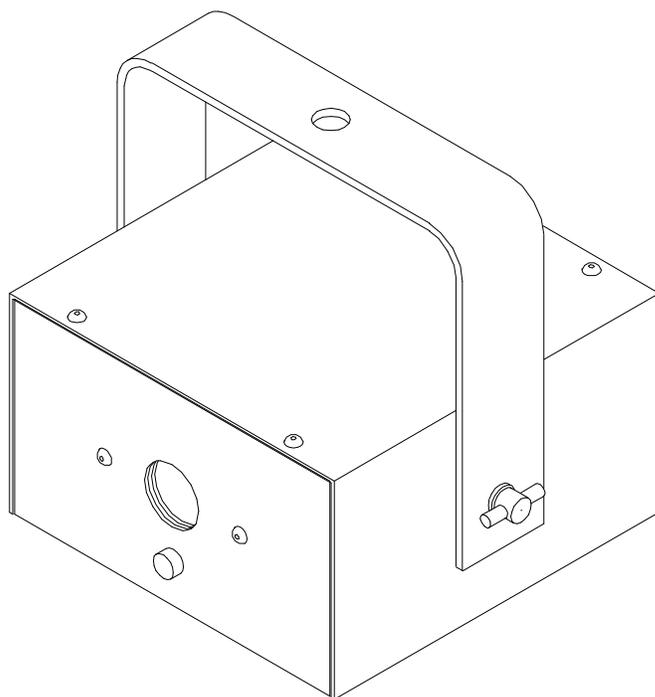




WAVELIGHT[®] MODEL WVL-L1/L2 DMX USER INSTRUCTIONS

Description:

The Wavelight model WVL-L1 and L2 DMX units are compact, lightweight moving pattern projectors which use advanced long lifetime LED light sources. L1 units use a single white LED emitter, and L2 units use one blue and one green emitter to produce a range of output colors. The units are designed to project a moving pattern of light with an irregular character resembling the reflection of light off of the surface of water, or the refraction of light through a water surface. Two pattern wheels rotated by gear reduction motors produce the moving effect pattern with very little light loss. The projection lens mount allows for adjustment of effect focus. The lighting industry standard DMX control interface provides control of effect motor speed and output intensity, and also the color balance of the blue and green LED emitters when installed. Installation of gel or dichroic color filters or aperture plates in the filter slot provided will create further variations in the appearance of the output pattern.



Recommended Use

The Wavelight fixture is intended for use in applications where the appearance or illusion of a nearby water surface or an underwater environment is desired. The fixture is intended to operate from a 120 volt AC power source using the power supply provided, or an appropriate substitute, or can be operated from a DC power source with appropriate voltage and polarity, and a current rating of at least 1.5 amperes.

General Precautions

The Wavelight fixture is intended for indoor special effect applications in theme parks, themed attractions, themed restaurants or scenic displays, and for any other specialized lighting application where the illusion, impression, or appearance of a nearby water surface, or underwater environment is desired, without any of the difficulties associated with real water.

CAUTION

The fixture is intended only for indoor use in dry locations. The unit is not intended for outdoor use, or for indoor use in close proximity to an actual body of water. The fixture is not rated for, nor protected against water splash, droplets, or mist.

Electrical Precautions

The Wavelight projector is provided with a Class II AC power supply with a total cord length of 6 feet minimum. The AC power cord has a standard two pin AC power connector at one end, and a two pin female plug at the other, which mates to the power input socket of the power supply module. The output connector of the power supply has a coaxial DC power connector which mates with the input socket at the rear of the Wavelight fixture. To connect the Wavelight to the power supply, install the coaxial plug into the socket at the rear of the unit. Once the DC connector is attached, the power cord may be connected to the power supply module, and then to the AC power supply.

