MAC 600 (E) NT

user manual

Printed in Denmark.

P/N 35000088 Rev. C

INTRODUCTION 1

The MAC 600 NT is a highly efficient automated 575 watt moving-head wash light that features subtractive cyan, magenta, and yellow (CMY) color mixing and continuous color temperature correction. It provides a soft-edged 25° field in the standard configuration. Narrow and wide angle fields may be achieved with accessory snap-lock lens assemblies.

About this manual

For information about the MAC 600, MAC 600 E, or any other Martin product, please visit the Martin web site at http://www.martin.dk. The latest updates in fixture software and documentation are available from the Support Area.

Unpacking

The MAC 600 (E) NT comes with

- 2 Fast-Lock Omega clamp brackets
- 5-meter XLR-XLR control cable
- Snoot
- User manual

The packing material is carefully designed to protect the fixture during shipment - always use it or a suitable flight case to transport the fixture.

SAFETY 2

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 hotline at +45 70 200 201.

TO PROTECT YOURSELF AND OTHERS 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.

TO PROTECT YOURSELF AND OTHERS 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 before usage exceeds the maximum service life, or if the lamp is defective or worn out.

TO PROTECT YOURSELF AND OTHERS FROM BURNS AND FIRE

- Never bypass the fuses. Always replace defective fuses with ones of the specified type and rating.
- Keep all combustible materials (for example fabric, wood, paper) at least 1.0 meter (39 inches) away from the fixture. Keep flammable materials well away from the fixture.
- Do not illuminate surfaces within 1.0 meter (39 inches) 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.
- 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).

TO PROTECT YOURSELF AND OTHERS FROM INJURY DUE TO FALLS

- 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.
- Do not lift the fixture by its head.

AC POWER 3

WARNING! ***For protection from dangerous 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.***

Important! ***Verify that the power supply settings match the mains voltage before applying power.***

Power supply settings

The MAC 600 (E) NT must be tapped correctly for the local AC voltage and frequency. The wrong setting can cause overheating, damage, and poor performance. The factory settings are printed on the label under the base. The procedure for changing the power supply settings depends on the model.

To change the MAC 600 NT power supply settings

1 *Disconnect the fixture from AC power.* Remove the top covers.

2 Find the correct transformer and ballast terminals for your AC supply in the table below.

3 Locate the transformer: it is on the left end, near the power switch. Move the BROWN and RED transformer wires to the correct terminal. The terminal number is printed in front of the connection tab.

4 Locate the ballast: it is on the opposite end from the transformer, near the control panel. Move the BROWN ballast wire to the correct terminal. The terminal number is printed in front of the connection tab.

5 Replace the covers before applying power.

AC Supply		Transformer		Ballast	
Frequency	**Voltage**	**Voltage**	**Terminal**	**Setting**	**Terminal**
50 Hz	200-210 V	210 V	4	200 V / 50 Hz	7
50 Hz	210-220 V	210 V	4	230 V / 50 Hz	10
50 Hz	220-235 V	230 V	6	230 V / 50 Hz	10
50 Hz	235-240 V	230 V	6	245 V / 50 Hz	12
50 Hz	240-260 V	250 V	8	245 V / 50 Hz	12
60 HZ	200-217 V	210 V	4	208 V / 60 Hz	4
60 HZ	217-240 V	230 V	6	227 V / 60 Hz	7

To change the MAC 600 E NT power supply settings

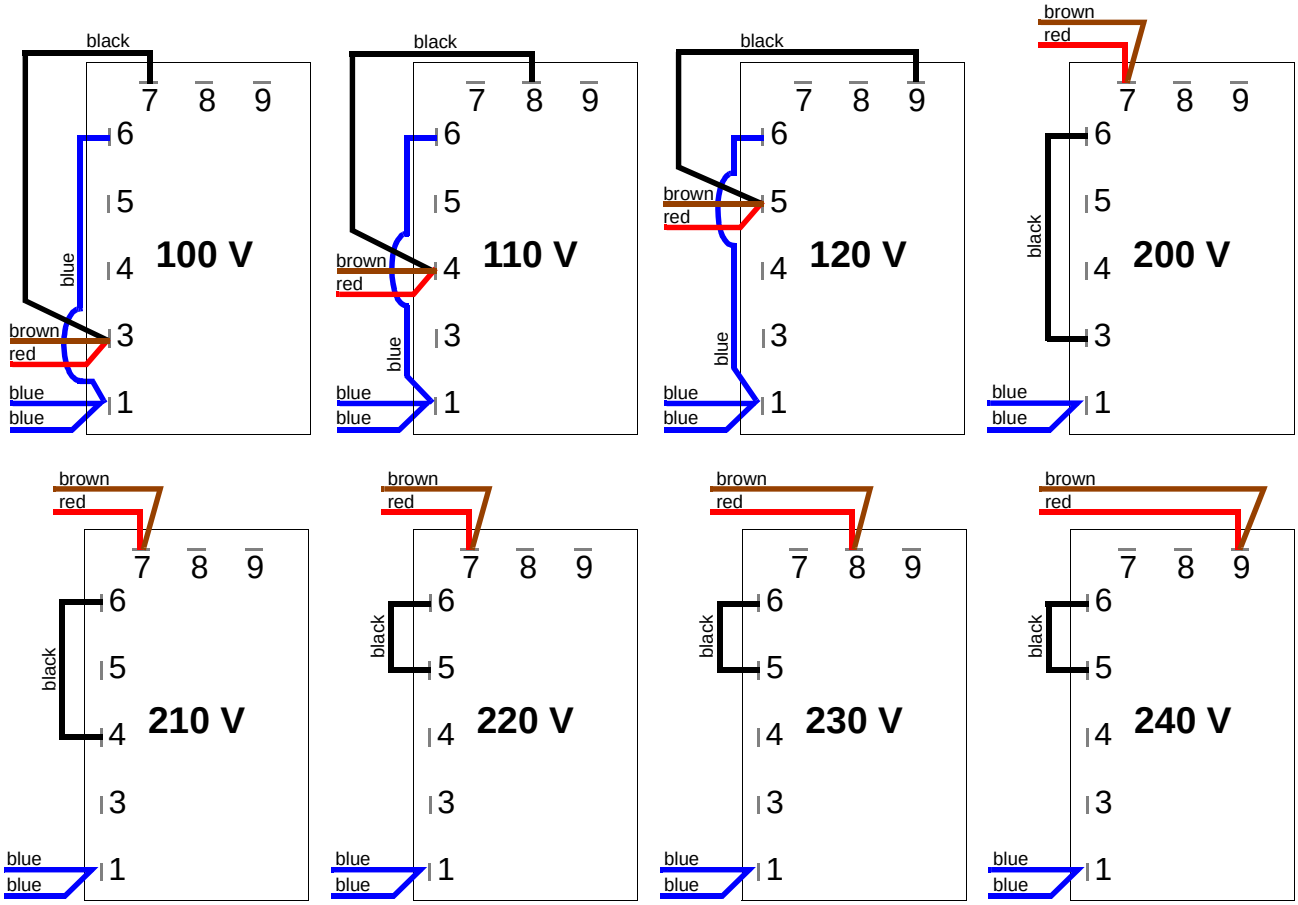
The MAC 600 E NT electronic ballast is auto-ranging and works at any voltage between 100 and 250 volts and at any frequency between 50 and 60 Hz. Simply tap the transformer for the local AC voltage as shown below. When switching to or from the 100 - 120 V settings, the primary fuse must be changed as well.

1 *Disconnect the fixture from AC power.* Remove the top covers.

2 Tap the *transformer* for the local supply voltage as shown below.

3 Verify that the primary fuse, which is located near the power switch, is correct for the voltage setting. The fuse shall be a T 6.3 A fuse when the transformer is set at 200, 210, 220, 230, or 240 V. It shall be a T 10 A fuse when set at 100, 110, or 120 V.

4 Replace the top covers before applying power.



MAC 600 NT E *Transformer* Settings

Power connection

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.

