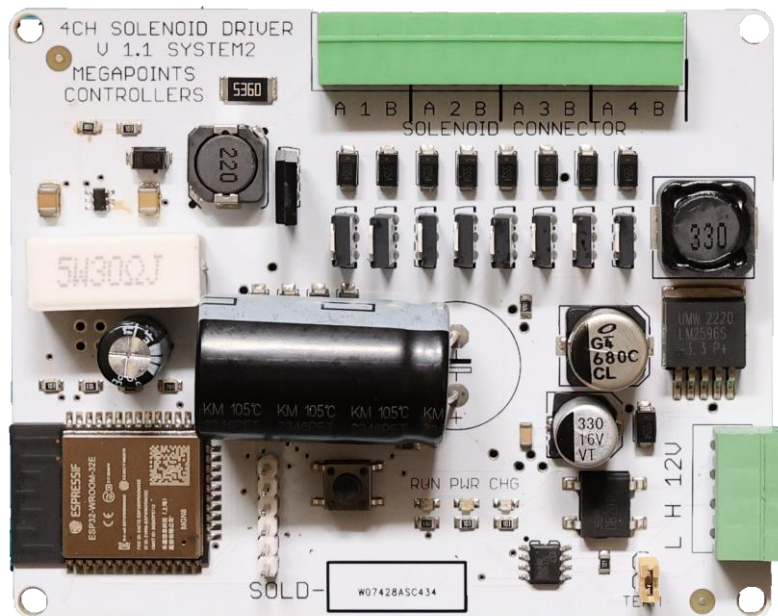


System2 Solenoid Driver

User Reference by MegaPoints Controllers

A four channel solenoid motor driver for traditional solenoid point motors with integrated Capacitive Discharge Unit (CDU), intelligent motor firing and feedback.

Includes support for both Wi-Fi and CAN network operation, additionally JMRI and native modes via MQTT.



User Reference and Guide

Revision 1 JULY 2024 Status: Draft

© MegaPoints Controllers 2024

Email: info@megapointscontrollers.com

Table of contents

What is System2 Air?	3
How to use this document	4
System2 Solenoid motor driver	4
Introduction	4
Intelligent operation	5
Power and Charging	5
Motor Activation	5
Command Queuing	5
Example: Operating Multiple Motors	5
Feedback and Monitoring	5
Power Consumption	5
Additional Requirements	6
First use	7
Network cabling	10
Getting your first board on your local Wi-Fi network	11
Admin Interface	12
Board Location	14
Reference section	14
CAN ID management	14
Wi-Fi credential sharing	17
Actions	18
Reset to defaults	19
Save Changes	20
Reload Values	20
Erase WiFi Credentials	21
Update Firmware	21
Reboot	23
Reload Page	24
Documentation	24
Network Monitor	24
Status area	27
Board Type (1)	28
SW Rev (2)	28
Templates (3)	28
IP Address (4)	28
Board Name and serial (5)	28
SSID(6)	28
In conclusion	28
Contacting us	29

What is System2 Air?

System2 is our new generation of model railway accessory bus products that feature our V-Port protocol (virtual port) and can address up to 60,000 devices. You can scale an installation from a single Servo-8 Controller (8 V-ports) right up to a huge layout as your needs grow. Flexibility is baked in and as we announce new modules that will work right alongside other System2 modules.

The “Air” in System2 refers to how you configure the system. It’s done wirelessly using Wi-Fi. This means you can configure a device using your PC, tablet or phone and replaces the need for buttons, flashing lights and extension cables to reach under baseboard locations.

We use Wi-Fi for configuration and a CAN network for data. This offers high speed, low latency and above all else reliability. You can even shut down the Wi-Fi network when your configuration is complete making your system secure and robust. It’s not required for operation at all.

MQTT support built right in. Using Wi-Fi and MQTT you can optionally configure the device for wireless operation and avoid the need to cable in a CAN wired network altogether. Our MQTT implementation supports two modes, Native for peer to peer communication and JMRI where we delegate control authority to your JMRI installation.

Software for all System2 Air modules can be updated over the air if your network allows Internet access. A single button push is all that’s needed to download and install the latest version. This means as new ideas and features are introduced everyone gets to benefit from them. You can even see the changes that have been introduced since your last update and choose whether to install or not. You won’t get nagging reminders to update. It’s flexible and entirely up to you when or if you decide to do it.

System2 has been real world tested on some of the largest exhibition model railway layouts in the UK for over a year before launching, so you can be confident it’s fit for your needs and fit for purpose.

Each of our System2 boards has the administrative core baked in. You can connect to any board’s admin web page and from there manage your entire network. There’s no central point of control (or failure) as they are all peers in their own right.

We use standard web protocols for configuration so that your browser can connect and perform all administrative tasks without requiring any special apps and app permissions. This leaves you in control of your network.

System2 Air, for the smallest to the largest layouts and everything in between.

In order to use System2 you’ll need a Wi-Fi router configured for DHCP with optional Internet access. This is the standard router configuration as supplied by your Internet Service Provider.

Designed and manufactured in Cheshire, England.

How to use this document

Treat this guide as a reference. All settings are documented and examples given where appropriate.

It is designed to accompany the appropriate product introduction that will demonstrate all the functions and use cases. The video is available from the same product page as this guide.

System2 Solenoid motor driver

Introduction

The solenoid points motor driver will control up to four traditional centre tapped points motors. Best practice dictates that one motor per output is used, however if the points and motors are free and not binding testing shows that one output can operate a pair of motors. Your results may vary.

The System2 Solenoid Driver has the following features:

- Common 12 Volt power supply to all other System2 components.
- Supports up to 4 solenoid channels.
- Built in CDU (Capacitive Discharge Unit).
- Built in charge pump raising the 12 volt supply to 19 volts.
- Huge reservoir capacitor (plenty of thump).
- Intelligent firing, will only fire when capacitor is charged.
- Control via two wire CAN bus.
- Optional control via Wi-Fi (native mode).
- Optional control via Wi-Fi (JMRI mode) *** *coming soon*.
- Can drive a pair of motors per output (assuming they move freely).
- Addressable via vPort for both command and feedback.
- Software updateable as new features are developed.

This is a 12 Volt device and should be connected to a minimum of a 1 Amp regulated power supply.

MegaPoints Controllers use static sensitive components that must be handled with care.

Avoid touching any components or the circuit printed on the bottom of the board.

Avoid placing the board on any metallic surfaces including track.

DO NOT connect any part of this device directly to your track bus.

Intelligent operation

Power and Charging

When the solenoid driver board is powered, a charge pump converts the 12V supply to 19-20V, storing the charge in the reservoir capacitor for future use.

Motor Activation

Upon receiving a command to activate a motor, the capacitor discharges into the appropriate motor.

