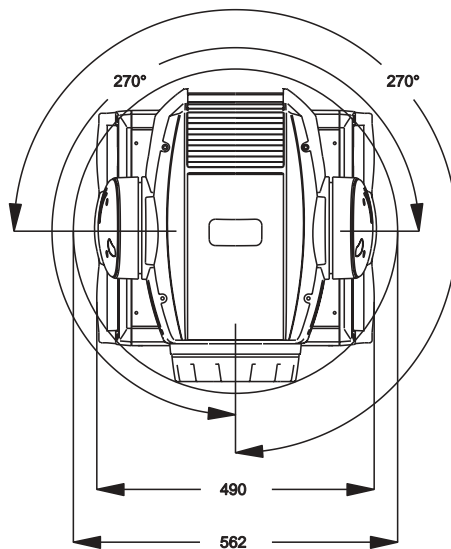
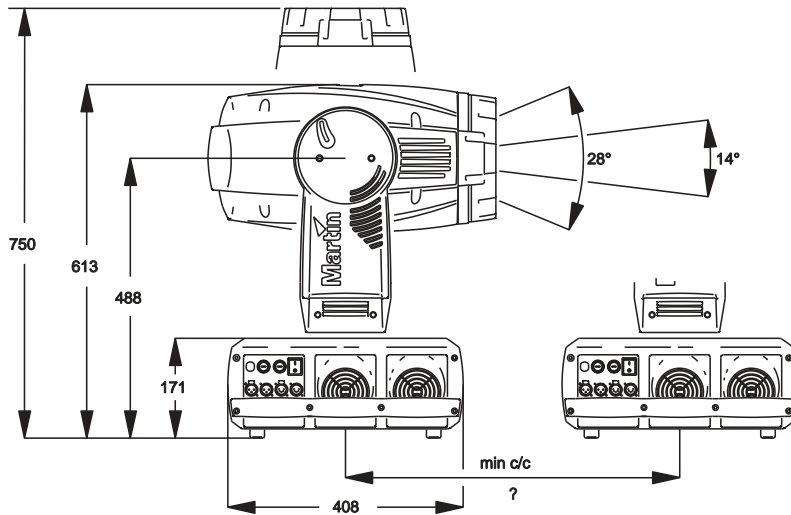
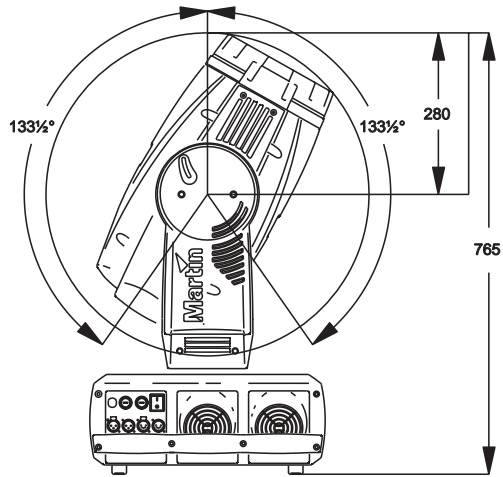


MAC 2000 Wash

user manual





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INTRODUCTION

Thank you for selecting the MAC 2000 Wash. The MAC 2000 Wash is a 1200 Watt moving head wash light that provides CMY color mixing, color correction (CTC), two color wheels (each with four removable colors), a combined dimmer/shutter, 540° of pan, and 267° of tilt. A motorized barn-door system is available as a separately orderable accessory.

The MAC 2000 Wash has a Fresnel lens fitted as standard, and is also supplied with a PC lens and a super-wide-angle lens. A motorized zoom provides a beam angle ranges of 11° through to 40° (in the standard Fresnel configuration), 12° through to 34° (with the PC lens fitted), or 66° through to 80° (with the super-wide-angle lens fitted).

The MAC2000 Wash is fitted with an electronic ballast that provides flicker-free operation and an economic power-saving mode. It also has a switch mode power supply allowing it to 'auto sense' and automatically adjust for the local electrical power.

For the latest firmware updates, documentation, and other information about this and all Martin Professional products, please visit the Martin web site at <http://www.martin.dk>.

MAC 2000 Wash safety information

Warning! *This product is for professional use only. It is not for household use.*

This product presents risks of lethal or severe injury due to fire and heat, electric shock, ultraviolet radiation, lamp explosion, and falls. **Read this manual** before powering or installing the fixture, follow the safety precautions listed below and observe all warnings in this manual and printed on the fixture. If you have questions about how to operate the fixture safely, please contact your Martin dealer or call the Martin 24-hour service hot line at +45 70 200 201.

PROTECTION FROM ELECTRIC SHOCK

- Disconnect the fixture from AC power before removing or installing the lamp, fuses, or any part, and when not in use.
- Always ground (earth) the fixture electrically.
- Use only a source of AC power that complies with local building and electrical codes and has both overload and ground-fault protection.
- Do not expose the fixture to rain or moisture.
- Refer any service operation not described in this manual to a qualified technician.

PROTECTION FROM UV RADIATION AND LAMP EXPLOSION

- Never operate the fixture with missing or damaged lenses and/or covers.
- When replacing the lamp, allow the fixture to cool for at least 15 minutes before opening the fixture or removing the lamp. Protect your hands and eyes with gloves and safety glasses.
- Do not stare directly into the light. Never look at an exposed lamp while it is lit.
- Replace the lamp if it becomes defective or worn out, or before usage exceeds the maximum service life.

PROTECTION FROM BURNS AND FIRE

- Never attempt to bypass the thermostatic switch or fuses. Always replace defective fuses with ones of the specified type and rating.
- Keep all combustible materials (for example fabric, wood, paper) at least 1 meter (39 inches) away from the fixture. Keep flammable materials well away from the fixture.
- Do not illuminate surfaces within 3 meters (10 feet) of the fixture.
- Provide a minimum clearance of 0.1 meters (4 inches) around fans and air vents.
- Never place filters or other materials over the lens.
- The exterior of the fixture can get very hot. Allow the fixture to cool for at least 5 minutes before handling.
- Do not modify the fixture or install other than genuine Martin parts.
- Do not operate the fixture if the ambient temperature (Ta) exceeds 40° C (104° F).

PROTECTION FROM INJURY DUE TO FALLS

- Do not lift or carry the fixture alone.
- When suspending the fixture, verify that the structure can hold at least 10 times the weight of all installed devices.
- Verify that all external covers and rigging hardware are securely fastened and use an approved means of secondary attachment such as a safety cable.
- Block access below the work area whenever installing or removing the fixture.

TRANSPORTATION

Important! Release the transport locks before operating the fixture.

Included items

The MAC 2000 Wash is shipped in a 1 or 2 unit flight case that contains the following items.

- User manual
- 2 x 20 A main fuses (for use with 100-130 V local power supply)
- 2 clamp attachment brackets

Transport locks

The head and yoke may be locked for transportation and service. The locks are shown in Figure 1. The fixture must be unlocked before operation.

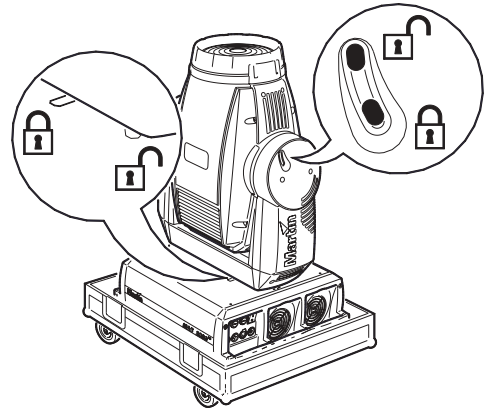


Figure 1: Pan and tilt locks

Single flight case

Unpacking the fixture

- 1 Remove the top of the flight case.
- 2 With one person on each side, lift the fixture out of the bottom of the flight case.
- 3 Release the pan and tilt locks before operating.

Packing the fixture

- 1 Disconnect the fixture from power and allow it to cool.
- 2 Lock the head and yoke in the position shown in Figure 2.
- 3 Place the fixture in the bottom of the flight case. Place the top section over the fixture without forcing.

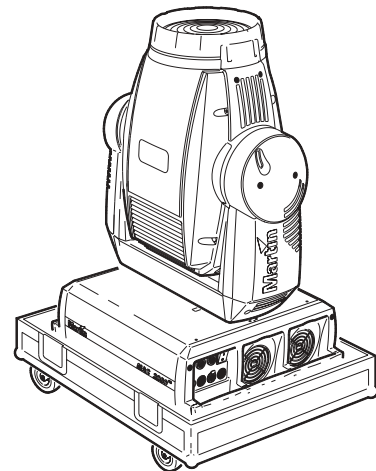


Figure 2: Single

Double flight case

Unpacking

- 1 Open the flight case and pull the drawer all the way out.
- 2 Release the head (tilt) transport lock.
- 3 Install rigging hardware as described on page 12.
- 4 With one person on each side, lift the fixture out of the flight case.

Packing

- 1 Disconnect the fixture from power and allow it to cool.
- 2 Turn the yoke parallel to the sides of the base with the tilt lock closest to the back.
- 3 Pull the transport drawer all the way out. With one person on each side, place the fixture on the drawer with the arrow pointing in.
- 4 Remove and stow rigging hardware. Coil and stow the power cord in the door.
- 5 Tilt the head so that the lens points away from the door as shown in Figure 3. Lock the head in the horizontal position. Do not lock the yoke.
- 6 Slide the drawer all the way in without forcing. Close the flight case.

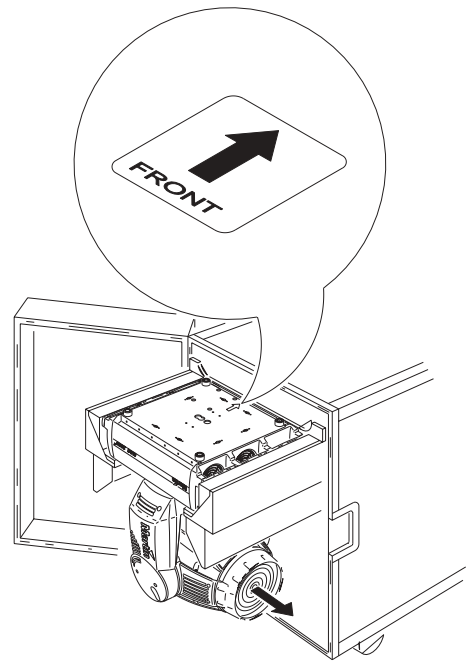


Figure 3: Double unit transport position

Setup for flight case testing

The double flight case has two slide-out arms from which the fixture can hang for testing and setting. Though unnecessary, the pan and tilt reset can be cancelled by pressing [Menu] and [Enter] at the same time.

- 1 Open the flight case and pull the drawer all the way out. Release the transport locks.
- 2 Pull the test arms all out. Tilt the fixture up and over the slide arms so that the handle cross-braces that are second from the back rest on the arms. The fixture should rest at an angle.
- 3 Push the transport drawer into the flight case.

LAMP

About the HMI 1200 W/S lamp

The MAC 2000 Wash comes with a double-ended OSRAM HMI 1200 W/S discharge lamp installed. This highly-efficient short-arc source provides an exceptionally stable 6000K color temperature, a color rendering index greater than 90, and an average life of 750 hours.

The lamp is capable of hot restrike. This feature, however, is only supported by the MAC 2000 Wash with electronic ballast.

The ends of the lamp have specially-developed keys, shown in Figure 6, to ensure proper installation. Do not use HMI 1200 W/S lamps with the non-keyed SFC 10-4 base.

Warning! *Installing any other lamp may create a safety hazard or damage the fixture!*

The lamp has an average life of 750 hours. To reduce the risk of explosion, replace the lamp before usage exceeds 125% of the average life, i.e., before it exceeds 940 hours. To read lamp hours from the control panel, please refer to “Readouts” on page 14.

For optimum performance, avoid turning off the lamp before it has warmed up fully.