Connect the MAC 600 (E) NT directly to AC power. *Do not connect it to a dimmer system; doing so may damage the fixture.*

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

LAMP 4

Compatible lamps

The MAC 600 (E) NT shall be used only with the lamps listed on page 30. *Installing any other lamp may damage the fixture or create a safety hazard.*

Maximum usable hours

The risk of lamp explosion increases with usage due to gradual weakening of the quartz envelope. To minimize the risk of lamp explosion, replace lamps before usage exceeds the rated life by 200 hours or the manufacturer's stated maximum service life.

To track usage, reset the RLAH and RLST counters under the TIME menu when installing a new lamp. See page 14.

Installation and alignment

WARNING! Disconnect the fixture from AC power before proceeding. Always wear safety goggles to protect your eyes and allow a hot lamp to cool for at least 15 minutes before removing it from the fixture.

To install a lamp

1 Remove the 2 thumbscrews securing the lamp-socket assembly to the rear of the head. Pull out the lamp-socket assembly and remove the old lamp from the socket.

2 Holding the new lamp by its ceramic base (do not touch the glass), insert it fully into the lamp socket.

3 Clean the glass bulb with the cloth supplied with the lamp, particularly if you touched the glass. A clean, lint-free cloth wetted with alcohol may also be used.

4 Keep the lamp wire between the fins as you insert the lamp-socket assembly into the head. Turn the assembly counterclockwise to align the holes with the spacer nuts. Replace the thumbscrews and tighten them by hand.

5 See page 14 to reset the lamp hour (RLAH) and lamp strike (RLST) counters.

To align a lamp

Align the lamp if light distribution is uneven.

1 Switch on the MAC 600 (E) NT and allow it to reset.

2 Using either a controller or the control module, turn on the lamp and project the light on a flat surface.

3 Center the hot-spot (the brightest part of the beam) using the 3 Allen-head (3 mm) adjustment screws. Turn one screw at a time to drag the hot-spot diagonally across the field. If you cannot detect a hot-spot, adjust the lamp until the light is even.

4 To reduce the hot-spot, pull the lamp in by turning all three screws clockwise 1/4-turn at a time until the light is evenly distributed.

5 If the light is brighter around the edge than it is in the center, or if light output is low, the lamp is too far back in the reflector. "Push" the lamp out by turning the screws counterclockwise 1/4-turn at a time until the light is bright and evenly distributed.

DATA CONNECTION 5

The MAC 600 (E) NT has locking 3-pin data input and output sockets that are compatible with DMX 512 devices, i.e., pin 1 to shield, pin 2 to cold (-) and pin 3 to hot (+). If required, the polarity of pins 2 and 3 can be reversed for compatibility with earlier Martin fixtures.

Connecting fixtures

ADAPTOR CABLES

The following adaptor cables are available for connection to devices with different sockets.

3-pin to 3-pin Phase-Reversing Cable	3-pin to 5-pin Phase-Reversing Cable	5-pin to 3-pin Phase-Reversing Cable	5-pin to 3-pin Straight Cable	3-pin to 5-pin Straight Cable
Connections Male Female 1 — 1 2 — 2 3 — 3	Connections Male Female 1 — 1 2 — 2 3 — 3 4 5	Connections Male Female 1 — 1 2 — 2 3 — 3 4 5	Connections Male Female 1 — 1 2 — 2 3 — 3 4 5	Connections Male Female 1 — 1 2 — 2 3 — 3 4 5
P/N 11820006	P/N 11820002	P/N 11820003	P/N 11820005	P/N 11820004

To connect the data link

1 Connect the controller's DMX data output to the MAC 600 (E) NT's data input with a cable such as the one supplied. Insert a 5-pin to 3-pin adaptor if the controller output has 5 pins. (Pins 4 and 5 are not used.)

2 To continue the link, connect the output of the fixture closest to the controller to the input of the next fixture.

Note: Martin fixtures introduced before 1997 have reversed polarity data sockets, i.e., pin 2 hot (+) and pin 3 cold (-). The socket polarity is labelled. *Use a phase-reversing cable between the MAC 600 (E) NT (or other DMX-compatible device) and any Martin device with reversed polarity.*

3 Insert a male 120 Ω XLR termination plug in the output of the last fixture on the link.

TIPS FOR BUILDING A DATA LINK

- 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 a "Y" connector 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.

RIGGING

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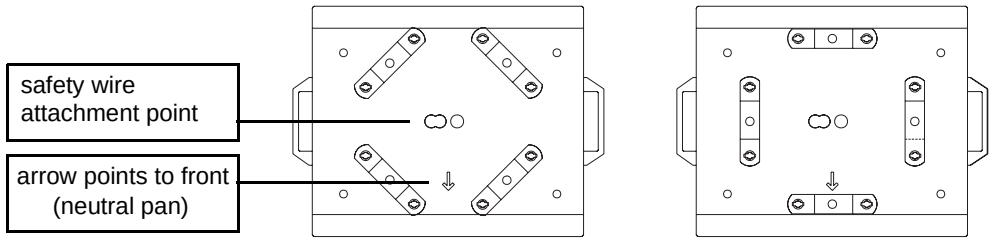
The MAC 600 (E) NT can be placed directly on the stage floor or rigged in any orientation on a truss. The integrated Fast-Lock system enables quick and easy fastening of the clamp adapters in 4 different positions as shown below.

The front of the fixture, which is defined as the middle of the pan range, is indicated by an arrow on the base.



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 base.***

To hang the fixture on 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. 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. *Never use the carrying handles for secondary attachment.*
6. Verify that there are no combustible materials or surfaces to be illuminated within 1 meter of the fixture, and that there are no flammable materials nearby.

