

MAC Quantum Wash™

USER GUIDE



User Documentation update information

Any important changes in the MAC Quantum Wash User Guide are listed below.

Revision A

First version released. Covers MAC Quantum Wash firmware version 1.1.0.

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Introduction



Warning! Before using the MAC Quantum Wash, read the latest version of the product's Safety and Installation Manual, paying particular attention to the Safety Precautions section.

This User Guide is a supplement to the Installation and Safety Manual that is supplied with the MAC Quantum Wash. Both these documents are available for download from the Martin™ website at www.martin.com. The User Guide contains information that is mainly of interest for lighting designers and operators, whereas the Safety and Installation Manual contains important information for all users, especially installers and technicians.

We recommend that you check the Martin™ website regularly for updated documentation, because we publish revised versions each time we can improve the quality of the information we provide and each time we release new firmware with changes or new features. Each time we revise this guide, we list any important changes on page 2 so that you can keep track of updates.

Effects

This section gives details of the effects that can be controlled via DMX. See the DMX protocol tables starting on page 17 for details of the channels used to control them.

Where fine control is available, the main control channel sets the first 8 bits (the most significant byte or MSB), and the fine channels set the second 8 bits (the least significant byte or LSB) of the 16-bit control byte. In other words, the fine channel works within the position set by the coarse channel.

Beam zones

The LED array in the MAC Quantum Wash can be controlled in four zones:

- Center spot
- Middle ring
- Outer ring
- Aura zone (backlight effect)

These zones can be controlled together in various combinations or independently.

Color control

The 'color wheel effect' channel offers a range of single-color presets which control the fixture's beam zones together, plus a range of split-color presets in which center, middle and outer rings display different colors to give multicolored beam and projection effects.

In 16-bit Extended mode, RGB color mixing is available for each of the four beam zones independently.

White LEDs are not controlled separately but are deployed automatically as required during RGB color mixing or color temperature-controlled white operation.

Beam twister

The MAC Quantum Wash uses a rotating lens array over the outer ring of LEDs to provide 'Beam Twister' effects. Combining use of the rotating lens array, the zoom system and the fixture's different beam zones gives highly complex and dynamic multicolored beam and projection effects.

In 16-bit Extended mode, the lens array can be set to an indexed angle or rotated with variable speed in either direction using the Beam Twister DMX channel. You can also select from a range of pre-programmed Beam Twister effects that combine lens rotation, zoom and multicolored beam zones.

Color temperature control

The MAC Quantum Wash provides white output with CTC (color temperature control) that is controllable from 2000 K to 10 000 K in precise 50 K increments.

Electronic shutter and strobe effects

Electronic shutter/strobe effects include instant blackout and snap open as well as a regular or random strobe with variable speed from approx. 2 Hz to 10 Hz.

Dimming

16-bit resolution overall dimming is available in both 16-bit Basic and 16-bit Extended Modes.

Zoom

The zoom system lets you vary the beam angle from **XXXX° to XXXX°** allowing wide or tight washlight and mid-air beam effects. The zoom gives complex effects when combined with the Beam Twister.

Pan and tilt

8-bit and 16-bit pan and tilt control are available in both 16-bit Basic and 16-bit Extended modes.

Control panel operations

You can configure individual fixture settings (such as the MAC Quantum Wash's DMX address), read out data, execute service operations and view error messages using the fixture's backlit graphic display and control panel.

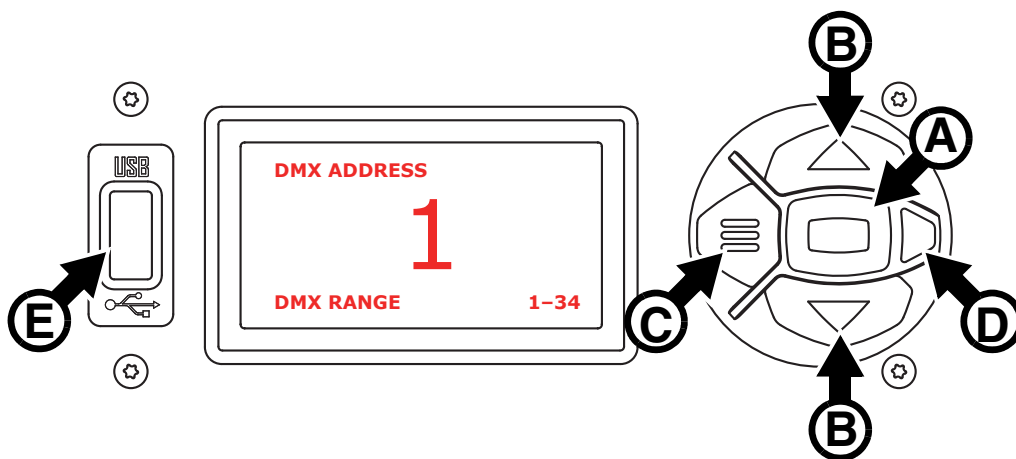


Figure 1: Display and control panel

When the MAC Quantum Wash is powered on, it first boots and resets, then it displays its DMX address (or its fixture ID number, if one has been set) and any status messages (see page 31) in the display **A**.

The display can be set to automatically rotate to match standing or hanging fixture orientation in the **PERSONALITY** → **DISPLAY** menu or the Shortcuts menu (see “Shortcuts” on page 8).

Using the control panel

- Press XXXXX Enter XXXXX **A** to access the menus.
- Use the Up and Down buttons **B** to scroll up and down menus.
- Press XXXXX Enter XXXXX **A** to enter a menu or make a selection.
- The currently selected item in a menu is indicated by a star ✱.
- Press the **Escape** button **C** to step backwards through the menus.

Status LED

An LED **D** next to the control buttons indicates fixture status depending on the color displayed and DMX status depending on whether the LED flashes or lights constantly:

- **GREEN**: All parameters normal.
- **AMBER**: Warning (service interval exceeded, for example).
If **ERROR MODE** is set to **Normal**, the warning message will be shown in the display. If **ERROR MODE** is set to **Silent**, the display must be activated by pressing XXXXX Enter XXXXX to display the warning message.
- **RED**: Error detected.
If **ERROR MODE** is set to **Normal**, the error message will be shown in the display. If **ERROR MODE** is set to **Silent**, the display must be activated by pressing XXXXX Enter XXXXX to display the error message.
- **FLASHING**: No DMX signal detected.
- **CONSTANT**: Valid DMX signal detected.

Battery power

The display and control panel are powered by the MAC Quantum Wash's onboard battery. This gives access to the most important functions in the control panel – including DMX addressing – when the fixture is not connected to AC power.

To activate the display when the fixture is not connected to power, press the Escape button. The display extinguishes after 10 seconds with no jog wheel activity and the control panel is de-activated after 1 minute with no jog wheel activity. Press the Escape button again to re-activate.

Shortcuts

If you hold the **Escape** button pressed in for 2 - 3 seconds, a shortcut menu with the most important commands appears. Select a command with the Up and Down buttons and press **Enter** to activate, or press Escape to cancel.

- **RESET ALL** resets the whole fixture
- **ROTATE DISPLAY** rotates the MAC Quantum Wash display 180°.

Settings stored permanently

The following settings are stored permanently in the fixture memory and are not affected by powering the MAC Quantum Wash off and on or by updating the fixture software:

- DMX address
- DMX Protocol setting
- Fixture ID
- All personality settings (pan/tilt and pan/tilt limit, linked zoom/focus, cooling, fan clean mode, dimming curve, DMX reset, parameter shortcuts, all display settings, error mode)
- Factory settings
- Resettable counters
- All Service settings (adjust, calibration, firmware)

These settings can be returned to factory defaults using the control menus or via DMX.

Service mode

Holding **XXXXXX** Enter **XXXXXX** and Escape button pressed in while powering the fixture on puts the fixture into service mode, in which pan and tilt are disabled and a **SERV** warning appears in the display. Service mode removes the risk of unexpected head movement during lamp adjustment. Cycling power and allowing the fixture to start normally takes it out of service mode.

DMX address

The DMX address, also known as the start channel, is the first channel used to receive instructions from the controller. For independent control, each fixture must be assigned its own control channels. If you give two MAC Quantum Washes the same address, they will behave identically. Address sharing can be useful for diagnostic purposes and symmetrical control, particularly when combined with the inverse pan and tilt options.

DMX addressing is limited, depending which DMX mode the fixture is in, to make it impossible to set the DMX address so high that you are left without enough control channels for the fixture.

DMX address setting

To set the fixture's DMX address:

1. Press **XXXXXX** Enter **XXXXXX** to enter the main menu.
2. Press **XXXXXX** Enter **XXXXXX** to enter the **DMX ADDRESS** menu, then scroll to the desired address and press **XXXXXX** Enter **XXXXXX** to save.
3. Press the Escape button to step back to the main menu.