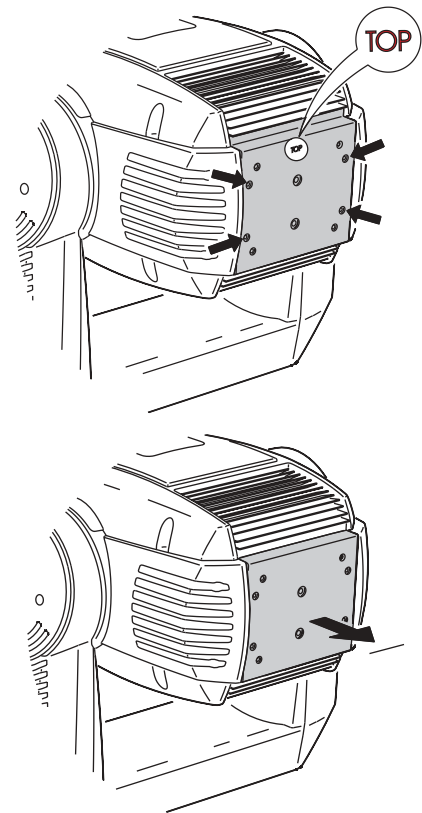


Figure 4: Lamp access

Lamp replacement

Important! *Do not touch the quartz bulb with bare fingers.*

Replacement lamps are available from your Martin dealer. Please order Martin P/N 97010304.

The clear quartz bulb must be clean and free of any oils from your fingers. Clean the lamp with an alcohol wipe and polish it with a dry cloth, particularly if you accidentally touch the bulb.

Replacing the lamp

- 1 Disconnect the fixture from power and allow it to cool. Lock the head horizontally with the top up.
- 2 See Figure 4. Release the 4 quarter-turn fasteners marked with arrows on the rear plate. Pull the lamp assembly straight back as far as it goes and let it rest in place.
- 3 See Figure 5. Pull the retention spring on the left end up and then swing the end of the lamp out. Pull the other end out of the socket.

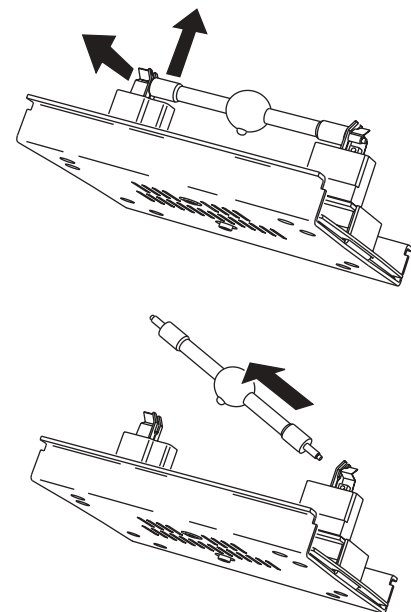


Figure 5: Lamp removal

- 4 See Figure 6. With the nipple on the bulb facing the back, insert the right end of the new lamp in the socket. Pull up on the left spring and snap the other end into place.
- 5 Lift the lamp assembly so that lamp is level with the center of the reflector. Push the assembly straight in until it seats, making sure the lamp passes through the reflector opening. Lock the 4 quarter-turn fasteners.
- 6 When installing a new lamp, reset the lamp hour and lamp strike counters as described in "Time" on page 14.

Aligning the lamp

- 1 Switch on the MAC 2000 Wash and allow it to reset. Using either a controller or the control module, turn on the lamp and project an open white beam on a flat surface.
- 2 Center the hot spot vertically using the top Allen-head adjustment screw in the center of the rear plate.
- 3 If there is significant hot spot, turn the bottom adjustment screw counterclockwise until the light is evenly distributed. If the light is brighter around the edge than it is in the center, or if light output is low, turn the bottom adjustment screw clockwise until the light is bright and evenly distributed.
- 4 Repeat step 2.

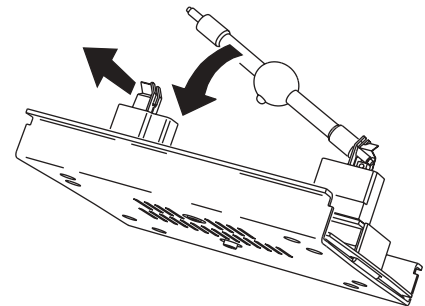
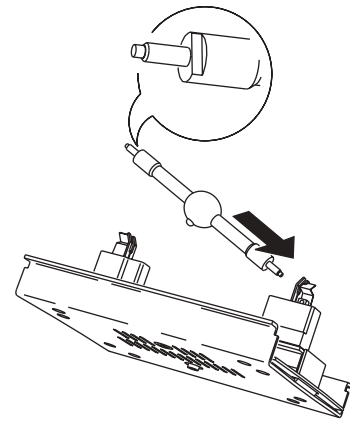


Figure 6: Lamp insertion

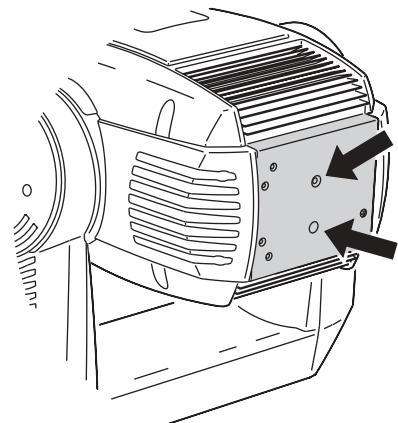


Figure 7: Lamp adjustment

AC POWER

WARNING! For protection from electric shock, the fixture must be grounded (earthed). The AC mains supply shall be fitted with a fuse or circuit breaker and ground-fault protection.

Power supply

The MAC 2000 Wash comes with an auto-sensing, auto-ranging switch-mode power supply. Manual adjustments are not necessary as the MAC 2000 Wash automatically adapts to the mains voltage and frequency.

Fuses

The MAC 2000 Wash comes with two:

- 20 AT (time delay) main fuses for use with AC supplies of 100 - 120 volts.
- 15 A main fuses for use with AC supplies of 200 - 250 volts.

Install the appropriate fuses in the holders near the power switch.

Power connection

Important! Connect the MAC 2000 Wash directly to AC power. Do not connect it to a dimmer system; doing so may damage the fixture.

You may need to install a cord cap that fits your supply on the power cable. A 3-prong grounding-type plug must be installed following the manufacturer's instructions. The table shows some possible pin identification schemes; if the pins are not clearly identified, or if you have any doubts about proper installation, consult a qualified electrician.

To apply power, set the power switch on the base to the "I" position.


| Wire Color | Pin | Symbol | Screw (US) |
|--------------|---------|---|-----------------|
| brown | live | L | yellow or brass |
| blue | neutral | N | silver |
| yellow/green | ground |  | green |

Table 1: Cord cap connections

Reduced power function

The MAC 2000 Wash has an automatic power reduction function, which reduces the consumption to 700W if the shutter/dimmer is closed for more than 10 seconds. This not only increases the lamp life, but also further decreases the overall noise emission of the fixture.

DATA

Important! Never connect more than 1 data input and 1 data output.

The MAC 2000 Wash has both 3-pin and 5-pin XLR sockets for DMX input and output. The pin-out on all sockets is pin 1 to shield, pin 2 to cold (-), and pin 3 to hot (+). There is no connection to pins 4 and 5.

The sockets are wired in parallel: both inputs connect to both outputs. *For reliable data transmission and to avoid damage to the fixture, however, use one input and one output!*

Connecting fixtures

- Use shielded twisted-pair cable designed for RS-485 devices: standard microphone cable cannot transmit control data reliably over long runs. 24 AWG cable is suitable for runs up to 300 meters (1000 ft). Heavier gauge cable and/or an amplifier is recommended for longer runs.
- Never use both outputs to split the link. To split the serial link into branches use a splitter such as the Martin 4-Channel Opto-Isolated RS-485 Splitter/Amplifier.
- Do not overload the link. Up to 32 devices may be connected on a serial link.
- Terminate the link by installing a termination plug in the output socket of the last fixture. The termination plug, which is a male XLR plug with a 120 ohm, 0.25 watt resistor soldered between pins 2 and 3, “soaks up” the control signal so it does not reflect and cause interference. If a splitter is used, terminate each branch of the link.
- Martin fixtures introduced before 1997 have reversed polarity data sockets (pin 2 hot and pin 3 cold). The socket polarity is labelled. *Use a phase-reversing cable between the MAC 2000 Wash and any Martin device with reversed polarity.*

Connecting the data link

- 1 Connect the DMX data input from the controller to the MAC 2000 Wash's 3-pin or 5-pin input (male) socket.
- 2 Using the sockets that match your data cable, connect the output of the fixture closest to the controller to the input of the next fixture.
- 3 Insert a male 120 Ω XLR termination plug in the 3-pin or 5-pin output of the last fixture on the link.

RIGGING

The MAC 2000 Wash can be placed on stage or clamped to a truss in any orientation. The Fast-Lock system enables quick and easy fastening of the clamp brackets in 4 positions as shown Figure 8.

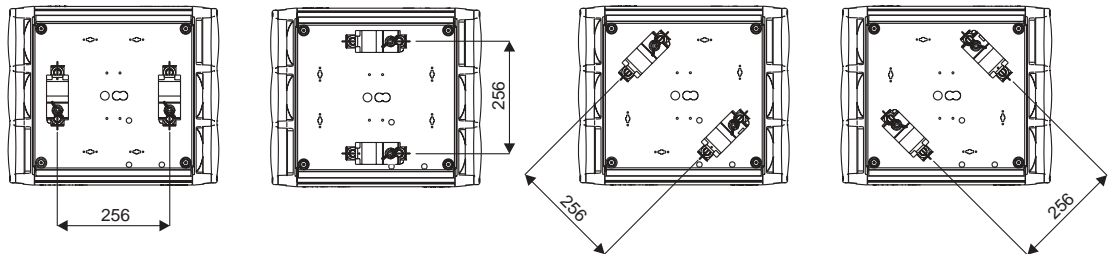


Figure 8: Clamp bracket positions

Warning! Always use 2 clamps to rig the fixture. Lock each clamp with both 1/4-turn fasteners. The fasteners are locked only when turned fully clockwise.

Warning! Attach an approved safety cable to the attachment hole in the base. Never use the carrying handles for secondary attachment.

Clamping the fixture to a truss

- 1 Verify that the rigging clamps (not included) are undamaged and can bear at least 10 times the weight of the fixture. Verify that the structure can bear at least 10 times the weight of all installed fixtures, clamps, cables, auxiliary equipment, etc.
- 2 Bolt each clamp securely to a clamp bracket with an M12 bolt (grade 8.8 or better) and lock nut.
- 3 Align a clamp with 2 mounting points in the base. Insert the fasteners into the base and turn both levers a full 1/4-turn clockwise to lock. Install the second clamp.
- 4 If the truss can be lowered, fixtures can be clamped on directly from the double flight case. If the fixture must be lifted, block access under the work area. Working safely from a stable platform, hang the fixture on the truss with the arrow towards the area to be illuminated. Tighten the rigging clamps.
- 5 Install a safety wire that can bear at least 10 times the weight of the fixture. The attachment point is designed to fit a carabiner clamp.
- 6 Verify that the pan and tilt locks are released. Verify that there are no combustible materials or surfaces to be illuminated within 1 meter (39 inches) of the fixture, and that there are no flammable materials nearby.

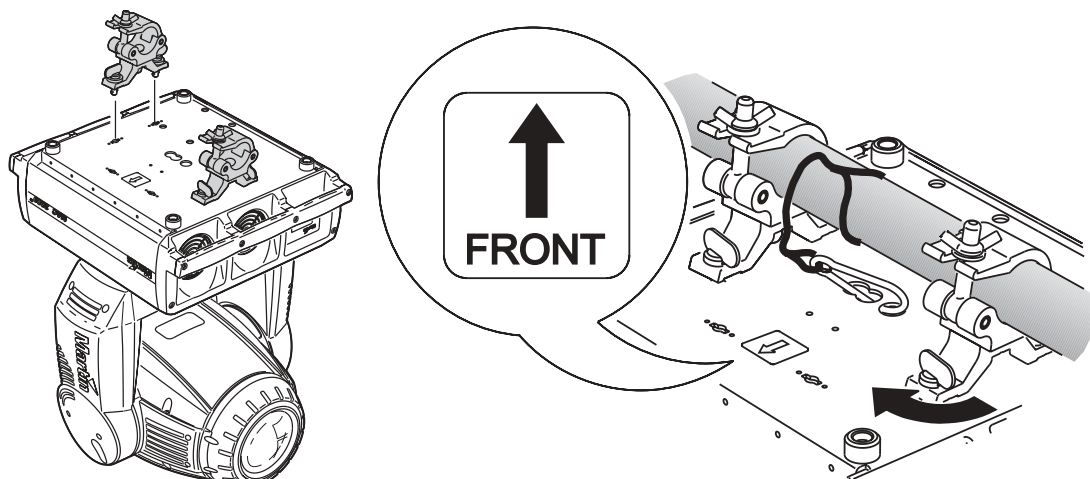


Figure 9: Rigging hardware installation

CONTROL PANEL

The LED control panel is used to set the address and personalities, read lamp hours and other information, calibrate effects, and run a test routine. Most of these functions may be performed remotely via the serial link with the Martin MP-2 Uploader.

