



Mark Roberts Motion Control

MINI MSA CONTROLLER



USER GUIDE

Document version: MMSA-UG-20160421 MSA-21 v6.14
Part number: MRMC-1336-00

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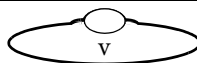
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Contents

	Contents.....	iii
Chapter 1	Quick start	1
	Safety.....	1
	Overview.....	1
	Connecting the cables	3
	Powering up and loading the head	4
	Turning off the Mini MSA and head.....	6
	The Mini MSA controls	6
	Setting the control directions	8
	Using the control direction switches.....	9
	Zeroing the axes	10
	Zeroing the axes manually.....	11
	Zeroing the axes by homing	12
	Setting the soft limits	13
	Session summary	15
Chapter 2	Using Broadcast mode to record and re-use static camera positions.....	16
	About Broadcast mode.....	16
	Recording a preset.....	16
	Using a preset.....	17
	Modifying a preset	17
Chapter 3	Using Film mode to record and play back camera movements.....	19
	About Film mode.....	19
	Using the Emergency Stop button	19
	Specifying the camera settings	20
	Creating a move by defining start and end points.....	23
	Creating a move by live recording	24
	Playing back a move - simple method	26
	Playing back a move - advanced method.....	28
	Summary of playback events	30
	Using time-lapse playback	31
	Modifying a move	33
	Assigning moves to the Preset buttons.....	35
	Playing a move with a Preset button	35
	Deleting a move.....	36

Chapter 4	Speed controls.....	37
Chapter 5	Advanced settings	41
	Setting the axis type	42
	Duplicate axis position outputs for stepper motors	42
	Input method.....	43
	Input dead zone.....	43
	Back-pan	44
	Back-pan scale.....	44
	Setting up Preston lens motors	45
	Setting up Canon analog lens controls.....	46
	Using Canon and Fujinon digital lens controls.....	48
	Low level settings	50
	Current limits	50
	Temperature limits	50
	PID system motor tunings.....	51
	Motor frequency and polarity	51
	Maximum error	52
	Head axes type	52
	Encoder Safety.....	53
	Axes home type	54
	Head communication statistics.....	55
	Wireless communication	55
Chapter 6	Managing settings and firmware with a Windows PC.....	56
	Introduction to the MSA Ethernet Archiver and MSA Ethernet Firmware Updater.....	56
	General procedure	57
	Downloading and installing the MSA Ethernet Archiver and MSA Ethernet Firmware Updater.....	58
	Obtaining the .btl firmware file for your Mini MSA	59
	Adjusting the PC network settings	60
	Using the MSA Ethernet Archiver.....	62
	Using the MSA Ethernet Firmware Updater.....	64
	Returning the PC network settings to their original configuration	66

Appendix 1	Menu reference	68
	Broadcast mode.....	70
	Film mode	72
	Engineering mode.....	80
Appendix 2	Troubleshooting	100
	Typical symptoms, causes, and actions	100
	Working with Local Area Networks.....	103
	Introduction to LAN addresses	103
	Managing LAN addresses with the Mini MSA	105
	Managing LAN addresses with Flair.....	109
	Zeroing lens axes with external Lens Control Motors ..	112
	Axes directions.....	112
	Zeroing a lens ring with a hard stop.....	114
	Setting up a lens axis for manual zeroing.....	114
	Setting up a lens axis for automatic homing.....	114
	Zeroing a lens ring with a slip clutch	115
	Using a FIZ pot	116
	Calibrating the FIZ pot.....	116
Appendix 3	Panels and accessories	118
	Panel summary.....	118
	Connector pin-out information	120
	Camera trigger out	120
	Camera trigger in.....	120
	Auto-focus and bloop trigger out.....	120
	Camera sync in.....	121
	Serial connector	122
	Auxiliary connectors for Roll and Zoom.....	122
	Pan Bars connector.....	123
	Remote Trigger In connector	124
	Power In connector	125
	Power Out connector	125
Appendix 4	Specifications.....	126
	Index of menu options.....	127
	Index	129



Chapter 1 Quick start

Safety

- Do not use around flammable gas. All electrical equipment can generate sparks that can ignite flammable gas.
- Heads have powerful motors that can pinch, so take care not to get your hands trapped in the head or cabling.
- Keep the equipment dry. The system has **not** been made weatherproof. Do not use with wet hands.
- Keep cables tidy. Use cable ties to keep them out of harm's way. If you have a head with slip rings then make use of them; avoid running any cables between the base and the rotating head or camera.

Overview

Thank you for using the Mini MSA camera head controller from Mark Roberts Motion Control (MRMC). You can use the Mini MSA as a standalone controller attached to an MRMC camera head. The Mini MSA is a robust controller designed for day-in, day-out use in professional studio and Outside Broadcast environments.

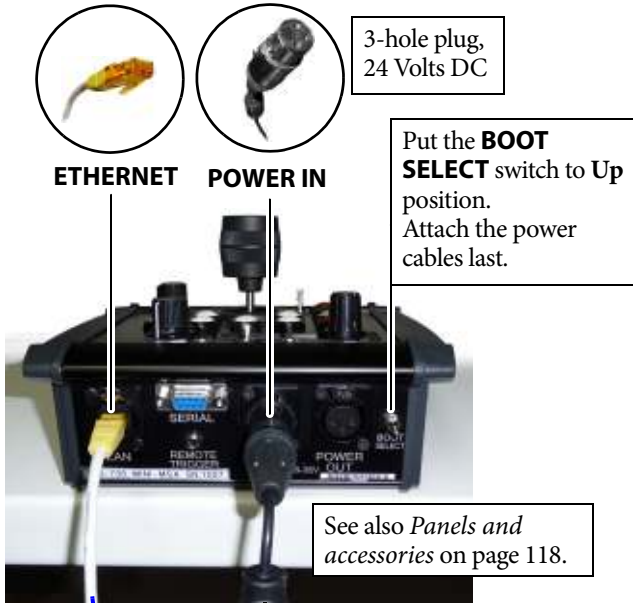
The controls on the Mini MSA controller give you precise, ergonomic, real-time control of the camera direction (pan, tilt) and camera functions (focus, zoom).

The controller includes the following features:

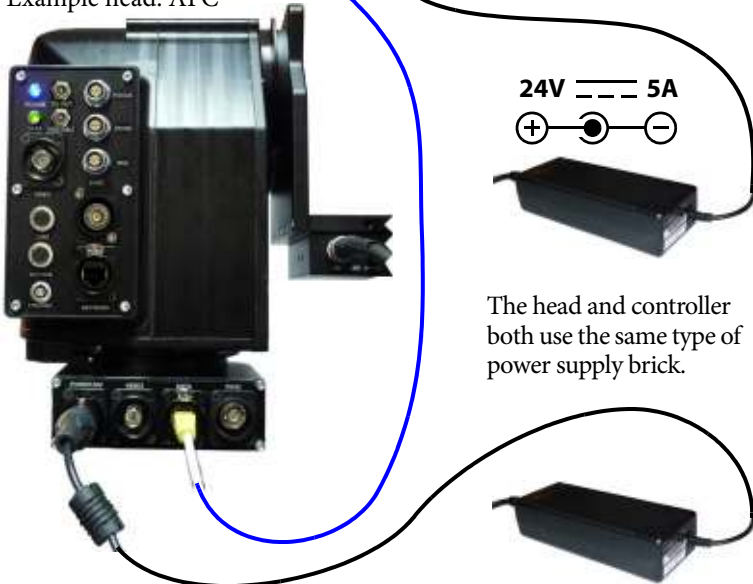
- Record and Playback of static camera positions - You can store up to eight static head “preset” positions (including lens settings) and go to any preset position at the touch of a button.
- Record and Playback of moves, including camera synchronization - You can create, store, play back, and modify up to 174 axis-minutes of head movements, including lens control movements.
- A-B moves – To define start and end points and automatically create a smooth move between them.

- Time-lapse Playback – to record a move at normal speed and play it back slowly in stop-frame or slow motion mode.
- Back-Pan – You can set up the pan axis to automatically compensate for rotation axis movement to keep the camera on target.
- Soft-limits – to limit the movement ranges of the axes
- Velocity limits – to ensure axes do not trip
- Acceleration limits – to give smooth movement
- Lens axis control – to give absolute position control when required
- Standard axis control – to give relative position control when required
- Control scaling – to allow fine adjustment or a fast response
- Control to motor axis mapping – to switch between controls
- Low level motor control (current limits, motor tunings, etc) – to control a range of small and large motors
- Control of DC servo, Stepper, and serial lens motors (for example Preston) – 6 DC (35V 8A max), 3 Stepper, and 3 serial lens
- Preston controls – Lens movements from a Preston system can be recorded and played back.
- Serial lens control – Both Canon and Fujinon digital lenses can be controlled.
- Wireless Head Communication – MRMC wireless modules can be connected and are automatically detected.

Connecting the cables



Example head: AFC





Hint

It is recommended that you **do not** use the **POWER OUT** socket on the Mini MSA to power the head if you are using an Ethernet connection to the head. If you do so then powering up the Mini MSA will simultaneously power up the head, and in this instance powering up two Ethernet devices at the same time on the same network can cause communication problems between them.

Powering up and loading the head

There is no power switch on the Mini MSA; the power is on whenever the 24-volt power supply is attached and live. Similarly, there is normally no power switch on MRMC camera heads; the power is on whenever the head has a 24-volt power supply that is live.

1. Attach the power cables to the head and the Mini MSA after you have attached all the other cables. Make sure the relevant indicators light up; for example, the power indicator LEDs on all 24Volt power supply bricks (), and the power indicator LED on the head ().

Hint

If you are using an Ethernet connection between the controller and the head it is recommended that you power up the head first and the controller last, as powering up two devices simultaneously on the same network can cause communication problems.

If you are using a Serial connection to the head you must power up the controller first and the head last.

Hint

Do not touch the Joystick control when the controller is starting up. Within the first second of start-up, the controller uses the centre (resting) position of the Joystick as the zero calibration point, and any Joystick movement or offset during this time will result in the head moving later when no one is touching the Joystick.

When the Mini MSA has power, its screen displays a prompt similar to the following:

```
(C) MRMC 2016
MSA-21 v6.14.
PRESS SELECT TO
LOAD QUAD ETHER II
```

The last line of the prompt tells you which operating system will be loaded into the head - in this example **QUAD ETHER II**. Each Mini MSA is configured at the factory for a specific head, and contains the operating system for that head.

If this prompt does not appear then check that the position of the **BOOT SELECT** switch on the Mini MSA is in the Normal (Up) position for stand-alone operation, then remove and re-attach the power cables.

2. Press the **SELECT** knob to load the operating system into the head. This is called “**loading the head**”.

If the load is successful, the screen on the Mini MSA displays a message similar to the following, and you will be able to move the head with the joystick:

```
ETHERNET MODE
CAM FPS: 0.00
```

If you get a message similar to any of the following, see *Troubleshooting* on page 100:

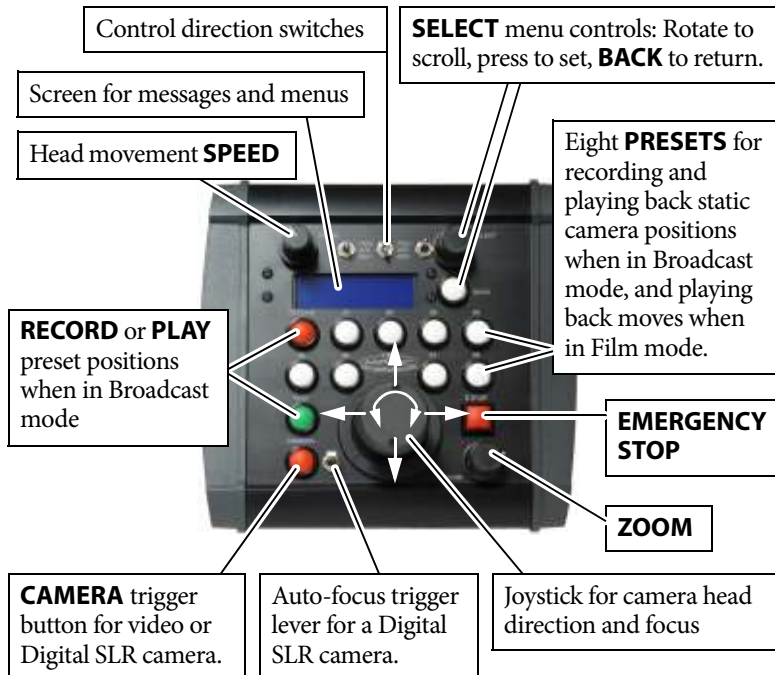
```
HEAD DID NOT LOAD
HEAD NOT LOADED
LOAD FAIL
FAILED TO LOAD HEAD
```

Turning off the Mini MSA and head

As there is no power switch on the Mini MSA or head, to turn these off you simply remove the power cable. All MRMC controllers and heads have robust electronics that are designed to withstand the rigours of connection and disconnection to live power cables.

You can leave the other cables plugged in if you want.

The Mini MSA controls



On the Mini MSA, the rotation of the joystick is typically assigned to the lens focus.

Note that the physical effects of most controls are adjustable in the menu, in terms of the **limit** (range) of motion, **direction**, **speed**, **damping** (smoothing of jerkiness in the controls), **input exponential** and **scale** (sensitivity).

The MiniMSA has two main modes of operation:

- **Broadcast mode**, in which you can store and recall static camera positions. This is described in Chapter 2.
- **Film mode**, in which you can store and recall dynamic camera movements. This is described in Chapter 3.

To change modes you use the menu option **CHANGE MODE**.


Setting the control directions

In the Mini MSA you need to specify the directions of the zoom and joystick controls for your particular head, lens gearing attachments, and preference. For example, some people prefer the camera to point upward when the joystick is pulled back, while others prefer the opposite logic whereby pushing forward (“up”) on the joystick targets the camera upward in the scene. To set the control directions you use the procedure below.

- On the Mini MSA, use the **SELECT** knob (rotate and press) to choose the menu sequence:
SET DIRECTION (if you are in Broadcast mode)
 or...
GENERAL SETUP > SET DIRECTION (if you are in Film mode)
 or...
GENERAL SETUP > INPUTS SETUP > SET INPUT DIR (if you are in Engineering mode)
- Set each sub-option to **FWD** (forward) or **REV** (reverse) as you prefer. Test each control after you set it.

Menu option	Description
JOY HORIZ	Joystick controls - three directions On the Mini MSA the focus control is typically assigned to the Joystick rotation.
JOY VERT	
JOY ROTATE	
ZOOM POT	Zoom control.
ROLL	Auxiliary roll control plugged into the Mini MSA.



Menu option	Description
ZOOM AUX	Auxiliary zoom control plugged into the Mini MSA. 

Using the control direction switches

The Mini MSA has three direction control switches across the top. Which controls are affected depends on how the switches have been assigned on your particular controller. They are typically assigned to [JOY HORIZ](#), [JOY VERT](#), and [ZOOM POT](#).

The switches perform the same function as the menu option [SET DIRECTION](#) mentioned above but are instantly accessible.



The switch settings interact with the [SET DIRECTION](#) menu settings as follows:

- **FWD** (Forward) - The control will operate using the direction that you have set in the [SET DIRECTION](#) menu option.
- **OFF** - The control will be inactive.
- **REV** (Reverse) - The control will operate in the opposite sense to whatever direction you have set in the [SET DIRECTION](#) menu option.

Zeroing the axes

At the beginning of each session, right after loading the head, you need to **zero the axes**. This defines a base position at which all head positions and lens settings are set to zero (0) in the Mini MSA. All limits, lens controls, preset positions, and moves that are stored in the Mini MSA are measured relative to this base position. The zero points themselves are not stored in the head or lens when the power is off, so you need to define them at the start of each session, by zeroing the axes.

You can zero the axes in two ways, depending on how you want to calibrate the head direction:

- **Zero the axes manually** - you use the controls to point the camera in the direction that you want to use as the zero position for the head axes. See *Zeroing the axes manually* on page 11.
- **Zero the axes by homing** - the Mini MSA automatically moves the head to its “home” position, and uses that position as the zero position. The “home” position is the head’s centre of motion, as determined by the limit sensors built into the head hardware. You can only use this method if your head has a homing facility and your Mini MSA is in Film mode. See *Zeroing the axes by homing* on page 12.



Hint

If you are using a lens with external Lens Control Motors (LCMs), you need to make sure that the Mini MSA controls move the focus, zoom, and iris rings in the correct direction, before you zero the axes. Refer to *Zeroing lens axes with external Lens Control Motors* on page 112.

Zeroing the axes manually

1. If you have a serial lens with internal motors for the focus, zoom, and iris then you can skip this step.

If you have a lens with external motors, set the **focus to infinity** (∞), **zoom to wide-angle** (zoomed out all the way), and **iris/aperture to wide open**. Do this either with the Mini MSA controls or by moving the gears by hand. Also see *Zeroing lens axes with external Lens Control Motors* on page 112.

2. Use the controls to point the camera head in the direction that you want to use as the zero position for the head axes. (If the head is on rails, also use the controls to move to the zero rail position that you want to use).

Hint

Some methods for finding a useful zero position are, in order of increasing accuracy and repeatability:

- Use the controls to point the camera straight ahead.
- Use the controls to point the camera at a small object in the field of view that is easy to find again in subsequent sessions, such as the corner of a ceiling or desk.
- Zoom in on the object and centre it in the field of view (but remember to zoom all the way out again after adjusting the direction so that your zoom axis will be correctly zeroed.)
- If you are in Film mode you can use **DIAGNOSE AXES > LIMIT INPUTS** to display information that tells you when an axis crosses its home position as you move the controls. See page 79.

3. In the Mini MSA menu, choose one of the following options:

DIRECT ZERO ALL (in Broadcast mode; this option is only available if the Engineering menu option **HOME AXIS ≥ ZEROING METHOD** is set to **ZEROING**.)

or...

HOME AXES > DIRECT ZERO ALL (in Film mode).

The Mini MSA axes settings are now zeroed. Any stored limits, presets, and moves are now operational.

Zeroing the axes by homing

Hint

If your head is in an **underslung** configuration (hanging upside-down from its mount) then it is recommended that you use the **manual** method for zeroing the axes (see page 11) instead of the automatic homing method. Depending on the direction settings of the Tilt and Pan axes in the controller, the automatic homing method might pan or tilt the camera into a home orientation that is 180° from your working target orientation, which can be potentially awkward or risky for the attached cables and equipment.



You can only use this method if your head has a homing facility.

1. In the Mini MSA menu, choose one of the following options:

HOME ALL AXES (if you are in Broadcast mode; this option is only available if the Engineering menu option **HOME AXIS > ZEROING METHOD** is set to **HOMING**.)

or...

HOME AXES > ALL AXES (if you are in Film mode)

2. The menu panel on the Mini MSA prompts you to move the lens controls (focus, zoom, and iris as applicable) to their zero points:

IF USING LCMs FOCUS ON INFINITY, OPEN THE IRIS, ZOOM OUT, AND PRESS SELECT

You can skip this step if you have a serial lens with internal motors for the focus, zoom, and iris, or if all of your external Lens Control Motors (LCMs) have homing enabled (that is, if the Engineering menu option **HOME AXES > SET HOME AXIS TYPE** is set to **HARD-LIMIT**).

If you have any external Lens Control Motors that have homing disabled (Engineering menu option **HOME AXES > SET HOME AXIS TYPE** set to **DIRECT**) then you need to manually set the **focus to**

infinity (∞), **zoom to wide-angle** (zoomed out all the way), and **iris/aperture to wide open**, as relevant for that axis. Do this either with the Mini MSA controls or by moving the gears by hand. Also see *Zeroing lens axes with external Lens Control Motors* on page 112.

3. Press **SELECT**.

The head moves its axes to their home positions and all Mini MSA axes settings are zeroed. Any stored limits, presets, and moves are now operational.

Setting the soft limits

In order to prevent damage to cables and other equipment, you can set limits to the range of physical travel of the head movement and lens controls. This is especially important if you have a head without slip rings, where cabling can get wrapped around the head, or if you have a lens with external lens control motors where you need to limit the travel of the lens axes.

Before the limits can be set or applied you need to zero the axes as described in page 10.