WARNING

The WVL-L1 / L2 Wavelight is provided with a “Universal Voltage” AC power supply which operates on 100 to 240 volt AC line voltage at either 50 or 60 Hertz. Application of DC voltage or AC voltages outside of this range to the power supply may cause serious damage to power supply and the fixture, and may cause increased risk of electrical shock or fire, potentially resulting in serious injury or death. Do not attempt to operate the unit with incorrect or unknown supply voltages.

Do not operate any universal voltage power supply from a dimmed AC lighting circuit.

DC Power Connections

For applications where DC power is available, the AC power supply may be omitted, and the fixture operated directly by DC power. The recommended DC power supply must have a voltage of from 9 to 12 volts at a current of 1.5 amperes minimum. The DC power input socket on the fixture is a standard 2.1 mm female coaxial DC socket, where the 2.1 mm center pin is the positive connection, and the outer sleeve is negative. The output connector of the DC power supply should be equipped with a male coaxial DC power plug, wired with correct polarity to mate with the input socket at the rear of the Wavelight fixture.

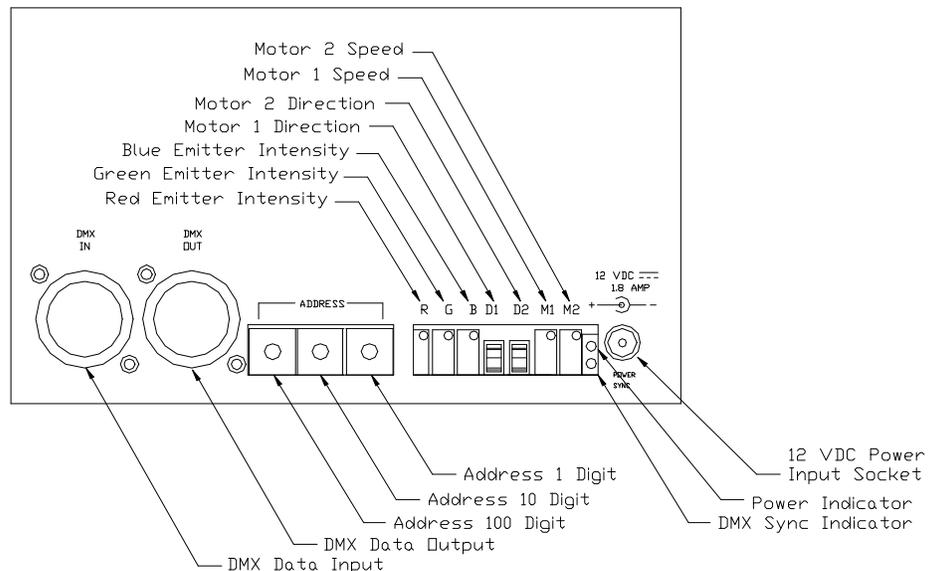
WARNING

The WVL-L1 / L2 Wavelight fixture is designed to operate on 9 or 12 volt DC power, depending on the fixture model and date of manufacture. The correct voltage is marked on the rear panel of each fixture. Application of AC voltage, incorrectly polarized DC voltage, or DC voltages outside of the normal range to the fixture may cause serious damage to the power supply and the fixture, and may cause increased risk of electrical shock or fire, potentially resulting in serious injury or death. Do not attempt to operate the unit with incorrect or unknown DC supply voltages.

Controls and Connections

All connections and controls with the exception of the focus adjustment are located on the rear panel of the fixture. Connections for DMX data input and output are provided using standard 5 pin male and female connectors, and DMX address settings are made using three rotary selector switches adjacent to the DMX connectors. DC power is applied to the fixture using a 2.1mm coaxial DC power socket, and Power and DMX Sync indicators are located next to the power connector. Trimpots and switches to provide manual control over motor speed and direction, and intensity of the LED emitters installed are also accessible on the rear panel.

Note: Some or all of the manual trimmer controls may be inoperative depending upon the DMX mode setting selected.