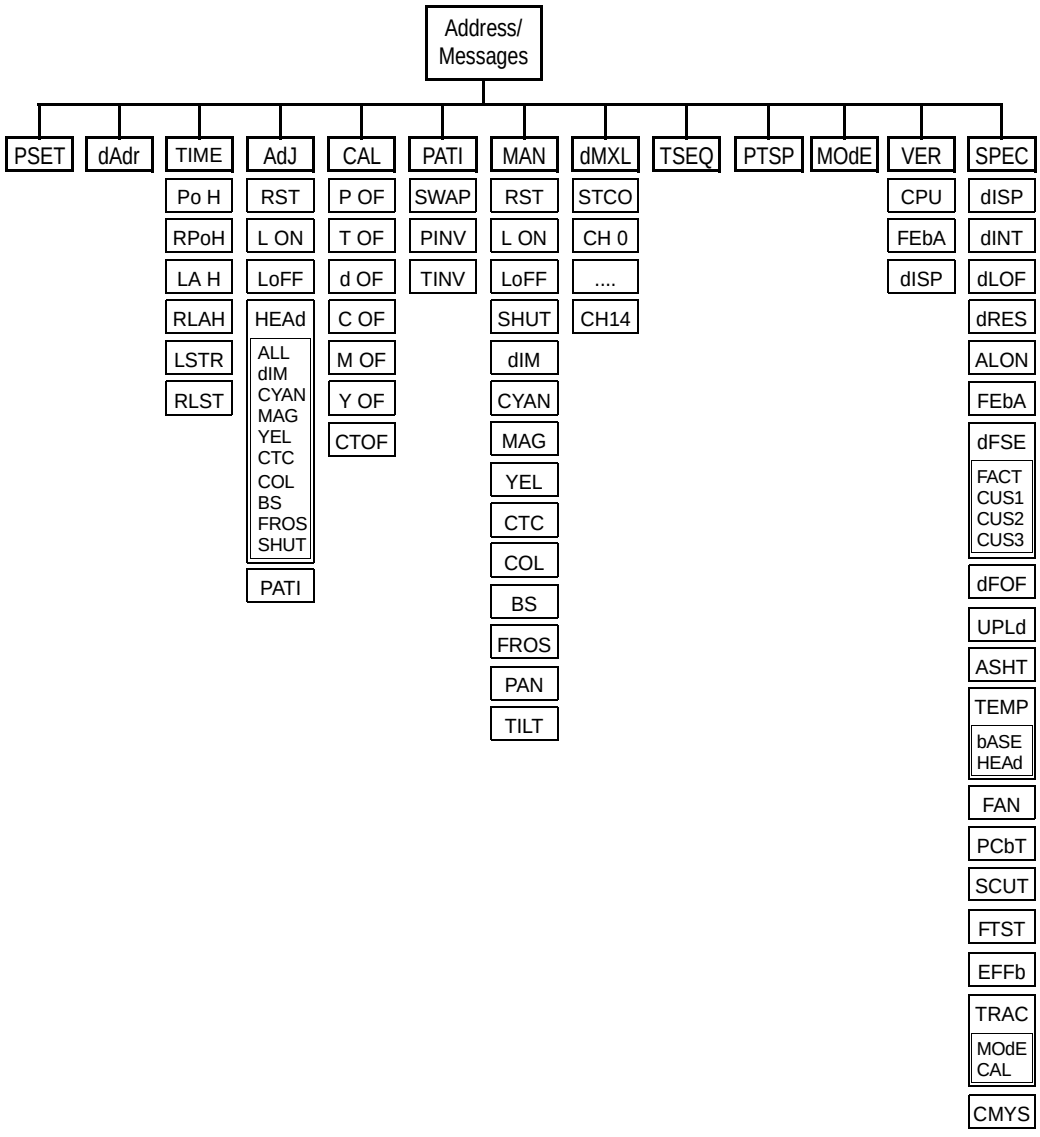
FIXTURE SETTINGS 7

The LED control panel is used to set the address and personalities, read lamp hours and other information, calibrate effects, control the fixture manually, and run a test routine. Most of these functions may be performed remotely via the serial link with the MPBB1 Uploader.

Menu navigation

The display can be flipped for easy reading by pressing the [↑] and [↓] keys simultaneously. The intensity is adjustable and the display can be set to go out 2 minutes after the last key-press. See “Personality settings” on page 13.

The DMX address and any messages are displayed when the MAC 600 (E) NT is turned on. To enter the menu, press [MENU]. Use the [↑] and [↓] keys to move within the menu. To select a function or submenu, press [ENTER]. To escape a function or menu, press [MENU].



DMX mode and address

The DMX mode options are described under “DMX-512 control” on page 20. Maximum flexibility is provided in mode 4.

The 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 600 (E) NTs may share the same address, however, if identical behavior is desired. Address sharing can be useful for diagnostic purposes and other situations, particularly when combined with the inverse pan and tilt options.

To set DMX mode and address

1. Switch on the fixture.
2. If the fixture is in a flight case, press [MENU] and [ENTER] at the same time to disable pan and tilt reset. (A partial reset can take 2 - 3 minutes and error messages will be displayed.)
3. Press [MENU] once to enter the main menu.
4. Select PSET and press [ENTER]. Scroll to the desired DMX mode (1, 2, 3, or 4) and press [ENTER].
5. Select dAdr from the main menu and press [ENTER]. Scroll to the desired DMX address and press [ENTER].

Personality settings

Personality	Path	Options	**Effect** (Default settings shaded.)
Pan/tilt speed	PTSP	FAST	Optimize movement for speed.*
		NORM	Optimize movement for smoothness.*
Pan/tilt swap	PATI/SWAP	ON	Map DMX pan control to tilt channel and vice versa.
		OFF	Normal pan and tilt control.
Pan inverse	PATI/PINV	ON	Reverse DMX pan control, right → left.
		OFF	Normal pan control, left → right.
Tilt inverse	PATI/TINV	ON	Reverse DMX tilt control, down → up.
		OFF	Normal tilt control, up → down
Tracking algorithm	SPEC/TRAC/ MOdE	MOd1	Absolute delta value algorithm (for most controllers)
		MOd2	Real delta value algorithm
Tracking samples	SPEC/TRAC/ CAL	1-10	Tracking samples. Increase if pan/tilt is not smooth.
Display on/off	SPEC/dISP	ON	Display stays on.
		OFF	Display goes out 2 minutes after last key press.
Display intensity	SPEC/dINT	10-100	Adjust display intensity.
DMX lamp off	SPEC/dLOF	ON	Enable DMX lamp off command.
		OFF	Disable DMX lamp off command.*
DMX reset	SPEC/dRES	ON	Enable DMX reset command.
		OFF	Disable DMX reset command.*
Automatic lamp on	SPEC/ALON	ON	Lamp strikes automatically within 90 seconds of power on.
		OFF	Strike lamp from controller.
Shortcuts	SPEC/SCUT	ON	Dimmer, color wheel, and beam shaper take shortest path.*
		OFF	Dimmer, color wheel, and beam shaper paths oscillate.*
Automatic shutter	SPEC/ASHT	ON	Enable fast (shutter) blackout on dimmer channel.
		OFF	Shutter not activated by dimmer channel.
Studio mode	MOdE	NORM	Optimize effects for speed.*
		STUd	Optimize effects for silence.*
Pan/tilt feedback	SPEC/FEbA	ON	Enable pan/tilt position correction system.
		OFF	Disable pan/tilt feedback. Setting not saved.
Effects feedback	SPEC/EFFb	ON	Enable on the fly reset of dimmer, color wheel, and beam shaper.
		OFF	Disable on the fly reset of dimmer, color wheel, and beam shaper.
Fan speed	SPEC/FAN	REG	Enable automatic fan speed regulation.
		FULL	Set fan speed to full.
CMY speed	SPEC/CMYS	FULL	Optimize color mixing for speed.
		REdU	Optimize color mixing for quietness.

* Setting may be overridden via DMX. See the protocol for details.

Tests and readouts

The following readouts and tests are available from the control panel.

Function	Path	Options	Readout or effect
Usage counters	TIME/	Po H	Total hours of operation since fabricated.
		RPoH	Hours of operation since counter reset. To reset, display counter and press [↑] for 5 seconds.
		LA H	Total hours of operation with lamp on since fabricated.
		RLAH	Lamp hours since counter reset. Reset when relamping to track lamp life. To reset, display counter and press [↑] for 5 seconds.
		LSTR	Total number of lamp strikes since fabricated.
		RSTR	Number of lamp strikes since counter reset. To reset, display counter and press [↑] for 5 seconds.
DMX readout	dMXL/	STCO	Decimal value of the DMX start code. The start code must be 0 for the MAC 600 (E) NT to function properly.
		CH 0..CH14	DMX value (from 0 - 255) received for each channel. Note that the channel number is 1 less than it is in the DMX protocol.
Software versions	Ver/	CPU	CPU firmware version. Updates can be uploaded.
		FEBA	Feedback circuit firmware version.
		dISP	Display circuit firmware version.
Temperature readout	SPEC/TEMP/	HEAd	Head temperature in Celsius. Temperatures below 25° C are shown as -25; temperatures above 100° C are shown as +100.
		bASE	Base temperature in Celsius. Temperatures below 25° C are shown as -25; temperatures above 100° C are shown as +100.
Tests	TSEQ	RUN	Run a general test of all effects
	SPEC/PCbT	T1-T3	Run three tests of the circuit board. *For service use only.*
	SPEC/FTST/	WTST	Run an quality control effects test
		MTST	Run a quality control movement test
	SPEC/FTST/ STST	dIM	Run a quality control dimmer sensor test
		COL	Run a quality control color wheel sensor test
		bS	Run a quality control beam shaper sensor test

To calibrate temperature sensors

The temperature sensors are calibrated at the factory. Use this procedure if you suspect the calibration is faulty.

1 Turn off the fixture for 4 hours to allow it to cool to room temperature.

2 Measure the room temperature in Celsius. (To convert F° to C°, subtract 32° and multiply by 0.555.)

3 Power up the unit and allow it to reset.

4 Press [MENU] and [↓] and hold until “25” is displayed.

5 Scroll to the room temperature and press [ENTER].

Manual control

The manual control menu provides limited operation from the control panel.