Hint

The soft limits apply to any live motions that you perform with the Mini MSA controls, and to any existing positions and moves that you have recorded previously. If you tighten the limits or zero the axes in a different place, any existing position or move that now extends outside a limit will be restrained; it will only go as far as the limit allows.

If an axis is outside its soft limit then you will only be able to move the axis towards the nearest soft limit.

1. Choose one of the following menu options:

SET SOFT LIMITS (in Broadcast mode)

or...

GENERAL SETUP > SET SOFT LIMITS (in Film mode:).

2. The menu shows the current soft limits. For example:

```
PAN SL: ENABLED
  MAX: 203923
  MIN: -202148
TILT SL: ENABLED
  MAX: 80365
  MIN: -90008
FOCUS SL: ENABLED
  MAX: 187614
  MIN: 0
ZOOM SL: ENABLED
  MAX: 149113
  MIN: 0
IRIS SL: ENABLED
  MAX: 65522
  MIN: 0
```

The numbers in the menu options refer to physical positions of the head or lens axes, relative to the zero point that was set earlier.

3. Set the **MAX** and **MIN** limits that you want. For example to set the pan limits:
 - 3.1 Make sure the **PAN SL** option is set to **ENABLED**.
 - 3.2 Scroll to the **PAN MAX** option and press **SELECT**.

The **PAN MAX** number in the menu now shows the current pan position of the head (for example **31896**), which is updated continuously as you pan the head.
 - 3.3 Use the joystick to pan the head so that the **PAN MAX** number in the menu goes toward **higher** numbers (more positive numbers). Stop where you want this end of the physical pan limit of the head to be.
 - 3.4 Press **SELECT**. You have now set the pan maximum limit.
 - 3.5 Scroll to the **PAN MIN** option and press **SELECT**.
 - 3.6 Use the joystick to pan the head in the other direction, so that the **PAN MIN** number in the menu goes toward **lower** numbers (or more negative numbers). Stop where you want this end of the physical pan limit of the head to be.
 - 3.7 Press **SELECT**. You have now set the pan minimum limit.

4. Repeat step 3 for the head tilt and position (if on a rail), and for the lens controls (focus, zoom, and iris as applicable).

Hint

You can turn off the limits for one or more axes. For example if you have an Ulti-head or AFC head with slip rings and you want to make use of the 360 degree pan capability, set **PAN SL** to **DISABLED**.

For the lens controls you only set the **MAX** limit, as the **MIN** limit will have already been set to zero when you zeroed the axes.

For all axes, **MAX** must be greater (more positive) than **MIN**. If this is not possible for a particular axis (for example, if focussing closer puts that axis into negative values) then it means that the axis values are increasing in the wrong direction for that axis, on your particular rig. To fix this problem see *Zeroing lens axes with external Lens Control Motors* on page 112.

Session summary

After you have initially set up the system for your particular camera lens and preferences, subsequent sessions take less time to set up, especially if you have not disconnected control cables or moved sites. For subsequent sessions at the same site you typically need to do the following at the start of every session.

1. Attach the power cables to the head and Mini MSA.
2. Load the head (page 4).
3. Zero the axes (page 10).

If you have moved sites you will need to connect the control cables before the power cables, and then set new soft limits after you have zeroed the axes (page 13).

Chapter 2 Using Broadcast mode to record and re-use static camera positions

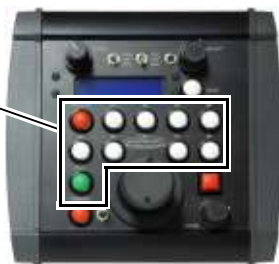
About Broadcast mode

In Broadcast mode you can record the current head direction and position (if on rails), and lens focus, zoom, and iris settings as a single “**preset**”, and then return to that preset later at the touch of a button.

You can record up to eight presets, and the Mini MSA remembers them even if you power off, and even if you change modes and then come back to Broadcast mode. To go into Broadcast mode:

- ◆ In the Mini MSA menu choose **CHANGE MODE > BROADCAST MODE**.

Once in Broadcast mode you record, use, and modify presets by using the **RECORD**, **PLAY**, and numbered **presets** buttons. No menu is required.



Recording a preset

1. In Broadcast mode, press the **RECORD** button.

The panel shows that you are now in Record mode:
SHOTBOX RECORD.



2. If you haven't done so already, use the Mini MSA controls to go to the head direction, and lens focus and zoom settings that you want to record.

3. Press one of the eight white numbered preset buttons.

The current settings are stored to **that** numbered preset button.



4. Repeat steps 2 and 3 to record additional presets if you want, using a different numbered preset button for each position.

As long as you stay in Record mode (panel showing **SHOTBOX RECORD**), pressing one of the white numbered preset buttons will store the current settings to that button, overwriting the previous settings for that button.

Using a preset

1. In Broadcast mode, press the **PLAY** button.

The panel shows that you are now in Playback mode:
SHOTBOX PLAYBACK.



2. Press one of the white numbered preset buttons.

The head and lens go to the settings that are stored under **that** button.



3. Repeat step 2 to go to any other presets that you want.

As long as you stay in Playback mode (panel showing **SHOTBOX PLAYBACK**), pressing one of the white numbered preset buttons will go to that combination of head position and lens settings.

Hint

You do not need to wait until the head finishes going to a preset position in order to go to another one. For example, if you press the wrong numbered preset button by mistake during a broadcast you can rectify it by immediately pressing the correct one. Pressing any numbered preset button in Playback mode instantly aborts any current action and goes to the new preset selection.



To immediately stop the head and abort the current action without going to another preset, press the **BACK** button.



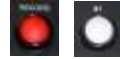
Modifying a preset

1. Press **PLAY** then the numbered preset button for the position you want to modify.



2. When the head arrives at the preset position, use the Joystick and lens controls to fine-tune the settings the way you want.

3. Press **RECORD** then press **the same** numbered preset button again.



The new fine-tuned settings overwrite the previous settings for that button.

Chapter 3 Using Film mode to record and play back camera movements

About Film mode

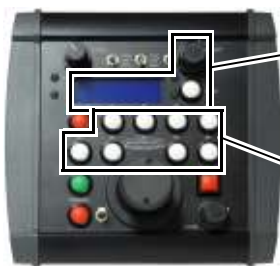
In Film mode you can record the movements of the head and changes to the lens focus and zoom settings as a single “**move**”, and then play that move again later.

In addition to recording live moves, you can define a move by defining its start and end points (including lens settings and other parameters), and the Mini MSA can generate the move by interpolating between the points.

There is no practical limit on the number of moves you can store, although there is a total time limit of 174 axis minutes. For example, if you record the movements of 4 axes simultaneously, the total time storage capacity is about 43 minutes.

The Mini MSA remembers the stored moves even if you power off, and even if you change modes and then come back to Film mode. To go into Film mode:

- ◆ In the Mini MSA menu choose **CHANGE MODE > FILM MODE**.



Once in Film mode you record, play, and modify moves by using the menu.

You can also assign existing moves to the numbered preset buttons, and then play the moves with the buttons. See page 35.

Using the Emergency Stop button

- ◆ Pressing the **E STOP** button **once** stops all playback immediately, disables all controls on the Mini MSA, and makes the head hold its current position.
- ◆ Pressing the **E STOP** button **again** also cuts power to the head (to stop a runaway head), so will cause the head to droop if it is in a position that is affected by gravity.



The following message is displayed:

E-STOP DROPPED

**PRESS BACK AND
E-STOP TO RE-ENABLE**

To recover from an Emergency stop:

- ◆ Press the **E STOP** and **BACK** buttons simultaneously and release, then press the **BACK** button again by itself.

After you recover from a **single-press** E-Stop your axes retain their zero setting so you do **not** need to re-zero them.

After you recover from a **double-press** E-Stop your axes encoders will have lost position so you will need to re-zero them.

Specifying the camera settings

Before recording and playing back moves, you need to specify how the Mini MSA will trigger the video camera to start and stop recording, along with other camera parameters. To do this:

- ◆ In Film mode, choose menu option **CAMERA SETUP** and specify the options suitable for your camera.

The following is a summary of the important options:

- **FPS** - Frames Per Second at which the camera is running.
- **LPF** - Lines Per Frame. The number of encoder lines (servo motor) or steps (Stepper motor) that are required when the camera motor rotates in order to expose 1 frame.
- The **ENABLE** setting controls how the Mini MSA triggers the camera when you play back a move. Possible settings are:
 - **MOMENTARY** - The camera is not triggered during playback, and you take manual control of the camera trigger instead. The controller generates a continuous high camera trigger signal when you depress and hold the **CAMERA** trigger button, and stops when you release the button, whether or not playback is in progress.



- **TIME-LAPSE** - used only for time-lapse playback. A camera trigger pulse is generated at the start of each frame (see page 31).
- **PULSE** - At the start of playback the controller sends a brief signal to turn on the camera, unless you have already started the camera manually with the **CAMERA** button (panel showing **CAMERA RUNNING**). During playback no further camera trigger signal is sent; the camera keeps running and you cannot turn it off with the **CAMERA** button. At the end of playback the controller sends a brief camera trigger signal to turn off the camera.
- **CONTINUOUS** - At the start of playback the controller starts sending a continuous high signal to turn on the camera. If you have already triggered the camera manually with the **CAMERA** button (panel showing **CAMERA RUNNING**) then the continuous high signal stays on. During playback the controller keeps sending the continuous high signal and the camera keeps running, and you cannot turn it off with the **CAMERA** button. At the end of playback the controller stops the signal, to turn off the camera.

Hint

For **MOMENTARY**, **PULSE**, and **CONTINUOUS** settings, if a bloop light is connected to the system (see page 120) the light will flash at the start of move playback, regardless of the **CAMERA RUNNING** status.

For **TIME-LAPSE** mode it is assumed that you won't have a bloop light, but you might have an auto-focus cable attached to the same output pins (see page 120). An auto-focus signal is generated whenever the camera trigger signal is generated.

- The **CAM SYNC** setting specifies where the controller should look to find the synchronisation (“sync”) signal. This signal is used to control how the movement of the head is synchronised to the camera frames so that repeat passes match, frame for frame. This signal usually comes from the camera, but can also come from a separate “genlock” sync generator, and is used to synchronise the movement of the head with the video frames so that multi-pass shots match, frame-for-frame.
 - **INTERNAL** - (Not operational in this version.)
 - **MSA GPI 1** - the controller expects the sync signal to come in through the General Purpose Input connector. This does not apply to the Mini MSA.
 - **MSA VIDEO** - (Not operational in this version.)
 - **HEAD** - the controller expects the sync signal to come in via the head, through one of the following connectors:

Trigger In (pin 3) on the **TRIGGER** connector, on an AFC head that has the optional BCST70 panel or on any head with a Quad-box or Octo-box (SFH-30 head or SFH-50).

GPI1 In (pin 10, Trigger In 1) on the **CAM ACC** (Camera Accessory) connector on any head with an Ulti-box (SFH-50 head or Ulti-head).
 - **DISABLED** - no synchronisation. Record and playback starts without waiting for a sync pulse from the camera.

If you specify **MSA GPI 1** or **HEAD**, recording or playback of a move will not begin until the controller detects an incoming sync signal through the specified connection. That is, you must start the camera manually to initiate recording or execution of the move, by using the **CAMERA** button on the controller either before the move starts or while the controller is waiting for the sync signal.



- **SYNC TIMEOUT** - The number of seconds that the controller will wait to receive a sync pulse at the start of the move. If no sync pulse is received in this time then the move will not start and the message **CAM SYNC FAILED** is displayed.

Hint

All synchronization sources are rising-edge triggered. For information on how the sync facility interacts with playback, camera triggering, and bloop light triggering, see *Summary of playback events* on page 30.

Creating a move by defining start and end points

1. In Film mode, choose menu option **REC-PLAY AXES > A->B WAYPOINT MOVE > SET POSITIONS > POS A:STORE CURRNT?.**
2. Move the head to the starting point of the move, and set the lens controls the way you want.
3. Press **SELECT.**
The starting point is now stored:
POS A: STORED
4. Scroll to **POS B: NOT STORED** and press **SELECT.**
5. Move the head to the end point of the move, and set the lens controls the way you want.
6. Press **SELECT.**
The end point is now stored:
POS B: STORED
7. Press **BACK**, then use option **SET MOVE DURATION > MOVE SECONDS,** to set amount of time that you want the move to take, in seconds.
8. Press **BACK** then use option **SET A->B FAIRINGS > UP FAIRING** to set the acceleration for the start of the move. For example, a value of 25% means that the head will use the first 25% of the movement to accelerate from 0 to the move's full speed.
9. Use the option **DOWN FAIRING** to set the deceleration for the end of the move. For example, a value of 25% means that the head will use the last 25% of the move to slow from the move's full speed to 0.
10. Press **BACK** then use option **GENERATE A->B MOVE** (pressing **SELECT** again if prompted) to create the move.

The move is automatically assigned a move number for identification and stored in the Mini MSA. For example:

```
A->B MOVE GENERATED
PROGRESS: 100%
MOVE #8
```

11. Press **BACK** then test the move by using the following sequence:
 - 11.1 **RUN GENERATED MOVE > PLAYBACK SAME SPEED.**
 - 11.2 When the panel displays **READY TO GOTO**, press **SELECT** to go to the start position of the move. (When moving to the start position, the panel displays **PERFORMING GOTO.**)
 - 11.3 When the panel displays **READY TO SHOOT**, press **SELECT** to begin playing the move. (When playing a move, the panel displays **SHOOTING.**)

Hint

If the Mini MSA is set to wait for a sync signal (**CAMERA SETUP > CAM SYNC**, see page 22) then the controller displays the message **AWAITING CAM SYNC** and playback of the move will not start until a sync pulse is received from the specified sync source. If you are using a sync source from the camera you must also start the camera to start playback.

The message **CAM SYNC FAILED** appears if no sync signal is received within the time that you specified in **CAMERA SETUP > SYNC TIMEOUT**.

If necessary, you can stop a move at any time by using the **BACK** button.

To modify the move, see *Modifying a move* on page 33.

Creating a move by live recording

1. In Film mode, choose menu option **REC-PLAY AXES > RECORD.**
2. Use **SELECT REC AXES** to select which axes you want to include in the recording. Each axis can have one of the following values:
 - **LEARN** - (not operational in the Mini MSA.)

- **LIVE** - This axis will **not** be recorded, although you can still move it with the controls during both recording and playback.
- **RECORD** - This axis will be recorded. (The default setting)
- **IGNORE** - This axis will **not** be recorded. During playback this axis will hold its position and you will **not** be able to move it with the controls.

If an axis is **UNASSIGNED** then there is no control mapped to it; it will not be recorded as you will not be able to move it with the controls.

3. Press **BACK**, then choose menu option **RECORD**.

The panel shows **NOT RECORDING**, along with the ID number of the move about to be recorded, and the recording time left. For example:

MOVE #1
TIME LEFT: 00:43:26

4. Move the head and lens controls to the start positions of the move.
5. Press **SELECT** to start the recording.

Hint

If the Mini MSA is set to wait for a sync signal (**CAMERA SETUP > CAM SYNC**, see page 22) then the controller displays the message **AWAITING CAM SYNC** and recording will not start until a sync pulse is received from the specified sync source. If you are using a sync source from the camera you must start the camera to start recording, for example by pressing the **CAMERA** button.



The message **CAM SYNC FAILED** appears if no sync signal is received within the time that you specified in **CAMERA SETUP > SYNC TIMEOUT**.

6. Move the controls to make the motion that you want to record.
The **TIME LEFT** amount decreases as you record.
7. When you have finished the move, press **SELECT** which stops recording and saves the move.

The panel shows **NOT RECORDING**, along with the ID number of the next move to be recorded, if you choose to do so.

8. If you want to record another move, repeat steps 4 to 7. Otherwise press **BACK** twice then **PLAYBACK > PLAYBACK SAME SPEED** to play the move.

If you press the **BACK** button while recording a move, the recording is aborted. You are returned to the **REC-PLAY AXES** menu and the move is not stored.

Playing back a move - simple method

Hint

In the context of the Mini MSA and this manual, the term “**Playback**” refers only to the move that is being played by the Mini MSA. The camera itself is either broadcasting or recording pictures or video, while the Mini MSA is “playing back” its move.

1. In Film mode, choose menu option **REC-PLAY AXES > PLAYBACK > SELECT PLAY MOVE**.
2. Use the **SELECT** knob to choose which move you want to play. For example, move #7:

MOVE 5	00:00:10	
MOVE 6	00:00:10	
MOVE 7	00:00:10<	
MOVE 8	00:00:10	↑ Selection indicator

3. Press **BACK** then **PLAYBACK SAME SPEED**.
4. When the panel displays **READY TO GOTO**, press **SELECT** to go to the start position of the move. (When moving to the start position, the panel displays **PERFORMING GOTO**.)

5. When the panel displays **READY TO SHOOT**, press **SELECT** to begin playing the move. (When playing a move, the panel displays **SHOOTING**.)

Hint

If the Mini MSA is set to wait for a sync signal (**CAMERA SETUP > CAM SYNC**, see page 22) then the controller displays the message **AWAITING CAM SYNC** and playback of the move will not start until a sync pulse is received from the specified sync source. If you are using a sync source from the camera you must start the camera to start playback, for example by pressing the **CAMERA** button.



The message **CAM SYNC FAILED** appears if no sync signal is received within the time that you specified in **CAMERA SETUP > SYNC TIMEOUT**.

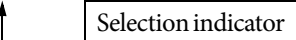
If necessary, you can stop a move at any time by using the **BACK** button.

Playing back a move - advanced method

1. In Film mode, choose menu option **REC-PLAY AXES > PLAYBACK > SELECT PLAY MOVE.**
2. Use the **SELECT** knob to choose which move you want to play. For example, move #7:

```

MOVE 5    00:00:10
MOVE 6    00:00:10
MOVE 7    00:00:10<
MOVE 8    00:00:10
    
```



Selection indicator

3. Press **BACK** then **PLAY OPTIONS** to specify the options you want:
 - **REPEATS:** the number of times you want the move to be played back. A setting of **INFINITE** will replay the move continuously until you press **BACK** to stop it.
 - **REC. SPEED:** the speed of the camera (frames per second) used when the move was recorded. This number affects the playback speed, which is also related to the number of frames per second that is specified in the menu option **CAMERA SETUP > FPS**. For example, for a move originally defined as a 10-second move:

REC-PLAY AXES > PLAYBACK > PLAY OPTIONS > REC. SPEED	CAMERA SETUP > FPS	Actual playback time (seconds)
25	25	10
10	25	4
25	10	25
10	10	10
10	5	20

Hint

You can think of the **REC. SPEED** (first column) as the original number of frames per second that the move was designed for when recording the move, and the **FPS** (second column) as the number of frames per second that the camera is actually using when the move is played back. If these are different, the Mini MSA will automatically adjust the speed of the playback a proportionate amount so that the overall move still contains the same number of frames, taken at exactly the same head positions and lens settings.

4. Press **BACK** then **PLAYBACK ANY SPEED**.
5. When the panel displays **READY TO GOTO**, press **SELECT** to go to the start position of the move. (When moving to the start, the panel displays **PERFORMING GOTO**.)
6. When the panel displays **READY TO SHOOT**, press **SELECT** to begin playing the move. (When playing a move, the panel displays **SHOOTING**.)

Hint

If the Mini MSA is set to wait for a sync signal (**CAMERA SETUP > CAM SYNC**, see page 22) then the controller displays the message **AWAITING CAM SYNC** and playback of the move will not start until a sync pulse is received from the specified sync source. If you are using a sync source from the camera you must start the camera to start playback, for example by pressing the **CAMERA** button.



The message **CAM SYNC FAILED** appears if no sync signal is received within the time that you specified in **CAMERA SETUP > SYNC TIMEOUT**.

If necessary, you can stop a move at any time by using the **BACK** button.

Summary of playback events

If camera sync is **disabled** (page 22), the sequence of events when you try to play a move is as follows:

1. **READY TO GOTO**
2. **SELECT**
3. **PERFORMING GOTO**
4. **READY TO SHOOT**
5. **SELECT**
6. **SHOOTING** (Controller simultaneously starts the move, sends a camera trigger signal, and sends a bloop trigger signal.)

