



Instruction Manual

AVW Controls Ltd

Stage Automation

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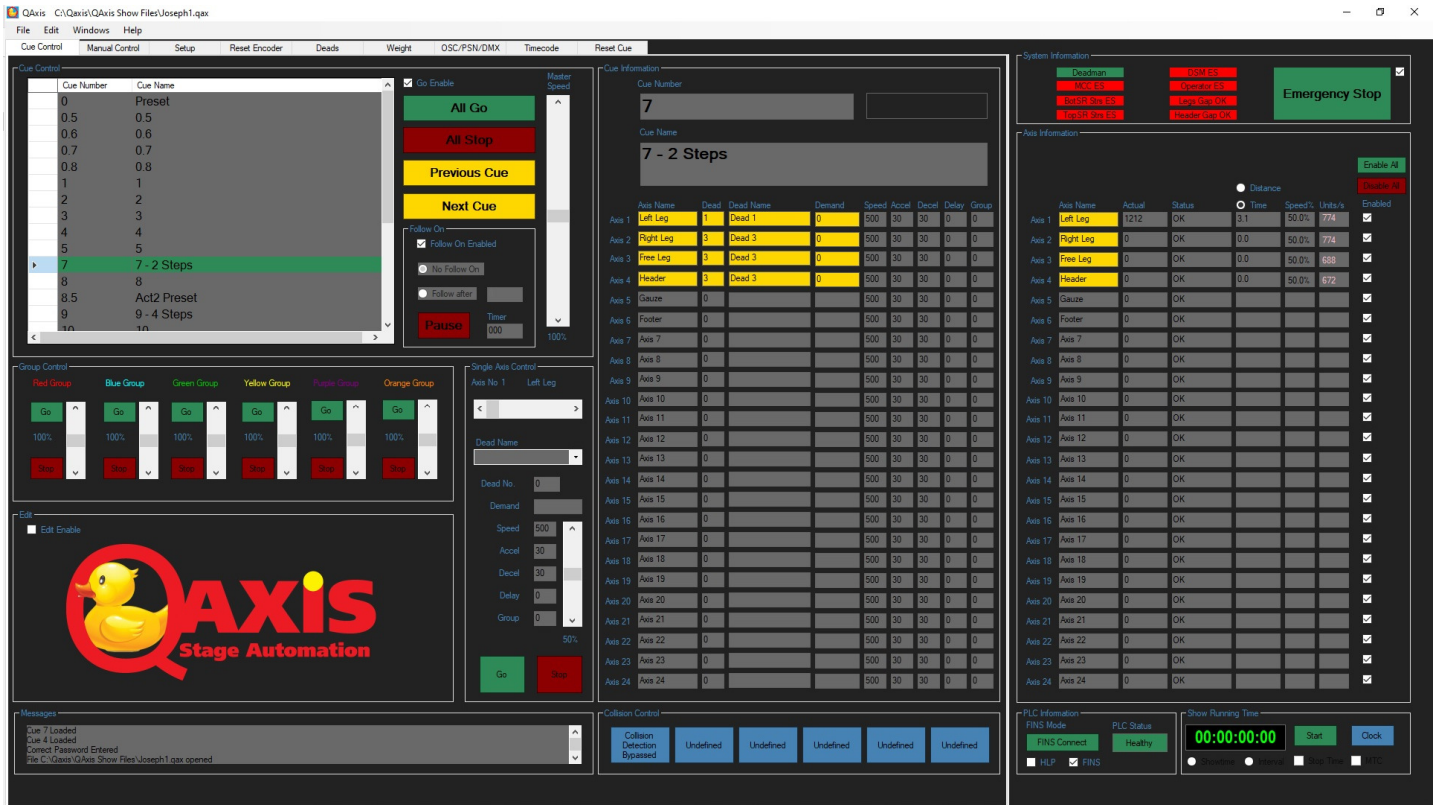
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Introduction

QAxis® is a stage automation system designed for the entertainment industry by AVW Controls Ltd.

QAxis allows motion control cues to be created, edited and run using a very friendly interface.



The QAxis interface allows the operator to see all relevant cue, axis, group and edit information at the same time and allows very quick change from the running environment to the editing environment.

QAxis uses proprietary Omron PLCs (Programmable Logic Controllers) as the main hardware. The Omron hardware is very reliable and is proven in general industry, and is readily available worldwide. All this means that AVW can offer a world class stage automation control system using a range of hardware that can be tailored to your requirements. The QAxis software is an object-orientated program written using Microsoft Visual Studio.



General Description

Its features include:

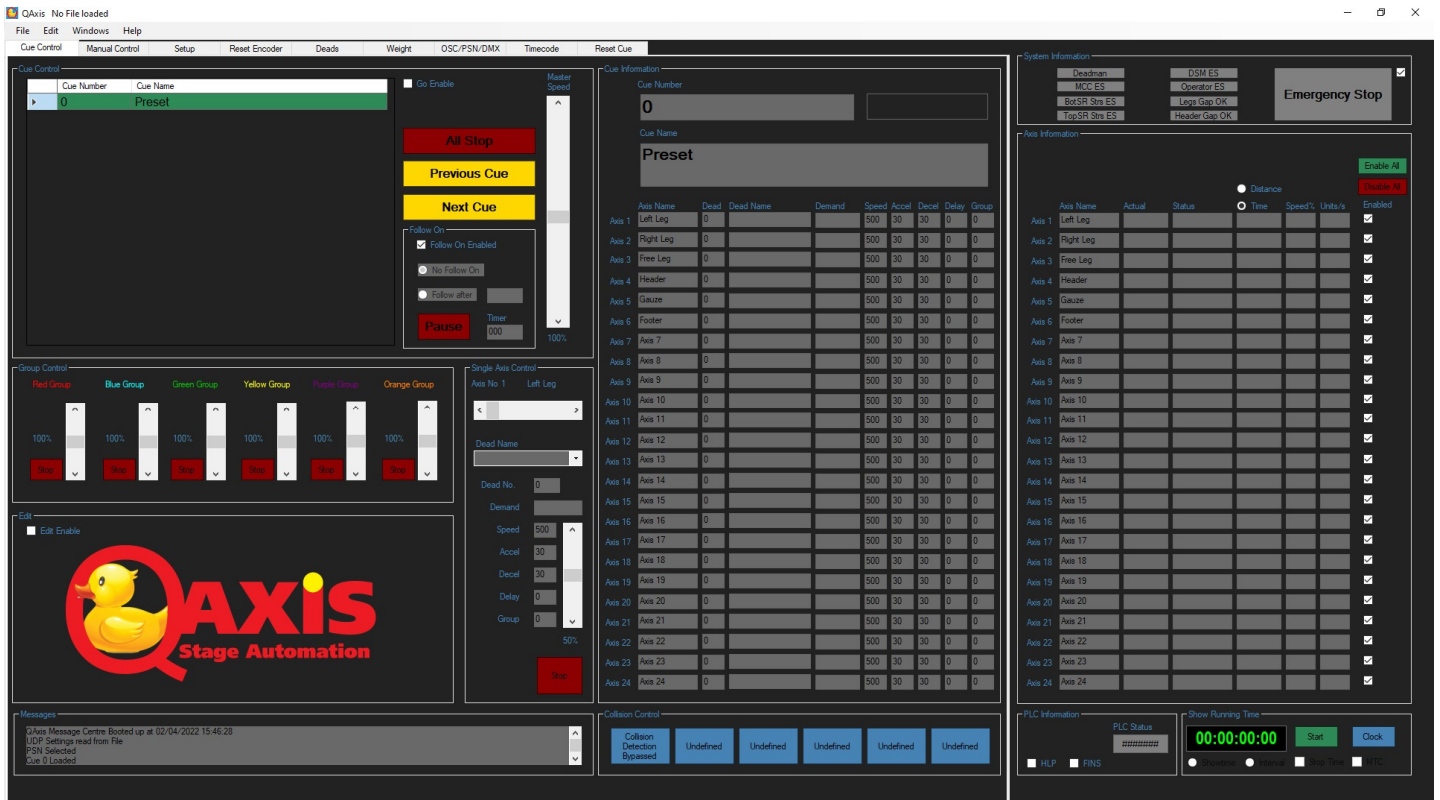
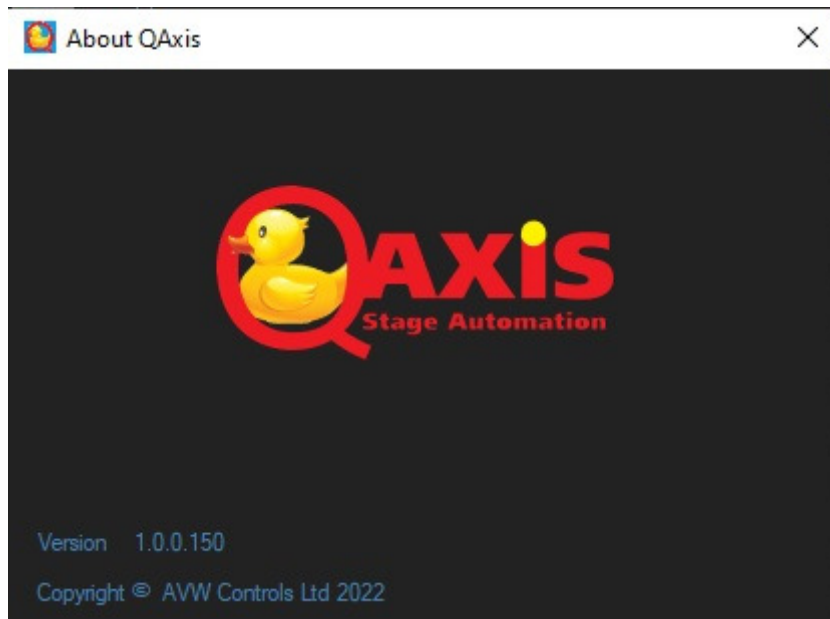
- QAxis can have a vast number of cues and any cue can control up to 24 axis simultaneously.
- QAxis has 128 named deads (trims) that can be used as many times as required for any axis in any cue.
- Six groups (playbacks) allow axis to be either run together or split during the running of cues with individual speed control.
- Cues can be linked together to produce complex cue sequences if required.
- The position and status of all axis are displayed the whole time.
- The time or distance to complete moves and cue speeds are displayed the whole time.
- There is a weight readout facility with over/under weight settings (Extra hardware required).
- There is a dedicated revolve interface to simplify revolve projects.
- QAxis has a show log to log all operator commands and any system error codes.
- Control of axis is restricted by a password, a keyswitch and a deadman pedal to prevent unintended movement.
- The single axis controller allows control of any one axis whilst other cues are running for immediate control of an axis without the need to write a cue.
- The manual page allows easy control of any axis without the need to write a cue for maintenance and installation purposes.
- QAxis runs on compatible Windows 10/11 computers with Full HD display and a USB or Ethernet port to communicate with the QAxis hardware.
- Remote diagnostic support is available if the user can provide an internet connection.
- QAxis has DMX output via sACN for integration with LX systems.
- QAxis has a PosiStageNet output for integration with AV systems.
- QAxis has an OSC (Open Sound Control) input for loading and firing automation cues from external control systems.
- QAxis has an MTC (Midi Timecode) input for synchronisation with external control systems.
- QAxis has a time script facility to trigger cues from internal or external timecode.

Operation

The QAxis software is a Windows based application; therefore many of the features will be familiar and intuitive. The file functions: New, Open, Save, Print and Exit are the same as for any modern Windows[®] application. However, for completeness, a brief description is given below.

Start-Up

QAxis is launched in the usual Windows manner, typically by double clicking on the QAxis logo on the desktop. The QAxis Splash screen will then be shown whilst the software is loading. It also displays the version number of the software.



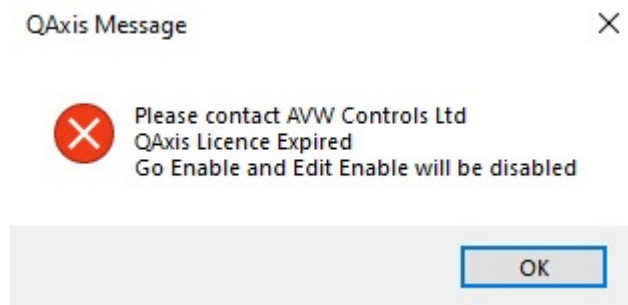
The main screen will then launch but with no file loaded and will be disconnected from the PLC.

QAxis Licence Expired

IMPORTANT!