External Manual Mode Selection and Operation

When no DMX data source is available, the WVL-L1 / L2 DMX fixture can be set to operate in manual mode for either demonstration or regular operation. Manual mode can be selected by setting the external DMX address switches to address 900 or higher. When the unit is powered up with a normally invalid DMX address setting of 900 or above, the fixture will ignore the settings of the internal jumpers, and revert to fully manual operation, where all LED intensity levels and effect motor speeds are controlled by the trimmer controls at the rear of the unit. Any DMX data applied to a unit in this mode will be ignored. The unit will resume normal DMX operation when the unit is powered up after the DMX address settings are restored to within the normal range, and suitable DMX data is applied to the fixture.

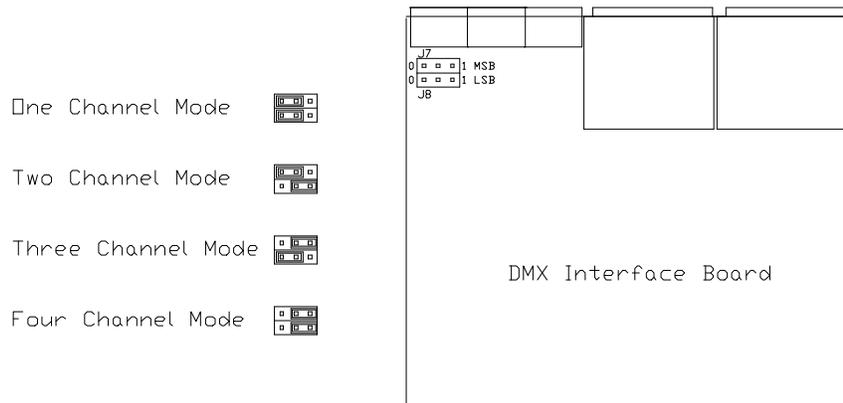
DMX Mode Selection

The WVL-L1 / L2DMX fixture has internal jumpers which can be preset to operate the unit in one of four DMX control modes. Basic control mode allows control of fixture intensity, while full control mode allows control over fixture intensity and effect motor speed. Depending on the fixture model, the unit may be set to use from one to four DMX channels.

For WVL-L1 fixtures with a single LED emitter, basic operation uses a single DMX channel, and full control operation uses three DMX channels. The internal default settings for WVL-L1 fixtures are: full DMX operation enabled; with three active DMX control channels.

For WVL-L2 fixtures with blue and green LED emitters, basic operation uses two DMX channels, and full control operation uses four DMX channels. The internal default settings for WVL-L2 fixtures are: full DMX operation enabled; with four active DMX control channels.

The DMX mode is selected by the position of internal jumpers J7 and J8, which are located on the DMX Interface board inside the fixture. If necessary, these settings can be altered by opening the fixture to change the jumper settings. The fixture should be disconnected from the DC power supply before opening the unit housing to change any jumper setting. The jumper positions for the various settings are illustrated below.



DMX Channel Assignments

The DMX channel assignments in the four available modes are defined in the following chart

Mode	Channel 1	Channel 2	Channel 3	Channel 4
One Channel	LED Intensity*	Unused	Unused	Unused
Two Channels	Blue Intensity	Green Intensity	Unused	Unused
Three Channels	LED Intensity*	Motor 1 Speed	Motor 2 Speed	Unused
Four Channels	Blue Intensity	Green Intensity	Motor 1 Speed	Motor 2 Speed

* LED intensity in these settings will control the output of both LED driver channels, which are commonly paralleled for driving high output white LED emitters.

DMX Address Selection

DMX base addresses are selected by setting the three DMX address switches to within the normal DMX channel numerical range of from 1 to 512. When the address switches are set to within this range, the fixture will respond to DMX control data corresponding to the channels selected. The three rotary address selector switches are set to choose the base DMX address for the unit, and the selected address is read and stored when power is applied to the unit. Changing to a new address setting will require that power be removed from the unit and restored before the new address setting will become functional.

