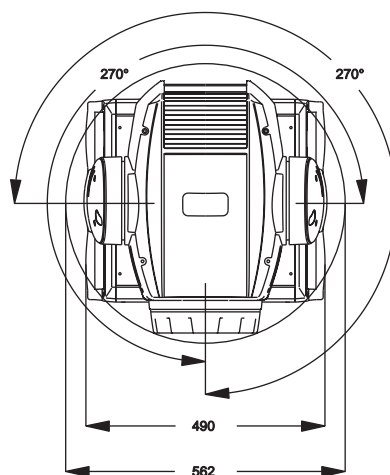
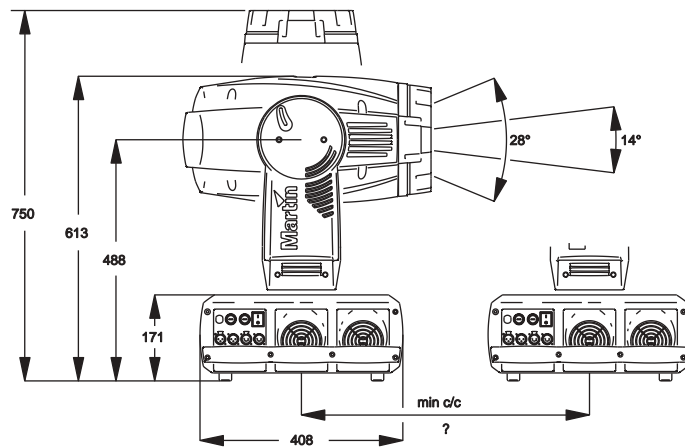
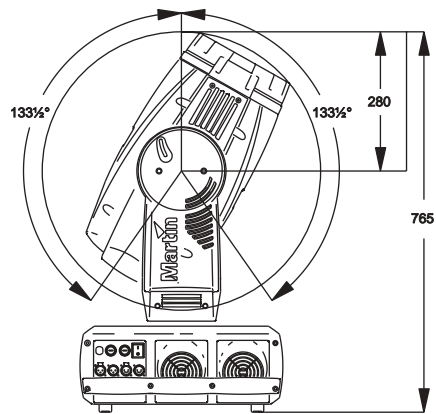


# MAC 2000 Wash

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 and optional dimmer wheel are 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.

**Note:** *This manual describes functionality available from version 1.7 of the MAC 2000 Wash firmware. 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.com>.*

## 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 ( $T_a$ ) 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 cardboard box or 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 x 15 A main fuses (for use with 200-250 V local power supply)
- 2 clamp attachment brackets
- XLR cable

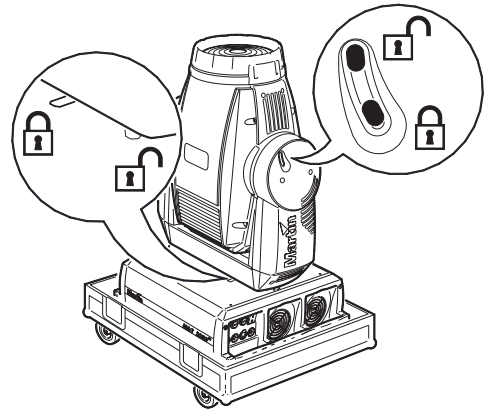


Figure 1: Pan and tilt locks

## 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.

## Cardboard box

Instructions for removing models that have been shipped in a cardboard box are printed on the outside of the box. The cardboard box is not designed for repeated use and for transportation of the fixture we strongly recommend the use of one of our flight cases.

## 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.

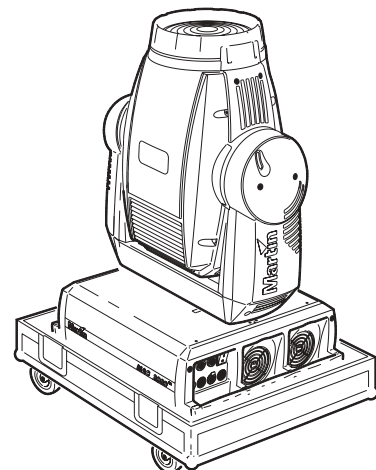


Figure 2: Single unit transport position

## 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.

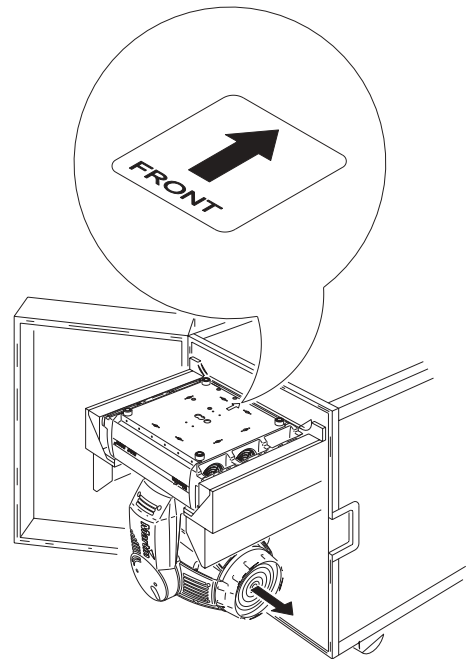


Figure 3: Double unit transport position

### 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 lamp

The MAC 2000 Wash comes with a double-ended lamp installed. This is one of two models:

- Up to the middle of 2004 the lamp will be an OSRAM HMI 1200 W/S discharge lamp.
- During 2004 the Philips MSI 1200 discharge lamp will be phased into being supplied with the MAC 2000 Wash.

The lamps are both highly-efficient short-arc sources providing an exceptionally stable 6000K color temperature, respective color rendering indexes of 90 (OSRAM) and 85 (Philips), and an average life of 750 hours.

The lamps are capable of hot restrike.

The ends of the lamp have specially-developed keys, shown in Figure 6, to ensure proper installation.

**Note:** *Do not use OSRAM 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.

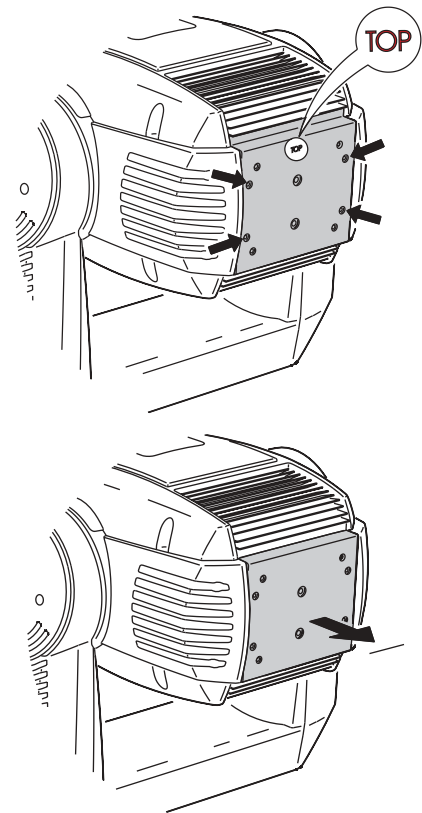


Figure 4: Lamp access

## Lamp replacement

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

Replacement lamps are available from your Martin dealer. Please order:

- OSRAM HMI 1200 W/S
- Philips MSI 1200

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.

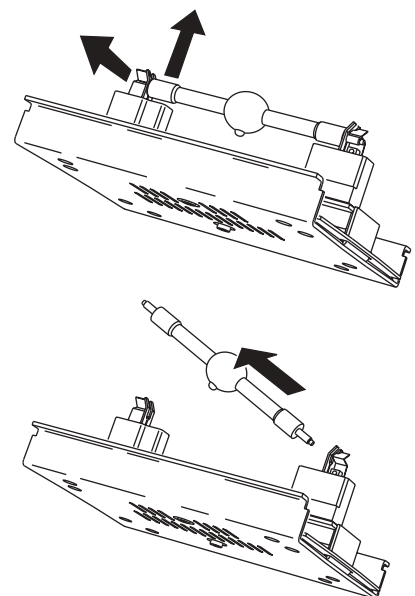


Figure 5: Lamp removal



- 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.
- 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.

