Quick Start Guide

Product code: MRMC-1485-20
MHC (Classic) v2.0 Quick Start Guide

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Chapter 1  Getting Started with MHC

MHC Overview

Multi-Head Controller, or MHC, is a software by Mark Roberts Motion Control used to control the MRMC camera heads via Ethernet. MHC is a robust software tool designed for day-in, day-out use in professional studio and external broadcast environment.

MHC software platform designed for complete user simplicity. It gives you a smooth, precise and real-time control over a multitude of MRMC robotic heads at the touch of a button from a single workstation. You can also connect additional controls via USB, such as a Joystick Controller, to the PC running MHC.

MHC has the following features:

- Homing of head axes and lens motors
- Set soft limits – To limit movement ranges of the axes
- Axes scaling
- Store presets - You can store up to 16 static head “preset” positions (including lens settings) and go to any preset position at the touch of a button.
- Add and assign heads to different users – You can add users and assign them to specific head(s) giving each user better control of the camera heads that they need to use. Each user can be assigned up to 12 heads.
- LiveView and manual controls – For real-time control over the camera view
- Allows two login types, Admin and User.
- Change camera source – Change the movement of the head to be guided by an external source.

The MHC application has two components: MHC server and MHC Client. MHC Server is a program that provides services to another program called MHC client on the network. The MHC Server acts as bridge between the MHC Client and the heads. You launch the MHC Server first and the MHC Client, which can run on the same or different PCs.
Note

MHC has been configured by MRMC for the type and number of heads, the lens motors used and the lens types as delivered. This includes network settings and names for each head, configuring homing for each robot axes and lens motors (if supplied), setting the axes soft limits and scaling for the heads supplied. These setting do not need to be changed. This Quick Start Guide details the changes to the settings that can be made by the Administrator and the User, if needed.

For more information on how to change network settings, refer to Changing system configuration and network settings on page 5. For more information on how to change robot settings, refer to Chapter 3 Robot Settings Page.

Powering up a head and the PC

1. Cable together and power up one head including camera and lens motors.

2. Power up the PC. Both the MHC Server and Client applications are started. The MHC Main page appears.
For a complete description of the controls on Main page, refer to Chapter 2 *Main page*.

Observe that the cabled head appears as a white or green icon to show that it is connected over the network.

3. Clicking/tapping the head icon **enables** the head and changes the icon to green showing it is selected for control from the Main page.

Observe that the un-cabled heads appear as red icons.

4. Cable together and power up the remaining heads. They will appear on MHC connected, as white icons.

**Home Zeroing – AFC**

After powering up, you need to Home the head and any lens axes, also called **Home Zeroing** the axes. The process of Home Zeroing involves moving each axis to a known position and referencing the software to this position. This position is usually set to zero and can include an offset adjustable by the User.

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 Home Zeroing the axes. The MHC software physically moves the axes to the home positions that are built into the hardware and then assigns these positions as the zero points for the axes.
The method of Home Zeroing depends on the hardware setup and is pre-configured by MRMC. It will usually be the automatic method. For more information on Homing, refer to Chapter 3 Robot Settings Page. It is not necessary for you change these settings.

Each axis must be homed individually.

1. Use the ⚙ > Robot > Axes tab to Home each axis. Select the axis you want to Home at the top of the page.
   - Ensure that the values in the Minimum and Maximum Position, and Homing Type are correct for the lens on the head for the axes you are homing. This is done automatically for Zoom with end stops (Homing type: Lens). The Focus is normally Homing type: Slip.
   - Check that the Status of the axis is ON in the grey box. If it is not, click the ENABLE button to turn it on.

2. Click/tap the HOME button to home the selected axis.

Homing when changing lenses

The values for the Minimum and Maximum Position must be entered for the lens fitted to the head. It is a good idea to label each lens with the Minimum and Maximum Position for Focus axis.

Important

During homing of the Focus axis, the lens ring is driven to each end of the travel. Ensure that the lens motors are sufficiently tight on their matte bars and remain in mesh with the lens gear.
Home Zeroing – Pod

Pan, Tilt and Roll axes in Pods are absolute encoders making Homing an automatic function. Therefore these axes do not need to be Homed by the User. However, the lens axes Zoom and Focus do need to be Homed. To home the axes, left-click and hold the Pod head icon and select HOME FOCUS or HOME ZOOM.

