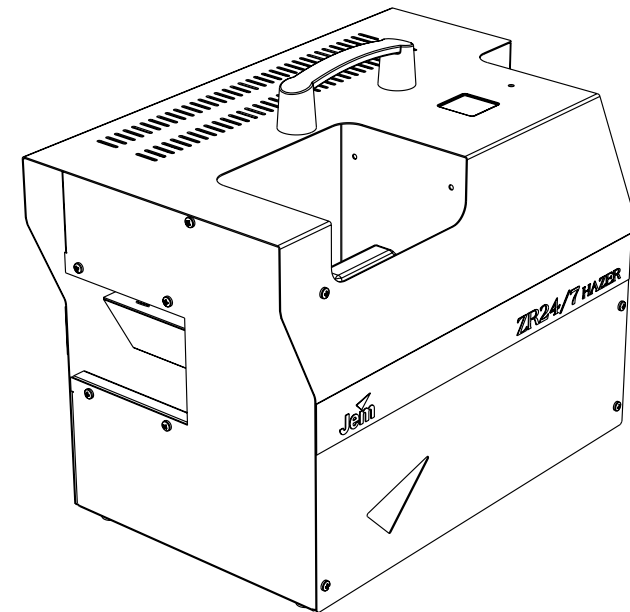


**USER GUIDE  
VERSION 1.0**



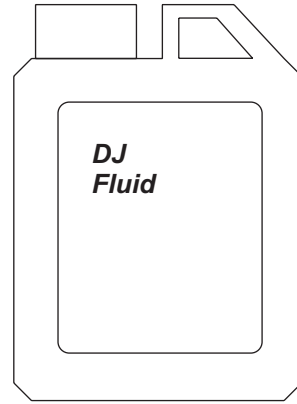
# **ZR24/7 Hazer**

Martin Professional A/S, Olof Palmes Allé 18, DK-8200, Aarhus N  
Phone: +45 87 40 00 00 Internet: [www.martin.dk](http://www.martin.dk)

**Fluids Suitable for this system:**



Temperature = 'Lo'



Temperature = 'nor'

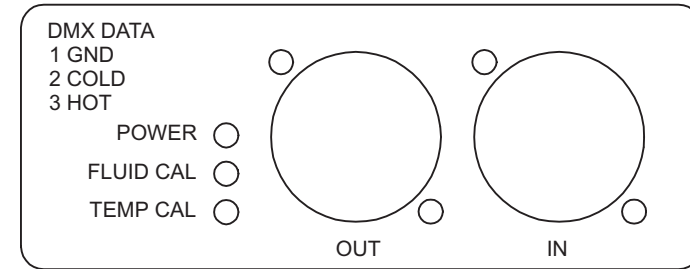


Temperature = 'Hi'

**NOTE! The warranty on this machine is conditional on the use of genuine JEM / Martin fluid only. Other fluids may represent a health hazard when used in this machine, and may damage the internal components.**

**CONNECTIONS**

The DMX connections and Status LEDs are mounted on the panel below the display unit. The following drawing shows the functions and connections. The 5 pin DMX connections are placed above the 3 pin connectors.



**LED FUNCTIONS**

**Power LED:** Shows that the main power supply is operating.

**Fluid Cal LED:** Not used on this model.

**Temp Cal LED:** Shows that the system is calibrating the temperature control system.

**FUSE RATINGS**

The ZR24/7 Hazer uses three fuses.

They should be replaced with the value and type detailed below:

**230V model**

Power PCB

F1 6.3AT

F2 3.15AT

Main Fuse (IEC inlet)

6.3AT

**115V model**

Power PCB

F1 10AT

F2 3.15AT

Main Fuse (IEC inlet)

10AT

Two of these fuses are located internally and should not be accessed without first disconnecting the power supply.

**SPECIFICATION****HEAT EXCHANGER**

- 900W
- Wide bore steel vaporizing coil
- Non resettable over-temperature protection
- Electronic Temperature control using thermocouple

**FLUID SYSTEM**

- Electronic low fluid detection
- 2.5L fluid container
- Maximum fluid consumption 410mL/hour (Haze fluid, **HOT** = Lo)

**REMOTE CONTROL OPTIONS**

- DMX512 decoder:
  - Required Channels = 2
  - Output is proportional for all levels above 8%
  - Channels supported = 1 to 509
  - Valid start codes = 0 (dimmer data only)
  - Full framing error detection implemented
- Digital control via Digital Multifunction Controller.
- Digital Machine to Machine link

**CONTROL PANEL**

- LED display with 4 button keypad
- Output level control from 0 to 20
- Fan speed control from 0 to 20
- Timer range:
  - Delay time (toF) 0 seconds - 90 seconds
  - Run time (ton) 0 seconds - 90 seconds

**OUTPUT DIRECTION CONTROL**

- Airflow inclination can be set in the range 0 to 60 degrees.