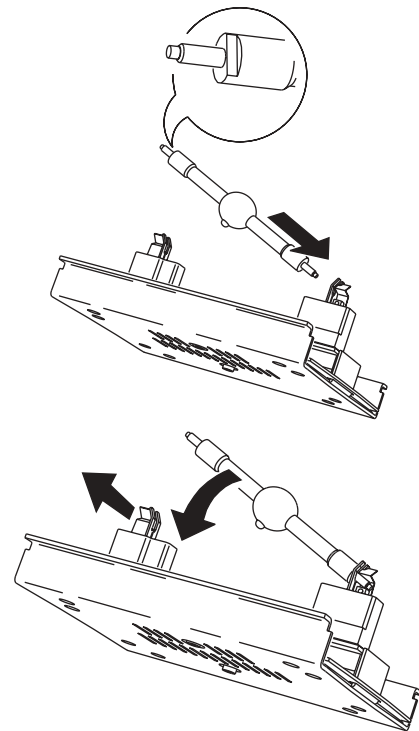


Figure 6: Lamp insertion

- 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.

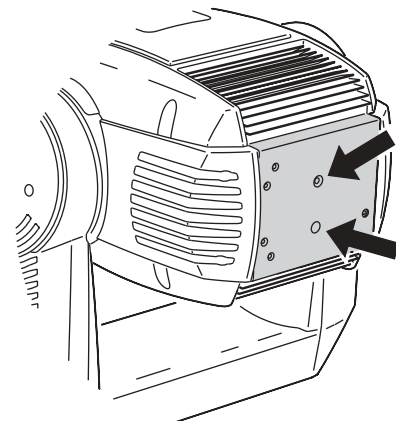


Figure 7: Lamp adjustment

# 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  $\Omega$  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.

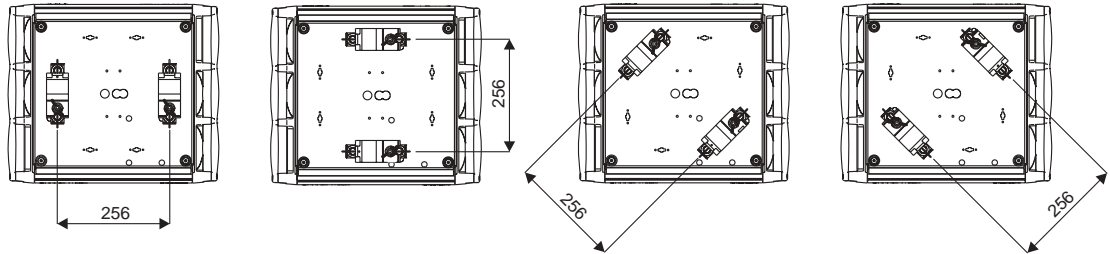


Figure 8: Clamp bracket positions

**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 caribiner 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.

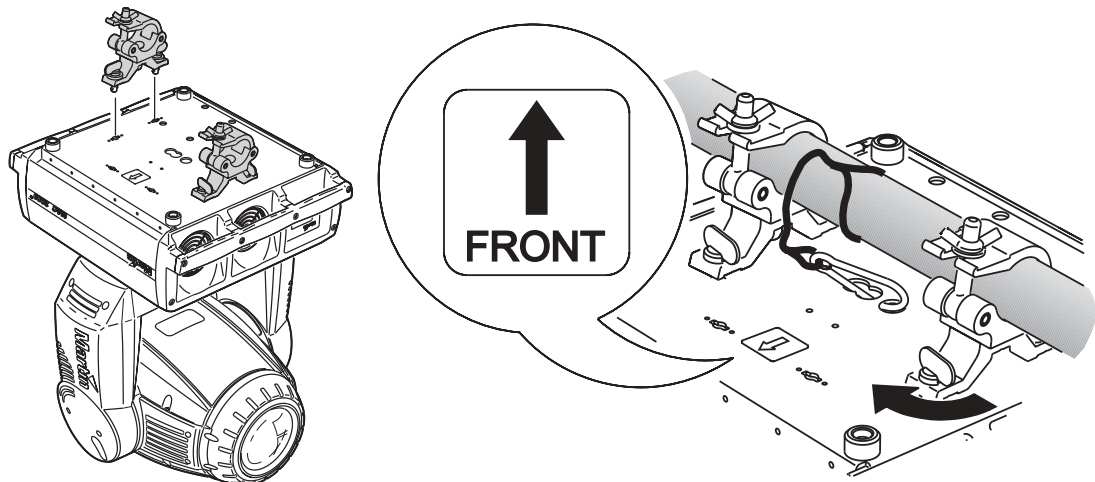


Figure 9: Rigging hardware installation

# 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 39) 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 34 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 `16bit` 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.
- Pan and tilt invert (`PATI`) menu swaps and/or inverts pan and tilt.
- Pan/tilt speed (`PTSP`) 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.
- Studio mode (`STUD`) setting optimizes all effects besides pan and tilt for speed or quietness.
- 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, `MOD2`, 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 (`DLOF`).

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 (`dLOF`) is on.

## Shutter dimming curves

Two dimming curves are available for the mechanical shutter system for adjusting intensity (`PERS/dICU`). The default, dimmer curve 1, simulates the dimming of a tungsten lamp. Dimmer curve 2 applies a linear algorithm to intensity adjustment, that results in even adjustment across the whole dimming range. Note that this setting has no effect on the optional dimming wheel, that uses a logarithmic dimming curve.

## 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 (`RSET`) 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 To calibrate the optional dimmer wheel to an offset from its mechanically indexed position, select `UTIL/CAL/DIMW` and press [Enter]. The default value of 128 can be adjusted up or down to move the dimmer wheel relatively forward or back from its indexed position. Make any necessary adjustments and press [Enter] to save the setting.
- 5 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.
- 6 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.
- 7 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.
- 8 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 “Firmware installation” on page 26.



# 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 27.

## 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.

## Dimming and strobe

Two dimming systems are available - a built-in mechanical dimmer/shutter and an optional dimmer wheel (orderable separately).

### Shutter

The mechanical shutter system provides full-range 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. Two dimming curves are available; one that simulates a tungsten lamp and another that provides linear dimming (see “Shutter dimming curves” on page 14).

### Optional dimmer wheel

A separately orderable dimmer wheel (P/N 62324018) that provides enhanced dimming can be installed in place of color wheel 2. The dimmer wheel uses a logarithmic algorithm that, compared with the dimming available from the shutter system, enables much finer and smoother dimming at the bottom end of the dimming range.

If you use the dimmer wheel, then it is recommended that you do not use the shutter system to control intensity, and that the shutters be set to fully open (ensure that 255 is the default DMX value issued on the shutter intensity channel from your controller). You can continue to use other shutter effects, such as the strobe.

The wheel is detected automatically by the fixture when installed. The installation procedure is described in “Installing the optional dimmer wheel” on page 23.

