



MARK ROBERTS MOTION CONTROL

ULTI-BOX



QUICK START GUIDE

QSG Product Code: MRMC-2259-00

Product Covered: MRMC-1080-03

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Contents

Chapter 1	Ulti-box panels.....	1
	Overview	1
	Notes on head-controller communication methods	1
	Ulti-box connector pin-out information	6
	Servo motor connector	6
	Program serial connector	6
	Power connector	7
	Camera Accessory connector.....	7
	Data In connector	8
	Brake 24V connector.....	8
	E-Stop connector	9
	CAN connector	9
	Adding an Ulti-box in Flair	10
	Servo Port Numbering in Flair.....	12
	Troubleshooting Finding Boards in Flair	12
	Changing IP Addresses.....	13
	Network Status.....	14
Appendix 1	Adding Stepper Motors	17
	Connection	17
	Flair.ini Adjustments	17
	Adjusting Axis Settings to Run Steppers	18

Chapter 1 Ulti-box panels

Overview

The Ulti-box is a multi-purpose interface box that is used to control servo motors on many MRMC heads and Lens Control Motor (LCM) units. The Ulti-box offers versatile connections for many camera and lens configurations. It can be mounted on another surface using the dovetail mount.



Notes on head-controller communication methods

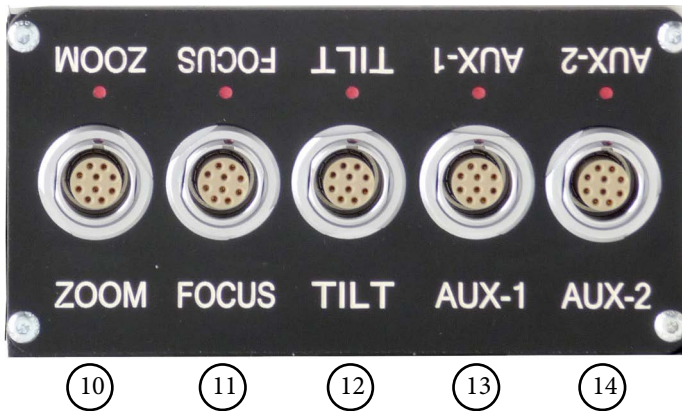
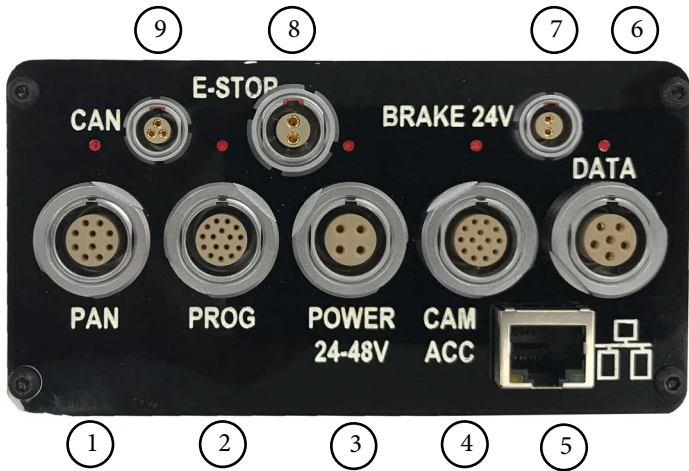
Three types of connections between the head and controller are in common use in MRMC equipment:

- Ethernet: This is the most modern preferred method, and uses standard Ethernet plugs, cables, hubs, and protocols.

- DataLink: This is an MRMC proprietary connection type based on a modified form of Serial RS232. You can connect several DataLink devices together in a daisy-chain. DataLink is robust and dependable and is still the preferred connection method in environments with high electrical interference that can cause problems on Ethernet networks.
- Serial RS232: This is based on standard computer serial RS232 hardware and protocols.

Although many MRMC devices have built-in hardware for two or three of the above connection methods, any controller that you use (such as the MSA-20 Handwheels, LFP, Joystick Controller, or Mini MSA) must be programmed at the factory for the connection method that you want to use.

Ulti-box connector summary



1. **PAN** connector for the Pan servo motor on a head. For pin-out information see *Servo motor connector* on page 6.
2. **PROG** serial connector for connection to a controller using a Serial RS232 connection (as an alternative to an Ethernet or DataLink

connection), and for updating the firmware in the Ulti-box. For pin-out information see *Program serial connector* on page 6.