**POWER REQUIREMENTS (dependant on model)**

- Input voltage 200 - 250Vac
- Input power (max) 975W @ 230V
- Main fuse 6.3AT
- Input voltage 100 - 130Vac
- Input power (max) 975W @ 115V
- Main Fuse 10AT

- Frequency 50/60Hz both models

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## INTRODUCTION

The ZR24/7 Hazer is the first of a new generation of professional Haze machines, designed for touring and installation in a variety of applications. Provision has been made for easy integration into most common control systems currently used in the entertainment industry. As well as providing remote control options via DMX, the machine comes with a comprehensive control panel for local operation and display of operating parameters.

The effect is provided by a conventional heat exchanger based vaporiser, fed from a unique liquid atomizer system. This technique is the key to a smooth and uniform production of effect at the machine's output duct, along with low specific fluid consumption. Air is added to the effect, prior to exit, from the fan mounted in the side of the machine. This increases the volume of the effect and allows the output to be dispersed over a wide area.

The output angle of the airflow can be adjusted using the thumb-wheels in the fluid compartment, thus allowing the user to control the vertical dispersion of the effect.

A container with 2.5L capacity is provided for fluid. To allow reliable unattended operation, the fluid level is monitored electronically, and the machine shut down if necessary. No fluid sensor is used, but an indirect measurement is made based on an energy balance calculation.

## FEATURES

2.5L fluid capacity	Electronic low fluid detection
Continuous operation	High pressure piston pump.
All digital control system	LED display for User settings
900W heat exchanger	Fog and Fan controls for easy set-up.
DMX512 interface (two channel)	Accurate timer
Non-volatile memory for user settings and calibration data	Digital remote interface.

## BASIC FAULT FINDING

The ZR24/7 Hazer is a complex machine and will require a competent service technician to repair any major faults. However, the following guide will allow the user to overcome the more common problems. When replacing fuses, always use one of the correct type and rating (see specifications in this book).

SYMPTOM	CAUSE	CURE
No haze output when the machine is in run mode.	Machine is not ready	Allow time to reheat
	Fluid is below min level	Add fluid
	Machine faulty	Consult distributor
No haze output when using DMX to fire the machine.	Incorrect DMX address	Check settings
	Machine not ready	Allow time with DMX on
	No DMX termination	Fit 120 ohm resistor
Flu/Out is displayed on the display	Fluid level is below min	Add more fluid, and use prime menu to restart machine
Machine is not ready after 4 minutes.	DMX ch2 is > 245	Increase DMX level
	Blown fuse on Power control PCB	Disconnect supply and replace fuse.
Haze disperses too quickly	Wrong grade of fluid used for the application	Choose a longer lasting fluid (see front cover)
	Fan level too high	Reduce fan speed

## DISPLAY MESSAGES

The following list shows the messages possible, and the context under which they are displayed. Only the messages available under normal operation are shown. Messages shown when using the menus, are detailed in other sections of this handbook.

Ht	Displayed when the heater is running but the machine is not ready.
rdy	The machine is ready to run using the run menu options. Not displayed when using DMX.
FLu/out	Indicates that the fluid in the container is below the minimum level to operate the machine. Only visible when the machine has reached the ready state. Reset using the <b>Pri</b> menu, after refilling the fluid container.
Fog/08	The run menu is set to 'on'. The number displayed is the current Fog output level in the range 0 to 20. Use level 0 to operate the fan without haze output.
Ht/Err	An over-temperature condition has occurred on the heat exchanger. Reset by power off.
CAL/Err	The control software has detected corrupt calibration settings in the EEPROM memory, and has shut the machine down.

## SAFETY GUIDELINES

Always use JEM / Martin approved fluid in the container supplied with the machine. Do not attempt to override the fluid sensing system, as this could cause damage to the machine.

Check that the local supply voltage is correct for use with the machine. The voltage setting is printed on the serial label.