Function	Path	Options	Effect
Reset	MAN/	RST	Reset fixture
Lamp on	MAN/	L ON	Strike lamp
Lamp off	MAN/	LoFF	Douse lamp
Shutter	MAN/SHUT	Open	Open shutter
		CLOS	Close shutter
		STRF	Strobe, fast
		STRM	Strobe, medium
		STRS	Strobe, slow
Dimmer	MAN/dIM	0-255	Insert dimmer wheel
Cyan	MAN/CYAN	0-255	Insert the cyan flags
Magenta	MAN/MAG	0-255	Insert the magenta flags
Yellow	MAN/YEL	0-255	Insert the yellow flags
Color correction	MAN/CTC	0-255	Insert the color temperature correction flags
Fixed color	MAN/COL	Open	Set color wheel to open position
		COL1-COL4	Set color wheel to position 1-4
Beam shaper	MAN/bS	0-255	Insert the beam shaper
Frost	MAN/FROS	0-255	Insert the frost filter
Pan	MAN/PAN	0-255	Pan the head
Tilt	MAN/TILT	0-255	Tilt the head

Adjustment control

The adjustment menu provides manual control for making mechanical adjustments. These shall be performed by a qualified technician.

Function	Path	Options	Effect
Reset	AdJ/	RST	Reset fixture
Lamp on	AdJ/	L ON	Strike lamp
Lamp off	AdJ/	LoFF	Douse lamp
Adjust all	AdJ/HEAd/ ALL	Open	Set all effects in the head to the full open position
		CLOS	Set all effects in the head to the full closed position
		SPOS	Set magnetically-indexed effects to the sensor position
Adjust dimmer	AdJ/HEAd/ DIM	OPEN	Set dimmer to open position
		CLOS	Set dimmer to closed position
		SPOS	Set dimmer to indexing (sensor) position
Adjust cyan	AdJ/HEAd/ CYAN	OPEN	Set cyan to open position
		CLOS	Set cyan to closed position
Adjust magenta	AdJ/HEAd/ MAG	OPEN	Set magenta to open position
		CLOS	Set magenta to closed position
Adjust yellow	AdJ/HEAd/ YEL	OPEN	Set yellow to open position
		CLOS	Set yellow to closed position
Adjust CTC	AdJ/HEAd/ CTC	OPEN	Set CTC to open position
		CLOS	Set CTC to closed position
Adjust color wheel	AdJ/HEAd/ COL	OPEN	Set color wheel to open position
		CLOS	Set color wheel to closed position
		SPOS	Set color wheel to indexing (sensor) position
Adjust beam shaper	AdJ/HEAd/ bS	OPEN	Set beam shaper to open position
		CLOS	Set beam shaper to closed position
		SPOS	Set beam shaper to indexing (sensor) position
Adjust frost	AdJ/HEAd/ FROS	OPEN	Set frost to open position
		CLOS	Set frost to closed position
Adjust shutter	AdJ/HEAd/ SHUT	OPEN	Open shutter
		CLOS	Close shutter
Adjust pan/tilt	AdJ/PATI	NEUT	Set pan and tilt to neutral positions
		PNTd-PRTU	Move pan and tilt to limits

Utilities

CALIBRATION

The calibration function allows you to fine-tune effect positions for uniformity between fixtures. Using one fixture as a reference, adjust the offsets of the other fixtures to match the reference.

CUSTOM CONFIGURATIONS

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, CMY speed, DMX lamp off and reset, display settings, automatic shutter, shortcuts, studio mode, fan speed, automatic lamp on, effects feedback, tracking algorithm, and tracking samples.

UPLOAD SOFTWARE

The software update mode is normally engaged automatically by the upload device. See “Updating software” on page 23.

Function	Path	Options	Effect
Calibration	CAL	P OF	Adjust pan offset
		T OF	Adjust tilt offset
		d OF	Adjust dimmer offset
		C OF	Adjust cyan offset
		M OF	Adjust magenta offset
		Y OF	Adjust yellow offset
		CTOF	Adjust CTC offset
Default offsets	SPEC/dFOF	SURE	Reset all effects to the default offset setting
Custom configuration	SPEC/dFSE/ CUS1, CUS2, CUS3	LOAd	Load custom configuration 1-3.
		SAVE	Save custom configuration 1-3. Adjust settings as desired before selecting. Press [ENTER] to save.
Default configuration	SPEC/dFSE/ FACT	LOAD	Return all personality settings (not calibrations) to factory defaults.
Upload software	SPEC/UPLD	SURE	Manually set fixture to software update mode.

OPTICAL CONFIGURATIONS 8

Field angles

Narrow and wide angle options are available for the MAC 600 (E) NT. The optional lenses are mounted in snap-lock hoods for easy changing. See “Accessories” on page 31.

Note: The narrow angle hood is longer than the standard hood. Because of this, MAC 600s and MAC 600 (E) NTs fitted with the narrow angle hood fit only in flight cases produced after September, 1997. These measure 894 mm (35.2") from bottom to top, including wheels. Earlier flight cases measure 860 mm (34") from bottom to top, including wheels.

To change field angle

1 Release the snap locks and remove the hood and lens assembly.

2 Unhook the head safety wire from the hood being removed and place it on the one being installed.

3 Place the hood over the head. Align and close the snap locks.

Color filters

The color wheel provides 4 dichroic glass filters: red 308, green 203, blue 108 and UV. The filters are held by a spring clip and may be removed. To avoid damaging the coating, wear clean lint-free gloves when handling the filters.

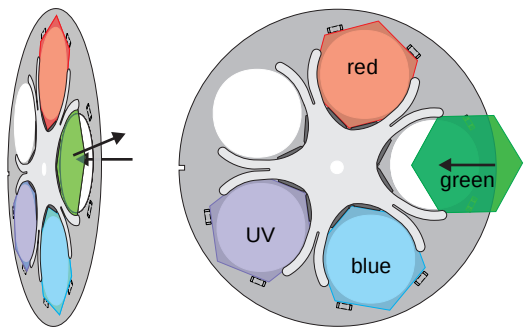
To remove and install a color filter

1 Disconnect the fixture from AC power and allow it to cool. Unlatch and remove the front head section.

2 Turn the desired filter position to the access cut-out.

3 To remove a filter, tilt the outside corner forwards past the retention tabs and slide it out of the clip.

4 To install a filter, carefully align the inside corner with the corner of the hub. Slide each side of the filter under the spring clip, starting at the leading edge as shown. If necessary, bend the wheel back gently to start the filter under the spring. Slide the filter in until it snaps into place.



Snoot

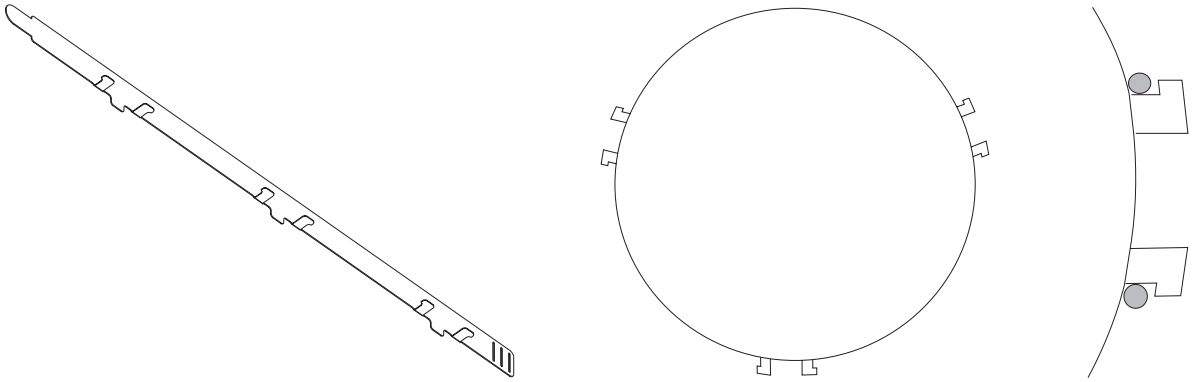
The snoot may be installed to reduce light spill to the sides.

To install the snoot

1 Bend the tabs 90°.

2 Bend the ring into a circle with the tabs on the outside. Weave the end tab through the 3 slots.

3 Insert the tabs between the 3 pairs of pins between the lens and the head cover.



1 2 3

Diffuser filter

The MAC 600 (E) NT includes a removable diffuser filter that provides a flatter field and superior color uniformity. For special applications, a 90 x 90 mm glass color filter may be installed in place of the diffuser.