Changing system configuration and network settings

Launching MHC as Admin

To change any network setting, you need to be logged in to the MHC Client as the Administrator.

1. Log out of the User login.

2. Log in to the MHC client as Administrator using the following credentials:
   - Username: Admin
   - Password: Admin1234
Note
At any time, if you need to restart MHC, perform the following steps:
1. Close the MHC Client and the MHC Server windows.
2. Double-click or tap the MHC Server desktop icon to launch it.
3. Double-click or tap the MHC Client icon to launch it. The MHC Client can be launched on the same or a different computer present on the same network.
Network setup

When you log in as the Administrator, the NETWORK SETUP page launches and provides a general overview of all the heads linked to the system’s network. The two row colours represent the status of the heads:

- **Green**: The head is connected and ready to operate.
- **Grey**: The head with the IP address is not connected with the system’s network or is not powered up.

Adding heads

MHC allows you to add heads in two ways:

Note

You can click the **Settings** button to display the Settings menu. The tabs in the menu are:

- **Network** – Settings regarding connected/connecting heads
- **User** – Add/change user accounts

The Settings menu is different for Administrator and User login. For more information on Settings menu for the User login, go to *Settings menu* on page 14.
Adding heads by using FIND

You can click the FIND button to automatically find the connected head(s). This will appear in a new row. Select the head’s row that you want to connect to and click the appearing ADD button. This will connect the head to the system, and move it to the group of the connected heads (the green section).

Adding heads manually

Alternatively, if your head is not present at the time and will be connected later, you can add the head by manually typing its IP address. If you know the IP address of the head you want to add, you can use the NEW button, then enter the IP address, and click ADD NEW.

Then, enter the TYPE of head and a NAME for it. The row for the head stays grey until the head is actually present on the network.

Caution

Do not connect a head with the same IP address as another head on the network. This would cause an IP address conflict and both heads will not function.
Changing a head’s name

You can change the name of a connected or disconnected head. The name appears in the ROBOT NAME column. To change the head’s name:

1. Select the row for the head.
2. Click or tap in the box representing the name of the head.
3. Enter the name for the head.

Assigning heads to user(s)

A head can only be used by a user, if it is assigned to the user. Assign a head to the user by selecting the user from the drop-down list.

Removing a head

To remove a head, click the appearing remove ( ) button on the head’s row.

Editing network settings on the head

On the NETWORK SETUP page, only the disconnected (grey) head’s IP address is editable. Only when the head is connected, can the network settings be changed on it.

Select a robot that is connected (green) and click in the IP ADDRESS box.
Use the appearing dialog box to change the IP settings of the robot. Your system will also automatically update its local reference address, so you won’t lose the connection to the edited robot.

Enter the **IP Address**, **Subnet Mask**, and **Default Gateway**. These are settings of the robot, not just the references in MHC Client. By changing these, you will override the settings on the robot.

![EDIT ON ROBOT](image)

**Note**

You must be logged in as Administrator to change network settings on the head.

**Adding users**

By default, there is one User account added to the system. However, if you require you can add more Users. To do this:

1. Click/tap Settings ( ) > **User**.
2. Click/tap **ADD USER**.
3. Enter the username and password that you want to assign to the user.
4. Click/tap **Save**.
Once user(s) are added, the heads each of them can see can be assigned.

**Changing the Server IP address**

By default, if the MHC Server and Client are running on the same PC, the Server IP address is set to 127.0.0.1. However, if the MHC Server is running on a PC other than that of the MHC Client, specify the server IP address when you start the MHC Client.

**Logging in as a User**

Once robots are added, accounts are created and robots are assigned to users, log out of the Administrator login and log in as a User.

The default user credentials are:

- username: operator
- password: password
Notes
Chapter 2  Main page

Using the Main page

The following figure shows the controls available on the Main page.

1. Settings menu
2. Head selection
3. LiveView
4. Camera settings
5. Manual controls
6. Shutter release button
7. Presets
8. AutoFocus toggle button
9. Portrait switch
Settings menu

You can navigate the different sections or pages of MHC using the Settings menu. To display the Settings menu, click the Settings button.