Navigation

The DMX address and any messages (see page 36) are displayed when the MAC 2000 Wash is turned on. To enter the menu, press [Menu]. Press [Up] and [Down] to move within the menu. To select a function or submenu, press [Enter]. To escape a function or menu, press [Menu].

See “Control menu” on page 32 for a complete list of the menu items.

Note: [Enter] must be pressed and held for a few seconds to enter the utilities menu.

DMX address and protocol setting

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. Two MAC 2000 Washes may share the same address, however, if identical behavior is desired. Address sharing can be useful for diagnostic purposes and symmetric control, particularly when combined with the inverse pan and tilt options.

Two DMX protocols, 8-bit and 16-bit, are available. The 8-bit mode uses 19 control channels and provides full basic control. The 16-bit mode uses 2 additional channels to provide finer pan/tilt positioning.

Setting the DMX address and protocol

- 1 Press [Menu] to enter the main menu.
- 2 Press [Up] until `AdDR` is displayed. Press [Enter]. To snap to channel 1, press [Enter] and [Up]. Scroll to the desired channel and press [Enter].
- 3 Select `PSET` from the main menu and press [Enter]. Select `8bit` or `16bt` and press [Enter].

Tailoring performance

MOVEMENT

The MAC 2000 Wash provides six options for optimizing movement for different applications.

- The protocol setting (`PSET`) setting selects 8-bit or finer 16-bit control of pan and tilt.
- The pan and tilt invert (`PATI`) menu swaps and/or inverts pan and tilt.
- The pan/tilt speed (`PTSPEED`) menu provides 3 settings: `FAST`, `NORM`, and `SLOW`. `NORM` is best for most applications. `FAST` provides better performance in applications where speed is most important. `SLOW` provides the smoothest movement and is best in long-throw applications with slow movements through narrow angles.
- The studio mode (`STUD`) setting optimizes all effects besides pan and tilt for speed or quietness.
- The shortcuts (`SCUT`) setting determines whether the color wheels always take the shortest path between two static positions or oscillate between outer positions.

TRACKING RESPONSE

The MAC 2000 Wash has a filter algorithm that looks at several position updates in tracking control mode and calculates the ideal response for smooth movement. Tracking response is adjustable to compensate for variations in controller performance. In most cases the default settings work well.

If tracking mode movement is not satisfactory there are 2 parameters that can be adjusted. The first is selected under `PERS/TRAC/MODE`. The default, `MOD1`, is the best choice with controllers that calculate intermediate

positions at a steady rate. Begin by selecting the alternative, `MOD 2`, which is better if the intermediate positions stray significantly from the line of travel.

The second parameter is the number of position updates used to calculate speed. The level is adjustable between 1 and 10 under `PERS / TRAC / CAL`. Increasing the number of samples increases the distance over which speed is calculated, making movement smoother but less responsive to sudden changes. Experiment for best results.

DISPLAY

The display intensity (`dINT`) setting controls display brightness. The display on/off setting (`dISP`) determines whether the display remains on or extinguishes two minutes after the last key-press. To flip the display, press [Up] and [Down] simultaneously.

LAMP

There are two settings that modify lamp control: Automatic Lamp On (`ALON`) and DMX Lamp Off (`DL0F`).

When `ALON` is off, the lamp remains off until a “lamp on” command is received from the controller. When `ALON` is on, the lamp strikes automatically after the fixture is powered on. When `ALON` is set to `DMX`, the lamp strikes automatically when the fixture receives DMX data, and it extinguishes 15 minutes after DMX data is lost.

When `ALON` is set to either `ON` or `DMX`, the automatic lamp strike timing is staggered to prevent all lamps from striking at once. The delay is determined by the fixture address.

If striking lamps from the controller, note that striking many lamps at once may cause a voltage drop large enough to prevent lamps from striking or trip the main circuit breaker. Avoid this by programming a “lamp on” sequence that strikes lamps one at a time at 5 second intervals.

Power to the lamp can be turned off from the controller if DMX Lamp Off (`dL0F`) is on.

DMX RESET

The fixture can be reset from the controller if DMX reset (`PERS / dRES`) is ON.

CUSTOM SETTINGS

The custom configuration function allows you to save and recall three sets of fixture settings. The savable settings are DMX mode, pan/tilt speed, pan/tilt inverse and swap, DMX lamp off and reset, display settings, shortcuts, studio mode, automatic lamp on, effects feedback, tracking algorithm, and tracking samples.

Readouts

Note: The MP-2 Uploader provides commands to display the time, temperature, and version readouts on the fixture control panel.

TIME

`INFO / TIME` provides readouts of fixture hours (`HRS`), lamp hours (`L HR`), and lamp strikes (`L ST`). Under each item is a resettable (`RESET`) increment counter and a non-resettable counter for total accumulated hours/strikes since fabrication (`TOTL`). To reset an increment counter, display it and then press [Up] until it reads 0. (This may also be done remotely using the MP-2 Uploader.)

TEMPERATURE

`INFO / TEMP` provides readouts of the head and base temperature in Celsius and Fahrenheit.

FIRMWARE VERSION

`INFO / VER` displays the version number of the installed firmware. The firmware version is also displayed briefly at startup.

DMX

The `DMXL` menu shows the DMX start code (`STCO`) and DMX values received for each effect.

Service messages

The Service LED on the control panel lights under conditions that require fixture service, and there is a message describing the service required. To display the message, select `SMSG` in the main menu. This item is available only when the LED is lit. There are two service messages.

`Replace lamp` is displayed when the lamp counter exceeds 750 hours, which is the rated average life for the HMI 1200 W/S lamp. The maximum service life is 125% of the average life, or 940 hours.

`Fixture overheating` is displayed when the head temperature exceeds 120° C (248° F). Overheating is likely due to dirty air filters, fans, or air vents; incorrect power supply settings, or a defective fan.

Service utilities

Important! *Enter must be held for several seconds to access the utilities menu.*

TEST SEQUENCES

`TSEQ` provides a general test of all effects that can be run without a controller. `UTIL / PCBt` provides routines for circuit board testing that are for service use only.

FEEDBACK TOGGLES

An on-the-fly position correction system monitors the color wheels. If a position error is detected, the shutter closes while the effect resets. This feature can be disabled by turning effects feedback (`UTIL / EFFb`) off.

The automatic pan/tilt position correction system may be temporarily turned off under `UTIL / FEbA`. The off setting, however, is not saved and the system will be re-enabled the next time the fixture starts. If the system cannot correct the pan/tilt position within 10 seconds, feedback is automatically disabled.

ADJUSTMENT

The adjustment menu (`UTIL / Adj`) provides manual control for making mechanical adjustments and is used by Martin service technicians.

CALIBRATION

The calibration menu (`UTIL / CAL`) provides utilities to 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. Dimmer and zoom are calibrated to defined points. The other effects are calibrated relative to an arbitrary reference fixture.

Default offset settings may be restored by selecting default offsets (`UTIL / dFOF`).

Calibrating effects

- 1 Apply power and strike the lamp.
- 2 To calibrate the zoom, select `UTIL / CAL / ZOOF` and press [Enter]. The default value of 128 can be adjusted up or down to move the diffuser lens relatively forward or back. Make any necessary adjustments and press [Enter] to save the setting.
- 3 To calibrate the color wheels to an offset from their mechanically indexed position, select `UTIL / CAL / C1OF` and press [Enter]. The default value of 128 can be adjusted up or down to move the color wheel relatively forward or back from its indexed position. Make any necessary adjustments and press [Enter] to save the setting. Repeat this procedure if necessary for color wheel 2 (`C2OF`).
- 4 Pan calibration is most useful when multiple fixtures are stacked vertically. To calibrate, set zoom, focus, iris, and tilt position for easy one-over-the-other comparison and set each fixture to the same pan DMX value. Select one fixture to be the reference fixture. On the other fixtures, select `UTIL / CAL / P OF` and press [Enter]. Adjust the offset as necessary to align the beam with the reference beam. Press [Enter] to save the setting.
- 5 Tilt calibration is most useful when multiple fixtures are arranged horizontally. To calibrate, set zoom, focus, iris, and pan position for easy side-by-side comparison and set each fixture to the same tilt DMX value.

Select one fixture to be the reference fixture. On the other fixtures, select `UTIL/CAL/T OF` and press [Enter]. Adjust the offset as necessary to align the beam with the reference beam. Press [Enter] to save the setting.

- 6 To calibrate the dimmer, select `UTIL/CAL/D OF` and press [Enter]. Hold a piece of paper over the lens. Set the offset to 0 and then increase it until light is clearly projected onto the paper. Press [Enter] to save the setting. Remove the paper.
- 7 To calibrate color mixing flags (cyan, magenta, yellow, and color temperature correction), project white beams with no dimming and position them for easy comparison. On each fixture, *including the reference*, select `UTIL/CAL/C OF` and press [Enter]. (This adds a defined amount of cyan.) Select one fixture to be the reference. Adjust the offsets on the other fixtures to match the reference color. Press [Enter] to save the setting. Repeat for `M OF` (magenta), `Y OF` (yellow), and `CTOF` (CTC).

SOFTWARE UPLOAD

The software update mode is normally engaged automatically by the upload device. If this does not occur then see “Software installation” on page 24.

EFFECTS

The MAC 2000 Wash is compatible with USITT DMX512 controllers. The fixture has two DMX operating modes, 8-bit and 16-bit. 16-bit mode requires two more DMX channels than 8-bit mode but provides more precise pan/tilt positioning. All other functions are identical. See “DMX protocol” on page 25.

Dimming and strobe

The mechanical dimmer/shutter system provides smooth, high-resolution 100 percent dimming, instant open and blackout, random and variable strobe effects up to 10 Hz, and random and variable pulses in which the dimmer snaps open and slowly dims or snaps closed and slowly opens.

Color

The color mixing system uses continuous dichroic cyan, magenta, and yellow (CMY) color filters. It is a subtractive system that removes color from white light. Inserting all three filters results in loss of light: for maximum brightness, mix 2 colors at a time.

In addition, two color wheels are provided, each with four removable positions for dichroic glass color filters and a position for a direct pass through of the beam.

Color temperature correction

The color temperature correction (CTC) system uses a continuous 0 - 178 mireds color filter that lowers the color temperature from 6000 K to 2900 K.

Motorized zoom

The zoom lens widens the beam from 11° at full spot to 40° at full flood with the standard lens and aperture ring fitted.

BEAM ANGLES

The following tables list the beam angles available with the standard 50 mm (2 in) aperture ring fitted. Note that narrower beam angles can be achieved by fitting smaller aperture rings. Note that light buster mode provides a high intensity spot with no diffusion and is engaged when the zoom channel is set to 100%.

| Standard Fresnel lens | Beam angle |
|-----------------------|------------|
| Light buster mode | 11° |
| Zoom narrow | 15° |
| Zoom wide | 40° |

| PC lens | Beam angle |
|-------------------|------------|
| Light buster mode | 12° |
| Zoom narrow | 12° |
| Zoom wide | 34° |

| Super-wide-angle lens | Beam angle |
|-----------------------|------------|
| Light buster mode | 66° |
| Zoom narrow | 70° |
| Zoom wide | 80° |

For information about changing the lens see “Changing the front lens” on page 21.

Motorized barn-doors

A motorized barn door system that attaches to the front of the fixture is available as a separately orderable accessory. These barn doors can be rotated, or opened and closed using DMX control signals. Five DMX channels are allocated for barn door control irrespective of whether or not they are connected to the fixture. We have done this to cover the possibility that you rig and begin programming your MAC 2000 Wash and add barn doors to it later. If the DMX channels were not already assigned, you would have to re-patch your console and therefore would lose any programming already completed.

Aperture adjustment

A 50 mm (2 in) aperture is fitted as standard in the optical path of the fixture just behind the zoom lens. This works well with the standard Fresnel lens.

Inside the head of the fixture, three additional aperture rings are secured to the chassis by a thumbscrew. When using the PC lens, the best beam characteristic is achieved by attaching the 45 mm aperture ring. For instructions on changing the aperture ring see “Changing the aperture ring” on page 22.

Pan and tilt

The yoke pans 540° and the head tilts 267°. For maximum positioning accuracy, select 16-bit mode.

The pan/tilt speed (fast, norm, or slow) may be selected on the pan/tilt speed channel. Setting the pan/tilt speed channel to “blackout” causes the shutter to black out the light while the head is moving.