To remove or install the diffuser filter

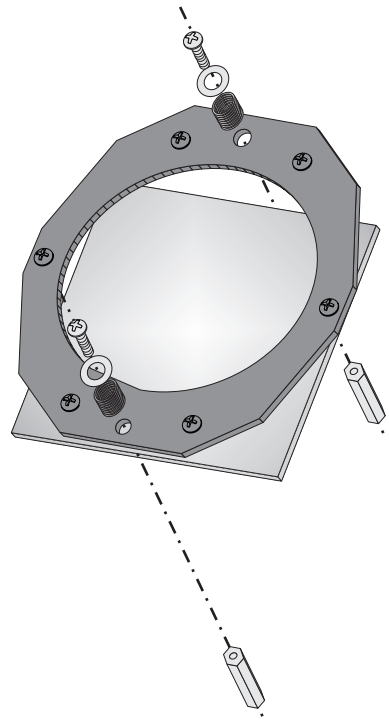
1 Disconnect the fixture from AC power and allow it to cool.

2 Unlatch and remove the front section of the head.

3 Remove the screw, washer, and retention spring from each end of the filter holder as shown. Lift off the holder and filter.

4 Replace the filter holder or store it with the filter.

5 Filter installation is the reverse. Turn the diffuser glass so that the textured side is away from the lamp.



OPERATION 9

DMX-512 control

The MAC 600 (E) NT may be controlled with any DMX-512 controller. Four DMX modes are available that provide different combinations of speed control and pan/tilt resolution.

Mode	DMX 1	DMX 2	DMX 3	DMX 4
Movement speed	Tracking		Tracking and/or Vector	
Pan/tilt resolution	8 bit	16 bit	8 bit	16 bit
Channels	11	13	13	15

TRACKING MODE

Tracking mode is available in all 4 DMX modes. In tracking mode the speed at which an effect moves is determined by the controller's fade time. The effect tracks the fade from one DMX value to another and a digital filter algorithm ensures smooth movement at all fade speeds.

Two tracking algorithms are available to optimize movement for any controller. Algorithm 1 is recommended for use with most controllers. Algorithm 2 provides smoother movement if the controller's DMX value changes are uneven.

The number of DMX value changes used to calculate smooth movement is selectable between a level of 1 and 10. The default level works well with most controllers. Increasing the level makes movement smoother but less responsive to sudden DMX changes. Experiment for best results.

VECTOR MODE

Vector control is available in DMX modes 3 and 4. This mode provides direct speed control using 2 speed channels and may result in smoother movement when using a controller with a slow or irregular refresh rate. Vector mode also provides a "blackout" speed and overrides of the pan/tilt speed (PTSP), shortcut (SCUT), and studio mode (MOdE) settings.

When vector control is used, the controller fade time should be set to 0, i.e., the position bumps from one value to the next. However, tracking control may be enabled in vector mode by setting the speed channels to a tracking value.

8-BIT MODE

8-bit pan and tilt control is provided in DMX modes 1 and 3. This mode provides 256 pan positions in 1.7° steps and 256 tilt positions in 1.2° steps.

16-BIT MODE

16-bit pan and tilt control requires 2 additional channels and is available in DMX modes 2 and 4. This mode provides 32,768 pan positions in 0.013° steps and 45,567 tilt positions in 0.007° steps.

Lamp

The MAC 600 (E) NT can be set to automatically strike within 90 seconds of being powered on by setting Automatic Lamp On (SPEC/ALON) to ON. A delay determined by the fixture address prevents all lamps from striking at the same time.

If Automatic Lamp On is set to off, the default, the lamp remains off until a "lamp on" command is sent from the controller. Note: A peak of electric current that can be many times the operating current is drawn for an instant when striking the lamp. 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.

The lamp can be turned off from the controller. The DMX lamp off command is executed if DMX lamp off (SPEC/dLof) is set to ON. *Note: It is not possible to strike the lamp within 8 minutes of having switched it off.* If DMX lamp off is OFF, the lamp off command can only be executed if the cyan, magenta, and yellow channels are set to a value from 230 to 232.

With the MAC 600 E NT, lamp power falls to 400 watts for cooler operation and longer lamp life when the shutter is closed for 10 seconds. Power instantly returns to full when the shutter opens. Reduced-power mode with the shutter open can be forced by setting channel 1 to a DMX value from 116 to 122.

Mechanical effects

All mechanical effects are reset to their home position when the fixture is powered up, and the fixture can be reset from the controller. A controller reset command is executed if DMX reset (SPEC/dRES) is set to ON. If DMX reset is OFF, the reset command can only be executed if the cyan, magenta, and yellow channels are set to a value from 230 to 232.

An on-the-fly position correction system monitors the dimmer, color wheel, and beam shaper position. If a position error occurs in one of these effects, the shutter closes while the effect automatically resets. This feature may be disabled by setting effects feedback (SPEC/EFFb) to OFF.

General operation may be optimized for speed or quietness with the studio mode setting (MOdE).

PAN AND TILT

The moving head can be panned 440° and tilted 306°. The middle of the pan range is perpendicular to the front of the fixture, as indicated by the arrow on the base. Movement may be optimized for speed by setting the pan/tilt speed (PTSP) personality to FAST, or for smoothness by setting it to NORM. The setting may be overridden on the speed channel in vector mode. Movement is disabled if lamp feedback is lost - indicating a blown lamp - to prevent possible damage or injury due to glass fragments.

Setting the movement speed to “blackout” in vector mode causes the shutter to black out the light while the head is moving. The pan and tilt DMX channels can be inverted and/or swapped for convenience using the pan/tilt (PATI) menu.

COLOR WHEEL

The color wheel provides dichroic red, green, blue, and UV color filters. The wheel can be scrolled, allowing for split color effects, snapped to fixed positions, and continuously rotated in both directions at different speeds. The Shortcuts (SPEC/SCUT) setting determines whether the wheel takes the shortest path to the next position or swings between the end positions. The setting may be overridden on the speed channel in vector mode.

Setting the color speed to “blackout” in vector mode causes the shutter to black out the light while the wheel moves, making the transition invisible.

CMY COLOR MIXING

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

Random CMY color mixing is available at the top of channel 7.

COLOR TEMPERATURE CORRECTION

The color temperature correction (CTC) system uses a continuous 0 - 178 mireds color correction filter. The range of color temperatures available with a new lamp is shown below. As the source color temperature varies, DMX values for specific color temperatures cannot be stated.

Source	Color Temperature Range	Color Rendering Index
Osram HSR 575/2	6000 - 2900 K	95
Philips MSD 575	6000 - 2900 K	75
Philips MSR 575/2	7200 - 3150 K	80

BEAM SHAPER

The beam shaper widens the beam on one axis and flattens it on the other. The effect rotates 180°. The Shortcuts (SPEC/SCUT) setting determines whether the beam shaper takes the shortest path to the next position or swings between the end positions. The setting may be overridden on the speed channel in vector mode.

VARIABLE FROST

The variable frost system softens and widens the beam, thus providing a zoom effect.

DIMMER

The mechanical dimmer provides smooth, high-resolution dimming from full-closed to full-open. The Shortcuts (SPEC/SCUT) setting determines whether the dimmer takes the shortest path to the next position or swings between the end positions. The setting may be overridden on the speed channel in vector mode.

SHUTTER

The high-speed mechanical shutter opens and closes instantly and flashes the light at speeds up to 8 Hz.

With the automatic shutter function (SPEC/ASHT) enabled, the shutter works in tandem with the dimmer to automatically provide faster blackouts than the dimmer alone can provide.

UPDATING SOFTWARE 10

The latest software and documentation for the MAC 600 (E) NT is available from the Martin Professional web site. Software installation requires a Martin uploader, such as the MPBB1, prepared with the latest fixture software. The DMX interface card provided with the Club version of the Martin LightJockey controller also supports software upload.

To install software with the MPBB1 uploader, normal method

1 Download the latest MAC 600 (E) NT CPU firmware from the Martin web site at http://www.martin.dk. Load the software into the uploader as described in the MPBB1 manual.

2 Connect the uploader to the fixture as you would a controller. *The data link must be terminated.* Apply power to the uploader and the fixtures.