Head selection

The icons on the page represent the heads that you can view and control using the MHC client. You can select them for operation, change their source and read their statuses and errors.
### Colours of states

<table>
<thead>
<tr>
<th>Colours of states</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Available Head" /></td>
<td>The head is available to use, but not selected.</td>
</tr>
<tr>
<td><img src="image2.png" alt="Selected Head" /></td>
<td>The head is selected.</td>
</tr>
<tr>
<td><img src="image3.png" alt="Problematic Head" /></td>
<td>There is a problem with the head, it cannot be used at the time.</td>
</tr>
<tr>
<td><img src="image4.png" alt="Problematic Head with Selection Option" /></td>
<td>There is a problem with the head, but you can still select and use it.</td>
</tr>
<tr>
<td><img src="image5.png" alt="Empty Slot" /></td>
<td>The slot is empty, no head assigned to the icon.</td>
</tr>
</tbody>
</table>

### Selecting a head

You can select an available head by clicking or tapping on it. If the head has an error, this action will present the error message.
**Error messages on heads**

If a head displays an error state, you can read the error message by simply clicking/tapping on the head icon. On the message box, there could be a repair button depending on the type of the error you are facing. Click/tap the repair (🔧) button to initiate an automated fix on the problematic head.

Some errors can be fixed (for example, tripped axis) and some cannot.

**Change the source of a head**

If you long-press or right-click the head icon, you will be able to change it’s source in the displayed menu.

<table>
<thead>
<tr>
<th>Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic</td>
<td>This is the basic mode for using presets to store the position of a head.</td>
</tr>
<tr>
<td>Tracking</td>
<td>The movement of the head is guided by an external tracking source, manual controls are limited when this source is selected.</td>
</tr>
<tr>
<td>Home Zoom and Home Focus</td>
<td>Applicable only for a Pod. Selecting these options will home the selected axis.</td>
</tr>
</tbody>
</table>

**LiveView**

Here you can see what the camera sees. It is either accomplished by using a small ‘eye-piece’ camera attached to the optical viewfinder of the DSLR, or using the camera’s video output stream directly. In the case of using an
'eye-piece' camera, you may see additional information (displayed by the DSLR) around the picture but inside the window. For more information on how to set up LiveView go to Appendix 2 LiveView Setup.

When you point on the LiveView window, play, pause, and stop buttons appear briefly and disappear when you point away. These buttons can be used to play, pause, or stop LiveView. Note that these will only change what you see in the LiveView window and not the actual camera output.

LiveView can be toggled to Full Screen view by using the ( ) button on top.
**Camera settings**

If using a Nikon D5 camera, MHC has a direct camera control interface. You can change the settings of the camera in two levels. The most common properties—Camera mode, Shutter speed, Aperture, ISO, Exposure meter—are placed under the LiveView window.

Camera mode markings: **A** - Aperture priority, **S** - Shutter priority, **P** - Program, **M** - Manual

**Changing the camera settings**

You can change camera settings by clicking/tapping on them and then using the set-wheel or the arrows on the side. If a value is faded grey instead of white, that means it cannot be changed. This happens if a particular camera mode is selected, which has that property automatically set by the camera. The exposure meter is just a reading from the camera, nothing to change on it. (It is not the same as exposure compensation.)

To access more camera controls you can open the rest of the camera settings by clicking/tapping on the cog in the right hand side of the bar. That will present a box with more camera controls.
Manual controls

There are two types of manual controls: 2-axes joystick and 1-axis joystick.

The joysticks provide velocity controls. The further you drag their handle from the centre, the faster the robot will move in that direction. As long as you hold it in a position other than the centre, it will keep moving (if it can).

Pan and tilt control

This is a two-function control to pan and tilt the head with a two-axes joystick. While the vertical movement of the control will tilt the head, the horizontal will change its pan angle.

Focus

You can manually focus the camera by using this joystick control.
**Zoom**

You can adjust the Zoom level of the camera/lens by using the one-axis joystick control.

**Shutter release button**

To capture a picture, you need to tap/click on the shutter release button. If you want to take multiple shots rapidly (burst), keep pressing the button.

**Presets**

Presets can be used when the mode of the head is set to BASIC. You can store the position of the head as a preset and later make it to go to a recorded position (this motion is called Goto). When storing a position, all the axes will be stored. A preset button is faded when no position is stored in them.
Storing a position as a preset

1. Use the controls to go to a head position of your choice. Ensure that the Zoom and Focus axes are in correct positions.