## 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 22.

## 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 23.

## 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.

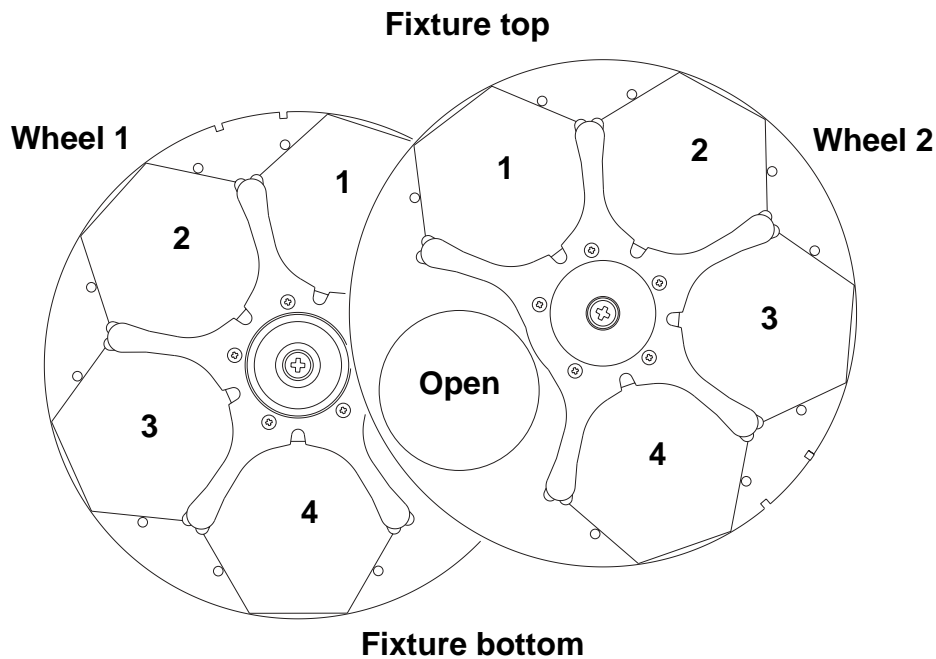
# OPTICS

This chapter describes the elements of the optical path and changes that can be made to them. It covers the:

- Color wheel and filters, below
- Front lenses, on page 22
- Aperture rings, on page 23
- Optional dimmer wheel, on page 23

## 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

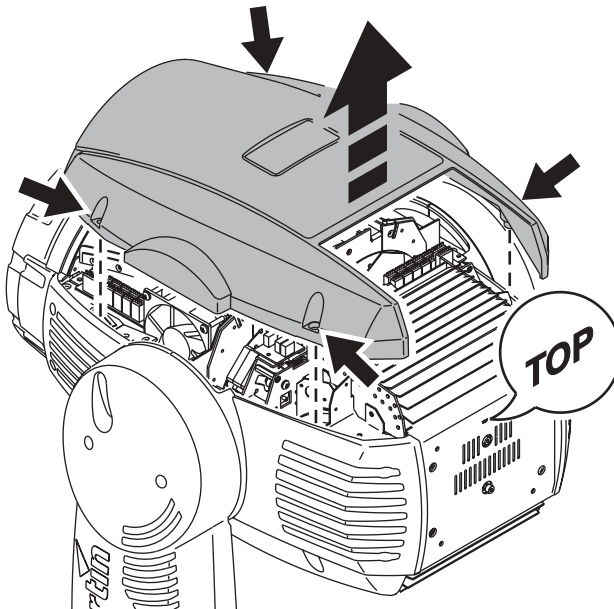
## Changing color filters

Additional color filters can be ordered from Martin.

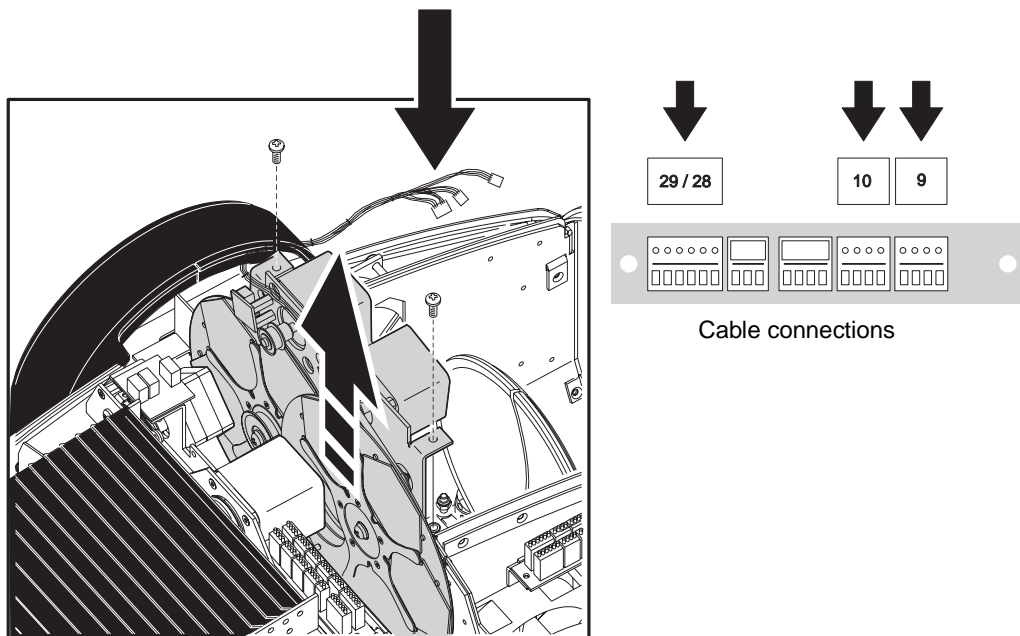
To ensure the best performance, lenses must be fitted with the coated surface away from the lamp.

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.

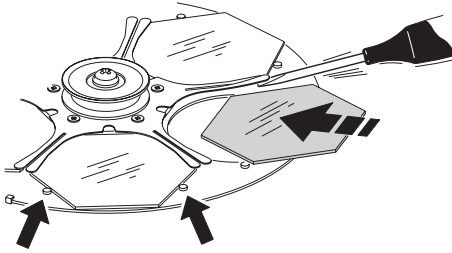


- 4 Remove the two screws holding the color wheel module in place using a Philips screwdriver. Disconnect the cables and lift the whole module out of the fixture.



- 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

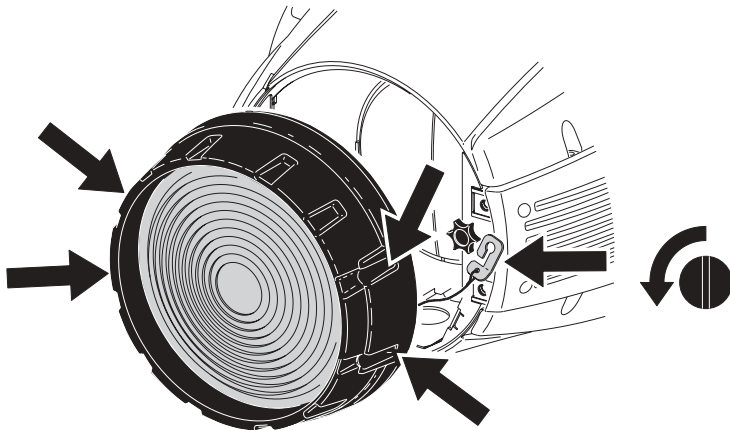
The MAC 2000 Wash has a Fresnel lens fitted as standard, and is also supplied with a PC lens, and a super-wide-angle lens.

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 23).