Speed control

There are two ways to control the speed at which effects move from one static position to another. These are known as tracking control and vector control and are selected on the Pan/Tilt Speed and Effect Speed Channels. These channels are independent so you may, for example, combine a vector control pan movement with a tracking control color fade.

In tracking mode, speed is determined by the cross-fade time. The controller continuously sends small position changes that the fixture “tracks.” To enable tracking mode, set the relevant speed channel to a tracking value. Note that in addition to enabling tracking control, some tracking values also provide overrides of the menu settings.

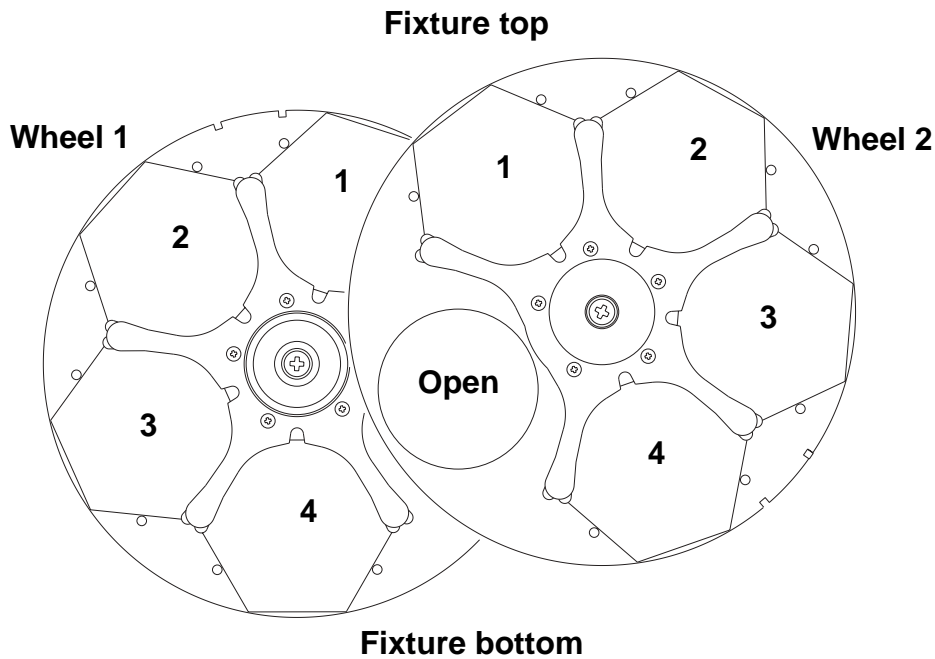
In vector mode, speed is set directly on a speed channel. *The cross-fade time must be 0.* Vector control provides a way to set speed on controllers that do not have programmable fade times and results in smooth movement regardless of the cross-fade time or the controller’s processing power.

OPTICS

This chapter describes the elements of the optical path and changes that can be made to them. It covers the color wheel and filters, front lenses, and aperture rings.

Color wheels

The following is a view of the color wheels as seen from the lamp.



COLOR WHEEL 1

Color wheel 1 provides the following four removable dichroic color filters and an open position.

- 1 Position 1 - Green 203 (P/N 46402006)
- 2 Position 2 - Blue 108 (P/N 46402007)
- 3 Position 3 - UV Transmitter (P/N 46402008)
- 4 Position 4 - Half Minus Green (P/N 46402009)
- 5 Position 5 - Open

COLOR WHEEL 2

Color wheel 2 provides the following four removable dichroic color filters and an open position:

- 1 Position 1 - Red 308 (P/N 46402005)
- 2 Position 2 - Orange 306M (P/N 46402004)
- 3 Position 3 - Green 208 (P/N 46402002)
- 4 Position 4 - Blue 102 (P/N 46402001)
- 5 Position 5 - Open

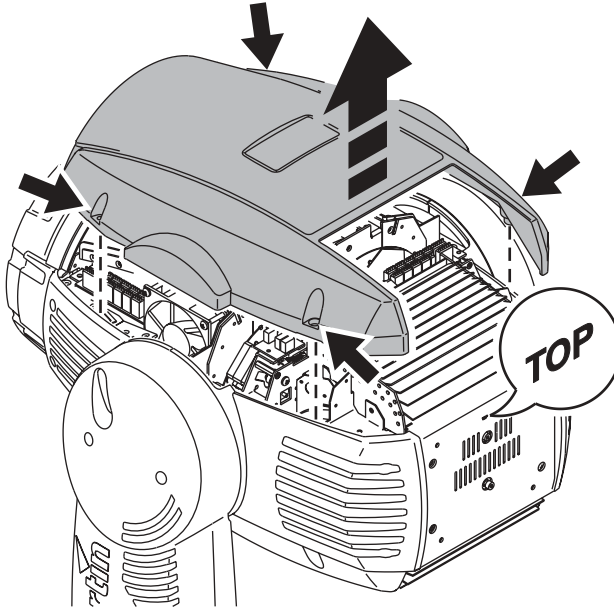
CHANGING COLOR FILTERS

Additional color filters can be ordered from Martin.

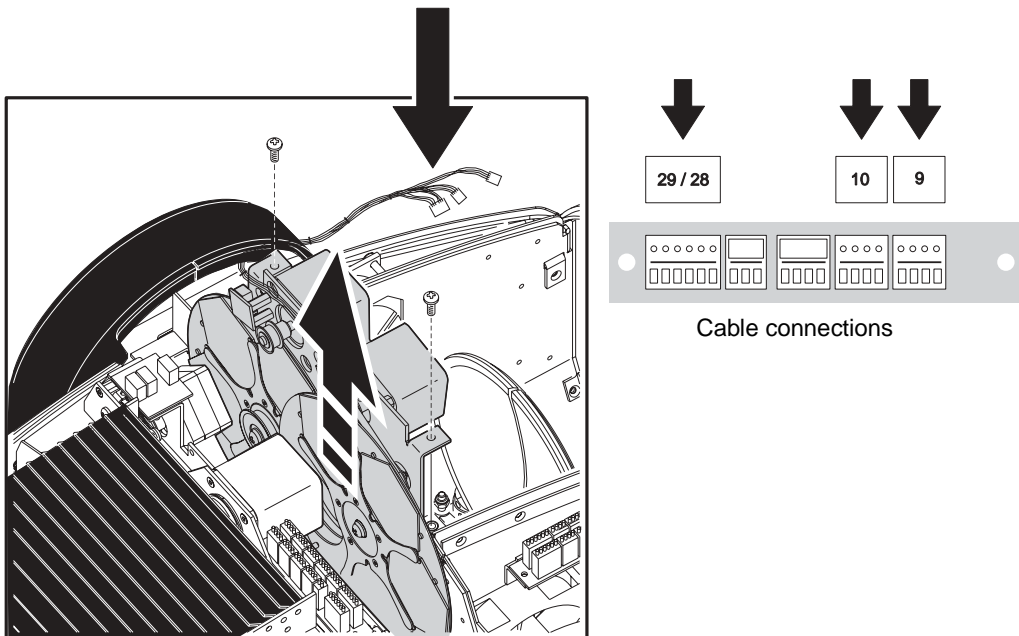
To ensure the best performance, lenses must be fitted with the coated surface away from the lamp.

To change a color filter:

- 1 Disconnect the fixture from power and allow it to cool.
- 2 Lock the head horizontally with the top cover up.
- 3 Remove the top cover of the fixture using a flathead screwdriver to unlock the four quarter-turn screws.

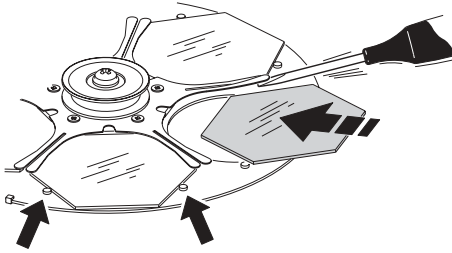


- 4 Remove the two screws holding the color wheel module in place using a Philips screwdriver. Disconnect the cables and lift the whole module out of the fixture.



- 5 Remove filters using your fingers and a soft cloth to protect the lens.

- 6 To install a filter, use a small flathead screwdriver to lift the filter support leaves on the color wheel.



- 7 Reinsert the color wheel module, screw it into place, and connect the cables.
- 8 Replace the fixture cover and apply power.

Changing the front lens

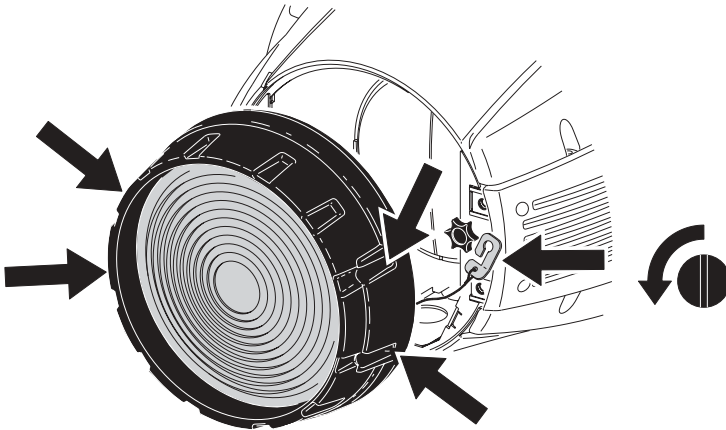
The MAC 2000 Wash has a Fresnel lens fitted as standard, and is also supplied with a PC lens, and a super-wide-angle lens.

Note that when using the Fresnel lens the 50 mm (2 in) aperture ring provides the highest light output. When the PC lens is fitted we recommend the use of the 45 mm (1.8 in) aperture ring (see “Changing the aperture ring” on page 22).

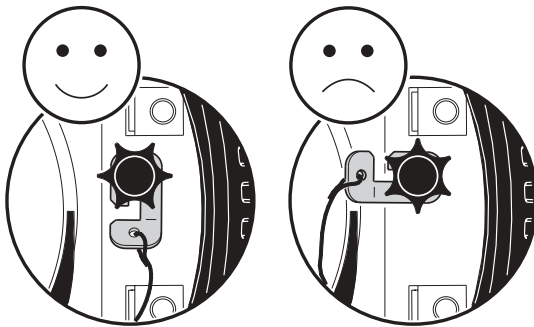
Warning *The front lens is very heavy. Ensure that it is secured to the MAC 2000 Wash with the internal safety cable provided.*

To change the lens:

- 1 Remove the lens using a flathead screwdriver to unlock the four quarter-turn screws.



- 2 Detach the safety cable from the thumb screw and then perform this process in reverse to attach a different lens. Note that when you attach the safety cable it is very important to keep the cable out of the optical path (see the following illustration).



Changing the aperture ring

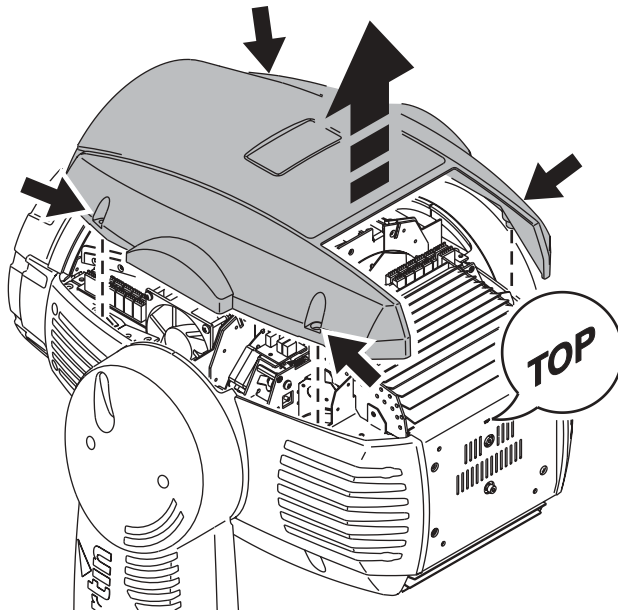
The MAC 2000 Wash comes factory fitted with a 50 mm (2 in) aperture ring (identified by 5 small holes), and 3 optional rings:

- 30 mm (1.2 in) - identified by 3 small holes
- 40 mm (1.6 in) - identified by 4 small holes
- 45 mm (1.8 in) - identified by 4 small holes and a half-crescent

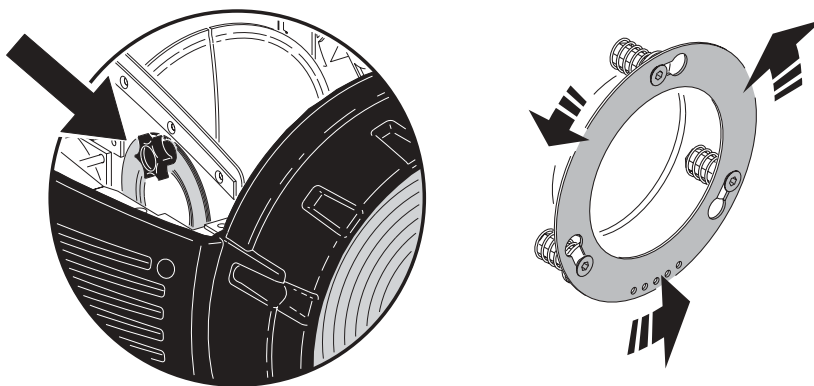
Use of the smaller apertures will result in less light output and a narrower beam angle.

