

MAC 401™ Dual

MAC 401™ CT Zoom

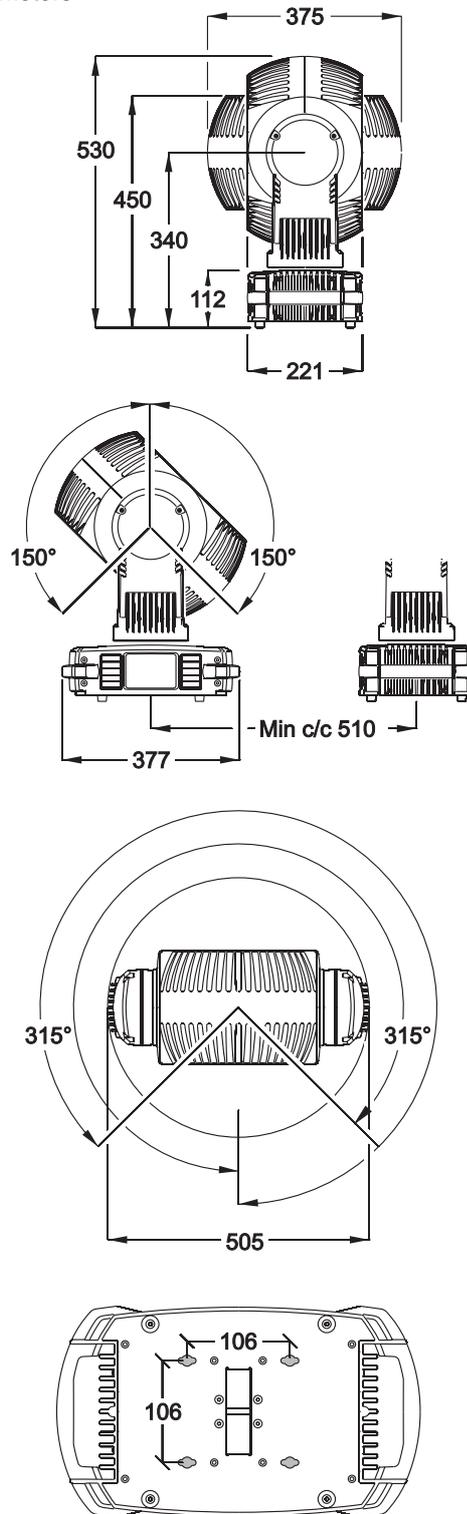
user manual



Martin®

Dimensions

All dimensions are in millimeters



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Safety Information



WARNING!

Read the safety precautions in this section before installing, powering, operating or servicing this product.

The following symbols are used to identify important safety information on the product and in this manual:



DANGER!
Safety hazard.
Risk of severe injury or death.



DANGER!
Hazardous voltage. Risk of lethal or severe electric shock.



WARNING!
Fire hazard.



WARNING!
LED light emission. Risk of eye injury.



WARNING!
Burn hazard. Hot surface. Do not touch.



WARNING!
Wear protective eyewear.



WARNING! Refer to user manual.



Warning! Class 3B LED product. Do not look into the beam at a distance of less than 1 meter (3 feet 4 inches) from the front surface of the product. Do not view the light output with optical instruments or any device that may concentrate the beam.



This product is for professional use only. It is not for household use.

This product presents risks of severe injury or death due to fire and burn hazards, electric shock and falls.



Read this manual before installing, powering or servicing 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 supplier or call the Martin 24-hour service hotline on +45 8740 0000, or in the USA on 1-888-tech-180.



PROTECTION FROM ELECTRIC SHOCK

- Disconnect the fixture from AC power before removing or installing any cover or part – including fuses – 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 (earth-fault) protection.
- Before using the fixture, check that all power distribution equipment and cables are in perfect condition and rated for the current requirements of all connected devices.
- Isolate the fixture from power immediately if any power connector, power cable, seal, cover or other component is damaged, defective, deformed, wet or showing signs of overheating. Do not reapply power until repairs have been completed.
- Do not expose the fixture to rain or moisture.
- Refer any service operation not described in this manual to a qualified technician.



PROTECTION FROM BURNS AND FIRE

- Do not operate the fixture if the ambient temperature (T_a) exceeds 40° C (104° F).
- The exterior of the fixture becomes hot during use. Avoid contact by persons and materials. Allow the fixture to cool for at least 10 minutes before handling.
- Keep all combustible materials (e.g. fabric, wood, paper) at least 200 mm (8 in.) away from the head.
- Keep flammable materials well away from the fixture.
- Ensure that there is free and unobstructed airflow around the fixture.
- Do not illuminate surfaces within 200 mm (8 in.) of the fixture.
- Do not attempt to bypass thermostatic switches or fuses. Replace defective fuses with ones of the specified type and rating.
- Do not modify the fixture in any way not described in this manual
- Install only genuine Martin parts.



PROTECTION FROM INJURY

- Do not look at LEDs from a distance of less than 1 meter (3 feet 4 inches) from the front surface of the fixture without protective eyewear such as shade 4-5 welding goggles. At less than this distance, the LED emission can cause eye injury or irritation. At distances of 1 meter (3 feet 4 inches) and above, light output is harmless to the naked eye provided that the eye's natural aversion response is not overcome.
- Do not look at LEDs with magnifiers, telescopes, binoculars or similar optical instruments that may concentrate the light output.
- Ensure that persons are not looking at the LEDs from within 1 meter (3 feet 4 inches) when the product lights up suddenly. This can happen when power is applied, when the product receives a DMX signal or when service menu items are selected in the **SERV** menu.
- To minimize the risk of eye irritation or injury, set the zoom to wide angle and disconnect the fixture from power at all times when the fixture is not in use, and provide well-lit conditions to reduce the pupil diameter of anyone working on or near the fixture.
- Install as described in this manual a secondary attachment such as a safety cable that is approved by an official body such as TÜV as a safety attachment for the weight of all the fixtures it secures. The safety cable must comply with EN 60598-2-17 Section 17.6.6 and be capable of bearing a static suspended load ten times the weight of the fixture.
- If suspending from a rigging structure, attach the fixture with two evenly spaced clamps. Do not use only one clamp.
- Ensure that any supporting structure and/or hardware used can hold at least 10 times the weight of all the devices they support.
- Allow enough clearance around the head to ensure that it cannot collide with an object or another fixture when it moves.
- Check that all external covers and rigging hardware are securely fastened.
- Block access below the work area and work from a stable platform whenever installing, servicing or moving the fixture.
- Do not operate the fixture with missing or damaged covers, shields or any optical component.



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Introduction

Thank you for selecting the MAC 401™, an intelligent LED-based moving head washlight fixture from Martin Professional™ that is available in two models:

- The MAC 401 Dual™, with an RGB Zoom LED module fitted as standard
- The MAC 401 CT Zoom™, with a CT (Color Temperature) Zoom LED module fitted as standard.

The MAC 401 features:

- A twin-face head that can operate with one or two plug-and-play LED modules
- Various RGB (red, green, blue), HSV (hue, saturation, value), electronic 'color wheel' and CTC (color temperature control) control options depending on LED module(s) fitted and control mode selected
- DMX control
- Onboard control panel with LED display
- Two ranges of pre-programmed superimposable dynamic effects
- Four pixel grouping options
- Smooth electronic dimming
- Electronic strobe with pulse effects
- Motorized zoom providing beam angles from 20° - 50°, as well as 16° Hypermode effect
- 630° pan and 300° tilt ranges

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

Comments or suggestions regarding this document may be e-mailed to service@martin.dk or posted to: Technical Documentation, Martin Professional A/S, Olof Palmes Allé 18, DK-8200 Aarhus N, Denmark



Warning! Read "Safety Information" on page 3 before installing, powering, operating or servicing the MAC 401™.

Unpacking

The following items are included with the MAC 401:

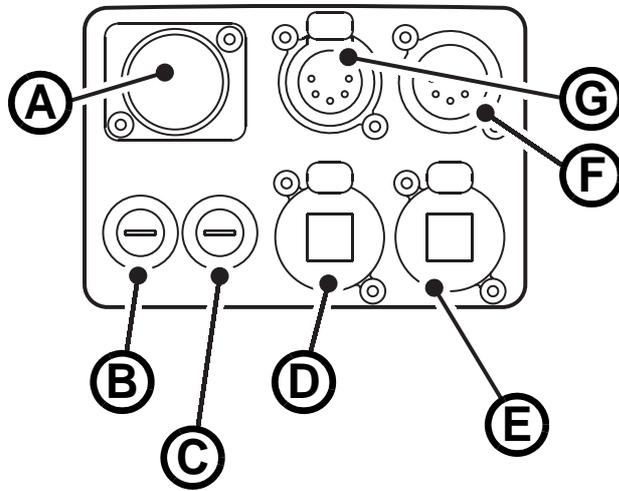
- One LED head module (installed): RGB Zoom module in MAC 401 Dual, CTC Zoom module in MAC 401 CT Zoom
- Two clamp attachment brackets with quarter-turn fasteners
- This user manual
- Neutrik PowerCon input connector

Using for the first time

Before applying power to the fixture:

- Check the Martin Professional website at www.martin.com for the most recent user documentation and technical information about the MAC 401. Martin user manual revisions are identified by the letter at the bottom of page 2.
- Carefully review "Safety Information" on page 3.
- Check that the fixture's power voltage and frequency ranges match the local AC mains power source. See "Power voltage" on page 8.
- Prepare the cabling and connectors for running the fixture off AC power as described in "Power cable and plugs" on page 8.

Connections panel



- A – AC mains power input (Neutrik PowerCon)
- B – Fuseholder, mains fuse 1
- C – Fuseholder, mains fuse 2
- D – Ethernet 1 (RJ-45, for future use)
- E – Ethernet 2 (RJ-45, for future use)
- F – DMX in (5-pin XLR)
- G – DMX out (5-pin XLR)

Figure 1: Connections panel overview

AC power



Warning! Read “Safety Information” starting on page 3 before connecting the MAC 401 to AC mains power.

For protection from electric shock, the MAC 401 must be grounded (earthed). The AC power distribution circuit must be equipped with a fuse or circuit breaker and ground-fault (earth-fault) protection.



The MAC 401 does not have a power on/off switch. To shut down power in an emergency, disconnect the fixture’s power input connector.

Important! Do not use an external dimming system to supply power to the MAC 401, as this may cause damage to the fixture that is not covered by the product warranty.

The MAC 401 can be hard-wired to a building electrical installation if you want to install it permanently. If you do this, provide a means of shutting down power near the fixture. Alternatively a power cable (not supplied) with a power plug suitable for local power output sockets can be used to supply the fixture with AC mains power.

Power voltage



Warning! Check that the voltage range specified on the fixture’s serial number label matches the local AC mains power voltage before applying power to the fixture.

MAC 401 fixtures are factory-configured to accept AC mains power at 100-240 V nominal, 50/60 Hz.

Do not apply AC mains power to the fixture at any other voltage than that specified on the fixture’s serial number label.

Power cable and plugs

The fixture must be connected to AC power using three-conductor cable that is rated 20 A minimum (12 AWG or 2.5 mm²), with a diameter of 5 - 15 mm (0.2 - 0.6 in.). The cable jacket must be SJT type or better and heat-resistant to 90° C (194° F) minimum. A power cable is not supplied with the product.

The MAC 401 is supplied with a male Neutrik PowerCon NAC3FCA locking 3-pole input connector that can be attached to the end of the power cable. Only use this connector to disconnect the fixture from power in an emergency – frequent use can cause damage to the connector or socket due to arcing across the terminals.

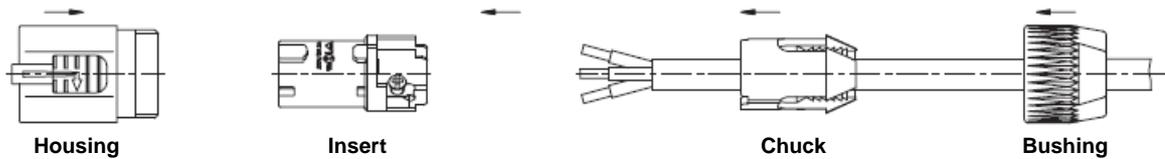
The power cable can either be permanently connected to a building’s electrical installation circuits (in this case an external power switch must be installed close to the fixture) or fitted with a power plug that is suitable for the local AC mains power outlets.

If you decide to install a power plug on the fixture’s power cable, install a grounding-type (earthed) plug that is correctly rated for the current and power requirements of the fixture. Follow the plug manufacturer’s instructions. Table 1 shows standard wire color-coding schemes and some possible pin identification schemes; if pins are not clearly identified, or if you have any doubts about proper installation, consult a qualified electrician.

Wire Color (EU)	Wire Color (US)	Conductor	Symbol	Screw (US)
brown	black	live	L	yellow or brass
blue	white	neutral	N	silver
yellow/green	green	ground (earth)	 or 	green

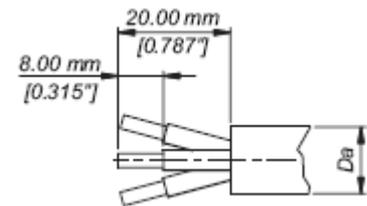
Table 1: Wire color-coding and power connections

Attaching a cable to the male input connector

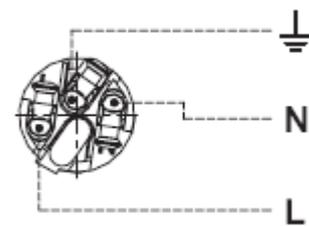


To attach a power cable to the supplied input connector:

1. Slide the bushing over the cable.
2. Slide the white chuck over cables with a diameter (D_a) of 5 - 10 mm (0.2 - 0.4 in.), or the black chuck over cables with a diameter of 10 - 15 mm (0.4 - 0.6 in.).
3. Prepare the end of the cable by stripping 20 mm (0.8 in.) of the cable's outer jacket.
4. Strip 8 mm (1/3 in.) from the end of each of the wires.
5. Insert each of the wire ends into the appropriate terminal (see Table 1 above) and fasten the clamping device using a small flathead screw driver.
6. Push and insert the chuck into the housing (note that there is a raised key on the chuck to ensure that it is oriented correctly).
7. Fasten the bushing, using a wrench, to a torque of 2.5 Nm (1.8 lb-ft).



Cable end



Terminals

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Data link

A data link is required in order to control a MAC 401 via DMX.

The MAC 401 has 5-pin locking XLR connectors for DMX data input and output. The pin-out on XLR connectors is pin 1 = shield, pin 2 = cold (-), and pin 3 = hot (+).