The machine must be operated in a horizontal position and should not be suspended overhead.

Observe the warnings displayed on the machine.

Always use smoke machines in well ventilated areas. High smoke density could affect sufferers of asthma or other severe respiratory disorders.

Smoke machines can cause condensation to form. Floors and surfaces may become slippery and should be checked regularly.

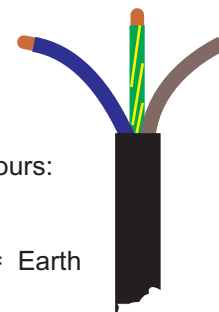
This machine is not waterproof, and should not be exposed to wet outdoor conditions.

Do not spill fluid over the machine. If fluid is spilt, disconnect the power supply and clean with a damp cloth.

Refer servicing to qualified service personnel. Disconnect the machine from the power supply before removing any covers.

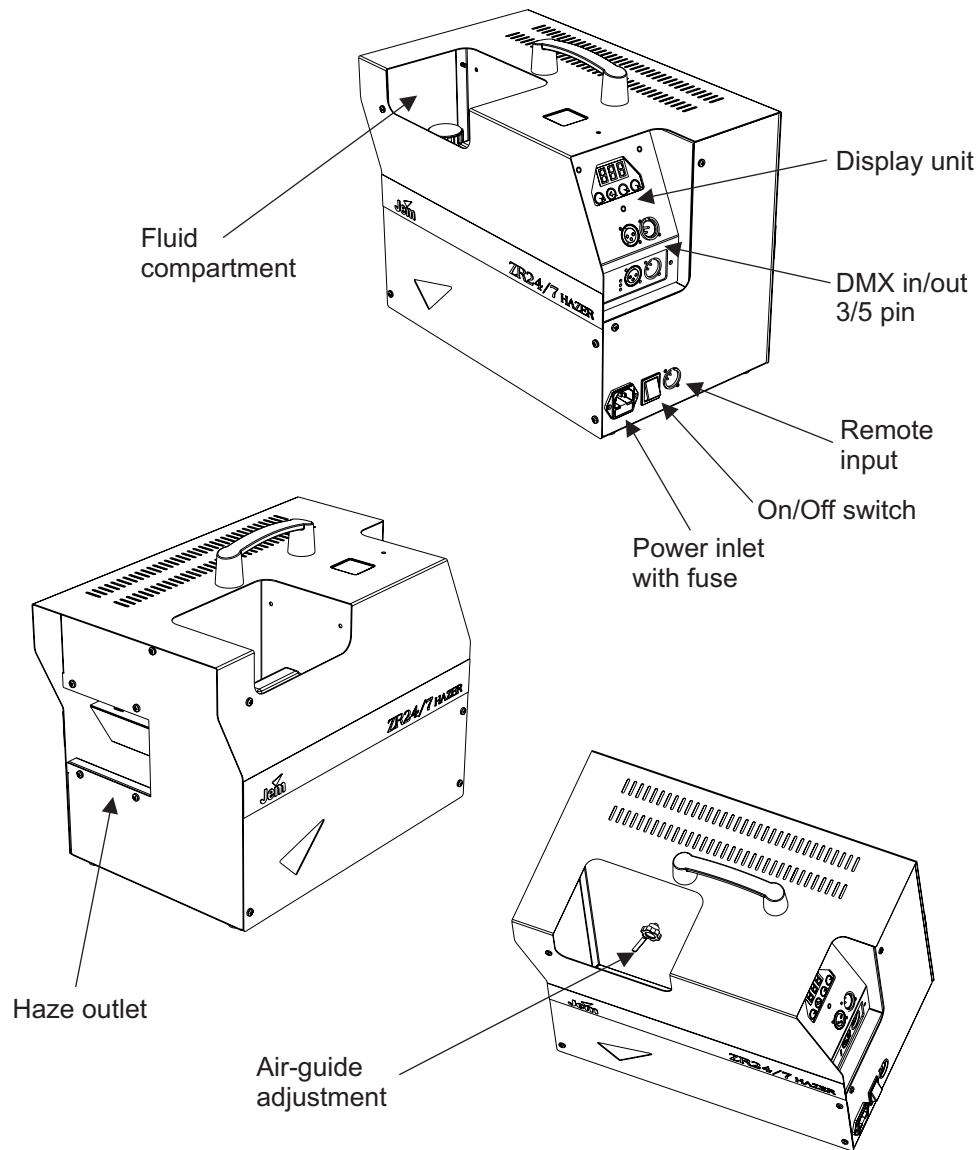
### Mains Cable Wiring Instructions

UK/EU cable colours:  
Brown = Live  
Blue = Neutral  
Green / Yellow = Earth



The ZR24/7 Hazer is fitted with an IEC power inlet with integral fuse draw. A suitable IEC mains cable should be used to connect to the supply system.