2. Get into store mode by clicking/tapping on the STORE button under the preset buttons. You will see a green border around the STORE button and white borders around the preset buttons, indicating that the preset buttons can be selected to store your current head position.

3. Click/tap on the preset button to store the current head position.

Activating a preset

To activate a preset you simply click/tap on the preset button. A green border will appear around the preset and the head will move to the preset position.

If a Goto is in progress, you can immediately stop the movement by clicking/tapping the red STOP button. The speed of the robot moving into preset positions can be adjusted in the Preferences tab. For more information, refer to Chapter 4 Goto Speed on page 42.

AutoFocus toggle button
You can turn on/off the AutoFocus feature of the camera lens with this toggle button.

**Portrait switch**

Use this switch if you want to take portrait pictures. It will flip the LiveView image and rotates the camera by -90°.
Chapter 3  **Robot Settings Page**

The Robot Settings page is a collection of engineering type displays related to the head. They are separated into pages for each head assigned to the user and indicated with selectable tabs near the top.

**Selecting different robots**

You’ll find the name and number of the currently selected robot in the header of the page in green. With the green arrow buttons on the side of the header, you can browse through all of your robots, while staying at the same robot settings sub-section. (For example, you want to change the same parameter on all of your connected robots.)
Axes tab

Use the Axes tab to store the settings for all the axes of the head. You can select the axis you want to set up at the top of the page.

After setting the options, when you click Apply the settings are saved in the RAM of the head and are volatile. However, when you click Save after applying the settings, they are saved in the flash memory of the head and are permanent until you modify and save them again.

Motion settings

Speed limits

Set the Maximum Velocity to limit the head’s maximum speed to a safer setting. Maximum Acceleration would set how quickly (or slowly) the head would attain a speed.

Soft limits (Min-Max Positions)

You might need to restrict the range of movement of the robot in some cases.
If there is limited space for the robot, you want to avoid collisions to the surrounding objects. Or you want to keep the view in a certain field for easier operation.

**Minimum** and **Maximum Positions** can be set, the unit is degrees. The recommended way to set these values, is to slowly approach the desired limit while carefully watching the robot. Once satisfied with the position, read the value over the joystick control and use that number as the soft limit for one end of the desired track. Note that while the head tries to store the modified settings, it disconnects for a few seconds and does not accept any command.

Also, for Homing to be accurate, these values should be set correctly.

**Change of Acceleration**

Use this setting to smoothen the head movements and make them less jerky. You can set it to a value between 0 and 1.

**Scaling and direction**

With Scaling, you can define the ratio between your manual controls and the real movement of the robot. This value is usually already set.

You can reverse the direction for the selected axis by inverting the value in the text field. To do that add or remove the minus sign (-) in the beginning of the number to invert the control of the axis.

**Backlash offset**

This setting compensates for backlash in the motor during Goto moves and manual control.

**Override and restore limits**

You can override the set limits by clicking/tapping the **OVERIDE LIMITS** button. Doing this will display a red border around the limits that will be overridden. Use this option to perform certain checks on the settings or whilst troubleshooting axes movements. After you have finished, ensure that you click **RESTORE LIMITS** to restore the limits for safer head movement.

**Maximum Deceleration**

This would set how quickly (or slowly) the head would slow down.
**Change of Deceleration**

Use this setting to smoothen the head movements when slowing down and make them less jerky. You can set it to a value between 0 and 1.

**Homing settings**

The process of Homing or Zeroing, both meaning the same, is used to let the computer know exactly where each axis is. The process usually involves moving each axis to a known point, either by the user or MHC, and referencing from that known point. The accuracy of this depends on how exactly that known point can be sensed by the user or computer. Once zeroed, an axis can be controlled to not hit its limits of travel, and can be used to provide accurate Target Tracking information. When the computer powers up, it assumes that all axes are at zero and before a move is shot it is a good idea to Zero all the axes.

**Basic principle**

When an axis is zeroed by the computer, it is moved in a certain direction set by the Homing Velocity value until it reaches a sensor, once the sensor is detected, the axis slows down and stops. If the sensor is not detected within a certain time (Homing Time), then the zeroing will stop and an error will be reported. Once the computer has stopped on a sensor, it moves the motor slowly away until the sensor can no longer be detected and this point is used as a reference point to zero the axis. The axis is then moved further away from the sensor by an amount set in the Homing Offset value to its standard Zero point and then the axis position is set to 0.0.