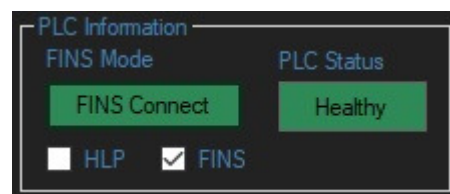
If you see the message below you will need to contact AVW Controls to reset the expiry date. The QAxis® software will still load if you see this message but you will not be able to run or edit cues.

AVW Controls can be contacted via our web site at www.avw.co.uk.



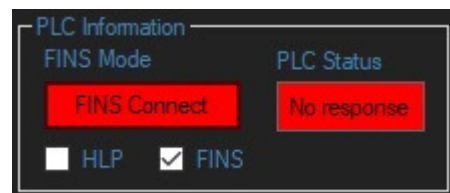
Connect to the PLC

To connect to the PLC you will need to select either HLP (Host Link Protocol) or FINS (Factory Interface Network Service) and then press the connect button.



If the PLC is found then the PLC Status indicator will illuminate green and say 'Healthy'.

If HLP is being used then a valid Comms port will need to be found and selected. Normally this is automatic but if the port has been removed or changed then a comms error will occur. Valid comms ports can be found using the combo box on the setup page.

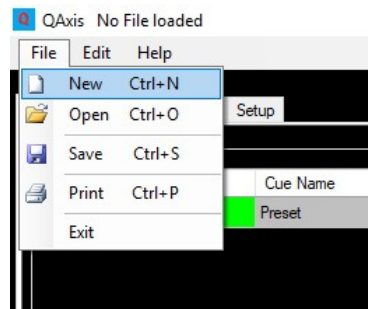


If FINS is being used then a valid Ethernet port will need to be found and selected. Normally this is automatic but if the IP address has been changed then a comms error will occur. The correct IP Address for your computer can be found using the combo box on the setup page. The IP Address for the PLC is normally 192.168.1.45, Omron communications is on Port 9000 so this will also need to be clear and may require permission from your firewall or anti-virus software.

The File Menu

The File menu is at the top left hand corner of the main screen. From this menu you can start a new show file, open an existing show file, save your current show file, print your show file or exit the program.

QAxis saves its cue data in files with the extension .QAX. By default these files are opened and saved from the last location used. There are other important files that are kept in a folder called QAxis in the root directory, show files can be kept in this location too if required or saved to external data media such as a USB stick.



The file operations are as follows:

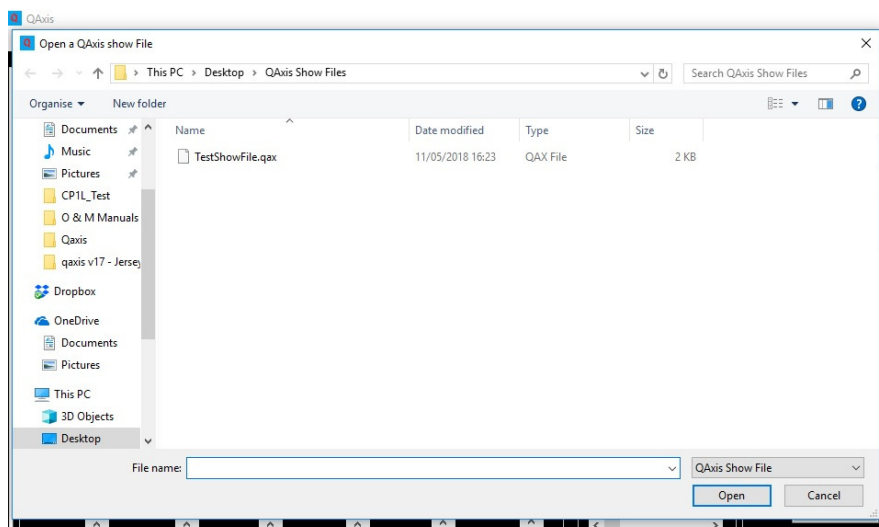
New

Be sure to save any work you intend to keep before starting a new show file!

This deletes the current cue information if there is any, you will be prompted to ask if you are sure. The cue list will then only show a single cue numbered zero with the Cue Name 'Preset' and all cue demand data will be null and other cue data set to default.

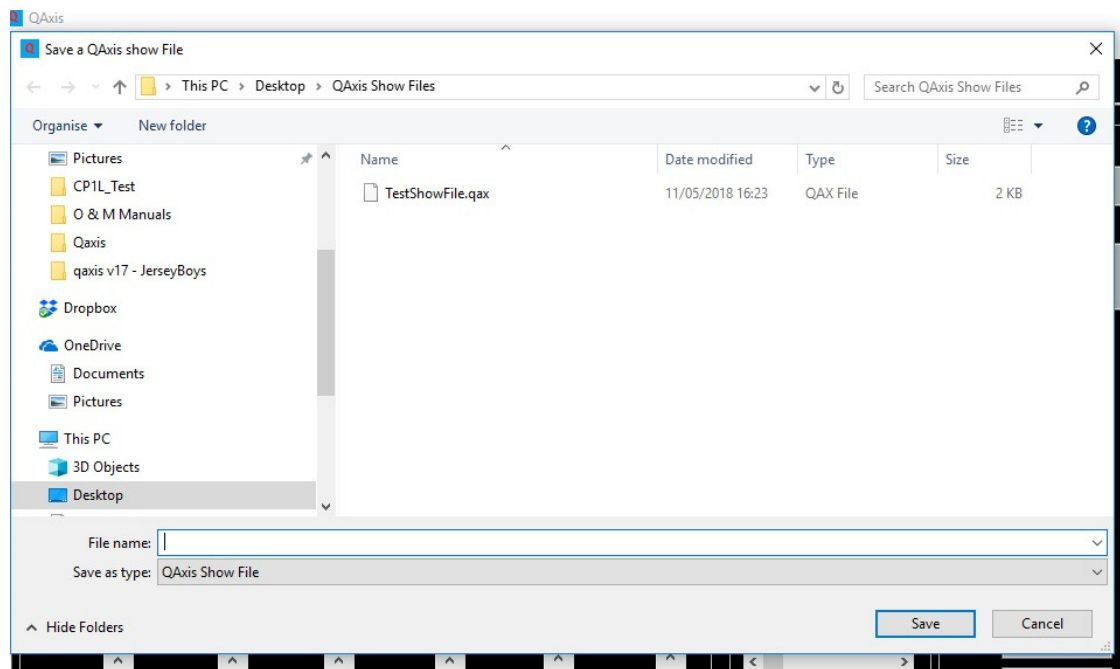
Open

This brings up a file browser allowing available drives and folders to be searched for the required *.QAX file. The file browser will open at the last drive and folder used, if this is not present because it is removeable media e.g. USB data stick ,then it will open at the default file location which may not necessarily be where the required show file is located. In this case, use the navigation buttons to navigate to the required Drive and Folder. A single click on the required file name followed by clicking the Open button will load this file. Alternatively, double-clicking on the file name will have the same effect.



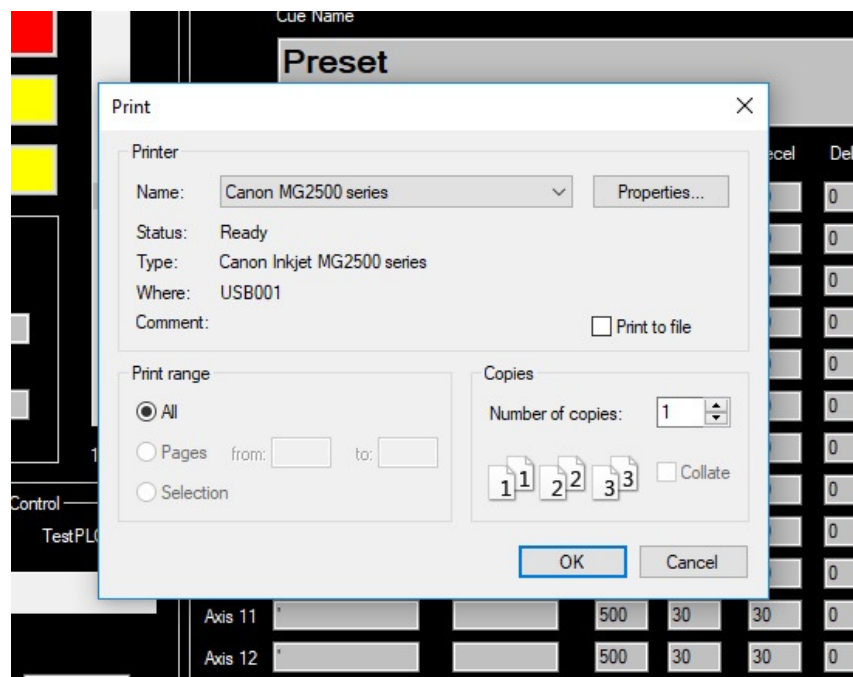
Save

This brings up a file browser allowing available drives and folders to be searched for where the current show file should be saved. The file browser will open at the last drive and folder used, if this is not present because it is removeable media e.g. USB data stick, then it will open at the default file location which may not necessarily be where the required show file is to be saved. In this case, use the navigation buttons to navigate to the required Drive and Folder. The file can then either be saved as an existing file by clicking on the existing file name and pressing the Save button, this will overwrite the cue data or it can be saved with a new filename by typing a new file name and pressing the Save button.



Print

Clicking on the Print function will bring up the Print dialog box for your printer. The print function will use a sheet of paper for each cue. Most printers will give you the option of how many copies and which pages etc are to be printed. The cue sheet is designed to fit A4 paper in portrait orientation.