The unit ensures no further solenoids are activated until the reservoir capacitor's voltage reaches the minimum threshold. This prevents misfires when multiple commands are received simultaneously.

Command Queuing

Commands are queued, with a capacity of up to 32 commands, and executed in the order received once the microcontroller determines there is sufficient charge.

Example: Operating Multiple Motors

For a double crossover requiring four point motors in O gauge, each solenoid needs a full charge to operate correctly.

To operate all four motors, set the control vPorts for each motor to the same setting.

Upon receiving a command on that vPort, the first motor will activate, followed by the second after about 300 ms, continuing until all motors are activated.

Feedback and Monitoring

Feedback data is sent only after the physical point motor has activated, allowing observation of all four motors activating within just over one second.

Power Consumption

The unit consumes approximately 200 mA when idle and up to 1 Amp when charging the reservoir capacitor.

Additional Requirements

You may also need:

- 12 Volt DC regulated power supply.
 - 1 Amp minimum
- Network cable (twisted pair).
 - Telephone cable
 - Alarm cable
 - Such as CW1109B/Y supplied by CPC/Farnell. See website for cable links. Non twisted pair cable is OK for testing purposes, not for installation.

To use the network features of this board you will require:

- A Wi-Fi Router that is configured for:
 - DHCP (default enabled on most routers)
 - An active internet connection (only required for software updates).
- A current browser that supports HTML5 or later.

To use the MQTT features of this board you require:

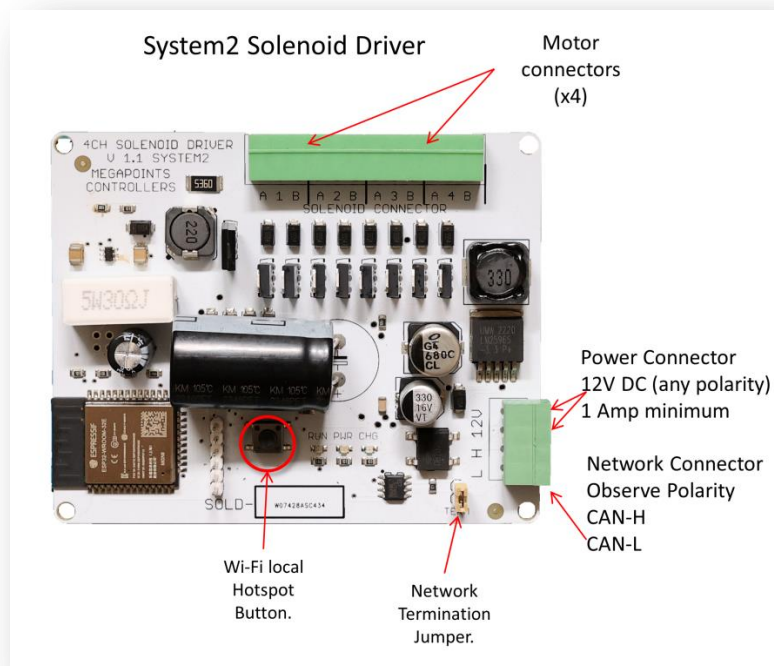
- An MQTT broker installed on your local network (see installation video on our System2 website).
- An optional JMRI installation if JMRI is to be used.

First use

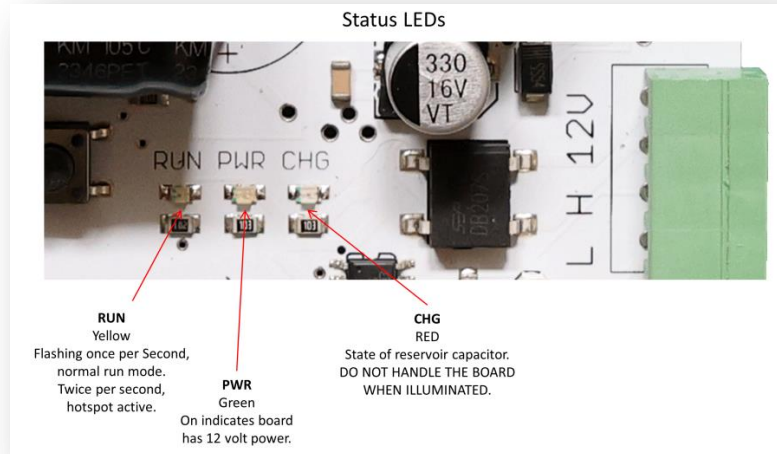
WARNING: Ensure this board is kept in a well ventilated area. Do not affix within a sealed on unventilated enclosure. Ensure the rear of the circuit board does not come into contact with any conductive material. Suggest you consider our PCB Mounts for mounting the device.

WARNING: Do not handle the board when the red LED (CHG) is illuminated. This indicates the reservoir capacitor is charged. Disconnect the 12 Volt power and the circuitry will automatically discharge the capacitor over a 30 second period.

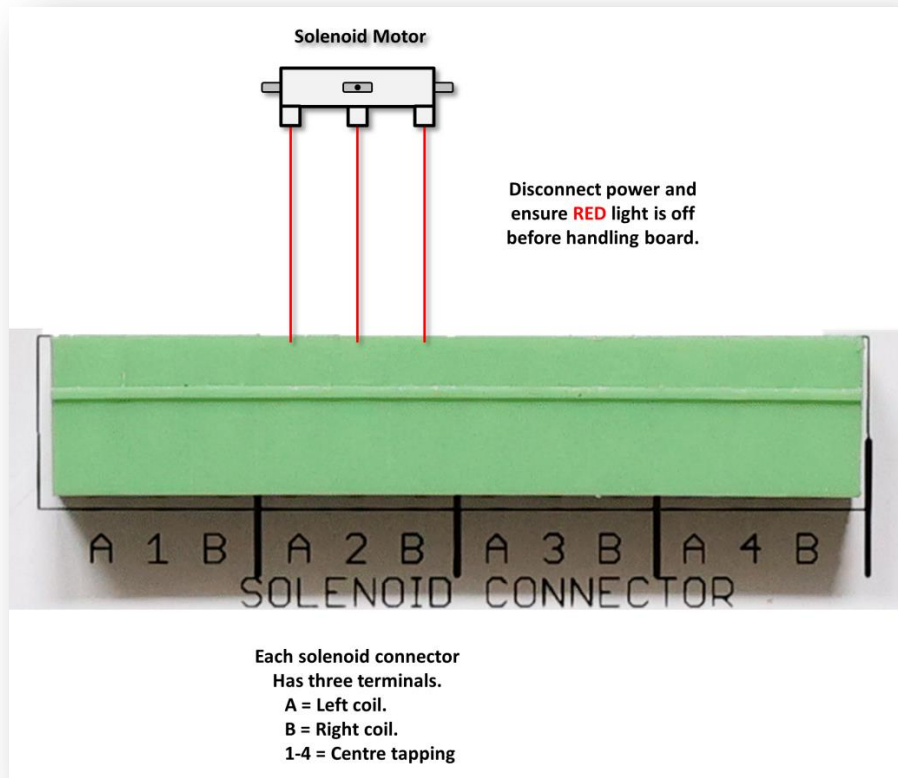
See the connection diagram below for details.