The WVL-L1 / L2DMX fixtures occupy from 1 to 4 consecutive DMX control channels, beginning with the channel selected as the base address on the DMX address selection switches. For example, a unit in 2 channel mode set to a base DMX address of 100 would occupy and respond to information on DMX channels 100 and 101. A unit in 4 channel mode set to a base DMX address of 200 would occupy and respond to information on DMX channels 200 through 203.

Normal DMX Indicators and Operation

When power is applied to the unit in DMX mode, the green “Power” indicator will light immediately, and the green “Sync” indicator will flash from one to four times depending upon the DMX Mode setting. The “Sync” indicator will then illuminate steadily when valid DMX data is applied, and the unit will operate in response to DMX data signals, with the light sources and effect motors operating at their assigned intensity and speed settings. The unit will project a moving pattern of light with an irregular character resembling the reflection of light off of the surface of water, or the refraction of light through a water surface. The unit will continue to operate in this manner until the settings are readjusted to the users preference. The fixture is rated for continuous operation, and in normal use the unit will continue to display the desired output pattern until power is removed, or until the DMX data settings are altered or reduced to minimum.

Drop Out Tolerance

The green “Sync” indicator will respond immediately to the presence or absence of valid DMX data. However, the fixture will continue to operate using the last valid data received before DMX data was lost for a period of approximately 3 seconds. This data retention allows the unit to tolerate minor interruptions in the DMX data stream caused by poor connections or brief “dropouts”. After this interval, the unit will default to the normal “no DMX data” state, with all output channels inactive. Normal operation will resume immediately when the normal DMX data stream is restored.

DMX Troubleshooting

If the “Sync” indicator is not steadily illuminated when DMX data is connected, then there is either a problem with the DMX data or cables, or an internal problem with the Wavelight unit. If the unit does not operate, and the “Sync” indicator flashes at a regular interval, the DMX address is set to an invalid range, either to zero, or to a number higher than 512, which is the highest base address setting which will allow control of the fixture in 1 channel mode. If the “Sync” indicator is erratic, then the DMX data connection is either intermittent due to a poor electrical connection, or the DMX data is dropping out, which can be caused by poor connections, poor quality cables, long data runs, or poor signal quality in general. Test the unit with different cables, or in a different location closer to the DMX data source to determine what or where the problem is.