Pins 4 and 5 in the 5-pin XLR connectors are not used in the MAC 401 but they are connected from the DMX input to the DMX output connector to allow any data that may be present on pins 4 and 5 to pass through the fixture.

Sockets are wired in parallel: both inputs connect to both outputs.

Two RJ-45 connectors are also provided, making the MAC 401 ready for future data communication options over an Ethernet link. If you wish to use these options when available, ensure that the latest available firmware is installed in the fixture.

Tips for reliable DMX data transmission

- 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.
- To split the link into branches, use a splitter such as the Martin™ RS-485 Opto-Splitter™ 4-channel optically isolated 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.

Connecting the DMX data link

1. Connect the DMX data output from the controller to the MAC 401's 5-pin male XLR input socket.
2. Continue connecting fixtures, DMX output to DMX input, in one single chain.
3. Use a splitter-amplifier such as the Martin RS-485 Optosplitter (P/N 90758060) if you need to branch the link into two chains.
4. Insert a DMX termination plug in the DMX output of the last fixture on each chain.

Physical installation

The MAC 401 can be placed on a horizontal surface such as a stage or clamped to a truss in any orientation using the quarter-turn clamp brackets supplied with the fixture and a half-coupler (not supplied).



Warning! Attach an approved safety cable to the attachment point on the connections panel (see Figure 2).

Check that all surfaces to be illuminated are minimum 200 mm (8 in.) from the fixture, that combustible materials (wood, fabric, paper, etc.) are minimum 200 mm (8 in.) from the head, that there is free airflow around the fixture and that there are no flammable materials nearby.

Make sure that it is impossible for the moving head to collide with another fixture or other object.

Ensure that wherever the product is installed that people are not able to look directly down the LED beam zone from within a distance of 1 meter (3 feet 4 inches). At less than this distance, the LED emission can cause eye injury or irritation. At distances of 1 meter (3 feet 4 inches) and above, light output is harmless to the naked eye provided that the eye's natural aversion response is not overcome.

Placing the fixture on a flat surface

The MAC 401 can be placed on a stage or other level, flat surface. Check that the surface can support at least 10 times the weight of all fixtures and equipment to be installed on it.



Warning! The supporting surface must be hard and flat or air vents in the base may be blocked, which will cause overheating. Secure the fixture against falling. Attach a securely anchored safety cable to the safety cable attachment point (see Figure 2) if the fixture is to be placed above ground level in any location where it may fall and cause injury or damage.

Mounting the fixture on a truss

The MAC 401 can be clamped to a truss or similar rigging structure in any orientation. Clamp brackets can be attached to the base of the fixture using quarter-turn quick connectors.



Warning! Use two clamps to rig the fixture. Lock each clamp bracket by turning both 1/4-turn fasteners fully clockwise.

To clamp a MAC 401 to a truss:

1. Check that the rigging structure can support at least 10 times the weight of all fixtures and equipment to be installed on it.
2. Obtain two rigging clamps and check that they are undamaged and can bear at least 10 times the weight of the fixture. Bolt the clamps securely to the supplied clamp brackets with a minimum grade 8.8 M12 bolt and lock nut.
3. See Figure 2. Align each of the two clamp brackets with two mounting points in the base. Insert the quarter-turn fasteners into the base and turn all levers a full 90° clockwise to lock.
4. Block access under the work area. Working from a stable platform, hang the fixture on the truss. Tighten the rigging clamps.
5. Secure the fixture against clamp or bracket failure with a secondary attachment such as a safety cable that can bear at least 10 times the weight of the fixture using the attachment point in the base of the fixture (arrowed in Figure 2). This attachment point is designed to accept a carabiner clamp. Do not use any other part of the fixture as a safety cable attachment point.
6. Check that the head will not collide with other fixtures or objects.

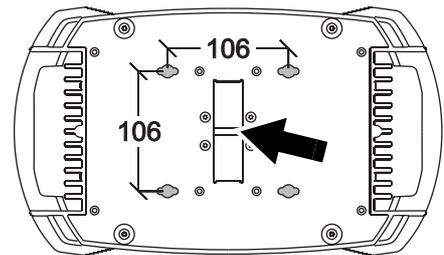


Figure 2: Safety cable attachment point

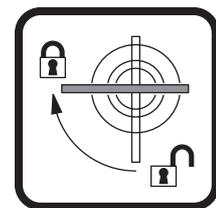


Figure 3: Quarter-turn fasteners

Setup



Warning! Read “Safety Information” on page 3 before installing, powering, operating or servicing the MAC 401.

Control panel and menu navigation

The onboard control panel and LED display are used to set the MAC 401’s DMX address, configure individual fixture settings (personality), read out data and execute service utilities. See “Onboard control menus” on page 36 for a complete list of menus and commands.

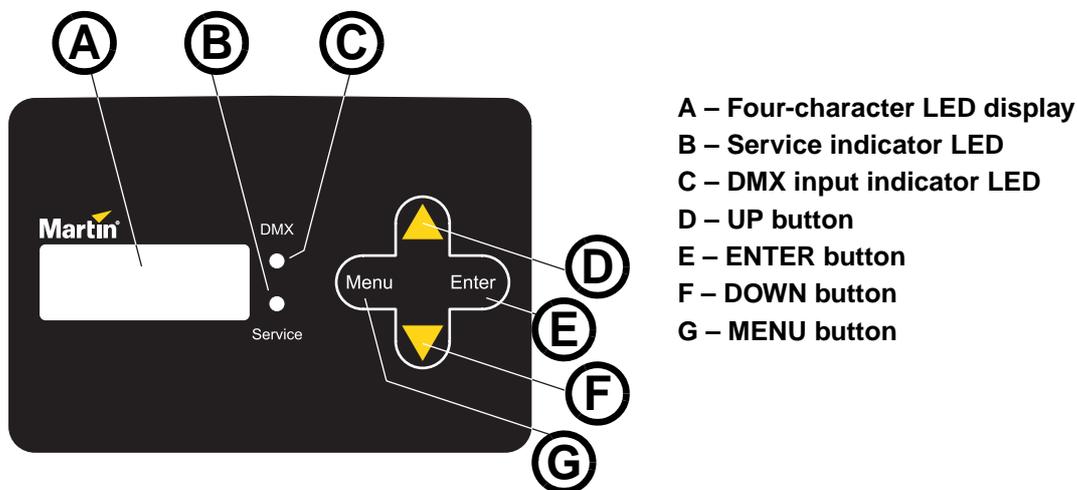


Figure 4: Control panel and display

Using the control buttons

See Figure 4.

- Press [Menu] to enter a menu, to escape a function or move back one level in the menu structure.
- Press the [Up] and [Down] buttons to scroll within a menu or increase and decrease values.
- Press [Enter] to enter a submenu or activate a function. Note: [Enter] must be pressed and held for a few seconds to enter the Service menu (**SERV**).

Control menu shortcuts

- Hold [Menu] and press [Up] - Resets fixture
- Hold [Menu] and [Enter] during fixture reset - Freezes pan and tilt
- Hold [Up] and press [Down] - Inverts display for easy reading when the fixture is suspended base up.

Display functions

The DMX address is shown in the display panel when the MAC 401 is powered on and has reset.

By default the display is set to go into sleep mode 2 minutes after the last key press. To reactivate the display, press any key. To modify or disable this setting see “Display settings” on page 17.

LED indicators

The two LEDs on the right of the display indicate fixture status:

- The DMX LED lights when the fixture is receiving a valid DMX signal.

- The SERVICE LED lights if the fixture requires a service intervention. At the same time, a message appears in the display indicating the type of service required.
The SERVICE LED blinks when the fixture is in factory service mode.

Restoring factory default settings

The MAC 401's factory default settings can be restored by scrolling to the main **FACT** menu, pressing [Enter], opening the **FACT** submenu and applying a **LOAD** command.

Three sets of custom user settings can also be stored and recalled from the main **FACT** menu.

Pixel grouping

In all DMX control modes, the LEDs in the MAC 401 Dual and CT Zoom can be controlled as one single group or split into two or four segments that can be controlled as individual pixels.

The following options are available in the **DMX - PGRP** submenu:

- **1** – LEDs are divided into four segments **A** to **D**, giving Individual control of four pixel groups
- **2V** – LEDs are divided vertically into two segments **A** and **B**, giving individual control of two pixel groups
- **2H** – LEDs are divided horizontally into two segments **A** and **B**, giving individual control of two pixel groups
- **All** – All LEDs are controlled together as one pixel (this is the default pixel grouping setting).

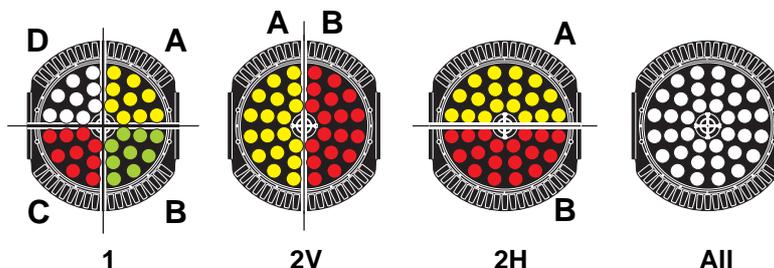


Figure 5: Pixel grouping (fixture standing on base, tilt positive)

Pixel inversion

The **DMX - PINV** submenu can be used to invert the pixel settings, from left to right and top to bottom.

DMX setup

When one LED module is installed in the front of the head, the MAC 401 automatically sets **HEAD** to **SNGL** in the control panel, automatically recognizes the type of module installed and makes the correct DMX protocol available. The module can be controlled using “DMX protocol, RGB Zoom module” on page 25 or “DMX protocol, CT Zoom module” on page 31, depending on which type of module is installed.

If a second LED module is installed on the rear of the head, the MAC 401 automatically sets **HEAD** to **DUAL** in the control panel, automatically recognizes the types of module installed and makes the correct DMX protocol available for each module, but it removes the pan, fine pan, tilt, fine tilt and fixture control DMX channels from the protocol for the module installed on the rear of the head. These are only available in the DMX protocol for the module installed on the front of the head.

DMX address 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 LED module must be assigned its own control channels. Two modules of the same type in the same fixture or in different fixtures may share the same address, however, if identical behavior is desired. Address sharing can be useful for diagnostic purposes and symmetrical control of fixtures, particularly when combined with the inverse pan and tilt options.

The DMX address is configured using the **ADDR** menu in the control panel. The highest address available is reduced depending on mode settings so that the fixture will always have enough DMX channels in the 512 available in a DMX universe. If the fixture is set up so that it uses 33 DMX channels, for example, the highest address available will be 480.

Whether one or two LED modules are installed on a fixture, all modules' DMX addresses must be set manually using the **ADDR** menu for that module. You can set the address of each module on the rear of the head immediately after the channels used by the module on the front of that head, or group similar modules together, for example, or set addresses according to any other preference. Table 2 and Table 3 on the following pages can help you determine the number of DMX channels used by a module, if you are in any doubt.

DMX control modes

The MAC 401 can be set to various combinations of DMX control modes using the **DMX - PSET** menu. Different modes are available for RGB Zoom and CT Zoom LED modules. See "DMX protocols" on page 25 for details of the DMX commands available in the different modes. The MAC 401 automatically recognizes which type of LED modules are fitted to the front and rear and lists only the DMX modes available for those modules:

RGB Zoom module control modes

If an RGB Zoom LED module is installed, it can be set to six DMX control modes in the **DMX - PSET** menu:

- **RAWX** – Uncalibrated RGB color mixing with dynamic effects available
- **RGBX** – Calibrated RGB color mixing with dynamic effects available (this is the default control mode setting)
- **HSX** – Hue, saturation, value color control with dynamic effects available
- **RAW** – Uncalibrated RGB color mixing with no dynamic effects available
- **RGB** – Calibrated RGB color mixing with no dynamic effects available
- **HS** – Hue, saturation, value color control with no dynamic effects available

CTC (color temperature control) is available in all six modes.

CT Zoom module control modes

If a CT Zoom LED module is installed, it can be set to two DMX control modes in the **DMX - PSET** submenu:

- **CTX** – Warm white, cold white, CTC with dynamic effects available (this is the default control mode setting)
- **CT** – Warm white, cold white, CTC with no dynamic effects available.

One DMX channel between the warm white and cold white channels on CT Zoom modules is left unused so that RGB Zoom and CT Zoom modules use the same number of channels. This avoids the need to repatch lighting desks if one type of LED module is replaced with another.

DMX channel requirements

The number and type of LED modules installed, pixel grouping and control mode determine the number of DMX channels used:

- When two LED modules are installed, the DMX protocol for the module on the rear of the head does not contain coarse and fine pan, coarse and fine tilt or fixture control channels. This module will thus require five less DMX channels than if it was installed on the front of the head.
- The RGB Zoom module uses four channels per pixel group to control Red/Green/Blue/CTC or Hue/Saturation/Value/CTC.
- The CT Zoom module uses four channels per pixel group to control warm white/unused/cold white/CTC.
- No matter which LED module is installed and whether it is installed in the front or rear of the head, pixel group setting **PGRP - All** uses four channels, pixel group settings **2H** and **2V** divide the module into two groups and therefore use eight channels, and pixel group setting **1** divides the module into four groups and therefore uses sixteen channels to control color or color temperature. See "Pixel grouping" on page 13.
- Control modes that incorporate dynamic effects use eight additional DMX channels.

DMX channels used by RGB Zoom module

The following table gives an overview of the control menu settings available and number of DMX channels used in the RGB Zoom module.

PSET	PGRP	Mode	Number of channels, front of head	Number of channels, rear of head
RGB	1	RGB, no dynamic effects, individual control of 4 quadrant-split LED groups	25	20
RGB	2H	RGB, no dynamic effects, individual control of 2 horizontally split LED groups	17	12
RGB	2V	RGB, no dynamic effects, individual control of 2 vertically split LED groups	17	12
RGB	All	RGB, no dynamic effects, collective control of all LEDs	13	8
HS	1	HSV, no dynamic effects, individual control of the 4 quadrant-split LED groups	25	20
HS	2H	HSV, no dynamic effects, individual control of 2 horizontally split LED groups	17	12
HS	2V	HSV, no dynamic effects, individual control of 2 vertically split LED groups	17	12
HS	All	HSV, no dynamic effects, collective control of all LEDs	13	8
RGBX	1	RGB, dynamic effects, individual control of the 4 quadrant-split LED groups	33	28
RGBX	2H	RGB, dynamic effects, individual control of 2 horizontally split LED groups	25	20
RGBX	2V	RGB, dynamic effects, individual control of 2 vertically split LED groups	25	20
RGBX	All	RGB, dynamic effects, collective control of all LEDs (default setting, RGB Zoom module)	21	16
HSX	1	HSV, dynamic effects, individual control of the 4 quadrant-split LED groups	33	28
HSX	2H	HSV, dynamic effects, individual control of 2 horizontally split LED groups	25	20
HSX	2V	HSV, dynamic effects, individual control of 2 vertically split LED groups	25	20
HSX	All	HSV, dynamic effects, collective control of all LEDs	21	16

Table 2: DMX channel use in different mode settings, RGB Zoom module

DMX channels used by CT Zoom module

The following table gives an overview of the control menu settings available and number of channels used in the various modes available in the CT Zoom module.