The image below explains the purpose of the three indicator LEDs.



Label	Colour	Purpose
RUN	Yellow	Flashing once per Second: normal run mode. Twice per second: hotspot active.
PWR	Green	On indicates board has 12 volt power.
CHG	RED	On = charged. State of reservoir capacitor. DO NOT HANDLE THE BOARD WHEN ILLUMINATED.

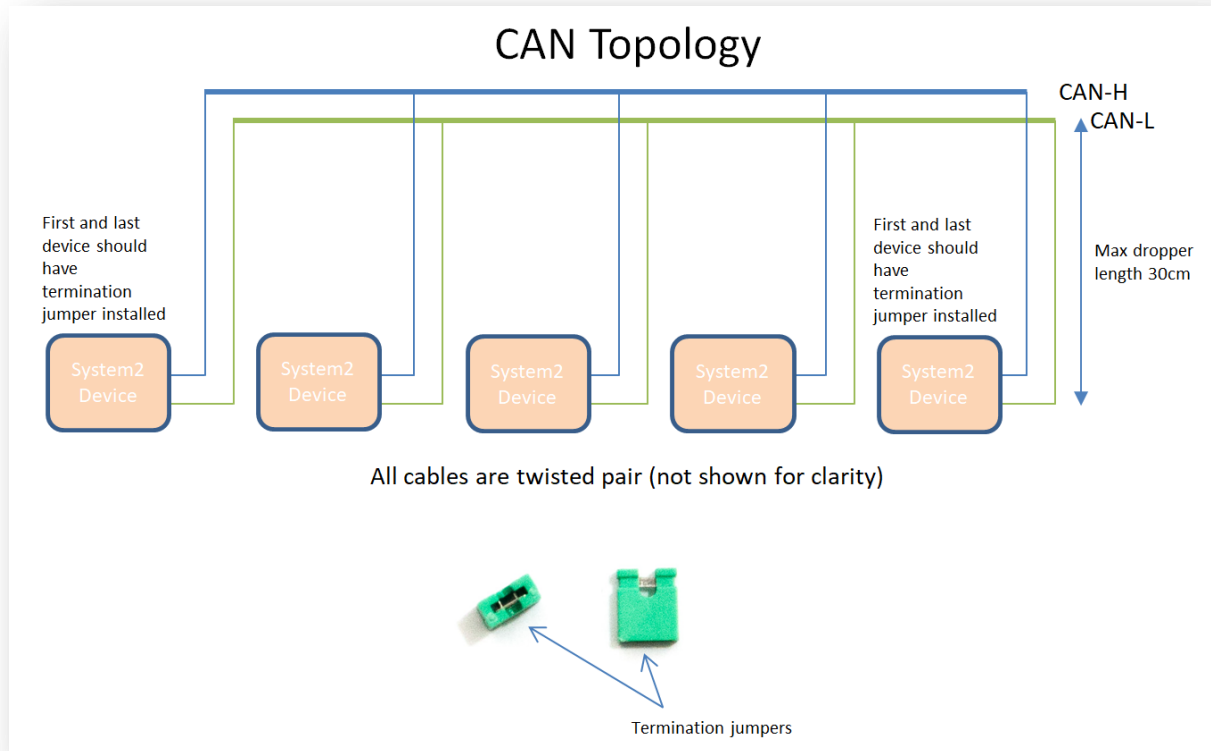


Each solenoid motor has three wires or terminals connecting to it. Ensure the centre terminal always goes to the connector centre terminal.

NOTE: There is always power present on the centre terminals. Do not connect or handle the board when the reservoir capacitor is charged or the RED (CHG) light is on.

- Connect your solenoid motors to the appropriate terminals.
- Connect the Solenoid driver to a 12 Volt regulated power supply, minimum 1A per board.
- Connect the network cable to the two screw terminals. Observe the 'H' and 'L' terminals. Ensure all the 'H' and 'L' wires connect to each other respectively.

Network cabling



You can fit the termination jumpers to the first and last board on your network if not already fitted (see above two diagrams).

See the above diagram for network cabling. All cables should be a twisted pair signal cable. Fit any termination jumpers (supplied as part of a starter kit) to the boards at the ends of the network for a maximum of two jumpers per network.

You can use droppers to a main bus much like DCC or connect boards to each other in daisy chain fashion. Ensure the CAN-H and CAN-L connects to the same terminal in all cases.

Getting your first board on your local Wi-Fi network

There's a dedicated YouTube video demonstrating this. Follow this link to view: <https://youtu.be/G3ajZazycP4>. It will probably be easier than going through the following text.

With your updated software the procedure here overrides that in the Starter Kit Quick Start Guide. It has changed slightly making it more intuitive and easier. The very first board on from your System-2 Air should be configured for your Wi-Fi. This will allow you to connect and adjust the board settings such as servo movement type, speed or range adjustment as well as download future software updates and change port addresses. We suggest using the Panel Controller for this example.

Broadly speaking, here's how to connect to your Wi-Fi:

- Apply 12 DC regulated power to the device.
- Observe the RUN LED flashing about once per second (may take up to 30 seconds on first time boot).
- Hold the HOTSPOT button for 1 second; observe the RUN LED flash rate increase to double.
- From your phone, tablet or other Wi-Fi device scan for Wi-Fi networks and locate the hotspot network for the panel controller (it will be the device name/serial number on the sticker) such as "panel-xxxxxx" or "serv8-xxxxxx". The name is dependent on the device you are connecting to.
- Connect to this network hotspot network. You may receive a warning stating this network does not connect to the Internet. This is OK.
- If your device states "sign-in required", select this option and go to the sign-in page.
- If your device does not offer a sign-in page, navigate your browser to "4.3.2.1/admin" (Apple).
- Enter the SSID and password for your local network. Note case sensitivity (screenshot below).
- Press the "Scan WiFi" button. After a few seconds the adjacent text box will populate with scanned networks. Select the appropriate network (strongest signals towards the top).
- Enter a password (case sensitive) and press the save button.
- Your devices IP address will now be displayed near the top (red band). Make a note of this.

12:16 4G 99%

Sign in to serv8-451b34
4.3.2.1

MegaPoints Controllers

System 2 AIR WiFi Configuration

Product: Servo-8
Hostname: serv8-451b34
IP Address: 192.168.0.121

Scan Wi-Fi networks automatically.