If camera sync is **enabled** (page 22), the sequence of events when you try to play a move is as follows:

1. **READY TO GOTO**
2. **SELECT**
3. **PERFORMING GOTO**
4. **READY TO SHOOT**
5. **SELECT**
6. **AWAITING CAM SYNC**
7. Controller automatically sends a camera trigger signal
8. Camera starts
9. Controller receives sync signal from the camera or other sync generator
10. **SHOOTING** (Controller simultaneously starts the move and sends a bloop trigger signal.)

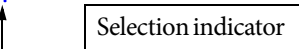
Using time-lapse playback

When you play back a move on the Mini MSA using the time-lapse facility, the head and lens perform the same motions as during normal playback, but the Mini MSA sends a camera trigger pulse to take a frame (single exposure) at regular time intervals along the way. The resulting camera exposures can then be played back later as a video which gives the illusion of compressed time, where slow events occur quickly on the screen.

The controller also sends an auto-focus trigger pulse when it sends a camera trigger pulse. For technical details, see *Camera trigger out* on page 120 and *Auto-focus and bloop trigger out* on page 120.

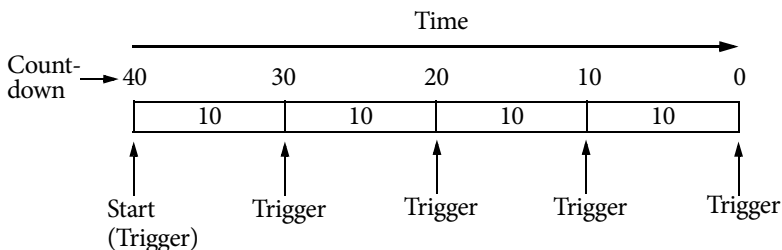
1. In Film mode, choose menu option **CAMERA SETUP**.
2. Change the **ENABLE** option to **TIME-LAPSE**. This sends a trigger to the camera at the start of each frame during time-lapse playback.
3. Press **BACK** then **REC-PLAY AXES > TIME LAPSE > SELECT TL PLAY MOVE**.
4. Use the **SELECT** knob to choose which move you want to play. For example, move #7:

```
MOVE 5    00:00:10
MOVE 6    00:00:10
MOVE 7    00:00:10<
MOVE 8    00:00:10
```



5. Press **BACK** then **TL OPTIONS** to specify the options you want:
 - **FRAMES:** the total number of exposures you want the camera to take during the move.
 - **FRAME TIME:** the number of seconds between exposures. ($\text{FRAMES} \times \text{FRAME TIME} = \text{total time to execute the move.}$) The

following example uses **FRAMES: 4**, **FRAME TIME: 10**, giving a total playback time of 40 seconds.



Note that because the controller takes frames at both the start and end of the move, it actually takes a total of **FRAMES+1** frames, so 5 total frames in the above **FRAMES: 4** example. This makes it easy to calculate the total time as **FRAMES × FRAME TIME**.

- **TYPE:** One of:
 - **SLOW-MOTION** - the head and lens settings don't stop during the exposures. The move is played as one continuous motion, and the camera is triggered at the correct points along the way.
 - **STOP-FRAME** - the head and lens axes stop just before triggering each exposure. The head and lens axes essentially perform a go-to at each frame, then stop and hold position while the frame is exposed. If you choose this option, the Mini MSA also calculates and displays a **MIN FRAME** value. The **FRAME TIME** that you specify above must be larger than this value so that the axes have enough time to accelerate, move, decelerate, and stop between exposures.

In the above example, the slow motion and stop-frame playback would each take 40 seconds of total running time. The stop-frame would execute the move in four distinct motions, each of which would come to a stop just as the trigger point is reached.

6. Press **BACK** then **TL PLAYBACK**.

7. When the panel displays **READY TO GOTO**, press **SELECT** to go to the start position of the move. (When moving to the start, the panel displays **PERFORMING GOTO**.)
8. When the panel displays **READY TO SHOOT**, press **SELECT** to begin playing the move. (When playing a move, the panel displays **SHOOTING**.)

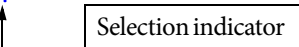
If necessary, you can stop a move at any time by using the **BACK** button.

Modifying a move

To modify a move you play it back in a special way, replacing one or more of the axes with live controls. The original move remains unchanged in the Mini MSA and the modified move is stored as a complete new move. You typically use this facility to manually correct a lens setting, such as focus.

1. In Film mode, choose menu option **REC-PLAY AXES > MODIFY > SELECT PLAY MOVE**.
2. Use the **SELECT** knob to choose which move you want to modify. For example, move #7:

```
MOVE 5    00:00:10
MOVE 6    00:00:10
MOVE 7    00:00:10<
MOVE 8    00:00:10
```



Selection indicator

3. Press **BACK** then **SELECT MOD AXES**.
4. Choose which axis you want to modify by changing its setting to **MODIFY**. For example:

```
FOCUS: MODIFY
```

Make sure that any recorded axis motions that you want to keep are set to **PLAY**.

If any axes are using **LIVE** or **IGNORE** status in the move then you can keep the original status or change it to **MODIFY** to include it in the new recording. Once an axis is included in the recording you cannot modify its status back to **LIVE** or **IGNORE**.

5. Press **BACK** then **RECORD MOD**.

- When the panel displays **READY TO GOTO**, press **SELECT** to go to the start position of the move. (When moving to the start, the panel displays **PERFORMING GOTO**.)

The panel also displays the ID number of the move that you are modifying, the ID number of the modified move that will be created, and the total time of the move. For example:

```
PLAY #7, REC #9  
TIME LEFT: 00:00:06
```

- When the panel displays **READY TO SHOOT**, press **SELECT** to begin playing the move. (When playing a move, the panel displays **SHOOTING**.)

Hint

If the Mini MSA is set to wait for a sync signal (**CAMERA SETUP > CAM SYNC**, see page 22) then the controller displays the message **AWAITING CAM SYNC** and playback of the move will not start until a sync pulse is received from the specified sync source. If you are using a sync source from the camera you must start the camera to start playback, for example by pressing the **CAMERA** button.



The message **CAM SYNC FAILED** appears if no sync signal is received within the time that you specified in **CAMERA SETUP > SYNC TIMEOUT**.

- As the move plays, use the live controls to move the selected axis the way you want. Concentrate only on that axis; the others will be insensitive to the controls.

When the move finishes it is automatically stored with your modification and you can immediately create another modified move, in case your previous modification wasn't quite perfect.

```
READY TO GOTO  
PLAY #9, MOD #10  
TIME LEFT: 00:00:06
```

- If you want to do another take, press **SELECT** and repeat steps 7 to 8. Otherwise press **BACK** twice then **PLAYBACK > PLAYBACK SAME SPEED** to check the final modified move.

Assigning moves to the Preset buttons

If you assign an existing move to one of the eight white numbered preset buttons you can play the move by pressing the button. This is equivalent to using the menu option **REC-PLAY AXES > PLAYBACK > PLAYBACK SAME SPEED**.

1. In Film mode, choose menu option **REC-PLAY AXES > PAIR PRESETS&MOVES**.
2. Use the menu to pair up any of the first eight listed Presets with an existing move that you have created. In this example Preset buttons 1 and 2 will trigger moves 7 and 6:

```
PRESET P1: MOVE 7
PRESET P2: MOVE 6
PRESET P3:-
PRESET P4:-
```

3. When you have assigned all the moves you want, press **BACK** to return to the top-level menu.

Playing a move with a Preset button

1. In Film mode, press one of the eight white numbered preset buttons that you have assigned to a move.



The head immediately goes to the start of the move.

2. Press **SELECT** to start the move.

Hint

If the Mini MSA is set to wait for a sync signal (**CAMERA SETUP > CAM SYNC**, see page 22) then the controller displays the message **AWAITING CAM SYNC** and playback of the move will not start until a sync pulse is received from the specified sync source. If you are using a sync source from the camera you must start the camera to start playback, for example by pressing the **CAMERA** button.



The message **CAM SYNC FAILED** appears if no sync signal is received within the time that you specified in **CAMERA SETUP > SYNC TIMEOUT**.

After the move finishes you can press **SELECT** to return to the start of the move for another replay, or press another numbered preset button.

Deleting a move

1. In Film mode, choose menu option **REC-PLAY AXES > DELETE > DELETE MOVES.**
2. In the panel, select all the moves that you want to delete:

MOVE 5	00:00:10	
MOVE 6	00:00:10<	
MOVE 7	00:00:10<	
MOVE 8	00:00:10	↑

Selection indicators

3. Scroll to the **HOLD SEL HERE 2 DEL** option at the top of the list and press **SELECT.**

The moves are deleted, and system memory is rearranged to provide the maximum amount of free space for recording more moves. If a large amount of memory has been used up then the delete process may take some time to complete (worst case is 1minute 22 seconds).

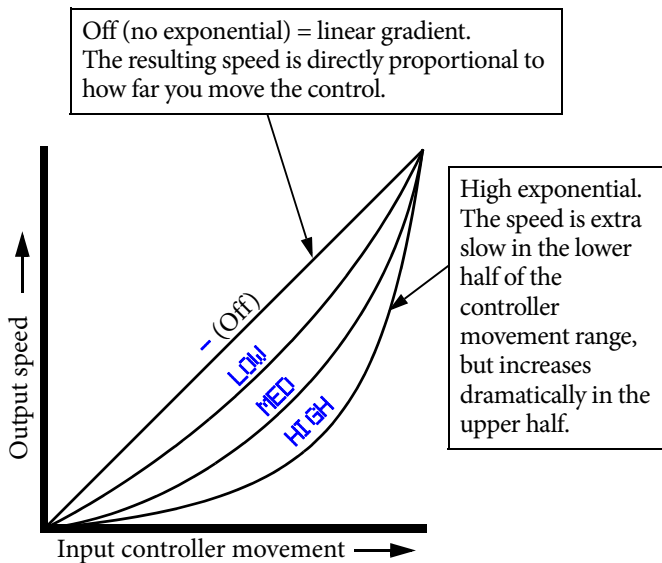
Chapter 4 Speed controls

The following is a summary of the controls that have an effect on the speed of the rig.

- **SPEED** knob on the Mini MSA.
This controls the general speed of the head movement when using manual controls. It has no effect on playback speed, and no effect on the lens controls (focus, zoom, or iris).
- **Maximum speed**
`GENERAL SETUP > AXES SETUP > SET MAX SPEED` in Engineering mode.
The maximum allowed axis speed.
- **Scaling of controls**
`SET INPUT SCALE %` in Broadcast mode, or
`GENERAL SETUP > SET INPUT SCALE %` in Film mode or...
`GENERAL SETUP > INPUTS SETUP > SET INPUT SCALE %` in Engineering mode.
The amount of scaling to be applied to each control, entered as a percentage of the maximum that the control is capable of.
- **Scaling of axes**
`GENERAL SETUP > SET SCALES` in Film mode or...
`GENERAL SETUP > AXES SETUP > SET SCALES` in Engineering mode.
The amount of scaling to be applied to the axes. To automatically calculate the scale so the axis range matches the range of a FIZ pot controller, see page 116.
- **Damping** - maximum allowed
`SET DAMPING %` in Broadcast mode, or
`GENERAL SETUP > SET DAMPING %` in Film mode, or
`GENERAL SETUP > INPUTS SETUP > SET DAMPING %` in Engineering mode.
The amount of smoothing to be applied to the controls, in order to filter out sudden movements and twitches.
- **Damping** - maximum possible
`GENERAL SETUP > INPUTS SETUP > SET DAMPING` in Engineering mode.
The amount of smoothing to be applied to the controls. The number that you specify here is the maximum amount of

position change that is allowed within a specific time frame. Movements faster than this are clipped and averaged to stay within this limit as the movement is constantly integrated over time. Higher numbers allow greater acceleration (and deceleration). Lower values limit the allowed acceleration, giving a smoother response. Values in the range 10 to 200 are usually suitable. The **SET DAMPING %** option (see above) is a percentage of this number, inverted so that 0% = no damping (very responsive system) and 100% = maximum damping (smoother system).

- **Maximum acceleration** - maximum allowed
SET MAX ACCEL % in Broadcast mode, or
GENERAL SETUP > SET MAX ACCEL % in Film mode or
GENERAL SETUP > AXES SETUP > SET MAX ACCEL % in Engineering mode.
The maximum allowed acceleration of the axes, as a percentage of the maximum possible acceleration.
- **Maximum acceleration** - maximum possible
GENERAL SETUP > AXES SETUP > SET MAX ACCEL in Engineering mode.
The maximum possible axis acceleration.
- **Input exponential**
SET INPUT EXP in Broadcast mode, or
GENERAL SETUP > SET INPUT EXP in Film mode or
GENERAL SETUP > INPUTS SETUP > SET INPUT EXP.
The sensitivity gradient of the controls; that is, the relationship between the amount that you move the control (such as the joystick) and the resulting speed of the motion:



- **Zoom Related Speed**

SET ZRS > ZRS SCALE in Broadcast mode, or

GENERAL SETUP > SET ZRS > ZRS SCALE in Film mode.

When you are zoomed in, the head automatically slows down by an amount proportional to the zoom setting. You can adjust this by using the menu option. The higher the number, the greater the slowing effect. You can also specify:

- **SET ZRS > ZRS MASTER** - Choose which axis to use as the reference axis. You usually choose **ZOOM**.
- **SET ZRS > (Controls)** - Choose which controls you want to slow down, by changing **OFF** to **ON**. You usually choose whichever controls have been assigned to Pan and Tilt, such as **JOY HORIZ** and **JOY VERT.**, or the Pan Bars (**PB 1** and **PB 2**).

- **Feathering**

GENERAL SETUP > SET FEATHERING in Film mode.

The maximum deceleration an axis is allowed to have as it approaches a soft limit. The lower the feathering value, the sooner the axis starts to slow down as it approaches its soft

limit. The higher the value, the closer the axis gets to the soft limit before it starts slowing down to come to a stop.

- **Goto speed**

SET GOTO SPEED % in Broadcast mode, or

GENERAL SETUP > SET GOTO SPEED % in Film mode.

The speed of the head when going to a preset position (in Broadcast mode), or when going to the start of a move (in Film mode). You set this as a percentage of the maximum axis speed.

Chapter 5 Advanced settings

Caution

Many of the features in this chapter are only accessible in the Engineering menu (**CHANGE MODE > ENGINEERING MODE**). Engineering mode is only for advanced users, as applying the wrong settings here can stop the system from working. When you go into Engineering mode you are prompted for a four-digit PIN, which is 4217. Apply the settings in Engineering mode carefully, and make a note of the changes so you can revert to the previous settings if the system stops working.

For a comprehensive listing of the menu-based features in the Mini MSA, refer to Appendix 1 *Menu reference*. This chapter describes some of the advanced features for which you might need more information than that provided in the menu listing.

This chapter covers the following topics:

- *Setting the axis type* on page 42
- *Duplicate axis position outputs for stepper motors* on page 42
- *Input method* on page 43
- *Input dead zone* on page 43
- *Back-pan* on page 44
- *Setting up Preston lens motors* on page 45
- *Setting up Canon analog lens controls* on page 46
- *Using Canon and Fujinon digital lens controls* on page 48
- *Low level settings* on page 50
- *Axes home type* on page 54
- *Head communication statistics* on page 55
- *Wireless communication* on page 55

Setting the axis type

Engineering mode:

`GENERAL SETUP > AXES SETUP > SET AXIS TYPE`

This is a legacy option that is no longer used. The axis type for all axes on the system must be set to `MSA STND` (MSA Standard). The parameters for the other axis types are now set elsewhere in the menus and ignored here.

Duplicate axis position outputs for stepper motors

Engineering mode:

`GENERAL SETUP > AXES SETUP > SET INTERNAL AXES`

When you move the controls or play back a move on the Mini MSA, the unit internally generates target positions for the axes which the PID system in the unit tries to closely follow, using feedback from the encoders in the head. You can output these internally generated target positions to one or two external devices that use stepper motors, even if you don't actually have a head attached to the Mini MSA.

The output goes through the General Purpose Output (GPO) pins on the **PAN BARS** connector (25-way D-Type):

- Output Axis 1:
pin 9 (GPO6, Step 1)
pin 10 (GPO7, Direction 1)
- Output Axis 2:
pin 11 (GPO8, Step 2)
pin 12 (GPO9, Direction 2)

You specify which axes to output by using `GENERAL SETUP > AXES SETUP > SET INTERNAL AXES`. For example:

```
AXIS1: MTR: PAN  
AXIS2: MTR: TILT
```

If a slave stepper axis is not assigned to a master axis then the corresponding GPO output pins behave as LED enable outputs which activate, for example, the **ENABLE** LEDs on any mimic-only Handwheels that you have attached to the Mini MSA via the **PAN BARS** connector.

Input method

Engineering mode:

GENERAL SETUP > INPUTS SETUP > SET INPUT METHOD

The input method for each control can be set to Normal or Speedboat:

- Normal – Control input position affects motor position. The axis only moves when the control is moving.
- Speedboat – Control input position affects motor speed. This requires a speedboat style controller such as a joystick. The greater the distance from centre in the control, the greater the speed of the axis.

Input dead zone

Engineering mode:

GENERAL SETUP > INPUTS SETUP > SET INPUT DEADZONE

The dead zone is the amount of control movement (away from some centre or zero position) that is required to make the head start to respond. This intentional “slack” is designed to keep the extremely sensitive controls from constantly moving the head due to tiny fluctuations from, for example, vibration, looseness or wear in the controller mechanics, voltage fluctuations, or an operator’s hand resting on the controls.

You set the dead zone independently for each control, and it only affects inputs that use the Speedboat input method (see above).

If you find that an axis is spontaneously creeping off position (especially in a high-noise environment) increase the dead zone for the control for that axis.

If you have to move a control such as a joystick an excessive amount before its corresponding axis starts to move, decrease the dead zone.

You can fine-tune the dead zone value for some controls, such as those controlling Pan and Tilt axes, by listening to the head motors in a quiet environment. Decrease the dead zone value to find the point where you can hear the motor just barely start to spontaneously whine, then set the value 5 or 10 above that point to give the system some slack. The motors should be completely still (and silent) when you are not touching the controls.

Back-pan

Film mode:

GENERAL SETUP > SET BACK-PAN

Engineering mode

GENERAL SETUP > BACK-PAN SETUP

The back-pan facility is a simple form of target tracking that allows you to link two axes so that when one rotates, the other compensates to keep the camera on target or pointed in the same direction. The menu sub-options are as follows:

- **BP** - toggles the back-pan facility on and off: **ENABLED** or **DISABLED**.
- **PAN AXIS** - the slave axis to which compensation is applied - usually **PAN**.
- **BP AXIS** - the master axis, whose movement triggers compensatory movement of the slave axis - usually a rotate axis on another part of the rig.
- **BP SCALE** - The amount of compensation to be applied to the slave axis. This is calculated by the controller (see below).

For example with a head mounted on a crane, assign the crane's **ROTATE** axis to the **BP AXIS**, and the head's **PAN** axis to the **PAN AXIS**. Rotating the crane would automatically pan the head to keep the camera on target. The link is one-way; that is, you can still move the Pan axis with the controls but this has no effect on the Rotate axis.

Similarly, you could apply back-pan to Tilt and Lift axes, so that lifting the head higher with a crane tilts the camera down to stay on target.

Back-pan scale

To set the amount of compensation to be applied to the slave axis you use the **BP SCALE** option (see above) in combination with head axis positions, and the controller automatically calculates the scaling factor that is required to stay on target:

1. Select the **BP SCALE** menu option.

You are prompted to move the slave axis into position. For example:

ALIGN PAN
AND PRESS SELECT

2. Move both the master axis (**BP-AXIS**) and slave axis (**PAN AXIS**) to some base position.
3. Press **SELECT**.

You are prompted to move the master and slave axes into their new positions. For example:

MOVE ROTATE
RE-ALIGN PAN
AND PRESS SELECT

4. Move both the master axis (**BP-AXIS**) and slave axis (**PAN AXIS**) to their new positions. The further apart the new and old positions are, the more accurate the scaling calculation will be.
5. Press **SELECT**.

The controller calculates the scale.