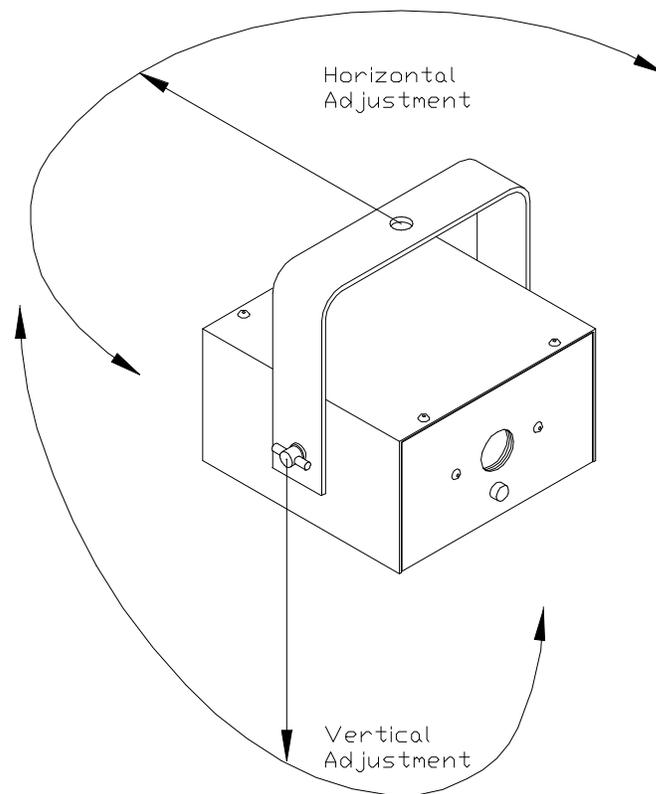
Mounting

The Wavelight fixture incorporates a mounting yoke with a 1/2" hole at the center for hanging the instrument. The Wavelight is normally attached to a mounting "C-clamp" or other stable means of support using the yoke mounting hole and an appropriate bolt and washer. The unit can be mounted in any orientation, keeping in mind that intensity and speed adjustments along with power and DMX data connections must be made at the rear of the unit, and focus adjustments from either the top or bottom.

Supplementary mounting accessories such as safety cables are recommended, and may be required when the fixture is mounted above occupied areas. . The user is responsible for mounting the instrument in a safe and secure manner. Please consult with local public or workplace safety authorities to determine if any additional safety restraints, such as safety wires or cables may be required.

Aiming

The instrument can be pointed using the mounting hole on the yoke as a directional pivot. Tightening the mounting fastener will lock the instrument in that axis. The mounting yoke attaches to the sides of the instrument with two thumbscrews. Loosening the thumbscrews allows adjustment of the instrument in elevation. Tightening the thumbscrews locks the elevation axis. The user is responsible for mounting the instrument in a safe and secure manner. Please consult with local public or workplace safety authorities to determine if any additional safety restraints, such as safety wires or cables may be required.

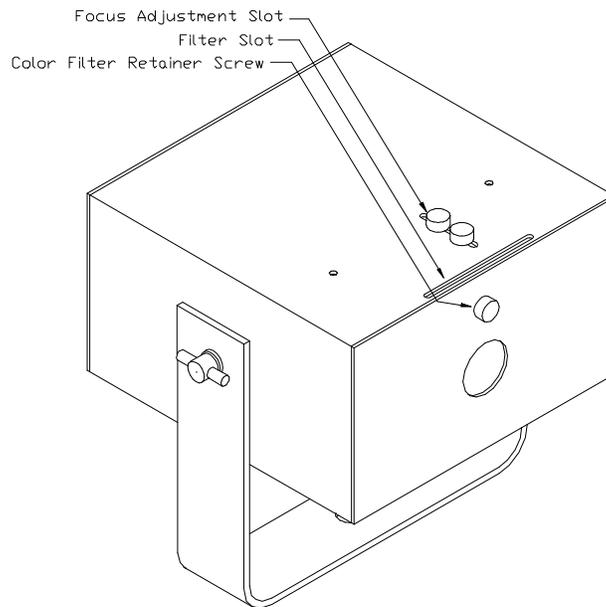


Focus Adjustment

The effect focus can be varied by moving the projection lens. This may be accomplished without opening the unit case. Two small thumb screws on the upper or lower surface of the unit secure the lens mount. Loosen both screws slightly, (but do not remove either screw) and use one of them as a handle to slide the lens mount forward or back until the desired focus is achieved, then tighten both thumb screws securely.

Filter or Gel Installation

A slot for a filter or color gel is provided at the front of the Wavelight. Color filters or gels should be cut to two inches by two inches, or 50mm square in size, and be no thicker than 1/16 inch, or 1.5mm. A thumbscrew at the front of the unit retains the filter or gel. Note that the adjustable color range available from blue / green fixtures will generally make gels or dichroic filters unnecessary to select colors. Filters or apertures may still be useful to change the general character and appearance of the projected display.



To install or change a filter, disconnect power to the unit, remove the thumbscrew next to the output port, and slide the filter into the slot in the case top or bottom nearest the thumbscrew. The filter or gel should be pushed into the slot until it stops, or at least until the edge of the filter or mount is clear of the thumbscrew hole. Reinsert the thumbscrew and gently tighten it to retain the filter. If it is possible to invert the Wavelight unit when installing a filter or gel, the filter can be simply dropped in or out of the slot after removing the thumbscrew. Be sure to replace the thumbscrew before turning the Wavelight right side up to hold the filter in place. Reconnect power, aim, and focus the unit for normal operation.