To change aperture ring:

- 1 Disconnect the fixture from power and allow it to cool.
- 2 Lock the head horizontally with the top cover up.
- 3 Remove the top cover of the fixture using a flathead screwdriver to unlock the four quarter-turn screws.



- 4 The additional aperture rings can be found secured to the chassis with a thumb screw just behind the front lens (see the following illustration). Remove the thumb screw and select the appropriate aperture ring.



- 5 Remove the currently installed aperture ring, from just behind the zoom lens, by pushing and twisting it.
- 6 Install the replacement aperture ring, lock the others in place behind the front lens using the thumb screw, and replace the fixture cover.

ROUTINE MAINTENANCE

The MAC 2000 Wash requires routine cleaning. The schedule depends heavily on the operating environment; please consult a Martin service technician for recommendations.

Refer all service not described here to a qualified Martin technician.

Important! *Excessive dust, smoke fluid, and particulate buildup degrades performance and causes overheating and damage to the fixture that is not covered by the warranty.*

Warning! *Disconnect the fixture from power before removing any cover.*

Cleaning

Use care when cleaning optical components and work in a clean, well lit area. The coated surfaces are fragile and easily scratched. Do not use solvents that can damage plastic or painted surfaces.

Inspect the air filters regularly and clean before they become clogged. Replace the air filters with new ones when replacing the lamp.

To maintain adequate cooling, dust must be cleaned from the fans and air vents periodically.

To clean optical components

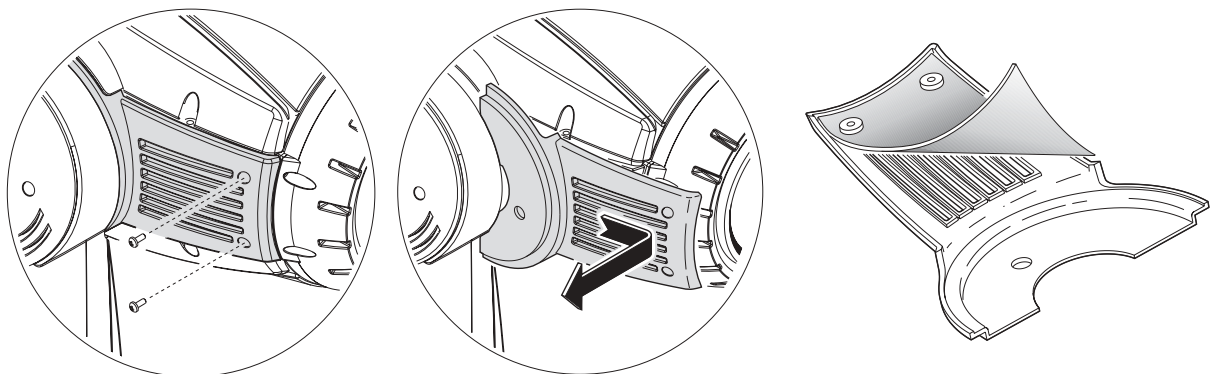
- 1 Disconnect the fixture from power and allow the components to cool completely. Remove the head cover.
- 2 Vacuum or gently blow away dust and loose particles with compressed air.
- 3 Remove stuck particles with an unscented tissue or cotton swab moistened with glass cleaner or distilled water. Do not rub the surface: lift the particles off with a soft repeated press.
- 4 Remove smoke and other residues with cotton swabs or unscented tissues moistened with isopropyl alcohol. A commercial glass cleaner may be used, but residues must be removed with distilled water. Clean with a slow circular motion from center to edge. Dry with a clean, soft and lint-free cloth or compressed air.

To clean the fan and air vents

- Remove dust from the fans and air vents with a soft brush, cotton swab, vacuum, or compressed air.

To clean or replace the air filters

- 1 Disconnect the fixture from power. On each side of the head, remove the 2 screws that hold the side cover using a Torx-20 screwdriver. Slide the cover forward to remove. Lift the filter off of the cover.
- 2 Clean the filters with a vacuum or compressed air, or replace them. If they are saturated with smoke fluid, etcetera, soak them in warm soapy water and blot dry.
- 3 Place the filters on the covers and replace the covers.



Software installation

Software updates are installed in the MAC 2000 Wash using a Martin MP-2 Uploader or a LightJockey 4064 DMX interface card. The procedure is found in the MP-2 user manual and the Martin Software Uploader online help file.

REQUIREMENTS

The following are required in order to install software.

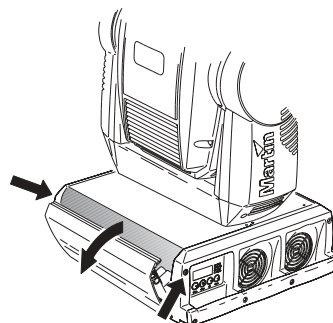
- The MAC 2000 Wash update file, available for download from the User Support Area of the Martin web site (<http://www.martin.dk>).
- The Martin Software Uploader program, version 4.0 or later, available for download from the User Support Area of the Martin web site.
- A Martin MP-2 Uploader connected to a Windows 95/98 PC, or a LightJockey Controller (DJ or Club) with 4064 DMX Interface card.

BOOT SECTOR JUMPER

If the normal upload procedure does not work, or if the software update notes call for a boot sector update, move the boot sector jumper at PL16 to the BOOT position before uploading software.

Setting the boot sector jumper

- 1 Disconnect the fixture from power.
- 2 Remove the top screws from the ends of the front side panel and tilt the panel down to expose the main circuit board.
- 3 Using the diagram in "Circuit board connections" on page 38 or the label inside the base, locate the BOOT jumper (PL16). Move the jumper to the "BOOT" position.
- 4 Perform a boot mode upload. When the upload is complete, disconnect the fixture from power and move the jumper back to the "NORM" position.



PREVENTING SOFTWARE UPDATES

Software updates are enabled by default, but you can disable this by setting the Write jumper (see "Circuit board connections" on page 38) to disable.

DMX PROTOCOL

This section contains two DMX protocols (both from protocol version 1.0A):

- “16-bit protocol” on page 26
- “8-bit protocol” on page 29

The 16-bit is the default protocol that is used. To modify this use the control menu. For more information see “Control menu” on page 32.

16-bit protocol

| DMX channel | Value | Percent | Function | Start code = 0 |
|-------------|-----------|--|--|----------------|
| 1 | 0 - 19 | 0 - 7 | Shutter, Strobe, Reset, Lamp On/Off | |
| | 20 - 49 | 8 - 19 | Shutter Closed (lamp reduced to 700 W (E-ballast) after 10 sec.) | |
| | 50 - 72 | 20 - 28 | No function (Shutter Open) | |
| | 73 - 79 | 29 - 31 | Strobe on fast->slow | |
| | 80 - 99 | 32 - 39 | Shutter open, lamp reduced to 700 W (E-ballast) | |
| | 100 - 119 | 40 - 47 | Pulse opening fast ->slow | |
| | 120 - 127 | 48 - 50 | Pulse closing fast ->slow | |
| | 128 - 147 | 51 - 57 | No function | |
| | 148 - 167 | 58 - 65 | Random Strobe Fast | |
| | 168 - 187 | 66 - 73 | Random Strobe Medium | |
| | 188 - 190 | 74 - 74 | Random Strobe Slow | |
| | 191 - 193 | 75 | No function | |
| | 194 - 196 | 76 | Random pulse opening fast | |
| | 197 - 199 | 77 | Random pulse opening slow | |
| | 200 - 202 | 78 - 79 | Random pulse closing fast | |
| | 203 - 207 | 80 - 81 | Random pulse closing slow | |
| | 208 - 217 | 82 - 85 | No function | |
| 218 - 227 | 86 - 89 | Reset Fixture | | |
| 228 - 237 | 90 - 93 | No function | | |
| 238 - 247 | 94 - 97 | Lamp On (Power On) | | |
| 248 - 255 | 98 - 100 | No Function | | |
| | | | Lamp Off (Power Off) Note: T ≥ 5 seconds | |
| 2 | 0 - 255 | 0 - 100 | Intensity 0 - 100% | |
| 3 | 0 - 255 | 0 - 100 | Cyan White -> Cyan | |
| 4 | 0 - 255 | 0 - 100 | Magenta White -> Magenta | |
| 5 | 0 - 255 | 0 - 100 | Yellow White -> Yellow | |
| 6 | 0 - 255 | 0 - 100 | CTC White -> CTC | |
| 7 | 0 | 0 | Color Wheel 1 (Multi Color) | |
| | 1 - 31 | 1 - 12 | White | |
| | 32 | 13 | White → Color 1,1 | |
| | 33 - 63 | 14 - 24 | Color 1,1 | |
| | 64 | 25 | Color 1,1 → Color 1,2 | |
| | 65 - 95 | 26 - 36 | Color 1,2 | |
| | 96 | 37 | Color 1,2 → Color 1,3 | |
| | 97 - 127 | 38 - 49 | Color 1,3 | |
| | 128 | 50 | Color 1,3 → Color 1,4 | |
| | 129 - 159 | 51 - 61 | Color 1,4 | |
| | 160 | 62 | Color 1,4 → White | |
| | | | White | |
| | | | Fixed Colors 1 | |
| | 161 - 165 | 63 - 64 | Color 1,4 | |
| | 166 - 170 | 65 - 66 | Color 1,3 | |
| | 171 - 175 | 67 - 68 | Color 1,2 | |
| | 176 - 180 | 69 - 70 | Color 1,1 | |
| 181 - 185 | 71 - 72 | White | | |
| | | Continuous Color 1 Scroll | | |
| 186 - 214 | 73 - 83 | fast ◊ slow CW | | |
| 215 - 243 | 84 - 95 | slow ◊ fast CCW | | |
| | | Random Color (CMY) | | |
| 244 - 247 | 96 | Random color fast, set min./ max. CMY limits on channels 2-4 | | |
| 248 - 251 | 97 - 98 | Random color medium, set min./ max. CMY limits on channels 2-4 | | |
| 252 - 255 | 99 - 100 | Random color slow, set min./ max. CMY limits on channels 2-4 | | |