PSET	PGRP	Mode	Number of channels, front of head	Number of channels, rear of head
CT	1	CT, no dynamic effects, individual control of the 4 quadrant-split LED groups	25	20
CT	2H	CT, no dynamic effects, individual control of 2 horizontally split LED groups	17	12
CT	2V	CT, no dynamic effects, individual control of 2 vertically split LED groups	17	12
CT	All	CT, no dynamic effects, collective control of all LEDs	13	8
CTX	1	CT, dynamic effects, individual control of the 4 quadrant-split LED groups	33	28
CTX	2H	CT, dynamic effects, individual control of 2 horizontally split LED groups	25	20
CTX	2V	CT, dynamic effects, individual control of 2 vertically split LED groups	25	20
CTX	All	CT, dynamic effects, collective control of all LEDs (default setting, CT Zoom module)	21	16

Table 3: DMX channel use in different mode settings, CT Zoom module

Tailoring performance

The following performance options are available in the **PERS** menu.

Pan and tilt movement

The MAC 401 provides several options for optimizing movement for different applications.

- Pan and tilt speed can be set to normal or fast with the **PTST - PTSP** command.
- The **PINV** and **TINV** commands invert the direction of pan and tilt and the **SWAP** command sets pan commands to tilt and vice versa. These settings are useful for symmetrical effects with multiple fixtures.

Resetting via DMX

By default, it is possible to reset the whole fixture, reset pan and tilt only or reset effects only by sending a DMX command on the Fixture Control DMX channel (the last of the channels used). This feature can be disabled (to avoid accidental resets in the middle of a show, for example) and enabled in the **DRES** submenu.

If the DMX reset feature is disabled in the **DRES** submenu, it is still possible to override this setting and reset the fixture via DMX by sending DMX value 232 on channel 2 and DMX value zero on channel 1 before applying the reset command on the Fixture Control channel.

Cooling

The **FANS** submenu gives you a choice of three cooling fan settings:

- The default setting **REG** sets fans to temperature-regulated operation. This setting should suit use in all normal situations and ensure excellent service lifetimes for all components.
- The **FULL** setting maximizes cooling and reduces the operating temperature of the components in the head. It is recommended when the MAC 401 is used intensively in a warm environment or in fixed installations. Note that this setting will give increased fan noise compared to temperature-regulated fan operation.
- When the **SLNT** setting is selected, Silent mode is activated and head fan speed is reduced to minimum. The base fan will still run. Maximum values allowed for RGB or HSV will be limited (no matter what operating mode is selected), so that less heat is generated. If the LEDs get too hot the fans will revert to Regulated mode. When the LEDs are cool enough the fans shift back to Silent mode. The color wheel channel has lower intensity when Silent mode is engaged.

Whatever cooling mode is selected, a thermal cutout shuts down power to the LEDs if the fixture temperature exceeds safe limits. If this occurs, you must reset the fixture via the control menus or via DMX, or cycle power to the fixture off and on again.

If a thermal shutdown occurs, you are pushing the fixture to its limits. Clean the fixture, particularly the air vents, and check that there is sufficient airflow around the fixture. Consider increasing ventilation, reducing the ambient temperature, or switching to **FULL** mode.

Dimming

DIM allows you to select a dimming curve for overall intensity. You can choose from an optically linear curve, a square-law curve that gives finer control at low intensity and coarser control at high intensity, an inverse square-law curve, and an S-curve that gives finer control at low and high intensities and coarser control at medium intensities (see Figure 6).

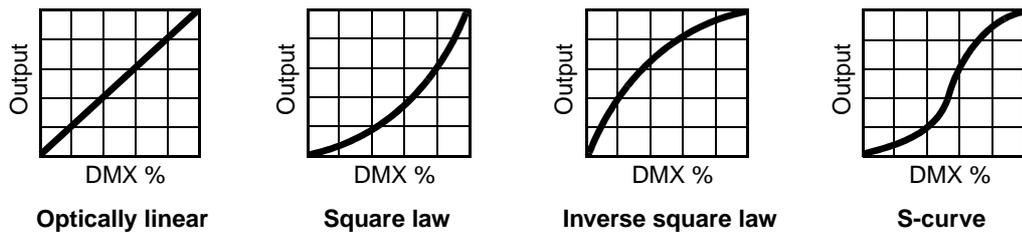


Figure 6: Dimming curve options

Display settings

The **DISP** submenu can be used to adjust the length of time the display is on before it switches off automatically and goes into Sleep mode. You can also deactivate Sleep mode so that the display remains on all the time.

You can set the intensity level of the display using the **DINT** submenu. The default is 100%.

Two modes are available for displaying error messages in the **ERRM** submenu. The default is setting is normal, where error messages appear on the display at 100% intensity (regardless of what the display intensity has been set to), and the service light illuminates. Alternatively, a 'silent' error mode is available, where no error message is displayed, but the service light illuminates.

Effects

MAC 401 – all models

This section describes the lighting effects available in all currently available models of the MAC 401.

Shutter effect

The electronic 'shutter' effect provides instant open and blackout, variable speed regular and random strobe, and opening/closing pulse effects.

Dimming

Overall intensity can be adjusted using 0 - 100% electronic dimming.

Zoom

The motorized zoom varies the beam angle continuously from 20° through to 50°. The zoom can also be set to Hypermode where the beam angle is fixed at 16°.

Pan and tilt

The MAC 401 fixture's moving head can be panned through 630° and tilted through 300°. Coarse (8-bit/Most Significant Byte) and fine (16-bit/Least Significant Byte) control of pan and tilt are available in all DMX modes. The fine channels allow fine adjustment of pan and tilt at the position set on the coarse channels.

Bear in mind that if two head modules are installed, the second module will point towards the base, and direct light output will be lost, during a portion of its tilt range.

Pre-programmed dynamic effects 1 and 2

Both RGB Zoom and CT Zoom LED modules feature two superimposable dynamic effects. These effects are pre-programmed macros that give quick access to a variety of effects from the DMX controller without the need for complex programming.

Effect crossfade times for the change from one segment to the next can be set from zero (snap) to approximately one second.

Certain effects divide LEDs into two or four segments for a chase that gives a 'pixel wheel' rotation effect.

Pulse, flip and flicker effects are also available.

The speed of the dynamic effects – including rotation speed and direction of the 'pixel wheel' effect – can be adjusted on a separate DMX channel for each of the two dynamic effects.

The dynamic effects have greater visual impact in the RGB Zoom module but can add 'life' to the CT Zoom module.

MAC 401 Dual / RGB Zoom LED module

This section describes the lighting effects available in the RGB LED module that is fitted as standard to the MAC 401 Dual and available as an accessory for the MAC 401 CT Zoom.

Raw RGB color mixing

Uncalibrated red, green, blue color mixing is available, with 0 - 100% intensity control on one DMX channel for each color. Setting a color to 100% intensity will set each LED to its absolute maximum output.

Calibrated RGB color mixing

Red, green, blue color mixing is available, with 0 - 100% calibrated intensity control on one DMX channel for each color. Setting a color to 100% intensity will set each LED to a calibrated maximum output. In other

words, output is very slightly lower than absolute maximum output to allow a margin for adjustment, and LED modules are individually calibrated at the factory to ensure that color and white output is the same in different LED modules at the same DMX values.

Calibrated HSV color mixing

As an alternative to RGB control, hue, saturation and value color control, with one DMX channel for each of these parameters, is available. HSV control is calibrated at the factory.

CTC

From fixture software v. 1.2.0, the MAC 401 Dual's RGB Zoom LED module can vary the color temperature of any color being displayed. White light color temperature is variable from a very cool blue sky (10 000 K) to a warm sunrise (2000 K). The **PERS** menu contains two settings for the way CTC works:

- If **PERS - CTC - WITH** (the default setting) is selected, sending a DMX value on the CTC channel will adjust the temperature of whatever color the fixture or segment is currently displaying. The more saturated the color, the less CTC will be noticeable.
- If **PERS - CTC - INDP** is selected, sending a DMX value on the CTC channel will act independently from color controls, override any currently selected color and the fixture or segment will switch over to white light with variable color temperature.

CTC control is calibrated at the factory. It works in RGB, HSV and RAW modes, but in RAW mode it is uncalibrated.

Color wheel effect

The electronic 'color wheel' effect gives the convenience and feel of a mechanical color wheel. The color wheel effect in the RGB LED module lets you fade or snap between 33 different full LEE-referenced colors. You can also scroll continuously forwards or backwards through the colors or display random colors at variable speed.

The approximate RGB equivalents of the 'color wheel' colors are given in "LEE colors and RGB equivalents" on page 35.

MAC 401 CT Zoom / CT Zoom LED module

This section describes the lighting effects available in the CT Zoom LED module that is fitted as standard to the MAC 401 CT Zoom and available as an accessory for the MAC 401 Dual.

Raw warm white and cold white

The CT Zoom LED module gives separate control of warm white and cold white using two DMX channels. This control mode is raw, so it gives absolute maximum output.

Calibrated color temperature control

CTC can be varied continuously from 7000 K to 3000 K using one DMX channel which mixes cold and warm white LEDs. This control mode is calibrated at the factory, so color temperature will be the same in different modules, but intensity is very slightly reduced compared to raw warm white and cold white mode to allow a margin for adjustment.

Service and maintenance



Warning! Read “Safety Information” on page 3 before servicing the MAC 401.

Warning! Disconnect the fixture from AC mains power and allow to cool for at least 10 minutes before handling. Do not view the light output from less than 1 meter (3 feet 4 inches) without shade 4-5 welding goggles. Set the zoom to wide angle and work in well-lit conditions. Be prepared for the fixture to light suddenly if connected to power.



Warning! Refer any service operation not described in this user manual to a qualified service technician.



Important! Excessive dust, smoke fluid, and particle buildup degrades performance, causes overheating and will damage the fixture. Damage caused by inadequate cleaning or maintenance is not covered by the product warranty.



The user will need to clean the MAC 401 periodically, and it is also possible for the user to remove and install head modules, change the mains fuses and update the firmware. All other service operations on the MAC 401 must be carried out by Martin Professional or its approved service agents.

Installation, on-site service and maintenance can be provided worldwide by the Martin Professional Global Service organization and its approved agents, giving owners access to Martin’s expertise and product knowledge in a partnership that will ensure the highest level of performance throughout the product’s lifetime. Please contact your Martin supplier for details.

It is Martin policy to apply the strictest possible calibration procedures and use the best quality materials available to ensure optimum performance and the longest possible component lifetimes. However, LEDs are subject to wear and tear over the life of the product, resulting in gradual changes in color and overall brightness over many thousands of hours of use. The extent of wear and tear depends heavily on operating conditions and environment, so it is impossible to specify precisely whether and to what extent LED performance will be affected. However, you may eventually need to ask Martin Professional to replace LEDs if their characteristics are affected by wear and tear after an extended period of use and if you require fixtures to perform within very precise optical and color parameters.

Cleaning

Cleaning schedules for lighting fixtures vary greatly depending on the operating environment. It is therefore impossible to specify precise cleaning intervals for the MAC 401.

Environmental factors that may result in a need for frequent cleaning include:

- Use of smoke or fog machines.
- High airflow rates (near air conditioning vents, for example).
- Presence of cigarette smoke.
- Airborne dust (from stage effects, building structures and fittings or the natural environment at outdoor events, for example).

If one or more of these factors is present, inspect fixtures within their first 100 hours of operation to see whether cleaning is necessary. Check again at frequent intervals. This procedure will allow you to assess cleaning requirements in your particular situation. If in doubt, consult your Martin dealer about a suitable maintenance schedule.

Use gentle pressure only when cleaning, and work in a clean, well-lit area. Do not use any product that contains solvents or abrasives, as these can cause surface damage.

You can set the fixture to issue a time alert after a defined number of operating hours has passed to remind you to clean it. This is set by default to 999 hours. You can adjust this threshold from 100-999 hours using the **INFO - AIRF - STTM** menu on the control panel. Whenever the value on the **INFO - AIRF - TOTL** counter exceeds the threshold set on **INFO - AIRF - STTM**, an alert will be displayed on the control panel.

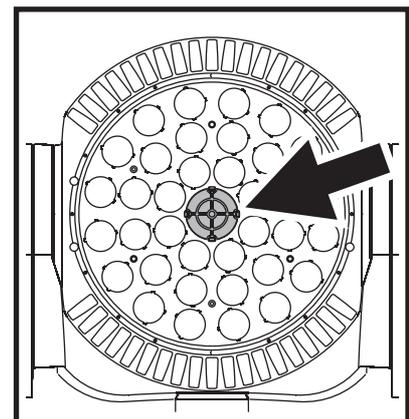
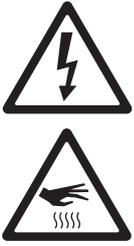


Figure 7: Head air filter



Warning! Disconnect from power and allow to cool before cleaning.

To clean the fixture:

1. Disconnect the fixture from power and allow it to cool for at least 10 minutes.
2. See Figure 7. Unclip and remove the head air filter from the center of the lens plate. Rinse the filter in lukewarm soapy water and blot dry. If the filter is not in perfect condition, replace it with a new one (available from Martin, P/N 62407156).
3. Vacuum or gently blow away dust and loose particles from the outside of the fixture and the air vents at the back and sides of the head and in the base with low-pressure compressed air.
4. Clean the front glass by wiping gently with a soft, clean lint-free cloth moistened with a weak detergent solution. Do not rub the surface hard: lift particles off with a soft repeated press. Dry with a soft, clean, lint-free cloth or low-pressure compressed air. Remove stuck particles with an unscented tissue or cotton swab moistened with glass cleaner or distilled water.
5. Reinstall the head air filter.
6. Check that the fixture is dry before reapplying power.
7. Using the **INFO-AIRF-TOTL** control menu, reset the counter for elapsed time in hours since the fixture was cleaned to **0** by displaying the counter and pressing and holding the up button for five seconds.