Manual Effect Adjustments

Manual controls for effect intensity, color, motor speed, and motor direction are accessible at the rear of the unit. Note that some or all of the manual trimmer controls may be inoperative when the fixture is operated in DMX control mode. The selector switches for motor direction will operate as described in either manual or DMX mode.

The LED intensity and effect motor speed controls are multi-turn potentiometers. These controls can be adjusted using a small slot-blade screwdriver without opening the unit case. Rotating the controls clockwise increases the setting, counterclockwise adjustment will decrease the setting. The controls are very precise, and several turns may be required to produce a significant change. The controls do not stop or tighten at the end of their adjustment range, but will continue to spin without causing any additional change at minimum or maximum settings.

Changing Color and Intensity

The fixture electronics have provisions for controlling up to three LED emitters, one each Red, Green, and Blue, not all of which may be installed. For each installed emitter, the intensity of the selected color is adjusted by increasing or decreasing the setting of the matching trimmer. The balance of color between two or three emitters, and the overall intensity of the fixture may be adjusted to the users requirements by using these controls as necessary. For units with a single white emitter, multiple driver channels may be operated in parallel to drive high output emitters at their maximum rated current levels. The LED intensity controls are non-functional in any DMX mode.

Changing Motor Speed

The two motor speed controls are used to adjust the rate of motion in the output pattern. The adjustment ranges from slow enough to be barely perceptible, to very rapid and turbulent. For the most natural appearance, both controls should be set from 5 to 7 turns from minimum. Higher or lower settings may be used depending upon the display requirements. It is normal for the noise level from the effect motors to increase at higher speed settings, but the motors will not be damaged by prolonged operation even at maximum speed settings. Motor speed controls are non-functional in 3 or 4 channel DMX mode

Changing Motor Direction

Two switches control the direction of the two effect motors. Each switch controls one of the motors. The switches can be set using a small slot-blade screwdriver or probe without opening the unit case. The switches are accessible between the LED Intensity and Motor Speed controls on the rear panel of the fixture. The switches are recessed to prevent accidental motor direction changes. Motor direction can be changed by using a small screwdriver or probe to gently engage the switches, and move the switch toggle or rocker. Avoid applying excessive force to the switches. Motor direction switches operate in all modes.

The motion of the projected effect can be significantly altered by changing the direction that the pattern wheels rotate. Wavelight units are shipped with both motors turning the same direction. Due to the arrangement of the wheels, this produces an effect of overlapping up and down motion, which cancels out to appear quite neutral with the motors at equal speed. Changing the direction of one motor will alter the pattern so that all of the effect motion will be upward or downward. If the resulting motion is not in the desired direction, i.e. up when you want down, then changing the direction of both motors will correct the pattern motion. To obtain more swirling, or interaction in the effect, one of the motors should be operated at a slightly faster or slower speed than the other.

Dimming

The Wavelight WVL-L1 / L2DMX fixtures should not be operated from dimmed AC lighting circuits due to the voltage adaptability of the “Universal Voltage” DC power supplies provided, as these units will attempt to compensate for any variation in the input voltage. The unit should not be dimmed by attempting to vary the DC power supply voltage either. If dimming is required in any application, the fixture should be dimmed using the DMX control functions as intended.

LED Emitter Lifetime

The LED light sources used in the Wavelight WVL-L1 / L2DMX fixture should operate for tens of thousands of hours, or several years of daily operation without requiring replacement. A decrease of from 25 to 30 percent in intensity can be expected after approximately 50,000 hours of operation. If the unit is mounted close to high wattage fixtures, or otherwise operated in hot environments, the output of the LED emitters may decrease more rapidly, but should not require replacement over the lifetime of the fixture.