Scan WiFi Megapoints

Password

Save Reboot

Or enter Wi-Fi details manually.

SSID

Password

Save

Device Management

- Press the reboot button when ready and access the device via your usual network using the IP address obtained previously.

Refer to the website for how to videos and full documentation (megapointscontrollers.com/system2).

Admin Interface

The admin web page is shown on the below. On this page you will change any settings for the driver board. Each board on the System2 network has its own management web page.

The screenshot shows a web browser window with the address bar displaying 'sold-d43f00.local'. The page features the MegaPoints Controllers logo and a photo of the hardware. The main section is titled 'System 2 Air' and includes a 'Location' input field. Below this is the 'Solenoid Driver' configuration area, which contains a table for motor settings and various control options.

Motor	Control vPort	Feedback vPort	Reverse
1	<input type="text" value="1"/>	<input type="text" value="161"/>	<input type="checkbox"/>
2	<input type="text" value="2"/>	<input type="text" value="162"/>	<input type="checkbox"/>
3	<input type="text" value="3"/>	<input type="text" value="163"/>	<input type="checkbox"/>
4	<input type="text" value="4"/>	<input type="text" value="164"/>	<input type="checkbox"/>

EasyConfig Range Selector Capacitor charge: **19.8** Volts.

Auto CAN ID ☒ CAN ID (Manual range 1000-1999.) Locate Board ☐

[Share WiFi Credentials](#) [Revoke WiFi Credentials](#)

[Reset to defaults](#) | [Save Changes](#) | [Reload Values](#)
[Erase WiFi Credentials](#) | [Update Firmware](#) | [Reboot](#)
[Reload page](#) | [Documentation](#) | [Network Monitor](#)

Solenoid Driver S/W Rev: 5 | Templates: 5 | IP Address: 192.168.0.73 | Name: sold-d43f00 | SSID: Megapoints

Protocol

Status Log

Web client connected.
Firmware up to date. (09-JUN-2024)

Below is a description of all the fields on the main admin page:

- Device name and serial number (sold-d43f00).
- A photo of the device.

- A location description field. Use this to enter meaningful information such as baseboard number, IE: "B12C7 Tunnel entrance".
- Motor vPorts for control and feedback.
- Reverse to reverse the operation of the motor. Cycle several times to sync the system after changing.
- EasyConfig, this allows loads a pre-configured set of vPorts for the first 40 boards.
- Capacitor charge: Shows the voltage in the reservoir capacitor. Updates once per second.
- Auto CAN ID. You can override the CAN ID if required.
- Locate Board: Will cause the LED on the selected board to flash fast helping you to locate the board if you have many. This will also bring up a list of discovered boards in the Status Log.
- Share and revoke Wi-Fi credentials with all boards on the CAN network.
- Control buttons (shown in blue text) to:
 - Reset the board
 - Save changes you've made
 - Reload changes (resyncs the web page with board)
 - Erase this board's Wi-Fi credentials (will immediately leave the network)
 - Select the firmware update (requires internet connection)
 - Reboot the board (throws out any unsaved changes if you made a mess)
 - Reload the web page
 - Link to online documentation and support videos
 - A CAN network monitor (for those who prefer watching network packets to trains).
- The next line shows:
 - Product name (Stall/Kato Driver)
 - Software version
 - Templates version (should match the software version)
 - The local IP address
 - The device network name (includes serial number)
 - The Wi-Fi name you are connected to
- The Protocol configuration. Clicking on the Protocol button toggles between three states:

CAN	The default state that uses a wired CAN network.
Native	Configure your local broker and port details here. Save and reboot to take effect. This is peer to peer mode and offers the same functions as a wired CAN installation, using Wi-Fi instead.
JMRI	Configure your local broker and port details here. Save and reboot to take effect. Uses Wi-Fi instead of CAN and requires a JMRI installation accessible over your network.

- The last item is a status log (light yellow background). This provides a real time status such as up to date software, or boards joining the network, whether you saved (or should) save your changes etc.

Board Location

The board location field (top right) should be used to enter meaningful information to help you locate a specific board. We are planning an update for this feature in a future release that will display the first few characters as part of a report when you request all boards to report in (covered later in this document).

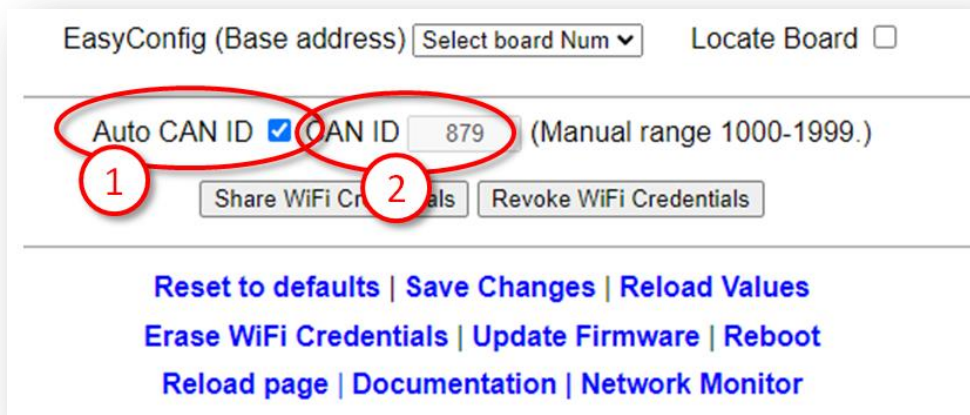
We therefore suggest you begin the text with the most meaningful information such as a baseboard number or location for example:

Suggested entry types	B2 Fiddle Yard 12 Station throat A3 Scenic
Avoid	Baseboard B2 Main approach on the left

Reference section

CAN ID management

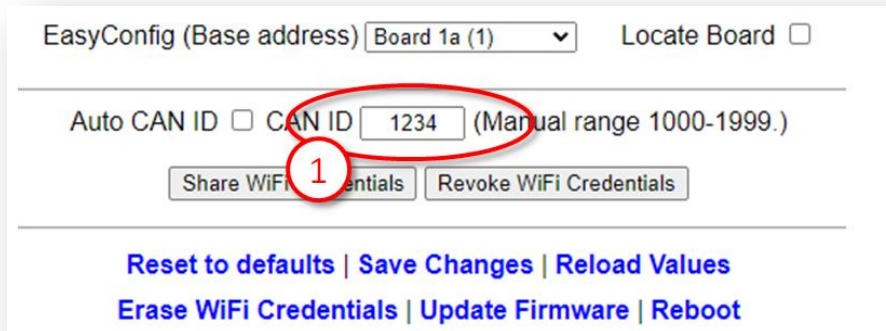
The next area down on the main configuration page concerns network parameters. Refer to the screenshot below and explanation text for details.