DMX modes

The **CONTROL MODE** menu lets you set the MAC Quantum Wash to one of the two DMX operating modes, basic 16-bit and extended 16-bit:

- Basic 16-bit mode offers coarse control of all effects plus fine control of gobo indexing angle, pan and tilt.
- Extended 16-bit mode provides all the features of basic 16-bit mode plus fine control of the dimmer, zoom and focus.

The MAC Quantum Wash uses 32 DMX channels in basic 16-bit mode and 35 DMX channels in extended 16-bit mode. Five more channels in extended 16-bit mode are reserved ready for future control options.

To set the fixture's DMX mode:

1. Press XXXXX Enter XXXXX to enter the main menu.
2. Scroll down to **CONTROL MODE**, then press XXXXX Enter XXXXX. Scroll to select either **BASIC** or **EXTENDED**, then press XXXXX Enter XXXXX to save.
3. Press the Escape button to step back to the main menu.

Fixture ID

The MAC Quantum Wash lets you set a four-digit ID number to ease identification of the fixtures in an installation. When a fixture is powered on for the first time, it displays its DMX address by default. As soon as you set an ID number other than **0** in **FIXTURE ID**, the MAC Quantum Wash will display this ID number by default, and indicate **FIXTURE ID** in the display.

Personality

The MAC Quantum Wash provides several options that let you optimize the fixture for different applications in the **PERSONALITY** menu:

- The **PAN/TILT** menu lets you swap and/or invert pan and tilt.
- The **SPEED** menu lets you set **PAN/TILT** to **NORMAL**, **FAST** (optimized for speed) or **SLOW** (optimized for smooth movement – useful for slow movements in long-throw applications). Likewise, you can select an overall speed for all the effects by setting **EFFECT** speed to **NORMAL**, **FAST** or **SLOW**. You can also set effect speed to **FOLLOW P/T**, in which effects will always use whatever speed is set for pan and tilt.
- **DIMMER CURVE** provides four dimming options (see Figure 2):

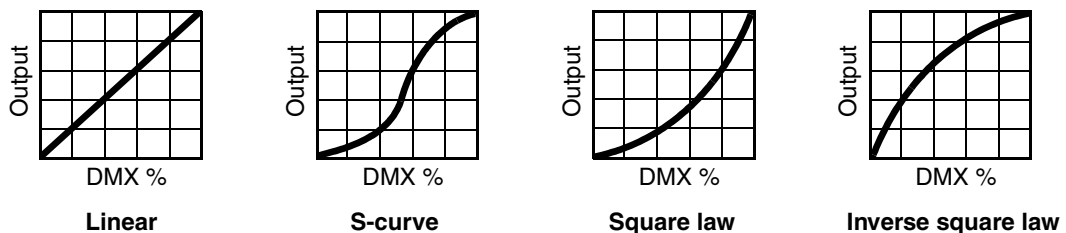


Figure 2: Dimming curve options

- **LINEAR** – (optically linear) the increase in light intensity appears to be linear as DMX value is increased.
- **S-CURVE** – light intensity control is finer at low levels and high levels and coarser at medium levels. This curve emulates the RMS voltage dimming characteristics of an incandescent lamp such as the tungsten halogen lamp of the Martin™ MAC TW1™.
- **SQUARE LAW** – light intensity control is finer at low levels and coarser at high levels.
- **INV SQUARE LAW** – light intensity control is coarser at low levels and finer at high levels.
- **DISPLAY** offers the following options for the LCD display:
 - **DISPLAY SLEEP** determines whether the display remains on permanently, or goes into sleep mode 2, 5 or 10 minutes after the last movement of XXXXX Enter XXXXX or Escape button.
 - **DISPLAY INTENSITY** lets you define the brightness of the display backlighting. Select **Auto** for automatic adjustment to match the ambient light level, or manually set the intensity to a level from 0% to 100%.
 - **DISPLAY ROTATION** lets you rotate the display manually through 180° so that it can be read easily no matter how the fixture is oriented. If set to **Auto**, the MAC Quantum Wash senses its orientation and rotates the display automatically.
 - **DISPLAY CONTRAST** lets you define the contrast of the backlit graphic display. Select **Auto** for automatic adjustment to match display intensity, or manually set the contrast to a level from 0% to 100%.
- **ERROR MODE** enables or disables error warnings. If set to **NORMAL**, the display is activated and lights up if the fixture needs to report an error. If set to **SILENT**, the fixture does not light the display with error

warnings but error messages can still be read when the display is activated manually. In both **NORMAL** and **SILENT** modes, the status LED lights amber to indicate a warning and red to indicate an error.

Factory defaults

FACTORY DEFAULT lets you reload the fixture's factory default settings. Effect calibration is not affected, so any effects that have been re-calibrated will not be returned to factory calibration settings.

Fixture information readouts

The following fixture information can be called up in the display:

- **POWER ON TIME** provides two counters:
 - The **TOTAL** counter is not user-resettable and displays total hours powered on since manufacture.
 - The **RESETTABLE** counter is user-resettable and displays the number of hours the fixture has been powered on since the counter was last reset.
- **SW VERSION** displays the currently installed firmware (fixture software) version.
- **SERIAL NUMBER** displays the fixture's manufacturer serial number.
- **RDM UID** displays the fixture's factory-set unique ID for identification in RDM systems.
- **FAN SPEEDS** provides separate status readouts from the fixture's cooling fans.
- **TEMPERATURES** provides separate PCB temperature readouts.

DMX signal monitoring

The MAC Quantum Wash provides data on the DMX signal it is receiving in the **DMX LIVE** menu. This information can be useful for troubleshooting control problems.

RATE displays the DMX refresh rate in packets per second. Values lower than 10 or higher than 44 may result in erratic performance, especially when using tracking control.

QUALITY displays the quality of the received DMX data as a percentage of packets received. Values much below 100 indicate interference, poor connections, or other problems with the serial data link that are the most common cause of control problems.

START CODE displays the DMX start code. Packets with a start code other than 0 may cause irregular performance.

The remaining options under **DMX LIVE** display the DMX values in a range from 0 - 255 that are being received on each channel. The DMX channels displayed depend on whether the fixture is in 16-bit or 16-bit extended mode.

Test sequences

TEST activates effects in sequence, allowing you to test all effects, pan and tilt movement only, or effects only (i.e. without pan and tilt movement) without a DMX controller:

- Select a test type and press XXXXX Enter XXXXX to start the test.
- Press the Escape button to stop the test.

Manual control

The **MANUAL CONTROL** menu lets you reset the MAC Quantum Wash and operate the fixture without a DMX controller. To execute commands in the **MANUAL CONTROL** menu, select a menu item for the effect that you want to control, then enter a value from 0 to 255 to apply a command. The menu items and values correspond to the commands listed in the DMX protocol on page 17.

Adjusting settings via DMX

Certain fixture settings and parameters can be adjusted from the DMX controller on the Fixture control/settings channel.

Commands sent on the fixture control channel override any settings entered in the fixture's onboard control menus.

To help you avoid accidentally applying a setting that may disrupt a light show, for example, most of the commands must be held for a certain time before they are applied. For example, the command that turns off the display illumination must be held for one second to activate it. The command that resets the fixture must be held for five seconds to activate it. The times required to apply DMX commands on the Fixture control/settings channel are listed for each command on page 19 in the DMX protocol.

Resetting

Either the entire fixture or individual effects can be reset to their initial positions. Resetting individual effects can allow on-the-fly recovery if an effect loses its correct position, for example, without having to reset the entire fixture.

Illuminating the display

The fixture's display panel can be brought out of sleep mode with a DMX command. This makes it possible to read the fixture's DMX address while the fixture is installed in the rig.

After being illuminated in this way, the display will return to sleep mode according to the setting entered in the onboard control menus.

Control menu setting overrides

The following fixture settings can be adjusted via DMX, overriding the settings entered in the onboard control menus. See under "Control panel menus" on page 27 for details of these settings.

- Dimming curve
- Pan and tilt speed
- Effect shortcuts
- Zoom/focus linking
- Beam smoothing
- Auto blackout
- Calibration offsets

Changing calibration offsets using DMX

The Fixture control/settings DMX channel allows effects to be calibrated by changing their factory default offsets from the DMX controller.