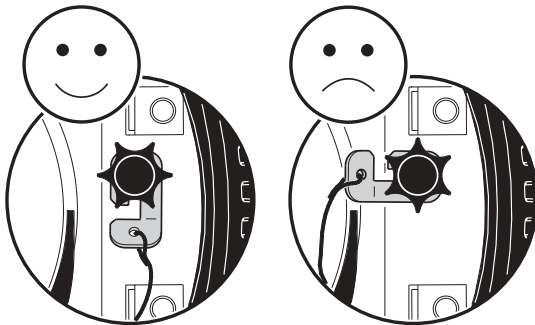
**Warning** *The front lens is very heavy. Ensure that it is secured to the MAC 2000 Wash with the internal safety cable provided.*

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

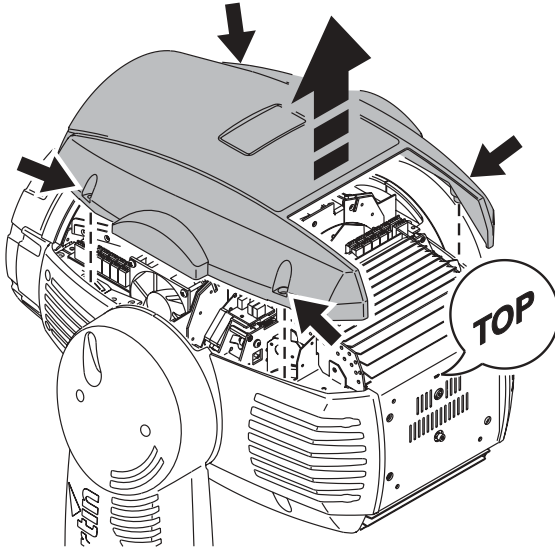
The MAC 2000 Wash comes factory fitted with a 50 mm (2 in) aperture ring (identified by 5 small holes), and 3 optional rings:

- 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

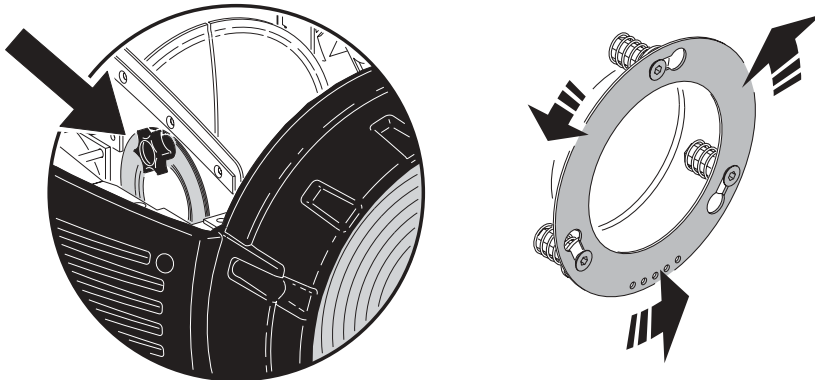
Use of the smaller apertures will result in less light output and a narrower beam angle.

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.

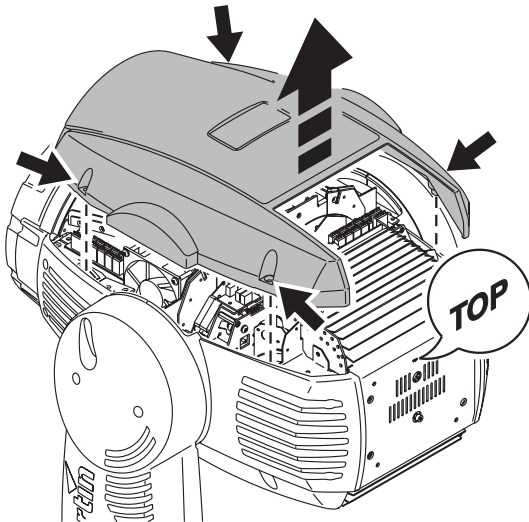
## Installing the optional dimmer wheel

An optional dimmer wheel (orderable separately and supported from firmware version 1.6) can be installed in place of color wheel 2.

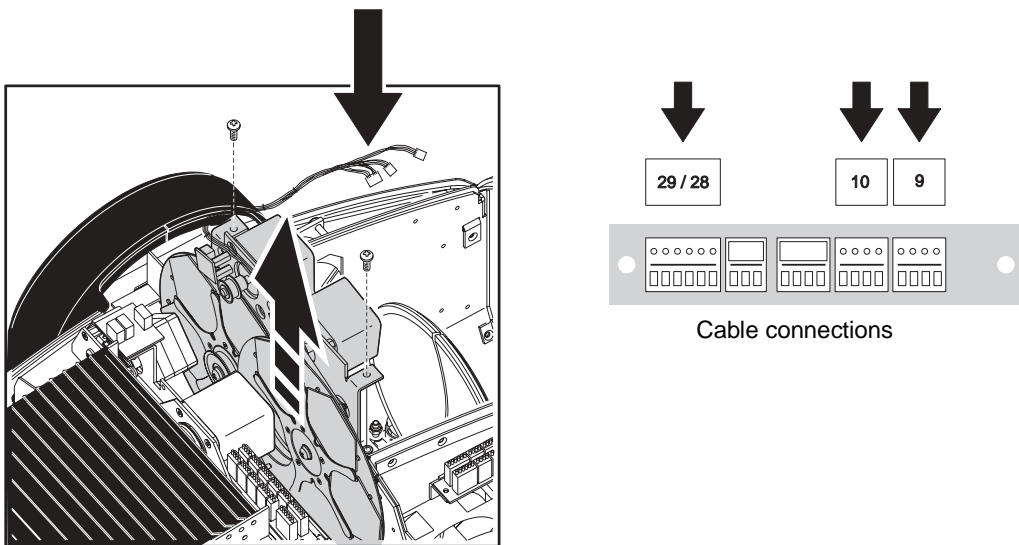
To install the dimmer wheel:

- 1 Disconnect the fixture from power and allow it to cool.
- 2 Lock the head horizontally with the top cover up.

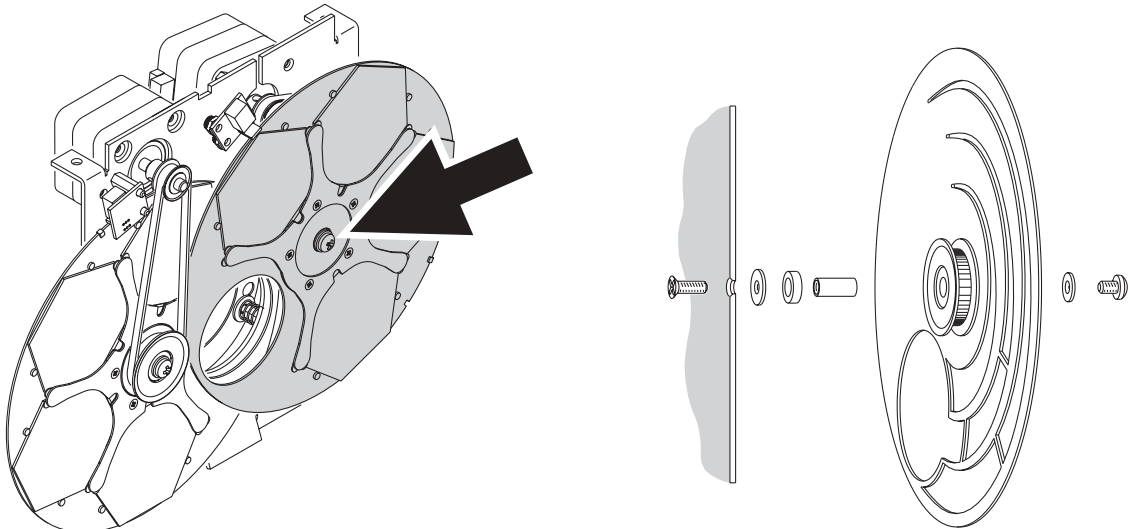
- 3 Remove the top cover of the fixture using a flathead screwdriver to unlock the four quarter-turn screws.



- 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 color wheel 2 using a Philips screwdriver.



- 6 Attach the dimmer wheel in place of the color wheel. Ensure that the indexing magnet on the wheel rim is aligned with the sensor on the color wheel module.

The dimmer wheel will be automatically detected by the MAC 2000 Wash when the fixture is powered on/reset. When the dimmer wheel is installed, the DMX channel 2 (Intensity) must be maintained at 100%.