Printed Cue Sheet

QAxis by AVW Controls Ltd

Cue Sheet

Show File: C:\Qaxis\QAxis Show Files\Joseph1.qax

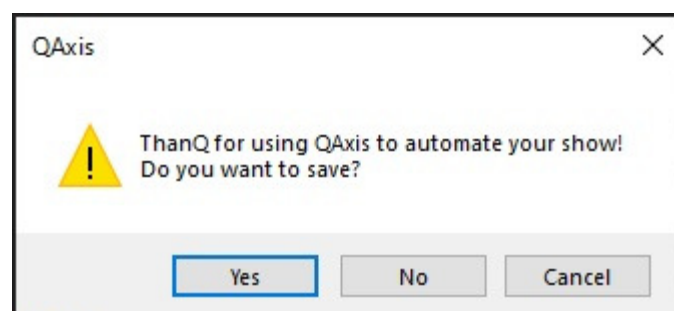
Cue number: 0

Cue name: Preset

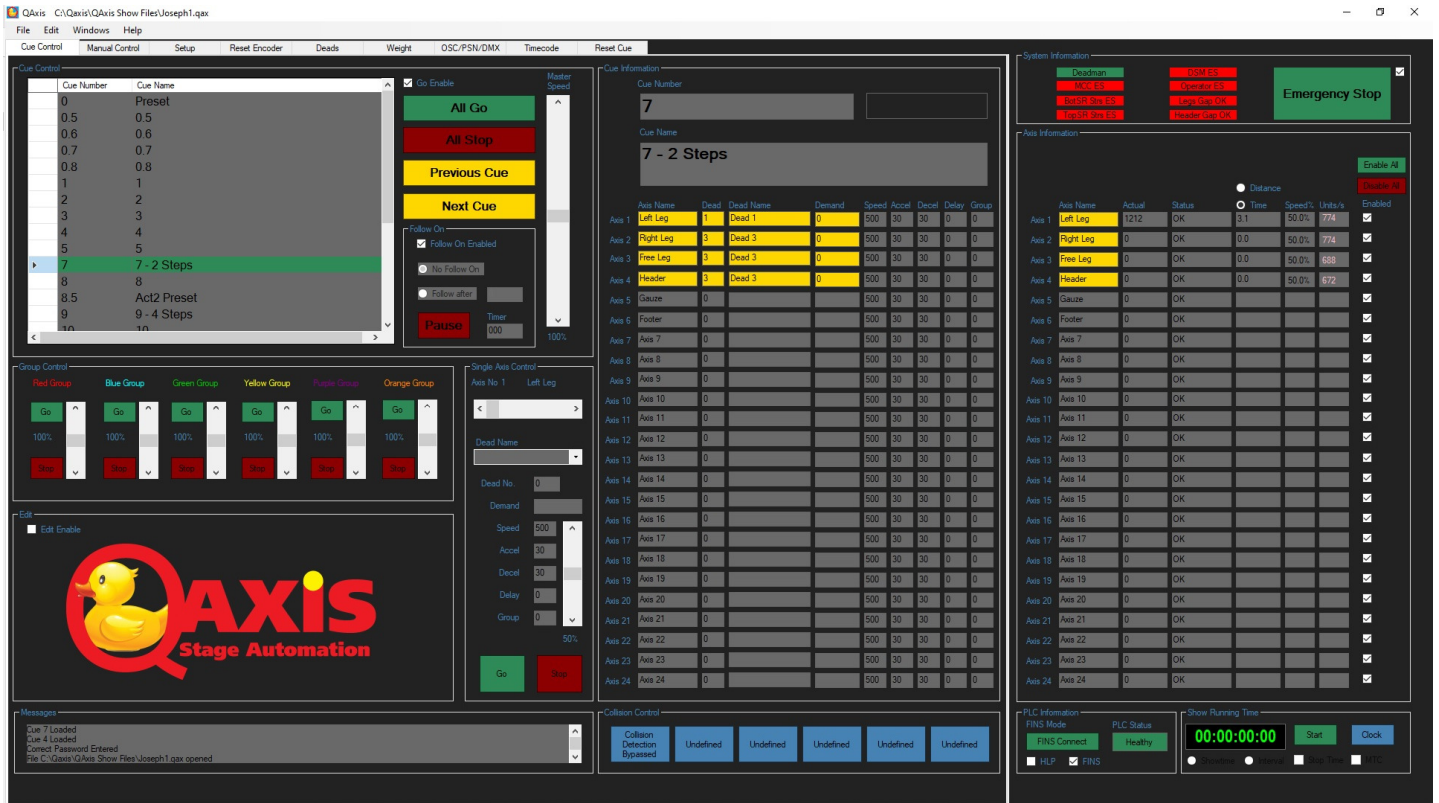
Axis	Demand	Speed	Accel	Decel	Delay	Dead	Group
Left Leg	0	500	30	30	0	Dead 1	0
Right Leg	0	500	30	30	0	Dead 1	0
Free Leg	0	500	30	30	0	Dead 1	0
Header	0	500	30	30	0	Dead 1	0
Gauze		500	30	30	0	0	0
Footer		500	30	30	0	0	0
Axis 7		500	30	30	0	0	0
Axis 8		500	30	30	0	0	0
Axis 9		500	30	30	0	0	0
Axis 10		500	30	30	0	0	0
Axis 11		500	30	30	0	0	0
Axis 12		500	30	30	0	0	0
Axis 13		500	30	30	0	0	0
Axis 14		500	30	30	0	0	0
Axis 15		500	30	30	0	0	0
Axis 16		500	30	30	0	0	0
Axis 17		500	30	30	0	0	0
Axis 18		500	30	30	0	0	0
Axis 19		500	30	30	0	0	0
Axis 20		500	30	30	0	0	0
Axis 21		500	30	30	0	0	0
Axis 22		500	30	30	0	0	0
Axis 23		500	30	30	0	0	0
Axis 24		500	30	30	0	0	0

Exit

This closes the program. A prompt will appear first asking to save data, if you press Yes then the Save dialog will start if you press No the program will close. If you press Cancel then the data is not saved and the program does not close.



Main Screen



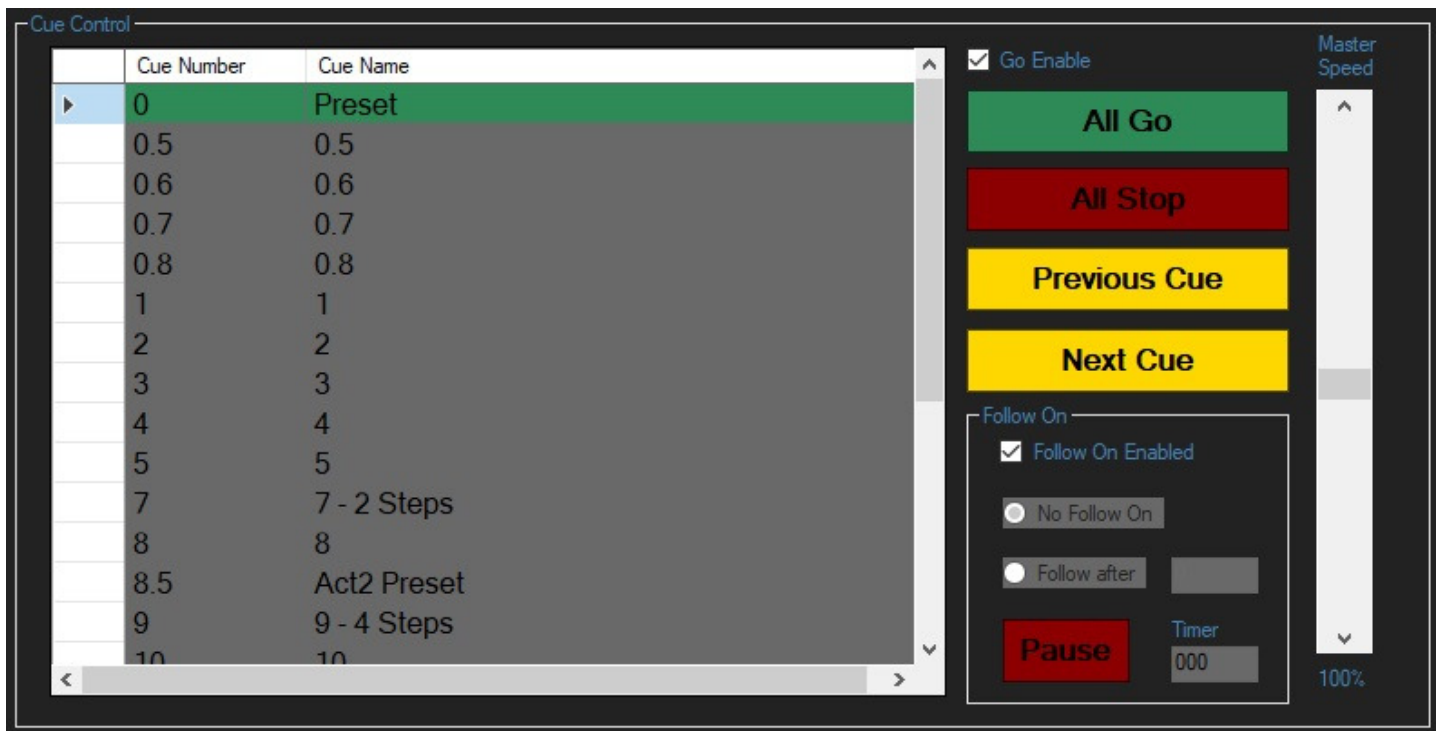
The main screen comprises of several windows.

- Cue Control
- Group Control
- Edit
- Single Axis Control
- Cue Information
- Axis Information
- System Information
- PLC Information
- Running Clock Display/Midi Timecode display
- Message Centre
- Custom Buttons

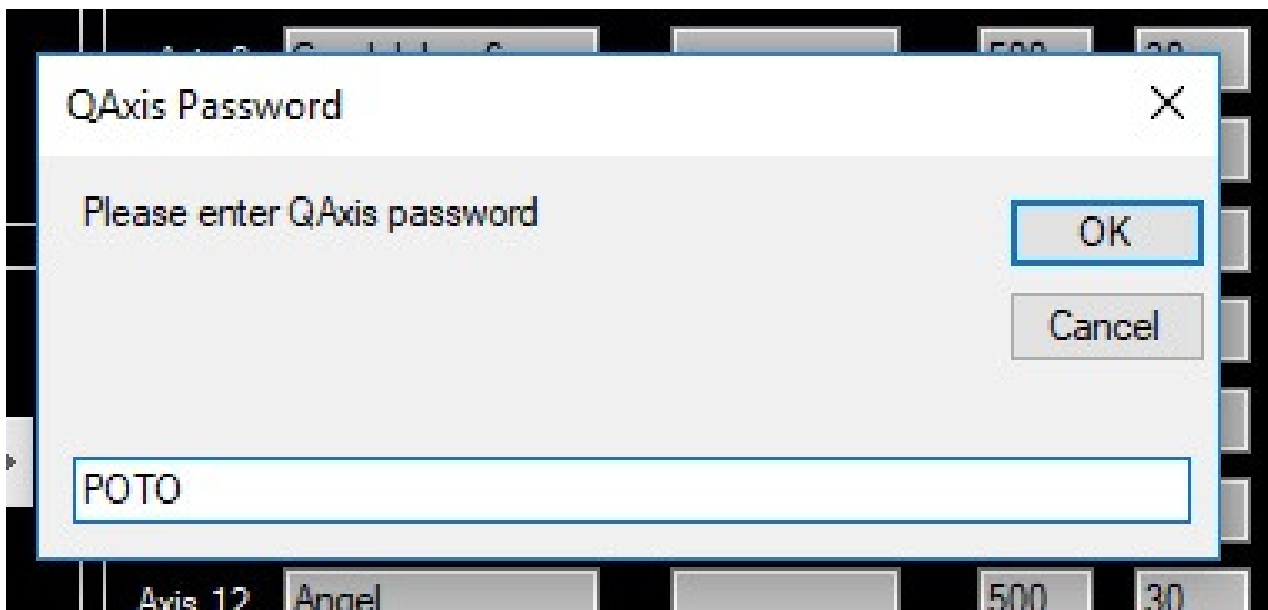
In addition there is a Manual Control Page, a Setup page, Encoder reset page, Deads page, Weight setup page, DMX/PSN/OSC page, Reset Cue page and a Timecode page accessed by a tab control.

When first accessing the Main Screen the PLC will be disconnected so the PLC Online Mode button will require pressing to establish communications with the PLC. The 'Actual' position and 'Status' of all the axis will then be displayed in the Axis Information window. The system information will then also be displayed. The PLC Healthy indicator will also show Green to indicate that the PC and PLC are communicating.

Cue Control Window



The Cue Control window will have the Go button missing when the QAxis program is first run. In order to display the Go button the Go Enable Checkbox will require clicking. The first time the Go Enable checkbox is clicked, or the Edit Enable checkbox is clicked then the system password will need to be entered. The password will vary from project to project. Once the correct password has been entered the Go Button will be displayed.



The Cue Control window is where the cues are listed in numerical order, the Go, Stop, Previous and Next Cue buttons are located, the Follow On Timer box and Master Speed Slider are also in the Cue Control window. Any cue can be selected by either using the Next/Previous buttons, clicking on the list at the required cue or using the shortcut keyboard. In addition a normal QWERTY keyboard can be used as follows:

- F1 Go
- F2 Stop
- F3 Next
- F4 Previous
- F5 Pause
- F6 Master Speed Faster
- F7 Master Speed Slower

Pressing Go will start any axis that has a valid demand (highlighted in yellow) on the Cue Information window. Any axis that are moving will display the 'Positioning' message in the Status box on the Axis information window, in addition the 'Actual' position will indicate that the scenery is moving toward its intended target. The axis information window will also display the remaining time or distance to complete the move. The speed will also be displayed, this is normally the cue speed that has been programmed but this might have been modified by either the master speed control or a group speed control. The speed in units per second is also displayed. If the units/s is displayed in pink it means that the programmed move is too short to perform the speed, acceleration and deceleration as programmed. The move will still happen but some or all of the move will be at creep speed to ensure that the target is not overrun. It is therefore normal for the units to be in pink near the end of a move.

Axis	Axis Name	Dead	Dead Name	Demand	Speed	Accel	Decel	Delay	Group	Axis	Axis Name	Actual	Status	Time	Speed%	Units/s	Enabled
Axis 1	Left Leg	1	Dead 1	0	500	30	30	0	0	Axis 1	Left Leg	461	Positioning	2.1	50.0%	774	<input checked="" type="checkbox"/>

When the scenery reaches its target, the Status box will briefly illuminate Yellow with the message 'At Position' and then revert to grey background with the OK message to indicate that it is ready for its next required move.