6. Press **SELECT** again to finish.

Setting up Preston lens motors

Preston Lens motors can be used with the Mini MSA in record and playback. Although Preston Lens motors have their own separate Preston Hand Unit controller, the Mini MSA can still read the Preston encoders, via the head, and record their positions when you record a move. When you play back the move, the Mini MSA takes control of the Preston Lens motors and repeats the move with all recorded axes including the Preston Lens motor moves recorded from the Preston Hand Unit. When you exit playback, control of the Preston motors returns to the Preston Hand Unit, and the motors automatically move back to the current Hand Unit position.

1. Set up the Preston controls as normal with the Preston Hand Unit controlling the Preston MDR2 Lens Control Motor, either wireless or wired.
2. Connect the Preston MDR2 Lens Control Motor to the Head via the Serial connector on the MDR2 (3-pin Lemo) using an MRMC cable.
3. Load the Head as normal.

4. In the Engineering menu choose **GENERAL SETUP > AXES SETUP > SET AXIS NAME** and change the name of the axis that you want to use for the Preston axis to one of: **PN ZOOM**, **PN FOCUS**, or **PN IRIS**.
For example:
AXIS10: PN ZOOM

We recommend using axes 10, 11, and 12 for the Preston lens controls.
5. Choose menu option **GENERAL SETUP > LOW LEVEL SETUP > SET HEAD AXES TYPE** and for the Preston axes set the type to **LENS ZOOM**, **LENS FOCUS**, or **LENS IRIS** as appropriate.
6. If you intend to include Preston moves when recording a move, in the menu choose **REC-PLAY AXES > RECORD > SELECT REC AXES**, scroll down to any Preston (**PN**) axes that appear at the bottom of the list, for example **PN ZOOM**, and make sure the Preston axes are set to **RECORD**.

To record a move with the Preston controls you do so as normal, using the Mini MSA to control the standard axes such as Pan and Tilt, and the Preston Hand Unit to control the Preston motors.

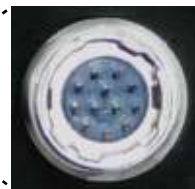
To play back a move that includes Preston moves you play the move as normal on the Mini MSA. The Mini MSA takes control of the Preston motors and uses the recorded data to position the Preston motors. The Preston Hand Unit will have no control during playback. When exiting playback the Preston Hand Unit regains control of the Preston motors, which do a small go-to to match the current Hand Unit positions.

Setting up Canon analog lens controls

To use a Canon analog lens you can use the Mini MSA in combination with an AFC head that is fitted with a BCST 070 panel. This panel has an **ANALOG LENS** connector suitable for a Canon analog lens, for example the KJ20X8.5B KTSM.



AFC Head panel
BCST 070



ANALOG LENS
connector

To set up the lens for use with the Mini MSA follow these steps:

1. Set up the Canon lens controller as normal with the lens controller being powered from the camera.
2. Connect the lens controller to the AFC head via the 12-pin **ANALOG LENS** connector.
3. Load the AFC head as normal.
4. Use Engineering menu option **GENERAL SETUP > AXES SETUP > SET AXIS NAME** to assign suitable names to the lens axes, such as **FOCUS** and **ZOOM**.

For example:

AXIS 6: ZOOM

We recommend using axes 5 to 8 for the Canon analog lens controls.

5. Assign a control inputs to the Canon lens axes, using **GENERAL SETUP > INPUTS SETUP > SET CONTROLLER**.
6. Choose Engineering menu option **GENERAL SETUP > LOW LEVEL SETUP > SET HEAD AXES TYPE** and for the Canon analog lens axes set the type **D TO A**.
7. If a control is controlling the lens position (normal input, as opposed to speedboat input) the lens velocity in the case of speedboat inputs) then you need to set the scaling give control of the full range of movement, using **GENERAL SETUP > AXES SETUP > SET SCALE POTS** and **GENERAL SETUP > AXES SETUP > SET POT RANGE**. If the controller for an axis is changed then you must repeat this step to give the correct scaling.
8. If a control is controlling the lens velocity (speedboat input, as opposed to normal input) then you can set the scaling manually to adjust the affect of the speedboat input on the lens velocity, using **GENERAL SETUP > AXES SETUP > SET SCALES**.
9. The Canon lens position is directly proportional to the Voltage applied to it. Since this is automatically limited it is not necessary to use Soft Limits. To disable the soft limits use **GENERAL SETUP > AXES SETUP > SET SOFT LIMITS**.
10. For the full range of travel of the lens to be achieved you must calibrate the lens. To do this move each control to its maximum travel in both directions.

11. If the lens is moving in the wrong direction for the control then change the axis direction using **GENERAL SETUP > AXES SETUP > SET DIRECTION**.

Using Canon and Fujinon digital lens controls

Heads that have a lens serial port can control Canon and Fujinon digital lenses. Any lens axis (focus/zoom/iris) that is motorized can be controlled through the Mini MSA. The following steps will allow you to control a digital lens.

1. Connect your serial lens cable to the lens serial port on the head, such as:
 - The **CAM ACC** connector on the Ulti-box (on an Ulti-head or SFH-50 head) or...
 - The **Lens** connector on an AFC head.
2. Connect the other end of the cable to the lens. Note that some lenses have more than one serial port and you must use the correct one in order to have control of the lens.
3. Power the lens and the controller system and load the head as normal.
4. In the Engineering menu select **GENERAL SETUP > LOW LEVEL SETUP > SET HEAD AXES TYPE** and specify the axis settings according to the head type. For example:

Axis	Ulti-box (Ulti-head or SFH-50)	AFC 100	AFC 180	AFCH 100
1	Servo	Stepper	CAN	Lens Focus
2	Servo	Stepper	CAN	Lens Zoom
3	Servo	Lens Focus	Lens Focus	Lens Iris
4	Servo	Lens Zoom	Lens Zoom	Stepper
5	Servo	Lens Iris	Lens Iris	Stepper
6	Servo			
7	Lens Focus			
8	Lens Zoom			
9	Lens Iris			

5. If you changed the low-level settings, power cycle and re-load the head.
6. A control input (for example **FOCUS**) needs to be assigned to the lens axis, using **GENERAL SETUP > INPUTS SETUP > SET CONTROLLER**. Assign the lens motor axes to the desired control input, for example **FOCUS CON: FOCUS**. Note that the motor name will only be displayed if the axes names have been assigned to match the head in use, using **GENERAL SETUP > AXES SETUP > SET AXIS NAME**, and that the control input name (for example **FOCUS CON**) will vary between controller panels.
7. You must also set the input method to suit the type of input, for example you should set a zoom rocker to Speed-boat, using **GENERAL SETUP > INPUTS SETUP > SET INPUT METHOD**.
8. Use **GENERAL SETUP > AXES SETUP > SET SOFT LIMITS** to check the soft limits of the lens. The values for each lens axis should be (approximately):

Upper: 65535

Lower: 0
9. The linearity of the control input can be modified to facilitate smooth control of the lens axes, using **GENERAL SETUP > INPUTS SETUP > SET INPUT EXP**.
10. If it is required that one of the lens axes is given external control (for example iris) then the **HEAD AXIS TYPE** should be changed back to **SERVO**, see steps 4-5.

Low level settings

Caution

The low-level factory settings affect the motors in the head. These should only be changed under instruction from an MRMC engineer, as using the wrong settings can in some cases damage the motors.

Engineering mode:

[GENERAL SETUP](#) > [LOW LEVEL SETUP](#)

You specify the low level settings for each axis independently. Descriptions of the low level options are given below.

Current limits

Engineering mode:

[GENERAL SETUP](#) > [LOW LEVEL SETUP](#) > [SET CURRENT LIMITS](#)

If the head has servo motor (or PWM servos) control functionality then you can set the maximum current that a servo motor can draw before it trips. Typical values are:

Ulti-head Pan motor: 8.00A

Ulti-head Tilt motor: 4.00A

Lens control motor: 1.00A

Temperature limits

Engineering mode:

[GENERAL SETUP](#) > [LOW LEVEL SETUP](#) > [SET TEMP LIMITS](#)

Some heads have servo motor amplifiers with temperature sensing to protect against overheating. You can Enable or Disable this protection mechanism for each axis. Heads and/or axes without this feature will not be affected by this setting; it currently only applies to the Ulti-box, as found on the Ulti-head and some SFH-50 heads.

PID system motor tunings

Engineering mode:

**GENERAL SETUP > LOW LEVEL SETUP > SET MOTOR TUNINGS > (Axes)
PRO**

**GENERAL SETUP > LOW LEVEL SETUP > SET MOTOR TUNINGS > (Axes)
DER**

**GENERAL SETUP > LOW LEVEL SETUP > SET MOTOR TUNINGS > (Axes)
INT**

The motor drives in the head use a PID loop (**P**roportional, **I**ntegral, **D**erivative) to maintain motor position. The three tuning parameters for these control loops can be adjusted to change the response of the servo motor (or PWM servo motor). It is not recommended that you change these unless instructed to by an MRMC engineer or you are familiar with PID control theory. Typical values are:

PRO: 30

DER: 20

INT: 20

Motor frequency and polarity

Engineering mode:

GENERAL SETUP > LOW LEVEL SETUP > SET MOTOR CONTROL

There are four different motor drive options for the servo motor axes:

- 80KHz Uni-Polar
- 20KHz Uni-Polar
- 80Khz Bi-Polar
- 20KHz Bi-Polar

20KHz Uni-Polar is the default value, suitable for all motors supplied with the head. Contact Mark Roberts Motion Control for assistance with selecting the control option for motors not supplied with the Head.

Caution

Selection of an incorrect drive option may damage the motor.

Maximum error

Engineering mode:

GENERAL SETUP > LOW LEVEL SETUP > SET MAX ERROR

You can set the maximum amount of position error that is allowed for each axis before the motor trips out. The maximum position error is the difference between the desired motor position and the actual motor position, beyond which the axis will trip.

A larger maximum error allows more slack in the system, making it less likely that a motor will trip out during high-acceleration moves and sudden direction changes. A large maximum error value is suitable for high-speed single-pass shots, as it makes an axis less likely to trip out during the move.

A smaller maximum error allows less slack in the system, making it more likely that a motor will trip out during a high-speed move. A small maximum error can be useful for multi-pass shots, as it puts constraints on how far the actual movement can vary from one pass to the next. A tripping axis can alert you move discrepancies and remind you to adjust the motor tunings (*PID system motor tunings* on page 51) if, for example, you change the camera speed or the load on the camera platform by a large amount.

Head axes type

Engineering mode:

GENERAL SETUP > LOW LEVEL SETUP > SET HEAD AXES TYPE

Different heads have different motor configurations. The hardware in the head can support a range of configurations and this setup can vary between systems. These settings allow the firmware to be set up for a particular head motor configuration.

SERVO: Integrated brushed DC motor amplifier. This is used on the Ulti-head, and the Ulti-box version of the SFH-50.

STEPPER: Stepper motor (step and direction). This is used on the AFC 100 and AFCH 100 heads, SFH-30 head, and the Quad-box and Octo-box versions of the SFH-50.

STEPPER + FB: Stepper motor with encoder position feedback.

D to A: (Digital to Analog) Analog Voltage proportional to position error. This is used for the Canon analog lens.

D to A + FB: (Digital to Analog) Analog Voltage proportional to position error with encoder position feedback.

LENS IRIS: Digital lens iris control. This is used for Preston lens control motors, and for the Canon and Fujinon digital lenses.

LENS FOCUS: Digital lens focus control. This is used for Preston lens control motors, and for the Canon and Fujinon digital lenses.

LENS ZOOM: Digital lens zoom control. This is used for Preston lens control motors, and for the Canon and Fujinon digital lenses.

VEL OUTPUT: For an analog head motor. The output value is a function of the commanded velocity. The faster you want to go, the higher the voltage output. There is no position feedback so it is only for live manual control.

CAN: Controller Area Network brushless DC motor amplifier. You use this if you have an external motor amplifier that supports CANOpen protocol. This is used in the AFC 180 head.

ROBOT: (Not operational in this version.)

PWM SERVO: External brushed Pulse Width Modulation DC motor amplifier with encoder feedback.

Encoder Safety

Engineering mode:

GENERAL SETUP > LOW LEVEL SETUP > SET ENCODER SAFETY

This feature detects encoder feedback failure, which can result in a run-away head. You can set the value to **ON** or **OFF** for each axis. This only applies to motors with encoders; that is, servo or PWM servo motors. If an encoder fails, the controller displays the message:

**COMMS FAULT
DETECTED!!!
POWER CYCLE
THE HEAD**

To recover from this error you must unplug the power lead from the head, plug it back in, and then reload and re-zero the head.

Axes home type

Engineering mode:

HOME AXES > SET HOME AXIS TYPE.

There are five types of homing:

- **DIRECT** - The axis will be zeroed at its current location (equivalent to **DIRECT ZERO**). You use this method for any axes that don't have a built-in physical home position such as an optical homing sensor, magnetic homing sensor, or hardware limit to its range of movement. This setting is typically used for focus rings that have a slip clutch instead of hard stops.
- **MAGNETIC** - The axis will rotate to find its magnetic home sensor and use that as the home position.
- **VANE** - A 180° vane and optical sensor are used. The axis will rotate to find the edge of the vane and use that as the home position.
- **HARD-LIMIT** - You use this if you have a Lens Control Motor (LCM) driving a lens axis that has a hard physical limit, such as a zoom ring. The axis will rotate to find the hard limits (one at each end of travel of the lens ring), record the axis positions, and use this information to zero the lens at the lower end and set the soft limits. You use this option in combination with the Engineering menu option **HOME AXES > SET HOMING POWER**. Too little power will fail to move a stiff lens ring; too much power will cause the motor gear to jump out of mesh when it pushes against the physical end of travel.
- **SERIAL LENS** - The controller will exercise the lens to find its limits, and then set those as the soft limits.

Head communication statistics

Engineering mode:

DIAGNOSE AXES > HEAD COMMS

If you are using a serial connection between the controller and the head (via the **SERIAL A** connector), the statistics for the communication are displayed. The values are as follows:

- **UPTIME** – The amount of time the controller has been powered up.
- **BUFFER FAIL** - The number of buffer failures.
- **BUFFER OVER** - The number of buffer overruns.
- **BUFFER UNDR** - The number of buffer underruns.
- **PACKET FAIL** - The number of packets that were corrupted.
- **ABSENT PKTS** - The number of packets that have gone missing.

Wireless communication

For information on using wireless communication between MRMC controllers and heads, contact Mark Roberts Motion Control.

Chapter 6 Managing settings and firmware with a Windows PC

Introduction to the MSA Ethernet Archiver and MSA Ethernet Firmware Updater

You can use a Windows PC connected to your Mini MSA via an Ethernet cable to help manage the settings and firmware on your Mini MSA. To do this you download and install the following two applications from Mark Roberts Motion Control:

- **MSA Ethernet Archiver**, for backing up and restoring your Mini MSA settings. You can also send the backup file to Mark Roberts Motion Control to help troubleshoot a problem with your controller. Note that this application does **not** back up or restore **preset positions** or **moves**.
- **MSA Ethernet Firmware Updater**, for updating the firmware in your Mini MSA, or for configuring the Mini MSA for use with a different head or different type of link to the head.

When you use either of the above applications the Mini MSA acts a slave device responding to requests from the PC.

In the Mini MSA, the controller settings and firmware are independent. They are stored in different locations and you manage them with the different applications listed above. When you power up the controller the firmware refers to the stored settings, and these settings then become visible in the Mini MSA menus.

When you update the firmware, the existing settings in the Mini MSA are unaffected but you might need to specify additional settings for any new menu options that don't yet have their settings stored in the Mini MSA. Nevertheless, it is safe practice to back up your settings before performing any major updates on your controller.

If you update the firmware to use different head, you will also need to either load a new settings file suitable for the new head (the recommended option) or else manually adjust many of the settings in the controller to cater for the new head.

The MSA Ethernet Archiver and MSA Ethernet Firmware Updater require firmware version MSA-21 v6.00 or later in your Mini MSA. The

firmware version is displayed on the controller screen when you first power up the system. If you have an version earlier than 6.00 then you must first update your firmware with a PC using the older serial-based application **MSA Move Archiver and Re-Flash Utility**, in combination with a Serial (RS232) connection. For assistance contact Mark Roberts Motion Control; you will also need the **.bt1** file describe in *Obtaining the .bt1 firmware file for your Mini MSA* on page 59. After updating to MSA-21 v6.00 or later you can manage the settings and firmware in your Mini MSA using the Ethernet methods described in this chapter.

General procedure

1. Download and install the applications and files that you will need. See:
Downloading and installing the MSA Ethernet Archiver and MSA Ethernet Firmware Updater on page 58
Obtaining the .bt1 firmware file for your Mini MSA on page 59.
2. Adjust the network settings on the PC so the archiver and firmware updater can communicate directly with the Mini MSA over the Ethernet cable. See:
Adjusting the PC network settings on page 60.
3. Back up or restore the settings in your Mini MSA as required. See:
Using the MSA Ethernet Archiver on page 62.
4. Update the firmware in your Mini MSA as required. See:
Using the MSA Ethernet Firmware Updater on page 64.
5. When you are done using the archiver and/or firmware updater, revert the network settings on the PC to their original state so you have normal networking and internet access again. See:
Adjusting the PC network settings on page 60.

Downloading and installing the MSA Ethernet Archiver and MSA Ethernet Firmware Updater

1. Using a web browser on the PC, go to the Resources - Downloads section of the MRMC web site:

<http://www.mrmoco.com/resources/downloads>
2. In the **Software** section of the web page, click on the **MSA Ethernet Archiver** to download it to your PC.
3. In same the **Software** section of the web page, click on the **MSA Ethernet Firmware Updater** to download it to your PC.
4. On your PC, start a file browser (Windows Explorer) and point it to the location into which you downloaded the files, typically:

C:\Users\Username\Downloads

The files are:

MSA Ethernet Archiver.exe

FirmwareUpdater.exe

5. The MSA Ethernet Firmware Updater (**FirmwareUpdater.exe**) does not require any installation; you just run it from its existing location when needed, as described in *Using the MSA Ethernet Firmware Updater* on page 64. However, you need to install the MSA Ethernet Archiver before you can use it. To install it, double-click on the downloaded file:

MSA Ethernet Archiver.exe
6. Follow the instructions on the PC screen to install the MSA Ethernet Archiver software.

Obtaining the .bt1 firmware file for your Mini MSA

To update the firmware in your Mini MSA you use the MSA Ethernet Firmware Updater to load a new **.bt1** file into the Mini MSA. To find out which **.bt1** file you need and to get the file, contact Mark Roberts Motion Control. The choice of **.bt1** file depends on the following, and you will need to supply this information to Mark Roberts Motion Control:

- Which controller you are using (Mini MSA).
- Which head you want to use with the controller, and which board is installed in the head: Quad, Hex, Octo, or Ulti.
- Which communication method you want to use between the controller and the head: Ethernet or Serial.

The file will have a name similar to:

MSA21_Hex_II_Ether_mini_msa_ether.bt1

When you get the **.bt1** file from Mark Roberts Motion Control, put it into a convenient location on your Windows system, such as the Windows Desktop or **C:\Users\User Name\Downloads**. You will use the **.bt1** file in *Using the MSA Ethernet Firmware Updater* on page 64.

Caution


If you have Flair Motion Control Software installed on your PC, note that the **.bt1** files in folder **C:\Flair\Flair6\Bt1s** are for heads only — not for controllers. **Do not** use any of the **.bt1** files in this folder to update your controller, or else you will erase the existing firmware in the controller and have to install it again from scratch using a Serial cable in combination with the old **MSA Move Archiver and Re-Flash Utility**.