3. **POWER** DC input for the Ulti-box and its attached devices. The standard unit uses a power input of 24-36 Volts. The high-power variant (marked **HV**, for **H**igh **V**oltage) uses 24-48 Volts. For pin-out information see *Power connector* on page 7.
4. **CAM ACC** Camera Accessory input/output connector. It has pins for three stepper motors, two serial lens controls, two trigger in controls, and two trigger out controls. For pin-out information see *Camera Accessory connector* on page 7.
5. **DATA** DataLink In (Up Link) connector for controlling the Ulti-box and its attached devices using a DataLink connection, as an alternative to an Ethernet or Serial RS232 connection. You connect this to a device that is further up the DataLink daisy-chain, such as:
 - The **DATA OUT** (or **DOWN LINK**) connector on a controller such as the MSA-20 Handwheels or Large Format Panel (LFP).
 - The **RIG/HEAD** connector on an RT-14 interface box which is in turn connected to a PC running Flair Motion Control Software.

Note that because there is no DataLink Out connector on the Ulti-box, the Ulti-box must be connected at the end of the DataLink daisy-chain rather than the middle. For pin-out information see *Data In connector* on page 8.

6. **ETHERNET** RJ45 connector for controlling the Ulti-box and its connected devices from a Flair PC. This Ethernet port is rated at 100 Mbits/sec but can operate at lower speeds of 10 Mbits/sec or less.
7. **BRAKE 24V** connector to connect the 24V brake power supply.
8. **E_STOP** connector can be used as an input for E-Stop. To enable the motors, Pins of this connector needs to be shorted, else all drivers are disabled and enable signal from Flair is ignored. It can be connected to the external E-Stop box, but if no external E-Stop is needed, a bypass jumper may be used.
9. **CAN** connector is used to communicate with external CAN capable motor drives.

- 10,11. **ZOOM, FOCUS** connectors for external servo LCMs mounted on the camera platform. For pin-out information see *Servo motor connector* on page 6.
12. **TILT** connector for a Tilt servo motor on a head. For pin-out information see *Servo motor connector* on page 6.
- 13, 14. **AUX-1, AUX-2** connectors for control of auxiliary servo motors. For pin-out information see *Servo motor connector* on page 6.

Note

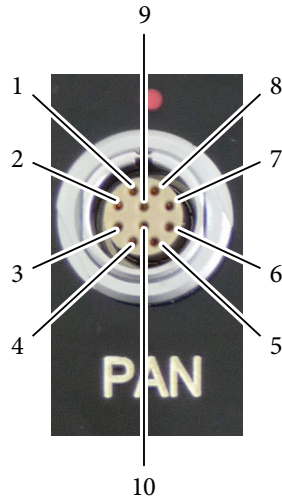
Connectors 1, 7, 8, 9, 13 and 14 are identical and are labelled only for ease of use.

Ulti-box connector pin-out information

Servo motor connector

This type of connector is used for six servo motor connectors on the Ulti-box:
Pan, Zoom, Focus, Tilt, Aux-1, Aux-2.

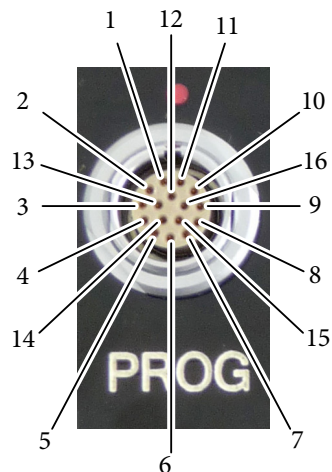
1. DATUM
2. A+
3. B+
4. Z+
5. Brake/Enable output
6. MOTOR_B
7. MOTOR_A
8. LIMIT
9. +5V
10. GND



Program serial connector

Serial connector for connection to a controller using a **Serial RS232** connection, and for updating the firmware in the Ulti-box.

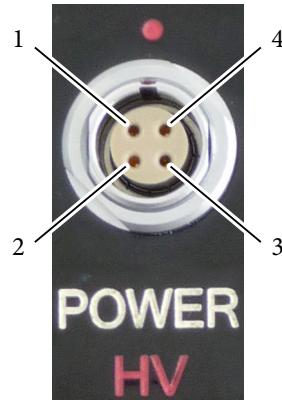
1. SerialTxA
2. SerialRxA
3. +5V
4. FGPIO
5. DSP_TRSTN
6. TCK
7. TMS
8. DSP_TDI
9. DSP_TDO
10. DSP_EMU0
11. DSP_EMU1
12. FPGA_TDI
13. FPGA_TDO
14. BOOT_SEL
15. +3.3V
16. GND



Power connector

The power input connector for the Ulti-box. For usage see page 4.