| DMX channel | Value | Percent | Function | Start code = 0 |
|-------------|-----------|----------------------------------|---|----------------|
| 8 | 0 | 0 | Color Wheel 2 (Multi Color, MCW) | |
| | 1 - 31 | 1 - 12 | White | |
| | 32 | 13 | White → Color 2, 1 | |
| | 33 - 63 | 14 - 24 | Color 2, 1 | |
| | 64 | 25 | Color 2, 1 → Color 2, 2 | |
| | 65 - 95 | 26 - 37 | Color 2, 2 | |
| | 96 | 38 | Color 2, 2 → Color 2, 3 | |
| | 97 - 127 | 39 - 50 | Color 2,3 | |
| | 128 | 51 | Color 2, 3 → Color 2, 4 | |
| | 129 - 159 | 52 - 62 | Color 2, 4 | |
| | 160 | 63 | Color 2, 4 → White | |
| | | | White | |
| | | | Fixed Colors 2 | |
| 161 - 165 | 64 - 65 | Color 2, 4 | | |
| 166 - 170 | 66 - 66 | Color 2, 3 | | |
| 171 - 175 | 67 - 68 | Color 2, 2 | | |
| 176 - 180 | 69 - 70 | Color 2, 1 | | |
| 181 - 185 | 71 - 72 | White | | |
| | | Continuous Color 2 Scroll | | |
| 186 - 214 | 73 - 84 | fast → slow CW | | |
| 215 - 243 | 85 - 95 | slow → fast CCW | | |
| 244 - 255 | 96 - 100 | No Function | | |
| 9 | 0 - 244 | 0 - 95 | Zoom | |
| | 245 - 251 | 96 - 98 | Zoom: wide → narrow | |
| | 252 - 255 | 99 - 100 | No Changes. Open (Light buster mode) | |
| 10 | 0 - 255 | 0 - 100 | Barn Door 1 (Upper) Out → In | |
| 11 | 0 - 255 | 0 - 100 | Barn Door 2 (Lower) Out → In | |
| 12 | 0 - 255 | 0 - 100 | Barn Door 3 (Left) Out → In | |
| 13 | 0 - 255 | 0 - 100 | Barn Door 4 (Right) Out → In | |
| 14 | 0 - 255 | 0 - 100 | Rotate Barn Doors Right → Center → Left (Center = 127) | |
| 15 | 0 - 2 | 0 - 1 | MACRO functions | |
| | 3 - 255 | 2 - 255 | No Macro Reserved for Macros | |
| 16 | 0 | 0 | Pan coarse (most significant byte) | |
| | 127 | 50 | Max Left | |
| | 255 | 100 | Neutral Max Right | |
| 17 | 0 | 0 | Pan fine (least significant byte) | |
| | 127 | 50 | Max Left | |
| | 255 | 100 | Neutral Max Right | |
| 18 | 0 | 0 | Tilt coarse (most significant byte) | |
| | 127 | 50 | Max Up | |
| | 255 | 100 | Neutral Max Down | |
| 19 | 0 | 0 | Tilt fine (least significant byte) | |
| | 127 | 50 | Max Up | |
| | 255 | 100 | Neutral Max Down | |
| 20 | 0 - 2 | 0 - 1 | Speed: Pan/Tilt Movement | |
| | 3 - 236 | 2 - 92 | Tracking | |
| | 237 - 239 | 93 | Speed Fast → Slow | |
| | 240 - 242 | 94 | Tracking (Slow speed - Overriding the PTSP menu setting) | |
| | 243 - 245 | 95 | Tracking (Normal speed - Overriding the PTSP menu setting) | |
| | 246 - 248 | 96 - 97 | Tracking (Fast speed - Overriding the PTSP menu setting) | |
| | 249 - 251 | 98 | Fan speed (Regulation, min. noise level - Overriding the FAN menu setting) | |
| | 252 - 255 | 99 - 100 | Fan speed (Full speed, max. cooling - Overriding the FAN menu setting) Blackout while moving | |

| DMX channel | Value | Percent | Function | Start code = 0 |
|-------------|-----------|---|--|----------------|
| 21 | 0 - 2 | 0 | Speed: Dimmer, Cyan, Magenta, Yellow, CTC, Zoom. | |
| | 3 - 239 | 1 - 93 | Tracking | |
| | 240 - 242 | 94 - 95 | Speed Fast → Slow | |
| | 243 - 245 | 96 | Tracking (Studio mode disabled – Overriding the M0dE menu setting) | |
| | 246 - 248 | 97 - 98 | Tracking (Studio mode enabled – Overriding the M0dE menu setting) | |
| | 249 - 251 | 99 | Tracking (Shortcuts disabled - Overriding the SCUT menu setting) | |
| | 252 - 255 | 100 | Tracking (Shortcuts enabled - Overriding the SCUT menu setting) | |
| | | | Fast Speed | |
| | | | Speed: Color 1, Color 2, Barn Door. | |
| | 0 - 2 | 0 | Tracking | |
| | 3 - 239 | 1 - 93 | Speed Fast → Slow | |
| | 240 - 242 | 94 - 95 | Tracking (Studio mode disabled – Overriding the M0dE menu setting) | |
| | 243 - 245 | 96 | Tracking (Studio mode enabled – Overriding the M0dE menu setting) | |
| | 246 - 248 | 97 - 98 | Tracking (Shortcuts disabled - Overriding the SCUT menu setting) | |
| 249 - 251 | 99 | Tracking (Shortcuts enabled - Overriding the SCUT menu setting) | | |
| 252 - 255 | 100 | Blackout while moving | | |

8-bit protocol

| DMX channel | Value | Percent | Function | Start code = 0 |
|-------------|-----------|---|--|----------------|
| 1 | 0 - 19 | 0 - 7 | Shutter, Strobe, Reset, Lamp On/Off | |
| | 20 - 49 | 8 - 19 | Shutter Closed (lamp reduced to 700 W (E-ballast) after 10 sec.) | |
| | 50 - 72 | 20 - 28 | No function (Shutter Open) | |
| | 73 - 79 | 29 - 31 | Strobe on fast->slow | |
| | 80 - 99 | 32 - 39 | Shutter open, lamp reduced to 700 W (E-ballast) | |
| | 100 - 119 | 40 - 47 | Pulse opening fast ->slow | |
| | 120 - 127 | 48 - 50 | Pulse closing fast ->slow | |
| | 128 - 147 | 51 - 57 | No function | |
| | 148 - 167 | 58 - 65 | Random Strobe Fast | |
| | 168 - 187 | 66 - 73 | Random Strobe Medium | |
| | 188 - 190 | 74 - 74 | Random Strobe Slow | |
| | 191 - 193 | 75 | No function | |
| | 194 - 196 | 76 | Random pulse opening fast | |
| | 197 - 199 | 77 | Random pulse opening slow | |
| | 200 - 202 | 78 - 79 | Random pulse closing fast | |
| | 203 - 207 | 80 - 81 | Random pulse closing slow | |
| | 208 - 217 | 82 - 85 | No function | |
| 218 - 227 | 86 - 89 | Reset Fixture | | |
| 228 - 237 | 90 - 93 | No function | | |
| 238 - 247 | 94 - 97 | Lamp On (Power On) | | |
| 248 - 255 | 98 - 100 | No Function | | |
| | | | Lamp Off (Power Off) Note: T ≥ 5 seconds | |
| 2 | 0 - 255 | 0 - 100 | Intensity 0 - 100% | |
| 3 | 0 - 255 | 0 - 100 | Cyan White -> Cyan | |
| 4 | 0 - 255 | 0 - 100 | Magenta White -> Magenta | |
| 5 | 0 - 255 | 0 - 100 | Yellow White -> Yellow | |
| 6 | 0 - 255 | 0 - 100 | CTC White -> CTC | |
| 7 | 0 | 0 | Color Wheel 1 (Multi Color) | |
| | 1 - 31 | 1 - 12 | White | |
| | 32 | 13 | White → Color 1,1 | |
| | 33 - 63 | 14 - 24 | Color 1,1 | |
| | 64 | 25 | Color 1,1 → Color 1,2 | |
| | 65 - 95 | 26 - 36 | Color 1,2 | |
| | 96 | 37 | Color 1,2 → Color 1,3 | |
| | 97 - 127 | 38 - 49 | Color 1,3 | |
| | 128 | 50 | Color 1,3 → Color 1,4 | |
| | 129 - 159 | 51 - 61 | Color 1,4 | |
| | 160 | 62 | Color 1,4→White | |
| | | | White | |
| | | | Fixed Colors 1 | |
| | 161 - 165 | 63 - 64 | Color 1,4 | |
| | 166 - 170 | 65 - 66 | Color 1,3 | |
| | 171 - 175 | 67 - 68 | Color 1,2 | |
| | 176 - 180 | 69 - 70 | Color 1,1 | |
| 181 - 185 | 71 - 72 | White | | |
| | | Continuous Color 1 Scroll | | |
| 186 - 214 | 73 - 83 | fast ◊ slow CW | | |
| 215 - 243 | 84 - 95 | slow ◊ fast CCW | | |
| | | Random Color (CMY) | | |
| 244 - 247 | 96 | Random color fast,set min./ max. CMY limits on channels 2-4 | | |
| 248 - 251 | 97 - 98 | Random color medium,set min./ max. CMY limits on channels 2-4 | | |
| 252 - 255 | 99 - 100 | Random color slow,set min./ max. CMY limits on channels 2-4 | | |

| DMX channel | Value | Percent | Function | Start code = 0 |
|-------------|-----------|----------------------------------|--|----------------|
| 8 | 0 | 0 | Color Wheel 2 (Multi Color, MCW) | |
| | 1 - 31 | 1 - 12 | White | |
| | 32 | 13 | White → Color 2, 1 | |
| | 33 - 63 | 14 - 24 | Color 2, 1 | |
| | 64 | 25 | Color 2, 1 → Color 2, 2 | |
| | 65 - 95 | 26 - 37 | Color 2, 2 | |
| | 96 | 38 | Color 2, 2 → Color 2, 3 | |
| | 97 - 127 | 39 - 50 | Color 2,3 | |
| | 128 | 51 | Color 2, 3 → Color 2, 4 | |
| | 129 - 159 | 52 - 62 | Color 2, 4 | |
| | 160 | 63 | Color 2, 4 → White | |
| | | | White | |
| | | | Fixed Colors 2 | |
| 161 - 165 | 64 - 65 | Color 2, 4 | | |
| 166 - 170 | 66 - 66 | Color 2, 3 | | |
| 171 - 175 | 67 - 68 | Color 2, 2 | | |
| 176 - 180 | 69 - 70 | Color 2, 1 | | |
| 181 - 185 | 71 - 72 | White | | |
| | | Continuous Color 2 Scroll | | |
| 186 - 214 | 73 - 84 | fast → slow CW | | |
| 215 - 243 | 85 - 95 | slow → fast CCW | | |
| 244 - 255 | 96 - 100 | No Function | | |
| 9 | 0 - 244 | 0 - 95 | Zoom | |
| | 245 - 251 | 96 - 98 | Zoom: wide → narrow | |
| | 252 - 255 | 99 - 100 | No Changes. Open (Light buster mode) | |
| 10 | 0 - 255 | 0 - 100 | Barn Door 1 (Upper) Out → In | |
| 11 | 0 - 255 | 0 - 100 | Barn Door 2 (Lower) Out → In | |
| 12 | 0 - 255 | 0 - 100 | Barn Door 3 (Left) Out → In | |
| 13 | 0 - 255 | 0 - 100 | Barn Door 4 (Right) Out → In | |
| 14 | 0 - 255 | 0 - 100 | Rotate Barn Doors Right → Center → Left (Center = 127) | |
| 15 | 0 - 2 | 0 - 1 | MACRO functions | |
| | 3 - 255 | 2 - 255 | No Macro Reserved for Macros | |
| 16 | 0 | 0 | Pan | |
| | 127 | 50 | Max Left | |
| | 255 | 100 | Neutral Max Right | |
| 17 | 0 | 0 | Tilt | |
| | 127 | 50 | Max Up | |
| | 255 | 100 | Neutral Max Down | |
| 18 | 0 - 2 | 0 - 1 | Speed: Pan/Tilt Movement | |
| | 3 - 236 | 2 - 92 | Tracking | |
| | 237 - 239 | 93 - 94 | Speed Fast → Slow | |
| | 240 - 242 | 95 | Tracking (Slow speed - Overriding the PTSP menu setting) | |
| | 243 - 245 | 96 | Tracking (Normal speed - Overriding the PTSP menu setting) | |
| | 246 - 248 | 97 | Tracking (Fast speed - Overriding the PTSP menu setting) | |
| | 249 - 251 | 98 | Fan speed (Regulation, min. noise level – Overriding the FAN menu setting) | |
| | 252 - 255 | 99 - 100 | Fan speed (Full speed, max. cooling – Overriding the FAN menu setting) | |
| | | | Blackout while moving | |

| DMX channel | Value | Percent | Function | Start code = 0 |
|-------------|-----------|---|--|----------------|
| 19 | 0 - 2 | 0 - 1 | Speed: Dimmer, Cyan, Magenta, Yellow, CTC, Zoom | |
| | 3 - 239 | 2 - 93 | Tracking | |
| | 240 - 242 | 93 - 94 | Speed Fast → Slow | |
| | 243 - 245 | 95 - 96 | Tracking (Studio mode disabled – Overriding the MOdE menu setting) | |
| | 246 - 248 | 97 | Tracking (Studio mode enabled – Overriding the MOdE menu setting) | |
| | 249 - 251 | 98 | Tracking (Shortcuts disabled - Overriding the SCUT menu setting) | |
| | 252 - 255 | 99 - 100 | Tracking (Shortcuts enabled - Overriding the SCUT menu setting) | |
| | | | Fast Speed | |
| | | | Speed: Color 1, Color 2, Barn Door. | |
| | 0 - 2 | 0 - 1 | Tracking | |
| | 3 - 239 | 2 - 93 | Speed Fast → Slow | |
| | 240 - 242 | 93 - 94 | Tracking (Studio mode disabled – Overriding the MOdE menu setting) | |
| | 243 - 245 | 95 - 96 | Tracking (Studio mode enabled – Overriding the MOdE menu setting) | |
| | 246 - 248 | 97 | Tracking (Shortcuts disabled - Overriding the SCUT menu setting) | |
| 249 - 251 | 98 | Tracking (Shortcuts enabled - Overriding the SCUT menu setting) | | |
| 252 - 255 | 99 - 100 | Blackout while moving | | |