Removing and installing head modules

From software version 1.2.0 (available for download free of charge from www.martin.com for fixtures with earlier software versions), two head modules can be installed and controlled in the MAC 401™.

To remove a head module:

1. Disconnect the fixture from power and allow to cool for at least 10 minutes.
2. See Figure 8. Use a Torx 30 screwdriver to release the four head module retaining screws (arrowed), lift the module away from the yoke slightly, disconnect the head module safety wire and lift the module away from the head.

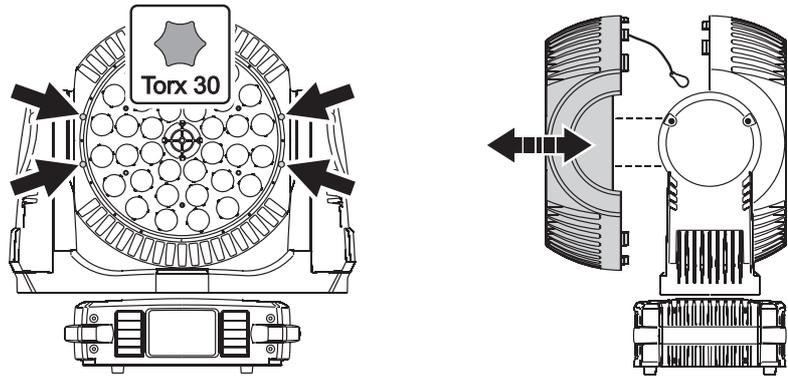


Figure 8: Head module removal/installation

3. Head module installation procedure is the reverse of the removal procedure. See Figure 9. When installing a module, clip the safety wire into the attachment point in the yoke frame, and make sure that the connectors in the module engage in the connectors in the yoke frame while you press the module into position on the head.
4. The MAC 401 automatically senses which modules are installed when power is applied.

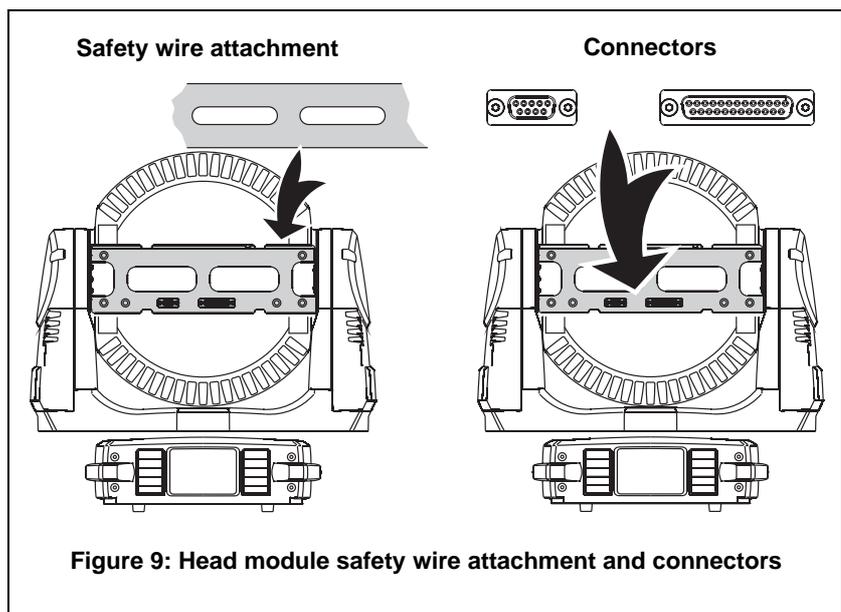


Figure 9: Head module safety wire attachment and connectors

Control menu service utilities

Fixture reset

The **RST** command in the **MAN** menu resets the fixture and can be used as a first remedy if an error occurs.

Software upload

The MAC 401 software can be installed and updated by the user. Software updates are available for download on the Product Support pages of the Martin website at www.martin.com

The following are required in order to install software:

- A PC running Windows 98/2000/XP
- The latest version of the MAC 401 software, available for download from www.martin.com
- The Martin™ Software Uploader Application, available for download from www.martin.com
- A Martin Universal USB/DMX Interface device (P/N 90702045) with USB cable (supplied with the device) and 5-pin XLR male to 5-pin XLR female DMX cable.

Normal upload

A MAC 401 should automatically enter software upload mode when it is connected as described above. If it does not, use **SERV**→**UPLD** in the control menu to prepare the fixture for the upload. Carry out the upload in Auto/DMX mode as described in the Uploader application help file.

If the display and control panel are unusable because the software has become corrupted, carry out a boot mode upload (see below).

Boot mode upload

Carry out a boot mode upload only if the fixture software is totally corrupted (which is evident if the control panel does not respond when power is applied) or if the software update notes call for a boot sector update. To carry out a boot mode upload:

1. Disconnect the fixture from power.
2. Remove the left-hand (as seen from the front of the head) side cover from the yoke to expose the main PCB.
3. See Figure 10. Locate the 2-pin DIP-switch (arrowed) on the PCB and move pin 1 to **ON** (Boot mode upload enable).
4. Reapply power, upload the software, and disconnect from power.
5. Move DIP-switch pin 1 back to **OFF** (Normal) and reinstall the yoke side cover.

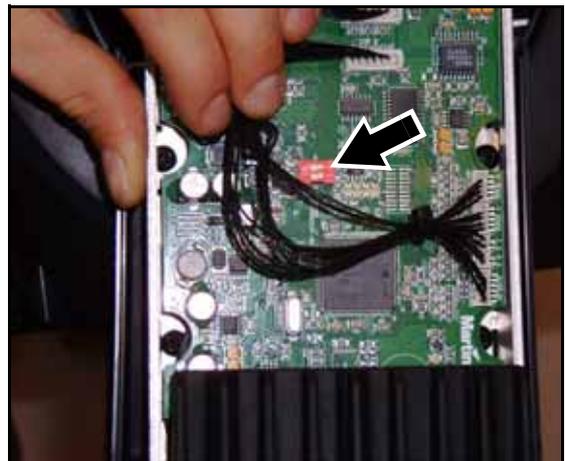


Figure 10: 2-pin DIP switch for boot mode upload

If a checksum error occurs when powering on after performing a boot mode upload, carry out a normal upload as described above.

Both DIP-switch pins should be set to **OFF** during normal operation.

Testing

A series of test commands are available in the **TEST** menu, these enable:

- Testing effects (LED and zoom) and pan/tilt movement at same time
- Testing the LED effects and zoom only
- Testing pan/tilt movement only
- Lighting all segments of the display for five seconds

Fixture readouts

DMX input signal

The **DMXL** menu lets you view the DMX values received on each channel. If the fixture does not behave as expected, reading the DMX values can help you troubleshoot the problem.

Fixture status

The MAC 401 gives fixture status readouts in the **INFO** menu:

- Current software/firmware version information is available for the main processor in the base, and for the processors in each of the installed LED modules (one or two).
- The **POHR** counters display hours with power on. The **RSET** counter displays hours since the counter was last reset, and the non-resettable **TOTL** counter displays hours since the fixture was manufactured.
- Temperature readouts from the main PCB in the base as well as the average temperature of driver and pixel (i.e. LED) PCBs in the head are available. In each case, you can view the current temperature, the maximum temperature reached since the readout was last reset, and the maximum temperature reached since manufacture.

Lubrication

In general, the MAC 401 does not require lubrication. However, depending on use conditions, the moving parts in the head and zoom mechanisms may eventually require reapplication of lubricant. Excessive noise during pan/tilt and zoom movement is a sign that lubrication may be required. This operation can be carried out by a Martin service partner if necessary.

Fuse replacement



Warning! Disconnect from power before replacing a fuse. Replace fuses with ones of the same type and rating only. Never bypass or bridge a fuse.

The MAC 401 is protected by two 10 AT mains fuses located in fuseholders next to the power cable entry (see Figure 1 on page 7).



To replace a fuse:

1. Isolate the fixture from power.
2. Use a flathead screwdriver to open the fuseholders and remove the fuses for testing or replacement.
3. Replace defective fuses with ones of the same type and rating only. Replacement fuses are available from Martin.
4. Reinstall the fuseholders before reapplying power.

If a fuse blows repeatedly, disconnect the fixture from power immediately and consult your Martin supplier.

Diagnostic feedback

If an error occurs, one of the following messages may appear in the MAC 401 display:

Message	Cause...	What to do...	
AIRF	The AIRF counter has reached its limit.	Clean the fixture and air filter. Reset the AIRF counter in the INFO menu.	
CSER	A fixture firmware upload was unsuccessful and has resulted in a Checksum Error	Try to upload the firmware again. Contact Martin Service if problem persists.	
D1CO D2CO D3CO D4CO	Driver PCB 1 temperature cut off Driver PCB 2 temperature cut off Driver PCB 3 temperature cut off Driver PCB 4 temperature cut off	Clean the fixture and air filter and ensure unrestricted airflow around it. Check that ambient temperature does not exceed 40° C (104° F). Contact Martin Service if problem persists.	
DTER	Driver temperature sensor error		
FTCO	Fixture temperature cutoff		
P1CO P2CO P3CO P4CO	Pixel PCB 1 cut-off Pixel PCB 2 cut-off Pixel PCB 3 cut-off Pixel PCB 4 cut-off		
PTER	Pixel temperature sensor error		
YTCO	Yoke temperature sensor cutoff. The temperature has exceeded the allowed maximum and the LEDs have been switched off.		
DPER	Display programming error		Reset fixture. Contact Martin Service if problem persists.
DREH	Zoom stepper motor driver failure.		
F1ER F2ER	Fan 1 error Fan 2 error		
FBEP	Pan feedback error. The pan correction system could not correct a loss of step.		
FBER	Pan/tilt feedback error		
FBET	Tilt feedback error. The tilt correction system could not correct a loss of step.		
MERR	Communication error in EEPROM memory		
OPER	Onboard programming error		
PAER	Pan timeout error. There is a malfunction in the pan position indexing circuit.		
RAME	RAM error		
RCER	Real time clock error		
RUER	Fixture identification code missing or invalid		
TIER	Tilt timeout error. There is a malfunction in the tilt position indexing circuit.		
YTER	Yoke temperature circuit error.		
RST	Reset. This occurs when power is applied, or when reset is selected in the menu.	Wait for reset to finish. Note that you can prevent accidental resets via DMX by setting PERS - DRES to OFF in the control menus.	
SRST	Serial RESET command received via DMX		

DMX protocols

Two DMX protocols are given below: for the MAC 401 RGB Zoom module and CT Zoom module.

Certain channels in the CT Zoom module's DMX protocol are intentionally left without function to avoid having to repatch channels if one type of module is replaced with another.

For each protocol, pan, tilt and fixture control channels are only available if the module is installed on the front of the head. If a module is installed on the rear of the head, control of pan, tilt and fixture functions is not available in that module's DMX protocol. Instead, they must be controlled using the DMX channels for the module installed on the front of the head.

For information about setting up DMX modes, see "DMX setup" on page 13.

DMX protocol, RGB Zoom module

RAW RGB HS	RAWX RGBX HSX	DMX Value	Percent	Function	Snap/ fade	Default DMX value
1	1	0 - 19	0 - 7	Strobe/Virtual shutter effect Shutter closed	Snap	020
		20 - 49	8 - 19	Shutter open		
		50 - 64	20 - 25	Strobe (fast → slow)		
		65 - 69	26 - 27	Shutter open		
		70 - 84	28 - 33	Opening pulse (fast → slow)		
		85 - 89	34 - 35	Shutter open		
		90 - 104	36 - 41	Closing pulse (fast → slow)		
		105 - 109	42 - 43	Shutter open		
		110 - 124	44 - 49	Random strobe (fast → slow)		
		125 - 129	50 - 51	Shutter closed		
		130 - 144	52 - 57	Random opening pulse (fast → slow)		
		145 - 149	58 - 59	Shutter open		
		150 - 164	60 - 65	Random closing pulse (fast → slow)		
		165 - 169	66 - 67	Shutter closed		
		170 - 184	68 - 73	Burst pulse (fast → slow)		
		185 - 189	74 - 75	Shutter open		
		190 - 204	76 - 81	Random burst pulse (fast → slow)		
205 - 209	82 - 83	Shutter closed				
210 - 224	84 - 89	Sine wave (fast → slow)				
225 - 229	90 - 91	Shutter open				
230 - 244	92 - 97	Electronic burst (fast → slow)				
245 - 255	98 - 100	Shutter open				
2	2	0 - 255	0 - 100	Virtual dimmer Closed → open	Fade	0

Table 4: DMX Protocol, RGB Zoom module

RAW RGB HS	RAWX RGBX HSX	DMX Value	Percent	Function	Snap/ fade	Default DMX value
—	3	0 - 19	0 - 7	Dynamic effect 1 No Effect	Snap	0
		20 - 39	7 - 16	Effect 1 - White Single Segment Chase		
		40 - 59	17 - 24	Effect 2 - White Double Segment Chase		
		60 - 79	25 - 32	Effect 3 - Red Single Segment Chase		
		80 - 84	30 - 31	Effect 4 - Green Single Segment Chase		
		85 - 89	32 - 33	Effect 5 - Blue Single Segment Chase		
		90 - 94	34 - 35	Effect 6 - Cyan Single Segment Chase		
		95 - 99	36 - 37	Effect 7 - Magenta Single Segment Chase		
		100 - 104	38 - 39	Effect 8 - Yellow Single Segment Chase		
		105 - 109	40 - 41	Effect 9 - Red Double Segment Chase		
		110 - 114	42 - 43	Effect 10 - Green Double Segment Chase		
		115 - 119	44 - 45	Effect 11 - Blue Double Segment Chase		
		120 - 124	46 - 47	Effect 12 - Cyan Double Segment Chase		
		125 - 129	48 - 49	Effect 13 - Magenta Double Segment Chase		
		130 - 134	50 - 51	Effect 14 - Yellow Double Segment Chase		
		135 - 139	52 - 53	Effect 15 - Yellow Blue Pulse		
		140 - 144	54 - 55	Effect 16 - Green Magenta Pulse		
		145 - 149	56 - 57	Effect 17 - Red Cyan Pulse		
		150 - 154	58 - 59	Effect 18 - Red Green Pulse		
		155 - 159	60 - 61	Effect 19 - Red Blue Pulse		
		160 - 164	62 - 63	Effect 20 - Red Flip 1		
		165 - 169	64 - 65	Effect 21 - Red Flip 2		
		170 - 174	66 - 67	Effect 22 - Green Flip 1		
		175 - 179	68 - 69	Effect 23 - Green Flip 2		
		180 - 184	70 - 71	Effect 24 - Blue Flip 1		
		185 - 189	72 - 73	Effect 25 - Blue Flip 2		
		190 - 194	74 - 75	Effect 26 - White Flip 1		
		195 - 199	76 - 77	Effect 27 - White Flip 2		
		200 - 204	78 - 79	Effect 28 - White Flicker Chase		
		205 - 209	80 - 81	Effect 29 - Rising Pulse		
		210 - 214	82 - 83	Effect 30 - White Flicker		
		215 - 219	84 - 85	Effect 31 - Strobe Pulse		
		220 - 224	86 - 87	Effect 32 - Single segment chase (use RGB to set color)		
		225 - 229	88 - 89	Effect 33 - Two segment chase (use RGB to set color)		
		230 - 234	90 - 91	Effect 34 - Double horiz. seg. chase (use RGB to set color)		
		235 - 239	92 - 93	Effect 35 - Double vert. seg. chase (use RGB to set color)		
		240 - 244	94 - 95	Effect 36 - Double opposite chase (use RGB to set color)		
		245 - 249	96 - 97	Effect 37 - Reserved for future use		
250 - 255	98 - 100	Effect 38 - Reserved for future use				
—	4	0 - 2	0	Dynamic effect 1 speed Stop	Fade	128
		3 - 126	1 - 49	Clockwise rotation, fast → slow		
		127 - 129	50	Stop		
		130 - 253	51 - 99	Counter-clockwise rotation, slow → fast		
		254 - 255	100	Stop		
—	5	0 - 255	0 - 100	Dynamic effect 1 x-fade No fade → max. fade	Fade	0
—	6	0 - 255	0 - 100	Dynamic effect 1 intensity Zero → 100%	Fade	0

