5V then connect the power to the 0V and 5V terminals of CN5 the 3 pin PWR terminal block. A 2A fuse is recommended in series.

If running off 12V (see range above) then connect the power to the 0V and 12V terminals of CN5. A 1A fuse is recommended in series.

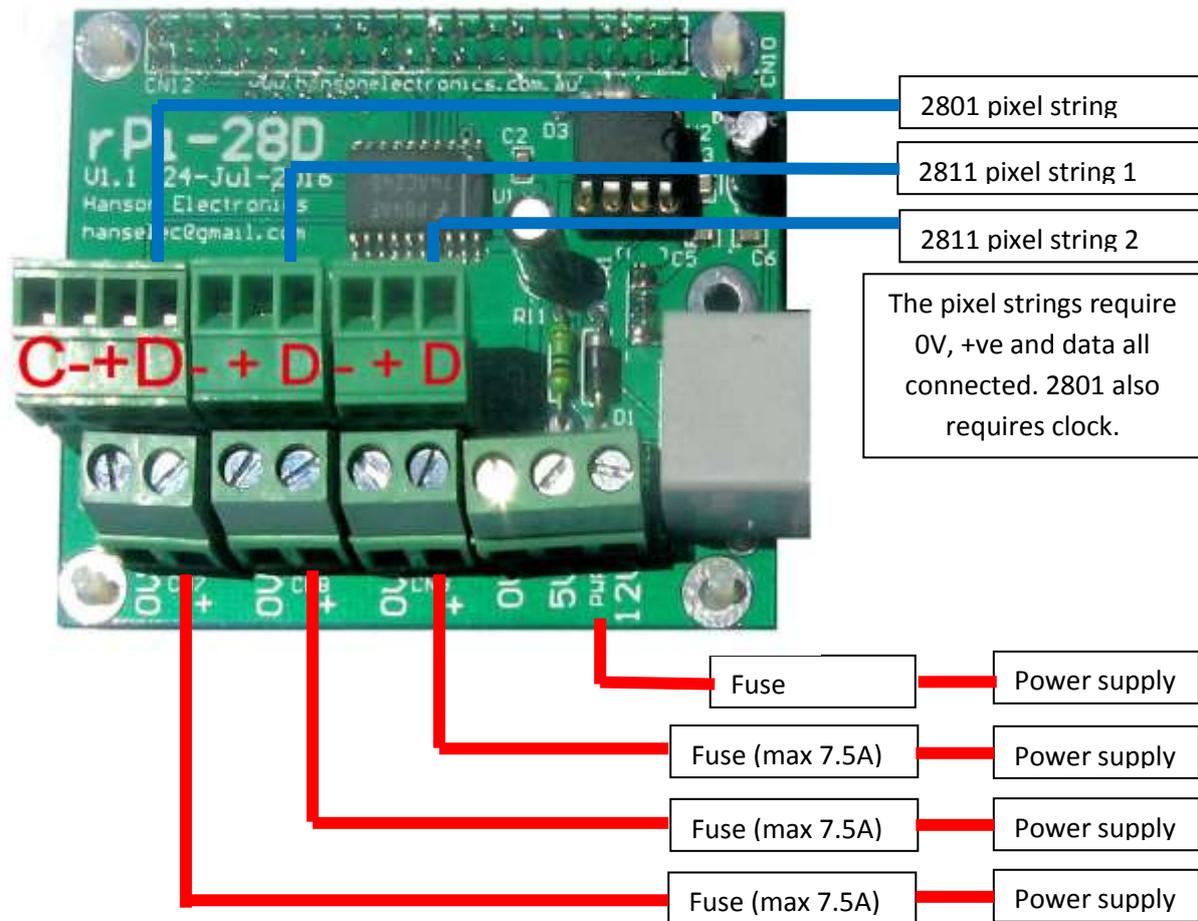
The 3 pixel outputs can be powered from the same or different voltage power supplies. The pluggable pixel connectors are rated at 7.5A so a fuse of no higher than 7.5A should be in series with the power input.

Connecting 12V to the 5V power input will damage components on the pcb and may damage the Raspberry Pi. Connecting 5V to the 12V input will cause the board to not work due to insufficient voltage. Connecting the power in reverse can also damage the board and Pi.