In the event that a fixture appears to be operating at reduced output, especially if the selected output color changes abruptly, it is possible that an LED emitter has failed prematurely. The unit may be returned for service if an LED emitter failure is confirmed after closer evaluation of the unit for improper control settings, dust or dirt contamination, or other routine problems.

Maintenance

The only maintenance recommended is a periodic cleaning to remove dust accumulation from the fixture. The proper cleaning interval is determined by the amount of dust in the environment, which may be established by inspecting the unit at regular intervals over the first 12 months of operation.

Although the WVL-L2DMX unit is convection cooled, and there is no fan to draw air or dust through the fixture, dust will eventually build up outside and inside the fixture over time. Heavy accumulations of dust will reduce the fixture output, and may reduce the airflow over the unit, resulting in increased temperatures and reduced LED lifetimes.

Periodic cleaning with compressed air or bottled gas will remove most light dust contamination. Heavy dust contamination may require removal of the fixture outer cover for more thorough cleaning of the interior and optics using compressed air, aided by a soft dry brush or tissue paper. Severe contamination by dust in combination with oil, and fog or smoke fluid residue may require the use of a cleaning cloth or tissue dampened with water, or a water based cleaner to thoroughly remove dirt from the fixtures exterior, interior, and optical surfaces. Proper cleaning will generally restore the fixture to original performance.

The two DC effect drive gearmotors installed in the unit are sealed and permanently lubricated, and should not require maintenance over the lifetime of the fixture. Some minor leakage of oil from the motors may be expected over time, but this is not an indication of motor failure, and is objectionable mainly because of the dust it tends to capture inside the fixture. After prolonged operation, typically 15 to 20 thousand hours, the gearmotors may fail to operate due to brush wear or contamination. Temporarily running an inoperative motor at a high speed setting may clear off contaminated brushes and restore a motor to normal operation. Worn out brushes will eventually require the installation of replacement effect drive motors.

Although the fixture is designed for continuous operation, for the longest motor lifetimes, the fixture should be operated only when an active display is required, and should be powered off when not needed.

Troubleshooting

Problem

Probable Cause

Fixture completely inoperative:
No "Power" indicator

No AC line voltage to power supply
Power supply input cord unseated at supply
Power supply output cord unseated at fixture
Power supply or cable defective

Good "Power" indicator,
No DMX "Sync" indicator

No DMX data applied
Bad DMX cable or connection

Good "Power" indicator,
Good DMX "Sync" indicator

DMX address settings incorrect (DMX Mode)
DMX control settings at minimum (DMX Mode)
Manual control settings at minimum (Manual Mode)

Blinking DMX "Sync" indicator

DMX address out of normal range

Erratic DMX "Sync" indicator

Bad DMX cable or connection

Effect motors operate normally,
but no light output

No DMX data applied (1 or 2 Channel mode)
DMX address settings incorrect
Manual control settings at minimum (Manual Mode)
Defective LED emitters or LED drivers

LED Emitters operate normally,
but no effect motion or animation

Motor speed settings at minimum (1-2 Ch. / Manual Mode)
Motor direction switches set at mid-position
Defective motor or motor drivers

Fixture operates in one color only,
Blue or green

DMX color data for inactive color at minimum
Manual control setting at minimum (Manual Mode)
Defective LED emitters or LED drivers

Fixture buzz or excessive noise

Some hum and quiet buzzing sound is normal
Motor operating at maximum speed
Worn or defective effect motor

Weak or uneven output pattern

Fixture focus set incorrectly
Fixture optics dirty or damaged
LED emitter or lens damaged

No pattern motion, or directional motion.

One motor speed set at minimum
Fixture effect wheel loose or jammed
Defective effect drive motor

Fixture is excessively hot

High ambient temperature at fixture location
Ventilation blocked or obstructed by dust
Excessive DC input voltage