Table 4: DMX Protocol, RGB Zoom module

RAW RGB HS	RAWX RGBX HSX	DMX Value	Percent	Function	Snap/ fade	Default DMX value
—	7	0 - 19	0 - 7	Dynamic effect 2 No Effect	Snap	0
		20 - 39	7 - 16	Effect 1 - White Single Segment Chase		
		40 - 59	17 - 24	Effect 2 - White Double Segment Chase		
		60 - 79	25 - 32	Effect 3 - Red Single Segment Chase		
		80 - 84	30 - 31	Effect 4 - Green Single Segment Chase		
		85 - 89	32 - 33	Effect 5 - Blue Single Segment Chase		
		90 - 94	34 - 35	Effect 6 - Cyan Single Segment Chase		
		95 - 99	36 - 37	Effect 7 - Magenta Single Segment Chase		
		100 - 104	38 - 39	Effect 8 - Yellow Single Segment Chase		
		105 - 109	40 - 41	Effect 9 - Red Double Segment Chase		
		110 - 114	42 - 43	Effect 10 - Green Double Segment Chase		
		115 - 119	44 - 45	Effect 11 - Blue Double Segment Chase		
		120 - 124	46 - 47	Effect 12 - Cyan Double Segment Chase		
		125 - 129	48 - 49	Effect 13 - Magenta Double Segment Chase		
		130 - 134	50 - 51	Effect 14 - Yellow Double Segment Chase		
		135 - 139	52 - 53	Effect 15 - Yellow Blue Pulse		
		140 - 144	54 - 55	Effect 16 - Green Magenta Pulse		
		145 - 149	56 - 57	Effect 17 - Red Cyan Pulse		
		150 - 154	58 - 59	Effect 18 - Red Green Pulse		
		155 - 159	60 - 61	Effect 19 - Red Blue Pulse		
		160 - 164	62 - 63	Effect 20 - Red Flip 1		
		165 - 169	64 - 65	Effect 21 - Red Flip 2		
		170 - 174	66 - 67	Effect 22 - Green Flip 1		
		175 - 179	68 - 69	Effect 23 - Green Flip 2		
		180 - 184	70 - 71	Effect 24 - Blue Flip 1		
		185 - 189	72 - 73	Effect 25 - Blue Flip 2		
		190 - 194	74 - 75	Effect 26 - White Flip 1		
		195 - 199	76 - 77	Effect 27 - White Flip 2		
		200 - 204	78 - 79	Effect 28 - White Flicker Chase		
		205 - 209	80 - 81	Effect 29 - Rising Pulse		
		210 - 214	82 - 83	Effect 30 - White Flicker		
		215 - 219	84 - 85	Effect 31 - Strobe Pulse		
		220 - 224	86 - 87	Effect 32 - Single segment chase (use RGB to set color)		
		225 - 229	88 - 89	Effect 33 - Two segment chase (use RGB to set color)		
		230 - 234	90 - 91	Effect 34 - Double horiz. seg. chase (use RGB to set color)		
		235 - 239	92 - 93	Effect 35 - Double vert. seg. chase (use RGB to set color)		
		240 - 244	94 - 95	Effect 36 - Double opposite chase (use RGB to set color)		
		245 - 249	96 - 97	Effect 37 - Reserved for future use		
250 - 255	98 - 100	Effect 38 - Reserved for future use				
—	8	0 - 2	0	Dynamic effect 2 speed Stop	Fade	128
		3 - 126	1 - 49	Clockwise rotation, fast → slow		
		127 - 129	50	Stop		
		130 - 253	51 - 99	Counter-clockwise rotation, slow → fast		
		254 - 255	100	Stop		
—	9	0 - 255	0 - 100	Dynamic effect 2 x-fade No fade → max. fade	Fade	0
—	10	0 - 255	0 - 100	Dynamic effect 2 intensity Zero → 100%	Fade	0
3	11	0 - 200 201 - 210 211 - 255	0 - 77 78 - 81 82 - 100	Zoom Zoom wide → narrow Hypermode No function	Fade	0
4	12	0 - 255	0 - 100	Pan ³ Pan 0 - 630° (128 = centered)	Fade	128
5	13	0 - 255	0 - 100	Pan fine ³ Pan fine (Least Significant Byte)	Fade	0
6	14	0 - 255	0 - 100	Tilt ³ Tilt 0 - 300° (128 = centered)	Fade	128
7	15	0 - 255	0 - 100	Tilt fine ³ Tilt fine (Least Significant Byte)	Fade	0

Table 4: DMX Protocol, RGB Zoom module

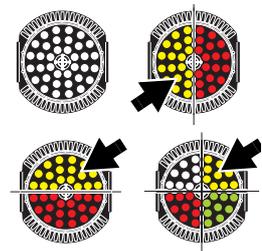
RAW RGB HS	RAWX RGBX HSX	DMX Value	Percent	Function	Snap/ fade	Default DMX value
8	16	0 - 9	0 - 1	Fixture control ³ No function	Snap	0
		10 - 14	2 - 3	Reset Entire fixture1		
		15 - 19	4 - 5	No function		
		20 - 24	6 - 7	Reset Effects only1		
		25 - 29	8 - 9	No function		
		30 - 34	10 - 11	Reset Pan & Tilt Only1		
		35 - 39	12 - 13	No function		
		40 - 44	14 - 15	PTSP = NORM ²		
		45 - 49	16 - 17	PTSP = FAST ²		
		50 - 54	18 - 19	No function		
		55 - 59	20 - 21	Reserved for Future Use		
		60 - 64	22 - 23	No function		
		65 - 69	24 - 25	Fan Mode - Full ²		
		70 - 74	26 - 27	No function		
		75 - 79	28 - 29	Fan Mode - Regulated ²		
		80 - 84	30 - 31	No function		
		85 - 89	32 - 33	Fan Mode - Silent ²		
		90 - 94	34 - 35	No function		
		95 - 99	36 - 37	Dimmer Curve = LIN ²		
		100 - 104	38 - 39	No function		
		105 - 109	40 - 41	Dimmer Curve = SQR ²		
		110 - 114	42 - 43	No function		
		115 - 119	44 - 45	Dimmer Curve = ISQR ²		
		120 - 124	46 - 47	No function		
		125 - 129	48 - 49	Dimmer Curve = SCUR ²		
130 - 249	50 - 97	No function, reserved for future use				
250 - 255	98 - 100	Illuminate Display				

Table 4: DMX Protocol, RGB Zoom module

RAW RGB HS	RAWX RGBX HSX	DMX Value	Percent	Function	Snap/ fade	Default DMX value
9	17	0 - 9	0 - 1	Color wheel effect Open (white)	Fade	0
		10 - 14	2 - 3	LEE 790 - Moroccan Pink		
		15 - 19	4 - 5	LEE 157 - Pink		
		20 - 24	6 - 7	LEE 332 - Special Rose Pink		
		25 - 29	8 - 9	LEE 328 - Follies Pink		
		30 - 34	10 - 11	LEE 345 - Fuchsia Pink		
		35 - 39	12 - 13	LEE 194 - Surprise Pink		
		40 - 44	14 - 15	LEE 181 - Congo Blue		
		45 - 49	16 - 17	LEE 071 - Tokyo Blue		
		50 - 54	18 - 19	LEE 120 - Deep Blue		
		55 - 59	20 - 21	LEE 079 - Just Blue		
		60 - 64	22 - 23	LEE 132 - Medium Blue		
		65 - 69	24 - 25	LEE 200 - Double CT Blue		
		70 - 74	26 - 27	LEE 161 - Slate Blue		
		75 - 79	28 - 29	LEE 201 - Full CT Blue		
		80 - 84	30 - 31	LEE 202 - Half CT Blue		
		85 - 89	32 - 33	LEE 117 - Steel Blue		
		90 - 94	34 - 35	LEE 353 - Lighter Blue		
		95 - 99	36 - 37	LEE 118 - Light Blue		
		100 - 104	38 - 39	LEE 116 - Medium Blue Green		
		105 - 109	40 - 41	LEE 124 - Dark Green		
		110 - 114	42 - 43	LEE 139 - Primary Green		
		115 - 119	44 - 45	LEE 089 - Moss Green		
		120 - 124	46 - 47	LEE 122 - Fern Green		
		125 - 129	48 - 49	LEE 738 - JAS Green		
		130 - 134	50 - 51	LEE 088 - Lime Green		
		135 - 139	52 - 53	LEE 100 - Spring Yellow		
		140 - 144	54 - 55	LEE 104 - Deep Amber		
145 - 149	56 - 57	LEE 179 - Chrome Orange				
150 - 154	58 - 59	LEE 105 - Orange				
155 - 159	60 - 61	LEE 021 - Gold Amber				
160 - 164	62 - 63	LEE 778 - Millennium Gold				
165 - 169	64 - 65	LEE 135 - Deep Golden Amber				
170 - 174	66 - 67	LEE 164 - Flame Red				
175 - 179	68 - 69	Open (white)				
		180 - 201	70 - 78	Color wheel rotation effect Clockwise, fast → slow		
		202 - 207	79 - 80	Color wheel stop (freezes at current color)		
		208 - 229	81 - 89	Counter-clockwise, slow → fast		
		230 - 234	90 - 91	Open (white)		
		235 - 239	92 - 93	Random color Fast		
		240 - 244	94 - 95	Medium		
		245 - 249	96 - 97	Slow		
		250 - 255	98 - 100	Open (white)		

The **PGRP** option on the control menu on the fixture defines which LEDs the following 4 channels control. See "Pixel grouping" on page 13. The channels can control:

- All of the LEDs (**PGRP** set to "**ALL**"), or
- Group **A** of 2 vertically split LED groups (**PGRP** set to "**2V**" and four other channels control the opposite segment), or
- Group **A** of 2 horizontally split LED groups (**PGRP** set to "**2H**" and four other channels control the opposite segment), or
- Group **A** of 4 quadrant split LED groups (**PGRP** set to "**1**" and three groups of four other channels control the other three segments).

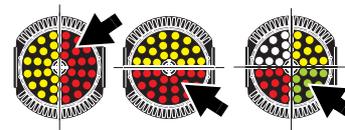


10	18	0 - 255	0 - 100	Red or Hue (depending on operating mode) Color wheel channel must be set to a DMX value from 0 - 9. Zero → 100%	Fade	0
11	19	0 - 255	0 - 100	Green or Saturation (depending on operating mode) Color wheel channel must be set to a DMX value from 0 - 9. Zero → 100%	Fade	0
12	20	0 - 255	0 - 100	Blue or Value (depending on operating mode) Color wheel channel must be set to a DMX value from 0 - 9. Zero → 100%	Fade	0
13	21	0 - 19 20 - 255	0 - 7 8 - 100	CTC (Color Temperature Control) No function CTC 10 000 K → 2 000 K	Fade	0

Table 4: DMX Protocol, RGB Zoom module

RAW RGB HS	RAWX RGBX HSX	DMX Value	Percent	Function	Snap/ fade	Default DMX value
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The following block of four channels is *only available and used if individual quarter or half groups of LEDs are to be controlled*. The level of control is set using the **PGRP** option on the control menu on the fixture. See "Pixel grouping" on page 13. When available, the channels control:



- Group **B** of 2 vertically split LED groups (**PGRP** set to "2V"), or
- Group **B** of 2 horizontally split LED groups (**PGRP** set to "2H"), or
- Group **B** of 4 quadrant split LED groups (**PGRP** set to "1").

14	22	0 - 255	0 - 100	Red or Hue (depending on operating mode) Color wheel channel must be set to a DMX value from 0 - 9. Zero → 100%	Fade	0
15	23	0 - 255	0 - 100	Green or Saturation (depending on operating mode) Color wheel channel must be set to a DMX value from 0 - 9. Zero → 100%	Fade	0
16	24	0 - 255	0 - 100	Blue or Value (depending on operating mode) Color wheel channel must be set to a DMX value from 0 - 9. Zero → 100%	Fade	0
17	25	0 - 19 20 - 255	0 - 7 8 - 100	CTC (Color Temperature Control) No function CTC 10 000 K → 2000 K	Fade	0

The following four channels are *only available and used if individual quarter groups of LEDs are to be controlled (PGRP is set to "1")*. The level of control is set using the **PGRP** option on the control menu on the fixture. See "Pixel grouping" on page 13. The channels control Group **C** of quadrant split LEDs.



18	26	0 - 255	0 - 100	Red or Hue (depending on operating mode) Color wheel channel must be set to a DMX value from 0 - 9. Zero → 100%	Fade	0
19	27	0 - 255	0 - 100	Green or Saturation (depending on operating mode) Color wheel channel must be set to a DMX value from 0 - 9. Zero → 100%	Fade	0
20	28	0 - 255	0 - 100	Blue or Value (depending on operating mode) Color wheel channel must be set to a DMX value from 0 - 9. Zero → 100%	Fade	0
21	29	0 - 19 20 - 255	0 - 7 8 - 100	CTC (Color Temperature Control) No function CTC 10 000 K → 2000 K	Fade	0

The following four channels are *only available and used if individual quarter groups of LEDs are to be controlled (PGRP is set to "1")*. The level of control is set using the **PGRP** option on the control menu on the fixture. See "Pixel grouping" on page 13. The channels control Group **D** of quadrant split LEDs.