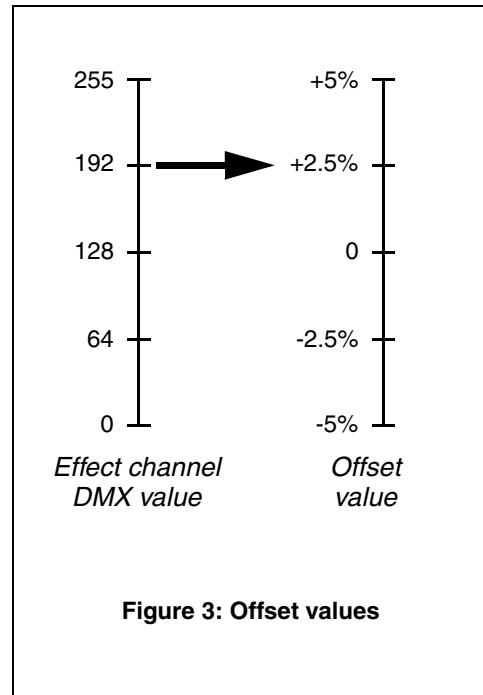
To set an effect offset:

1. Set the effect to a DMX value from 0 to 255 on its own DMX channel (for example, set XXXXXXXX to 192 on channel 4).
2. Send a 'Store' command for the effect on the Fixture control/settings channel.

The MAC Quantum Wash now reads the value on the effect channel (192 for XXXXXXXX in the example above), translates it to an offset value of between -5% and +5% as shown in Figure 3 (+2.5% XXXXXXXX offset in the example above) and stores that offset in memory.

See the Fixture control/settings channel on page 19 in the DMX protocol for details of the effect offsets that can be set using this method.

Effect offsets stored in memory are not affected by powering the fixture off and on or by updating the fixture software. To return all offsets to their factory defaults, send the required DMX value for 5 seconds on the Fixture control/settings channel or apply **LOAD FACTORY SETTINGS** in the **FACTORY SETTINGS** menu in the fixture's control panel.



RDM

The MAC Quantum Wash can communicate using RDM (Remote Device Management) in accordance with ESTA's *American National Standard E1.20-2006: Entertainment Technology RDM Remote Device Management Over DMX512 Networks*.

RDM is a bi-directional communications protocol for use in DMX512 control systems, it is the open standard for DMX512 device configuration and status monitoring.

The RDM protocol allows data packets to be inserted into a DMX512 data stream without affecting existing non-RDM equipment. It allows a console or dedicated RDM controller to send commands to and receive messages from specific fixtures.

RDM ID

Each MAC Quantum Wash has a factory-set RDM UID (unique identification number) that makes it addressable and identifiable in RDM systems. The number can be found in the control panel **INFORMATION** menu under **RDM UID**.

RDM communication

The MAC Quantum Wash supports a range of RDM PIDs (Parameter IDs). Sending **SUPPORTED_PARAMETERS** and **PARAMETER_DESCRIPTION** commands from an RDM controller will call up a list of the PIDs supported in the firmware version installed in the fixture.

Software service functions

Service utilities

The control panel **SERVICE** menu provides utilities for technicians rigging or servicing the fixture:

- **ERROR LIST** displays any error messages that are stored in internal memory.
- **PT FEEDBACK** lets you disable feedback to the fixture software from the pan, tilt and effects positioning systems. If feedback is set to **ON** and a pan, tilt or effect position error is detected, the shutter closes and the effect resets. This feature can be disabled by setting feedback to **OFF**. The **OFF** setting is not saved when the fixture is powered off, and the system will be re-enabled the next time the fixture starts. If a pan/tilt position error occurs and the system cannot correct pan/tilt position within 10 seconds, feedback is automatically disabled.
- **ADJUST** is for use at the factory and by authorized Martin Service technicians only and is intended for use after replacement of components, etc. If you want to adjust the default positions of the MAC Quantum Wash effects, use the **CALIBRATION** menu.

Important! *Do not enter the **ADJUST** menu without service documentation from Martin™.*

- **CALIBRATION** lets you set new default positions for calibration purposes, set effects to their factory default positions or overwrite the factory default positions with new values. See "Calibration" below.
- **USB** lets you update the firmware (fixture software) using a USB memory device. For a detailed guide to updating the firmware, see "Installing using a USB memory device" later in this chapter.

Calibration

The **CALIBRATION** menu lets you define offsets in software that are relative to the mechanical reset or home positions. This allows you to fine-tune optical alignment and achieve uniform performance between fixtures. Fixtures are adjusted and calibrated at the factory, and further calibration will normally only be necessary if fixtures have been subjected to abnormal shocks during transport or if normal wear and tear has affected alignment after an extended period of use.

Calibrating pan and tilt sensors

Warning! *Be ready for the head to move during pan and tilt calibration.*

To calibrate pan and tilt:

1. Place the fixture on a stable surface.
2. In the **CALIBRATION** menu, select **PT AT END STOP**.
3. Move pan to its end stop position by rotating the yoke *clockwise* (as seen from above the head looking towards the base) to maximum pan.
4. Move tilt to its end stop by tilting the head to its maximum angle with the front glass pointing towards the base and away from the display/control panel.
5. Be ready for the head to move. Press XXXXX Enter XXXXX to register the positions. The fixture will display **Saving...** and the head will move.
6. Press the Escape button to exit pan/tilt sensor calibration. Be ready for the head to move again.

Calibrating effects

Calibration can be carried out via DMX (see "Changing calibration offsets using DMX" on page 12) but the most thorough approach is probably to set multiple fixtures to the same position (e.g. dimmer open 1%) and then calibrate each fixture using its onboard control panel while comparing its light output with a reference fixture. The calibration range available for each effect varies but is approximately 5%. After selecting a calibration value, press XXXXX Enter XXXXX to set the effect to that value.

Loading and storing default calibration offsets

In the **CALIBRATION** menu, **LOAD DEFAULTS** lets you load the factory default calibration offsets stored in memory.

SAVE DEFAULTS lets you overwrite the factory default calibration offsets stored in memory with any new offsets that you have defined. Overwriting is permanent, so once you have saved new default offsets, **LOAD DEFAULTS** will reload the new offsets.

Firmware installation

The currently installed firmware (fixture software) version can be viewed in the control panel **INFORMATION** menu. Firmware updates are available from the Martin™ website and can be installed using a USB memory stick or a Windows PC running the Martin Uploader application and either a Martin Universal USB Duo™ USB-DMX interface device or a Martin DABS1™ USB-DMX interface device.

Calibration data is stored in the relevant modules wherever possible so that a module will stay calibrated if is removed from the fixture or installed in another fixture.

Do not switch the fixture off during a firmware update, or firmware will be corrupted.

Installing using a USB memory device

The following are required in order to install firmware using a USB memory device:

- The MAC Quantum Wash '.BANK' firmware update file, available for download from the Martin website at <http://www.martin.com>.
- A USB memory stick with the update file copied from a PC into the USB stick's root directory.

To install the MAC Quantum Wash firmware:

1. Download the '.BANK' firmware file from the MAC Quantum Wash Product Support page at www.martin.com, read the firmware release notes carefully to check for any instructions or warnings, and copy the firmware file to the root directory of a USB stick.
2. Disconnect the data link from the MAC Quantum Wash.
3. Insert the USB stick in the MAC Quantum Wash's USB host socket. The fixture should recognize the USB stick, illuminate the display and show **UPDATING FILES** in the display while it checks and if necessary updates its internal memory with new firmware versions stored on the USB stick. If the fixture does not recognize the USB stick, scroll to the **USB** menu under **SERVICE** in the control panel.

Important! *Do not remove a USB memory device while the fixture is updating files.*

4. When the fixture has updated its internal memory, **AVAILABLE FIRMWARE** will appear in the display. You can now scroll through the firmware versions available in memory.
5. To install a firmware version, select it by scrolling and then pressing XXXXX Enter XXXXX. The MAC Quantum Wash asks you to confirm installation of the new firmware. If you do not want to install that version, press the Escape button.
6. Allow the fixture to install the firmware and reboot.
7. Remove the USB stick. The newly-installed firmware version will now be displayed in the **INFORMATION** menu.
8. Reconnect the data link.
9. If you have installed a new firmware version, check the Martin™ website to see whether an updated User Guide is available for this firmware.

Fixture information and settings, including zoom-focus linking, are not affected when new software is uploaded.

Installing using a PC and hardware interface

The following are required in order to install firmware using a PC:

- The MAC Quantum Wash firmware '.MU3' update file, available for download from the Product Support area of the Martin website at <http://www.martin.com>.
- A Windows PC running the latest version of the Martin Uploader™ application (also available for download free of charge from www.martin.com) and loaded with the firmware update file.
- A USB-DMX hardware interface device such as the Martin USB Duo™ or Martin DABS1™.

To install the MAC Quantum Wash firmware:

1. Download the firmware '.MU3' file from the MAC Quantum Wash support page on the Martin website to the PC.
2. Read the firmware release notes carefully to check for any instructions or warnings.
3. Follow the instructions for an auto upload/upload via DMX in the Martin Uploader application help files and supplied with the hardware interface.