**Types of Homing**

Controllers usually offer two different ways to Home the axes: an automatic method and a manual method:

- In the **automatic** method, MHC moves the axes to the home positions that are built into the hardware and then assigns these positions as the zero points for the axes. This is for Pan, Tilt, and Roll axes on the head. The Focus and Zoom axes having end-stops are Homed differently by MHC but are done automatically.

  Click/tap the **HOME** button to home the selected axis.
In the **manual** method, while observing the position of the axis, use the controls to take the axes to an end point and then click/tap **DIRECT ZERO**. Conventionally **Focus** is zeroed at **infinity** and **Zoom** is zeroed at **wide angle**.

**Homing Style**

This setting depends on the type of the motor of the head. The default setting of this field is set for your head so you don’t need to alter Homing Style. However, if you need to set it again, contact MRMC to know the Homing Style.

**Homing Velocity**

The speed at which the axis will seek its reference point (The direction is set by the sign). This should be set low at first. It is in display scaled units just like the maximum velocity.

**Homing Time**

This setting determines the time allowed to look for the home position before timing out.

**Homing Offset**

Once a reference point has been properly located, the axis will move a given distance from this point back to its normal zero position, this is known as the **Homing Offset**. This is useful for making small adjustments to an existing zero.
Enabling and disabling the axis

You can disable an axis when you want to pass control of the axis such as Iris to a separate controller. Or you can enable the axis if it has tripped for some reason. The status of the axis is shown in the centre.

Stopping the head

Use the STOP button to stop the head movement.

Test the axis with manual control

You can test your axis settings with the joystick control at the bottom. The Current Position of the axis is shown above the joystick control.

Motor settings

Use the options in this area for settings related to the motor for the axis. Motor type depends on the type of motor that the head uses for that axis. Note that this value is fixed based on the type of head you are using and was selected in the Network Settings page in the Administrator login.

Save and apply settings to the head

To save and apply the settings to the robot, use the two buttons in the top right corner.
Lens tab

Settings in the Lens tab stores information relating to the individual lenses characteristics, such as its focal length and throw of the manual Focus ring so that the system knows which lens is attached. These settings are used when you are using an external tracking system or when you need to control the camera lens in the robot in a more advanced way. A tracking system requires Focus and Zoom axes to keep the moving target in focus and in frame without apparent change in target size. However, the relationship between Focus motor position and target distance, and Zoom motor position and focal length is not linear. Therefore, the Zoom and Focus axes need to be linearised or calibrated allowing the head to control the Focus axis in terms of target distance and the Zoom axis in terms of focal length.

For details on setting up a tracking system using MHC, refer to Chapter 3 Polycam® tab.

Linearise Zoom button

Linearise Zoom is a toggle button that allows you to enable Zoom linearisation during Goto moves, using the parameters shown in the table.
Importing lens settings

Use the IMPORT button to populate a previously saved lens profile on the Lens tab. Note that any value changed will be stored on the head immediately. Normally, as long as you are using the same lens on the head, you will not need to change this.

Exporting lens settings

You can save the current populated field characteristics in a lens configuration file on the local disk. In other words, clicking the EXPORT button will save the current values to the local disk.

To export a lens configuration file:

1. Change the required settings on the Lens tab.
2. Click EXPORT.
3. Select one of the existing lens configurations. Rename the configuration.

4. Click **EXPORT**.

---

**Note**

For the Lens calibration settings to work, you should have already set the soft limits in the AXES tab.

---

**Infinity offset**

Before calibrating the Focus axis, it is important that the axis is correctly zeroed. Sometimes, the Focus axis might not zero at infinity. In this case, set up the zeroing to where you want it to go and zero the lens, then move it to Infinity, and use the reading over the Focus axis control on the Main page to store this distance as the Infinity Offset.

**Lens Focal Length**

Specify the focal length of the lens. If the focal length of the lens is not fixed, then use a number in the meddle of the focal length range of the camera.