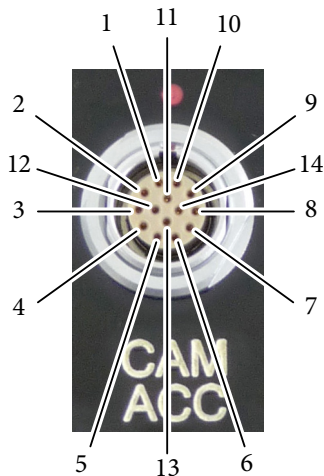
1. GND
2. GND
3. +35V for Basic and +48V for HV
4. +35V for Basic and +48V for HV



Camera Accessory connector

This is a multi-purpose camera accessory connector with connections for three stepper motors, two serial lens controls, two trigger in controls, and two trigger out controls.

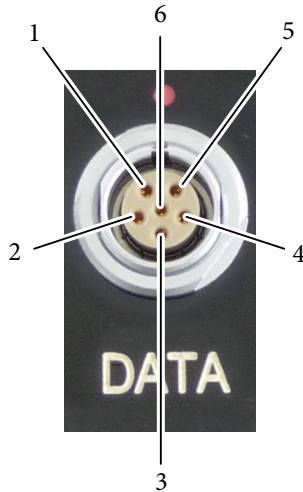
1. Step1
2. Gp2In (Trigger In 2)
3. Step2
4. SerialTxB serial lens control
5. Step3
6. SerialRxB serial lens control
7. Dir3
8. GND
9. +5V
10. Gp1In (Trigger In 1)
11. Dir1
12. Dir2
13. Gp2Out (Trigger Out 2)
14. Gp1Out (Trigger Out 1)



Data In connector

This is a DataLink In connector for connection to a controller using a DataLink connection. DataLink In (Up Link) connector for connection to a DataLink device higher up in the DataLink daisy-chain. For usage see page 4.

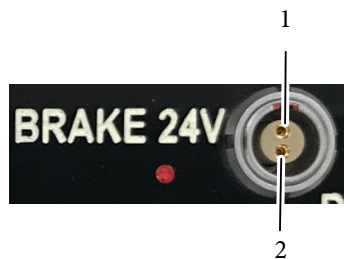
1. Watchdog-
2. Link1Out-
3. Link1Out+
4. Link1In-
5. Link1In+
6. Watchdog+



Brake 24V connector

This is a Lemo Size 0 2-way connector and is sourced from external PSU.

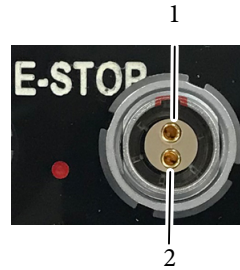
1. GND
2. +24V



E-Stop connector

This is a Lemo Size 1 2-way connector; external circuitry should keep the pins closed.

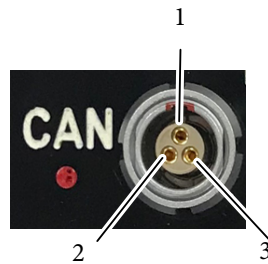
1. E-STOP-
2. E-STOP+



CAN connector

This is a Lemo Size 0 3-way connector; is used to communicate with external CAN capable motor drives.

1. CAN Hi
2. CAN Lo
3. GND



Adding an Ulti-box in Flair

When a new model mover or motor driven by a Ulti-box needs to be added to a Flair system, there is a set of steps that need to be followed to get this information on the nature of the item into Flair so the network can detect it and load it on bootup.

Devices are added to the network as nodes identified by their IP address, and it is possible that there may be duplicated IP addresses which will need to be handled before this is possible.

The additional Ulti-box will need to have an Ethernet cable connected to the Ethernet hub of the Flair system, and be powered.