DMX protocol

Basic 16-bit mode

Channel	DMX Value	Percent	Function	Fade type	Default value
1	0 - 19	0 - 7	Strobe/shutter effect	Snap	30
	20 - 49	8 - 19	Shutter closed		
	50 - 200	20 - 78	Shutter open		
	201 - 210	79 - 82	Strobe, slow → fast		
	211 - 255	82 - 100	Shutter open		
2	0 - 65535	0 - 100	Dimmer fade (MSB)	Fade	0
			Closed → open		
3			Dimmer fade, fine (LSB)	Fade	0
4	0 - 255	0 - 100	Red 0 → 100%	Fade	0
5	0 - 255	0 - 100	Green 0 → 100%	Fade	0
6	0 - 255	0 - 100	Blue 0 → 100%	Fade	0
7	0 - 10	0 - 4	CTC	Fade	101
	11 - 171	4 - 67	Disabled		
	171 - 255	67 - 100	Color temp. from 2000 K to 10 000 K in 50 K steps (see Table 3 on page 26) 10 000 K		
8	0 - 10	0 - 4	'Color wheel' color selection effect	Snap	0
	11 - 12	4 - 5	Open. RGB color mixing enabled		
	13 - 14	5	Color 1 - LEE 790 - Moroccan pink		
	15 - 16	6	Color 2 - LEE 157 - Pink		
	17 - 18	7	Color 3 - LEE 332 - Special rose pink		
	19 - 20	7 - 8	Color 4 - LEE 328 - Follies pink		
	21 - 22	8 - 9	Color 5 - LEE 345 - Fuchsia pink		
	23 - 24	9	Color 6 - LEE 194 - Surprise pink		
	25 - 26	10	Color 7 - LEE 181 - Congo Blue		
	27 - 28	11	Color 8 - LEE 071 - Tokyo Blue		
	29 - 30	11 - 12	Color 9 - LEE 120 - Deep Blue		
	31 - 32	12 - 13	Color 10 - LEE 079 - Just Blue		
	33 - 34	13	Color 11 - LEE 132 - Medium Blue		
	35 - 36	14	Color 12 - LEE 200 - Double CT Blue		
	37 - 38	14 - 15	Color 13 - LEE 161 - Slate Blue		
	39 - 40	15 - 16	Color 14 - LEE 201 - Full CT Blue		
	41 - 42	16	Color 15 - LEE 202 - Half CT Blue		
	43 - 44	17	Color 16 - LEE 117 - Steel Blue		
	45 - 46	18	Color 17 - LEE 353 - Lighter Blue		
	47 - 48	18 - 19	Color 18 - LEE 118 - Light Blue		
	49 - 50	19 - 20	Color 19 - LEE 116 - Medium Blue Green		
	51 - 52	20	Color 20 - LEE 124 - Dark Green		
	53 - 54	21	Color 21 - LEE 139 - Primary Green		
	55 - 56	21 - 22	Color 22 - LEE 089 - Moss Green		
	57 - 58	22 - 23	Color 23 - LEE 122 - Fern Green		
	59 - 60	23	Color 24 - LEE 738 - JAS Green		
	61 - 62	24	Color 25 - LEE 088 - Lime Green		
	63 - 64	25	Color 26 - LEE 100 - Spring Yellow		
	65 - 66	25 - 26	Color 27 - LEE 104 - Deep Amber		
	67 - 68	26 - 27	Color 28 - LEE 179 - Chrome Orange		
	69 - 70	27	Color 29 - LEE 105 - Orange		
	71 - 72	28	Color 30 - LEE 021 - Gold Amber		
	73 - 74	29	Color 31 - LEE 778 - Millennium Gold		
	75 - 76	29 - 30	Color 32 - LEE 135 - Deep Golden Amber		
	77 - 78	30	Color 33 - LEE 164 - Flame Red		
	79 - 80	31	Color 34 - Magenta		
	81 - 82	32	Color 35 - Medium Lavender		
			Color 36 - Pure White		

Table 1: DMX Protocol - Basic 16-bit mode

Channel	DMX Value	Percent	Function	Fade type	Default value
8 (cont.)	83 - 103	32 - 40	'Color wheel rotation' effect Clockwise, fast → slow Stop (this will stop wherever the color is at the time) Counter-clockwise, slow → fast		
	104 - 106	41			
	107 - 127	42 - 50			
			Split color		
	128 - 129	50	Color preset 1		
	130 - 131	51	Color preset 2		
	132 - 133	52	Color preset 3		
	134 - 135	52 - 53	Color preset 4		
	136 - 137	53 - 54	Color preset 5		
	138 - 139	54	Color preset 6		
	140 - 141	55	Color preset 7		
	142 - 143	55 - 56	Color preset 8		
	144 - 145	56 - 57	Color preset 9		
	146 - 147	57	Color preset 10		
	148 - 149	58	Color preset 11		
	150 - 151	59	Color preset 12		
	152 - 153	59 - 60	Color preset 13		
	154 - 155	60 - 61	Color preset 14		
	156 - 157	61	Color preset 15		
	158 - 159	62	Color preset 16		
	160 - 161	63	Color preset 17		
	162 - 163	63 - 64	Color preset 18		
	164 - 165	64	Color preset 19		
	166 - 167	65	Color preset 20		
	168 - 169	66	Color preset 21		
	170 - 171	66 - 67	Color preset 22		
	172 - 173	67 - 68	Color preset 23		
	174 - 175	68	Color preset 24		
	176 - 177	69	Color preset 25		
	178 - 179	70	Color preset 26		
	180 - 181	70 - 71	Color preset 27		
	182 - 183	71	Color preset 28		
	184 - 185	72	Color preset 29		
	186 - 187	73	Color preset 30		
	188 - 189	73 - 74	Color preset 31		
	190 - 191	74 - 75	Color preset 32		
	192 - 193	75	Color preset 33		
	194 - 195	76	Color preset 34		
	196 - 197	77	Color preset 35		
	198 - 199	77 - 78	Color preset 36		
			'Color wheel rotation' effect		
	200 - 220	78 - 86	Clockwise, fast → slow		
	221 - 224	86 - 88	Stop (this will stop wherever the color is at the time)		
	225 - 245	88 - 96	Counter-clockwise, slow → fast		
	246 - 255	96 - 100	Open		
9	0 - 200 201 - 255	0 - 78 79 - 100	Zoom Flood → spot Overdrive min. → max.	Fade	200
10	0 - 65535	0 - 100	Pan, 16-bit (MSB and LSB)	Fade	32768
11			Left → right (32768 = neutral)		
12			Tilt, 16-bit (MSB and LSB)		
13	0 - 65535	0 - 100	Up → down (32768 = neutral)	Fade	32768

Table 1: DMX Protocol - Basic 16-bit mode

Channel	DMX Value	Percent	Function	Fade type	Default value
14			Fixture control/settings <i>(hold for number of seconds indicated to activate)</i>		
	0 - 9	0 - 4	<i>No function (disables calibration) – 5 sec.</i>		
	10 - 14	4 - 5	Reset entire fixture – 5 sec.		
	15	6	Reset shutter/dimmer only – 5 sec.		
	16	6	Reset color only – 5 sec.		
	17	7	Reset beam only – 5 sec.		
	18	7	Reset pan and tilt only – 5 sec.		
	19 - 22	7 - 9	<i>No function</i>		
	23	9	Linear dimming curve – 1 sec. (menu override, setting unaffected by power off/on)		
	24	9	Square law dimming curve – 1 sec. (menu override, factory default setting, setting unaffected by power off/on)		
	25	10	Inverse square law dimming curve – 1 sec. (menu override, setting unaffected by power off/on)		
	26	10	S-curve dimming curve – 1 sec. (menu override, setting unaffected by power off/on)		
	27	11	<i>No function</i>		
	28	11	Fast pan and tilt speed – 1 sec. (default setting, menu override - setting returns to MENU setting after power on/off)		
	29	11	Smooth pan and tilt speed – 1 sec. (menu override - setting returns to MENU setting after power on/off)		
	30	12	Parameter shortcuts = ON (default)		
	31	12	Parameter shortcuts = OFF		
	32 - 35	13 - 14	<i>No function</i>		
	36	14	Enable video tracking		
	37	14	Disable video tracking		
	38	15	Extended color (default)	Snap	0
	39	15	Calibrated color		
	40 - 49	16 - 19	<i>No function</i>		
	50	20	Regulated fan speed, fixed intensity (default)		
	51	20	Fixed fan speed, regulated intensity		
	52	20	Turn on control panel display – 1 sec.		
	53	21	Turn off control panel display – 1 sec.		
	54 - 99	21 - 39	<i>No function</i>		
	100	39	Enable calibration – 5 sec.		
	101	39	Store pan and tilt calibration – 5 sec.		
	102	40	Store dimmer calibration – 5 sec.		
	103 - 110	40 - 43	<i>No function</i>		
	111	43	Store Beam Twister calibration – 5 sec.		
	112 - 113	44	<i>No function</i>		
	114	45	Store zoom calibration – 5 sec.		
	115	45	Store pan calibration – 5 sec.		
	116	45	Store tilt calibration – 5 sec.		
	117	46	Store red Beam calibration – 5 sec.		
	118	46	Store green Beam calibration – 5 sec.		
	119	46	Store blue Beam calibration – 5 sec.		
	120	47	<i>No function</i>		
	121	47	Store all Beam RGB calibration – 5 sec.		
	122	48	Store red Aura calibration – 5 sec.		
	123	48	Store green Aura calibration – 5 sec.		
	124	48	Store blue Aura calibration – 5 sec.		
	125	49	Store all Aura RGB calibration – 5 sec.		
	126 - 198	49 - 77	<i>No function</i>		
	199	78	Reset all calibration values to factory defaults – 5 sec.		
	200 - 255	78 - 100	<i>No function</i>		