DMX output

The RS485 output of the rPi-28D is wired according to the ESTA pinout with pin 1 being Data +, pin 2 being Data- and pins 7 and 8 being gnd. It's possible in the FPP setup to configure the data type as DMX, LOR or Renard. It will be necessary to use an adaptor or crossover cable to connect to these other style of controller. The RS485 driver IC is in an IC socket and can be easily replaced if damaged. The DMX output is not electrically isolated from the Pi.

Powering pixels through rPi-28D

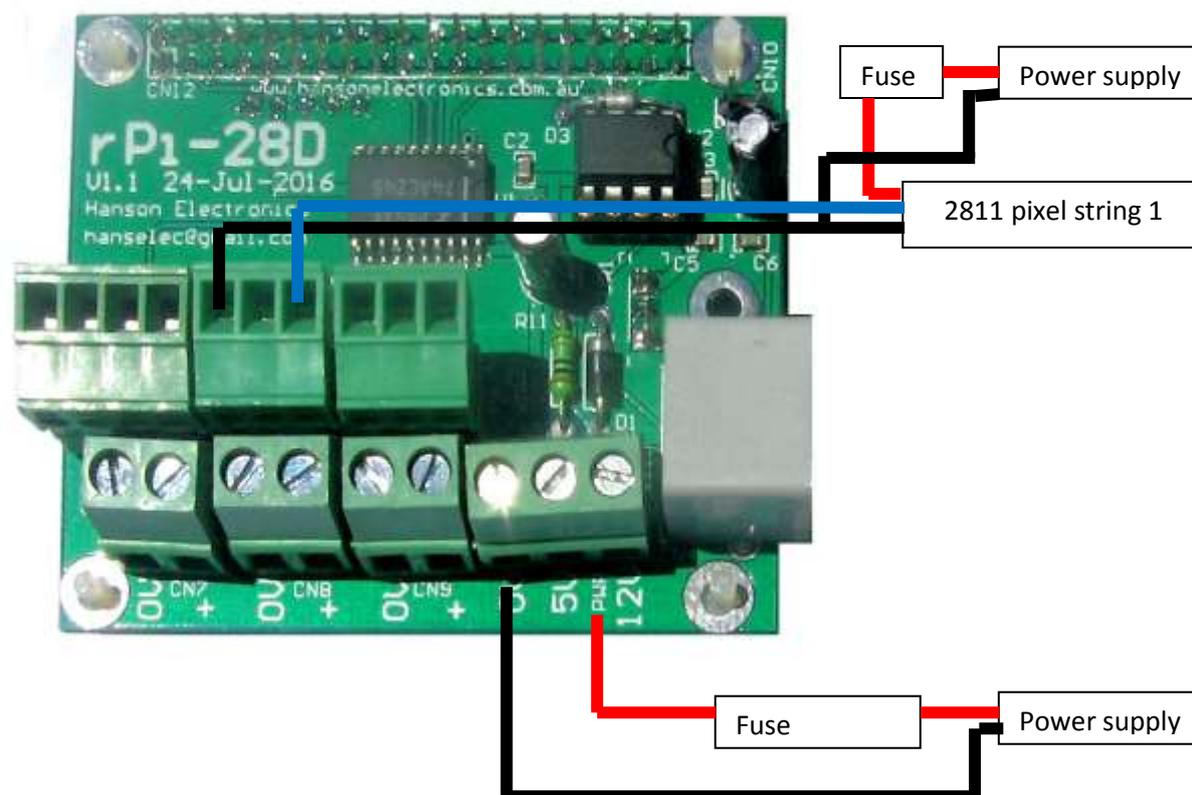


Power supply connections showing how the board and pixels are connected if powering pixels through the rPi-28D. If this method is used then up to 150 pixels (at 100% brightness) can be powered through the board. Power injection may be required depending on pixel wiring.

The 0V/Ground connection isn't shown for image clarity but is required. Four power supplies are shown but depending on the pixel voltage/s only 1 may be required.

The power for the pcb is not shown connected to the 5V or 12V input. It connects to the 1 that matches the power supply voltage. If 5V then a 2A fuse should be used. If 12V then a 1A fuse should be used.