# 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.

## Optical components

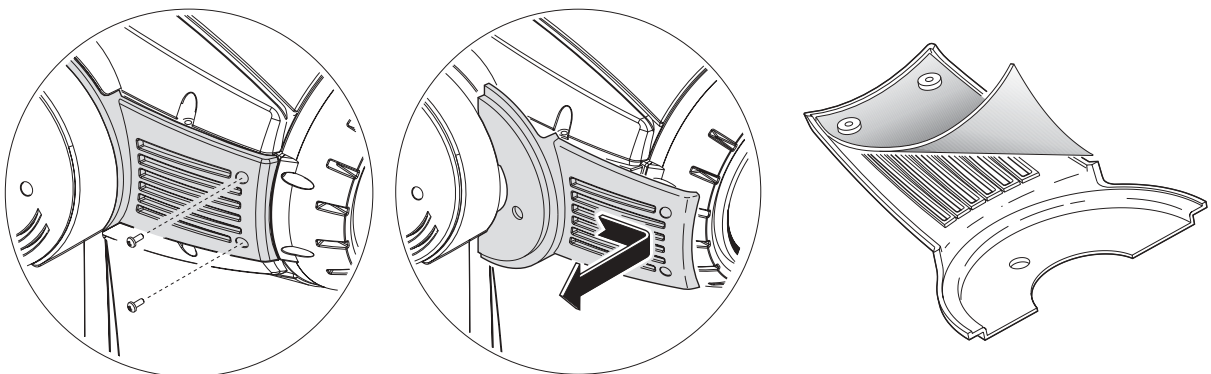
- 1 Disconnect the fixture from power and allow the components to cool completely. Remove the head cover.
- 2 Vacuum or gently blow away dust and loose particles with compressed air.
- 3 Remove stuck particles with an unscented tissue or cotton swab moistened with glass cleaner or distilled water. Do 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.

## The fan and air vents

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

## Cleaning 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.



## Firmware installation

The factory installed firmware version is indicated on the serial number label. The installed firmware version number is displayed in the control panel during power-on, during reset and under the Info/Ver menu. Firmware updates are released when features are added.

The latest firmware is available from the support area of the Martin web site at <http://www.martin.com>. It can be installed using an MP-2, or via a PC serial data link using a hardware interface supported by the Software Uploader shareware (also available from the Martin web site). The following devices are currently supported (in Version 5.5):

- DABS 1 (presently available with the MUM software package)
- ShowDesigner PCI DMX Interface Card (2048 channel version)
- LightJockey PCI DMX Interface Card (512 and 2048 channel versions)
- LightJockey PCMCIA DMX Interface
- LightJockey 4064 ISA DMX Interface Card (DJ and Club versions)

Note: Intermediate control systems such as the Martin Lighting Director (MLD) and the Martin Matrix must be bypassed when updating fixture software via the DMX link. These systems do not relay the update code correctly because it is not a DMX-compliant signal.

## Requirements

Firmware is installed using one of the following hardware devices, hereafter referred to as the "Uploader":

- Martin MP-2 Uploader
- PC using any DMX interface that supports the Software Uploader program (for example a Martin LightJockey or DABS 1 interface)

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.com>).
- The Software Uploader program, version 5.5 or later - supplied with the MUM, DABS1, Martin MP-2, LightJockey, or available for download from the support pages for these products in the User Support Area of the Martin web site.

## Standard firmware installation

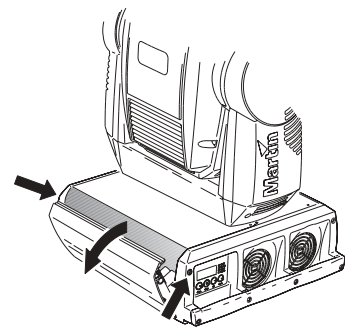
For guidance on preparing and using a LightJockey, MP-2 or Software Uploader refer to the user documentation and/or online help for these products.

## What to do if the standard firmware installation fails

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 42 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 firmware updates

Firmware updates are enabled by default, but you can disable this by setting the Write jumper (see "Circuit board connections" on page 42) to disable.

# DMX PROTOCOL

This section contains two DMX protocols (both apply to MAC 2000 Wash firmware version 1.7):

- “16-bit protocol” on page 28
- “8-bit protocol” on page 31

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 34.

Ensure that you have the latest firmware installed. 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.com>.

## 16-bit protocol

DMX channel	Value	Percent	Function (Start code=0)	
1	0 - 19	0 - 7	<b>Shutter, Strobe, Reset, Lamp On/Off</b> Shutter Closed (lamp reduced to 700 W (E-ballast) after 10 sec.) No function (Shutter Open)	
	<b>NOTE!</b> 20 - 49	8 - 19		
	Lamp Off is only allowed with <b>SPEC</b> → <b>Loff</b> set "On" or with <b>SPEC</b> → <b>Loff</b> set to "OFF", Cyan & Magenta & Yellow = 255 and Ch. 1 between 248-255 (Lamp Off).	50 - 72	20 - 28	Strobe on fast → slow
		73 - 79	29 - 31	Shutter open, lamp reduced to 700 W (E-ballast)
		80 - 99	32 - 39	Pulse opening fast → slow
		100 - 119	40 - 47	Pulse closing fast → slow
		120 - 127	48 - 50	No function
		128 - 147	51 - 57	Random Strobe Fast
		148 - 167	58 - 65	Random Strobe Medium
	Reset is only allowed with <b>SPEC</b> → <b>dRES</b> set "On" or with <b>SPEC</b> → <b>dRES</b> set to "OFF", Cyan & Magenta & Yellow = 255 and Ch. 1 between 208-217 (Reset Fixture).	168 - 187	66 - 73	Random Strobe Slow
		188 - 190	74 - 74	No function
		191 - 193	75	Random pulse opening fast
		194 - 196	76	Random pulse opening slow
		197 - 199	77	Random pulse closing fast
		200 - 202	78 - 79	Random pulse closing slow
		203 - 207	80 - 81	No function
		208 - 217	82 - 85	Reset Fixture
	218 - 227	86 - 89	No function	
	228 - 237	90 - 93	Lamp On (Power On)	
	238 - 247	94 - 97	No Function	
	248 - 255	98 - 100	Lamp Off (Power Off) Note: Time >5 seconds	
2	0 - 255	0 - 100	<b>Intensity (Dimmer Blades)</b> 0 → 100% (When the optional dimmer wheel is installed this must be set to 100%)	
3	0 - 255	0 - 100	<b>Cyan</b> White → Cyan	
4	0 - 255	0 - 100	<b>Magenta</b> White → Magenta	
5	0 - 255	0 - 100	<b>Yellow</b> White → Yellow	
6	0 - 255	0 - 100	<b>CTC</b> White → CTC	