Table 1: DMX Protocol - Basic 16-bit mode

MSB = Most significant byte

LSB = Least significant byte

16-bit Extended mode

Channel	DMX Value	Percent	Function	Fade type	Default value
1	0 - 19	0 - 7	Strobe/shutter effect	Snap	30
	20 - 49	8 - 19	Shutter closed		
	50 - 200	20 - 78	Shutter open		
	201 - 210	79 - 82	Strobe, slow → fast		
	211 - 255	82 - 100	Shutter open		
2	0 - 65535	0 - 100	Dimmer fade (MSB)	Fade	0
			Closed → open		
3			Dimmer fade, fine (LSB)	Fade	0
4	0 - 10	0 - 4	CTC	Fade	101
	11 - 171	4 - 67	Disabled		
	171 - 255	67 - 100	Color temp. from 2000 K to 10 000 K in 50 K steps (see Table 3 on page 26) 10 000 K		
5	0 - 10	0 - 4	'Color wheel' color selection effect	Snap	0
	11 - 12	4 - 5	Open. RGB color mixing enabled		
	13 - 14	5	Color 1 - LEE 790 - Moroccan pink		
	15 - 16	6	Color 2 - LEE 157 - Pink		
	17 - 18	7	Color 3 - LEE 332 - Special rose pink		
	19 - 20	7 - 8	Color 4 - LEE 328 - Follies pink		
	21 - 22	8 - 9	Color 5 - LEE 345 - Fuchsia pink		
	23 - 24	9	Color 6 - LEE 194 - Surprise pink		
	25 - 26	10	Color 7 - LEE 181 - Congo Blue		
	27 - 28	11	Color 8 - LEE 071 - Tokyo Blue		
	29 - 30	11 - 12	Color 9 - LEE 120 - Deep Blue		
	31 - 32	12 - 13	Color 10 - LEE 079 - Just Blue		
	33 - 34	13	Color 11 - LEE 132 - Medium Blue		
	35 - 36	14	Color 12 - LEE 200 - Double CT Blue		
	37 - 38	14 - 15	Color 13 - LEE 161 - Slate Blue		
	39 - 40	15 - 16	Color 14 - LEE 201 - Full CT Blue		
	41 - 42	16	Color 15 - LEE 202 - Half CT Blue		
	43 - 44	17	Color 16 - LEE 117 - Steel Blue		
	45 - 46	18	Color 17 - LEE 353 - Lighter Blue		
	47 - 48	18 - 19	Color 18 - LEE 118 - Light Blue		
	49 - 50	19 - 20	Color 19 - LEE 116 - Medium Blue Green		
	51 - 52	20	Color 20 - LEE 124 - Dark Green		
	53 - 54	21	Color 21 - LEE 139 - Primary Green		
	55 - 56	21 - 22	Color 22 - LEE 089 - Moss Green		
	57 - 58	22 - 23	Color 23 - LEE 122 - Fern Green		
	59 - 60	23	Color 24 - LEE 738 - JAS Green		
	61 - 62	24	Color 25 - LEE 088 - Lime Green		
	63 - 64	25	Color 26 - LEE 100 - Spring Yellow		
	65 - 66	25 - 26	Color 27 - LEE 104 - Deep Amber		
	67 - 68	26 - 27	Color 28 - LEE 179 - Chrome Orange		
	69 - 70	27	Color 29 - LEE 105 - Orange		
	71 - 72	28	Color 30 - LEE 021 - Gold Amber		
	73 - 74	29	Color 31 - LEE 778 - Millennium Gold		
	75 - 76	29 - 30	Color 32 - LEE 135 - Deep Golden Amber		
	77 - 78	30	Color 33 - LEE 164 - Flame Red		
	79 - 80	31	Color 34 - Magenta		
	81 - 82	32	Color 35 - Medium Lavender		
			Color 36 - Pure White		

Table 2: DMX Protocol - 16-bit Extended Mode

Channel	DMX Value	Percent	Function	Fade type	Default value
5 (cont.)	83 - 103	32 - 40	'Color wheel rotation' effect Clockwise, fast → slow		
	104 - 106	41	Stop (this will stop wherever the color is at the time)		
	107 - 127	42 - 50	Counter-clockwise, slow → fast		
			Split color		
	128 - 129	50	Color preset 1		
	130 - 131	51	Color preset 2		
	132 - 133	52	Color preset 3		
	134 - 135	52 - 53	Color preset 4		
	136 - 137	53 - 54	Color preset 5		
	138 - 139	54	Color preset 6		
	140 - 141	55	Color preset 7		
	142 - 143	55 - 56	Color preset 8		
	144 - 145	56 - 57	Color preset 9		
	146 - 147	57	Color preset 10		
	148 - 149	58	Color preset 11		
	150 - 151	59	Color preset 12		
	152 - 153	59 - 60	Color preset 13		
	154 - 155	60 - 61	Color preset 14		
	156 - 157	61	Color preset 15		
	158 - 159	62	Color preset 16		
	160 - 161	63	Color preset 17		
	162 - 163	63 - 64	Color preset 18		
	164 - 165	64	Color preset 19		
	166 - 167	65	Color preset 20		
	168 - 169	66	Color preset 21		
	170 - 171	66 - 67	Color preset 22		
	172 - 173	67 - 68	Color preset 23		
	174 - 175	68	Color preset 24		
	176 - 177	69	Color preset 25		
	178 - 179	70	Color preset 26		
	180 - 181	70 - 71	Color preset 27		
	182 - 183	71	Color preset 28		
	184 - 185	72	Color preset 29		
	186 - 187	73	Color preset 30		
	188 - 189	73 - 74	Color preset 31		
	190 - 191	74 - 75	Color preset 32		
	192 - 193	75	Color preset 33		
	194 - 195	76	Color preset 34		
	196 - 197	77	Color preset 35		
	198 - 199	77 - 78	Color preset 36		
			'Color wheel rotation' effect Clockwise, fast → slow		
	200 - 220	78 - 86	Stop (this will stop wherever the color is at the time)		
	221 - 224	86 - 88	Counter-clockwise, slow → fast		
	225 - 245	88 - 96	Open		
	246 - 255	96 - 100			
6	0 - 200	0 - 78	Zoom Flood → spot	Fade	200
	201 - 255	79 - 100	Overdrive min. → max.		