1. Edit the file `C:\Flair\Flair6\Flair.ini`. This file is a text file that you can edit with any text editor such as Notepad, either directly or by using the Flair menu option **Help > View .ini File**. You need to add or edit some lines in the file similar to the following lines.

```
*NetworkBoards: 3
*NodeProgram3: Ulti6Ether_II.bt1
```

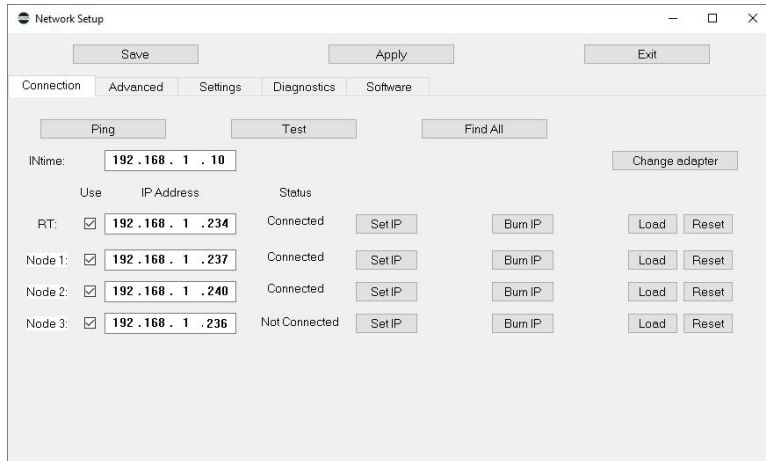
The keywords used in the above table are described below:

- ***NetworkBoards:** This line shows the number of network boards (nodes) in the system. You need to increase this by one (1) to cater for the new Ulti board. For example, if the number of network boards was 2 before you added the Ulti board, increase it by 1 to make it 3.
- ***NodeProgram3:** For the node that you are assigning the new board to (node 3 in this case), add a reference to the node program, or `.bt1` file, that you want Flair to load on that node when starting up. The `.bt1` file is already supplied with Flair so you don't need to copy or download it from elsewhere. For example, in this the new board is assigned to node 3, the `.bt1` file will be added to `NodeProgram3`.

Remember to save the file after you have edited it. When this Flair is booted, Flair will attempt to load all the boards it has been informed about in `Flair.ini`. It may fail to do so until correct connections are made and correct IP addresses are set.

2. In the Flair menu, click on **Setups > Network Setup**. The first screen is the Connection tab.

3. In the pop-up, click on the **Find** button.
4. In the Find results, find the IP address of the Ulti-box (**192.168.1.236** in this example – this is normally written on the box at the factory), and copy it into the node that you assigned to the Ulti (**Node 3** in this example):



5. In the Network Setup pop-up, click on the buttons **Save** and **Apply**.
6. Click **Load** and exit the Network Setup.

If the IP address is correct and does not conflict with any other IP on the system, and you have put the correct software name in Flair.ini then clicking on the Load button will load the board. On the next restart, Flair should automatically recognise all the nodes and load the **.bt1** files into them.

Even if the IP address is correct and there are no conflicts of address, the software may not be set correctly. If you now look at the Software tab it will give the PC address of the software it has tried to load, and if you click on **Select**, it will open the Btls folder and allow you to choose another software file to load. You can then Reload and it will attempt to load that new software. If this works you will need to put that software name into Flair.ini to enable it to work next time you boot Flair.

Note

Even though the specified .btl file might load, this does not guarantee that it is the correct software for your Flair setup. Older systems may need older versions of software loaded to work best.

Servo Port Numbering in Flair

When you set up an Ulti box in Flair you need to input the port number of the port that your motor is connected to in the Axis Setup. The numbering starts at Pan with 1 and continues on the other side with the aux ports, as below:



Troubleshooting Finding Boards in Flair

Once you have physically connected with an Ethernet cable and powered on the added board, and Network setups is open, if you click on Find, it will broadcast a signal to see all the boards on the system, and will tell you their IP address settings. If they do not appear, then they are not

connected or not powered; Or there is an IP address duplicated on two boards!

Note

It may be necessary to unplug temporarily the other boards on the system for the new board to show up!

You may then find you have conflicts in that the board you want to connect will have the same IP address as the one already on the system. The Find button will not find two boards with the same IP address. This often occurs where you want to use the spare Ulti-box from your Bolt as a model mover, and it has been set up to have the same IP, 192.168.1.237 as the present Ulti-box mounted on the Bolt arm.

Changing IP Addresses

The facility to change an IP address is built into the system, but to work it must have the board you want to change already loaded.

If you find that whatever you do the new board does not appear, try cycling the power to the network hub. Sometimes a hub may not “look” for any additional devices unless rebooted.

Unfortunately, you cannot load two identical IP boards and then change one, you have to load the incorrect board by doing a Find with other boards not connected, to find its IP, then set that IP in the Network setup screen, with its duplicated IP board disconnected. When you are connected to it you can change the IP in Network Setups to a new IP and press Set IP to make that the IP address Flair looks for, and press Burn IP to burn that IP into the new board.