DMX channel	Value	Percent	Function (Start code=0)
7	0 1 - 31 32 33 - 63 64 65 - 95 96 97 - 127 128 129 - 159 160  161 - 165 166 - 170 171 - 175 176 - 180 181 - 185  186 - 214 215 - 243  244 - 247 248 - 251 252 - 255	0 1 - 12 13 14 - 24 25 26 - 36 37 38 - 49 50 51 - 61 62  63 - 64 65 - 66 67 - 68 69 - 70 71 - 72  73 - 83 84 - 95  96 97 - 98 99 - 100	<b>Color Wheel 1 (Multi Color)</b> White White → Color 1,1 Color 1,1 Color 1,1 → Color 1,2 Color 1,2 Color 1,2 → Color 1,3 Color 1,3 Color 1,3 → Color 1,4 Color 1,4 Color 1,4 → White White  <b>Fixed colors on wheel 1</b> Color 1,4 Color 1,3 Color 1,2 Color 1,1 White  <b>Continuous color wheel 1 scroll</b> fast → slow CW slow → fast CCW  <b>Random Color (CMY)</b> Random color fast, set min./ max. CMY limits on channels 3-5 Random color medium, set min./ max. CMY limits on channels 3-5 Random color slow, set min./ max. CMY limits on channels 3-5
8 <i>(if color wheel 2 is installed)</i>	0 1 - 31 32 33 - 63 64 65 - 95 96 97 - 127 128 129 - 159 160  161 - 165 166 - 170 171 - 175 176 - 180 181 - 185  186 - 214 215 - 243  244 - 255	0 1 - 12 13 14 - 24 25 26 - 37 38 39 - 50 51 52 - 62 63  64 - 65 66 - 66 67 - 68 69 - 70 71 - 72  73 - 84 85 - 95  96 - 100	<b>Color Wheel 2 (Multi Color, MCW) - if installed</b> White White → Color 2, 1 Color 2, 1 Color 2, 1 → Color 2, 2 Color 2, 2 Color 2, 2 → Color 2, 3 Color 2, 3 Color 2, 3 → Color 2, 4 Color 2, 4 Color 2, 4 → White White  <b>Fixed colors on wheel 2</b> Color 2, 4 Color 2, 3 Color 2, 2 Color 2, 1 White  <b>Continuous color wheel 2 scroll</b> fast → slow CW slow → fast CCW  No Function
8 <i>(if Dimmer Wheel is installed)</i>	0-255	0-100	<b>Intensity - (Dimmer Wheel) - if installed</b> 0 → 100% (see "Optional dimmer wheel" on page 17)
9	0 - 244 245 - 251 252 - 255	0 - 95 96 - 98 99 - 100	<b>Zoom</b> Zoom: wide → narrow No changes Open (Power mode)
10	0 - 255	0 - 100	<b>Barn Door 1 (Upper)</b> Out → In
11	0 - 255	0 - 100	<b>Barn Door 2 (Lower)</b> Out → In

DMX channel	Value	Percent	Function (Start code=0)
12	0 - 255	0 - 100	<b>Barn Door 3 (Left)</b> Out → In
13	0 - 255	0 - 100	<b>Barn Door 4 (Right)</b> Out → In
14	0 - 255	0 - 100	<b>Rotate Barn Doors</b> Right → Center → Left (Center = 127)
15	0 - 20 21 - 40 41 - 60 61 - 80 81 - 100 101 - 120 121 - 255	0 - 7 8 - 15 16 - 23 24 - 31 32 - 39 40 - 48 49 - 100	<b>MACRO functions (Barn Doors)</b> No Macro Action All doors at 50% No Macro Action Large doors at 80% and small doors a 0% No Macro Action Small doors at 80% and large doors at 0% No Macro Action
16	0 127 255	0 50 100	<b>Pan coarse (most significant byte)</b> Max Left Neutral Max Right
17	0 127 255	0 50 100	<b>Pan fine (least significant byte)</b> Max Left Neutral Max Right
18	0 127 255	0 50 100	<b>Tilt coarse (most significant byte)</b> Max Up Neutral Max Down
19	0 127 255	0 50 100	<b>Tilt fine (least significant byte)</b> Max Up Neutral Max Down
20	0 - 2 3 - 236 237 - 239 240 - 242 243 - 245 246 - 248  249 - 251 252 - 255	0 - 1 2 - 92 93 94 95 96 - 97  98 99 - 100	<b>Speed: Pan/Tilt Movement</b> Tracking Speed Fast → Slow Tracking (Slow speed - Overriding the PTSP menu setting) Tracking (Normal speed - Overriding the PTSP menu setting) Tracking (Fast speed - Overriding the PTSP menu setting) Fan speed (Regulation, min. noise level - Overriding the FAN menu setting) Fan speed (Full speed, max. cooling - Overriding the FAN menu setting) No function
21	0 - 2 3 - 239 240 - 242  243 - 245  246 - 248 249 - 251 252 - 255  0 - 2 3 - 239 240 - 242  243 - 245  246 - 248 249 - 251 252 - 255	0 1 - 93 94 - 95  96  97 - 98 99 100  0 1 - 93 94 - 95  96  97 - 98 99 100	<b>Speed: Dimmer, Cyan, Magenta, Yellow, CTC, Zoom.</b> Tracking Speed Fast → Slow Tracking (Studio mode disabled – Overriding the MOfE menu setting) Tracking (Studio mode enabled – Overriding the MOfE menu setting) Tracking (Shortcuts disabled - Overriding the SCUT menu setting) Tracking (Shortcuts enabled - Overriding the SCUT menu setting) Fast Speed  <b>Speed: Color 1, Color 2, Barn Door.</b> Tracking Speed Fast → Slow Tracking (Studio mode disabled – Overriding the MOfE menu setting) Tracking (Studio mode enabled – Overriding the MOfE menu setting) Tracking (Shortcuts disabled - Overriding the SCUT menu setting) Tracking (Shortcuts enabled - Overriding the SCUT menu setting) No function

## 8-bit protocol

DMX channel	Value	Percent	Function (Start code=0)
1	0 - 19	0 - 7	<b>Shutter, Strobe, Reset, Lamp On/Off</b> Shutter Closed (lamp reduced to 700 W (E-ballast) after 10 sec.)
	20 - 49	8 - 19	No function (Shutter Open)
	50 - 72	20 - 28	Strobe on fast → slow
	73 - 79	29 - 31	Shutter open, lamp reduced to 700 W (E-ballast)
	80 - 99	32 - 39	Pulse opening fast → slow
	100 - 119	40 - 47	Pulse closing fast → slow
	120 - 127	48 - 50	No function
	128 - 147	51 - 57	Random Strobe Fast
	148 - 167	58 - 65	Random Strobe Medium
	168 - 187	66 - 73	Random Strobe Slow
	188 - 190	74 - 74	No function
	191 - 193	75	Random pulse opening fast
	194 - 196	76	Random pulse opening slow
	197 - 199	77	Random pulse closing fast
	200 - 202	78 - 79	Random pulse closing slow
	203 - 207	80 - 81	No function
	208 - 217	82 - 85	Reset Fixture
	218 - 227	86 - 89	No function
	228 - 237	90 - 93	Lamp On (Power On)
	238 - 247	94 - 97	No Function
248 - 255	98 - 100	Lamp Off (Power Off) Note: Time > 5 seconds	
2	0 - 255	0 - 100	<b>Intensity (Dimmer blades)</b> 0 → 100% (When the optional dimmer wheel is installed this must be set to 100%)
3	0 - 255	0 - 100	<b>Cyan</b> White → Cyan
4	0 - 255	0 - 100	<b>Magenta</b> White → Magenta
5	0 - 255	0 - 100	<b>Yellow</b> White → Yellow
6	0 - 255	0 - 100	<b>CTC</b> White → CTC