CONTROL MENU

Default values are in bold.

| Menu | Item | Options | Notes (Default settings in bold print) |
|------|--------------------|-----------------|--|
| AddR | - | 1 - 512 | DMX address. |
| PSET | - | 8bit | Full control with coarse pan and tilt. |
| | | 16bit | Full control with fine pan and tilt. |
| PATI | SWAP | ON | Map DMX pan control to tilt channel and vice versa. |
| | | OFF | Normal pan and tilt control. |
| | PINV | ON | Reverse DMX pan control, right → left. |
| | | OFF | Normal pan control, left → right. |
| | TINV | ON | Reverse DMX tilt control, down → up. |
| | | OFF | Normal tilt control, up → down. |
| PTSP | - | NORM | Medium pan/tilt speed. |
| | | FAST | Optimize movement for speed. |
| | | SLOW | Optimize movement for smoothness. |
| Stud | - | OFF | Optimize effects for speed. |
| | | ON | Optimize effects for silence. |
| PERS | dISP | ON | Display remains on. |
| | | OFF | Display extinguishes 2 minutes after last key press. |
| | dINT | 10 - 100 | Adjust display intensity. |
| | dLOF | ON | Enable DMX lamp off command. |
| | | OFF | Disable DMX lamp off command. |
| | dRES | ON | Enable DMX reset command. |
| | | OFF | Disable DMX reset command. |
| | ALON | OFF | No automatic lamp strike. |
| | | ON | Lamp strikes automatically within 90 seconds of power on. |
| | | dMX | Lamp strikes if DMX is present, douses 15 mins. after it's missing. |
| | SCUT | ON | Color wheels turn shortest distance. |
| | | OFF | Color wheel paths oscillate. |
| | TRAC | MOdE | MOd1 : Absolute delta value algorithm (for most controllers) moD2 : Real delta value algorithm. |
| | | CAL | 1-10. Tracking samples. Increase if pan/tilt is not smooth. (Default = 6). |
| | dICU | dIM1 | Dimmer curve 1. |
| dIM2 | | Dimmer curve 2. | |
| dFSE | FACT | LOAD | Return all personality settings (not calibrations) to factory defaults. |
| | CUS1 , CUS2 , CUS3 | LOAD | Load custom configuration. |
| | | SAVE | Save current configuration. |

| Menu | Item | Options | Notes (Default settings in bold print) |
|------|---------------------|---|---|
| INFO | TIME / HRS | TOTL | Total hours of operation since fabricated. |
| | | RSET | Hours of operation since counter reset. To reset, display counter and press [↑] for 5 seconds. |
| | TIME / L HR | TOTL | Total hours of operation with lamp on since fabricated. |
| | | RSET | Lamp hours since counter reset. To reset, display counter and press [↑] for 5 seconds. |
| | TIME / L ST | TOTL | Total number of lamp strikes since fabricated. |
| | | RSET | Number of lamp strikes since counter reset. To reset, display counter and press [↑] for 5 seconds. |
| | TEMP | HEAd | Head temperature. |
| | | bASE | Base temperature. |
| VER | - | CPU firmware version. | |
| dMXL | - | STCO | Decimal value of the DMX start code. The start code must be 0 for the MAC 2000 Wash to function properly. |
| | | dIM . . EFSP | DMX value (from 0 - 255) received for each channel. |
| MAN | RST | - | Reset fixture. |
| | L ON | - | Lamp on. |
| | L OFF | - | Lamp off. |
| | SHUT | OPEN | Open shutter. |
| | | CLOS | Close shutter. |
| | | STRF | Fast strobe. |
| | | STRM | Medium strobe. |
| | | STRS | Slow strobe. |
| | dIM | 0 - 255 | Dimmer. |
| | CYAN , MAG , YEL | 0 - 255 | White →Cyan/Magenta/Yellow. |
| | CTC | 0 - 255 | Color temperature correction. Cold →Warm (0-178 mireds). |
| | COL1 | OPEN | Color wheel 1. Open position. |
| | | COL1 | Color wheel 1. Color position 1. |
| | | COL2 | Color wheel 1. Color position 2. |
| | | COL3 | Color wheel 1. Color position 3. |
| | | COL4 | Color wheel 1. Color position 4. |
| | | CW F | Color wheel 1. Clockwise wheel rotation - fast. |
| | | CCWF | Color wheel 1. Counter clockwise wheel rotation - fast. |
| | | CW M | Color wheel 1. Clockwise wheel rotation - medium. |
| | | CCWM | Color wheel 1. Counter clockwise wheel rotation - medium. |
| CW S | | Color wheel 1. Clockwise wheel rotation - slow. | |
| CCWS | | Color wheel 1. Counter clockwise wheel rotation - slow. | |
| RNDF | | Random CMY color - fast. | |
| RNDM | | Random CMY color - medium. | |
| RNDS | | Random CMY color - slow. | |

| Menu | Item | Options | Notes (Default settings in bold print) |
|---|---------------------|---|--|
| MAN cont. | COL2 | OPEN | Color wheel 2. Open position. |
| | | COL1 | Color wheel 2. Color position 1. |
| | | COL2 | Color wheel 2. Color position 2. |
| | | COL3 | Color wheel 2. Color position 3. |
| | | COL4 | Color wheel 2. Color position 4. |
| | | CW F | Color wheel 2. Clockwise wheel rotation - fast. |
| | | CCWF | Color wheel 2. Counter clockwise wheel rotation - fast. |
| | | CW M | Color wheel 2. Clockwise wheel rotation - medium. |
| | | CCWM | Color wheel 2. Counter clockwise wheel rotation - medium. |
| | | CW S | Color wheel 2. Clockwise wheel rotation - slow. |
| | | CCWS | Color wheel 2. Counter clockwise wheel rotation - slow. |
| | ZOOM | 0 - 255 | Zoom: Narrow - Floodspot. |
| | b1IO | 0 - 255 | Barn door 1. Open - close. |
| | b2IO | 0 - 255 | Barn door 2. Open - close. |
| b3IO | 0 - 255 | Barn door 3. Open - close. | |
| b4IO | 0 - 255 | Barn door 4. Open - close. | |
| PAN | 0 - 255 | Pan - Left→Right | |
| TILT | 0 - 255 | Tilt - Up→Down | |
| TSEQ | - | RUN | Run a general test of all effects |
| UTIL (Press and hold Enter for a few seconds to use this menu) | FEbA | ON | Enable pan/tilt position correction system. |
| | | OFF | Disable pan/tilt feedback. Setting not saved. |
| | EFFb | ON | Enable on the fly reset of color wheels. |
| | | OFF | Disable on the fly reset of color wheels. |
| | Adj | - | See "Adjustment submenu" on page 35. |
| | CAL/P OF | -127 to 127 | Pan offset. |
| | CAL/T OF | -127 to 127 | Tilt offset. |
| | CAL/d OF | -127 to 127 | Dimmer offset. |
| | CAL/C OF | -127 to 127 | Cyan offset. |
| | CAL/M OF | -127 to 127 | Magenta offset. |
| | CAL/Y OF | -127 to 127 | Yellow offset. |
| | CAL/CTOF | -127 to 127 | CTC offset. |
| | CAL/C1OF | -127 to 127 | Color wheel 1 offset. |
| | CAL/C2OF | -127 to 127 | Color wheel 2 offset. |
| | CAL/ZOOF | -127 to 127 | Zoom offset. |
| dFOF | SURE | Return all offsets to the default settings. | |
| PCbT | LEd | PCB test for service use only. | |
| FANS | REG | Regulate the effect cooling fans for quieter performance. Enabling this option increases the operating temperature and thus increases wear on the components. | |
| | FULL | Operate cooling fans at full speed. | |
| UPLd | SURE | Manually set fixture to software update mode. | |
| MSG) | Replace lamp | | Displayed when lamp hours exceed average life (750 hours). |
| | Fixture overheating | | Displayed if head temperature exceeds 120° C (248° F). |

ADJUSTMENT SUBMENU

This functions are used by Martin service technicians to adjust the fixture. This menu is located under UTIL / Adj.

| Menu | Item | Options | Notes |
|------|------------------------|----------------------------|--|
| RST | - | - | Reset fixture. |
| L ON | - | - | Strike lamp. |
| LoFF | - | - | Douse lamp. |
| HEAD | dIM | OPEN | Open dimmer. |
| | | Adj | Turn dimmer to adjustment position (closed mechanical stop). |
| | | CLOS | Close dimmer. |
| | | STRO | Strobe. |
| | CYAN, MAG, YEL, CTC | MIN | Color flags out. |
| | | MAX | Color flags in. |
| | Col | MAX | Color flags in. |
| | | OPEN | Turn color wheels 1 & 2 to open position. |
| | | Adj | Turn color wheels 1 & 2 to the adjustment position. |
| | bd | OUT | Barn doors out. |
| | | IN | Barn doors in. |
| | BROT | LEFT | Barn door rotation left. |
| | | RIGH | Barn door rotation right. |
| | ZOOM | NARR | Zoom to spot (narrow beam). |
| WIDE | | Zoom to flood (wide beam). | |
| PATI | - | NEUT | Move pan and tilt to neutral positions. |
| | | PNTd | Pan neutral, tilt down. |
| | | PNTU | Pan neutral, tilt up. |
| | | PLTN | Pan left, tilt neutral. |
| | | PRTN | Pan right, tilt neutral. |
| | | PLTd | Pan left, tilt down. |
| | | PRTU | Pan right, tilt up. |