Axis	Axis Name	Actual	Status	Time	Speed%	Units/s	Enabled
Axis 1	Test 1	3500	At Position	0.0	50.0%	950	<input checked="" type="checkbox"/>

Axis	Axis Name	Actual	Status	Time	Speed%	Units/s	Enabled
Axis 1	Test 1	3500	OK	0.0	50.0%	950	<input checked="" type="checkbox"/>

Cue Information Window

Cue Information

Cue Number

0

Cue Name

Preset

	Axis Name	Dead	Dead Name	Demand	Speed	Accel	Decel	Delay	Group
Axis 1	Left Leg	1	Dead 1	0	500	30	30	0	0
Axis 2	Right Leg	1	Dead 1	0	500	30	30	0	0
Axis 3	Free Leg	1	Dead 1	0	500	30	30	0	0
Axis 4	Header	1	Dead 1	0	500	30	30	0	0
Axis 5	Gauze	0			500	30	30	0	0
Axis 6	Footer	0			500	30	30	0	0
Axis 7	Axis 7	0			500	30	30	0	0
Axis 8	Axis 8	5	Dead 5	0	500	30	30	0	0
Axis 9	Axis 9	0			500	30	30	0	0
Axis 10	Axis 10	0			500	30	30	0	0
Axis 11	Axis 11	0			500	30	30	0	0
Axis 12	Axis 12	0			500	30	30	0	0
Axis 13	Axis 13	0			500	30	30	0	0
Axis 14	Axis 14	0			500	30	30	0	0
Axis 15	Axis 15	0			500	30	30	0	0
Axis 16	Axis 16	0			500	30	30	0	0
Axis 17	Axis 17	0			500	30	30	0	0
Axis 18	Axis 18	0			500	30	30	0	0
Axis 19	Axis 19	0			500	30	30	0	0
Axis 20	Axis 20	0			500	30	30	0	0
Axis 21	Axis 21	0			500	30	30	0	0
Axis 22	Axis 22	0			500	30	30	0	0
Axis 23	Axis 23	0			500	30	30	0	0
Axis 24	Axis 24	0			500	30	30	0	0

The Cue Information window displays the current cue information. Any demand box with a yellow highlighted demand number indicates which axis will move when the Go button is pressed. The Cue information window will display the current demand, speed, acceleration, deceleration, delay time and playback group. If deads are being used the cue information window will display which dead has been selected. In Edit mode the deads can be selected from a drop-down combo box.

The current cue number and cue name is also displayed. If a Follow-On has been programmed then this will also be illuminated.

If the demand window is red then the demand is programmed outside of the soft limits of the system. It will still move towards the demand position but will stop when the soft limit has been reached.

Cue Information Window

The demand value is normally in millimetres (or hundredths of a degree for revolves). The demand value is eight digits long allowing values from –9999999 to 99999999. The value –1 is reserved for a Null value.

The speed value is in percent with an imaginary decimal point after two places. E.g. 567 means 56.7%

The Accel value is the time to reach full speed in tenths of a second. E.g. 30 means 3 seconds to reach full speed. If the speed required is, say, 50% then it would reach level speed in 1.5 seconds.

The Decel value is the time to reach zero speed from full speed in tenths of a second. E.g. 30 means 3 seconds to reach zero speed. If the speed required is, say, 50% then it would reach zero speed in 1.5 seconds.

The Delay value is the wait time in tenths of a second that the axis waits until it moves after receiving the Go command. The Status box on the Axis Information widow will illuminate Orange and display the message 'Waiting'.

	Axis Name	Dead	Dead Name	Demand	Speed	Accel	Decel	Delay	Group		Axis Name	Actual	Status	Time	Speed%	Units/s	Enabled
Axis 1	Left Leg	1	Dead 1	0	500	30	30	100	2	Axis 1	Left Leg	512	Waiting	2.2	50.0%	774	<input checked="" type="checkbox"/>

The Group value shows which Group (if any) that the Axis is in for that cue. Zero (0) is the default which means no Group. 1 is Red group, 2 is Blue group, 3 is green group, 4 is yellow group, 5 is purple group, 6 is orange group. Groups can then be started and stopped and have their speeds changed from the Group Control Window.

	Axis Name	Dead	Dead Name	Demand	Speed	Accel	Decel	Delay	Group
Axis 1	Left Leg	1	Dead 1	0	500	30	30	0	1
Axis 2	Right Leg	1	Dead 1	0	500	30	30	0	2
Axis 3	Free Leg	1	Dead 1	0	500	30	30	0	3
Axis 4	Header	1	Dead 1	0	500	30	30	0	4
Axis 5	Gauze	0			500	30	30	0	5
Axis 6	Footer	0			500	30	30	0	6

The Dead value is a number value from zero (0) to 128. The default value is zero, which means that no dead is selected.

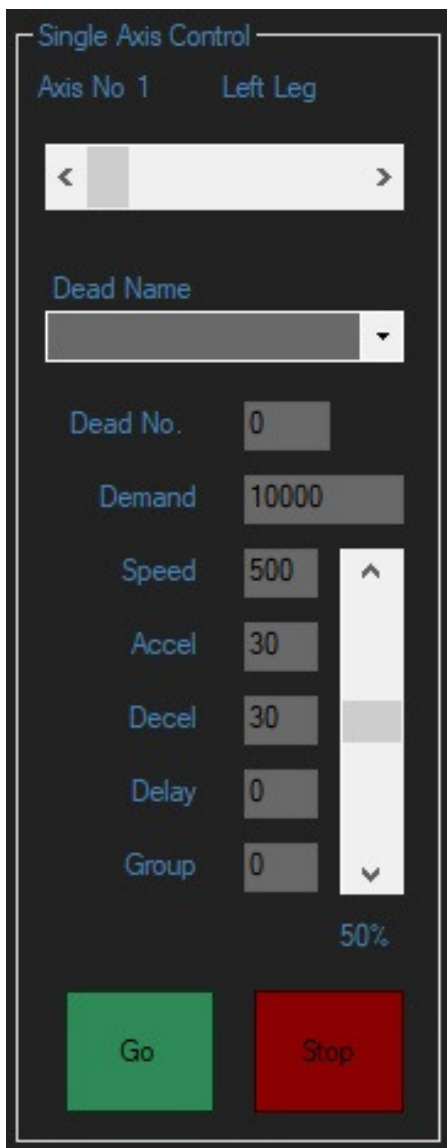
Dead values 129 to 999 can be used as special custom values that can be used for special purposes on a project by project basis. For example, they could be used for interlocking two or more axis for certain conditions to be met or synchronisation of multiple axis.

Group Control Window



The Control Window allows groups of axis to be controlled from within a cue. There are six groups (Playbacks); Red, Blue, Green, Yellow, Purple and Orange. Any axis can be assigned to any one of the six groups on a cue by cue basis. The groups can then be started, stopped or have their speeds adjusted independently of the Cue Control.

Single Axis Control Window



The Single Axis Control Window allows control of any one axis independently of the cue control. This is useful to move any axis without the requirement to program a cue. The axis required is selected by using the horizontal scroll bar. The demand, speed, accel, decel, delay, group and dead boxes use the same units as the Cue Information window. The Single Axis Control Go and Stop button will only affect the axis selected in the Single Axis window.

Axis Information Window

Axis Information							
				<input checked="" type="radio"/> Distance			
				<input type="radio"/> Time	Speed%	Units/s	Enabled
Axis 1	Test 1	2135	Positioning	3.9	87.2%	1657	<input checked="" type="checkbox"/>
Axis 2	Test 2	0	OK				<input checked="" type="checkbox"/>
Axis 3	Test 3	0	OK				<input checked="" type="checkbox"/>
Axis 4	Test 4	0	OK				<input checked="" type="checkbox"/>
Axis 5	Axis 5	0	OK				<input checked="" type="checkbox"/>
Axis 6	Axis 6	0	OK				<input checked="" type="checkbox"/>
Axis 7	Axis 7	0	OK				<input checked="" type="checkbox"/>
Axis 8	Axis 8	0	OK				<input checked="" type="checkbox"/>
Axis 9	Axis 9	0	OK				<input checked="" type="checkbox"/>
Axis 10	Axis 10	0	OK				<input checked="" type="checkbox"/>
Axis 11	Axis 11	0	OK				<input checked="" type="checkbox"/>
Axis 12	Axis 12	0	OK				<input checked="" type="checkbox"/>
Axis 13	Axis 13	0	OK				<input checked="" type="checkbox"/>
Axis 14	Axis 14	0	OK				<input checked="" type="checkbox"/>
Axis 15	Axis 15	0	OK				<input checked="" type="checkbox"/>
Axis 16	Axis 16	0	OK				<input checked="" type="checkbox"/>
Axis 17	Axis 17	0	OK				<input checked="" type="checkbox"/>
Axis 18	Axis 18	0	OK				<input checked="" type="checkbox"/>
Axis 19	Axis 19	0	OK				<input checked="" type="checkbox"/>
Axis 20	Axis 20	0	OK				<input checked="" type="checkbox"/>
Axis 21	Axis 21	0	OK				<input checked="" type="checkbox"/>
Axis 22	Axis 22	0	OK				<input checked="" type="checkbox"/>
Axis 23	Axis 23	0	OK				<input checked="" type="checkbox"/>
Axis 24	Axis 24	0	OK				<input checked="" type="checkbox"/>

The Axis Information window displays the Axis name, position, status and time or distance left to move and speed in percent and in real units.. The axis can also be disabled and enabled on the Axis Information window. If an axis is disabled then it will not respond to any Go commands, however it will **not** stop an axis that is already moving if the axis is disabled whilst moving. A disabled axis will respond to a Stop command though. The status box will display the status of each axis, the normal display is a grey background with an OK message to show that the axis is ready to accept Go commands. If an axis is moving, including manual control, the Status and Actual box will illuminate Green with a 'Positioning' message.

Axis Information Window

Axis Information

Enable All

Disable All

☒ Distance
 ☐ Time

	Axis Name	Actual	Status	Speed%	Units/s	Enabled
Axis 1	Test 1		No Comms	0.0	87.2% 1657	<input checked="" type="checkbox"/>
Axis 2	Axis 2		No Comms			<input checked="" type="checkbox"/>
Axis 3	Axis 3		No Comms			<input checked="" type="checkbox"/>
Axis 4	Axis 4		No Comms			<input checked="" type="checkbox"/>
Axis 5	Axis 5		No Comms			<input checked="" type="checkbox"/>
Axis 6	Axis 6		No Comms			<input checked="" type="checkbox"/>
Axis 7	Axis 7		No Comms			<input checked="" type="checkbox"/>
Axis 8	Axis 8		No Comms			<input checked="" type="checkbox"/>
Axis 9	Axis 9		No Comms			<input checked="" type="checkbox"/>
Axis 10	Axis 10		No Comms			<input checked="" type="checkbox"/>
Axis 11	Axis 11		No Comms			<input checked="" type="checkbox"/>
Axis 12	Axis 12		No Comms			<input checked="" type="checkbox"/>
Axis 13	Axis 13		No Comms			<input checked="" type="checkbox"/>
Axis 14	Axis 14		No Comms			<input checked="" type="checkbox"/>
Axis 15	Axis 15		No Comms			<input checked="" type="checkbox"/>
Axis 16	Axis 16		No Comms			<input checked="" type="checkbox"/>
Axis 17	Axis 17		No Comms			<input checked="" type="checkbox"/>
Axis 18	Axis 18		No Comms			<input checked="" type="checkbox"/>
Axis 19	Axis 19		No Comms			<input checked="" type="checkbox"/>
Axis 20	Axis 20		No Comms			<input checked="" type="checkbox"/>
Axis 21	Axis 21		No Comms			<input checked="" type="checkbox"/>
Axis 22	Axis 22		No Comms			<input checked="" type="checkbox"/>
Axis 23	Axis 23		No Comms			<input checked="" type="checkbox"/>
Axis 24	Axis 24		No Comms			<input checked="" type="checkbox"/>

PLC Information

FINS Mode

PLC Status

FINS Connect

No response

☐ HLP
 ☒ FINS

Show Running Time

00:00:00:00

Start

Clock

☐ Showtime
 ☐ Interval
 ☐ Stop Time
 ☐ MTC

If the PC is not communicating with the PLC when it should be then you will see the above screen. The PLC will not respond to any commands whilst it is not communicating. Typically the fault could be that the PLC is switched off, the PLC is physically disconnected from the PC or the wrong Com Port or IP Address has been selected. The Actual box will also be blank.

Axis Information Window

The Status box will also display a range of other messages as follows:

	Axis Name	Actual	Status	Time	Speed%	Units/s	Enabled
Axis 1	Test 1	3500	At Position	0.0	50.0%	950	<input checked="" type="checkbox"/>

The Status box will briefly illuminate Yellow with the 'At position' message at the end of a move.

	Axis Name	Actual	Status	Time	Speed%	Units/s	Enabled
Axis 1	Test 1	3009	Waiting	4.4	87.2%	1657	<input checked="" type="checkbox"/>

The Status box will illuminate Orange with the 'Waiting' message whilst Waiting a programmed Delay

	Axis Name	Actual	Status	Time	Speed%	Units/s	Enabled
Axis 1	Test 1	0		4.4	87.2%	1657	<input type="checkbox"/>

The Status box will illuminate Black with no message if the axis is disabled by unchecking the 'Enabled' check box. The axis will not move if commanded by a Go command.

	Axis Name	Actual	Status	Time	Speed%	Units/s	Enabled
Axis 1	Test 1	8	Disabled	4.4	61.3%	1165	<input checked="" type="checkbox"/>

The Status box will illuminate Blue with the 'Disabled' message if the axis is disabled by a hardware input. E.g. Emergency Stop or Deadman.