This equipment must be earthed.

**MACHINE LAYOUT****THE FLUID SYSTEM**

The ZR24/7 Hazer uses a 2.5L container to give approximately 6 hours of continuous operation at full output. Power supply voltage fluctuations should have little effect on this, since the unit has automatic supply voltage compensation for pump speed.

The machine control system uses a water based fluid to create the haze effect, and has adequate power to produce the maximum haze output continuously.

Supply voltage and frequency variations are measured and compensated for, within the limits of the specified operating voltage/frequency range for the model concerned.

Continuous operation gives rise to the possibility of pump damage if the machine runs out of fluid. This is overcome in the ZR24/7 Hazer by using an indirect electronic fluid sensing system, ensuring that the pump is shut down when the fluid level is too low. The display will show a **Flu Out** message to warn the user that the machine is shut down due to lack of fluid. The indirect nature of the system means that it is slow to respond, and may take up to 10 minutes to recognize a low fluid condition. However, the fluid system components are capable of running dry for this length of time, with no risk of damage.

When the machine is refilled with fluid, the user must reset the **Flu Out** error by entering the **Pri** menu and choosing 'y', followed by the enter key. This will clear the error and prime the fluid system ready for use. The prime function will run the pump at maximum for 10 seconds, but only if the machine is at operating temperature.

Remember that the type of fluid used will play a large part in determining the resulting effect. The list of fluids inside the front cover of this handbook shows the main fluids compatible with this machine. Choose a fluid suitable for the venue and type of effect you want to create. Generally, use the standard Haze fluid, but for longer lasting effects, contact a distributor for advice on using another fluid grade.

Changing the fluid type may also require the operating temperature of the machine to be altered to suit the new fluid. This can be done from the display unit by using the **Hot** menu, and selecting from the options **Hi**, **Lo** and **Nor**. See the inside front cover for the correct setting for the type of fluid in use.

## BASIC OPERATION

The following instructions explain how to operate the basic functions of the machine. It is assumed that the machine is being started from cold.

Starting with the **run** menu showing **oFF**, go through the following sequence. Allow the machine to reach operating temperature.

Display shows **Ht**

When the machine is ready (after approx. 2 minutes warm-up time) haze can be produced.

Display shows **rdy**

Set the **run** menu to **on**

Set the **fog** menu to 8

Set the **fan** menu to 15

Check that the Hot menu suits the fluid type

Display shows **FOG/08**

If starting the machine for the first time, or after the fluid has been changed, the pump may need to be primed.

Do this by selecting the **Pri** menu and selecting 'y' followed by the enter key. The pump will run at full output for 10 seconds, but only if the machine is at operating temperature. Refer to the Fault Finding section of the handbook for advice if the unit does not prime correctly.

Set the **run** menu to **ON** to produce continuous output.

Fog display shows **FOG/08**

Set the run menu to **tr** to produce timed output (read the Timer section to see how to configure the timer).

Fog display shows **ton/04,toff/03** etc

The output angle of the airflow can be adjusted using the V.G.A system. Alterations are made using the two thumb wheels located in the fluid compartment. Slacken the lower screw by  $\frac{3}{4}$  of a turn, and then the upper, while sliding the unit up or down as required.

Do not remove either of the screws, since this will require dismantling of the machine to repair.

Note that setting the **FOG** level, will override the fan speed setting and run the fan at the minimum speed allowed for this output level. If a higher fan speed is required, use the fan menu to set the level. When the fan is in override, a flashing bar is displayed in front of the speed value.

## COMMISSIONING THE MACHINE

Unpack the machine and look for any obvious signs of damage.

Place the machine on a level surface and fit a container of JEM/Martin approved fluid into the fluid compartment. Fit the fluid line and cap to the container.

Check the wiring instructions in the Safety Guidelines section of this handbook and connect the machine to the power supply.

Set the power switch on the rear panel to the ON position, and look for the start-up message on the displays (software revision number).