Powering pixels external to rPi-28D

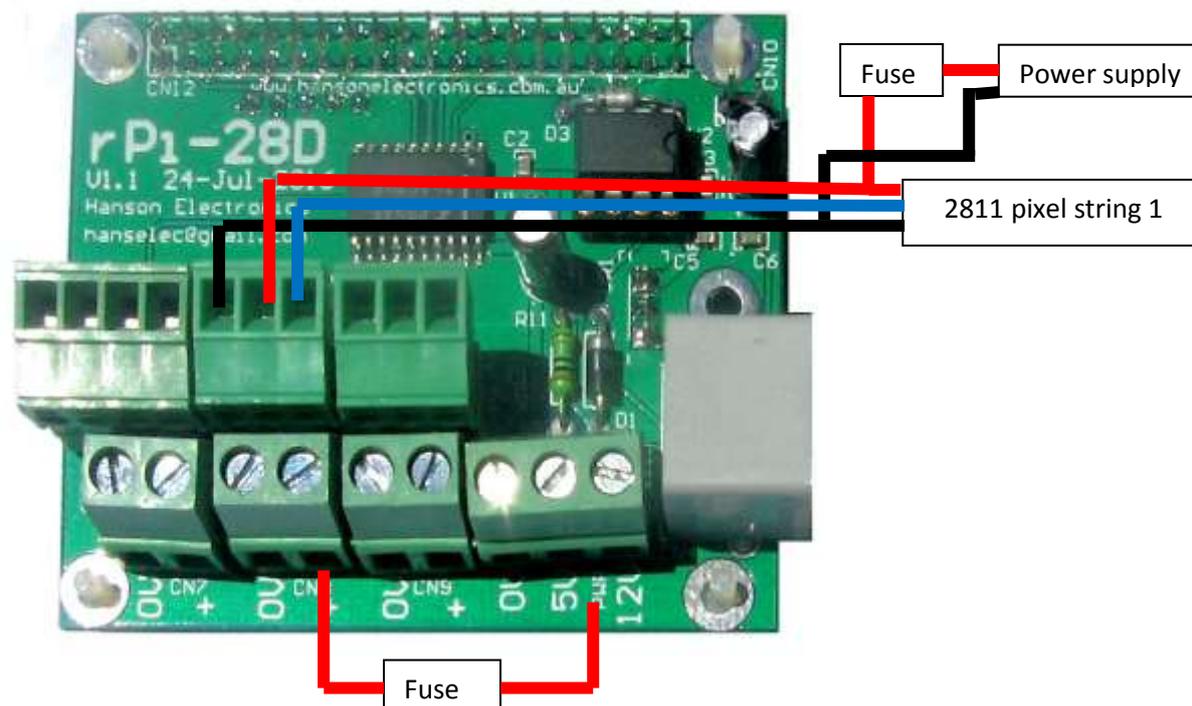


One pixel power supply is shown but depending on the pixel voltage/s more than 1 may be required. It is possible to mix between powering through the rPi-28D and powering external to it.

The power for the pcb is not shown connected to the 5V or 12V input. It connects to the 1 that matches the power supply voltage. If 5V then a 2A fuse should be used. If 12V then a 1A fuse should be used.

The 0V/-ve/GND and Data (plus Clock for 2801) must always be connected. With this method of connection there is virtually no voltage loss so lighter duty cable can be used.

Powering rPi-28D from pixels



One pixel power supply and string is shown. This method of powering the rPi-28D can be used on any 1 of the 3 pixel outputs. The power wiring between pixel string and rPi-28D needs to be sufficient to handle the 1A for 12V or 2A for 5V that the board requires. For 5V extra care in cable size needs to be taken as a voltage drop of more than about 100mV may render Pi inoperable.

The power for the pcb is not shown connected to the 5V or 12V input. It connects to the 1 that matches the power supply voltage. If 5V then a 2A fuse should be used. If 12V then a 1A fuse should be used.

Alternately the 1A or 2A fuse can be mounted at the pixel/power supply end.

Falcon Player (FPP) configuration

The 3 types of output from the rPi-28D are configured on the “Other” tab under the “Input/Output Setup”. The channels used have to setup in the E1.31 tab. The screenshot below shows the configuration of the 3 types of outputs. Any of the 4 outputs (3 types) can be left disabled if not needed.

The “Act” checkbox must be ticked to enable the output.

As of FPP Version 1.9-74 the 3 pixel outputs are each limited to 1000 pixels (3000 channels) for the 2 WS281x outputs and 510 pixels (1530 channels) for WS2801..

The WS2801 output CN1 (Pwr CN7) is configured as type “SPI-WS2801” and the port is “spidev0.1”

The 1st WS2811 output CN2 (Pwr CN8) is configured as type “RPIWS281X” . The port is automatically assigned to GPIO18.