3 After the fixture has finished resetting, select UPLd from the MPBB1 menu and press [ENTER]. Select dMX and press [ENTER].

4 Wait. The software has been installed when the MPBB1 displays dONE and the fixtures reset. Turn off and disconnect the MPBB1.

5 If a check-sum error occurs and/or the fixture does not reset, data was interrupted or corrupted during transmission. Reattempt the upload using backup method I.

To install software with the MPBB1, backup method I

Follow this procedure to install software if a normal upload attempt is unsuccessful.

1 Disconnect the fixture from power: it must be off at least 10 seconds. *Do not apply power to the fixture until the uploader is connected and ready.*

2 Connect the uploader to the fixture as you would a controller. *Terminate the link.*

3 Select UPLd from the uploader menu and press [ENTER]. Select boot *but do not press [ENTER].*

4 Apply power to the fixture.

5 When the fixture display reads boot, press [ENTER] on the uploader. If the fixture display shifts between CSER and boot, press [ENTER] 5 seconds after the display changes to boot. The timing must be exact.

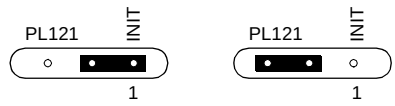
6 Wait. When the fixture resets, the software has been installed successfully. Disconnect the uploader.

To install software with the MPBB1, backup method II

Use this procedure to install software if all else fails or if a boot sector upload is recommended in the update notes.

1 Disconnect the fixture from power.

2 Remove the printed circuit board and move the boot sector jumper to the boot setting. Reconnect any unplugged wires.



3 Connect the uploader to the fixture as you would a controller. *Terminate the link.*

4 Select UPLd from the uploader menu and press [ENTER]. Select boot. *Do not press [ENTER].*

5 Apply power to the fixture and wait 5 seconds. Press [ENTER] on the uploader.

6 Wait. The software has been installed when the fixture resets.

7 Disconnect the fixture from power, move the jumper back to the normal setting, and replace the circuit board.

FIXTURE SERVICE 11

Excessive dust, grease, and smoke fluid buildup can result in damage that is not covered by the warranty. Dirty lenses and filters transmit less light, absorb more heat, and are subject to heat damage. Dirty fans and air vents reduce cooling and generally shorten component life. This section takes you through the general maintenance procedures and describes some basic service operations.

Warning! ***Disconnect from AC power before removing any cover or part.***

Circuit board service

To replace fuses or change the XLR pin-out

The main fuse is located above the XLR output and is replaced by unscrewing the holder with a screwdriver or small coin. The secondary fuses are located on the printed circuit board and are replaced as follows.

1 Disconnect the fixture from AC power.

2 Remove the top plate from the front of the base. *Do not remove the curved side plates.*

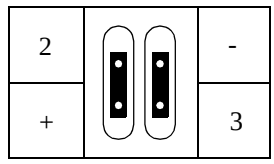
3 Unplug the white plastic connectors from the top of the printed circuit board. To unplug a connector, hold the plastic connector - never pull the wires - and pull it straight off the pins.

4 Grasp the black pins on either end of the circuit board and gently pull it out. You may have to guide some wires past the motor housing. Be careful not to knock the copper heat sinks.

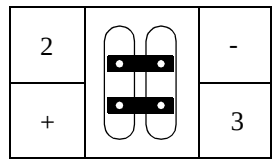
5 Replace defective fuses with ones of the same rating. The fuses values are listed on page 30.

6 To change the XLR pin out, position the jumpers for the desired XLR pin-out as shown.

7 Gently put the circuit board into the base. You may have to guide some wires past the motor housing. Push the black pins down to lock the board in place.



Martin pin-out



DMX pin-out

8 Reconnect all wires as shown on page 29. Replace the top cover.

Cleaning the optical path

Cleaning and servicing components in the head is best left to qualified Martin technicians.

To access the optical components, remove the head cover. Remember to attach the internal safety cable when reassembling the head.

Be very careful if you clean the optical components. The colored surface on the dichroic filters is achieved by means of special multi-layer coatings and even small scratches in these might be visible. Residues left from cleaning fluids can bake onto and ruin components.

Wash dirty lenses and filters with isopropyl alcohol. Rinse with distilled water: mixing the water with a small amount of wetting agent such as Kodak Photoflo will help prevent streaking and spotting. Dry with a clean, soft and lint-free cloth or blow dry with compressed air. A generous amount of regular window glass cleaner may also be used, but no residues may remain.

Cleaning the fans

To ensure proper cooling of the fixture it is important that the fans are free of dust. Clean the fans with a vacuum or damp cloth if they are dirty.

DMX PROTOCOL

A

DMX channel				Start code = 0		
DMX1	**DMX2**	**DMX3**	**DMX4**	**Value**	**Percent**	**Function**
1 Note: Lamp Off is allowed with SPEC/dLoF set to ON, or with SPEC/dLoF set to OFF and cyan, magenta and yellow set between 230 and 232. Reset is allowed with SPEC/dRES set to ON, or with SPEC/dRES set to OFF and cyan, magenta and yellow set between 230 and 232.						**Shutter, Strobe, Reset, Lamp On/Off**
				0 - 19	0 - 7	Shutter closed
				20 - 49	8 - 19	Shutter open
				50 - 112	20 - 44	Strobe on (fast->slow)
				113 - 115	44 - 45	Shutter closed
				116 - 122	45 - 48	Shutter open (Reduced lamp power w/electronic ballast)
				123 - 127	48 - 50	Shutter closed
				128 - 147	50 - 58	Random strobe, fast
				148 - 167	58 - 65	Random strobe, medium
				168 - 187	66 - 73	Random strobe, slow
				188 - 207	74 - 81	Shutter closed
				208 - 217	82 - 85	Reset fixture
				218 - 227	85 - 89	Shutter closed
				228 - 237	89 - 93	Lamp power on
				238 - 247	93 - 97	Shutter closed
				248 - 255	97 - 100	Lamp power off **Note**: T ≥ 5 seconds
2						**Intensity**
				0 - 255	0 - 100	0 → 100%
3						**Cyan**
				0 - 255	0 - 100	White → Cyan
4						**Magenta**
				0 - 255	0 - 100	White → Magenta
5						**Yellow**
				0 - 255	0 - 100	White → Yellow
6						**CTC**
				0 - 255	0 - 100	Cold → Warm (0-178 mireds)
7						**Color Wheel**
						Continuous scroll
				0 - 40	0 - 16	White → Color 1
				40 - 80	16 - 31	Color 1 → Color 2
				80 - 120	31 - 47	Color 2 → Color 3
				120 - 160	47 - 63	Color 3 → Color 4
						Stepped scroll
				161 - 165	63 - 65	Color 4
				166 - 170	65 - 67	Color 3
				171 - 175	67 - 69	Color 2
				176 - 180	69 - 71	Color 1
				181 - 185	71 - 73	White
						Continuous rotation
				186 - 214	73 - 84	CW, fast → slow
				215 - 243	84 - 95	CCW, slow → fast
						Random CMY color
				244 - 247	96 - 97	Random color, fast
				248 - 251	97 - 98	Random color, medium
				252 - 255	99 - 100	Random color, slow
8						**Beam Shaper**
				0	0	Open
				1 - 255	0 - 100	Beam shaper left → right
9						**Frost**
				0 - 255	0 - 100	No frost → full frost
10						**Pan Coarse** (16-bit MSB)
				0 - 255	0 - 100	Left → right (128 = neutral)
-	11	-	11			**Pan Fine** (16-bit LSB)
				0 - 255	0 - 100	Left → right
11	12	11	12			**Tilt Coarse** (16-bit MSB)
				0 - 255	0 - 100	Up → down (128 = neutral)