Refer to the Basic Operation section of this handbook for information on how to use the main functions of the machine. Read the Safety Guidelines before using the machine.

## REMOTE CONTROL OPTIONS

The ZR24/7 Hazer provides the user with 3 ways to implement a remote control on the machine. The main control panel is fixed and can not be removed for remote operation. The DMX interface is located on the panel adjacent to the control panel and the remote interface sits alongside the mains switch.

The options are:

### DMX 512 Digital Interface

The interface uses the two XLR 3/5 connectors marked DMX on the interface panel, and uses the usual DMX electrical standards (RS 485). The inputs are protected against overvoltage and an output connector is provided to allow multidrop operation of the link.

### Remote Interface

The remote interface uses a male XLR 3 connector to allow an optional digital remote to control the machine.

Full control of the output and timers can be achieved, at distances of up to 25m.

### Machine to machine link

By using one machine as a master, and linking the DMX out to other machines, a digital slave system can be created. This allows all machines to be slaved to the operation of the first machine in the link. Only use cables that meet the DMX specification. The master machine may be controlled using a remote if required.



## DMX OPERATION

The machine may be operated using the industry standard DMX 512 digital control protocol. This allows the control of the fog system to be easily integrated with the lighting system in most installations.

DMX may be used without changing any of the settings on the main control panel. When the system detects a valid DMX data stream on the input, the control will default to the DMX system levels. Any attempts to control the machine from the control panel will have no effect until the DMX signal is removed. The display will show the current DMX base address.

The machine requires two channels, with the address of the first channel set using the **Adr** menu. The channels control the Fog and Fan settings in the following manner.

### Channel 1

Fog output level

0 - 19 zero output (dead-band)

20 - 255 proportional output level control

Implemented in 20 discrete steps

### Channel 2

Fan speed setting

0 - 19 Fan off

20 - 244 proportional speed control

Implemented in 20 discrete steps

245 - 255 Fan off, Fog off, Heater off

The system implements true proportional control of the fog output rather than the simple switching functions found on some other equipment.

The DMX base address can be set to any channel in the range 1 - 509 using the **Adr** menu.

The onboard timer functions are not accessible via the DMX system. Any timing of the output must be done using the programming capabilities of the DMX console being used to control the system.

5 pin DMX connections, are provided as standard, along with the lower cost 3 pin types, thus allowing for all types of installation.

## THE TIMER

The timer system is implemented in software using the machine's main control PCB. As such, the timing is crystal controlled and will be of good accuracy when compared to the usual analogue timers commonly found on fog machines. The timer is enabled by setting the **run** menu to 'tr'. Selecting this option will cause the timer to start from the beginning of the ON period and run through to the end of the OFF period, the cycle will then repeat until the **run** menu is set to OFF. The timer will only function when the **run** menu is set to 'tr' and the machine is ready (RdY). Switching the **run** menu to OFF at any time during the cycle will halt the operation.

While the timer is running, the display will show the elapsed time in seconds. The display will alternate between the period name (ton/toF) and the elapsed time in seconds.

To set the time periods, use the Menu key on the display to set the **ton** menu as current. Press the Enter key to see the current value for the On Time (ton), and make adjustments using the Up/Down keys. Now press enter to store the value and use the menu key to select the Off Time (toF) menu. Adjust the value as for the On Time, and then set the run menu to 'tr' to test the settings.

The current Fog and Fan levels will be used by the timer system when in the ON period.



## THE REMOTE CONTROL

The ZR24/7 Hazer is not supplied with a remote control as standard. This is a reflection of the increasing popularity of DMX control, which can be used directly with the ZR24/7 Hazer.

However, there is always a situation where DMX is not available or appropriate, and the two remote controls available for the ZR24/7 Hazer provide a solution.

The *Standard Digital Remote* provides output and timer functions in a simple and cost effective format.

For users with more complex control requirements, a compact *Universal Digital Remote* with LCD display is available. Both units use the same digital interface (for location see 'Machine Layout' on page 4) which allows automatic identification of the remote to the machine.

Each remote unit comes with a user guide, giving detailed operating instructions, but the basic capabilities are summarised here:

### **Standard Digital Remote**

Output level control

Ready status indication

Timer ON setting

Timer OFF setting (timer runs on machine)

### **Universal Digital Remote**

Output level control

Fan speed control

Timer settings (ON/OFF)

Temperature control settings

Machine status (ready, fluid out etc.)