**Sensor Width and Height**

Specify the Sensor Width and Sensor Height for the sensor of the lens.
Use Pan to Calibrate FOV

When using pan and tilt along with Zoom, a small movement in the pan axis on narrow zoom can result in greater shift in FOV than the same movement in pan axis on wide zoom. Therefore, the Zoom axis might need to be scaled to avoid such shifts. Specify whether you want to use Pan to calibrate FOV.

Focus calibration

To calibrate the Focus axis, you need to specify a linearisation table in which each line contains a Target Distance and a matching Focus Position. The Target Distance is measured in metres, and the Focus Position is specified by using the Focus control. To create the linearisation table:

1. Ensure that the soft limits are set correctly on the AXES tab.
2. Ensure that the Focus ring on the camera is at the minimum position.
3. Click the ADD button to add the first line as the Target Distance of infinity and Focus Position of 0.0.
4. The next value must be in increasing Focus position and decreasing target distance:
   4.1 Use the Focus control to drive the Focus Position and type the Target Distance in the box.
   4.2 Click the ADD button.
5. The third or final position must be the maximum position that you set as the soft limit in the Axis tab. Use the marking of the lens to decide how many entries you add in the translation table. Normally, you would add about three entries for Focus linearisation.
Zoom linearisation

By entering in the MHC a few Zoom motor positions and their respective focal lengths, the software can work out for any desired focal length what the Zoom motor position should be. This means that you can plot a move on the Zoom axis in terms of focal length, and the zoom will be driven to change the focal length in a smooth manner. Normally the focal length (or field of view) change does not move steadily with a constant movement on the Zoom lens.

To linearise the Zoom axis, you need to specify a linearisation table in which each line contains a Focal Length and a matching Zoom Position. The Focal Length is measured in millimetres, and the Zoom Position is specified by using the Focus control. To create the linearisation table:
1. Ensure that the soft limits are set correctly for the Zoom axis on the AXES tab.

2. Ensure that the Zoom ring on the camera is at the minimum position (at widest zoom).

3. Specify the focal length for the widest zoom.

4. The next value must be in increasing Zoom position and respective focal length:
   
   4.1 Use the **Zoom** control to specify the Zoom **Position** and type the **Focal Length** in the box.

   4.2 Click the **ADD** button.

5. Use the marking of the lens to decide how many entries you add in the linearisation table. Normally, you would add about 3 to 7 entries for Zoom linearisation.

6. The last entry must correspond to the upper travel limit of the Zoom axis.

**Polycam system**

Polycam is a system containing multiple heads configured for fully automated subject tracking for broadcast or monitoring. A Polycam system uses external data feed from a source (for example, ChyronHego) and the cameras on the MRMC heads are set to trigger or record the target. The system can be integrated with Pod or AFC-100 heads.
**Polycam® tab**

- **System with which the network link is established**
- **IP address and port number of the system that the head is communicating with**
- **PID controller settings**
- **Dimensions of the field**
- **A and B points**

**Source**

The name of the system that is the source of data for the camera. In other words, if the head is receiving data from an external source.

**Master Head**

The head that you want to set as the master head. This is useful when you are player tracking and have the Autozoom on, the framing on the master head will be automatically used by all the other heads.

**Pitch length and Pitch width**

Length and width of the football pitch.
Height Offset

On a football field, height offset is how far off the ground the heads should target. If height offset is set to zero, the tracking system will target ground level. A value of 1m is usually used, as this is about waist height of a football player.

PID controller settings

A PID controller is a control loop feedback mechanism. This is used to fine tune the robot’s response to the incoming tracking data.

Each axis of the head has a value for:

- **P** (Proportional) accounts for present values
- **I** (Integral) accounts for past values
- **D** (Derivative) accounts for possible future values

The values entered are used by the PID controller to continuously calculate the required velocity of the axes to keep the target in frame. Changing these values will affect the smoothness and accuracy of tracking.

Head settings

IP settings of the source

Specify the IP address and port number of the incoming connection of the data from the external system. Click CONNECT.

Set A and B points

Use the SET A and SET B buttons to specify the range of physical travel of the head movement. Point A is the angular position in the middle of the goal post of Team A and Point B could be the angular position in the middle of the goal post of Team B. These positions along with the length of the football pitch and height offset will enable the camera to calculate the relative position of the subject on the field.
7. Click **SAVE**.