- 1 Auto CAN ID – Normally left selected (default). This will allow the board to automatically assign its CAN address and if a duplicate is detected may automatically reassign to a vacant address.
- 2 The current boards CAN ID. Showed greyed out if auto enabled (default).

Automatic range: The automatic range for the CAN ID is 1 – 9999. If a duplicate is detected and Auto CAN ID is enabled either this or the other board with a duplicate ID will seek out a vacant CAN ID and update its configuration. When Auto CAN ID is selected do not expect CAN IDs to be persistent as they can change without notice. System2 is designed with this in mind and the board CAN ID is not relevant to operation.

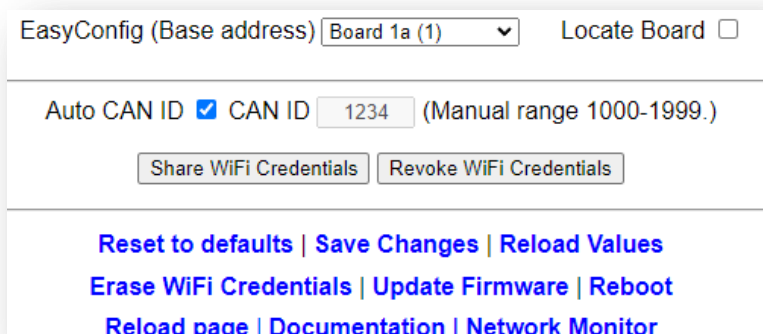
The CAN specification requires all boards to have a unique CAN ID as part of the collision detection mechanism. Forcing duplicates is a bad idea and will lead to data errors.



The screenshot shows the 'EasyConfig' web interface. At the top, there is a dropdown menu for 'EasyConfig (Base address)' set to 'Board 1a (1)' and a 'Locate Board' checkbox. Below this, the 'Auto CAN ID' checkbox is unchecked, and the 'CAN ID' is manually set to '1234' in a text box. A red circle with the number '1' highlights the 'CAN ID' text box. To the right of the text box is the text '(Manual range 1000-1999.)'. Below the text box are two buttons: 'Share WiFi Credentials' and 'Revoke WiFi Credentials'. At the bottom, there are several blue links: 'Reset to defaults', 'Save Changes', 'Reload Values', 'Erase WiFi Credentials', 'Update Firmware', and 'Reboot'.

Manual CAN ID selection: We must ask why? There's no possible benefit we can think of, so it's included for edge use cases. Not recommended to change this. Manual range is 1000 – 1999.

When reselecting Auto CAN ID, the current setting will remain until a collision is detected; whereupon the software will automatically reassign the ID (see below).

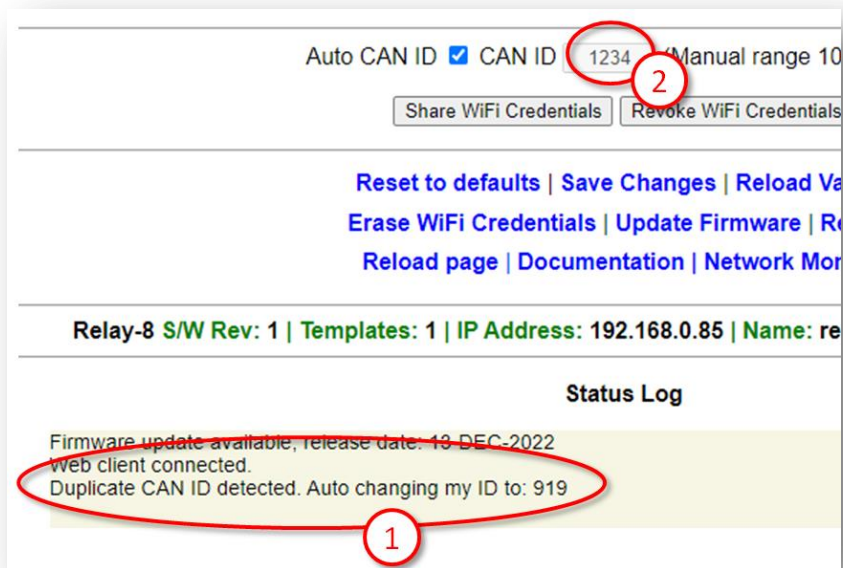


The screenshot shows the 'EasyConfig' web interface. At the top, there is a dropdown menu for 'EasyConfig (Base address)' set to 'Board 1a (1)' and a 'Locate Board' checkbox. Below this, the 'Auto CAN ID' checkbox is checked, and the 'CAN ID' is manually set to '1234' in a text box. To the right of the text box is the text '(Manual range 1000-1999.)'. Below the text box are two buttons: 'Share WiFi Credentials' and 'Revoke WiFi Credentials'. At the bottom, there are several blue links: 'Reset to defaults', 'Save Changes', 'Reload Values', 'Erase WiFi Credentials', 'Update Firmware', 'Reboot', 'Reload page', 'Documentation', and 'Network Monitor'.

If a duplicate ID is detected and the address manually configured you will observe a message in the Status Log (example below) warning of the duplicate address and that auto change is disabled. You need to manually reconfigure this.



With Auto CAN ID enabled the message is slightly different (see below):



The CAN ID was automatically changed to an unused ID. When the board is rebooted or the web page refreshed the CAN ID field will update to the new value.

Wi-Fi credential sharing

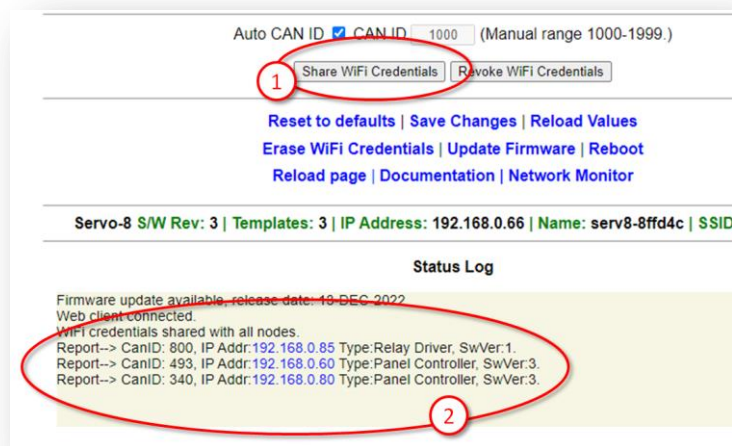
You may recall the procedure to connect the first board to your Wi-Fi network using your phone or tablet to connect to the boards local hotspot? You'll be pleased to know that you don't ever have to go through this again. In this section we'll cover how to share the Wi-Fi configuration with all boards on your CAN bus.