Both units have a maximum cable length limit of 25m.

## MACHINE TO MACHINE LINK

This feature is designed for users who do not have DMX equipment, but who need to link multiple machines and control them from a single source.

By linking the machines using the DMX sockets in a multi-drop cable arrangement, a single master machine can be used to operate a maximum of 16 machines. Since the data transmission is done over DMX compatible media, the distances of the cable runs need only comply with the normal limitations of a DMX system. Equally, DMX system components (isolators etc.) can be used if required. To avoid driver contention, the link system should never be connected to a live DMX installation.

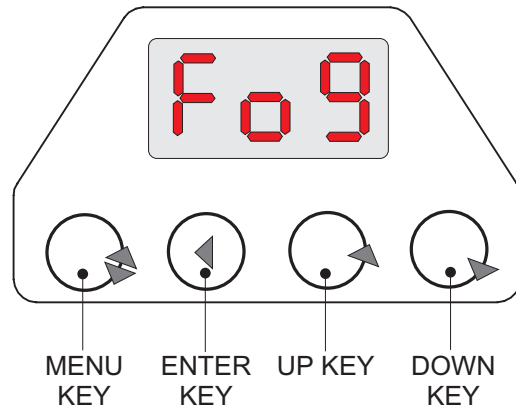
To use the system, one machine must be selected as the master, and the **Lnk** menu set to **tr** (transmit). This machine will transmit the current settings to the other machines in the link, and may use a remote control. All machines other than the master will have **Lnk** set to **rc** for receive only. All machines are now 'slaved' to the master machine and perform the same actions; no individual control is possible.

All slave machines should have their DMX base address set to 1. The address of the master machine is not important. No status information for any of the slave machines will be available at the master, only that of the master machine itself.

## THE DISPLAY

An LED display is used in the ZR24/7 Hazer to show status and control information.

Located below the display are 4 function keys that can be used to control the display and the settings on the machine. The functions of the keys are shown in the following drawing.



The message displayed will depend on the operating mode of the machine at the time. However, pressing the menu key at any time will cause the display to go into the edit mode, allowing the operating parameters to be adjusted. After approximately 25 seconds since the last keystroke, the display will leave the edit mode and revert to displaying the current status information.

Pressing the menu key will display the current menu function, whilst pressing and holding will scroll through the available menus. All keys work the same way, and can be operated with single keystrokes or held down to force the display to scroll through the available options/values. The scrolling function comes into operation 1 second after the key is pressed.

When the user has set the required menu function, pressing the enter key will display the current value associated with that menu item. The user can now use the UP/DOWN keys to move through the available options/values either by single keystrokes or by scrolling.

To store the new value into non-volatile memory, the enter key must be pressed before moving on to another menu or leaving the edit mode. The display will show **SEt** when the operation is complete.

When not in edit mode, the display will show information appropriate to the current operating mode. To do this, the display will alternate between two messages. The duration of the first message is typically 1 second, whilst the second message will be visible for 2 seconds. Some messages are compounded together to form one message, eg **FLu/out** indicating low fluid in the fluid container.

As an example, when the **run** menu is set to **on** with an output level of **08**, the display will alternate between **Fog** and **08**. For more information about the messages to expect, see the sections covering the different control functions on the machine, eg 'THE TIMER'. The section entitled 'DISPLAY MESSAGES' contains a complete list of the messages and the circumstances under which they are displayed.

The menus available and the functions they perform are as follows:

**Fog:** Sets the current Fog output level in the range 0 to 20.

**Fan:** Sets the output Fan level (0-20).

**TON:** Sets the ON time of the Timer in the range 0 to 90 (seconds).

**TOF:** Sets the OFF time of the Timer in the range 0 to 90 (seconds).

**Run:** Allows local operation without the remote.

**Adr:** Sets the base address for DMX operation.

**Hot:** Allows the user to adjust the operating temperature.

**Lnc:** Sets the operating mode of the DMX input.

**Alt:** Allows for auxiliary menu items.

**Rst:** Allows the user to return all menu items to default values.

**Pri:** Starts the 10 second priming cycle.

The software that controls the displays and the other functions of the machine is stored in 'Flash' memory on the DMX receiver PCB. As new features become available, this program code can be updated by using the Martin Uploader programming device for the AVR microprocessor. The unit may also require re-calibration when the software is updated.