	Axis Name	Actual	Status	Time	Speed%	Units/s	Enabled
Axis 1	Test 1	3009	High Limit	2.5	50.0%	950	<input checked="" type="checkbox"/>

The Status box will illuminate Red with the 'High Limit' message if the high hardware limit switch is struck. The axis will stop in the high direction.

	Axis Name	Actual	Status	Time	Speed%	Units/s	Enabled
Axis 1	Test 1	0	Low Limit	0.0	87.2%	1657	<input checked="" type="checkbox"/>

The Status box will illuminate Red with the 'Low Limit' message if the low hardware limit switch is struck. The axis will stop in the low direction.

	Axis Name	Actual	Status	Time	Speed%	Units/s	Enabled
Axis 1	Test 1	3009	Ultimate Limit	4.4	87.2%	1657	<input checked="" type="checkbox"/>

The Status box will illuminate Red with the 'Ultimate Limit' message if the ultimate limit switch is struck. The axis will stop in both directions.

	Axis Name	Actual	Status	Time	Speed%	Units/s	Enabled
Axis 1	Test 1	0	Overload	0.0	87.2%	1657	<input checked="" type="checkbox"/>

The Status box will illuminate Red with the 'Overload' message if the overload signal is missing for more than one second. The axis will stop in the high direction.

Axis Name	Actual	Status	Time	Speed%	Units/s	Enabled
Axis 1	Test 1	Underload	4.4	87.2%	1657	<input checked="" type="checkbox"/>

The Status box will illuminate Red with the 'Underload' message if the underload signal is missing for more than one second. The axis will stop in the low direction.

Axis Name	Actual	Status	Time	Speed%	Units/s	Enabled
Axis 1	Test 1	Encoder Fault	4.4	61.3%	1165	<input checked="" type="checkbox"/>

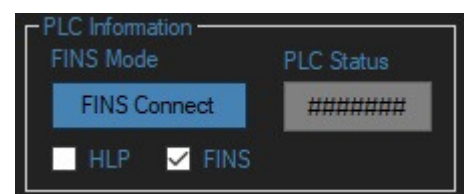
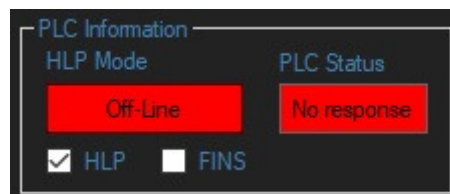
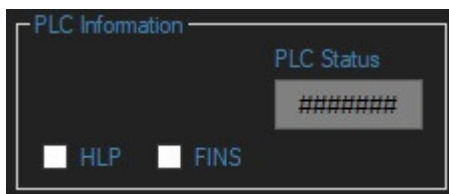
The Status box will illuminate Red with the 'Encoder Fault' message if the encoder signal is missing for more than one second. The Actual box will illuminate dark Green. Manual moves at creep speed are still possible.

System Information Window

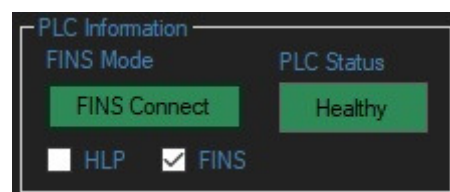


The System Information Window displays eight custom indicators and an Emergency Stop indicator. The eight custom indicators are assigned at commissioning time, in general the indicator will illuminate Green when the condition is good for movement and red when it is not good for movement. Likewise the Emergency Stop indicator is Green when movement is possible and red when movement is not possible.

PLC Information Window



The communications mode has to be selected between HLP or FINS. Then either go On-Line (HLP) or Connect (FINS)



When the PLC Status box is Green with the PLC Healthy message then the PC is communicating with the PLC and the PLC is able to accept commands. If the PLC Healthy is flashing then the PLC battery is running flat. When the PLC box is Dark Green with the PLC Busy message then the PC is communicating with the PLC and the PLC is receiving Go or Stop commands. The Status boxes and Actual boxes of the PLC is not updated whilst the PLC is busy. It is normal to see the PLC Busy during operation (especially in HLP mode when the communications is slower).

Edit



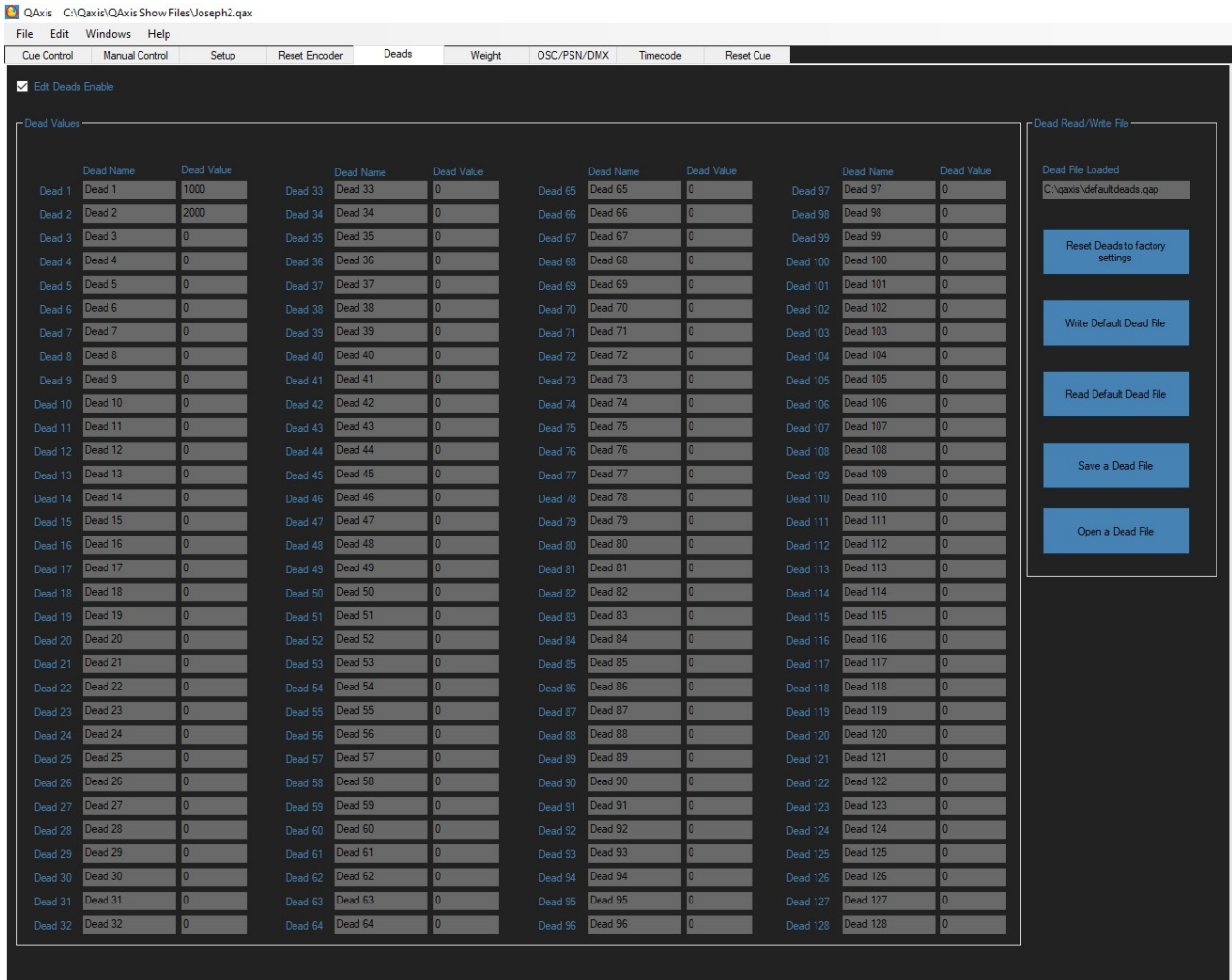
The Edit window is made visible by clicking the Edit Enable CheckBox. If the Go Enable has not already been enabled then the password will be required. If the Go Enable had been enabled it will become disabled when the Edit is enabled. i.e. The Go Enable and Edit Enable are mutually exclusive.

To create a new cue, you will assign a cue number that has not already been used. The cue number can be up to seven digits long including the decimal point. This means that there are potentially millions of cues available from 0 to 9999999, 0.000001 to 99999.9. A new cue must also have a cue name, if you do not put in a cue name it will assign a name with a Q with the cue number after it. The new cue will appear in the cue list in the Cue Control window at the numerically correct place in the list. The cue information on the Cue Information window is now editable. The cue information can be cut, copied and pasted from box to box or cue to cue allowing easy and fast editing. When all the information has been entered, press the Record Current Cue and the information will be saved to the current session but not to the current file. Use the save function to save your work to a file.

The cue information is entered on the cue information page as required. There are default speed, acceleration, deceleration, delay, group and dead information but these can be overwritten as required.

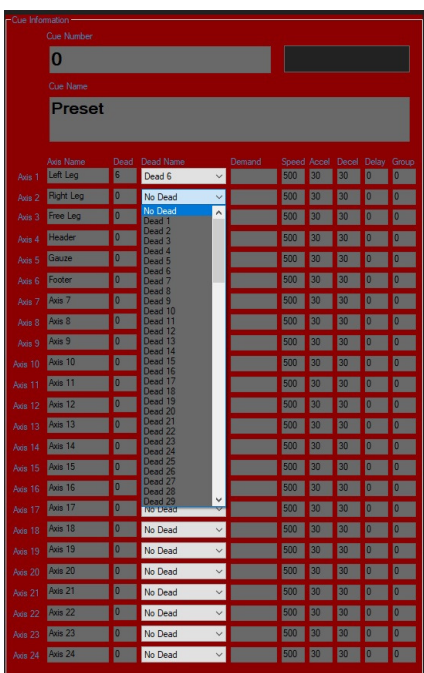
Any cue can be deleted by selecting the cue to be deleted on the Cue Control window and pressing the Delete Current Cue on the Edit window. Any cue can have its cue information reset by pressing the Reset Current Cue. Whole cues can be copied, cut and pasted using the relevant buttons on the Edit window.

Deads



The named Deads page can be accessed using the tab control. There are 128 deads that can have their name and dead value edited and saved. The default dead file is loaded automatically when QAxis is started, however it is possible to edit, save and load multiple dead files with different file names.

If a file is saved as the default dead file, then that will be the file that is loaded the next time QAxis is launched. If no default dead file is found then the deads will all be set to factory settings, i.e. all the dead values will be zero.



The deads can then be selected on the main page when QAxis is in Edit mode from a drop-down combo box for each axis. Any dead can be used as many times as required in any cue for any axis.

If a dead value or name is changed the cue list will display the new name and value in all the cues it is being used in. This is useful if many axis or cues are regularly using the same value; it only has to be edited once.

Calculators

Axis Number: < 1 > Test 1

Max Speed: 1900 Units/s

Calculate Speed from Distance and Time

Distance mm: 10000

Time Required 0.1s: 100

Accel 0.1s: 30

Decel 0.1s: 30

Calculate Speed

Speed Result %*10: 1

Triangle Move

Triangle Max Speed Shortest Distance:

Triangle xxx% Speed Shortest Distance:

Triangle 500 %*10 Speed Shortest Distance:

Triangle Time Result:

Calculate Triangle

Accel

Decel

Calculate fastest speed possible for short move.

Other Results

Distance mm:

Actual Speed mm/s:

Level Time s:

Accel Time s: m/s²

Decel Time s: m/s²

Revolve Calculator

Revs: Start 0 Move 0 Demand 0

Degrees * 100: Start 0 Move 0 Demand 0

Encoder Value: Start 0 Move 0 Demand 0

Clockwise

Anti-Clockwise

The calculators can be accessed from the Edit window or main menu. This will allow the speed required to be calculated to perform moves. The Max speed will be read from a max speed file if it has been set up and entered in the max speed calculator window. If the max speed file has not been set up then an undefined message will be displayed instead and the calculator function will not work.