Connect to a System2 board using your browser. Obviously you'll only be able to connect to a board that is connected to your local Wi-Fi.

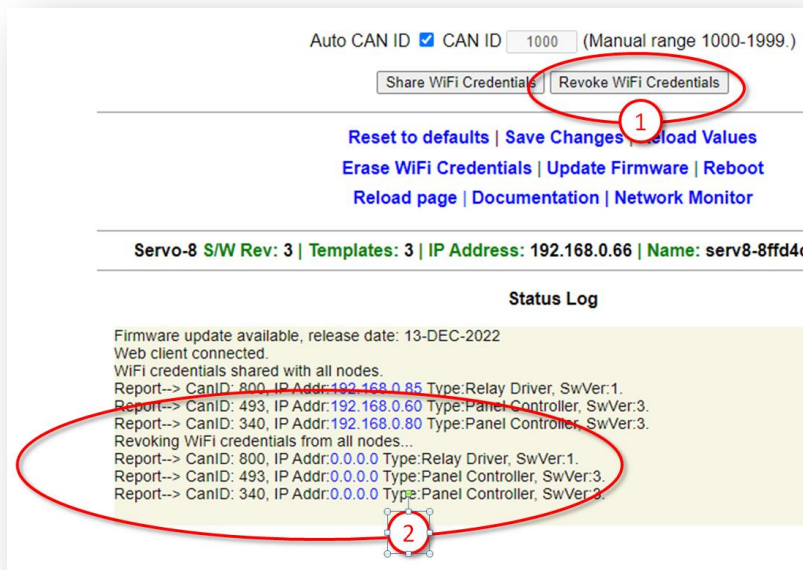
See the diagram below.

Click the "Share WiFi Credentials" button (1).

You will observe all boards on the CAN bus reporting in (Status Log) (2) with an IP address. These boards will now be accessible via a web browser from the same Wi-Fi network.



To revoke Wi-Fi access for all connected boards click the “Revoke WiFi Credentials” (1) button (see below):

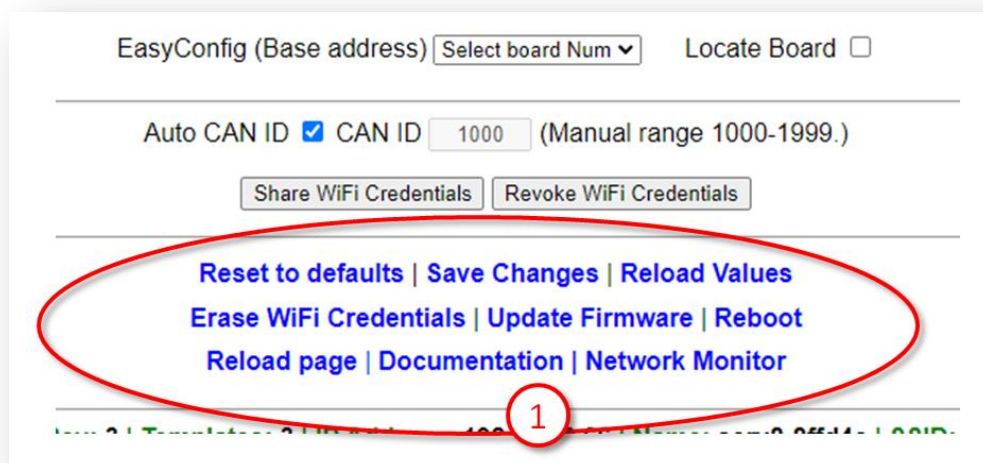


You will observe in the Status Log revocation messages. Each board will restart and show an IP address of “0.0.0.0” showing that it is not connected to any Wi-Fi network.

The board you are issuing the commands from is not affected by this and will remain connected to Wi-Fi until specifically revoked. This is covered later in this guide.

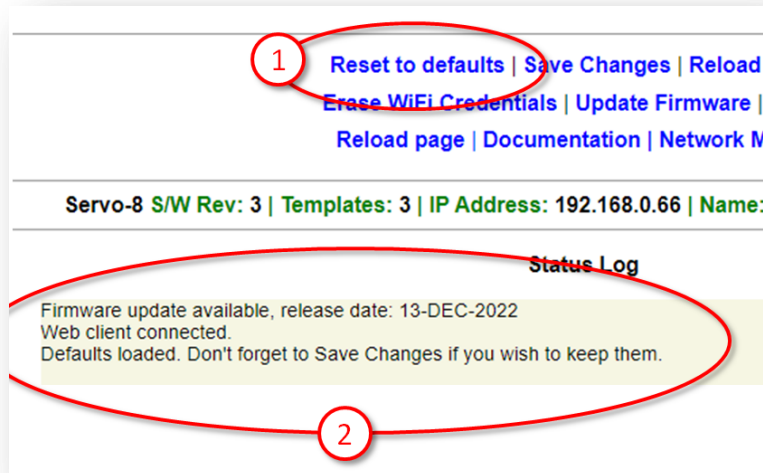
Actions

The action area (1 below) contains blue text that behaves just like buttons. This section covers each in turn.



Reset to defaults

This will reset most of the board values to defaults. Observe the message in the Status Log (2). You have reset to defaults and the default values are live, however will revert back to previous settings upon a reboot unless specifically saved. Particularly useful for testing and reverting.



Resetting to defaults changes the following:

- EasyConfig 1a is selected.
- V-Ports including trigger and feedback set for 1a (above).
- Reversed checkbox cleared.

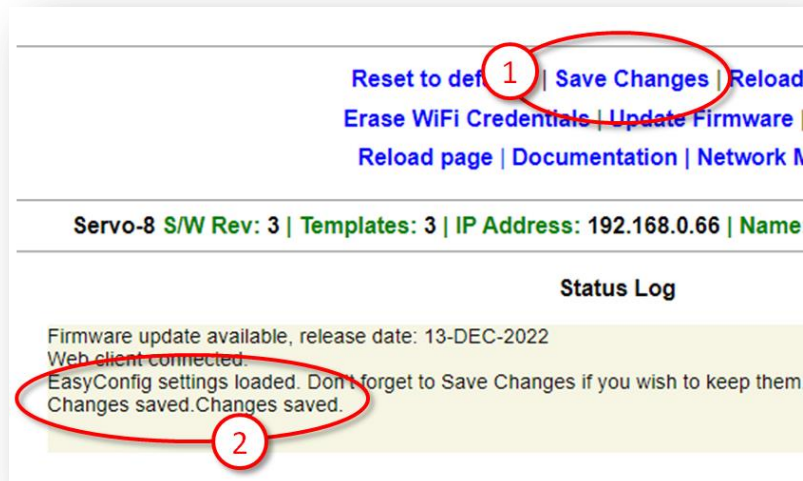
The following are not changed:

- Board location description (upper left of page).
- CAN ID
- IP Address
- Wi-Fi configuration
- Speed

Save Changes

As suggested by the description, this will save all uncommitted changes to non-volatile memory and be retained after reboots.