DISPLAY MESSAGES

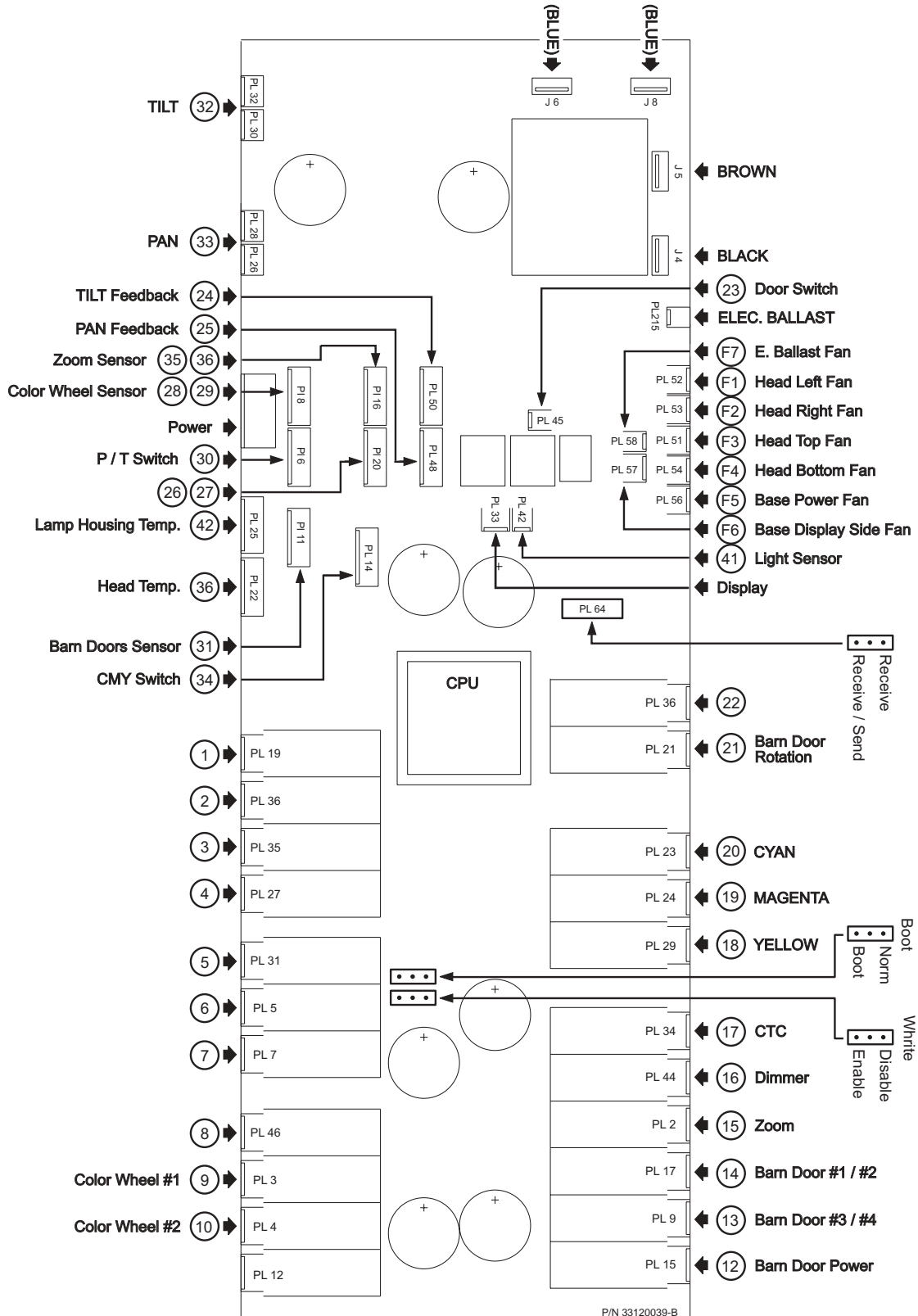
| Message | Appears when... | What to do |
|--|---|--|
| RST (Reset) | ... the fixture is indexing effects at startup. | Wait for reset to complete. |
| SRST (Serial reset) | ... the fixture has received a reset command from the controller. | Wait for reset to complete. Set PERS/dRES to off to prevent accidental reset commands. |
| HOME | ... the effects have been indexed and are moving to their default positions. | Wait a few moments. |
| OPEN | ...the lamp access cover is not fully closed. | Verify that the lamp access cover is locked in place. |
| LERR (Lamp error) | ... the lamp doesn't ignite within 10 minutes of receiving the 'Lamp ON' command. Likely reasons are a missing or defective lamp, or insufficient AC voltage. | Check the lamp. Check that the voltage and frequency settings match the local supply. |
| MERR (Memory error) | ...the EEPROM memory cannot be read. | Contact Martin service personnel for assistance. |
| ShER (Short error) | ... the fixture detects the lamp is ON but no 'Lamp ON' command has been received. This can occur if the lamp relay is stuck or if the lamp-power feedback circuit fails. The fixture may be operated but remote lamp on/off may be effected. | Contact Martin service personnel for assistance. |
| bTER (Base temperature error) HTER (Head temperature error) | ... there is a fault with the temperature sensor in the base or head. | Contact Martin service personnel for assistance. |
| FbEP (Feedback error pan) FbET (Feedback error tilt) FbER (Feedback error pan/tilt) | ...pan (FbEp), tilt (FbET) or both (FbER) feedback circuits are malfunctioning. It will still be possible to operate the fixture, though it goes into a "safe" mode where maximum speed is reduced, thus preventing the fixture from losing track of its home position (losing step). | Contact Martin service personnel for assistance. |
| PAER (Pan time-out) TIER (Tilt time-out) CYER (Cyan time-out) MAER (Magenta time-out) YEER (Yellow time-out) CTER (CTC time-out) COER (Color wheel 1) C2ER (Color wheel 2 time-out) ZOER (Zoom time-out) | ...the electric indexing circuit is malfunctioning. The fixture will, after the time-out, establish a mechanical stop, and continue to work normally. | Reset fixture again. Contact Martin service personnel if problem continues. |
| RBER | ...the barn door rotation mechanism is malfunctioning. | Reset fixture again. Contact Martin service personnel if problem continues. |
| S3SC S4SC S5SC S6SC S7SC S8SC S9SC S10S S11S S12S | ...an effect does not move away from the index position under reset, a sensor or micro-switch circuit is shorted, or a micro-switch is stuck or connected incorrectly. | Contact Martin service personnel for assistance. |
| RAME | ...there is an on board RAM memory error. | Contact Martin service personnel for assistance. |
| OPER | ...there is an on-board programming error. | Contact Martin service personnel for assistance. |
| L1ER | ...light sensor 1 is in error status. | Contact Martin service personnel for assistance. |
| LTER | ...lamp temperature error. | Set the fan speed to FULL using the UTIL menu and restart the fixture. Contact Martin service personnel if problem persists. |
| THER | ---there is a thermoswitch error or a jumper on PL47 error. | Contact Martin service personnel for assistance. |

Table 2: Display messages

TROUBLESHOOTING

| Problem | Probable cause(s) | Remedy |
|---|--|--|
| One or more of the fixtures is completely dead. | No power to fixture. | Check that power is switched on and cables are plugged in. |
| | Primary fuse blown (located near mains inlet). | Disconnect fixture and replace fuse. |
| | Secondary fuse(s) blown (located on PCB inside base). | Disconnect fixture. Check fuses on PCB and replace. |
| Fixtures reset correctly but respond erratically or not at all to the controller. | Bad data link. | Inspect connections and cables. Correct poor connections. Repair or replace damaged cables. |
| | Data link not terminated. | Insert termination plug in output jack of the last fixture on the link. |
| | Incorrect addressing of the fixtures. | Check fixture address and protocol settings. |
| | One of the fixtures is defective and disturbs data transmission on the link. | Bypass one fixture at a time until normal operation is regained: unplug the XLR in and out connectors and connect them directly together. Have the fixture serviced by a qualified technician. |
| | XLR pin-out on fixtures does not match (pins 2 and 3 reversed). | Install a phase-reversing cable between the fixtures or swap pins 2 and 3 in the fixture that behaves erratically. |
| No light and "LERR" error message displayed. | The transformer settings do not match local AC voltage and frequency. | Disconnect fixture. Check transformer settings and correct if necessary. |
| | Lamp blown | Disconnect fixture and replace lamp. |
| | Lamp not installed | Disconnect fixture and install lamp. |
| | Lamp access safety switch open | Verify that lamp access plate is fully seated and locked in place. |
| | Lamp too hot to strike | Send a lamp off command. Allow the lamp to cool for 5 - 10 minutes and try again. |
| Lamp cuts out intermittently. | Fixture is too hot. | Allow fixture to cool. Clean air filters. Reduce ambient room temperature. |
| | The transformer settings do not match local AC voltage and frequency. | Disconnect fixture. Check transformer settings and correct if necessary. |

CIRCUIT BOARD CONNECTIONS



SPECIFICATIONS

PHYSICAL

| | |
|---------|------------------|
| Length: | 408 mm (16.0 in) |
| Width: | 490 mm (19.3 in) |
| Height: | 750 mm (29.5 in) |
| Weight: | 34 kg (74.8 lbs) |

INSTALLATION

| | |
|---|--------------|
| Minimum distance to combustible materials | 1 m (39 in) |
| Minimum distance to illuminated surfaces | 3 m (10 ft) |
| Minimum distance around fans and vents | 0.1 m (4 in) |
| Orientation | any |

SOURCE

| | |
|------------------|-------------------------------------|
| Lamp: | 1200 W short arc discharge |
| Base: | Double-ended SFC 10-4 with key |
| Approved models: | Osram HMI 1200 W/S short-Arc |
| Control: | automatic and remote, hot re-strike |
| Ballast: | electronic |

ELECTRICAL

| | |
|--|---------------------------------|
| AC input: | 3 m trailing cable w/o cord cap |
| Operating ranges: | 100-130/200-260 V, 50/60 Hz |
| Main fuses (x 2 - when local AC supply is 200 - 250 V) | 15 A |
| Main fuses (x 2 - when local AC supply is 100 - 120 V) | T 20 A |
| Fuse F101 | T 6.3 A |
| Fuse F102 | T 10 A |
| Fuse F103 | T 3.15 A |
| Fuse F104 | T 3.15 A |
| Power supply | Electronic auto-ranging |

MAXIMUM POWER AND CURRENT

| | |
|-----------------|----------------|
| 100 V @ 50 Hz: | 1530 W, 20.9 A |
| 100 V @ 60 Hz: | 1570 W, 20.9 A |
| 120 V @ 50 Hz: | 1520 W, 18 A |
| 120 V @ 60 Hz: | 1520 W, 17.7 A |
| 208 V @ 50 Hz: | 1450 W, 10.4 A |
| 208 V @ 60 Hz: | 1450 W, 10.2 A |
| 230 V @ 50 Hz: | 1450 W, 9.5 A |
| 230 V @/ 60 Hz: | 1460 W, 9.4 A |
| 250 V @ 50 Hz: | 1450 W, 8.8 A |
| 250 V @ 60 Hz: | 1460 W, 8.6 A |

THERMAL

| | |
|-----------------------------------|-----------------|
| Maximum ambient temperature (Ta): | 40° C (104° F) |
| Maximum surface temperature: | 140° C (284° F) |
| Total heat dissipation: | ca. 5120 Btu/hr |

PHOTOMETRICS (STANDARD FRESNEL LENS)

| | |
|---------------------------------|---|
| Measurement conditions: | Standard Fresnel lens, 50 mm aperture ring |
| Light buster mode (no diffuser) | 31300 lumens, beam angle 11° (measured at 7.6 meters) |
| Zoom narrow | 21130 lumens, beam angle 15° (measured at 7.6 meters) |
| Zoom wide | 32027 lumens, beam angle 40° (measured at 3.8 meters) |
| Measurement source: | Osram HMI 1200 W/S |

PHOTOMETRICS (PC LENS)

| | |
|---------------------------------|---|
| Measurement conditions | PC lens, 50 mm aperture ring |
| Light buster mode (no diffuser) | 33125 lumens, beam angle 12° (measured at 7.6 meters) |
| Zoom narrow | 23421 lumens, beam angle 12° (measured at 7.6 meters) |
| Zoom wide | 32550 lumens, beam angle 34° (measured at 2.3 meters) |
| Measurement source | Osram HMI 1200 W/S |

PHOTOMETRICS (OPTIONAL SUPER-WIDE-ANGLE LENS)

| | |
|---------------------------------|--|
| Measurement conditions | Super-wide-angle lens, 50 mm aperture ring |
| Light buster mode (no diffuser) | beam angle 66° (measured at 2.4 meters) |
| Zoom narrow | beam angle 70° (measured at 1.7 meters) |
| Zoom wide | beam angle 80° (measured at 1.7 meters) |
| Measurement source | Osram HMI 1200 W/S |

CONTROL AND PROGRAMMING

| | |
|------------------------|--|
| Protocol | USITT DMX-512 |
| Control channels | 19 or 21 |
| Receiver | Opto-isolated RS-485 |
| Data I/O | locking 3-pin & 5-pin XLR, pin 1 shield, pin 2 cold (-), pin 3 hot (+) |
| Setting and addressing | LED control panel, remote w/ MP-2 uploader |
| Pan/tilt resolution | 8- or 16-bit |
| Movement control | tracking and vector |
| Software installation | serial upload (MUF) |

ELECTROMECHANICAL EFFECTS

| | |
|-------------------|---|
| Cyan | 0 - 100% |
| Magenta | 0 - 100% |
| Yellow | 0 - 100% |
| Color correction | 0 - 178 mireds |
| Color wheels x 2 | 4 removable positions plus open |
| Dimmer/shutter | full range dimming and variable speed flash |
| Motorized zoom | see photometric data for zoom beam angles |
| Light buster mode | narrow beam with diffuser removed |
| Pan | 540° |
| Tilt | 267° |

COLOR FILTERS

| | |
|-----------|------------|
| Shape | hexangular |
| Thickness | 1.2 mm |
| Type | dichroic |

DESIGN STANDARDS

| | |
|-----------------|---------------------------|
| EU EMC | EN 50 081-1, EN 50 082-1 |
| EU safety | EN 60598-1, EN 60598-2-17 |
| Canadian safety | CSA C22.2 No. 166 |
| US safety | ANSI/UL 157 |

CONSTRUCTION

| | |
|-------------------|---|
| Housing | UV-resistant fiber-reinforced composite |
| Colors | black |
| Protection factor | IP 20 |

INSTALLATION

| | |
|-----------------|---------------------------------------|
| Mounting points | 8 pairs of 1/4-turn locks, offset 45° |
| Orientation | any |

ORDERING INFORMATION

| | |
|---------------------------------------|--------------|
| MAC 2000 Wash in 2-unit flight case | P/N 90203000 |
| MAC 2000 Wash E in single flight case | P/N 90203010 |

INCLUDED ITEMS

2 x Omega bracket, 1/4-turn
PC lens
User manual
30 mm (1.2 in), 40 mm (1.6 in), 45 mm (1.8 in) and 50 mm (2 in) aperture rings
Super-wide-angle lens
PC lens
Fresnel lens

ACCESSORIES

| | |
|---------------------------|--------------|
| MP-2 Uploader | P/N 90758420 |
| G-clamp | P/N 91602003 |
| Half-coupler clamp | P/N 91602005 |
| The Wife DMX Tester | P/N 91611038 |
| Barndoor system | P/N tba |