DMX channel	Value	Percent	Function (Start code=0)
7	0 1 - 31 32 33 - 63 64 65 - 95 96 97 - 127 128 129 - 159 160  161 - 165 166 - 170 171 - 175 176 - 180 181 - 185  186 - 214 215 - 243  244 - 247 248 - 251 252 - 255	0 1 - 12 13 14 - 24 25 26 - 36 37 38 - 49 50 51 - 61 62  63 - 64 65 - 66 67 - 68 69 - 70 71 - 72  73 - 83 84 - 95  96 97 - 98 99 - 100	<b>Color Wheel 1 (Multi Color)</b> White White → Color 1,1 Color 1,1 Color 1,1 → Color 1,2 Color 1,2 Color 1,2 → Color 1,3 Color 1,3 Color 1,3 → Color 1,4 Color 1,4 Color 1,4→White White  <b>Fixed Colors 1</b> Color 1,4 Color 1,3 Color 1,2 Color 1,1 White  <b>Continuous Color 1 Scroll</b> fast → slow CW slow → fast CCW  <b>Random Color (CMY)</b> Random color fast (set min./ max. CMY limits on channels 3-5) Random color medium (set min./ max. CMY limits on channels 3-5) Random color slow (set min./ max. CMY limits on channels 3-5)
8 <i>(if color wheel 2 is installed)</i>	0 1 - 31 32 33 - 63 64 65 - 95 96 97 - 127 128 129 - 159 160  161 - 165 166 - 170 171 - 175 176 - 180 181 - 185  186 - 214 215 - 243  244 - 255	0 1 - 12 13 14 - 24 25 26 - 37 38 39 - 50 51 52 - 62 63  64 - 65 66 - 66 67 - 68 69 - 70 71 - 72  73 - 84 85 - 95  96 - 100	<b>Color Wheel 2 (Multi Color, MCW) - if installed</b> White White → Color 2, 1 Color 2, 1 Color 2, 1 → Color 2, 2 Color 2, 2 Color 2, 2 → Color 2, 3 Color 2,3 Color 2, 3 → Color 2, 4 Color 2, 4 Color 2, 4 → White White  <b>Fixed Colors 2</b> Color 2, 4 Color 2, 3 Color 2, 2 Color 2, 1 White  <b>Continuous Color 2 Scroll</b> fast → slow CW slow → fast CCW  No Function
8 <i>(if Dimmer Wheel is installed)</i>	0-255	0-100	<b>Intensity - (Dimmer Wheel) - if installed</b> 0 → 100% (see "Optional dimmer wheel" on page 17)
9	0 - 244 245 - 251 252 - 255	0 - 95 96 - 98 99 - 100	<b>Zoom</b> Zoom: wide → narrow No Changes. Open (Light buster mode)
10	0 - 255	0 - 100	<b>Barn Door 1 (Upper)</b> Out → In
11	0 - 255	0 - 100	<b>Barn Door 2 (Lower)</b> Out → In



DMX channel	Value	Percent	Function (Start code=0)
12	0 - 255	0 - 100	<b>Barn Door 3 (Left)</b> Out → In
13	0 - 255	0 - 100	<b>Barn Door 4 (Right)</b> Out → In
14	0 - 255	0 - 100	<b>Rotate Barn Doors</b> Right → Center → Left (Center = 127)
15	0 - 20 21 - 40 41 - 60 61 - 80 81 - 100 101 - 120 121 - 255	0 - 7 8 - 15 16 - 23 24 - 31 32 - 39 40 - 48 49 - 100	<b>MACRO functions (Barn Doors)</b> No Macro Action All doors at 50% No Macro Action Large doors at 80% and small doors a 0% No Macro Action Small doors at 80% and large doors at 0% No Macro Action
16	0 127 255	0 50 100	<b>Pan</b> Max Left Neutral Max Right
17	0 127 255	0 50 100	<b>Tilt</b> Max Up Neutral Max Down
18	0 - 2 3 - 236 237 - 239 240 - 242 243 - 245 246 - 248 249 - 251 252 - 255	0 - 1 2 - 92 93 - 94 95 96 97 98 99 - 100	<b>Speed: Pan/Tilt Movement</b> Tracking Speed Fast → Slow Tracking (Slow speed - Overriding the PTSP menu setting) Tracking (Normal speed - Overriding the PTSP menu setting) Tracking (Fast speed - Overriding the PTSP menu setting) Fan speed (Regulation, min. noise level – Overriding the FAN menu setting) Fan speed (Full speed, max. cooling – Overriding the FAN menu setting) No function
19	0 - 2 3 - 239 240 - 242 243 - 245 246 - 248 249 - 251 252 - 255  0 - 2 3 - 239 240 - 242 243 - 245 246 - 248 249 - 251 252 - 255	0 - 1 2 - 93 93 - 94 95 - 96 97 98 99 - 100  0 - 1 2 - 93 93 - 94 95 - 96 97 98 99 - 100	<b>Speed: Dimmer, Cyan, Magenta, Yellow, CTC, Zoom</b> Tracking Speed Fast → Slow Tracking (Studio mode disabled – Overriding the MOdE menu setting) Tracking (Studio mode enabled – Overriding the MOdE menu setting) Tracking (Shortcuts disabled - Overriding the SCUT menu setting) Tracking (Shortcuts enabled - Overriding the SCUT menu setting) Fast Speed  <b>Speed: Color 1, Color 2, Barn Door</b> Tracking Speed Fast → Slow Tracking (Studio mode disabled – Overriding the MOdE menu setting) Tracking (Studio mode enabled – Overriding the MOdE menu setting) Tracking (Shortcuts disabled - Overriding the SCUT menu setting) Tracking (Shortcuts enabled - Overriding the SCUT menu setting) No function

# CONTROL MENU

This control menu applies to version 1.7 of the MAC 2000 Wash firmware. For the latest firmware updates, please visit the Martin web site at <http://www.martin.com>.

Default values are in bold.

Menu	Item	Options	Notes (Default settings in bold print)
Addr	-	1-512	DMX address.
PSET	-	<b>16bt</b>	Full control with fine pan, tilt and gobo indexing.
		8bt	Full control with coarse pan, tilt and gobo indexing.
PATI	SWAP	ON	Map DMX pan control to tilt channel and vice versa.
		<b>OFF</b>	Normal pan and tilt control.
	PINV	ON	Reverse DMX pan control, right → left.
		<b>OFF</b>	Normal pan control, left → right.
	TINV	ON	Reverse DMX tilt control, down → up.
		<b>OFF</b>	Normal tilt control, up → down.
PTSP	-	<b>NORM</b>	Medium pan/tilt speed.
		FAST	Optimize movement for speed.
		SLOW	Optimize movement for smoothness.
Stud	-	ON	Optimize effects for silence.
		<b>OFF</b>	Optimize effects for speed.
PERS	dISP	<b>ON</b>	Display remains on.
		OFF	Display extinguishes 2 minutes after last key press.
	dINT	10- <b>100</b>	Adjust display intensity.
	dLOF	ON	Enable DMX lamp off command.
		<b>OFF</b>	Disable DMX lamp off command.
	dRES	OFF	Disable DMX reset command.
		<b>ON</b>	Enable DMX reset command.
	ALON	<b>OFF</b>	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	<b>ON</b>	Color wheels (1&2) turn shortest distance.
		OFF	Color wheel paths oscillate.
	TRAC	MOde	Tracking modes
		- <b>MOD2</b>	Real delta value algorithm
		- <b>MOD1</b>	Absolute delta value algorithm (for most controllers)
		CAL	1-10. Tracking samples. Increase if pan/tilt is not smooth. (Default = <b>6</b> ).
	dICU	dIM2	Dimmer curve 2 - linear. This has no influence on the optional dimmer wheel.
		<b>dIM1</b>	Dimmer curve 1 - simulated tungsten. This has no influence on optional dimmer wheel.
	CMYb	ON	Enable CMY blackout, 3 seconds after the shutter has closed to 0%
		<b>OFF</b>	Disable CMY blackout.

<b>Menu</b>	<b>Item</b>	<b>Options</b>	<b>Notes (Default settings in bold print)</b>	
dFSE	FACT	LOAD	Return all settings (not calibrations) to factory defaults.	
	CUS1 , CUS2 , CUS3	LOAD	Load custom configuration.	
		SAVE	Save current configuration.	
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.	
	bVER	-	Barndoor CPU firmware version displayed. This is only available when the barndoor unit is installed.	
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.		