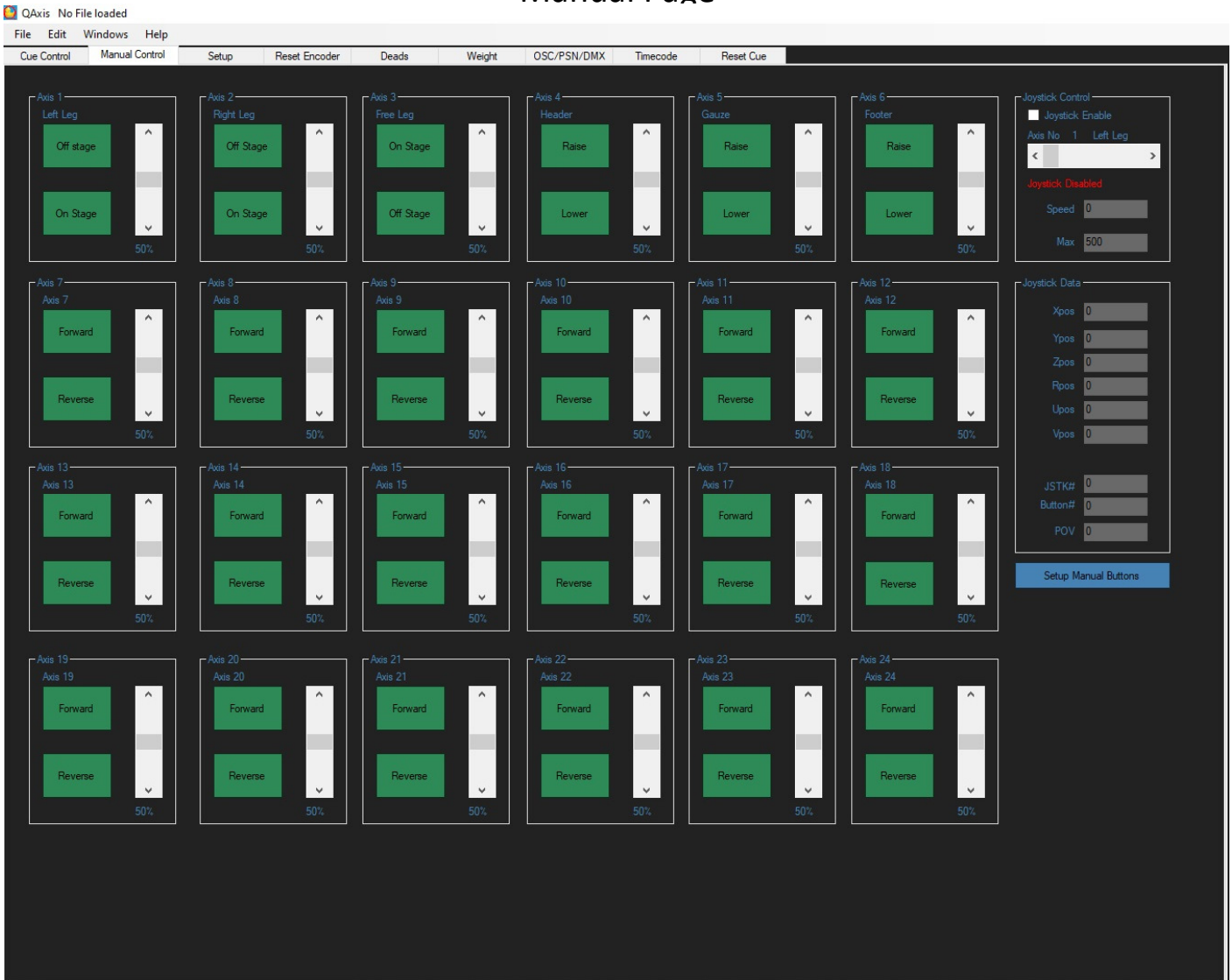
The move distance is entered in the units being used; normally millimetres (or hundredths of a degree for revolves). The time required is entered in 10ths of a second. E.g. 100 is 10 seconds. The accel and decel is entered in tenths of a second to full speed. E.g. 30 is three seconds to full speed. The Calculate Speed button is then pressed and result will be displayed if the axis is capable of achieving the required move. This result can then be entered into the speed box of the Cue Information and recorded using the Record button on the Edit window. In addition some other useful results are displayed.

The Triangle Move calculator calculates the shortest distance that can be achieved (i.e. a triangle shaped trajectory) with the given speed, acceleration and deceleration values.

The revolve calculator makes revolve calculations easier by converting Revolutions and Degrees into encoder counts.

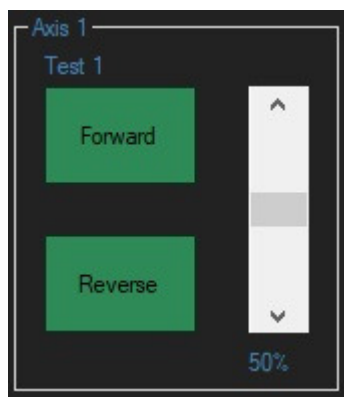
In addition there is a calculator button on the setup page that gives quick access to the Windows Calculator.

Manual Page



The Manual page can be selected by using the Tab control at the top of the Main Screen. This will give access to 24 manual axis controllers. The Axis Information, System Information and PLC Information windows are still visible. The axis will stop at their hard or soft limits if the button is kept pressed down. There is also a single axis joystick controller for USB Joystick control.

Each Manual controller has a Forward and Reverse button and a speed scroller bar. The default manual speed is 50%. If the speed is changed then the manual speed is also changed if there are other manual controls such as a touchscreen or hard wired buttons. The manual buttons text can be edited on the manual buttons set-up page that can be accessed using the Setup manual Buttons button.



Setup Page

The Setup page allows axis parameters to be edited, saved or retrieved from file and sent or retrieved from the PLC. The Axis names, system status names, custom button names, soft limits, comms port, speed calculator reference speeds and software expiry date can also be set up using this page. There is an enable check box that has to be clicked to make the 'write' buttons visible. There is an encoder scaling calculator accessible from this page.

You should not use this facility unless you have been trained to do so!

The screenshot shows the QAxis Setup Page with the following sections:

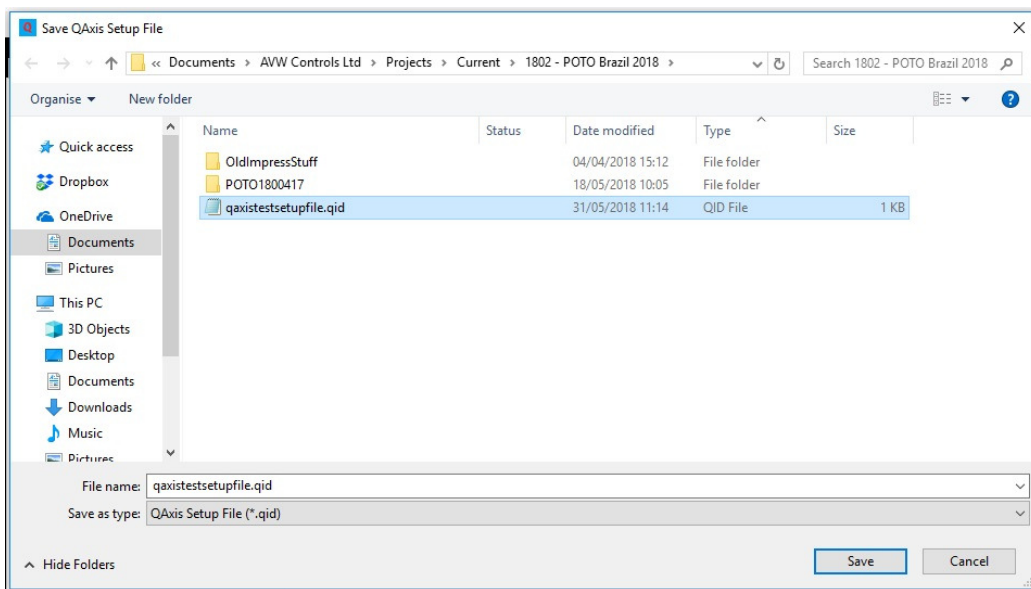
- Top Bar:** QAxis No File loaded, File, Edit, Windows, Help.
- Navigation Tabs:** Cue Control, Manual Control, Setup (selected), Reset Encoder, Presets, Weight, UDP, Timecode Script.
- Settings:** ☒ Setting Up Enable.
- Axis Parameters:** Axis No. 1, Test 1. Includes an Encoder Scaling Calculator, Scaling Multiplier, Scaling Divisor, High Soft Limit, Low Soft Limit, Max Frequency, Stop Offset, Creep Speed, Stop Decel, Encoder Reset Value, and buttons for Send to PLC, Load from PLC, Write File, and Read File. A caution note states: "Caution: Adjust axis parameters with care."
- Soft Limits File:** A table with columns for Axis, High Limit, and Low Limit. It lists 24 axes, all with High Limit 9999999 and Low Limit -9999999. Buttons for Write File, Read File, and Default File are at the bottom.
- Speed Calculator Values:** A table with columns for Axis, Test 1, and Test 2. It lists 24 axes. Test 1 values are 1900 for Axis 1, 314 for Axis 2, and Undefined for others. Test 2 values are all Undefined. Buttons for Write File and Read File are at the bottom.
- Axis Names:** A table with columns for Axis, Test 1, Status 1, and Test 2. It lists 24 axes. Status 1 values are Axis 1 Fault, Not Used, Not Used, Deadman, Not Used, Not Used, Not Used, Password 5555, and No. of Axis 24. Test 2 values are all Undefined. Buttons for Write File and Read File are at the bottom.
- Custom Buttons Setup:** A table with columns for Button Title Text and Test 1. It lists 6 buttons, all with Undefined Test 1 values. Buttons for Write File and Read File are at the bottom.
- QAxis Software Expiry Date:** A section with a date picker (31 March 2021), a password field, and a button for Incorrect password.
- Show Log:** A section with buttons for Test Today's Show Log, Delete Today's Show Log, and Read Today's Show Log. A checkbox for Show Log Reporting On is checked.
- Windows Help:** A section with buttons for Mouse Setup, Remote Help, Calculator, and Power Setup.

The 'Send to PLC' button will send the displayed parameters to the axis selected. A dialog box will pop up to check that you are sure.

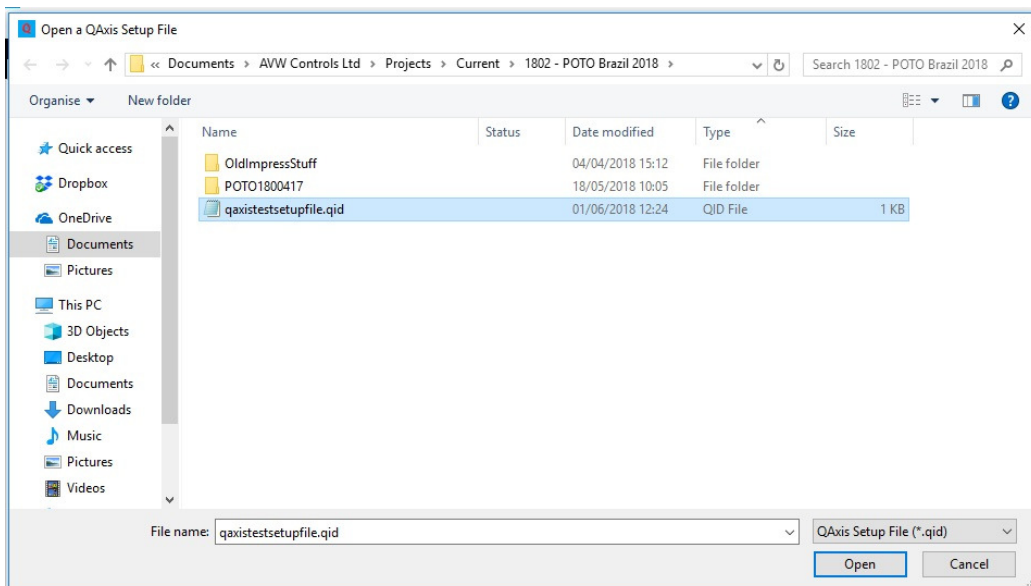
The dialog box is titled "Load Axis Parameters to PLC" and contains the text "Are you sure?". It has three buttons: Yes, No, and Cancel.

The 'Load from PLC' button will send the PLC parameters from the axis selected to the display.

The 'Save to file' button will send the PLC parameters from the axis selected to a QID file. A Save file browser will be displayed allowing available drives and folders to be searched for where the current QID file should be saved. The file browser will open at the last drive and folder used, if this is not present because it is removeable media e.g. USB data stick, then it will open at the default file location which may not necessarily be where the required QIDfile is to be saved. In this case, use the navigation buttons to navigate to the required Drive and Folder. The file can then either be saved as an existing file by clicking on the existing file name and pressing the Save button, this will overwrite the axis parameter data or it can be saved with a new filename by typing a new file name and pressing the Save button.