Table 2: DMX Protocol - 16-bit Extended Mode

Channel	DMX Value	Percent	Function	Fade type	Default value
7 and 8	0 - 32768	0 - 50	Beam twister, 16-bit (MSB and LSB) Index 0 → 360	Snap	0
	32769 - 40000	50 - 61	Disable		
	40001 - 49990	61 - 77	Rotation CW Fast → CW Slow		
	49991 - 50000	77	No rotation (lens stops at its current position)		
	50001 - 59990	77 - 92	Rotation CCW Slow → CCW Fast		
	59991 - 59999	92	Disable		
	60000 - 60999	92	Position 1: Wide		
	60100 - 60199	92	Position 2: Smooth		
	60200 - 60299	92	Position 3: Texture		
	60300 - 60399	92	Position 4: Dots		
	60400 - 60499	93	Position 5: Eye		
	60500 - 60599	93	Position 6: Donut		
	60600 - 60699	93	Position 7: Beam		
	60700 - 60799	93	Position 8: Beam 2		
	60800 - 60899	93	Position 9: Beam 3		
	60900 - 60999	93	Position 10: Beam 4		
	61000 - 61099	94	Position 11: Mixed		
	61100 - 61199	94	Position 12: Separation		
	61200 - 61299	94	Position 13: Separation 2		
	61300 - 61399	94	Position 14: Rays		
	61400 - 61499	94	Position 15: Halo		
	61500 - 61599	94	Position 16: Two Areas		
	61600 - 61699	94	Position 17: Clean Colors		
	61700 - 61799	95	Position 18: Crossover		
	61800 - 61899	95	Position 19		
	61900 - 61999	95	Position 20		
	62000 - 65355	95 - 100	Disable		
9	0 - 65535	0 - 100	Pan, 16-bit (MSB and LSB)	Fade	32768
10			Left → right (32768 = neutral)		
11	0 - 65535	0 - 100	Tilt, 16-bit (MSB and LSB)	Fade	32768
12			Up → down (32768 = neutral)		

Table 2: DMX Protocol - 16-bit Extended Mode

Channel	DMX Value	Percent	Function	Fade type	Default value
13			Fixture control/settings <i>(hold for number of seconds indicated to activate)</i>	Snap	0
	0 - 9	0 - 4	No function <i>(disables calibration)</i> – 5 sec.		
	10 - 14	4 - 5	Reset entire fixture – 5 sec.		
	15	6	Reset shutter/dimmer only – 5 sec.		
	16	6	Reset color only – 5 sec.		
	17	7	Reset beam only– 5 sec.		
	18	7	Reset pan and tilt only – 5 sec.		
	19 - 22	7 - 9	No function		
	23	9	Linear dimming curve – 1 sec. (menu override, setting unaffected by power off/on)		
	24	9	Square law dimming curve – 1 sec. (menu override, factory default setting, setting unaffected by power off/on)		
	25	10	Inverse square law dimming curve – 1 sec. (menu override, setting unaffected by power off/on)		
	26	10	S-curve dimming curve– 1 sec. (menu override, setting unaffected by power off/on)		
	27	11	No function		
	28	11	Fast pan and tilt speed – 1 sec. (default setting, menu override - setting returns to MENU setting after power on/off)		
	29	11	Smooth pan and tilt speed – 1 sec. (menu override - setting returns to MENU setting after power on/off)		
	30	12	Parameter shortcuts = ON (default)		
	31	12	Parameter shortcuts = OFF		
	32 - 35	13 - 14	No function		
	36	14	Enable video tracking		
	37	14	Disable video tracking		
	38	15	Extended color (default)		
	39	15	Calibrated color		
	40 - 49	16 - 19	No function		
	50	20	Regulated fan speed, fixed intensity (default)		
	51	20	Fixed fan speed, regulated intensity		
	52	20	Turn on control panel display – 1 sec.		
	53	21	Turn off control panel display – 1 sec.		
	54 - 99	21 - 39	No function		
	100	39	Enable calibration – 5 sec.		
	101	39	Store pan and tilt calibration – 5 sec.		
	102	40	Store dimmer calibration – 5 sec.		
	103 - 110	40 - 43	No function		
	111	43	Store Beam Twister calibration – 5 sec.		
	112 - 113	44	No function		
	114	45	Store zoom calibration – 5 sec.		
	115	45	Store pan calibration – 5 sec.		
	116	45	Store tilt calibration – 5 sec.		
	117	46	Store red Beam calibration – 5 sec.		
	118	46	Store green Beam calibration – 5 sec.		
	119	46	Store blue Beam calibration – 5 sec.		
	120	47	No function		
	121	47	Store all Beam RGB calibration – 5 sec.		
	122	48	Store red Aura calibration – 5 sec.		
	123	48	Store green Aura calibration – 5 sec.		
	124	48	Store blue Aura calibration – 5 sec.		
	125	49	Store all Aura RGB calibration – 5 sec.		
	126 - 198	49 - 77	No function		
	199	78	Reset all calibration values to factory defaults – 5 sec.		
	200 - 255	78 - 100	No function		
14-18	No function - reserved for future use				

Color - Outer

19	0 - 255	0 - 100	Red 0 → 100%	Fade	255
20	0 - 255	0 - 100	Green 0 → 100%	Fade	255
21	0 - 255	0 - 100	Blue 0 → 100%	Fade	255

Table 2: DMX Protocol - 16-bit Extended Mode

Channel	DMX Value	Percent	Function	Fade type	Default value
Color - Middle					
22	0 - 255	0 - 100	Red 0 → 100%	Fade	255
23	0 - 255	0 - 100	Green 0 → 100%	Fade	255
24	0 - 255	0 - 100	Blue 0 → 100%	Fade	255
Color - Center					
25	0 - 255	0 - 100	Red 0 → 100%	Fade	255
26	0 - 255	0 - 100	Green 0 → 100%	Fade	255
27	0 - 255	0 - 100	Blue 0 → 100%	Fade	255
Aura					
28	0 - 19 20 - 49 50 - 200 201 - 210 211 - 255	0 - 7 8 - 19 20 - 78 79 - 82 82 - 100	Strobe/shutter effect Shutter closed Shutter open Strobe, slow → fast Shutter open Random strobe, slow → fast	Snap	30
29	0 - 255	0 - 100	Dimmer (MSB) Closed → open	Fade	0
30	0 - 255	0 - 100	Red 0 → 100%	Fade	255
31	0 - 255	0 - 100	Green 0 → 100%	Fade	255
32	0 - 255	0 - 100	Blue 0 → 100%	Fade	255

Table 2: DMX Protocol - 16-bit Extended Mode

Channel	DMX Value	Percent	Function	Fade type	Default value
33	0 - 10	0 - 4	'Color wheel' color selection effect	Snap	0
	11 - 15	4 - 6	Open. RGB color mixing enabled		
	16 - 20	6 - 8	Color 1 - LEE 790 - Moroccan pink		
	21 - 25	8 - 10	Color 2- LEE 157 - Pink		
	26 - 30	10 - 12	Color 3 - LEE 332 - Special rose pink		
	31 - 35	12 - 14	Color 4 - LEE 328 - Follies pink		
	36 - 40	14 - 16	Color 5 - LEE 345 - Fuchsia pink		
	41 - 45	16 - 18	Color 6 - LEE 194 - Surprise pink		
	46 - 50	18 - 20	Color 7 - LEE 181 - Congo Blue		
	51 - 55	20 - 21	Color 8 - LEE 071 - Tokyo Blue		
	56 - 60	22 - 23	Color 9 - LEE 120 - Deep Blue		
	61 - 65	24 - 25	Color 10 - LEE 079 - Just Blue		
	66 - 70	26 - 27	Color 11 - LEE 132 - Medium Blue		
	71 - 75	28 - 29	Color 12 - LEE 200 - Double CT Blue		
	76 - 80	30 - 31	Color 13 - LEE 161 - Slate Blue		
	81 - 85	32 - 33	Color 14 - LEE 201 - Full CT Blue		
	86 - 90	34 - 35	Color 15 - LEE 202 - Half CT Blue		
	91 - 95	36 - 37	Color 16 - LEE 117 - Steel Blue		
	96 - 100	38 - 39	Color 17 - LEE 353 - Lighter Blue		
	101 - 105	39 - 41	Color 18 - LEE 118 - Light Blue		
	106 - 110	41 - 43	Color 19 - LEE 116 - Medium Blue Green		
	111 - 115	43 - 45	Color 20 - LEE 124 - Dark Green		
	116 - 120	45 - 47	Color 21 - LEE 139 - Primary Green		
	121 - 125	47 - 49	Color 22 - LEE 089 - Moss Green		
	126 - 130	49 - 51	Color 23 - LEE 122 - Fern Green		
	131 - 135	51 - 53	Color 24 - LEE 738 - JAS Green		
	136 - 140	53 - 55	Color 25 - LEE 088 - Lime Green		
	141 - 145	55 - 57	Color 26 - LEE 100 - Spring Yellow		
	146 - 150	57 - 59	Color 27 - LEE 104 - Deep Amber		
	151 - 155	59 - 61	Color 28 - LEE 179 - Chrome Orange		
	156 - 160	61 - 63	Color 29 - LEE 105 - Orange		
	161 - 165	63 - 64	Color 30 - LEE 021 - Gold Amber		
	166 - 170	65 - 66	Color 31 - LEE 778 - Millennium Gold		
	171 - 175	67 - 68	Color 32 - LEE 135 - Deep Golden Amber		
	176 - 180	69 - 70	Color 33 - LEE 164 - Flame Red		
	181 - 185	71 - 72	Color 34 - Magenta		
	186 - 190	73 - 74	Color 35 - Medium Lavender		
			Color 36 - Pure White		
			'Color wheel rotation' effect		
	191 - 214	75 - 84	Clockwise, fast → slow		
	215 - 219	84 - 86	Stop (this will stop wherever the color is at the time)		
	220 - 243	86 - 95	Counter-clockwise, slow → fast		
			Random colors		
	244 - 247	95 - 96	Fast		
	248 - 251	97 - 98	Medium		
	252 - 255	98 - 100	Slow		

Table 2: DMX Protocol - 16-bit Extended Mode

MSB = Most significant byte

LSB = Least significant byte

Applicable when running MAC Quantum Wash firmware version: 1.1.0

Color temperature control data

The table below gives the color temperatures obtained when specific DMX values are sent on the color temperature control channel.