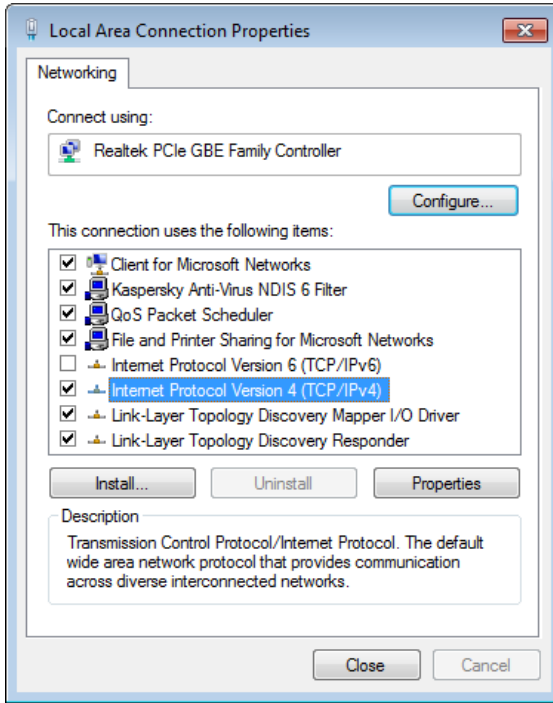
Adjusting the PC network settings

After you have downloaded and installed the MSA Ethernet Archiver and/or MSA Ethernet Firmware Updater and .btl file, but before using these programs to communicate with the Mini MSA, you need to adjust the network settings on the PC so it can communicate with the Mini MSA directly over the Ethernet cable. You need to do the following:

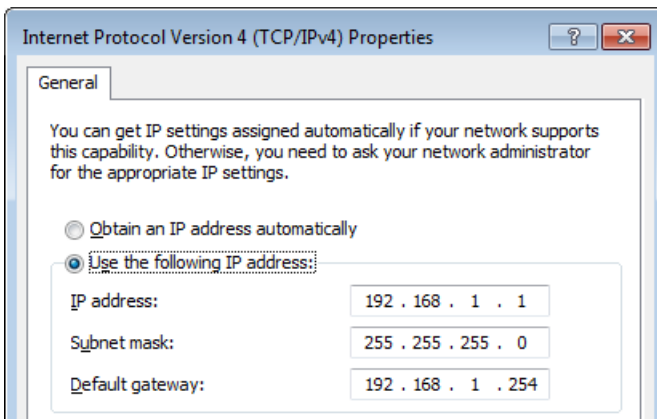
- Temporarily disable your Wi-Fi network connection, if you are using one (so that the MSA Ethernet software does not try to use it).
- Assign a temporary static IP address to the physical Local Area Connection, which uses the Ethernet cable attached to the Mini MSA.

The procedure for Windows 7 is as follows. Other versions will be similar.

1. Right-click on the Networking icon () at the bottom of the Windows Desktop and in the pop-up menu choose **Open Network and Sharing Center**.
2. In the Network and Sharing Center window, click on **Change adapter settings**.
3. Right-click on the **Wireless Network Connection** button and in the pop-up menu click on **Disable**.
4. Still in the Network and Sharing Center window, right-click on **Local Area Connection** and in the pop-up menu choose **Properties**.



5. In the Local Area Connection Properties pop-up that appears, on the **Networking** tab, switch on and select **Internet Protocol Version 4 (TCP/IPv4)** then click on **Properties** to see the IP address settings. For example:

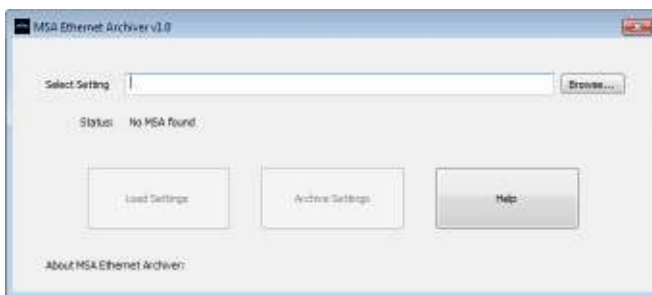


6. Make a note of the existing settings displayed on your PC, including the button setting and numbers, if any, so you can return to the same settings later.
7. Click on **Use the following IP address**, enter the numbers shown in the above screen shot, and click on **OK**. Confirm that you want to save the settings if you are prompted to do so, then **Close** the Local Area Connection Properties and Network and Sharing Center.

Using the MSA Ethernet Archiver

1. Unplug power cable from the Mini MSA.
2. If you haven't already done so, connect the Mini MSA to your PC using an Ethernet cable.
3. If you haven't already done so, adjust the Network settings on your PC (that is, turn off Wi-Fi and assign a static IP address to the cabled Ethernet connector) so that the PC and Mini MSA can communicate. Details are in *Adjusting the PC network settings* on page 60.
4. Start the MSA Ethernet Archiver in your PC, by using the Windows Start menu option **All Programs > MSA Ethernet Archiver > MSA Ethernet Archiver**.

The MSA Ethernet Archiver is displayed on the computer screen, and automatically starts searching for the Mini MSA.



5. With the **BOOT SELECT** switch on the Mini MSA in normal (Up) position for stand-alone operation, power up the Mini MSA by plugging in the power cable.

(You can plug the power cable into the controller before starting the MSA Ethernet Archiver if you want, as long as you haven't pressed

the **SELECT** knob yet and the controller is still waiting for you to load the head.)

The controller starts up and automatically establishes an Ethernet connection to the PC, and the MSA Ethernet Archiver will then automatically find the controller on the network. When this happens, the Mini MSA displays the message: **ETHERNET ARCHIVER**. The MSA Ethernet Archiver automatically downloads the settings from the controller and into application memory, and displays the message: **MSA found, settings received**.

6. To save the Mini MSA settings from application memory to a file on your PC, click on the **Archive Settings** button and in the file browser that appears specify a location and name for the settings file and click on **OK**.

or...

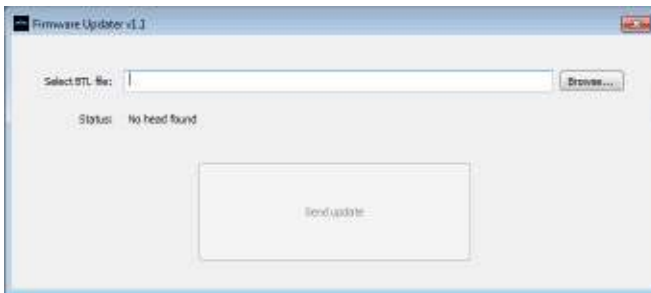
To restore the settings from a previously saved settings file into the controller, use the **Browse** button to find and select the relevant **.set** file on your PC, then click on the **Load Settings** button.

Using the MSA Ethernet Firmware Updater

Before doing this procedure make sure you have the `.bt1` file that you will need (see page 59).

1. Unplug power cable from the Mini MSA.
2. If you haven't already done so, connect the Mini MSA to your PC using an Ethernet cable.
3. If you haven't already done so, adjust the Network settings on your PC (that is, turn off Wi-Fi and assign a static IP address to the cabled Ethernet connector) so that the PC and Mini MSA can communicate. Details are in *Adjusting the PC network settings* on page 60.
4. Start the MSA Ethernet Firmware Updater in your PC, either by double-clicking on the **FirmwareUpdater.exe** file on the Desktop or by navigating to this file in a file browser (such as Windows Explorer, typically pointing to `C:\Users\Username\Downloads`) and double-clicking on the file.

The Firmware Updater is displayed on the computer screen, and automatically starts searching for the Mini MSA.



5. On the Mini MSA:
 - 5.1 Make sure the **BOOT SELECT** switch on the Mini MSA is in normal (Up) position for stand-alone operation.
 - 5.2 Hold down the **SELECT** button with one hand.
 - 5.3 Plug the power cable into the controller with the other hand.
 - 5.4 Release the **SELECT** button within 4 seconds. (If you hold it down longer the controller will start up normally without the

Firmware Updater and you will need to unplug the power cable and try repeating step 5 again.)

The Firmware Updater should find the head and display the message: **Connection established. Waiting for BTL file.** The screen on the Mini MSA remains blank.


6. In the Firmware Updater, click on the **Browse** button and in the file browser that appears specify the location and name of the **.btl** file that you got for the controller from Mark Roberts Motion Control.
7. In the Firmware Updater, click on the **Send Update** button.

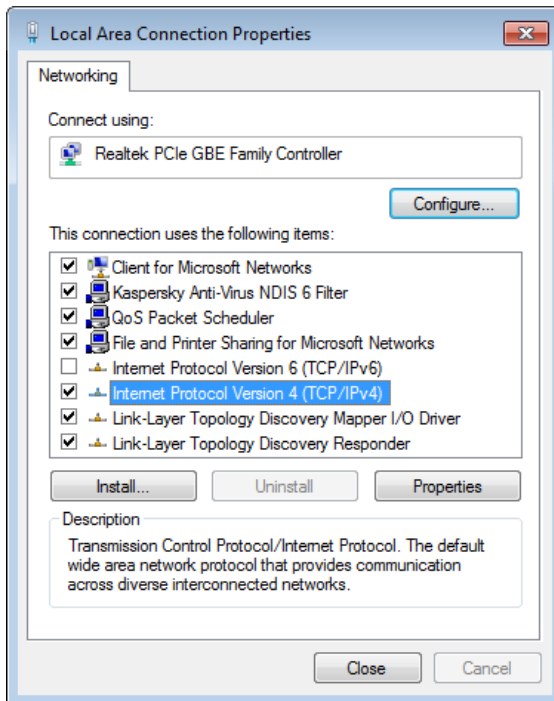
When the Firmware Updater finishes updating the firmware it displays the message: **Update complete.**

Hint

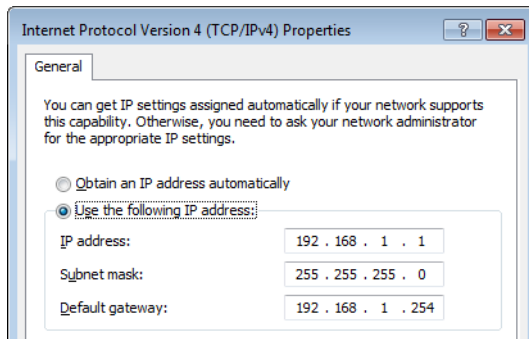
The MSA Ethernet Firmware Updater will automatically close if you do not update the firmware within about two minutes, for security reasons. Updating the controller firmware is a major configuration change for the controller and it would be risky to leave the updater running on the system when you are not using it.

Returning the PC network settings to their original configuration

1. Right-click on the Networking icon () at the bottom of the Windows Desktop and in the pop-up menu choose **Open Network and Sharing Center**.
2. In the Network and Sharing Center window, click on **Change adapter settings**.
3. If you were using Wi-Fi previously, right-click on the **Wireless Network Connection** button and in the pop-up menu click on **Enable**.
4. Still in the Network and Sharing Center window, right-click on **Local Area Connection** and in the pop-up menu choose **Properties**.



5. In the Local Area Connection Properties pop-up, **Networking** tab, switch on and select **Internet Protocol Version 4 (TCP/IPv4)** then click on **Properties** to see the IP address settings.



6. Enter your original settings and click on **OK**, then **Close** the then **Close** the Local Area Connection Properties and Network and Sharing Center.

Appendix 1 Menu reference

The collection of menu options that are available on your controller depends on which menu mode you are in: Broadcast, Film, or Engineering. To change modes, use the menu option **CHANGE MODE**. The controller remembers the current mode when you switch it off between sessions. The options are summarised in the following sections:

- *Broadcast mode* on page 70
- *Film mode* on page 72
- *Engineering mode* on page 80

This Appendix describes the menu options in version **MSA-21 6.14** of the Mini MSA firmware. The firmware version number is displayed on the screen when you first power up the controller in Normal mode or Flair mode. You can also inspect the version number by using Engineering menu option **DIAGNOSE AXES > VERSION INFO**.

Caution

When you go into Engineering mode you are prompted for a four-digit password (which is 4217), as applying the wrong settings here can stop the system from working. You should only use Engineering mode if you are an experienced user and have requirements that cannot be satisfied by using options in the other two modes. Make a note of any changes that you make so you can revert to the previous value if the system stops working.

The names of the **controls**, as they appear in the menu, can vary depending on which specific controller model you've got and how it has been configured for accessories. For example, the Mini MSA is typically set up for the following controls:

JOY HORIZ (Joystick Horizontal)
JOY VERT (Joystick Vertical)
JOY ROTATE (Joystick Rotate)
ZOOM POT (Zoom knob on the Mini MSA)
ROLL (Auxiliary Roll control)
ZOOM AUX (Zoom Auxiliary control)
PB 1 (Pan Bars 1)

FB 2 (Pan Bars 2)

FB 3 (Pan Bars 3)

FB 4 (Pan Bars 4)

The menu listings in this section abbreviate the above list as “**(Controls)**” instead of repeating the entire list each time.

The names of the **axes**, as they appear in the menu, can vary in how they are assigned to the controls, depending on how the controller has been configured for your particular head, requirements, and preferences. The axes are typically:

PAN

TILT

ROLL

FOCUS

ZOOM

IRIS (Aperture)

The menu listings in this section abbreviate the above list as “**(Axes)**” instead of repeating the entire list each time.

Broadcast mode

Menu sequence (Broadcast mode)		Description and possible settings
DIRECT ZERO ALL or HOME ALL AXES		Zero all axes at their current position or their home position. See page 10. The menu option that appears here depends the setting of the Engineering menu option HOME AXIS > ZEROING METHOD .
SET SOFT LIMITS >	(Axes) SL	ENABLE or DI SABLE the limits of travel for each axis, and specify those limits. The MAX value must be larger (or more positive) than the MIN value. See page 13.
	MAX	
	MIN	
SET DIRECTION >	(Controls)	Set the direction in which the controls operate. See page 8. FW D - Forward OFF - Disable the control. REV - Reverse
SET INPUT EXP >	(Controls)	The sensitivity gradient of the controls. See page 38. - (Off) LOW MED HIGH
SET ZRS >	ZRS MASTER	Specify the parameters for the Zoom-Related Speed facility, whereby the head axes (usually Pan and Tilt) automatically slow down a proportionate amount when you are zoomed in. See page 39.
	ZRS SCALE (Controls) ON/ OFF	

Menu sequence (Broadcast mode)		Description and possible settings
SET INPUT SCALE % >	(Controls)	The amount of scaling to be applied to the controls. See page 37.
SET DAMPING % >	(Controls)	The amount of smoothing to be applied to the controls, to filter out sudden jerks and twitches. See page 37.
SET MAX ACCEL % >	(Axes)	The maximum allowed acceleration and deceleration. See page 37.
SET GOTO SPEED % >	(Axes)	The speed of the axes, as a percentage of maximum speed, when going to a preset position (in Broadcast mode), or when going to the start of a move (in Film mode). See page 40.
INPUT VALUES >	(Controls)	The current values of the controls, updated continuously as you move the controls.
AXIS POSITIONS >	(Axes)	The current values of the axes, updated continuously as you move the axes.
AUTO ENABLE >	(Axes)	Automatically restart an axis if it trips out, for example from overheating, over-current, or loss of position.
CHANGE MODE >	BROADCAST MODE	Change the operating mode. Engineering mode requires you to enter a four-digit password.
	FILM MODE	
	ENGINEERING MODE	

Film mode

Menu sequence (Film mode)		Description and possible settings
CAMERA SETUP >	FPS	Camera speed, in Frames Per Second. See page 20.
	LPF	Lines Per Frame for the servo or stepper motors. See page 20.
	ENABLE	The type of signal used to trigger the camera during playback. See page 20. MOMENTARY TIME-LAPSE PULSE CONTINUOUS
	CAM SYNC	The connection to be used for the incoming sync signal, used to synchronise the movement of the head with the camera. See page 22. INTERNAL MSA GPI 1 MSA VIDEO HEAD DISABLED
	SYNC TIMEOUT	The number of seconds to wait for the synchronisation signal to start a move.

Menu sequence (Film mode)			Description and possible settings
GENERAL SETUP >	SET SOFT LIMITS >	(Axes) SL	ENABLE or DI SABLE the limits of travel for each axis, and specify those limits. The MAX value must be larger (or more positive) than the MIN value. See page 13.
		MAX	
		MIN	
	SET SCALES >	(Axes) SCL	The amount of scaling to be applied to the axes. See page 37.
	SET DIRECTION >	(Controls)	The direction in which the controls operate. See page 8. FWD - Forward OFF - Disabled. REV - Reverse
	SET FEATHERING >	(Axes)	The maximum deceleration an axis can have as it approaches a soft limit. See page 40.
	SET INPUT SCALE % >	(Controls)	The amount of scaling to be applied to the controls. See page 37.
SET MAX ACCEL % >	(Axes)	The maximum allowed acceleration and deceleration. See page 38.	

Menu sequence (Film mode)		Description and possible settings
GENERAL SETUP > (continued)	SET GOTO SPEED % >	(Axes) The speed of the axes, as a percentage of top speed, when going to a preset position (in Broadcast mode), or when going to the start of a move (in Film mode). See page 40.
	SET DAMPING % >	(Controls) The amount of smoothing to be applied to the controls, to filter out sudden jerks and twitches. See page 37.
	SET INPUT EXP >	(Controls) The sensitivity (exponential) gradient of the controls. See page 38. – (Off) LOW MED HIGH
	SET ZRS >	ZRS MASTER ZRS SCALE (Controls) ON/OFF Specify the parameters for the Zoom-Related Speed facility, whereby the head axes (usually pan and tilt) automatically slow down a proportionate amount when you are zoomed in. See page 39.

Menu sequence (Film mode)			Description and possible settings
GENERAL SETUP > (continued)	SET BACK-PAN >	BP	Link two axes so that when one rotates, the other compensates to keep the camera on target. See page 44.
		PAN AXIS	
		BP AXIS	
		BP SCALE	
	SET AXIS HOME SPEED >	(Axes)	The speed used when homing the axes, as a percentage of top speed.
	SET HOMING POWER >	(Axes)	The amount of motor power to be used when homing the axes, as a percentage of maximum power.
HOME AXES >	ALL AXES		Zero the axes automatically, all at once or one at a time, using the homing facility if your head has it. See page 12.
	SELECT AXIS >	(Axes)	
	DIRECT ZERO >	(Axes)	Zero the axes manually, at their current position.
	DIRECT ZERO ALL		The menu displays the status as each axis is zeroed. See page 11.

Menu sequence (Film mode)				Description and possible settings
REC- PLAY AXES >	A->B WAYPOINT MOVE >	SET POSITIONS >	POS A POS B	Create a move by defining its start and end points. See page 23.
		SET MOVE DURATION >	MOVE SECONDS	
		SET A->B FAIRINGS >	UP FAIRING	
			DOWN FAIRING	
		GENERATE A->B MOVE		
		RUN GENERATED MOVE >	SELECT PLAY MOVE	Test the move that you created. See page 24.
			PLAY OPTIONS	
			PLAYBACK SAME SPEED	
			PLAYBACK ANY SPEED	
				SET PLAYBACK TRIGGE >

Menu sequence (Film mode)				Description and possible settings	
REC- PLAY AXES > (continued)	RECORD >	SELECT REC AXES >	(Axes)	Select which axes you want to include in the recording. See page 24.	
		RECORD		Record a move. See page 24.	
	PLAYBACK >	SELECT PLAY MOVE		PLAYBACK	Play back a move. See page 26.
		PLAY OPTIONS >	REPEATS REC. SPEED		
		PLAYBACK SAME SPEED			
		PLAYBACK ANY SPEED		PLAYBACK	Play back a move with extra options. See page 28.
		SET PLAYBACK TRIGGE >	INPUT: TRIG1 = GPI1 (pin 3) TRIG2 = GPI2 (pin 4) TRIG3 = GPI3 (pin 5) TRIG4 = GPI4 (pin 6)		This only applies to the MSA-20 Handwheels. Trigger the start of playback (and subsequent replays) by using an external input device plugged into the GPIO 2 connector. You can still use the SELECT button to trigger playback if you want.
	MODIFY >	SELECT PLAY MOVE		MODIFY	Create a new move that is partially based on an existing move. See page 33.
		SELECT MOD AXES >	(Axes)		
		RECORD MOD			

Menu sequence (Film mode)			Description and possible settings
REC- PLAY AXES > (contin ued)	TIME- LAPSE >	SELECT TL PLAY MOVE TL OPTIONS >	Run a move as normal but trigger the camera at regular time intervals during playback, instead of just once at the start of the move. See page 31.
		FRAMES	
		FRAME TIME TYPE	
	TL PLAYBACK		
	PAIR PRESETS&MOVES	Assign recorded moves to the numbered preset buttons. In Film mode you can then play a move by pressing the relevant numbered preset button. (In Broadcast mode the numbered preset buttons still invoke static camera positions). See page 35.	
	DELETE >	DELETE MOVES	Delete one or more moves. See page 36.
		DELETE ALL MOVES	Delete all stored moves.