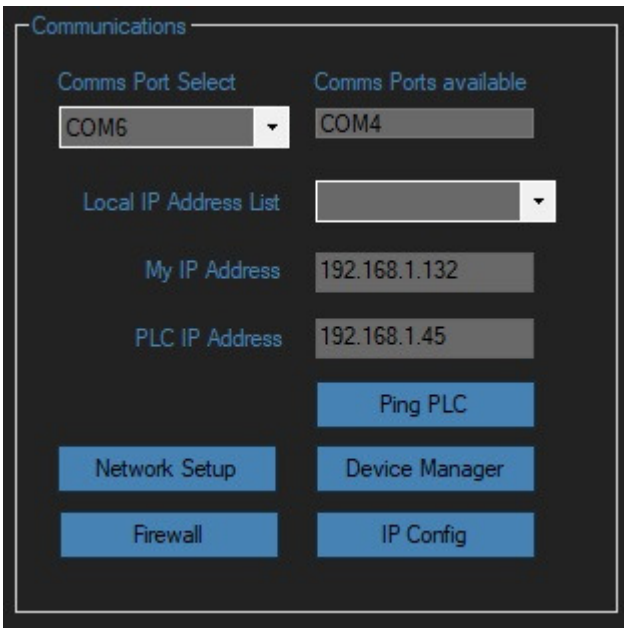


The 'Load from file' button will send the PLC parameters in a QID file to the display. An Open file browser will be displayed allowing available drives and folders to be searched for where the required QID file should be loaded from. The file browser will open at the last drive and folder used, if this is not present because it is removeable media e.g. USB data stick, then it will open at the default file location which may not necessarily be where the required QID file is to be loaded from. In this case, use the navigation buttons to navigate to the required Drive and Folder. A single click on the required file name followed by clicking the Open button will load this file. Alternatively, double-clicking on the file name will have the same effect.



Communications

The Communications window displays the comms ports (HLP) and IP addresses (FINS) that are available and what has been selected. The comms port or IP address is selected when the program is started from the Axisnames.dat file in the QAxis folder and therefore should not normally need changing.

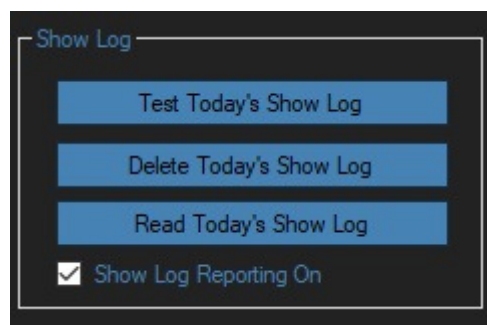


The Communications window also has Windows shortcuts to the Network settings, Device manager, Firewall settings and a Command Prompt for the IP configuration. This to provide quick links to Windows system information that might be helpful when setting up the communications.

The Ping PLC is a button to test that the PLC can be found using FINS Ethernet protocol.

Show Log

A Daily Show Log facility logs all operator Go and Stop commands, all QAxis error messages (e.g. Ultimate Limit) and all QAxis exception codes (system problems). It will date/time stamp all entries and fault entries will also report which cue was affected and the running time at the time of the fault (if the Running Clock is running). If a problem occurs it would be useful to have a copy of the show log emailed to AVW to assist with troubleshooting.



Windows Help

There are some shortcut buttons to some Windows utilities that might be useful.



Reset Encoder page

The Reset Encoder page is accessible from the main tab control. Each of the axis can have its encoder value reset from this page. The encoder will be set to the reset value using the Axis Parameters that have been saved to the PLC. By default this value is zero.

If a reset value other than the saved reset value is required this can also be entered. This will, however, change the saved reset value.

The screenshot displays the 'Reset Encoder' interface, which is divided into two main sections: 'Reset Axis Encoder' and 'Quick Reset Axis Encoders'.

Reset Axis Encoder Section:

- Caution:** This button resets the encoder value of the selected axis to the required encoder value and changes the stored encoder reset value in the PLC.
- Axis Selection:** A dropdown menu shows 'Axis 1' selected, with 'Test 1' as the active test.
- Actual Encoder Position:** A text field displays '2001'.
- Required Encoder Value:** A text field displays '0'.
- Reset Button:** A large blue button labeled 'Reset Selected Encoders required encoder value'.

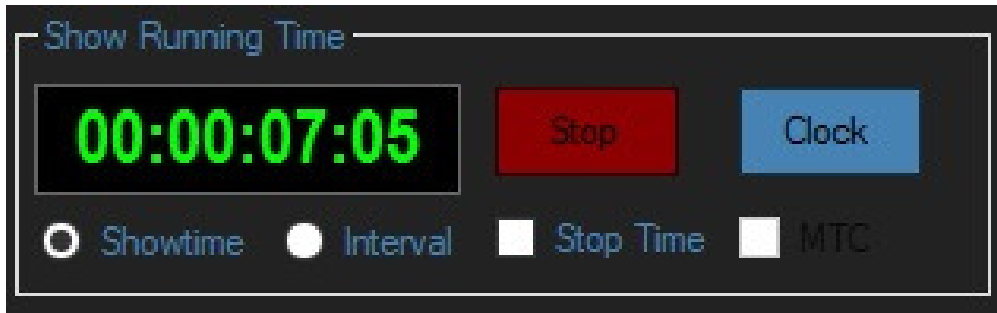
Quick Reset Axis Encoders Section:

- Caution:** These buttons reset the encoder value to the Encoder Reset Value already stored in the PLC.
- Note:** These stored values can be checked on the Seup page.
- Grid:** A table with 24 rows, each representing an axis. Each row contains the axis number, the test name (e.g., 'Axis 1', 'Axis 2'), and a corresponding 'Reset Encoder' button.

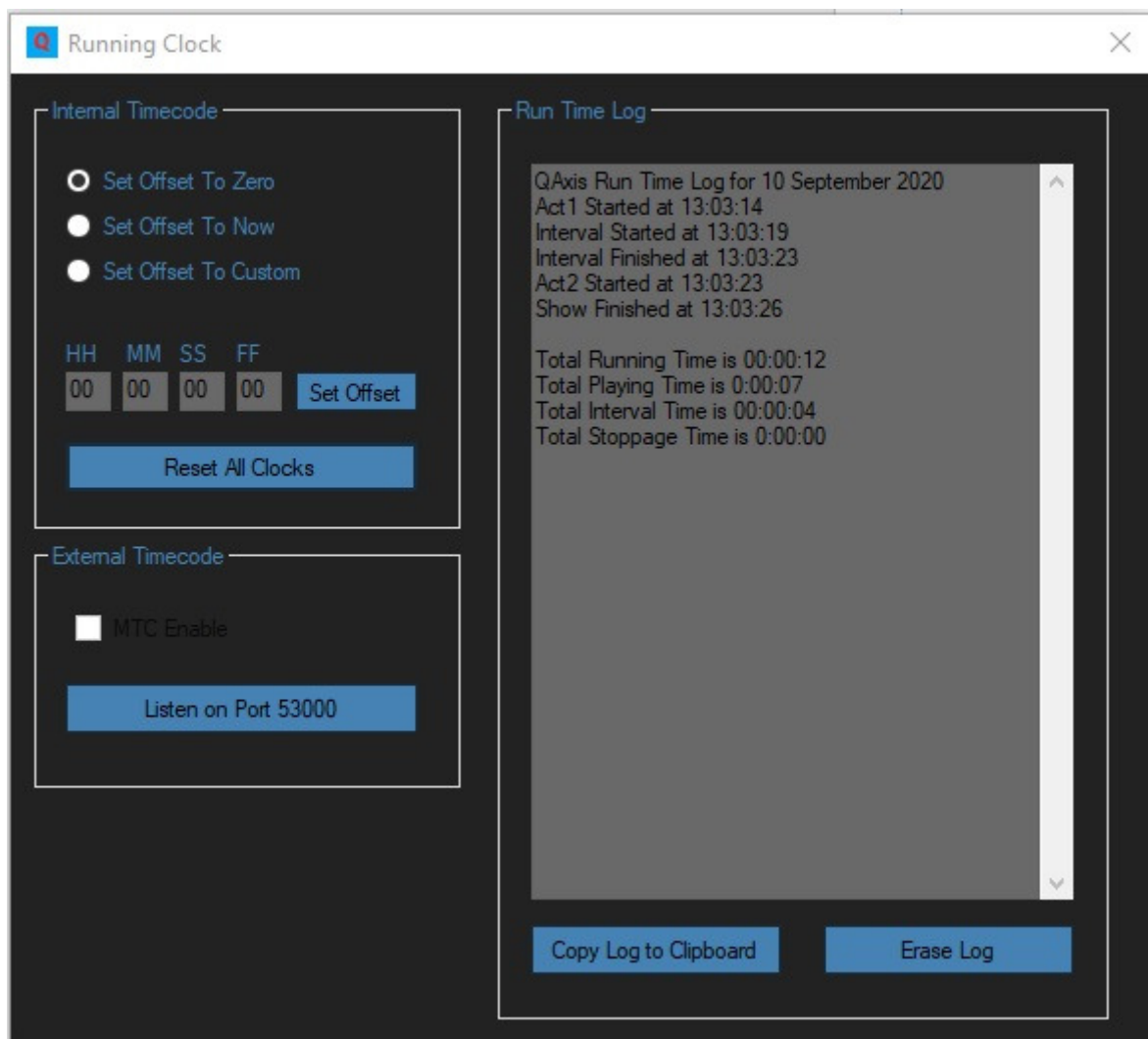
Modal Dialog:

A modal dialog box is open in the foreground, titled 'Reset Encoder for Test 1 to 0'. It contains the question 'Are you sure?' and three buttons: 'Yes', 'No', and 'Cancel'.

Running Clock



There is a running clock that can keep track of where you are in the show. This clock is also used for the show log system to time stamp all the cues which may be useful for troubleshooting if there is a problem. The running clock can also keep a log of the running time, interval time and stoppage time. The clock can be set to 'Now' time or be set to any start value. The default start value is zero.

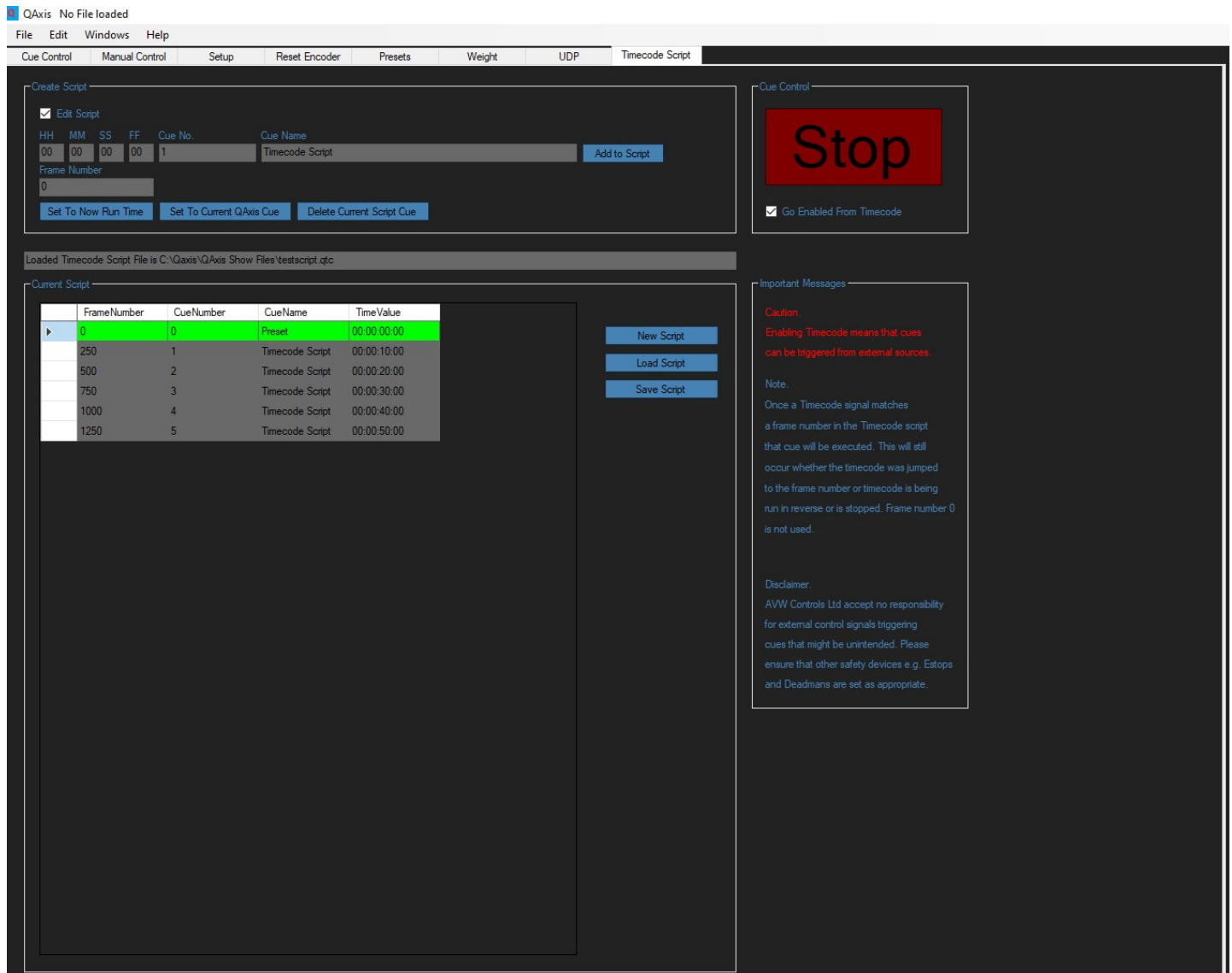


Midi Timecode

Alternatively QAxis can listen on Port 53000 for external Midi Timecode (MTC) received as a UDP Ethernet message. The format for the MTC message is HH:MM:SS:FF

The running clock will then display the received MTC instead.