DMX channel						Start code = 0
DMX1	**DMX2**	**DMX3**	**DMX4**	**Value**	**Percent**	**Function**
-	13	-	13	0 - 255	0 - 100	**Tilt Fine** (16-bit LSB) Up → down
-	-	12	14			**Speed: Pan, Tilt**
				0 - 2	0 - 1	Tracking
				3 - 245	1 - 96	Fast → slow
				246 - 248	96 - 97	Tracking, PTSP = NORM (normal pan/tilt speed)
				249 - 251	98 - 98	Tracking, PTSP = FAST (fast pan/tilt speed)
				252 - 255	99 - 100	Blackout
-	-	13	15			**Speed: Dimmer, Color Mix, Bm Shaper, Frost**
				0 - 2	0 - 1	Tracking
				3 - 239	1 - 94	Fast → slow
				240 - 242	94 - 95	Tracking, MOdE = NORM (studio mode off)
				243 - 245	95 - 96	Tracking, MOdE = STUd (studio mode on)
				246 - 248	96 - 97	Tracking, SCUT = OFF (shortcuts off)
				249 - 251	98 - 98	Tracking, SCUT = ON (shortcuts on)
				252 - 255	99 - 100	Fast
						Speed: Color wheel
				0 - 2	0 - 1	Tracking
				3 - 239	1 - 94	Fast → slow
				240 - 242	94 - 95	Tracking, MOdE = NORM (studio mode off)
				243 - 245	95 - 96	Tracking, MOdE = STUd (studio mode on)
				246 - 248	96 - 97	Tracking, SCUT = OFF (shortcuts off)
				249 - 251	98 - 98	Tracking, SCUT = ON (shortcuts on)
				252 - 255	99 - 100	Blackout

DISPLAY MESSAGES

B

Display readout	Appears if...	What to do
SRST (Serial reset)	...the fixture receives a reset command from the controller.	To prevent accidental resets, disable command. See page 13.
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 and check that the mains setting of the fixture matches the mains supply.
MERR (Memory error)	...the EEPROM memory cannot be read.	Contact Martin technician for assistance.
CSER (Check-sum error)	...a software upload is not successful.	Upload software again, see page 23.
****	... there is no communication between the control module and motherboard. This readout appears briefly when switching on the fixture.	Check fuses on motherboard and replace accordingly. Check that ribbon cable between control module and motherboard is connected properly.
ShER (Short error)	... the fixture detects that the lamp is ON but no 'Lamp ON' command has been received. This can occur if the lamp relays are stuck in the ON position or if the lamp-power feedback circuit has failed. You can still operate the fixture but may not be able to remotely switch off the lamp.	Contact Martin technician for assistance.
Hot (Hot lamp)	... you attempt to strike the lamp within 8 minutes after having switched it off. The fixture will store the 'Lamp ON' instruction and strike the lamp once the 8 minutes have elapsed.	Wait until the lamp strikes.
bTER (Base temperature error) HTER (Head temperature error)	...there is a malfunction in the base or head temperature sensing circuit.	Contact Martin technician 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 technician 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)	...the microswitch indexing circuit malfunctions. The effect defaults to a mechanical stop and continues to work normally.	Contact Martin technician for assistance.
DIER (Dimmer time-out) COER (Color time-out) bSER (Beam shaper 1 time-out)	...the magnetic-indexing circuit malfunctions. After the time-out, the effect stops in a random position.	Contact Martin technician for assistance.