Menu sequence (Film mode)			Description and possible settings
DIAGNOSE AXES >	INPUT VALUES >	(Controls)	The current values being output by the controls, updated continuously as you use the controls.
	AXIS POSITIONS >	(Axes)	The current values of the axes, updated continuously as you move the axes.
	LIMIT INPUTS >	(Axes) LIMIT	Three digits that indicate the state of the hard limit and datum (home position) switches on an axis, updated as you move the controls. The first digit is the limit status: 1 (one, open) when an axis reaches either one of its hard limit switches, and 0 (zero, closed) otherwise. The second digit is the datum status. For a head with homing fins it is 0 (closed) on one side of the home position and 1 (open) on the other side. For a head with a magnetic homing switch it is 1 (open) at the home position and 0 (closed) on either side of it. The third digit is not currently used.
CHANGE MODE >	BROADCAST MODE		Change the operating mode. Engineering mode prompts you for a four-digit password.
	FILM MODE		
	ENGINEERING MODE		

Engineering mode

Caution

Engineering mode is only for advanced users, as applying the wrong settings here can stop the system from working. When you go into Engineering mode you are prompted for a four-digit PIN, which is 4217. Apply the settings in Engineering mode carefully, and make a note of the changes so you can revert to the previous settings if the system stops working.

Menu sequence (Engineering mode)		Description and possible settings
CAMERA SETUP >	FPS	Camera speed, in Frames Per Second. See page 20.
	LPF	Lines Per Frame for the servo or stepper motors. See page 20.
	ENABLE	The type of signal used to trigger the camera during playback. See page 20. MOMENTARY TIME-LAPSE PULSE CONTINUOUS

Menu sequence (Engineering mode)				Description and possible settings
CAMERA SETUP > (continued)	CAM SYNC			The connection to be used for the incoming sync signal, used to synchronise the camera with the movement of the head. See page 22. INTERNAL MSA GPI 1 MSA VIDEO HEAD DISABLED
	SYNC TIMEOUT			The number of seconds to wait for the synchronisation signal to start a move.
GENERAL SETUP >	AXES SETUP >	SET SOFT LIMITS >	(Axes) SL	ENABLE or DISABLE the limits of travel for each axis, and specify those limits. The MAX value must be larger (or more positive) than the MIN value. See page 13.
			MAX	
		SET SCALES >	(Axes) SCL	The amount of scaling to be applied to the output of the axes. See page 37.

Menu sequence (Engineering mode)				Description and possible settings
GENERAL SETUP > (continued)	AXES SETUP > (continued)	SET ENC RATIOS >	(Axes) RATIO	Specify the conversion factor to be used to convert encoder values to real world values. This affects the numbers that are displayed for the axis positions (in DIAGNOSE AXES > AXIS POSITIONS) and the numbers that appear in exported moves.
		SET DIRECTION >	(Axes)	The direction in which the axes operate. This also determines the direction in which the axes position values increase, and (depending on the axis) determines which side or end of the axis is the Homing point (see page 112). Note that this option is different from the option GENERAL SETUP > INPUTS SETUP > SET INPUT DIR (page 8) which only changes the polarity of the Controls without changing the axis numbering direction or the Homing behaviour. FWD - Forward OFF - Disabled REV - Reverse
		SET MAX SPEED >	(Axes)	The maximum allowed speed for each axis.

Menu sequence (Engineering mode)			Description and possible settings
GENERAL SETUP > (continued)	AXES SETUP > (continued)	SET MAX ACCEL >	(Axes) The maximum possible acceleration that you want to use for each axis.
		SET MAX ACCEL % >	(Axes) The maximum allowed acceleration for each axis, as a percentage of the maximum possible acceleration that you have specified with SET MAX ACCEL .
		SET FEATHERING >	(Axes) The maximum deceleration each axis can have as it approaches a soft limit. See page 40.
		SET GOTO SPEED % >	(Axes) The speed of each axes, as a percentage of top speed, when going to a preset position (in Broadcast mode), or when going to the start of a move (in Film mode). See page 40.
		SET AXIS NAME >	AXIS1 AXIS2... : AXIS12 Assign a meaningful name to each axis, such as Pan, Tilt, Roll, Focus, Zoom, etc. The assigned name is then used elsewhere in the menus (in place of AXIS1 , AXIS2 , etc.), and in archived settings.
		SET AXIS TYPE >	(Axes) Specify the type of axis, for each axis. See page 42.
		SET BACKLASH >	(Axes) Specify the amount of backlash for each axis.

Menu sequence (Engineering mode)				Description and possible settings
GENERAL SETUP > (continued)	AXES SETUP > (continued)	SET INTERNAL AXES >	AXIS1: MTR:	Specify which axis control data is to be sent out through the GPO pins on the PAN BARS connector, to make a slave stepper motor plug-in perform the same move as one of the controller's other axes. See page 42.
			AXIS2: MTR:	
	INPUTS SETUP >	SET CONTROLLER >	(Controls)	Assign one or more control inputs to each axis.
		SET DAMPING >	(Controls)	The amount of smoothing to be applied to the controls, to filter out sudden jerks and twitches. The SET DAMPING % option in Broadcast and Film mode is a percentage of the amount that you set here, inverted so that 0% damping = no smoothing (very responsive), and 100% damping = heavily smoothed (very sluggish). See page 37.
		SET DAMPING % >	(Controls)	The amount of smoothing to be applied to the controls, to filter out sudden jerks and twitches. See page 37.
		SET INPUT SCALE % >	(Controls)	The amount of scaling to be applied to the controls. See page 37.

Menu sequence (Engineering mode)				Description and possible settings
GENERAL SETUP > (continued)	INPUTS SETUP > (continued)	SET INPUT DIR >	(Controls)	Set the direction in which the controls operate. See page 8. FWD - Forward OFF - Disable the control. REV - Reverse
		SET INPUT EXP >	(Controls)	The sensitivity (exponential) gradient of the controls: See page 38.
		SET DIR SWITCHES >	(Controls)	Assign the three direction switches (FWD , OFF , REV) on the controller to the controls.
		SET SCALE SWITCHES >	(Controls)	Assign the three scale switches (X1 , X2 , X3) to the controls. This does not apply to the Mini MSA controller.
		SET SCALE POTS >	(Controls)	Specify which controls are affected by the SPEED knob on the controller, or by other potentiometer-based controls (“POTS”) that you plug into the controller. This only applies to basic pots which control electric voltage such as the SPEED knob. It does not apply to knobs with encoders such as the ZOOM control which you assign to axes by using GENERAL SETUP > INPUTS SETUP > SET CONTROLLER .

Menu sequence (Engineering mode)			Description and possible settings
GENERAL SETUP > (continued)	INPUTS SETUP > (continued)	SET INPUT METHOD >	(Controls) The type of behaviour for the control: Normal or Speedboat. See page 43.
		SET INPUT DEADZONE >	(Controls) The amount of control movement (away from some centre or zero position) that is required to make the head start to respond. See page 43.
		SET POT RANGE >	(Controls) Adjust scaling of a FIZ pot control so that the full range of the pot is mapped to the full range of its assigned axis. See page 116.
		SET ZRS >	ZRS MASTER ZRS SCALE (Controls) ON/OFF Adjust the Zoom-Related Speed facility, whereby the head axes (usually pan and tilt) automatically slow down a proportionate amount when you are zoomed in. See page 39.
	BACK-PAN SETUP >	BP PAN AXIS BP AXIS BP SCALE	Link two axes so that when one rotates, the other compensates to keep the camera on target. See page 44.

Menu sequence (Engineering mode)			Description and possible settings
GENERAL SETUP > (continued)	SERIAL SETUP >	MODE	The mode and speed (in bits per second) to be used for the SERIAL B port on the controller. This is used by the legacy MSA Move Archiver and Re-Flash Utility running on a PC, and for outputting the control positions to a PC. This does not apply to the Mini MSA, which does not have an external SERIAL B port.
		SPEED	
	LAN SETUP >	SET MSA IP ADDRESS	Specify the IP (Internet Protocol), SN (Subnet Mask), and GW (Gateway) addresses of the controller. and head. See page 103.
		SET HEAD IP ADDRESS	
		PING HEAD	
	FIND HEAD		

Menu sequence (Engineering mode)			Description and possible settings
GENERAL SETUP > (continued)	LOW LEVEL SETUP >	SET CURRENT LIMITS >	(Axes)
		SET TEMP LIMITS >	(Axes)
		SET MOTOR TUNINGS >	(Axes) PRO
			(Axes) DER
			(Axes) INT
		SET MOTOR CONTROL >	(Axes)
		SET MAX ERROR >	(Axes)
		SET HEAD AXES TYPE >	(Axes)
SET ENCODER SAFETY >	(Axes)		
			Low-level motor settings. These should only be changed under instruction from an MRMC engineer, as an incorrect setting can damage the motors. See page 50.

Menu sequence (Engineering mode)		Description and possible settings
HOME AXES	> ALL AXES	Zero the axes automatically, all at once or one at a time, using the homing facility if your head has it. See page 12.
	> SELECT AXIS > (Axes)	
	> DIRECT ZERO > (Axes)	Zero the axes manually, at their current position. The menu displays the status as each axis is zeroed. See page 11.
	> DIRECT ZERO ALL	
	> SET AXIS HOME TYPE > (Axes)	
> SET AXIS HOME SPEED > (Axes)	The speed used when homing the axes, as a percentage of top speed.	

Menu sequence (Engineering mode)		Description and possible settings
HOME AXES > (continued)	SET HOMING POWER > (Axes)	<p>The amount of motor power to be used when homing each axis, as a percentage of maximum power. This is only used on axes that use a HARD-LIMIT homing type (see above). It limits the force applied when, for example, a lens motor reaches the end of travel of a lens ring. If this value is too high the lens motor gear will jump out of mesh and homing will fail. If the value is too low for a stiff lens then the axis will fail to move.</p> <p>Note that you cannot automatically home a lens ring that has a slip clutch, as this type does not have a hard end stop. You must zero such a ring/axis manually instead (using homing type DI RECT).</p>
	ZEROING METHOD	<p>Specify the type of zeroing/homing to be used when in Broadcast mode:</p> <p>ZEROING - the option DI RECT ZERO ALL is available in Broadcast mode so you can zero the axes manually at their current position.</p> <p>HOMING - the option HOME ALL AXES is available in Broadcast mode so you can zero the axes automatically at their hardware home positions.</p>

Menu sequence (Engineering mode)				Description and possible settings
REC-PLAY AXES	> A->B WAYPOINT MOVE	SET POSITIONS	> POS A POS B	Create a move by defining its start and end points. See page 23.
		SET MOVE DURATION	> MOVE SECONDS	
		SET A->B FAIRINGS	> UP FAIRING	
			DOWN FAIRING	
		GENERATE A->B MOVE		
	RUN GENERATED MOVE	> SELECT PLAY MOVE	Test the move that you created. See page 24.	
		PLAY OPTIONS		
PLAYBACK SAME SPEED				
RECORD	>	SELECT REC AXES	(Axes)	Select which axes you want to include in the recording. See page 24.
		RECORD		Record a move. See page 24.

Menu sequence (Engineering mode)			Description and possible settings	
REC-PLAY AXES (continued)	PLAYBACK >	SELECT PLAY MOVE	Play back a move. See page 26.	
		PLAY OPTIONS >		REPEATS
		REC. SPEED		
		PLAYBACK SAME SPEED		Play back a move with extra options. See page 28.
		PLAYBACK ANY SPEED		
SET PLAYBACK TRIGGE >	INPUT:	This only applies to the MSA-20 Handwheels. Trigger the start of playback (and subsequent replays) by using an external input device plugged into the GPIO 2 connector. Possible INPUT settings are: TRIG1 = GPI1 (pin 3) TRIG2 = GPI2 (pin 4) TRIG3 = GPI3 (pin 5) TRIG4 = GPI4 (pin 6)		

Menu sequence (Engineering mode)		Description and possible settings
REC-PLAY AXES >	MODIFY >	SELECT PLAY MOVE
		SELECT MOD AXES > (Axes)
		RECORD MOD
	TIME-LAPSE >	SELECT TL PLAY MOVE
		TL OPTIONS > FRAMES FRAME TIME TYPE
	TL PLAYBACK	
	PAIR PRESETS&MOVES	Assign recorded moves to the numbered preset buttons. In Film mode you can then play a move by pressing the relevant numbered preset button. (In Broadcast mode the numbered preset buttons still invoke static camera positions). See page 35.
DELETE >		DELETE MOVES
		DELETE ALL MOVES

Create a new move that is partially based on an existing move.
See page 33.

Run a move as normal but trigger the camera at regular time intervals during playback, instead of just once at the start of the move.
See page 31.

Assign recorded moves to the numbered preset buttons. In Film mode you can then play a move by pressing the relevant numbered preset button. (In Broadcast mode the numbered preset buttons still invoke static camera positions).
See page 35.

Delete one or more moves.
See page 36.

Delete all stored moves.

Menu sequence (Engineering mode)			Description and possible settings
DIAGNOSE AXES >	INPUT VALUES >	(Controls)	<p>The current raw values being output by the controls, updated continuously as you use the controls.</p> <p>Some inputs use encoders and others use an analog Voltage. Encoder values vary between 0 and 65535, analog Voltage inputs vary between 0 and 255.</p>
	INPUT POSITIONS >	(Controls)	<p>The input position is calculated from the input value after it has had the specified input method applied to it (Normal or Speedboat) which you set with GENERAL SETUP > INPUTS SETUP > SET INPUT METHOD, see page 43. Moving the control changes the raw input value, which in turn changes the corresponding control input position. The input position value has no position, speed, or acceleration limits applied.</p>
	COMMAND POSITIONS >	(Controls)	<p>The command position is calculated from the input position after it has had the scaling, damping, input exponential, and position, speed, and acceleration limits applied. The command position is sent to the head as the target position for the motor. The difference between the command position and the actual measured motor position is what the PID system uses to generate the motor movement.</p>

Menu sequence (Engineering mode)		Description and possible settings
DIAGNOSE AXES > (continued)	AXIS POSITIONS >	(Axes) The current values of the axes, updated continuously as you move the axes, in real world units such as degrees. You can adjust the conversion between encoders and reality with GENERAL SETUP > AXES SETUP > SET ENC RATIOS .
	AXIS VELOCITIES >	(Axes) The current velocities of the axes, updated continuously as you move the head.
	A2D VALUES	The low-level values being output from the controls, immediately after conversion from analog to digital, without any remapping or filtering. This is only used by MRMC engineers.
	INPUTS AND BUTTONS	The current statuses of the switches and buttons on the controller.

Menu sequence (Engineering mode)		Description and possible settings
DIAGNOSE AXES > (continued)	TEST OUTPUTS ENABLE1 ENABLE2... • • ENABLE12	You use this to test the operation of the LEDs on devices that are attached to the controller. Highlighting an ENABLE indicator in the menu will cause the corresponding LED to light. If it doesn't then there is a fault with the LED's connection. The LEDs for additional control inputs (ENABLE4 and ENABLE 5 for plug-in mimic devices such as pan bars and FIZ pots) will only light if the corresponding device is plugged into the controller. Note that not all products have ENABLE LEDs.
	TEST SERIAL	The serial ports and the controller can be tested to ensure correct communication. Alphabetic characters are sent out on each port and any received characters are displayed. Loop back testing is the best method of testing, which is where the transmit pin is connected to the receive pin, so all sent characters are echoed back to the display. If the head is connected then this test will fail.
	HEAD COMMS	Statistical information on communications, if you are using a serial connection between the controller and the head. See page 55.

	Menu sequence (Engineering mode)	Description and possible settings
<p>DIAGNOSE AXES > (continued)</p>	<p>RESTORE DEFAULTS</p>	<p>Restores the controller to its factory default settings. Caution: This loses all stored data and custom settings. You should only use this option in extreme circumstances under the direction of an MRMC engineer, as it usually results in a system that does not work until you manually re-enter all the appropriate settings for your particular head. Make a backup copy of your settings first, using the procedures in Chapter 6.</p>
	<p>VERSION INFO</p>	<p>Display the version number of various hardware and software components for the controller and attached head:</p> <p>SOFTWARE MSA BOARD MSA ISSUE MSA ID HEAD BOARD HEAD ISSUE HEAD ID</p>

Menu sequence (Engineering mode)			Description and possible settings
DIAGNOSE AXES > (continued)	HEAD DIAGNOSTICS >	LIMIT INPUTS (Axes)	Three digits that indicate the state of the hard limit and datum (home position) switches on an axis, updated as you move the controls. The first digit is the limit status: 1 (one, open) when an axis reaches either one of its hard limit switches, and 0 (zero, closed) otherwise. The second digit is the datum status. For a head with homing fins it is 0 (closed) on one side of the home position and 1 (open) on the other side. For a head with a magnetic homing switch it is 1 (open) at the home position and 0 (closed) on either side of it. The third digit is not currently used.
		ENCODER VALUES (Axes) ENC	The raw encoder values coming from the head, updated continuously as the head moves.
		AUTO ENABLE > (Axes)	If an axes trips (for example from the position error exceeding the maximum allowed value) then the system will automatically re-enable the motor after a short delay. However, if the axis continues to trip then the auto-enable feature will turn off to protect the motor. Once the problem that caused the motor to trip has been fixed the auto-enable feature for that motor can be re-enabled here.
CHANGE MODE >	BROADCAST MODE		Change the operating mode. Engineering mode prompts you for a four-digit password.
	FILM MODE		
	ENGINEERING MODE		

Appendix 2 Troubleshooting

Typical symptoms, causes, and actions

Symptoms or message	Cause and/or action
HEAD DID NOT LOAD	The Mini MSA failed to load the operating system into the head.
HEAD NOT LOADED	
LOAD FAIL	Check that all cables are connected, and all devices have power. If you have connected more than one head, connected the MRMC system to another local network, or moved the controller and head between networks, check that correct LAN addresses have been entered in the controller. See <i>Working with Local Area Networks</i> on page 103. Check the order in which the devices are powering up. If you are using an Ethernet connection to the head, avoid powering the head from the power output socket on the controller in order to avoid powering up the two devices simultaneously (which can cause problems on small isolated Ethernet networks). Use an independent power source for each, and power up the head first. If you are using a Serial connection to the head, power up the controller first. Data corruption can also cause a failure to load the head. Use a shorter cable to improve the communication, and ensure the cable is not running near any high current devices.
FAILED TO LOAD HEAD	
FAILED TO INITIALIZE ETHERNET	
Controls move in the wrong direction	Change the working direction of the controls to your preference (page 8).

Symptoms or message	Cause and/or action
Limits are being ignored or causing the head to oscillate when reached.	The axes have not been zeroed. You must do this at the beginning of each session just after you load the head (page 10).
The numbered preset buttons do not work (Broadcast mode).	
Can't set limits, or the head oscillates when you set a limit.	<p>When you set soft limits (page 13) you must set the MAX limit to the higher (or more positive) axis value, and set the MIN limit to the lower (or more negative) value.</p> <p>After zeroing the axes (page 10), all the lens axes (focus, zoom, and iris) should have a MIN value of zero (0) and for these axes you should only change the MAX values. If you can only move the focus, zoom, or iris axis into negative values then it means you are using a lens with external motors, and that the axis value is increasing in the wrong direction on your particular rig. To cater for this, see <i>Zeroing lens axes with external Lens Control Motors</i> on page 112.</p>
The head moves too slowly or too quickly when zoomed in.	The Zoom Related Speed (ZRS) feature automatically slows the live pan and tilt controls to cater for the narrow field of view when zoomed in. You can adjust the amount of slowing in the SET ZRS menu options (page 39).
The head moves more slowly when zoomed out.	You are using a lens with external motors, and the zoom axis value is increasing in the wrong direction on your particular rig. To cater for this, see <i>Zeroing lens axes with external Lens Control Motors</i> on page 112.