Timecode script



Timecode script

A timecode script can be created that can trigger cues in response to the running clock reaching a defined point in time. The timecode script can use the running clock whether the timecode is generated internally or received by MTC. The timescript cues are in time order according to the frame number but can call up the QAxis cues in any order.

Important

Enabling Timecode means that cues can be triggered from external sources.

Once a Timecode signal matches a frame number in the timecode script that cue will be executed. This will still occur whether the timecode was jumped to the frame number or timecode is being run in reverse or is stopped. Frame number 0 is not used.

Disclaimer

AVW Controls Ltd accept no responsibility for external control signals triggering cues that might be unintended. Please ensure that other safety devices e.g. Estops and Deadmans are set as appropriate.

Reset Cue

QAxis C:\Qaxis\QAxis Show Files\Joseph1.qax

File Edit Windows Help

Cue Control Manual Control Setup Reset Encoder Deads Weight OSC/PSN/DMX Timecode Reset Cue

Reset Cue Info

Reset Cue Number
0.7

Reset Cue Name
0.7

Axis	Axis Name	Demand	Speed	Accel	Decel
Axis 1	Left Leg	349	800	30	30
Axis 2	Right Leg	0	500	30	30
Axis 3	Free Leg	0	500	30	30
Axis 4	Header	0	500	30	30
Axis 5	Gauze	0	500	30	30
Axis 6	Footer	0	500	30	30
Axis 7	Axis 7				
Axis 8	Axis 8				
Axis 9	Axis 9				
Axis 10	Axis 10				
Axis 11	Axis 11				
Axis 12	Axis 12				
Axis 13	Axis 13				
Axis 14	Axis 14				
Axis 15	Axis 15				
Axis 16	Axis 16				
Axis 17	Axis 17				
Axis 18	Axis 18				
Axis 19	Axis 19				
Axis 20	Axis 20				
Axis 21	Axis 21				
Axis 22	Axis 22				
Axis 23	Axis 23				
Axis 24	Axis 24				

Reset Cue Control

Reset Cue Go

All Stop

Load Reset Cue

Reset Cue 4

Reset Cue Speed Control

Default Speed/Accel/Decel

Slow Speed/Accel/Decel

Fast Speed/Accel/Decel

Clear Reset Info

Clear Reset Cue Positions

Create Reset Cue

Last Cue	Reset Cue Number	Reset Cue Name
	1	1
Reset Cue 1	0	Preset
Reset Cue 2	0.5	0.5
Reset Cue 3	0.6	0.6
Reset Cue 4	0.7	0.7
Reset Cue 5	0.8	0.8
Reset Cue 6	1	1
Reset Cue 7		
Reset Cue 8		
Reset Cue 9		
Reset Cue 10		

Clear All Reset Cues ☒ Auto Record Reset Cues

Write/Read Reset Cue File

Write All Reset Cues To File

Read All Reset Cues from File

Reset Cue Page

The start position of the last ten cues started are stored on the Reset Cue page so that a cue can be returned to its start position easily.

The cue to be reset is selected from the 'Load reset Cue' dropdown list, it can then be reset using either the speeds of the selected cue or set to fast or slow to reset the positions as appropriate.

In addition the stored reset positions can be stored and retrieved from a Reset Cue file.

Stopwatch



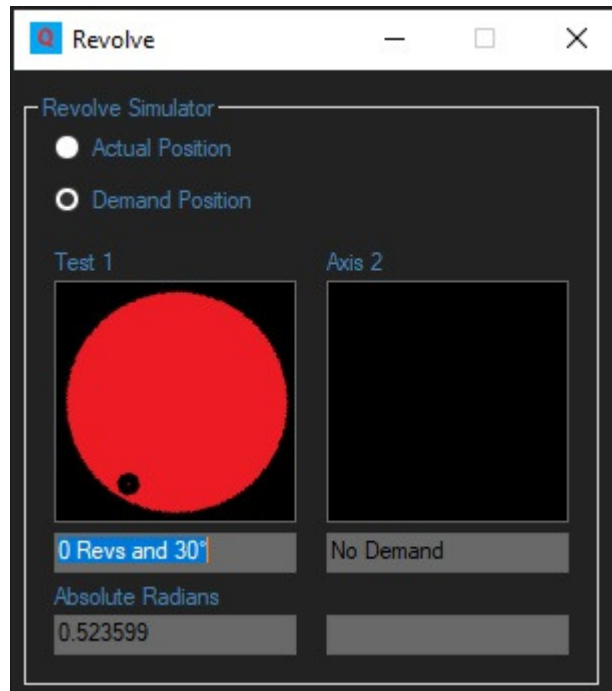
A stop watch can be accessed from the Window menu. This enables single moves to be timed accurately.

Custom Buttons



The Custom Buttons window is on the main page. This facility can be used when extra facilities or macro's are required and can be assigned at the time of commissioning. Typically this might be switching hydraulic pumps on and off, moving an axis to a pre-defined position or controlling a simple I/O axis.

Revolve Simulator



A revolve interface is available for Axis 1 and 2. This facility enables the operator to visualise revolve movements.

Each revolve revolution is calibrated to 36000 counts. Therefore there are 100 counts per degree. For example a revolve move of 1 revolution and 60 degrees would be 42000 (36000 + 6000).

The absolute value in Radians is also displayed.

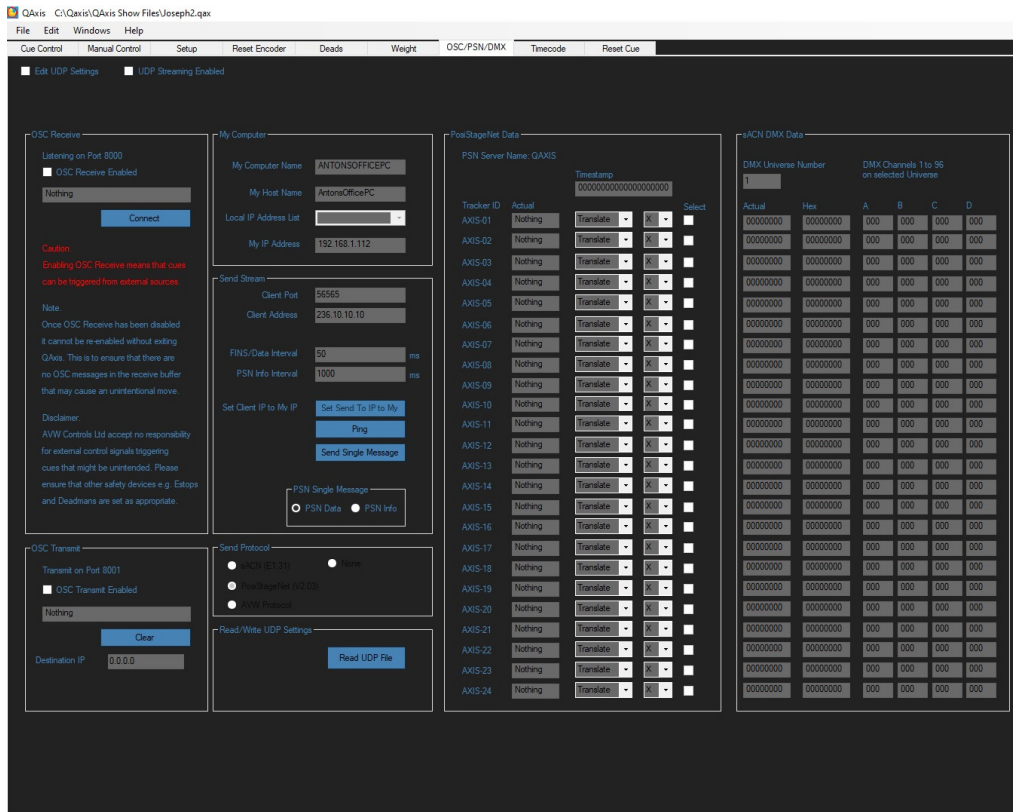
Messages



A message centre logs all operator and system events and displays them in the Messages window. In addition all messages are logged in the show log with a time stamp to assist with remote troubleshooting.

System exception errors are displayed in red and should always be reported back to AVW, preferably with a copy of the show log with any other relevant information to assist with identifying problems if they should occur.

OSC/PSN/DMX



The OSC/PSN/DMX page allows QAxis to send axis position information to external systems and to receive cue control commands from external systems.

sACN DMX

The axis position can be sent out as four channels of DMX for each axis on channels 1 to 96 on any DMX universe between 1 to 63999. The data is sent out as sACN (E1.31) on Port 5568 to IP Address 2.0.0.1 by default.

PosiStageNet

The axis position can be sent out as PosiStageNet (V2.03) data on Port 56565 to IP Address 236.10.10.10 by default. The axis data can be sent out as X, Y or Z as a translation in meters or as an absolute rotate in radians. The PSN Server name is QAXIS and the Tracker IDs are AXIS-01 to AXIS-24.

AVW Protocol

The axis position can be sent out as a simple ASCII message on Port 5656 to IP address 0.0.0.0 by default. The message is STX:01:11111111:02:22222222:03:33333333:ETX for any axis that are enabled.

OSC (Open Sound Protocol)

QAxis can be set to listen for OSC commands on Port 8000. Any message with Stop/stop/STOP will stop all axis, any message with Pause/pause/PAUSE will pause all axis. The load cue and go message should be constructed as /qaxis/cue/go ,S 1.1111 (where cue 1.1111 is required to be loaded and triggered).

In addition custom buttons 1 to 4 can be triggered with the message /1/push1 ,f 1.0 (for custom button 1). This is compatible with LittleOSC for iPhone/iPad/Android control.

Caution: Enabling OSC Receive means that cues can be triggered from external sources.

Weight

Edit Weight Settings

☐ Edit Weight Settings

Write File

Read File

Default Weight Settings

Edit in Metric only

Weight Information

☒ Weighing On
 ☐ KiloGrams

☐ Audible Warning On
 ☐ Pounds

	Axis Name	Low Weight	High Weight	Actual Weight
Axis 1	Test 1	0	500	0kg
Axis 2	Axis 2	0	500	0kg
Axis 3	Axis 3	0	500	0kg
Axis 4	Axis 4	0	500	0kg
Axis 5	Axis 5	0	500	0kg
Axis 6	Axis 6	0	500	0kg
Axis 7	Axis 7	0	500	0kg
Axis 8	Axis 8	0	500	0kg
Axis 9	Axis 9	0	500	0kg
Axis 10	Axis 10	0	50	0kg
Axis 11	Axis 11	0	500	0kg
Axis 12	Axis 12	0	500	0kg
Axis 13	Axis 13	0	300	0kg
Axis 14	Axis 14	0	500	0kg
Axis 15	Axis 15	0	500	0kg
Axis 16	Axis 16	0	500	0kg
Axis 17	Axis 17	0	500	0kg
Axis 18	Axis 18	0	500	0kg
Axis 19	Axis 19	0	500	0kg
Axis 20	Axis 20	0	500	0kg
Axis 21	Axis 21	0	500	0kg
Axis 22	Axis 22	0	500	0kg
Axis 23	Axis 23	0	500	0kg
Axis 24	Axis 24	0	500	0kg

A weighing page is available so that if the control system is monitoring weight they can be displayed and an audible warning can sound if the measured weight is too high (overload) or too low (underload). This will NOT necessarily stop the move unless it has been specifically set up to prevent movement in the PLC. This facility is determined by risk assessment for each project or axis.

The setting up is done in metric only but it is possible to display the weight in pounds.

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