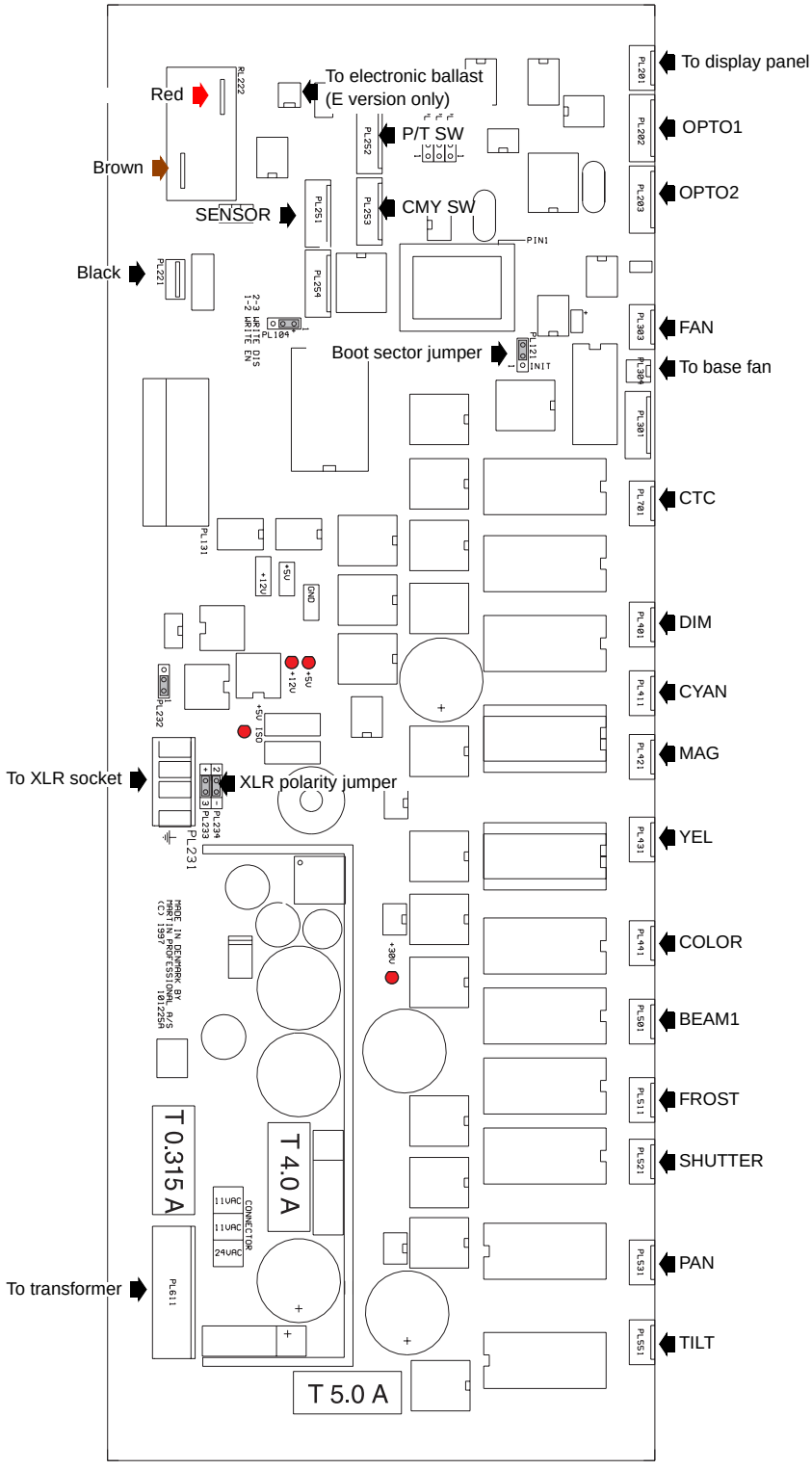
TROUBLESHOOTING

C

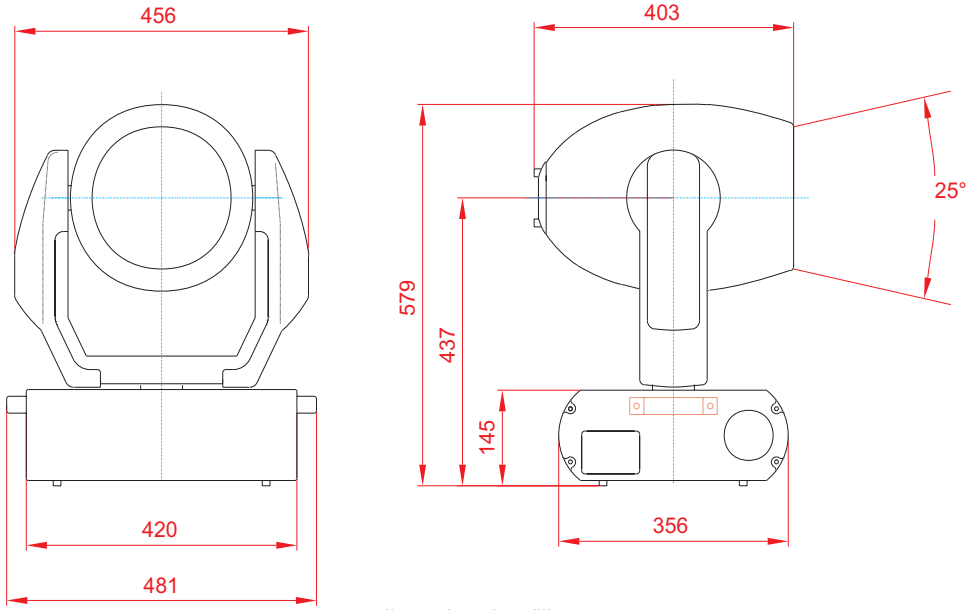
Problem	Probable cause(s)	Remedy
One or more of the fixtures is completely dead.	Fixture not powered on.	Check that power is switched on and cables are plugged in.
	Primary fuse blown (located at the mains inlet cable).	Disconnect fixture and replace fuse.
	Secondary fuse(s) blown (located on PCB inside the fixture base).	Disconnect fixture. Check fuses on PCB (F601 and F602) and replace.
Fixtures reset correctly but all respond erratically or not at all to the controller.	The controller is disconnected from the data link.	Connect controller.
	XLR pin-out of the controller does not match pin-out of the first fixture on the link (i.e. signal is reversed).	Install a phase-reversing cable between the controller and the first fixture on the link.
Fixtures reset correctly but some respond erratically or not at all to the controller.	Bad data link connection	Inspect connections and cables. Correct poor connections. Repair or replace damaged cables.
	Data link not terminated with 120Ω termination plug.	Insert termination plug in output jack of the last fixture on the link.
	Incorrect addressing of the fixtures.	Check fixture address and protocol settings. (page 12)
	One of the fixtures is defective and disturbs data transmission on the link.	Bypass one fixture at a time until normal operation is regained. Do this by unplugging the XLR in and out connectors and connecting 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 ballast and transformer settings do not match local AC voltage and frequency.	Disconnect fixture. Check ballast and transformer settings and correct if necessary.
	Lamp blown	Disconnect fixture and replace lamp.
	Lamp not installed	Disconnect fixture and install lamp.
Lamp cuts out intermittently.	Fixture is too hot.	Allow fixture to cool. Reduce ambient room temperature. Set fan speed to full. Recalibrate temperature sensors.
	The ballast and transformer settings do not match local AC voltage and frequency.	Disconnect fixture. Check ballast and transformer settings and correct if necessary.

CIRCUIT BOARD CONNECTIONS

D



SPECIFICATIONS



dimensions in millimeters

MEASUREMENTS

Dimensions (LxWxH) without clamps . . . . . 481 x 356 x 652 mm (18.9 x 14.0 x 25.7 in)
Minimum rigging distance, center to center . . . . . 457 mm (18 in)
Weight (without clamps), MAC 600 NT . . . . . 31.5 kg (69.3 lb)
Weight, without clamps, MAC 600 E NT . . . . . 25.4 kg (55.9 lb)

ELECTRICAL, MAC 600 NT

Wiring options . . . . . 200/230/245 V, 50 Hz; 208/227 V, 60 Hz
Power and current . . . . . 750 W, 3.9 A @ 230 V/50 Hz; 750 W, 4.2 A @ 208 V/60 Hz
Power factor (PF) 0.85

ELECTRICAL, MAC 600 E NT

Transformer taps . . . . . 100/110/120/200/210/220/230/240 @ 50 - 60 Hz
Power and current . . . . . 690 W, 3.2 A @ 230 V / 50 Hz
Power factor (PF) 0.94

FUSES

Primary fuse @ 200 - 250 V AC . . . . . T 6.3 A, 250 V
Primary fuse @ 100 - 130 V AC (MAC 600 E NT only) . . . . . T 10.0 A, 250 V
Fuse F601 . . . . . T 5.0 A, 250 V
Fuse F602 . . . . . T 4.0 A, 250 V
Fuse F603 . . . . . T 0.315 A, 250 V

COMMUNICATION

Protocol . . . . . USITT DMX512 (1990)
DMX start code 0
Recommended cable . . . . . 24 AWG (min.), low capacitance, 85-150 Ω shielded twisted pair
Connector type . . . . . 3-pin XLR male/female (pin 1: screen, pin 2: data -, pin 3: data +)

COMPATIBLE LAMPS

Osram HSR-575/2 . . . . . 575 W, 85 lm/W, 1000 hr., 6000 K, P/N 97010200
Philips MSR-575/2 . . . . . 575 W, 85 lm/W, 1000 hr., 7200 K, P/N 97010201
Philips MSD-575 . . . . . 575 W, 75 lm/W, 2000 hr., 6000 K, P/N 97010202

THERMAL

Maximum ambient temperature . . . . . 40° C (104° F)
Maximum surface temperature under normal conditions . . . . . 140° C (284° F)

ACCESSORIES

18° “long front” with lens 91610005
65° floodlight diffuser on standard front 91610008
MPBB1 Uploader 90758410
G-clamp 91602003
Half-coupler clamp 91602005
Clamp adaptor with 1/4-turn fasteners 91602001
Outdoor Protection Dome 90525010
2 unit flight case 91510002

MAC 600 NT DMX Protocol

Start code = 0

Implemented from CPU software version 1.0

Group	Mode 1	Mode 2	Mode 3	Mode 4	Function / values
LIGHT	1	1	1	1	**SHUTTER**: closed, open · **STROBE** ← · **B/O** · low pwr (E) · **B/O** · **RANDOM STROBE**: fast, med, slow · **B/O** · **RESET** * · **B/O** · **LAMP ON** · **B/O** · **LAMP OFF*** > 5 sec.
LIGHT	2	2	2	2	closed — **DIMMER** — open
COLOR	3	3	3	3	0% — **CYAN** — * — 100%
COLOR	4	4	4	4	0% — **MAGENTA** — * — 100%
COLOR	5	5	5	5	**YELLOW** — * — 100%
COLOR	6	6	6	6	cold (0 mireds) — **COLOR TEMPERATURE CORRECTION** — warm (178 mireds)
COLOR	7	7	7	7	**CONTINUOUS COLOR SCROLL**: (0) white, DMX 0; (1) red, DMX 40; (2) green, DMX 80; (3) blue, DMX 120; (4) UV, DMX 160 · **STEPPED SCROLL**: 4 | 3 | 2 | 1 | 0 · **CONTINUOUS ROTATION**: cw ←, ccw → · **RND. CMY**: f | m | s
BEAM	8	8	8	8	0° (open) — **BEAM SHAPER** — 180°
BEAM	9	9	9	9	0% — **FROST** — 100%
P/T	10	10	10	10	left — **PAN** — right: 210°, 190°, 170°, 150°, 130°, 110°, 90°, 70°, 50°, 30°, 10°, 10°, 30°, 50°, 70°, 90°, 110°, 130°, 150°, 170°, 190°, 210°
P/T	-	11	-	11	left — **PAN FINE (LSB)** — right
P/T	11	12	11	12	up — **TILT** — down: 150°, 135°, 120°, 105°, 90°, 75°, 60°, 45°, 30°, 15°, 0°, 15°, 30°, 45°, 60°, 75°, 90°, 105°, 120°, 135°, 150°
P/T	-	13	-	13	up — **TILT FINE (LSB)** — down
SPEED			12	14	T · fast — **PAN/TILT SPEED** — slow · T_S · T_F · «·»
SPEED			13	15	**EFFECTS SPEED**: T · fast — dimmer, CMY, CTC, beam shaper, frost — slow · M_N · M_S · T_S · T_F · f; T · fast — color wheel — slow · M_N · M_S · T_S · T_F · «·»

Scales: DMX 0–255 (25, 50, 75, 100, 125, 150, 175, 200, 225, 250); percent 0–100 (10, 20, 30, 40, 50, 60, 70, 80, 90).

** Set CMY from 230 to 232 to override disabled function.*
M_N = normal mode, M_S = studio mode
T = tracking mode (0-2 & 246-251)
S = normal PTSP or shortcuts off (246-248)
F = fast PTSP or shortcuts on (249 -251)
«·» = blackout speed (252-255)
← = variable speed, points to fast