8. Use the **GOTO A** and **GOTO B** buttons to test the settings specified.

**Tools tab**

The TOOLS tab allows resetting of the head and exporting and importing MHC settings.
Tools tab for Pods

When the Robot Type is set to POd in MHC, the tools tab contains additional button, as below:

![Tools Tab Screenshot]

**EXPORT ROBOT SETTINGS**

Use this button to store all the settings in MHC to an XML file which you can import later. This can be used to copy settings to another robot or save the factory settings to be restored later.

1. Clicking the button will open a dialog box, enter the name of the XML file.

![Export XML File Screenshot]
2. Click **Save**.

**Reset Robot**

Clicking **Reset Robot** resets the axes (Hex) board in the head. Use this option when the camera has crashed/frozen or a power cycle is required.

**IMPORT ROBOT SETTINGS**

Use this button to import MHC settings from an XML file.

![Import Robot Settings File](image)

**Reset Camera (Pod only)**

Clicking **Reset Camera** resets the Nikon camera as-though you power-cycled it.

**Camera Direct Connection Toggle (Pod only)**

Resets the camera to be connected to the PC via USB.

**TenPin Init (Pod only)**

Clicking **TenPin Init** reinitialises the TenPin board.
Notes
Chapter 4 Preferences Page

This screen provides a general overview of the speed and soft limits set for various axes. The limits set in the Preferences page are saved in the local disk and not stored on the head (unlike those in the Robot Settings page), thus providing a faster way of setting limits.

Controlling axes’ speed

Use either the Master Manual Speed control or individual axis speed controls to specify how fast you want the axes to move.

Max. Limit and Min. Limit

The allowed range of travel of any axis can be set up so that it does not exceed certain limits of travel. There are 2 limits, one is the Minimum Limit and the other is the Maximum Limit. Obviously, the minimum limit is the lowest number to which the axis can go and the maximum limit is the greatest limit to which it can travel. These limits are checked at run time to see that the move does not exceed the allowed limits of travel.
You can also disable the limits by clicking the Clear button. To set a Min. Limit and Max. Limit for an axis:

1. Use the manual control on the Main page for the head to reach the desired Position that you want to set as Min. Limit.
2. Click the SET button for that limit.
3. Similarly, use the manual control for the head to reach the desired position that you want to set as Max. Limit, and click the SET button.

**Goto Speed**

The value in this field will be used for the head movement to go directly to the Goto points.

**Invert**

Use this button to invert the direction of the control for the axis.
## Appendix 1 Troubleshooting

### Typical symptoms, causes, and actions

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Cause and/or action</th>
</tr>
</thead>
<tbody>
<tr>
<td>The head did not appear connected in MHC</td>
<td>Check that all cables are connected, and all units have power. Check you have added the correct IP address of the head in MHC. If you have connected more than one heads, connected the MRMC system to another local network, or moved the head between networks, check that correct addresses have been entered in MHC.</td>
</tr>
<tr>
<td>The LEDs on the head did not light up.</td>
<td>Click/tap the spanner( ) icon appearing below the head icon to allow MHC to correct the error.</td>
</tr>
<tr>
<td>A ‘!’ appears with the head icon in the MHC Main screen.</td>
<td></td>
</tr>
<tr>
<td>Tracking is not accurate</td>
<td>Ensure that the PTA is installed perfectly levelled to the ground. Ensure that you have checked this with spirit level.</td>
</tr>
<tr>
<td>While tracking, the camera is pointing in the wrong direction.</td>
<td>The Pan axis must move to the left when position is moved positively. If it is incorrect, then scaling for the axis will need its sign changing. The Tilt axis must move up when position is moved positively. If this is incorrect, then scaling for the axis will need its sign changing.</td>
</tr>
<tr>
<td>The controls are not moving the head or the head doesn’t appear to be communicating.</td>
<td>Click the <strong>Reset Robot</strong> button in the Tools tab.</td>
</tr>
<tr>
<td>Symptoms</td>
<td>Cause and/or action</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Camera controls are not responding.</td>
<td>• Click the <strong>Reset Robot</strong> button in the Tools tab.</td>
</tr>
<tr>
<td></td>
<td>For Pods:</td>
</tr>
<tr>
<td></td>
<td>• Click the <strong>TenPin Init</strong> button in the Tools tab.</td>
</tr>
</tbody>
</table>
Appendix 2  LiveView Setup

MHC Video Feed on Pods

Pods have the video feed to MHC set up by default and do not require the user to do the same. The Pod has an IP camera built in at the back which has a small Web camera that looks into the viewfinder of the DSLR in the Pod. This IP camera is connected to a hub at the back of the Pod along with the DSLR and the Hex board. The IP camera thus takes the video feed from the DSLR via Ethernet and transmits it to MHC though the umbilical.