Symptoms or message	Cause and/or action
Move playback fails to start.	<p>The option CAMERA SETUP > CAM SYNC is using a setting other than DI SABLED and the controller has not yet received a sync signal from the camera (or external genlock system) to trigger the start of the move recording or playback.</p> <p>Start the camera running, either by using the controls on the camera or the CAMERA button on the Mini MSA.</p> <p>Check the cable and connector that the sync signal is going through, and make sure the connection used is one of those specified in the CAMERA SETUP > CAM SYNC option (see page 22).</p>
AWAITING CAM SYNC	
CAM SYNC FAILED	

Working with Local Area Networks

If you are using an Ethernet connection between the Mini MSA and the head, they communicate with each other through an Ethernet Local Area Network (LAN). The Mini MSA and head are **devices** on the network. Under certain circumstances you might need to change the LAN settings of the devices so that the devices not only work together, but do so when connected to another network. For example:

- If you install the Mini MSA as part of a multi-component system.
- If you connect your MRMC equipment to a LAN.
- If you move the equipment between networks.
- If you have customised the LAN settings in a head for one of the above reasons and then sent the head back to MRMC for servicing. The service might change the LAN settings back to the factory defaults, and you will need to customise them again when you get the head back.

Introduction to LAN addresses

Each device on an Ethernet network has a suite of three addresses:

- Internet Protocol (IP) address. This is the specific address within the LAN.
- Subnet (SN) address. This defines the size (address range) of the local area network, and should normally be set to the value shown in the next table.
- Gateway (GW) address. This is the address of the device used when talking between local area networks. This should normally be set to the value shown in the next table, and you would only change it if you needed to communicate with a head that is not on the same LAN as the controller.

Together, these addresses indicate the device's identity and location on the network. Each address is usually written as a group of four numbers separated by periods. The factory default values used in MRMC equipment are shown in the next table:

	Mini MSA	Head
IP address	192.168.1.235	192.168.1.236
SN address	255.255.255.0	255.255.255.0
GW address	192.168.1.1	192.168.1.1

On a given local network, the last group of numbers in the IP address must be unique for each device. All other numbers and addresses must be identical.

The LAN addresses of the Mini MSA and head are **static**. That is, they will stay the same unless you explicitly change them.

Hint

Most local networks use the SN and GW values shown in the above table, so under ordinary circumstances you will only need to be concerned with **IP addresses**. The rest of this section therefore concentrates on **IP addresses**, but you might also need to inspect or change the SN and GW addresses, depending on the structure of the network that you are using to access the head.

Although a simple Mini MSA setup has only **two** devices on the network (the Mini MSA and the head) there are potentially **three** IP addresses involved:

1. **The IP address of the Mini MSA itself.** This is stored in the **Mini MSA**. You don't ordinarily need to change this unless you are connecting it to a local network that requires different settings.
2. **The IP address that the Mini MSA looks for** when it tries to find and load the head on the network. This is stored in the **Mini MSA**. This must match the next IP address...
3. **The actual IP address of the head.** This is stored in the head. This is usually the IP address shown in the above table unless it has been changed, or unless you specified a different address when you ordered the head. In any case, the factory-set IP address of a head is ordinarily printed on a sticker on the head.

You can use the **Mini MSA** to inspect and edit all of the above stored IP addresses using the procedure given in the next section, *Managing LAN addresses with the Mini MSA*.

If you want, you can also use Flair Motion Control Software to inspect and edit the actual IP address of a head with an unknown history. Details are in *Managing LAN addresses with Flair* on page 109.

Managing LAN addresses with the Mini MSA

1. Connect the Mini MSA and head to each other with the Ethernet cable.
2. Make sure the Mini MSA and head have power. The menu panel on the Mini MSA displays a prompt similar to the following:

```
(C) MRMC 2016  
MSA-21 v6.14.  
PRESS SELECT TO  
LOAD QUAD ETHER II
```

3. Press the **SELECT** knob to load the head.
 - If the head fails to load, you can use the remaining procedure to find the actual IP address of the head and then specify that IP address as the one that the Mini MSA looks for when trying to load the head.
 - If the head loads successfully, you can use the remaining procedure to change the actual IP address of the head.

You can also use the remaining procedure to inspect and edit the IP address of the Mini MSA itself, regardless of whether the head loaded or not.

4. Use the **SELECT** knob again to choose the following menu sequence:

```
CHANGE MODE > ENGINEERING MODE
```

5. Enter the PIN (4217) to access the Engineering menu.

Caution

Engineering mode is for advanced users, as applying the wrong settings here can stop the system from working. Apply the settings carefully, and make a note of the changes so you can revert to the previous settings if the system stops working.

6. Choose one of the following menu sequences:

To view or change the IP address of the Mini MSA itself, choose:

GENERAL SETUP > LAN SETUP > SET MSA IP ADDRESS

Otherwise choose...

GENERAL SETUP > LAN SETUP > SET HEAD IP ADDRESS

7. The LAN addresses of the selected device are displayed. For example:

IP: 192.168.1.236

GW: 192.168.1.1

SN: 255.255.255.0

You can edit the addresses here as required. In most cases you will only need to change the IP address.

If you are looking at the **MSA IP address** (that is, the IP address of the Mini MSA) then you can inspect or edit it here to make sure the IP address is unique on the network.

If you are looking at the **Head IP address** then the displayed value is the IP address that the controller is looking for when it tries to load the head.

- If the head loaded successfully then when you edit the IP address here, this will also change the actual IP address of the head.
- If the head did not load successfully then you can enter the actual IP address of the head here so the controller can find it the next time you try to load the head.

If you don't know the actual IP address of the head then you can find and register it as follows:

- 7.1 Press **BACK**, then **FIND HEAD**.

The panel displays: **PRESS SLCT TO FIND**

- 7.2 Press **SELECT** to begin the search.

The panel displays **Searching...** and then the actual IP address that it found for the head. For example:

IP:192.168.1.236

(If the panel displays **No head found** then the actual SN and/or GW values stored in the head are different from those on the controller and the controller will not be able to find out the IP address. Contact Mark Roberts Motion Control for advice.)

- 7.3 Make a note of the IP address that the controller found for the head.
 - 7.4 Press **BACK** then **SET HEAD IP ADDRESS**.
 - 7.5 Enter the IP address that the controller found for the head.
 - 7.6 You can check that the controller can communicate with the head on the new IP address by pressing **BACK** then **PING HEAD** and **SELECT**. The panel shows a blinking **PING!** response when it successfully tests the connection.
8. After you have inspected and/or edited the IP addresses, press **BACK** to return to the top of the Engineering menu.
 9. Return to Broadcast mode or Film mode:
CHANGE MODE > BROADCAST MODE
or...
CHANGE MODE > FILM MODE
 10. Unplug the Mini MSA power cable, then plug it back in.
 11. Press **SELECT** to load the head when prompted.

When the head has been loaded successfully you can use the Mini MSA to control the head, lens, and camera.

Hint

If you want to connect your head and controller to a larger network through an Ethernet hub and you need to edit the IP addresses of both head and controller, you can save time and avoid potential errors by entering and saving the IP values for the head in the menu, then using `GENERAL SETUP > LAN SETUP > SET MSA IP ADDRESS > Copy head settings` to copy the head LAN settings to the controller LAN settings. The IP address copy is automatically incremented by one (1) to avoid a conflict with the head.

Alternatively, you can copy the settings in the reverse direction by using `GENERAL SETUP > LAN SETUP > SET HEAD IP ADDRESS > Copy MSA settings`, although this direction is usually more problematic due to the need to maintain a connection with the head while simultaneously changing its connection parameters.

Managing LAN addresses with Flair

The factory-set IP address of a head is printed on a sticker on the head.

If the IP address of a head has been changed to an unknown value so you can't load the head from the Mini MSA, you can find out the head's IP address either by using the **FIND** facility in the or by connecting the head to a Windows PC that has Flair Motion Control Software installed on it and using Flair to interrogate the head on the network.

The procedure below tells you how to use Flair to find the IP address of a head, and if necessary change it. You can also use Flair to change the IP, SN, and GW addresses of the head if necessary.

1. Find a PC that has Flair Motion Control Software installed on it, or install Flair on your own PC.
2. Attach the head to the PC with an Ethernet cable. You can use the same Ethernet cable that was connecting the head to the Mini MSA.
3. Make sure the head has power, by checking that the power indicator LED on the head lights up.
4. Start Flair on the PC.
5. If you get any error messages, click on **OK** to close them.
6. When you get a message about network failure, click on the **Network Setup** button in the message:



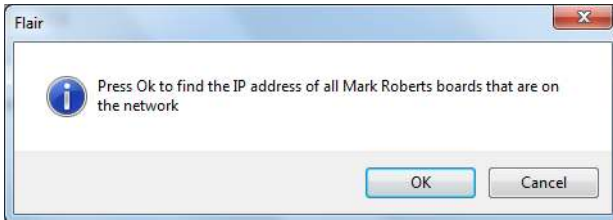
or...

If the Flair installation already has a valid head connection on a network then you might not get the network failure message. In this case, start the Network Setup facility manually by choosing the **Setups > Network Setup** menu option in Flair.

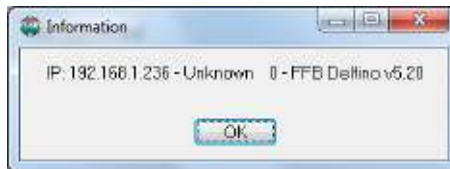


The Network Setup window, Connection tab, lists the Nodes (head connections) that Flair is looking for, as defined in the NetworkDirect.ini file. Any changes that you make and **Save** in the Network Setup window are saved in the NetworkDirect.ini file. You can also edit this file by using the menu option **Help > View Network .ini File**. If Flair cannot find the head on the network at the IP address shown then the node's status is **Not connected**.

7. In the Network Setup window click on **Find**, then on **OK** in the pop-up to confirm:



8. An Information pop-up displays information about the heads that Flair has found on the network:



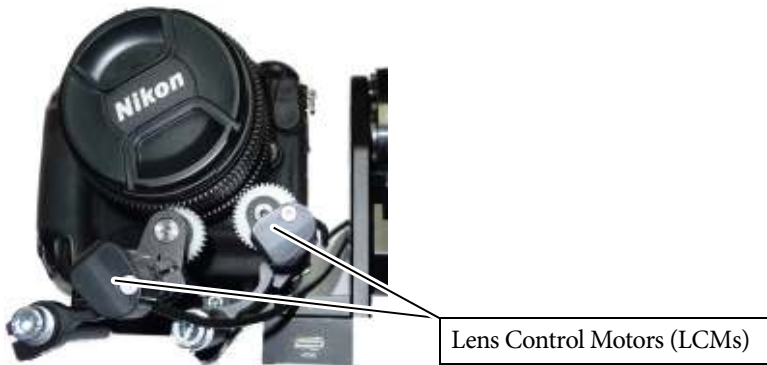
Make a note of the head's IP address that is displayed in the pop-up; for example 192.168.1.236.

9. To change the IP address stored in the head you can use either the Mini MSA or Flair. If you want to use Flair to change the head's IP address, or to inspect or change the SN or GW addresses, follow the sub-steps below:
 - 9.1 Enter the head's existing IP address (as shown in the Information pop-up) into the Network Setup window and click on **Save**.
 - 9.2 Click on **Load** to reset and load the head.

Once Flair is connected to the head, any LAN address changes that you make and **Save** in the Network Setup window will also affect the LAN addresses stored in the head.
 - 9.3 To change the IP address of the head, enter the new IP address into the Network Setup window now and click on **Save**.

The Status temporarily changes to **Not connected** as Flair changes the IP address in the head, then to **Connected** as Flair reconnects with the head at its new IP address.
 - 9.4 To inspect or change the SN or GW address of the head, click on **Find** again. A pop-up shows the head's three current LAN addresses, and the **Subnet Mask** (SN) and **Default Gateway** (GW) fields in the Network Setup window become editable. Enter the new SN and GW addresses that you want to use and click on **Save**.
10. Close the Network Setup window by clicking on **Exit**.
11. You are now done with the PC:
 - 11.1 Close Flair by choosing the **File > Quit** menu option.
 - 11.2 Disconnect the Ethernet cable from the PC, and re-attach it to the Mini MSA, so the head and Mini MSA are now connected.
 - 11.3 Tell the Mini MSA which IP address to look for by following the procedures in *Managing LAN addresses with the Mini MSA* on page 105.

Zeroing lens axes with external Lens Control Motors



Axes directions

If you are using a lens with external LCMs, you need to make sure that when you move the lens controls (focus, zoom, and iris), the axis values (as displayed on the Mini MSA) increase in the correct direction. To check this:

1. Choose menu option:
AXIS POSITIONS (in Broadcast mode)
or...
DIAGNOSE AXES > AXIS POSITIONS (in Film mode)
2. Inspect the values for the **FOCUS**, **ZOOM**, and **IRIS** displayed in the panel, as applicable to your setup. The values are updated as you move the controls:
 - **FOCUS** axis values must increase (or become more positive) as you focus near, and decrease as you focus toward infinity (∞).
 - **ZOOM** axis values must increase (or become more positive) when you zoom in (toward the telephoto end) and decrease when you zoom out (toward the wide angle end).
 - **IRIS** (aperture) axis values must increase (or become more positive) when you close down the aperture (to, say, $f/22$) and decrease when you open up the aperture (to, say, $f/2.8$).

If any of the axes increase in the wrong direction then this will cause problems with limits and stored positions and moves. You can fix the problem by following the remainder of this procedure.

3. Press **BACK** several times to return to the top of the menu tree, then choose **CHANGE MODE > ENGINEERING MODE**.
4. Enter the PIN (4217) to access the Engineering menu.

Caution

Engineering mode is for advanced users, as applying the wrong settings here can stop the system from working. Apply the settings carefully, and make a note of the changes so you can revert to the previous settings if the system stops working.

5. Choose menu option **GENERAL SETUP > AXES SETUP > SET DIRECTION**.
6. Invert the relevant **FOCUS, ZOOM, or IRIS** setting that you need to change. That is, change **FWD** to **REV** or vice versa for the rogue axis.
7. You now need to invert the input direction for the axis that you just changed, if you want to retain the same feel as before you inverted the axis numbering. To do this, press **BACK** several times to return to the top of the menu tree, then choose **GENERAL SETUP > INPUT SETUP > SET INPUT DIR**.
8. Invert the relevant control for the **FOCUS, ZOOM, or IRIS** axis that you changed. That is, change **FWD** to **REV** or vice versa for the relevant control.
9. Press **BACK** several times to return to the top of the menu.
10. Exit Engineering mode:
CHANGE MODE > BROADCAST MODE or FILM MODE.
11. Re-zero the axes (including the lens axes) using the manual or automatic homing method described in *Zeroing the axes* on page 10. Note that inverting the axis direction will also change its homing direction and position.

The zero points, limits, and Zoom-Related Speed (ZRS) facility will now work correctly for your lens system.

Zeroing a lens ring with a hard stop

For any lens ring that has a hard physical stop at the end of its range (for example zoom or iris) you have a choice of configuring the lens to be zeroed manually or homed automatically.

Setting up a lens axis for manual zeroing

1. Choose menu option **CHANGE MODE > ENGINEERING MODE**.
2. Enter the PIN (4217) to access the Engineering menu.

Caution

Engineering mode is for advanced users, as applying the wrong settings here can stop the system from working. Apply the settings carefully, and make a note of the changes so you can revert to the previous settings if the system stops working.

3. Set the menu option **HOME AXES > SET AXIS HOME TYPE** to **DIRECT**.

This disables the homing facility for this axis and you will need to move it into the home position manually with the controls whenever you zero or home all axes in the future (page 10).

Setting up a lens axis for automatic homing

1. Choose menu option **CHANGE MODE > ENGINEERING MODE**.
2. Enter the PIN (4217) to access the Engineering menu.

Caution

Engineering mode is for advanced users, as applying the wrong settings here can stop the system from working. Apply the settings carefully, and make a note of the changes so you can revert to the previous settings if the system stops working.

3. Set the menu option **HOME AXES > SET AXIS HOME TYPE** to **HARD-LIMIT**.
4. Adjust the **HOME AXES > SET HOMING POWER** value to a suitable setting (usually 30% to 70%). The power needs to be high enough to

move the lens ring but not so high that the motor jumps out of mesh when it reaches the hard limit of the lens ring.

With this setting, homing a lens axis (page 12) automatically moves the lens ring to find both ends of the hard physical limit, recording the encoder positions at each end. The homing facility then calculates the axis range, sets the lower end to zero, and uses the range information to set the soft limits of the axis.

When a lens axis is configured for automatic homing, you can still zero it manually if you want, by using the relevant **DIRECT ZERO** option (page 11).

Zeroing a lens ring with a slip clutch

Some lens rings (usually focus) have no hard limit. That is, when you reach one end of travel, such as focussing on infinity, you can continue turning the ring and this will have no further effect as the ring slips against the internal focussing mechanism.

For lens rings that have no physical hard limit to their range of movement, no amount of fine-tuning of the homing power will be able to find the point at which the ring starts to slip, so you must use manual zeroing instead. To set up a lens axis with a slip clutch for manual zeroing:

1. Choose menu option **CHANGE MODE > ENGINEERING MODE**.
2. Enter the PIN (4217) to access the Engineering menu.

Caution

Engineering mode is for advanced users, as applying the wrong settings here can stop the system from working. Apply the settings carefully, and make a note of the changes so you can revert to the previous settings if the system stops working.

3. Set the menu option **HOME AXES > SET AXIS HOME TYPE** to **DIRECT**.

This disables the homing facility for this axis and you will need to move it into the home position manually with the controls when you zero or home all axes in the future (page 10).

Using a FIZ pot

If you plug a FIZ pot (Focus-Iris-Zoom) into your controller, you identify it in the menus by the name of the connector that you attached it to, for example **ZOOM AUX**. You assign it to an axis by using the Engineering menu option **GENERAL SETUP > INPUTS SETUP > SET CONTROLLER**. You can assign more than one control to an axis, and adjust the control directions independently of each other (page 8).

If your FIZ pot moves the axis in the wrong direction then you need to first make sure the associated lens axis moves in the correct direction relative to its axis values (page 112), then adjust the direction setting of the FIZ pot control for that axis (page 8).

A FIZ pot differs from the controls on your Mini MSA, in that a FIZ pot has hard stops that limit its rotation range to about 355°. This has several consequences, described below.

You might reach the FIZ pot hard stop before you reach the soft limit of its assigned axis. If this happens you can do the following:

1. Press and hold the Disable button on the FIZ pot, which disables the FIZ pot output.
2. Rotate the FIZ pot back to centre (without affecting the axis).
3. Release the button and rotate the FIZ pot again in the original direction to continue moving the axis where you left off.



You can repeat this procedure as necessary until you get to the soft axis limit.

Calibrating the FIZ pot

To exploit the full ranges of both the FIZ pot and its assigned axis, you can map the FIZ pot range to the axis range. You do this as follows:

1. Choose menu option **CHANGE MODE > ENGINEERING MODE**.

2. Enter the PIN (4217) to access the Engineering menu.

Caution

Engineering mode is for advanced users, as applying the wrong settings here can stop the system from working. Apply the settings carefully, and make a note of the changes so you can revert to the previous settings if the system stops working.

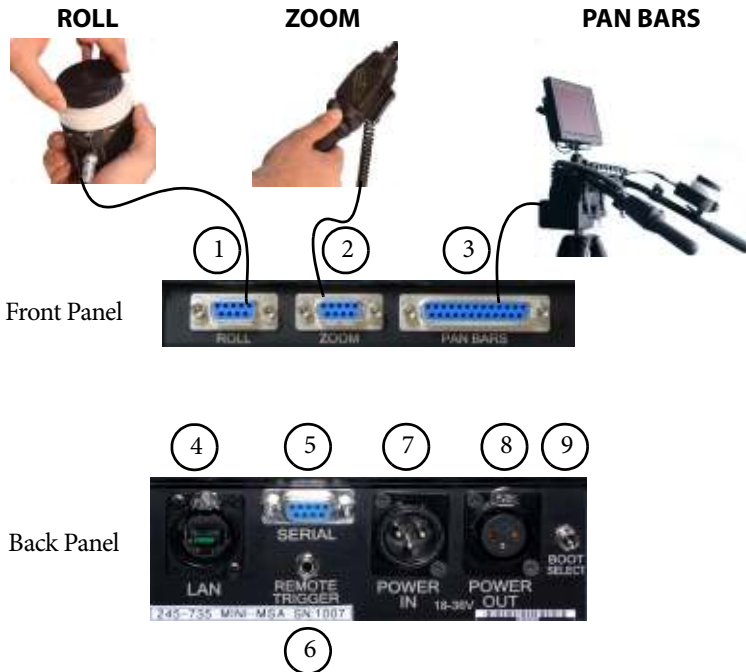
3. In the menu choose **GENERAL SETUP > INPUTS SETUP > SET POT RANGE**.
4. Scroll to the control that corresponds to your FIZ pot, for example **ZOOM AUX**, and press **SELECT**.
The **LOWER** value becomes editable.
5. Rotate the FIZ pot all the way counter-clockwise and press **SELECT**.
The **UPPER** value becomes editable.
6. Rotate the FIZ pot all the way clockwise and press **SELECT**.
The display shows the calculated FIZ pot range. For example **9834**.
7. Press **BACK** several times to return to the top menu level.