Once you have a new IP address burnt into the new board, put a new label on it for future reference, and you should then be able to plug back in any boards that were unplugged before making the change.

The list of IP addresses and boards loaded in sequence will be found in the Network.ini file.

Because you now have the new board written into your Flair.ini it will try to load every time you load Flair, and will give you a warning saying it did not load if it is not plugged in on later shoots. Of course this does not matter as the rest of the network will still work, you just need to know Flair looked for it and did not find it.

Network Status

Under the Status heading in Network Setup, 'Connected' appears if it is connected and being used by an axis in Flair. If it says 'Unassigned' it means it is connected but you have not assigned that board to any axis in Flair. Example, you have just added a node to be node 3 as an Ulti-box, but you have no axis assigned to Network Node 3 in the Flair Screen. You will need to assign your axes to that node for them to work.

There are coloured blobs in the bottom right of the Flair screen. A red blob means its not connected to that node, a blue blob means its connected but not assigned, a green blob means its connected and in use by an axis.

Once you have added the board to Flair you may still need to set up the axes. Refer to Flair manual for further details or the video "Flair Axis Setup" in the Tutorial Videos section of Resources on www.mrmoco.com.

Notes

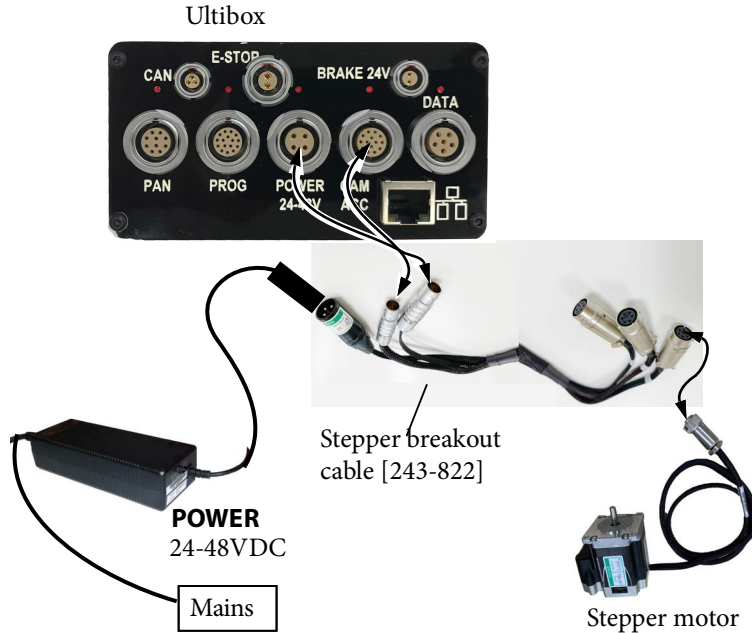
Appendix 1 Adding Stepper Motors

The stepper breakout cable [243-822] can be used to add up to three stepper motors/stepper turntables, if required, to an existing Flair system that uses an Ulti box. This cable is optional and is available on request.

Connection

This cable will take the place of the short XLR power patch cable as the 24V in is also fed to the three stepper motor connectors.

The 4 pin Lemo connects to the 'Power' connector and the 14 pin Lemo connects to the 'Cam Accs' connector on the Ulti.



Flair.ini Adjustments

In order for the three new axes to appear in Flair, the following lines in the Flair.ini file need to be modified:

*Axes : 11
*ShownAxes : 11

Add 3 to the value of the these two parameters (e.g from 11 to 14) and save the .ini file in the Flair folder and launch Flair. The three new axes will appear in Flair in addition to all the existing axes.

Adjusting Axis Settings to Run Steppers

Access the Axis Setup dialog box for each of the new axis and make the following changes:

In the 'Basic' tab, the 'Network' and 'Node' need to be changed to match whatever the Ultibox axis is already set up as. The 'Port' needs to be set to 7, 8 and 9, respectively for each of the newly added axis. Ports 1-6 are reserved for servo motors and are used to drive lens motors.

In the 'Tuning' tab, the 'Motor Type' needs to be set as 'Stepper' and the 'Step Pulse' to 5. The other settings in this menu do not apply to steppers and can be left unchanged.

The above changes are all that is required to run up to 3 stepper motors, but will not be finely tuned. The other settings including velocities, acceleration and scaling will all depend on the type of stepper motor or turntable that is connected and how it is being used. Refer to *Flair Operator's Manual* for further details.

Notes



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