Setting up LiveView on AFC 100

Live SDI video stream on AFC 100s can be sent to MHC via a HDMI video encoder which converts SDI input into an IP stream that is web managed and can be viewed over LAN or public Internet. To set up live feed on MHC using an AFC 100:

1. Connect the HD video encoder to the network. Ensure that your PC on which you want to view that video feed from the head is on the same LAN as the head and the encoder.

2. Open the encoder’s web page in the Web browser and note the rtsp address.
3. Copy this URL in the VLC player to test if you are able to view the video feed from the camera on the head.

4. To view the video feed in MHC client, navigate to the MHC Client folder on the PC and open the config.ini file.

Note
The number with the VideoSourceOverrideUrl field corresponds to the head number of any user who logs on to this client and is not the server’s global index.

5. Copy the rtsp address from the encoder Web page to the VideoSourceOverrideUrl field.

```
[Video]
VideoSourceOverrideUrl1=rtsp://10.44.25.67:554/ext
VideoSourceOverrideUrl2=
VideoSourceOverrideUrl3=
VideoSourceOverrideUrl4=
```

If you are receiving an NDI feed instead, change the NDIEnabledCamera field to true and add the NDI URL from the desired source.

6. Save the file and close.

7. Log in to MHC Client as a user. You should be able to view the video feed in the Main page.
Appendix 3  **Controller Options**

Additional controllers can be integrated to the PC running MHC Clients for easier control of the heads. These are plug-and-play devices and do not require any additional software.

**MRMC USB Joystick Controller**

- Manual control speed
- Preset 2
- Preset 1
- Store Preset
- Preset 5
- Preset 4
- Play a move
- Trigger
- AutoFocus toggle
- (click) Shutter release
- (left/right) Pan
- (up/down) Tilt
- (rotation) Roll
- Pan direction
- Tilt direction
- Zoom direction
- Head select
- Preset 3
- Focus closer
- Preset 6
- Focus further
- Emergency Stop
- Zoom
**Xbox 360 Controller**

- AutoFocus on/off
- Not assigned
- Store Preset
- Trigger
- Next camera
- Preset 3
- Preset 2
- Emergency Stop
- Preset 1
- Click (Lock Roll)
- Pan/tilt
- Portrait mode on
- Portrait mode off
- Zoom (up/down)
- Roll (left/right)
- Focus towards minimum
- Focus towards infinity
- Previous camera
- Trigger (click)
- Not assigned
Broadcast Panel controls

1. E-stop
2. Screen for messages
3. Reserved for future use
4. Enable, disable or change direction of axes
5. Master Speed for all controls
6. Head selection
7. Focus
8. 16 **PRESETS** for recording and playing back static camera positions
9. Telephoto zoom
10. Wide angle zoom
11. Stop the move
12. Home the head
13. Store a preset
14. Camera head direction and position joystick
Joystick Panel

1. Speed
2. IRIS
3. E-stop
4. Screen for messages
5. Back
6. Head selection
7. Focus
8. Auto Focus
9. Telephoto zoom
10. Wide angle zoom
11. Presets
12. (left/right) Pan
   (up/down) Tilt
Appendix 4 Glossary

Disable
To disable an axis is to click the Disable button on the Robot Settings page screen to get the motor to disable and not respond to user control.

Enable
To enable an axis is to click the Enable button on the Robot Settings page screen to get the motor to turn on and hold its position under computer control. Only if the axis is enabled will it respond to any user controls in MHC. In some lens types, if this works, then the motor is said to be engaged.

Homing (See also Zeroing)
A process whereby the exact position of an axis relative to a fixed reference point is established. In this way the axis can know where its ends of travel are, and thereby avoid hitting them.

Homing Offset
A small distance by which the axis would move away to its normal zero position.

Zeroing
Process whereby an axis is moved to a specific point in its travel where its position is determined to be 0.
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