After saving you'll see the confirmation message (2) in the Status Log below.



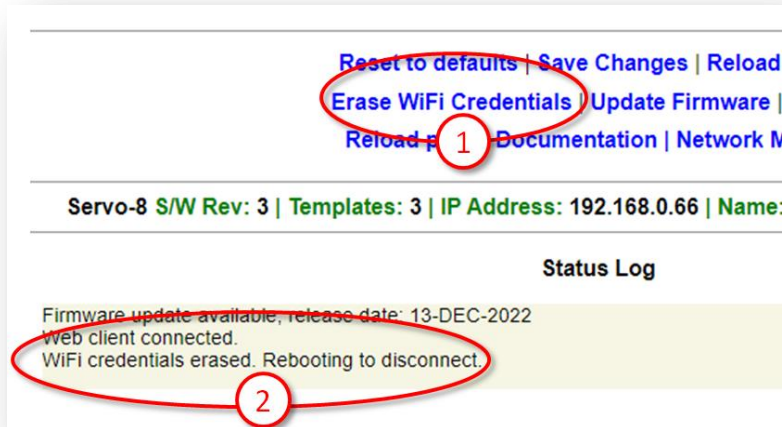
Reload Values

The Reload Values button will reset the parameters to the saved version. This will undo any changes that have not been saved. The browser page will refresh as part of the process.

Erase WiFi Credentials

Erasing the WiFi Credentials will remove the Wi-Fi details and reboot the board you are connected to. This action applies to the board you are connected to only. Other networked boards are unaffected.

If you wish to remove all boards from Wi-Fi see the Wi-Fi Credential Sharing section.



Update Firmware

If your board is connected to your Local Wi-Fi and that Wi-Fi has access to the Internet then you can update firmware. If a new firmware is available a message will be presented in the Status Log area:



Click on the Update Firmware to begin the dialogue. You will be taken to a new page.

Any changes that are available since your last update will automatically be listed in the Software Update section along with the dates they were released.



Servo-8

System 2 Air

Software Update

<p>14-OCT-2022</p> <ul style="list-style-type: none">o Added board location field for the user to enter meaningful data such as board location or purpose. <p>13-OCT-2022</p> <ul style="list-style-type: none">o Added hostname in large lettering to top right of config web page.
--

You can see the release dates and what's in each release. If you select to update you'll get all the changes right up to the latest version. The update is not mandatory. Installation is up to you.

In this example we're going to select the firmware update. It should complete within 10 minutes. During the update you'll see progress on the web page and the on board LED will flash erratically showing data transfer.

☐ [View full update history.](#)

Examine the release notes above to see what's changed from your installed software. Only the changes will be listed.

To upgrade to the latest software release [Click Here](#).

Once the upgrade has started you must not power off your device until the upgrade is complete. This will take between 4-8 minutes to complete. If successful the device will reboot automatically.

[Click Here](#) to return to the main page.

Below is an example log displayed during the software update process:

```
Update initiated.
Beginning firmware update. Two downloads will be processed.
Onboard LED will flash erratically indicating data transfer.
The update will take between 4-8 minutes to complete.
An active internet connection is required for success.
Please wait, do not reboot! Update in progress...
Download (1/2). Connecting to update server.
Received 926816 bytes from the update server.
Written only: 0/926816. Please Retry.
Received 926816 bytes from the update server.
Wrote: 926816 bytes successfully.
File (1/2) has been updated.
File (1/2) download complete.
Download (2/2). Connecting to update server.
Received 1507328 bytes from the update server.
Wrote: 1507328 bytes successfully.
File (2/2) has been updated.
Rebooting. Please return to the main web page.
```

When complete the board will automatically reboot and re-join the network.

All your configuration data remains unchanged and is preserved across updates.

The update will fail safe. This means that if you interrupt the connection or power off during an update you can return to the update screen and begin the process again though it's not recommended to interrupt the update process.

Select the "Click Here" on the bottom line to return to the main configuration page and not perform any update.

Reboot

Clicking the reboot text will cause the board to immediately restart. You will observe a message in the Status Log that the page will reload automatically after a few seconds along with a "Please wait ..." in blue.



Reload Page

This option reloads the web page and resets the Status Log area. Useful for clearing garbage from the log and confirming you are connected to the board.

Documentation

Clicking the Documentation link will open a new window in your browser and take you to the product page for the board you clicked from. On the product page you'll find links to the relevant documentation and video guides for this product along with recommended accessories.

This option requires an Internet connection.

Network Monitor

WARNING! This section may send you to sleep and is not required reading.

The Network Monitor option takes you to a CAN bus network monitor.

The Network Monitor should be considered experimental, though we relied on it heavily during development.

The Network Monitor will provide a real time display of the traffic on your CAN bus.

System 2 - CAN - Network Monitor

2

Seq	Min	SS	mSS	uSS	CanId	D0	D1	D2	D3	D4	D5	D6	D7	V-Port
0112	17.03.822.345		493		1	0	1	1	0	0	0	0		1
0113	17.03.827.467		1000		1	0	161	3	0	0	0	0		161
0113	17.03.827.467		1000		1	0	161	3	0	0	0	0		161
0114	17.06.093.270		1000		1	1	66	0	0	0	0	0		321
0115	17.08.374.266		1000		1	0	161	0	0	0	0	0		161
0116	21.37.570.266		493		1	0	1	0	0	0	0	0		1
0117	21.37.575.349		1000		1	0	161	3	0	0	0	0		161
0118	21.39.850.069		1000		1	1	66	1	0	0	0	0		321
0119	21.42.130.018		1000		1	0	161	1	0	0	0	0		161

1

The V-Port the packet is intended for is decoded in the right column (1).

The headers (2) contain the following details:

Header	Description
Seq	Packet sequence as observed by the board the Network Monitor is running on.
Min	Number of minutes since starting. Rolls over at 99.
SS	Seconds within the previous minute.
mSS	Millisecond within the previous second.
uSS	Microsecond within the previous millisecond.
CanId	The CAN ID that created the packet.

D 0-7	Data field of the packed (D0 – D7).
V-Port	Decoded V-Port the message is intended for.

The Network Monitor will only display packets created by remote boards. It will not display packets that are locally transmitted.

The local board that is running the packet monitor remains fully operational while the packet monitor is running. It will respond to events in its usual manner.

The data fields (D0-7) will be covered in separate documentation and are data type dependent.

In the above screen shot you can see network packets that were triggered by a button being pushed twice, once to turn on and again to turn off.