22	30	0 - 255	0 - 100	Red or Hue (depending on operating mode) Color wheel channel must be set to a DMX value from 0 - 9. Zero → 100%	Fade	0
23	31	0 - 255	0 - 100	Green or Saturation (depending on operating mode) Color wheel channel must be set to a DMX value from 0 - 9. Zero → 100%	Fade	0
24	32	0 - 255	0 - 100	Blue or Value (depending on operating mode) Color wheel channel must be set to a DMX value from 0 - 9. Zero → 100%	Fade	0
25	33	0 - 19 20 - 255	0 - 7 8 - 100	CTC (Color Temperature Control) No function CTC 10 000 K → 2000 K	Fade	0

Table 4: DMX Protocol, RGB Zoom module

¹ If DMX Reset is disabled in the onboard control menus, a reset command can only be executed if channel 2 is set to DMX value 232 and channel 1 is set to zero.

² Menu override. Setting unaffected by power off/on

³ If an RGB Zoom module is fitted to the rear of the head, the pan/tilt and fixture control channels have no effect.

DMX protocol, CT Zoom module

CT	CTX	DMX Value	Percent	Function	Snap/ fade	Default DMX value
1	1	0 - 19	0 - 7	Strobe/Virtual shutter effect Shutter closed	Snap	020
		20 - 49	8 - 19	Shutter open		
		50 - 64	20 - 25	Strobe (fast → slow)		
		65 - 69	26 - 27	Shutter open		
		70 - 84	28 - 33	Opening pulse (fast → slow)		
		85 - 89	34 - 35	Shutter open		
		90 - 104	36 - 41	Closing pulse (fast → slow)		
		105 - 109	42 - 43	Shutter open		
		110 - 124	44 - 49	Random strobe (fast → slow)		
		125 - 129	50 - 51	Shutter closed		
		130 - 144	52 - 57	Random opening pulse (fast → slow)		
		145 - 149	58 - 59	Shutter open		
		150 - 164	60 - 65	Random closing pulse (fast → slow)		
		165 - 169	66 - 67	Shutter closed		
		170 - 184	68 - 73	Burst pulse (fast → slow)		
		185 - 189	74 - 75	Shutter open		
		190 - 204	76 - 81	Random burst pulse (fast → slow)		
205 - 209	82 - 83	Shutter closed				
210 - 224	84 - 89	Sine wave (fast → slow)				
225 - 229	90 - 91	Shutter open				
230 - 244	92 - 97	Electronic burst (fast → slow)				
245 - 255	98 - 100	Shutter open				
2	2	0 - 255	0 - 100	Virtual dimmer Closed → open	Fade	0
—	3	0 - 19	0 - 7	Dynamic effect 1 No Effect	Snap	0
		20 - 39	7 - 16	Effect 1 - White Single Segment Chase		
		40 - 59	17 - 24	Effect 2 - White Double Segment Chase		
		60 - 189	25 - 73	No Effect		
		190 - 194	74 - 75	Effect 3 - White Flip 1		
		195 - 199	76 - 77	Effect 4 - White Flip 2		
		200 - 204	78 - 79	Effect 5 - White Flicker Chase		
		205 - 209	80 - 81	Effect 6 - Rising Pulse		
		210 - 214	82 - 83	Effect 7 - White Flicker		
		215 - 219	84 - 85	Effect 8 - Strobe Pulse		
		220 - 224	86 - 87	Effect 9 - Single segment chase (set color temperature using Warm/Cold or CT)		
		225 - 229	88 - 89	Effect 10 - Two segment chase (set color temperature using Warm/Cold or CT)		
		230 - 234	90 - 91	Effect 11 - Double horiz. seg. chase (set color temperature using Warm/Cold or CT)		
		235 - 239	92 - 93	Effect 12 - Double vert. seg. chase (set color temperature using Warm/Cold or CT)		
		240 - 244	94 - 95	Effect 13 - Double opposite chase (set color temperature using Warm/Cold or CT)		
245 - 249	96 - 97	Effect 14 - Reserved for future use				
250 - 255	98 - 100	Effect 15 - Reserved for future use				
—	4	0 - 2	0	Dynamic effect 1 speed Stop	Fade	128
		3 - 126	1 - 49	Clockwise rotation, fast → slow		
		127 - 129	50	Stop		
		130 - 253	51 - 99	Counter-clockwise rotation, slow → fast		
		254 - 255	100	Stop		
—	5	0 - 255	0 - 100	Dynamic effect 1 x-fade No fade → max. fade	Fade	0
—	6	0 - 255	0 - 100	Dynamic effect 1 intensity Zero → 100%	Fade	0

Table 5: DMX Protocol, CT Zoom module

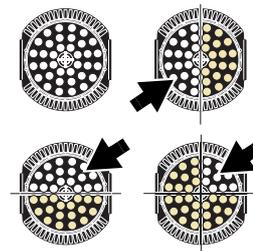
CT	CTX	DMX Value	Percent	Function	Snap/ fade	Default DMX value
—	7	0 - 19 20 - 39 40 - 59 60 - 189 190 - 194 195 - 199 200 - 204 205 - 209 210 - 214 215 - 219 220 - 224 225 - 229 230 - 234 235 - 239 240 - 244 245 - 249 250 - 255	0 - 7 7 - 16 17 - 24 25 - 73 74 - 75 76 - 77 78 - 79 80 - 81 82 - 83 84 - 85 86 - 87 88 - 89 90 - 91 92 - 93 94 - 95 96 - 97 98 - 100	Dynamic effect 2 No effect Effect 1 - White Single Segment Chase Effect 2 - White Double Segment Chase No effect Effect 3 - White Flip 1 Effect 4 - White Flip 2 Effect 5 - White Flicker Chase Effect 6 - Rising Pulse Effect 7 - White Flicker Effect 8 - Strobe Pulse Effect 9 - Single segment chase (set color temperature using Warm/Cold or CT) Effect 10 - Two segment chase (set color temperature using Warm/Cold or CT) Effect 11 - Double horiz. seg. chase (set color temperature using Warm/Cold or CT) Effect 12 - Double vert. seg. chase (set color temperature using Warm/Cold or CT) Effect 13 - Double opposite chase (set color temperature using Warm/Cold or CT) Effect 14 - Reserved for future use Effect 15 - Reserved for future use	Snap	0
—	8	0 - 2 3 - 126 127 - 129 130 - 253 254 - 255	0 1 - 49 50 51 - 99 100	Dynamic effect 2 speed Stop Clockwise rotation, fast → slow Stop Counter-clockwise rotation, slow → fast Stop	Fade	128
—	9	0 - 255	0 - 100	Dynamic effect 2 x-fade No fade → max. fade	Fade	0
—	10	0 - 255	0 - 100	Dynamic effect 2 intensity Zero → 100%	Fade	0
3	11	0 - 200 201 - 210 211 - 255	0 - 77 78 - 81 82 - 100	Zoom Zoom wide → narrow Hypermode No function	Fade	0
4	12	0 - 255	0 - 100	Pan ³ Pan 0 - 630° (128 = centered)	Fade	128
5	13	0 - 255	0 - 100	Pan fine ³ Pan fine (Least Significant Byte)	Fade	0
6	14	0 - 255	0 - 100	Tilt ³ Tilt 0 - 300° (128 = centered)	Fade	128
7	15	0 - 255	0 - 100	Tilt fine ³ Tilt fine (Least Significant Byte)	Fade	0

Table 5: DMX Protocol, CT Zoom module

CT	CTX	DMX Value	Percent	Function	Snap/ fade	Default DMX value
8	16	0 - 9	0 - 1	Fixture control ³ No function	Snap	0
		10 - 14	2 - 3	Reset Entire fixture1		
		15 - 19	4 - 5	No function		
		20 - 24	6 - 7	Reset Effects only1		
		25 - 29	8 - 9	No function		
		30 - 34	10 - 11	Reset Pan & Tilt Only1		
		35 - 39	12 - 13	No function		
		40 - 44	14 - 15	PTSP = NORM ²		
		45 - 49	16 - 17	PTSP = FAST ²		
		50 - 54	18 - 19	No function		
		55 - 59	20 - 21	Reserved for Future Use		
		60 - 64	22 - 23	No function		
		65 - 69	24 - 25	Fan Mode - Full ²		
		70 - 74	26 - 27	No function		
		75 - 79	28 - 29	Fan Mode - Regulated ²		
		80 - 84	30 - 31	No function		
		85 - 89	32 - 33	Fan Mode - Silent ²		
		90 - 94	34 - 35	No function		
95 - 99	36 - 37	Dimmer Curve = LIN ²				
100 - 104	38 - 39	No function				
105 - 109	40 - 41	Dimmer Curve = SQR ²				
110 - 114	42 - 43	No function				
115 - 119	44 - 45	Dimmer Curve = ISQR ²				
120 - 124	46 - 47	No function				
125 - 129	48 - 49	Dimmer Curve = SCUR ²				
130 - 249	50 - 97	No function, reserved for future use				
250 - 255	98 - 100	Illuminate Display				
9	17			<i>Channel not used</i>		

The **PGRP** option in the control menu for the module defines which LEDs the following 4 channels control. See "Pixel grouping" on page 13. The channels can control:

- All of the LEDs (**PGRP** set to "**ALL**"), or
- Group **A** of 2 vertically split LED groups (**PGRP** set to "**2V**" and four other channels control the opposite segment), or
- Group **A** of 2 horizontally split LED groups (**PGRP** set to "**2H**" and four other channels control the opposite segment), or
- Group **A** of 4 quadrant split LED groups (**PGRP** set to "**1**" and three groups of four other channels control the other three segments).



10	18	0 - 255	0 - 100	Warm white – raw CTC channel must be set to a DMX value from 0 - 19. Zero → 100%	Fade	0
11	19			<i>Channel not used</i>		
12	20	0 - 255	0 - 100	Cold white – raw CTC channel must be set to a DMX value from 0 - 9. Zero → 100%	Fade	0
13	21	0 - 19 20 - 255	0 - 7 8 - 100	CTC (Color Temperature Control) – calibrated No function, Warm and Cold channels (10 and 12 in CT mode/18 and 20 in CTX mode) enabled CTC 7 000 K → 3 000 K, Warm and Cold channels disabled	Fade	0

The following block of four channels is *only available and used if individual quarter or half groups of LEDs are to be controlled*. The level of control is set using the **PGRP** option in the control menu for the module. See "Pixel grouping" on page 13. When available, the channels control:

- Group **B** of 2 vertically split LED groups (**PGRP** set to "**2V**"), or
- Group **B** of 2 horizontally split LED groups (**PGRP** set to "**2H**"), or
- Group **B** of 4 quadrant split LED groups (**PGRP** set to "**1**").

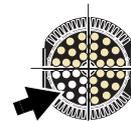


14	22	0 - 255	0 - 100	Warm white – raw CTC channel must be set to a DMX value from 0 - 19. Zero → 100%	Fade	0
15	23			<i>Channel not used</i>		
16	24	0 - 255	0 - 100	Cold white – raw CTC channel must be set to a DMX value from 0 - 9. Zero → 100%	Fade	0

Table 5: DMX Protocol, CT Zoom module

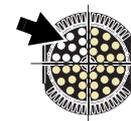
CT	CTX	DMX Value	Percent	Function	Snap/ fade	Default DMX value
17	25	0 - 19 20 - 255	0 - 7 8 - 100	CTC (Color Temperature Control) – calibrated No function, Warm and Cold channels (14 and 16 in CT mode/22 and 24 in CTX mode) enabled CTC 7 000 K → 3 000 K, Warm and Cold channels disabled	Fade	0

The following four channels *are only available and used if individual quarter groups of LEDs are to be controlled (PGRP is set to “1”).* The level of control is set using the **PGRP** option in the control menu for the module. See “Pixel grouping” on page 13. The channels control Group **C** of quadrant split LEDs.



18	26	0 - 255	0 - 100	Warm white – raw CTC channel must be set to a DMX value from 0 - 19. Zero → 100%	Fade	0
19	27			<i>Channel not used</i>		
20	28	0 - 255	0 - 100	Cold white – raw CTC channel must be set to a DMX value from 0 - 9. Zero → 100%	Fade	0
21	29	0 - 19 20 - 255	0 - 7 8 - 100	CTC (Color Temperature Control) – calibrated No function, Warm and Cold channels (18 and 20 in CT mode/26 and 28 in CTX mode) enabled CTC 7 000 K → 3 000 K, Warm and Cold channels disabled	Fade	0

The following four channels *are only available and used if individual quarter groups of LEDs are to be controlled (PGRP is set to “1”).* The level of control is set using the **PGRP** option in the control menu for the module. See “Pixel grouping” on page 13. The channels control Group **D** of quadrant split LEDs.



22	30	0 - 255	0 - 100	Warm white – raw CTC channel must be set to a DMX value from 0 - 19. Zero → 100%	Fade	0
23	31			<i>Channel not used</i>		
24	32	0 - 255	0 - 100	Cold white – raw CTC channel must be set to a DMX value from 0 - 9. Zero → 100%	Fade	0
25	33	0 - 19 20 - 255	0 - 7 8 - 100	CTC (Color Temperature Control) – calibrated No function, Warm and Cold channels (22 and 24 in CT mode/30 and 32 in CTX mode) enabled CTC 7 000 K → 3 000 K, Warm and Cold channels disabled	Fade	0

Table 5: DMX Protocol, CT Zoom module

¹ If DMX Reset is disabled in the onboard control menus, a reset command can only be executed if channel 2 is set to DMX value 232 and channel 1 is set to zero.

² Menu override. Setting unaffected by power off/on

³ If a CT Zoom module is fitted to the rear of the head, the pan/tilt and fixture control channels have no effect.

LEE colors and RGB equivalents

The table below gives approximate RGB equivalents for the LEE colors available in the RGB Zoom module's color wheel effect (DMX channel 9).