DMX value	Col. temp.	DMX value	Col. temp.	DMX value	Col. temp.	DMX value	Col. temp.
11	2000	51	4000	91	6000	131	8000
12	2050	52	4050	92	6050	132	8050
13	2100	53	4100	93	6100	133	8100
14	2150	54	4150	94	6150	134	8150
15	2200	55	4200	95	6200	135	8200
16	2250	56	4250	96	6250	136	8250
17	2300	57	4300	97	6300	137	8300
18	2350	58	4350	98	6350	138	8350
19	2400	59	4400	99	6400	139	8400
20	2450	60	4450	100	6450	140	8450
21	2500	61	4500	101	6500	141	8500
22	2550	62	4550	102	6550	142	8550
23	2600	63	4600	103	6600	143	8600
24	2650	64	4650	104	6650	144	8650
25	2700	65	4700	105	6700	145	8700
26	2750	66	4750	106	6750	146	8750
27	2800	67	4800	107	6800	147	8800
28	2850	68	4850	108	6850	148	8850
29	2900	69	4900	109	6900	149	8900
30	2950	70	4950	110	6950	150	8950
31	3000	71	5000	111	7000	151	9000
32	3050	72	5050	112	7050	152	9050
33	3100	73	5100	113	7100	153	9100
34	3150	74	5150	114	7150	154	9150
35	3200	75	5200	115	7200	155	9200
36	3250	76	5250	116	7250	156	9250
37	3300	77	5300	117	7300	157	9300
38	3350	78	5350	118	7350	158	9350
39	3400	79	5400	119	7400	159	9400
40	3450	80	5450	120	7450	160	9450
41	3500	81	5500	121	7500	161	9500
42	3550	82	5550	122	7550	162	9550
43	3600	83	5600	123	7600	163	9600
44	3650	84	5650	124	7650	164	9650
45	3700	85	5700	125	7700	165	9700
46	3750	86	5750	126	7750	166	9750
47	3800	87	5800	127	7800	167	9800
48	3850	88	5850	128	7850	168	9850
49	3900	89	5900	129	7900	169	9900
50	3950	90	5950	130	7950	170	9950
						171	10000

Table 3: DMX Values and color temperature

Control panel menus

Applicable when running MAC Quantum Wash firmware **version 1.1.0**.

Menu level 1	Menu level 2	Menu level 3	Menu level 4	Notes (Default settings in bold print)
DMX ADDRESS	1 – XXX			DMX address (default address = 1). The DMX address range is limited so that the fixture will always have enough DMX channels within the 512 available.
CONTROL MODE	BASIC			16-bit basic DMX mode
	EXTENDED			16-bit extended DMX mode
FIXTURE ID	0 – 9999	User-settable fixture ID number		0
PERSONALITY	PAN/TILT	PAN INVERT	ON/OFF	Inverse DMX pan control: right → left
		TILT INVERT	ON/OFF	Inverse DMX tilt control: down → up
	SPEED	PAN/TILT	NORMAL	Normal speed pan and tilt
			FAST	Optimize pan/tilt movement for speed
			SLOW	Optimize pan/tilt movement for smoothness
		EFFECT	FOLLOW P/T	Effects speed follows the speed setting applied to pan and tilt via DMX or in control menu
			NORMAL	Normal effects speed
			FAST	Optimize effects movement for speed
			SLOW	Optimize effects movement for smoothness
	DIMMER CURVE	LINEAR		Optically linear dimming curve
		SQUARE LAW		Square law dimming curve
		INV SQ LAW		Inverse square law dimming curve
		S-CURVE		S-curve (fixture emulates incandescent lamp voltage linear RMS dimming curve)
	FOCUS TRACKING	DISABLED		Disables zoom focus linking
		NEAR		Enables zoom focus linking, optimized for short-throw projection (5 - 10 m)
		MEDIUM		Enables zoom focus linking, optimized for medium-throw projection (10 - 20 m)
		FAR		Enables zoom focus linking, optimized for long-throw projection (20+ m)
	XXXXXXXXXX			
	XXXXXXXXXX			

Table 4: Control menus

Menu level 1	Menu level 2	Menu level 3	Menu level 4	Notes (Default settings in bold print)
PERSONALITY (continued)	DMX RESET	ON		Fixture can be reset via DMX
		OFF		Fixture cannot be reset via DMX (can be overridden: see DMX protocol)
	EFFECT SHORTCUT	ON		Effects take shortest route during changes, crossing open positions if necessary
		OFF		Effects avoid open positions during effects changes
	AUTO BLACKOUT	OFF		Shutter/dimmer blackout does not call up other effects.
		ON		Iris and gobo wheel are deployed 5 seconds after shutter/dimmer blackout to eliminate stray light.
	DISPLAY	DISPLAY SLEEP	ON	Display permanently on
			2 MINUTES	Display goes into sleep mode 2 minutes after last key press
			5 MINUTES	Display goes into sleep mode 5 minutes after last key press
			10 MINUTES	Display goes into sleep mode 10 minutes after last key press
		DISPLAY INTENSITY	10 ... 100	Set display intensity in % (default = 100)
		DISPLAY ROTATION	NORMAL / ROTATE 180	Display orientation normal or rotated 180°
		DISPLAY CONTRAST	1 ...100	Adjust contrast of display (default = 41)
	ERROR MODE	NORMAL		Enable error messages and warnings in display
		SILENT		Disable error messages and warnings in display (the status LED will still light to indicate fixture status if an error has been detected or the fixture has a warning)
FACTORY DEFAULT	LOAD FACTORY SETTINGS	ARE YOU SURE?	YES/NO	Return all settings (except calibrations) to factory defaults
INFORMATION	POWER ON TIME	TOTAL	0 ... XXX HR	Display hours fixture has been powered on since manufacture (not user-resettable)
		RESETTABLE	CLEAR COUNTER? YES/NO	Display hours fixture has been powered on since last counter reset (user-resettable)
	XXXXXXXXXX	TOTAL	0 ... XXX HR	Display hours of lamp use since manufacture (not user-resettable)
		RESETTABLE	CLEAR COUNTER? YES/NO	Display hours of lamp use since last counter reset (user-resettable)
	SW VERSION*	XX.XX.XX		Displays currently active software version
	SERIAL NUMBER*	(XX)XXXXXXXXXXXX		Displays fixture's serial number
	RDM UID*	4D50.XXXXXXXXXX		Displays fixture's unique RDM ID
	FAN SPEEDS*	LAMPFAN L ... BASEFAN 4	0 - XXX RPM	Displays current speed of all cooling fans (lamp, head and base)
DMX LIVE*	RATE	0 - 44 HZ		DMX transmission speed in packets per second
	QUALITY	0 - 100%		Percent of packets received
	START CODE	0 - 255		Value of the DMX start code
	STROBE/SHUTTER ...			Value received on each DMX channel (values for fine control channels can only be viewed if available in the DMX mode the fixture is set to)