Hint

If the axis has a slip clutch that slips and misaligns the axis range with the FIZ pot range, you can re-align them by rotating the FIZ pot all the way clockwise then all the way counter-clockwise.

Appendix 3 Panels and accessories

Panel summary



1, 2, 3. **ROLL, ZOOM, PAN BARS** connectors. You can use these additional controllers in parallel with those on the Mini MSA. For pin-out information see:

Auxiliary connectors for Roll and Zoom on page 122

Pan Bars connector on page 123

4. **LAN** (Local Area Network) Ethernet connector, for connection to the head or larger multi-component system. Ethernet is the recommended connection method (as opposed to DataLink or Serial). This Ethernet port is rated at 100 Mbits/sec but can operate at lower speeds of 10 Mbits/sec or less.
5. **SERIAL** connector. Used for updating the firmware in the Mini MSA, and for connecting to an Ulti-Head or any other head that

uses an RS-232 serial connection (as opposed to Ethernet). For pin-out information see *Serial connector* on page 122.

6. **REMOTE TRIGGER** input for triggering the camera using an external device such as a foot switch or PocketWizard. For pin-out information see *Remote Trigger In connector* on page 124.
7. **POWER IN** connector. The LFP requires a 3-pin, 24 Volt DC power supply. For pin-out information see *Power In connector* on page 125.
8. **POWER OUT** connector. For pin-out information see *Power Out connector* on page 125.

Hint

It is recommended that you **do not** use the **POWER OUT** socket to power the head if you are using an Ethernet connection to the head. If you do so then powering up the Mini MSA will simultaneously power up the head, and in this instance powering up two Ethernet devices at the same time on the same network can cause communication problems between them.

9. **BOOT SELECT** switch. The mode in which to start up. One of:
 - **Up position = Normal (stand-alone) mode**, where the Mini MSA will be used as the main controller, communicating with the head through the **LAN** or **SERIAL** connector. This mode is also used when copying moves to and from a PC that is running MSA Ethernet Archiver software.
 - **Centre position = Flair mode**. The Mini MSA only operates as a slave mimic device and boots up from a PC running Flair Motion Control Software (over an Ethernet cable, **LAN** connector). A head can be added to the system by attaching it to an Ethernet hub or RT-12 or RT-14 interface box.
 - **Down position = Serial mode**. This is only used to update the firmware in the Mini MSA through the **SERIAL** connector.

Connector pin-out information

Camera trigger out

When you press the **CAMERA** button on the Mini MSA, play a move, or activate a camera trigger device that is plugged into the Mini MSA's **REMOTE TRIGGER** socket, the Mini MSA outputs a camera trigger signal (Trigger 1) from the appropriate connector on the attached head. For example:



- Pin 2 of the **TRIGGER** connector on an AFC head, Quad-box (on an SFH-30 or SFH-50 head), or Octo-box (on an SFH-50 head)
- Pin 14 of the **CAM ACC** connector on an Ulti-box (on an SFH-50 head or Ulti-head)

To control the type of trigger signal produced, see the [ENABLE](#) setting on page 20.

Camera trigger in

The Mini MSA has a **REMOTE TRIGGER** input connector for triggering the camera using an external device such as a foot switch or PocketWizard. For pin-out information see *Remote Trigger In connector* on page 124.

Auto-focus and bloop trigger out

The auto-focus and bloop trigger output signals from the controller share the same output connectors:

- Pin 13 of the **CAM ACC** connector on an Ulti-box (on an SFH-50 head or Ulti-head)
- Pin 3 (Trigger 2 Out) of the **TRIGGER** connector on an AFC head, Quad-box (on an SFH-30 or SFH-50 head), or Octo-box (on an SFH-50 head). Note that some **TRIGGER** connectors might be internally configured (with a jumper setting) so that Pin 3 is a Trigger In instead of a Trigger 2 Out. If you have such a system and you want to use a bloop light or auto-focus facility then you won't be able to use Pin 3; you will have to use Pin 2 instead, by splitting camera Trigger 1 Out signal (**TRIGGER** Pin 2) and using one of the splits to trigger the bloop or auto-focus when the camera starts.

In Broadcast mode (see page 16) or time-lapse Film mode (see [TIME-LAPSE](#) on page 21) it is assumed that you will want to use an auto-focus trigger and not a bloop light. The controller generates an auto-focus signal through the above connectors whenever it generates a camera trigger signal, and whenever you directly activate the auto-focus by using the **auto-focus trigger lever** on the Mini MSA or activate an auto-focus trigger device that is plugged into the Mini MSA's **REMOTE TRIGGER** socket.



In normal Film mode (see [MOMENTARY PULSE](#), or [CONTINUOUS](#) on page 20) it is assumed that you will want to use a bloop light. The auto-focus lever is not operational (nor is the auto-focus component of the **REMOTE TRIGGER** input connector), and you must trigger the camera's auto-focus by other means. The controller generates a bloop light trigger pulse through the above connectors at the start of move playback, regardless of whether you have already started the camera with the **CAMERA** button (panel showing [CAMERA RUNNING](#)).

The bloop trigger pulse is 40ms long, and the camera trigger pulse and bloop trigger pulse are sent at the same time; there is no delay. If the camera reaction is too slow and the recording misses the bloop then you can start the camera in advance manually with the **CAMERA** button and the bloop will trigger as usual when the move starts.

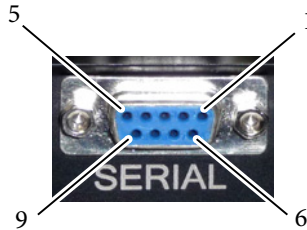
Camera sync in

For information on which pins you can use to input the camera sync signal into the controller, see page 22.

Serial connector

The Serial connector is an RS232 port used for updating the firmware in the Mini MSA, and for connecting the Mini MSA to an Ulti-Head or any other head that can an RS-232 serial connection (as opposed to Ethernet). The Baud rate is 76.8 kbps.

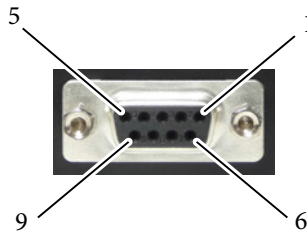
1. N/C
2. TX-A
3. RX-A
4. N/C
5. GND
6. N/C
7. N/C
8. N/C
9. N/C



Auxiliary connectors for Roll and Zoom

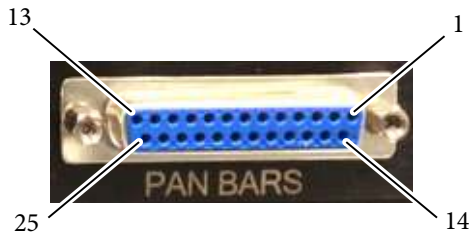
The pin assignments for these connectors are identical.

1. A+
2. B+
3. N/C
4. N/C
5. +5V
6. A-
7. B-
8. N/C
9. GND



Pan Bars connector

1. PB1A+
2. PB1B+
3. PB2A+
4. PB2B+
5. PB3A+
6. PB3B+
7. PB4A+
8. PB4B+
9. GPO6
10. GPO7
11. GPO8
12. GPO9
13. +12V
14. PB1A-
15. PB1B-
16. PB2A-
17. PB2B-
18. PB3A-
19. PB3B-
20. PB4A-
21. PB4B-
22. +5V
23. GND
24. GND
25. GND



Remote Trigger In connector

This is used for external camera triggering devices such as a foot switch or PocketWizard.

1. Trigger 1 (Tip)
2. Trigger 2 (Ring)
3. GND (Sleeve)



Note that these devices have no power themselves, so work by shorting the appropriate connections. That is:

Mini MSA
socket

Trigger device
jack

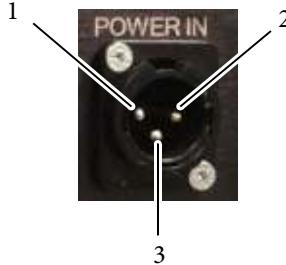
- Shorting pins 1 and 3 triggers the camera shutter. Pin 1 is not actually the Trigger 1 signal, but shorting pin 1 with pin 3 causes the Mini MSA to send a camera shutter Trigger 1 signal from the head to the camera.
- Similarly, shorting pins 2 and 3 triggers the auto-focus. Pin 2 is not actually the Trigger 2 signal, but shorting pin 2 with pin 3 causes the Mini MSA to send an autofocus Trigger 2 signal from the head to the camera.

See also *Camera trigger out* on page 120 and *Camera trigger in* on page 120.

Power In connector

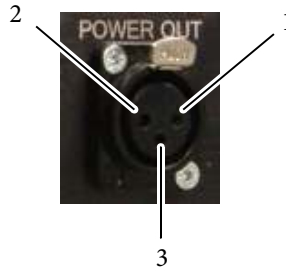
Power to supply the Mini MSA and the power output connector. The Mini MSA can run from 12-35 Volts DC.

1. GND
2. 24VIN
3. N/C



Power Out connector

1. GND
2. 24VOUT
3. N/C



Hint

It is recommended that you **do not** use the **POWER OUT** socket on the Mini MSA to power the head if you are using an Ethernet connection to the head. If you do so then powering up the Mini MSA will simultaneously power up the head, and in this instance powering up two Ethernet devices at the same time on the same network can cause communication problems between them.

Appendix 4 **Specifications**

Weight: 1.1 Kg

Power requirements: 24 Volts DC / 100-240 Volts AC

Temperature range: 0-45 °C (32-113 °F)

Humidity tolerance: 0% to 85% relative humidity, non-condensing

Dimensions: L × W × H = 186 × 194 × 111 mm

Index of menu options

- A->B WAYPOINT MOVE 23, 76, 92
- A2D VALUES 96
- ALL AXES 12, 75, 90
- AUTO ENABLE 71, 99
- AXES SETUP 82
- AXIS POSITIONS 71, 79, 96
- AXIS VELOCITIES 96
- BACK-PAN SETUP 44, 87
- BP 75, 87
- BP AXIS 75, 87
- BP SCALE 44, 75, 87
- BROADCAST MODE 16, 71, 79, 99
- CAM SYNC 22, 72, 82, 102
- CAMERA RUNNING 21
- CAMERA SETUP 20, 31, 72, 81
- CHANGE MODE 7, 16, 41, 71, 79, 99
- COMMAND POSITIONS 95
- Copy head settings 108
- Copy MSA settings 108
- DELETE 36, 78, 94
- DELETE ALL MOVES 78, 94
- DELETE MOVES 36, 78, 94
- DIAGNOSE AXES 79, 95
- DIRECT ZERO 75, 90
- DIRECT ZERO ALL 11, 70, 75, 90
- DOWN 76
- DOWN FAIRING 23, 76, 92
- ENABLE 20, 31, 72, 81
- ENCODER VALUES 99
- ENGINEERING MODE 41, 71, 79, 99, 105
- E-STOP DROPPED 20
- FILM MODE 71, 79, 99
- FIND HEAD 88, 107
- FPS 72, 81
- FRAME TIME 78, 94
- FRAMES 78, 94
- GENERAL SETUP 73, 82
- GENERATE A->B MOVE 76, 92
- HEAD COMMS 55, 97
- HEAD DIAGNOSTICS 99
- HOME ALL AXES 12, 70
- HOME AXES 75, 90
- INPUT 77, 93
- INPUT POSITIONS 95
- INPUT VALUES 71, 79, 95
- INPUTS AND BUTTONS 96
- INPUTS SETUP 85
- LAN SETUP 88, 106
- LIMIT INPUTS 11, 79, 99
- LOW LEVEL SETUP 50, 89
- LPF 72, 81
- MODE 88
- MODIFY 77, 94
- MOVE SECONDS 76, 92
- PAIR PRESETS&MOVES 35, 78, 94
- PAN AXIS 75, 87
- PING HEAD 88, 107
- PLAY OPTIONS 28, 76, 77, 92, 93
- PLAYBACK 26, 26, 28, 77, 93
- PLAYBACK ANY SPEED 29, 76, 77, 92, 93
- PLAYBACK SAME SPEED 24, 26, 26, 76, 77, 92, 93
- POS A 76, 92
- POS B 76, 92
- REC. SPEED 77, 93
- RECORD 24, 77, 77, 92, 92
- RECORD MOD 33, 77, 94
- REC-PLAY AXES 23, 24, 76, 92
- REPEATS 77, 93
- RESTORE DEFAULTS 98
- RUN GENERATED MOVE 24, 76, 92
- SELECT AXIS 75, 90
- SELECT MOD AXES 33, 77, 94
- SELECT PLAY MOVE 26, 28, 76, 77, 77, 92, 93, 94
- SELECT REC AXES 24, 77, 92
- SELECT TL PLAY MOVE 31, 78, 94

SERIAL SETUP 88
SET A->B FAIRINGS 23, 76, 92
SET AXIS HOME SPEED 75, 90
SET AXIS HOME TYPE 90
SET AXIS NAME 84
SET AXIS TYPE 42, 84
SET BACKLASH 84
SET BACK-PAN 44, 75
SET CONTROLLER 85
SET CURRENT LIMITS 50, 89
SET DAMPING 37, 85
SET DAMPING % 37, 71, 74, 85
SET DIR SWITCHES 86
SET DIRECTION 8, 9, 70, 73, 83
SET ENC RATIOS 83
SET ENCODER SAFETY 53, 89
SET FEATHERING 39, 73, 84
SET GOTO SPEED % 40, 71, 74,
84
SET HEAD AXES TYPE 52, 89
SET HEAD IP ADDRESS 88, 106
SET HOME AXIS TYPE 12, 54
SET HOMING POWER 75, 91
SET INPUT DEADZONE 43, 87
SET INPUT DIR 8, 86
SET INPUT EXP 38, 70, 74, 86
SET INPUT METHOD 43, 87
SET INPUT SCALE % 37, 71,
73, 85
SET INTERNAL AXES 42, 42, 85
SET MAX ACCEL 38, 84
SET MAX ACCEL % 38, 71, 73,
84
SET MAX ERROR 52, 89
SET MAX SPEED 37, 83
SET MOTOR CONTROL 51, 89
SET MOTOR TUNINGS 51, 89
SET MOVE DURATION 23, 76, 92
SET MSA IP ADDRESS 88, 106
SET PLAYBACK TRIGGE 76, 77,
93
SET POSITIONS 23, 76, 92
SET SCALE POTS 86
SET SCALE SWITCHES 86
SET SCALES 37, 73, 82
SET SOFT LIMITS 13, 70, 73,
82
SET TEMP LIMITS 50, 89
SET ZRS 39, 70, 74, 87, 101
SHOTBOX PLAYBACK 17
SHOTBOX RECORD 16
SPEED 88
SYNC TIMEOUT 22, 72, 82
TEST OUTPUTS 97
TEST SERIAL 97
TIME LAPSE 31
TIME-LAPSE 31, 78, 94
TL OPTIONS 78, 94
TL PLAYBACK 32, 78, 94
TYPE 32, 78, 94
UP FAIRING 23, 76, 92
ZEROING METHOD 11, 12, 91
ZRS MASTER 70, 74, 87
ZRS SCALE 39, 70, 74, 87

Index

See also: *Index of menu options*
on page 127.

A

acceleration 38
analog lens controls 46
archiver, MSA Ethernet 56
auto-focus 6, 21, 120
axes
 directions 112
 home type 54
 types 52
 zeroing 10
 zeroing on FIZ pots 116
 zeroing on Lens Control
 Motors 112
axis type 42

B

BACK button 6
backing up your settings 56
back-pan 44
bloop light 21, 120
BOOT SELECT switch 3, 119
broadcast mode 16
 menu options 70
.bt1 file 59
firmware .bt1 file 59

C

cable connections 3
CAM ACC connector 120
CAMERA button 6, 120
camera settings 20
camera sync 22
 order of events 30
Canon analog lens controls 46
Canon digital lens controls 48
CHANGE MODE 19
communication statistics (serial
 mode) 55

connectors
 cables 3
 panel 118
 pin-outs 120
controls 6
 directions 8
current limits 50

D

damping 37
dead zone 43
deleting moves 36
dimensions 126
direction of controls 8
directions of axes 112
duplicate stepper motor
 outputs 42

E

emergency stop (E-Stop) 6, 19
engineering mode 41
 menu options 80
error maximum 52
E-STOP 6, 19
Ethernet 103
Ethernet (**LAN**) connector 118
exponential input 38

F

feathering 39
FILM MODE 19
film mode 19, 19
 menu options 72
firmware updating 56
FIZ pots, zeroing 116
Flair
 network settings 109
frequency of motor drive 51
Fujinon digital lens controls 48

G

GENERATE A->B MOVE 23

go-to speed 39

GW address 104

H

Handwheels, mimic-only 42

hard limit, homing type 54

head communications statistics
(serial mode) 55

head, loading 4

homing the axes 10, 12
types 54

humidity tolerance 126

I

input exponential 38

input method 43

internal axes outputs 42

IP address 104

L

LAN connector 118

Lens Control Motors,
zeroing 112

limits, soft 13

loading the head 4

low level settings 50

M

magnet, homing 54

maximum error 52

menu summary 68

 broadcast mode 70

 engineering mode 80

 film mode 72

mimic input device, using the
Handwheels as

 mimic-only

 Handwheels 42

modifying

 moves 33

 preset camera

 positions 17

motor control 51

motor tunings 51

moves

 creating from end

 points 23

 deleting 36

 modifying 33

 playing, advanced 28

 playing, simple 26

 playing, time-lapse 31

 recording 24

 recording and using 19

MSA Ethernet Archiver 56

 downloading 58

 using 62

MSA Ethernet Firmware

 Updater 56

 downloading 58

 using 64

MSA Move Archiver and

 Re-Flash Utility 57, 88

N

network settings

 controller 103

 managing with Flair 109

 managing with the
 controller 105

 PC 60, 66

O

options, menu 68

P

PAN BARS connector 118

 pin-outs 42, 42, 85, 123

panel summary 118

PID system tunings 51

pin-outs 120

PLAY button 6, 17

playing moves

 advanced method 28

 simple method 26

 time-lapse 31

playing preset camera

 positions 17

polarity of motor drive 51

position error maximum 52

POWER IN connector 119

pin-outs 125

POWER OUT connector 119

Ethernet considerations 4

pin-outs 125

power requirements 126

powering down 6

powering up 4

preset camera positions 16

modifying 17

recording 16

using 17

preset moves 35

PRESETS buttons 6

presets buttons 16, 19, 35, 78,

78, 78, 94, 94, 94

Preston lens motors 45

Q

quick start 1

R

RECORD button 6, 16

recording moves 24

recording preset camera

positions 16

REMOTE TRIGGER

connector 119, 120, 124

ROLL connector 118

pin-outs 122

S

safety 1

scaling

axes 37

controls 37

screen menu 68

screen options 68

SELECT knob 6

SERIAL connector 118

pin-outs 122

serial statistics 55

session summary 15

settings backup 56

size 126

SN address 104

soft limits 13

specifications 126

speed 37

go-to 39

zoom related 39

SPEED knob 37

static camera positions,

recording and using 16

stepper motor outputs,

duplicate 42

switching off 6

switching on 4

sync, camera 22

order of events 30

T

temperature limits 50

temperature range 126

time-lapse playback 31

TRIGGER connector 120

trigger, auto-focus 120

trigger, bloop 120

trigger, camera 120, 120

troubleshooting 100

Ethernet network 103

serial mode 55

U

underslung head, zeroing

considerations 12

updating the firmware 56

V

vane, homing 54

W

weight 126

wireless communication 55

Z

zeroing axes 10

 by homing 12

 manually 11

 on FIZ pots 116

 on Lens Control

 Motors 112

ZOOM connector 118

 pin-outs 122

ZOOM control 6

zoom related speed (ZRS) 39

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