Lee no.	Name	DMX Integer		
		Red	Green	Blue
790	Moroccan Pink	255	062	014
157	Pink	255	033	010
332	Special rose Pink	255	001	012
328	Follies Pink	255	013	025
345	Fuchsia Pink	255	046	063
194	Surprise Pink	255	081	068
181	Congo Blue	092	002	255
071	Tokyo Blue	030	000	255
120	Deep Blue	019	026	255
079	Just Blue	031	093	255
132	Medium Blue	022	161	255
200	Double CT Blue	255	182	200
161	State Blue	255	221	183
201	Full CT Blue	255	135	075
202	Half CT Blue	255	118	045
117	Steel Blue	255	165	059
353	Lighter Blue	214	255	123
118	Light Blue	074	255	186
116	Medium Blue Green	000	255	112
124	Dark Green	069	255	015
139	Primary Green	058	255	000
089	Moss Green	198	255	008
122	Fern Green	251	255	012
738	JAS Green	255	228	000
088	Lime Green	255	138	003
100	Spring Yellow	255	101	000
104	Deep Amber	255	070	000
179	Chrome Orange	255	056	000
105	Orange	255	042	000
021	Gold Amber	255	031	000
778	Millennium Gold	255	025	000
135	Deep Golden Amber	255	017	000
164	Flame Red	255	010	001

Onboard control menus

Single head module operation

When only one module is installed on the head, the **HEAD** menu is automatically set to **SNGL**. The MAC 401 automatically detects whether an RGB Zoom or CT Zoom module is installed and adjusts the control menu accordingly. The following control menus are available:

Menu	Item	Options	Notes (Default settings in bold print)
ADDR		1 – XXX	DMX address (default address = 1). The DMX address range is limited so that the fixture will always have enough DMX channels in the 512 available.
	DMX	PSET <i>(fixture auto-detects which module is installed and displays either RGB/HS¹ or CT² menu items)</i>	RAWX
RGBX			Calibrated RGB mode with dynamic effects¹
HSX			HSV mode with dynamic effects ¹
RAW			Non-calibrated RGB mode without dynamic effects ¹
RGB			Calibrated RGB mode without dynamic effects ¹
HS			HSV mode without dynamic effects ¹
CTX			CT mode with dynamic effects ²
CT			CT mode without dynamic effects ²
PGRP		1	Individual control of 4 pixels (segments)
		2H	Control of pixels in 2 groups of 2 pixels, horizontal split
		2V	Control of pixels in 2 groups of 2 pixels, vertical split
		All	All pixels controlled as one group
PINV		OFF	Disable pixel inversion
		ON	Pixel inversion: pixels swapped left to right and top to bottom
PTST		PTSP	Pan and tilt speed normal / fast
		SWAP	Swap pan and tilt (pan commands move tilt and vice versa) - off / on
		PINV	Pan inversion (reverse direction pan control) - off / on
		TINV	Tilt inversion (reverse direction tilt control) - off / on
FANS		REG	Cooling fan speed thermostatically regulated
		FULL	Max. cooling fan speed
		SLNT	Silent mode. When Silent mode is selected the head fan will turn off. The base fan will still run. Values allowed for RGB or HSV (no matter what operating mode) will be limited to prevent the fixture from producing too much heat. If the LEDs get too hot the fans will revert to Regulated mode. When the LEDs are cool enough the fans shift back to Silent mode. The color wheel channel will have lower intensity in Silent mode.
DIM		LIN	Linear dimming curve
		SQR	Square law dimming curve
		ISQR	Inverse square law dimming curve
		SCUR	S-curve dimming curve
DRES		OFF	Disable reset via DMX
		ON	Enable reset via DMX
DISP		ON	Display is permanently on
		2MN	Display switches off and goes into Sleep mode if controls have not been pressed for 2 minutes.
		5MN	Display switches off and goes into Sleep mode if controls have not been pressed for 5 minutes
10MN		10MN	Display switches off and goes into Sleep mode if controls have not been pressed for 10 minutes
		DINT	0-100
ERRM		NORM	Display errors at 100% intensity (regardless of DINT setting) and illuminate the service light.
		SLNT	Silent error mode. The error message does not appear in the display, but the service lamp is illuminated
CTC <i>(RGB Zoom module only)</i>		WITH	Sending a value on a CTC channel adjusts the temperature of whatever color is currently being displayed on segment or fixture
		INDP	Sending a value on a CTC channel overrides any color being displayed. Fixture or segment switches to white with variable color temperature

Table 6: Control menu: single head module operation

Menu	Item	Options	Notes (Default settings in bold print)	
FACT	FACT	LOAD	Return all settings (except calibrations) to factory defaults <i>NB: can take up to 2 minutes to complete!</i>	
	CUS1, CUS2, CUS3	LOAD	Load custom configuration	
		SAVE	Save current custom configuration	
INFO	VERS	MAIN	CPU firmware version in main processor	
		HEAD	CPU firmware version in head processor front module (shows N/A if rear module not installed)	
	POHR	RSET	Hours of operation since counter reset (to reset counter, display counter and press [Up] for 5 secs.)	
		TOTL	Total hours of operation since manufacture	
	MTMP	CURR	Display current main PCB temperature	
		MSR	Display highest main PCB temperature since last reset	
		MR	Display highest main PCB temperature since manufacture	
	DTMP	CURR	Display current average driver PCB temperature	
		MSR	Display highest driver PCB temperature since last reset	
		MR	Display highest driver PCB temperature since manufacture	
	PTMP	CURR	Display current average pixel PCB temperature	
		MSR	Display highest pixel PCB temperature since last reset	
		MR	Display highest pixel PCB temperature since manufacture	
	AIRF	TOTL	Current elapsed time in hours since the air filter was cleaned or changed. Display the counter and press the up button for five seconds to reset it. This counter must be reset manually when the air filter is cleaned.	
		STTM	Set duration of time alert to be issued after 100-9999 hours have passed on the TOTL counter to remind you to clean it, particularly the air filter. The alert appears as long as the value of the TOTL counter is higher than the threshold set here. Default value = 0999	
SNUM	RDM	Display fixture's RDM ID		
	SNUM	Display fixture's serial number		
MAN	RST		Reset fixture. Press [Enter] to confirm	
	ALL	0 – 255	All LEDs, intensity 0 - 100%	
	RED or WARM	0 – 255	Red if RGB module installed, Warm white if CT module installed, intensity 0 - 100%	
	GRN1	0 – 255	Green 1 if RGB module installed, intensity 0 - 100% <i>Not displayed if CT module installed</i>	
	GRN2	0 – 255	Green 2 if RGB module installed, intensity 0 - 100% <i>Not displayed if CT module installed</i>	
	BLUE or COLD	0 – 255	Blue if RGB module installed, Cold white if CT module installed, intensity 0 - 100%	
	ZOOM	0 – 255	Zoom full wide → zoom full narrow (Hypermode)	
	PAN	0 – 255	Pan full left → pan full right	
TEST	TILT	0 – 255	Full tilt → full opposite tilt	
	TALL		Test LEDs, zoom and pan/tilt movement	
	T-FX		Test LEDs and zoom only	
	TP-T		Test pan/tilt movement only	
	TDIS		Light all segments in onboard display panel for 5 secs.	
DMXL	RATE		DMX transmission speed, live, in packets per second	
	QUAL		Percent of packets received with errors, live	
	STRT		Decimal value of the DMX start code, live	
	SHUT - FIXT SET	0 – 255	DMX value received on each channel	
SERV To access this menu, hold [Enter] pressed for a few seconds	PTFB	ON	Enable pan/tilt position feedback/correction system	
		OFF	Disable pan/tilt feedback for servicing (this setting is not saved when fixture is reset)	
	ADJ		Effects adjustment menu (for service use: for full details of this menu, see "Adjustment submenu" on page 42)	
	CAL (OF = offset)	P OF		Pan calibration 0- 255
		T OF		Tilt calibration 0 - 255
	DOF	SURE		Load factory effects calibration settings
	PCBT	SURE		PCB test: for service use only
UPLD	SURE		Manually set fixture to receive software upload	

Table 6: Control menu: single head module operation

Menu	Item	Options	Notes (Default settings in bold print)
HEAD	DUAL		Sets head to dual head module operation
	SNGL		Sets head to single head module operation

Table 6: Control menu: single head module operation

Dual head module operation

When you install a second head module on the rear of the head, **DUAL** is automatically selected in the **HEAD** menu and **FRNT** and **REAR** menus become available in the control panel:

- If the **FRNT** menu is selected, the commands you enter are applied to the front head module.
- If the **REAR** menu is selected, the commands you enter are applied to the rear head module.
- The **PERS**, **FACT**, **DMXL**, **SERV** and **HEAD** menus apply to the entire fixture.

As with single head module operation, the MAC 401 automatically detects whether an RGB Zoom or CT Zoom module is installed on the front and the rear of the head and adjusts the control menus accordingly. The following control menus are available:

Menu	Item	Item	Options	Notes (Default settings in bold print)
FRNT	ADDR		1 – XXX	DMX address of module on front of head (default address = 1). The DMX address range is limited so that the fixture will always have enough DMX channels in the 512 available.
	DMX	PSET <i>(fixture auto-detects which module is installed and displays either RGB/HS¹ or CT² menu items)</i>	RAWX	Non-calibrated RGB mode with dynamic effects ¹
			RGBX	Calibrated RGB mode with dynamic effects¹
			HSX	HSV mode with dynamic effects ¹
			RAW	Non-calibrated RGB mode without dynamic effects ¹
			RGB	Calibrated RGB mode without dynamic effects ¹
			HS	HSV mode without dynamic effects ¹
			CTX	CT mode with dynamic effects ²
			CT	CT mode without dynamic effects ²
	PGRP	1	Individual control of 4 pixels (segments)	
		2H	Control of pixels in 2 groups of 2 pixels, horizontal split	
		2V	Control of pixels in 2 groups of 2 pixels, vertical split	
		All	All pixels controlled as one group	
	PINV	OFF	Disable pixel inversion	
		ON	Pixel inversion: pixels swapped left to right and top to bottom	
	INFO	VERS	MAIN	CPU firmware version in main processor
			HEAD	CPU firmware version in head processor front module / rear module (if installed)
		POHR	RSET	Hours of operation since counter reset (to reset counter, display counter and press [Up] for 5 secs.)
			TOTL	Total hours of operation since manufacture
		MTMP	CURR	Display current main PCB temperature
			MSR	Display highest main PCB temperature since last reset
			MR	Display highest main PCB temperature since manufacture
		DTMP	CURR	Display current average driver PCB temperature
			MSR	Display highest driver PCB temperature since last reset
			MR	Display highest driver PCB temperature since manufacture
		PTMP	CURR	Display current average pixel PCB temperature
			MSR	Display highest pixel PCB temperature since last reset
	MR		Display highest pixel PCB temperature since manufacture	

Table 7: Control menu: dual head module operation

Menu	Item	Item	Options	Notes (Default settings in bold print)	
FRNT (continued)	INFO (continued)	AIRF	TOTL	Current elapsed time in hours since the air filter was cleaned or changed. Display the counter and press the up button for five seconds to reset it. This counter must be reset manually when the air filter is cleaned.	
			STTM	Set duration of time alert to be issued after 100-9999 hours have passed on the TOTL counter to remind you to clean it, particularly the air filter. The alert appears as long as the value of the TOTL counter is higher than the threshold set here. Default value = 0999	
		SNUM	RDM	Display fixture's RDM ID (this will be the same in the REAR menu)	
			SNUM	Display fixture's serial number (this will be the same in the REAR menu)	
	MAN	RST		Reset fixture. Press [Enter] to confirm	
		ALL	0 – 255	All LEDs, intensity 0 - 100%	
		RED or WARM	0 – 255	Red if RGB module installed, Warm white if CT module installed, intensity 0 - 100%	
		GRN1	0 – 255	Green 1 if RGB module installed, intensity 0 - 100% <i>Not displayed if CT module installed</i>	
		GRN2	0 – 255	Green 2 if RGB module installed, intensity 0 - 100% <i>Not displayed if CT module installed</i>	
		BLUE or COLD	0 – 255	Blue if RGB module installed, Cold white if CT module installed, intensity 0 - 100%	
		ZOOM	0 – 255	Zoom full wide → zoom full narrow (Hypermode)	
		TILT	0 – 255	Full tilt → full opposite tilt	
	PAN	0 – 255	Pan full left → pan full right		
	TEST	TALL		Test LEDs, zoom and pan/tilt movement	
		T-FX		Test LEDs and zoom only	
		TP-T		Test pan/tilt movement only	
		TDIS		Light all segments in onboard display panel for 5 secs.	
	REAR	ADDR	1 – XXX	DMX address of module on rear of head (default address = 1). The DMX address range is limited so that the fixture will always have enough DMX channels in the 512 available.	
		PSET <i>(fixture auto-detects which module is installed and displays either RGB/HS¹ or CT² menu items)</i>	RAWX	Non-calibrated RGB mode with dynamic effects ¹	
			RGBX	Calibrated RGB mode with dynamic effects¹	
			HSX	HSV mode with dynamic effects ¹	
			RAW	Non-calibrated RGB mode without dynamic effects ¹	
			RGB	Calibrated RGB mode without dynamic effects ¹	
			HS	HSV mode without dynamic effects ¹	
			CTX	CT mode with dynamic effects ²	
			CT	CT mode without dynamic effects ²	
		PGRP	1	Individual control of 4 pixels (segments)	
			2H	Control of pixels in 2 groups of 2 pixels, horizontal split	
2V			Control of pixels in 2 groups of 2 pixels, vertical split		
All			All pixels controlled as one group		
PINV			OFF	Disable pixel inversion	
		ON	Pixel inversion: pixels swapped left to right and top to bottom		
INFO		VERS	MAIN	CPU firmware version in main processor	
			HEAD	FRNT = CPU firmware version in head processor front module REAR = CPU firmware version in head processor rear module (shows N/A if rear module not installed)	
		POHR	RSET	Hours of operation since counter reset (to reset counter, display counter and press [Up] for 5 secs.)	
			TOTL	Total hours of operation since manufacture	
		MTMP	CURR	Display current main PCB temperature	
			MSR	Display highest main PCB temperature since last reset	
	MR		Display highest main PCB temperature since manufacture		
	DTMP	CURR	Display current average driver PCB temperature		
		MSR	Display highest driver PCB temperature since last reset		
MR		Display highest driver PCB temperature since manufacture			