<b>Menu</b>	<b>Item</b>	<b>Options</b>	<b>Notes (Default settings in bold print)</b>
MAN cont.	COL2 <i>(available if color wheel 2 is installed)</i>	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.
	DIMW <i>(available if optional dimmer wheel is installed)</i>	0 - 255	Dimmer wheel.
	ZOOM	0 - 255	Zoom: Narrow - Floodspot.
	b1IO	0 - 255	Barn door 1. Move in/out. Only available when barndoors are installed.
b2IO	0 - 255	Barn door 2. Move in/out. Only available when barndoors are installed.	
b3IO	0 - 255	Barn door 3. Move in/out. Only available when barndoors are installed.	
b4IO	0 - 255	Barn door 4. Move in/out. Only available when barndoors are installed.	
PAN	0-255	Pan - Left/Right	
TILT	0-255	Tilt - Up/Down	
TSEQ	-	RUN	Run a general test of all effects

Menu	Item	Options	Notes (Default settings in bold print)
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 38.
	CAL/P OF	1 - 255	Pan offset (default is 127).
	CAL/T OF	1 - 255	Tilt offset (default is 127).
	CAL/d OF	1 - 255	Dimmer offset (default is 127).
	CAL/C OF	1 - 255	Cyan offset (default is 127).
	CAL/M OF	1 - 255	Magenta offset (default is 127).
	CAL/Y OF	1 - 255	Yellow offset (default is 127).
	CAL/CTOF	1 - 255	CTC offset (default is 127).
	CAL/C1OF	1 - 255	Color wheel 1 offset (default is 127).
	CAL - C2OF, or - DIMW	1 - 255	Color wheel 2 or Dimmer wheel offset (default is 127).
	CAL/ZOOF	1 - 255	Zoom offset (default is 127).
	dFOF	SURE	Return all offsets to the default settings.
	PCbT	LEd	PCB test for service use only.
FANS	VREG		Variable fan regulation. Runs the fans at a minimum noise level. Switches off the head fans and reduces the base fans when lamp is OFF. Enabling this option increases the operating temperature and thus increases the wear on components.
		<b>FULL</b>	Operate cooling fans at full speed.
		REG	Regulate the effect cooling fans for quieter performance. Enabling this option increases the operating temperature and thus increases wear on the components.
UPLd	SURE	Manually set fixture to software update mode.	
MSG	Replace lamp		Displayed when lamp hours exceed average life (750 hours). Replace lamp.
	Fixture overheating		Displayed if head temperature exceeds 120° C (248° F). This indicates that the fixture is overheating.

# 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	ON S	Switch test position.
		MIN MAX	Color flags out. Color flags in.
	ZOOM	NARR	Zoom to spot (narrow beam).
		WIDE	Zoom to flood (wide beam).
	Bd 1..4	CLOS	Barndoor 1..4 closed position.
		Adj	Barndoor 1..4 closed adjust position (no power).
		1..255	Barndoor 1..4 vertical adjust position.
	Bd R	SW P	Barndoor rotation, switch position.
		CW	Barndoor CW position.
CCW		Barndoor CCW position.	
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) C1ER (Color wheel 1) C2ER (Color wheel 2/Dimmer wheel 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.

Table 2: Display messages

<b>Message</b>	<b>Appears when...</b>	<b>What to do</b>
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.

**Table 2: Display messages**

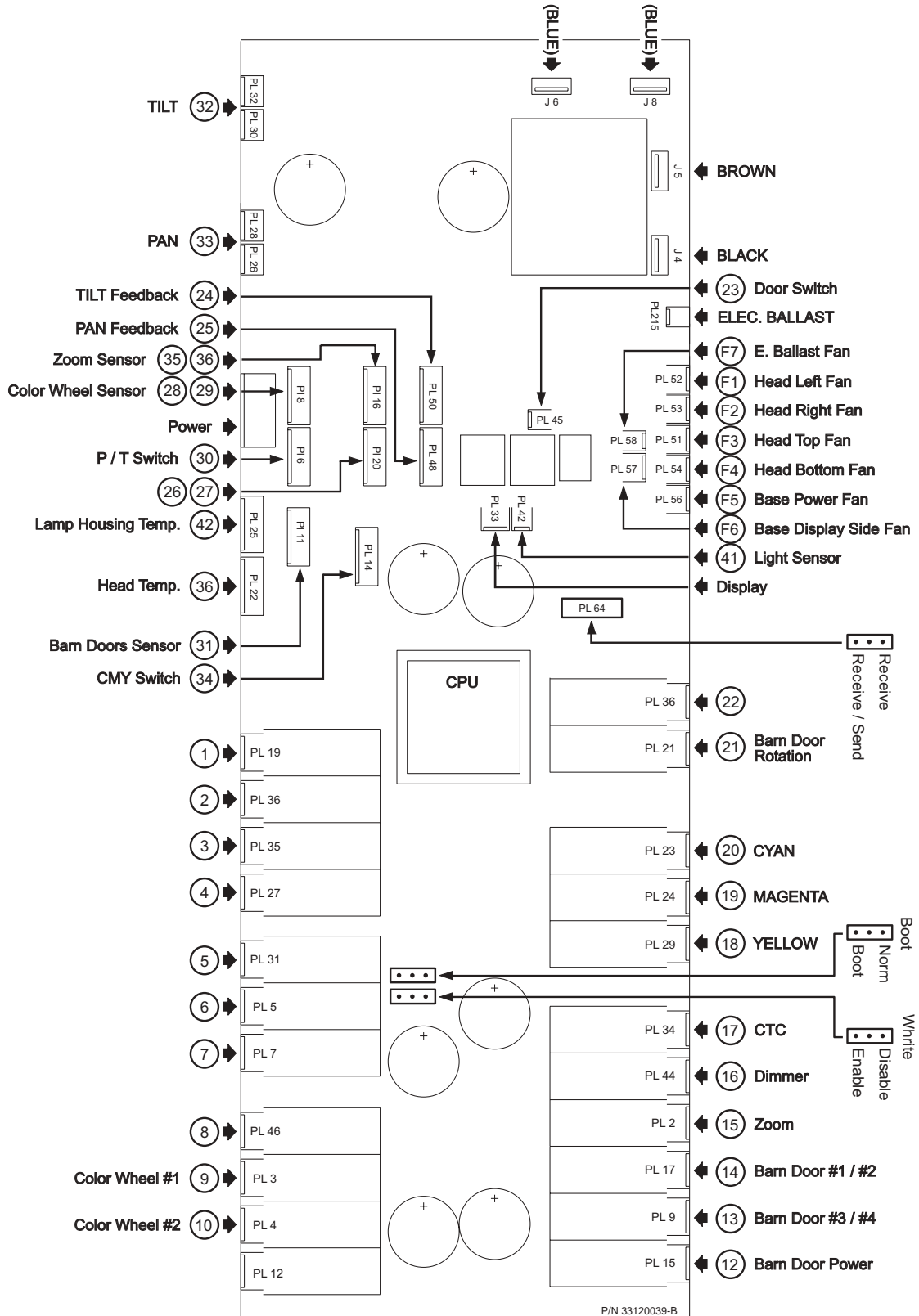


# TROUBLESHOOTING

<b>Problem</b>	<b>Probable cause(s)</b>	<b>Remedy</b>
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.

If the service lamp is lit, check the SMSG menu using the control panel.

# 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, Philips MSI 1200
Control	automatic and remote, hot re-strike
Ballast	electronic

## Electrical

AC input	3 m trailing cable w/o cord cap
Operating ranges	100-130/200-250 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 ( $T_a$ )	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 (1 or 2)	4 removable positions plus open
Dimmer/shutter	full range dimming, 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

## Listings

CE	EN 55015:2000, EN 55103-1:1996, EN 61547:1995, EN 60598-2-17 + Corr., A2:1989
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## 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-unit flight case . . . . .	P/N 90203010
MAC 2000 Wash E (in a cardboard packing case) . . . . .	P/N 90203015

## Included items

2 x Omega bracket, 1/4-turn  
PC lens  
Fresnel lens  
Super-wide-angle 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

## Accessories

DABS1 USB-XLR interface . . . . .	P/N 91611144
MP-2 Uploader . . . . .	P/N 90758420
G-clamp . . . . .	P/N 91602003
Half-coupler clamp . . . . .	P/N 91602005
The Wife DMX Tester . . . . .	P/N 91611038
MAC 2000 Wash Dimmer Wheel . . . . .	P/N 62324018
MAC 2000 Wash Barndoors . . . . .	P/N 91611059
MAC 2000 Double Flight Case . . . . .	P/N 91510017
OSRAM HMI1200 W/S lamp . . . . .	P/N 97010309