The 2nd WS2811 output CN3 (PWR CN9) is configured via the same setting as the 1st.

The FPP start channel and total channel count spans both string #1 and string #2.

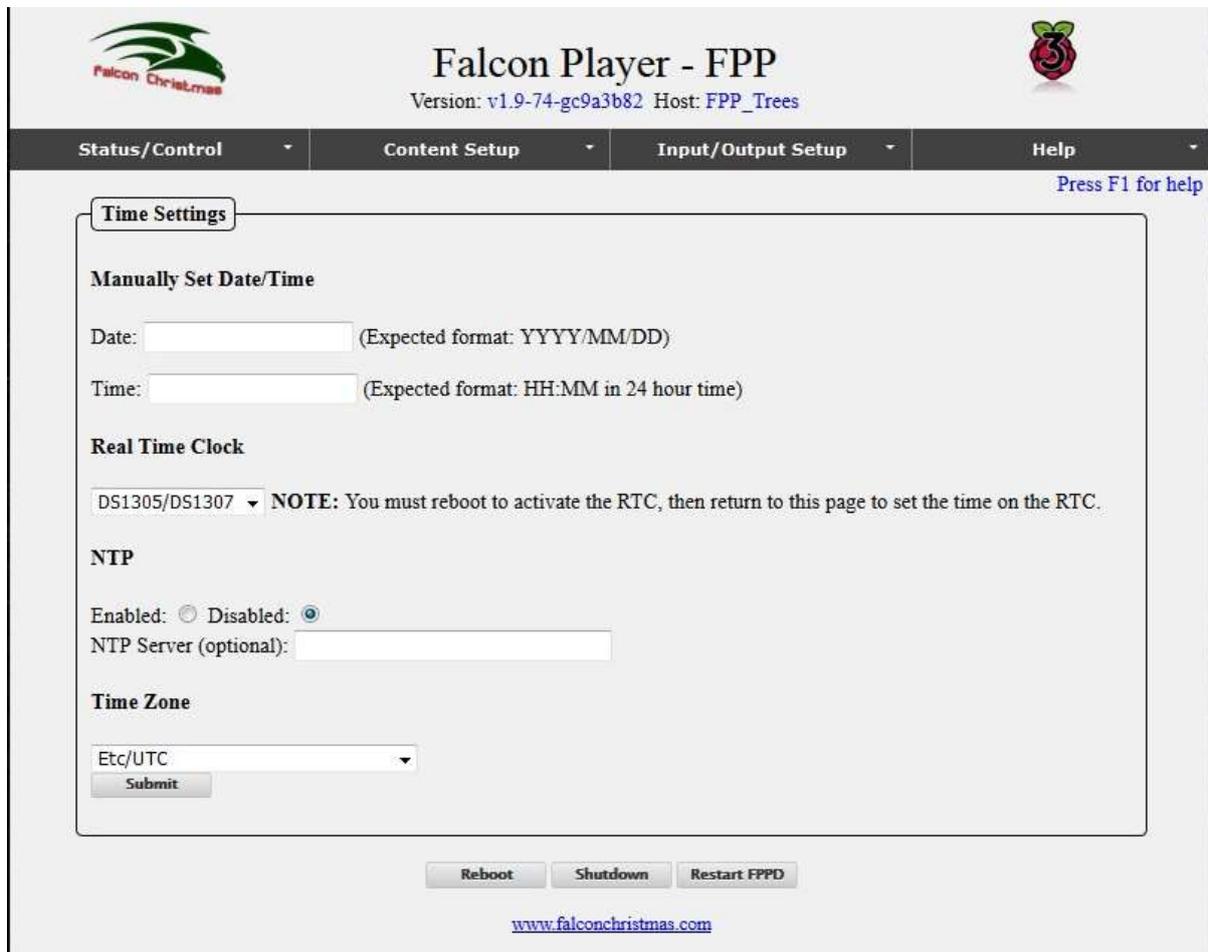
The screenshot shows the Falcon Player - FPP web interface. At the top, there is a navigation bar with 'Status/Control', 'Content Setup', 'Input/Output Setup', and 'Help' menus. The main content area is titled 'Channel Outputs' and has tabs for 'E1.31 / ArtNet', 'Falcon Pixelnet/DMX', 'LED Panels', and 'Other'. The 'E1.31 / ArtNet' tab is active, showing a configuration section with 'Enable E1.31 / ArtNet Output' checked, 'E1.31 / ArtNet Interface' set to 'eth0', and 'Universe Count' set to 16. Below this is a table with 16 rows, each representing a channel. The table columns are: Line #, Universe Active, FPP Start Channel, Universe #, Universe Size, Universe Type, Unicast Address, and Ping. All 'Universe Active' checkboxes are checked, and all 'Universe Type' dropdowns are set to 'E1.31 - Multicast'. At the bottom of the interface, there are buttons for 'Reboot', 'Shutdown', and 'Restart FPPD', and a link to 'www.falconchristmas.com'.