Table 7: Control menu: dual head module operation

Menu	Item	Item	Options	Notes (Default settings in bold print)	
REAR (continued)	INFO (continued)	PTMP	CURR	Display current average pixel PCB temperature	
			MSR	Display highest pixel PCB temperature since last reset	
			MR	Display highest pixel PCB temperature since manufacture	
		AIRF	TOTL	Current elapsed time in hours since the air filter was cleaned or changed. Display the counter and press the up button for five seconds to reset it. This counter must be reset manually when the air filter is cleaned.	
			STTM	Set duration of time alert to be issued after 100- 9999 hours have passed on the TOTL counter, to remind you to clean it, particularly the air filter. The alert appears as long as the value of the TOTL counter is higher than the threshold set here.	
		SNUM	RDM	Display fixture's RDM ID (this will be the same in the FRNT menu)	
	SNUM		Display fixture's serial number (this will be the same in the FRNT menu)		
	MAN	RST		Reset fixture. Press [Enter] to confirm	
		ALL	0 – 255	All LEDs, intensity 0 - 100%	
		RED or WARM	0 – 255	Red if RGB module installed, Warm white if CT module installed, intensity 0 - 100%	
		GRN1	0 – 255	Green 1 if RGB module installed, intensity 0 - 100% <i>Not displayed if CT module installed</i>	
		GRN2	0 – 255	Green 2 if RGB module installed, intensity 0 - 100% <i>Not displayed if CT module installed</i>	
		BLUE or COLD	0 – 255	Blue if RGB module installed, Cold white if CT module installed, intensity 0 - 100%	
		ZOOM	0 – 255	Zoom full wide → zoom full narrow (Hypermode)	
		TILT	0 – 255	Full tilt → full opposite tilt	
		PAN	0 – 255	Pan full left → pan full right	
	TEST	TALL		Test LEDs, zoom and pan/tilt movement	
		T-FX		Test LEDs and zoom only	
		TP-T		Test pan/tilt movement only	
		TDIS		Light all segments in onboard display panel for 5 secs.	
	PERS	PTST	PTSP		Pan and tilt speed normal / fast
			SWAP		Swap pan and tilt (pan commands move tilt and vice versa) - off / on
			PINV		Pan inversion (reverse direction pan control) - off / on
TINV			Tilt inversion (reverse direction tilt control) - off / on		
FANS		REG		Cooling fan speed thermostatically regulated	
		FULL		Max. cooling fan speed	
		SLNT		Silent mode. When Silent mode is selected the head fan will turn off. The base fan will still run. Values allowed for RGB or HSV (no matter what operating mode) will be limited to prevent the fixture from producing too much heat. If the LEDs get too hot the fans will revert to Regulated mode. When the LEDs are cool enough the fans shift back to Silent mode. The color wheel channel will have lower intensity in Silent mode.	
DIM		LIN		Linear dimming curve	
		SQR		Square law dimming curve	
		ISQR		Inverse square law dimming curve	
	SCUR		S-curve dimming curve		
DRES	OFF		Disable reset via DMX		
	ON		Enable reset via DMX		
DISP	ON		Display is always on		
	2MN		Display switches off and goes into Sleep mode if the controls have not been pressed for 2 minutes.		
	5MN		Display switches off and goes into Sleep mode if the controls have not been pressed for 5 minutes		
	10MN		Display switches off and goes into Sleep mode if the controls have not been pressed for 10 minutes		
DINT	0-100		Display intensity. Default= 100		

Table 7: Control menu: dual head module operation

Menu	Item	Item	Options	Notes (Default settings in bold print)
PERS (continued)	ERRM	NORM		Display errors at 100% intensity (regardless of DINT setting) and illuminate the service light.
		SLNT		Silent error mode. The error message does not appear in the display, but the service lamp is illuminated
	CTC (RGB Zoom module only)	WITH		Sending a value on a CTC channel adjusts the temperature of whatever color is currently being displayed on segment or fixture
		INDP		Sending a value on a CTC channel overrides any color being displayed. Fixture or segment switches to white with variable color temperature
FACT	FACT	LOAD		Return all settings (except calibrations) to factory defaults <i>NB: can take up to 2 minutes to complete!</i>
	CUS1, CUS2, CUS3	LOAD		Load custom configuration
		SAVE		Save current custom configuration
DMXL	RATE			DMX transmission speed, live, in packets per second
	QUAL			Percent of packets received with errors, live
	STRT			Decimal value of the DMX start code, live
	FRNT SHUT-FIXT SET	0 - 255		DMX value received on each channel, front module
	REAR SHUT - FIXT SET	0 - 255		DMX value received on each channel, rear module
SERV To access this menu, hold [Enter] pressed for a few seconds	PTFB	ON		Enable pan/tilt position feedback/correction system
		OFF		Disable pan/tilt feedback for servicing (this setting is not saved when fixture is reset)
	ADJ			Effects adjustment menu (for service use: for full details of this menu, see "Adjustment submenu" on page 42)
	CAL (OF = offset)	P OF		Pan calibration
		T OF		Tilt calibration
	DOF	SURE		Load factory effects calibration settings
	PCBT	SURE		PCB test: for service use only
UPLD	SURE		Manually set fixture to receive software upload	
HEAD	DUAL			Sets head to dual head module operation (selected by default if two modules are installed on the head)
	SNGL			Sets head to single head module operation

Table 7: Control menu: dual head module operation

Adjustment submenu

This menu is accessed under **ADJ** in the **SERV** service menu. Adjustments are for service use only.

ADJ	RSET			Reset fixture
	HEAD	FRNT <i>(applies to front module only)</i>	RED	Red if RGB module installed, Warm white if CT module installed, intensity 0%/50%/100%
			GRN1	Green 1 if RGB module installed, intensity 0%/50%/100% <i>Not displayed if CT module installed</i>
			GRN2	Green 2 if RGB module installed, intensity 0%/50%/100% <i>Not displayed if CT module installed</i>
			BLUE	Blue if RGB module installed, Cold white if CT module installed, Intensity 0%/50%/100%
			ZOOM	Zoom – 0%/50%/100%
		REAR <i>(applies to rear module only)</i>	RED	Red if RGB module installed, Warm white if CT module installed, intensity 0%/50%/100%
			GRN1	Green 1 if RGB module installed, intensity 0%/50%/100% <i>Not displayed if CT module installed</i>
			GRN2	Green 2 if RGB module installed, intensity 0%/50%/100% <i>Not displayed if CT module installed</i>
			BLUE	Blue if RGB module installed, Cold white if CT module installed, Intensity 0%/50%/100%
			ZOOM	Zoom – 0%/50%/100%
	P-T	NEUT		Pan and tilt in neutral (centered) 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

Table 8: Adjustment submenu

Troubleshooting

Problem	Probable cause(s)	Remedy
Fixture is completely dead.	No power to fixture.	Check power and connections.
	Fuse blown.	Disconnect fixture from power. Check fuses and replace.
One or more fixtures resets correctly but responds erratically or not at all to the controller.	Fault on data link.	Inspect connections and cables. Correct poor connections. Repair or replace damaged cables.
	Data link not terminated.	Insert termination plug in output connector of the last fixture on the link.
	Incorrect fixture DMX addressing.	Check addressing on fixture and controller. Check fixture is set to correct DMX mode.
	One of the fixtures is defective and is disturbing data transmission on the link.	Unplug XLR in and out connectors and connect them directly together to bypass one fixture at a time until normal operation is regained. Have faulty fixture serviced by Martin service 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.
Light output shuts down unexpectedly.	Fixture is too hot.	Clean the fixture, especially air vents. Ensure free airflow around fixture. Check that ambient temperature does not exceed max. permitted level. Switch to FULL cooling mode. If problem persists, contact Martin for advice.

Table 9: Troubleshooting

MAC 401 Specifications

Physical

Length	.221 mm (8.7 in.)
Width	.505 mm (19.9 in.)
Height	.527 mm (20.7 in.)
Weight	21 kg (46.3 lbs.) incl. 2 head modules, excl. brackets

Dynamic Effects

All models

Strobe effect	Electronic, with pulse and random effects
Electronic dimming	0 - 100%, four dimming curve options
Zoom	16° (Hypermode), 20° - 50°
Pan	630° with two speed settings
Tilt	300° with two speed settings
Pre-programmed effects	Two superimposable chase/pulse/flip/flicker/strobe/static effects with variable intensity, effect x-fading and 'pixel wheel' rotation speed

RGB Zoom module, MAC 401 Dual

Color mixing	RGB + CTC or HSV
Red or hue	0 - 100%
Green or saturation	0 - 100%
Blue or value	0 - 100%
Color temperature control	Variable 10 000 - 2000 K
Electronic 'color wheel' effect	.33 LEE-referenced colors plus white, variable speed color wheel rotation effect and random color

CTC Zoom module, MAC 401 CT Zoom

Warm white	0 - 100%
Cool white	0 - 100%
Color temperature control	Variable 7 000 - 3 000 K

Light Source

RGB Zoom module

Light source	.36 x Osram multi-color LE ATB S2W high power emitters
LED lifetime	50 000 hours to 70% luminous maintenance*

CT Zoom module

Light source	.36 x LedEngin 10 W warm white/daylight white emitters
LED lifetime	90 000 hours to 90% luminous maintenance*

**Manufacturer's figures obtained under manufacturer's test conditions*

Control and Programming

Control	DMX
Setting and addressing	Control panel with LED display
DMX channels	.8 - 33 depending on control mode & pixel grouping
Protocol	USITT DMX512/1990
Transceiver	RS-485

Construction

Color	Black
Housing	High-impact flame-retardant thermoplastic and die-cast aluminum
Protection rating	.IP 20

Installation

Mounting points	2 pairs of 1/4-turn locks
Orientation	Any
Minimum distance to illuminated surfaces	200 mm (8 in.)
Minimum distance to combustible materials	200 mm (8 in.)
Minimum distance to persons in the beam zone	1 m (3.4 feet)

Connections

AC power input	Neutrik PowerCon
DMX data in/out	5-pin locking XLR, RJ-45

Electrical

AC power	100-240 V nominal, 50/60 Hz
Power supply unit	Electronic switch mode
Mains fuses	2 x 10 AT

Typical Power and Current

Only RGB Zoom module installed

100 V, 50 Hz	367 W, 3.7 A, PF 0.995
100 V, 60 Hz	367 W, 3.7 A, PF 0.995
110 V, 60 Hz	364 W, 3.3 A, PF 0.994
120 V, 60 Hz	367 W, 3.1 A, PF 0.993
208 V, 60 Hz	360 W, 1.8 A, PF 0.967
230 V, 50 Hz	360 W, 1.7 A, PF 0.973
240 V, 50 Hz	360 W, 1.6 A, PF 0.969

Only CT Zoom module installed

100 V, 50 Hz	398 W, 4.0 A, PF 0.994
100 V, 60 Hz	400 W, 4.0 A, PF 0.995
110 V, 60 Hz	399 W, 3.7 A, PF 0.993
120 V, 60 Hz	400 W, 3.4 A, PF 0.992
208 V, 60 Hz	396 W, 2.0 A, PF 0.964
230 V, 50 Hz	396 W, 1.8 A, PF 0.965
240 V, 50 Hz	399 W, 1.8 A, PF 0.959

RGB Zoom and CT Zoom modules installed

100 V, 50 Hz	770 W, 7.8 A, PF 0.996
100 V, 60 Hz	765 W, 7.8 A, PF 0.997
110 V, 60 Hz	755 W, 7.0 A, PF 0.995
120 V, 60 Hz	749 W, 6.3 A, PF 0.993
208 V, 60 Hz	732 W, 3.6 A, PF 0.980
230 V, 50 Hz	731 W, 3.3 A, PF 0.965
240 V, 50 Hz	730 W, 3.2 A, PF 0.955

All measurements made with all LEDs at full intensity. Measurements made at nominal voltage. Allow for a deviation of +/- 10%. PF = power factor

Thermal

Cooling	Filtered forced air, temperature-regulated, low noise
Maximum ambient temperature (Ta max.)	40° C (104° F)
Minimum ambient temperature (Ta min.)	5° C (41° F)
Maximum surface temperature under steady state condition	80° C (176° F)
Total heat dissipation (calculated, +/- 10%), RGB Zoom module installed	1250 BTU/hr
Total heat dissipation (calculated, +/- 10%), CT Zoom module installed	1360 BTU/hr
Total heat dissipation (calculated, +/- 10%), RGB Zoom and CT Zoom modules installed	2630 BTU/hr

Approvals



EU safety	EN 60598-1, EN 60598-2-17
EU EMC	EN 61000-3-2, EN 61000-3-3, EN 61000-6-2, EN 61000-6-4
US safety	UL 1573
Canadian safety	CAN/CSA E60598-1, CAN/CSA E598-2-17

Included Items

Two Omega clamp attachment brackets with 1/4-turn fasteners	2 x P/N 91602001
Neutrik PowerCon NAC3FCA AC mains power input connector	P/N 05342804
Two 10 AT mains fuses (installed)	2 x P/N 05021029

Accessories

MAC 401™ RGB Zoom module	P/N 91611325
MAC 401™ CT Zoom module	P/N 91611349
MAC 401™ double flightcase	P/N 91510150
Color frame kit for MAC 401™	P/N 91610102
Omega bracket	P/N 91602002
G-clamp	P/N 91602003
Half-coupler clamp	P/N 91602005
Quick trigger clamp	P/N 91602007
Safety wire, universal, SWL (Safe Working Load) 50 kg	P/N 91604003
DMX cable, STP, 1 pair + shield, 5-pin male XLR to 5-pin female XLR, IEC/UL-CL, 1 m	P/N 91611242
DMX cable, STP, 1 pair + shield, 5-pin male XLR to 5-pin female XLR, IEC/UL-CL, 2 m	P/N 91611243
DMX cable, STP, 1 pair + shield, 5-pin male XLR to 5-pin female XLR, IEC/UL-CL, 5 m	P/N 91611244
DMX cable, STP, 1 pair + shield, 5-pin male XLR to 5-pin female XLR, IEC/UL-CL, 10 m	P/N 91611245
DMX cable, STP, 1 pair + shield, 5-pin male XLR to 5-pin female XLR, IEC/UL-CL, 20 m	P/N 91611246

Spare parts

10 AT mains fuse	P/N 05021029
Replacement head air filter	P/N 62407156

Related items

Martin Universal USB/DMX Interface Device	P/N 90702045
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Ordering Information

MAC 401 Dual™, in cardboard box, RGB Zoom module installed	P/N 90231200
MAC 401 CT Zoom™, in cardboard box, CT Zoom module installed	P/N 90231210

Specifications subject to change without notice. For the latest product specifications, see www.martin.com



Disposing of this product

Martin™ products are supplied in compliance with Directive 2002/96/EC of the European Parliament and of the Council of the European Union on WEEE (Waste Electrical and Electronic Equipment), as amended by Directive 2003/108/EC, where applicable.

Help preserve the environment! Ensure that this product is recycled at the end of its life. Your supplier can give details of local arrangements for the disposal of Martin products.



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