Table 4: Control menus

Menu level 1	Menu level 2	Menu level 3	Menu level 4	Notes (Default settings in bold print)
TEST*	TEST ALL			Run test sequence of all functions. Press Escape button to stop test
	TEST PAN/TILT			Run test sequence of pan and tilt functions. Press Escape button to stop test
	TEST EFFECTS			Run test sequence of all effects. Press Escape button to stop test
MANUAL CONTROL*	RESET	RESET		Reset fixture
	LAMP ON/OFF			Manually strike/douse lamp
	STROBE/SHUTTER	0 - 255		Set shutter/strobe effect (default = 30)
	DIMMER	0 - 255		Set dimmer opening
	DIMMER FINE	0 - 255		Set dimmer opening, fine (LSB)
	CYAN	0 - 255		Add cyan
	MAGENTA	0 - 255		Add magenta
	YELLOW	0 - 255		Add yellow
	CTC	0 - 255		Adjust color temperature control (add warmth)
	COLOR WHEEL	0 - 255		Select color filter
	ZOOM	0 - 255		Set zoom (default = 128)
	ZOOM FINE	0 - 255		Set zoom, fine (LSB, default = 128)
	FOCUS	0 - 255		Set focus
	FOCUS FINE	0 - 255		Set focus, fine (LSB, default = 128)
	PAN	0 - 255		Set pan angle (default = 128)
	PAN FINE	0 - 255		Set pan angle, fine (LSB, default = 128)
	TILT	0 - 255		Set tilt angle (default = 128)
	TILT FINE	0 - 255		Set tilt angle, fine (LSB, default = 128)
SERVICE	ERROR LIST	Empty or up to 20 errors		Display any errors in memory
	FAN CLEAN	ON/OFF		Activate fan cleaning
	PT FEEDBACK	ON		Enable pan/tilt position feedback systems
		OFF		Disable pan/tilt position feedback
	ADJUST	DIMMER	ADJUSTED/ NOT ADJUSTED	Important! For use by authorized service technicians during mechanical adjustment only. Do not enter the ADJUST menu without Martin™ service documentation, or you may make the fixture impossible to use correctly. Jog wheel must be held in for 5 seconds to enter.
		FROST	NOT ADJUSTED/ 1 - 255	
		FRAMING	ADJUST RESET/FRAMING BLADE 1 LEFT...FRAMING BLADE 4 RIGHT	
	CALIBRATION	PT AT END STOP	ACTION	Calibrate pan/tilt sensor by turning pan clockwise against end stop, and tilt against end stop pointing away from display, then push ACTION
		DIMMER ... TILT		Set individual effects to calibration positions (approx. +/- 5% offset available)
		LOAD DEFAULTS		Load factory default calibration settings
		SAVE DEFAULTS		Replace factory default calibration settings with current calibration settings
	FIRMWARE UPDATE	NO DEVICE		No USB device present or no firmware on USB device
		UPDATING FILES		Fixture updating internal memory from USB device
		AVAILABLE FIRMWARE	PERFORMANCE 1.0.0 ... PERFORMANCE X.X.X	Select firmware from versions stored in internal memory. Select version, then press XXXXX Enter XXXXX and confirm your choice to update

Table 4: Control menus

** Menus marked * are available only when the fixture is connected to mains power. All other menus are available in mains- and battery-powered operation.*

Service and display messages

The MAC Quantum Wash gives service and maintenance information by displaying a large 3- or 4-character short code and a smaller full-text message in the fixture's display. The short code is visible at a distance, allowing easier reading with the fixture still in the rig, for example, while the full-text message gives more detailed information.

Warning messages

Warning messages indicate that either:

- problems might appear in the future if no action is taken, or
- the user needs to pay special attention to a function or procedure when working with the fixture.

The MAC Quantum Wash communicates warnings as follows:

- Warning codes are shown continuously in the display and disappear when the user reacts to the warning.
- If more than one warning is detected, all warnings are displayed in sequence.
- If the display is inactive, the fixture's status LED (see Figure 1 on page 7) flashes orange to indicate that there is a warning. Activating the display will show the warning.

The possible warning messages are listed in Table 5 below:

Short code	Long message and explanation
AUTW	AURA TMP HIGH Aura temperature sensor detects that normal operating temperature is exceeded.*
BANK	BANK NO ACCESS Error unpacking firmware bank during/after software upload. Fixture will continue to operate on existing firmware. Warning message is cleared by a successful software upload or at the next power off/on cycle.
BETW	BEAM TEMP HIGH Beam temperature sensor detects that normal operating temperature is exceeded.*
DCTW	DC TEMP HIGH DC PCB sensor detects that normal operating temperature is exceeded.*
LDTW	LED DRV TMP HIGH LED driver temperature sensor detects that normal operating temperature is exceeded.*
PFTW	PFC TEMP HIGH PFC unit temperature sensor detects that normal operating temperature is exceeded.*
PTTW	PT TEMP HIGH
SERV	SERVICE MODE Fixture in service mode.
SL W	SAFETY LOOP A safety loop error occurred but is no longer active. Warning message is cleared at the next power off/on cycle.
UITW	UI TEMP HIGH User interface (LCD display and control panel) PCB sensor detects that normal operating temperature is exceeded.*
ZFTW	ZF TEMP HIGH Zoom PCB sensor detects that normal operating temperature is exceeded.*

Table 5: Warning messages

***High temperature warnings are canceled as soon as temperature returns to normal. If temperature reaches cutoff level, the warning is replaced by a cutoff error message.*

Error messages

Error messages indicate that a problem is present. The MAC Quantum Wash communicates errors as follows:

- Error messages flash in the display.
- If more than one error is detected, the fixture flashes all errors three times each.
- Errors are shown in the display regardless of display status: they override an inactive display and any other information that the display might be showing.
- If an error is present, the status LED flashes red.

The possible error messages are listed in Table 6 below:

Short code	Long message and explanation
ACER	AURA CALIB ERROR Aura calibration error.
AUTC	AURA TMP SEN ERR Aura temperature sensor error.
AUTE	AURA TMP SEN ERR Aura temperature sensor error.
BCER	BEAM CALIB ERROR Beam calibration error.
BETC	BEAM TMP SEN ERR Beam temperature sensor error.
BETE	BEAM TMP SEN ERR Beam temperature sensor error.
BSER	BEAM TWIST SENSOR ERR Beam twister position indexing system timeout.
BTER	BEAM TWIST ERR Beam twister error.
BTSA	BEAM TWIST SENSOR ADJ Beam twister sensor adjustment error.
CELD	COM ERR LED DRV LED driver communication error.
COLD	FIXTURE COLD Fixture too cold. Physical movement of effects is disabled until fixture has warmed up.
DCTC	DC TEMP CUT OFF DC XXXXXXXXXXXXXXXXXXXXXXXXXXXX temperature cutoff.
DCTE	DC TEMP SEN ERR DC XXXXXXXXXXXXXXXXXXXXXXXXXXXX temperature sensor error.
EXER	EXPECTED MODULE ERR XXXXXXXXXXXXXXXXXXXXXXXXXXXX .
FAN	BASE 1 FAN ERR Base fan 1 (XXXXXXXXXXXXXXXXXXXXXXXXXXXX) error.
FAN	BASE 2 FAN ERR Base fan 2(XXXXXXXXXXXXXXXXXXXXXXXXXXXX) error.
FAN	BASE 3 FAN ERR Base fan 3 (XXXXXXXXXXXXXXXXXXXXXXXXXXXX) error.
FAN	HEAD FAN 1 ERR Head fan 1 (XXXXXXXXXXXXXXXXXXXXXXXXXXXX) error.
FAN	HEAD FAN 1 ERR Head fan 2 (XXXXXXXXXXXXXXXXXXXXXXXXXXXX) error.
FAN	HEAD FAN 1 ERR Head fan 3(XXXXXXXXXXXXXXXXXXXXXXXXXXXX) error.
FAN	HEAD FAN 1 ERR Head fan 4 (XXXXXXXXXXXXXXXXXXXXXXXXXXXX) error.
FBEB	BEAM TWIST FBACK ERR Beam twister position feedback system timeout. Fixture is unable to correct beam twister position.

Table 6: Error messages

Short code	Long message and explanation
FBEP	PAN FBACK ERR Pan position magnetic indexing system timeout. Fixture is unable to correct pan position (but pan movement will often still be possible).
FBET	TILT FBACK ERR Tilt position magnetic indexing system timeout. Fixture is unable to correct tilt position (but tilt movement will often still be possible).
FBEZ	ZOOM FBACK ERR Zoom position indexing system timeout. Fixture is unable to correct zoom position.
LDTC	LED TEMP SEN ERR LED board temperature sensor error.
LDTE	LED TEMP SEN ERR LED board temperature sensor error.
PAER	PAN ERROR Pan position electrical indexing system timeout.
PFTC	PFC TEMP CUT OFF Power factor correction system temperature cutoff.
PFTE	PFC TEMP SEN ERR Power factor correction system temperature sensor error.
PSER	PAN SENSOR ERROR Fixture unable to retrieve reliable data from pan position sensor.
PTCM	P/T SENSOR ADJUST Pan/tilt sensors are incorrectly adjusted.
SLER	SAFETY LOOP Safety loop circuit activated. A temperature circuit breaker has shut down LEDs. Circuit breaker resets automatically after temperature has returned to normal operating range.
TIER	TILT ERROR Tilt position electrical indexing circuit timeout.
TSER	TILT SENSOR ERR Fixture unable to retrieve reliable data from tilt position sensor.
UELD	UPL ERR LED DRV Could not upload new LED driver firmware during a firmware upload. Error cleared when new firmware is uploaded successfully or power is cycled off and on.
UITC	UI TEMP CUTOFF User interface (LCD display and control panel) temperature cutoff activated.
ZSER	ZOOM SENSOR ERR Zoom position electrical indexing system timeout.

Table 6: Error messages

The fixture reports a calibration error if valid calibration data is not detected in EEPROM. The fixture may be unable to read/write calibration data to EEPROM.



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