Line #	Universe Active	FPP Start Channel	Universe #	Universe Size	Universe Type	Unicast Address	Ping
1	<input checked="" type="checkbox"/>	1	1	512	E1.31 - Multicast		Ping
2	<input checked="" type="checkbox"/>	513	2	512	E1.31 - Multicast		Ping
3	<input checked="" type="checkbox"/>	1025	3	512	E1.31 - Multicast		Ping
4	<input checked="" type="checkbox"/>	1537	4	512	E1.31 - Multicast		Ping
5	<input checked="" type="checkbox"/>	2049	5	512	E1.31 - Multicast		Ping
6	<input checked="" type="checkbox"/>	2561	6	512	E1.31 - Multicast		Ping
7	<input checked="" type="checkbox"/>	3073	7	512	E1.31 - Multicast		Ping
8	<input checked="" type="checkbox"/>	3585	8	512	E1.31 - Multicast		Ping
9	<input checked="" type="checkbox"/>	4097	9	512	E1.31 - Multicast		Ping
10	<input checked="" type="checkbox"/>	4609	10	512	E1.31 - Multicast		Ping
11	<input checked="" type="checkbox"/>	5121	11	512	E1.31 - Multicast		Ping
12	<input checked="" type="checkbox"/>	5633	12	512	E1.31 - Multicast		Ping
13	<input checked="" type="checkbox"/>	6145	13	512	E1.31 - Multicast		Ping
14	<input checked="" type="checkbox"/>	6657	14	512	E1.31 - Multicast		Ping
15	<input checked="" type="checkbox"/>	7169	15	512	E1.31 - Multicast		Ping
16	<input checked="" type="checkbox"/>	7681	16	512	E1.31 - Multicast		Ping

The channels used for the pixel and DMX outputs must be configured under the Input/Output Setup and E1.31/Artnet.

Real time clock

The rPi-28D real time clock (RTC) can be used if desired. No battery is supplied. A CR2032 battery is needed for battery backed time. It is configured as below under the Status/Control tab.



The screenshot shows the Falcon Player - FPP web interface. At the top, there is a logo for Falcon Christmas and a Raspberry Pi logo. The title is "Falcon Player - FPP" with version "v1.9-74-gc9a3b82" and host "FPP_Trees". Below the title is a navigation bar with tabs: "Status/Control", "Content Setup", "Input/Output Setup", and "Help". The "Status/Control" tab is active, and a "Time Settings" sub-tab is selected. The main content area contains the following sections:

- Manually Set Date/Time**: Includes input fields for "Date:" (Expected format: YYYY/MM/DD) and "Time:" (Expected format: HH:MM in 24 hour time).
- Real Time Clock**: Includes a dropdown menu showing "DS1305/DS1307" and a note: "NOTE: You must reboot to activate the RTC, then return to this page to set the time on the RTC."
- NTP**: Includes radio buttons for "Enabled:" (disabled) and "Disabled:" (selected), and an input field for "NTP Server (optional):".
- Time Zone**: Includes a dropdown menu showing "Etc/UTC" and a "Submit" button.

At the bottom of the form area, there are three buttons: "Reboot", "Shutdown", and "Restart FPPD". Below these buttons is the URL www.falconchristmas.com.

There is a GPIO input available on CN10 which connects to Pi GPIO25, BCM26 (pin 37 of header). This input can be used to trigger scripts.

Enquiries/Repairs :-

Hanson Electronics

Alan Hanson

16 York St

Eaglehawk, Victoria, Australia 3556

Mobile 0408 463295 International +61408 463295

email [hanselec @ gmail.com](mailto:hanselec@gmail.com) web www.hansonelectronics.com.au