Under the V-Port column observe the following events that occurred at minute 17:

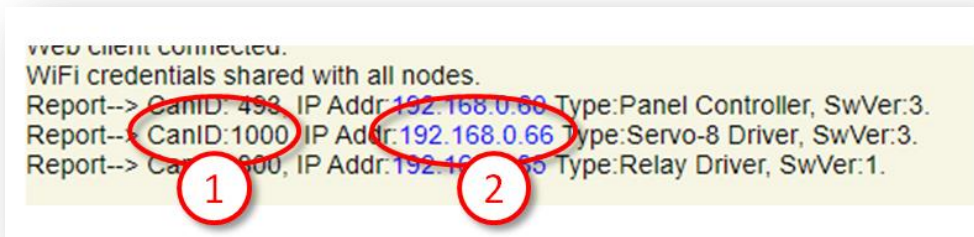
Header	Description
1	An event addressed to V-Port 1 is initiated from CAN ID 493.
161	An event is addressed to V-Port 161 from CAN ID 1000 (packet duplicated).
321	An event is addressed to V-Port 321 from CAN ID 1000.
161	An event is addressed to V-Port 161 from CAN ID 1000 (packet duplicated).

CAN ID 493 is a Panel Controller and looking at its configuration we observe V-Port 1 is a push button attached to physical port 1:

Input Ports									
Phys Port	V-Port	Latch (ms)	Input Type	Invert	RGB Red	LED Green	Colour Blue	Colour B/G	
1	1	400	Push to make btn	<input type="checkbox"/>	0	0	0		<input type="checkbox"/>
2	2	400	Push to make btn	<input type="checkbox"/>	0	0	0		<input type="checkbox"/>
3	3	400	Push to make btn	<input type="checkbox"/>	0	0	0		<input type="checkbox"/>

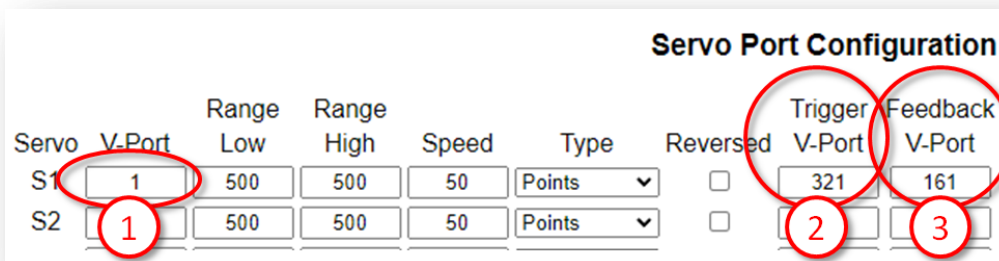
So we know what created the packet, a button on physical port 1.

The next packet was created by Can ID 1000. Looking at the Status Log (below) we can see (1) this is a Servo-8 board:



We are also presented with the IP address of the board (2), so clicking on the blue IP address takes us to the Servo-8 management portal.

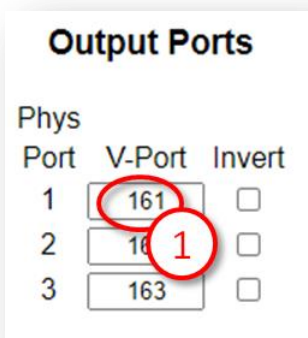
The Servo-8 port configuration is reported as:



The V-Port (1) is 1 meaning channel S1 (servo 1) is listening for this address (V-Port).

Remember this board has a CAN ID of 1000, and it generated a packet to V-Port 161. This is the configured Feedback V-Port at the marker (3).

If we look at the packet under column D3 you'll observe a "3" in the data byte. Where is this going?



The Output Ports section of the Panel Controller (1 left) matches the Feedback V-Port of the Servo-8. It is this port that is listening for the event.

The data value of "3" indicates to flash. This will cause the panel Controller to flash the LEDs on physical port 1 and is used to indicate a motor in motion.

When the centre of motion for the servo has been reached another event is triggered to V-Port 321. Look at the Servo Port Configuration above. See the Trigger V-Port is configured for 321. The trigger fires when the servo is at its centre position. Particularly useful for firing a frog when the point blades are dead centre.

Looking at the relay driver port configuration (below) we observe:

Relay Port Configuration

Phys Port	Command V-Port	Pulse m/Sec	Feedback V-Port	Reversed
R1	321	0	0	<input type="checkbox"/>
R2	322	0	0	<input type="checkbox"/>
R3	323	0	0	<input type="checkbox"/>

Relay R1 is configured for events on V-Port 321 and will trigger when the Servo-8 is halfway.

This can be freely changed to respond to the same ports as the push button or any other device. It can also provide feedback data of its own, however setting the Feedback V-Port to "0" disables feedback from the relay.

Finally on the Network Monitor we observe the last packet at minute 17. It's addressed to V-Port 161 and this time contains a 0 in the D3 column. This tells the Panel Controller to stop flashing as the servo has reached its final position.

Skipping ahead to the last packet on the report you can see it's to V-Port 161 and contains a 1 under the D3 column. This is the polar opposite of the previous paragraph and indicates the servo has reached the opposite end of motion and sets the Panel Controller indicator appropriately.

Packet summary	
peak/sec	peak/min
23/0	51/5

At the bottom of the network monitor page are some packet statistics. The leftmost column indicates the peak and current number of packets per second. The rightmost column shows the same data over a one minute interval.

Status area

The status area shows information at the board level and is display only.

Servo-8	SW Rev: 3	Templates: 3	IP Address: 192.168.0.66	Name: serv8-8ffd4c	SSID: Megapoints
1	2	3	4	5	6

Board Type (1)

This tells you what the board is. In this case a servo-8.

SW Rev (2)

The current software version loaded.

Templates (3)

Displays the current version of loaded templates. Normally this will match the software version above.

IP Address (4)

The current IP address of the board as allocated from your Wi-Fi.

Board Name and serial (5)

The board serial number. Each is unique and is a combination of the board type and last 3 hexadecimal digits of the MAC address.

SSID(6)

The network name of the configured Wi-Fi network.

In conclusion

We hope you'll agree, System2 Air is a powerful, flexible model railway control system. Future updating is baked in through a trivial firmware update process and new boards are under development to expand the capabilities of the range.

If you've made it this far through the user reference then you'll understand just how much this board is capable of.

Happy railroading!

Contacting us

Web: megapointscontrollers.co.uk

Email: info@megapointscontrollers.com

All parts ©MegaPoints Controllers 2023

If you have any product improvement suggestions we'd be very pleased to hear from you.

NOTE: We operate on a policy of continuous improvement. Colours, specifications and even the placement of components may vary from time to time.