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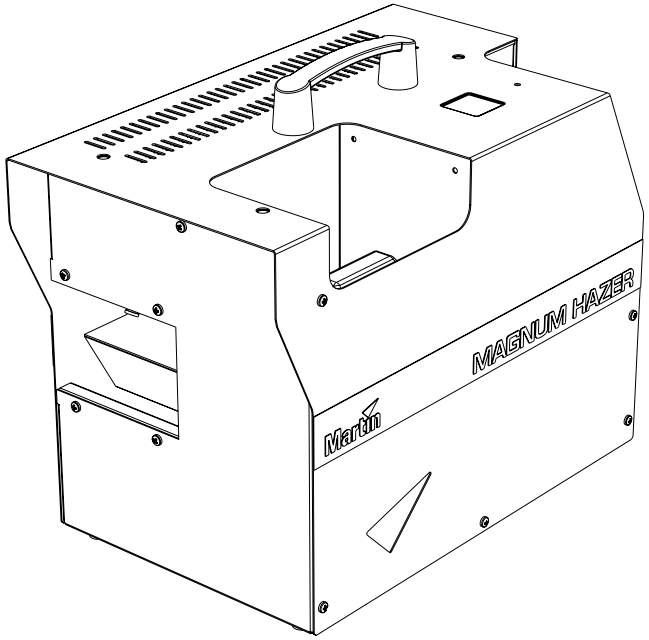
USER GUIDE
VERSION 1.1



Magnum Hazer

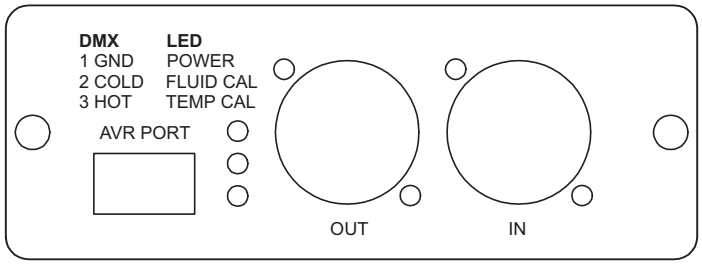
Fluids Suitable for this machine:

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.

Magnum Hazer

CONNECTIONS

The DMX connections and Status LEDs are mounted on the panel below the control panel. The following drawing shows the functions and connections.



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 Magnum 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)

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 Controller.

CONTROL PANEL
Analogue control panel with 2 button keypad
- Output level control from 0 to 10/prime
- Fan speed control from 0 to 10/auto
- Timer range:
  - Delay time (toF) 90 - ton
  - 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

USER GUIDE CONTENTS

INTRODUCTION

The Magnum Hazer is one of a new generation of professional haze machines, designed for touring and installation, in a variety of applications. The integrated 2 channel DMX receiver allows easy integration with lighting control systems, whilst the comprehensive control panel allows local operation and display of machine status.

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. To improve vertical coverage further, the machine allows the fan to run in 'Auto' mode, which varies the fan speed over a 1 minute cycle time.

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

Continuous operation

All digital control system

900W heat exchanger

DMX512 interface (two channel)

Non-volatile memory for user settings and calibration data

Electronic low fluid detection

High pressure piston pump.

Analogue control panel

Fog and Fan controls for easy set-up.

Accurate timer

Digital remote interface.

BASIC FAULT FINDING

The Magnum 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 and Prime
	Machine faulty	Consult distributor
No haze output when using DMX to fire the machine.	Incorrect DMX address	Check settings
	Machine not ready	Allow 2 minutes to heat
	No DMX termination	Fit 120 ohm resistor
Fluid Out LED is illuminated	Fluid level is below min	Add more fluid, and use prime function to restart machine
Machine is not ready after 4 minutes.	DMX ch2 is > 245	Decrease DMX level
	Blown fuse on Power control PCB	Disconnect supply and replace fuse.
Haze disperses too quickly	Ambient temperature too high	Increase output level
	Fan level too high	Reduce fan speed or use Auto mode

ERROR CONDITIONS

The following list details all the possible error conditions that can prevent the machine from operating. Some of the errors are mentioned in other sections of this booklet.

Calibration Error: Indicated by a flashing fluid out LED.
The control software has detected corrupt calibration settings in the EEprom memory, and has shut the machine down.

Fluid Out: Indicated by a continuous fluid out LED.
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 **Prime** function, after refilling the fluid container.

DMX Data Error: Indicated by a flashing DMX LED.
Indicates that the DMX data stream contains formatting errors.

Heat Error: Indicated by a flashing timer LED.
Indicates that the machine has detected a problem with the temperature control system.

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.

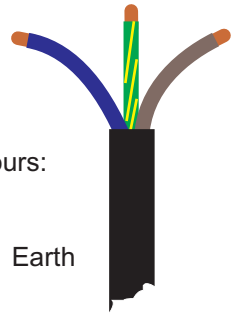
This machine is not waterproof, and should not be exposed to wet outdoor conditions.

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

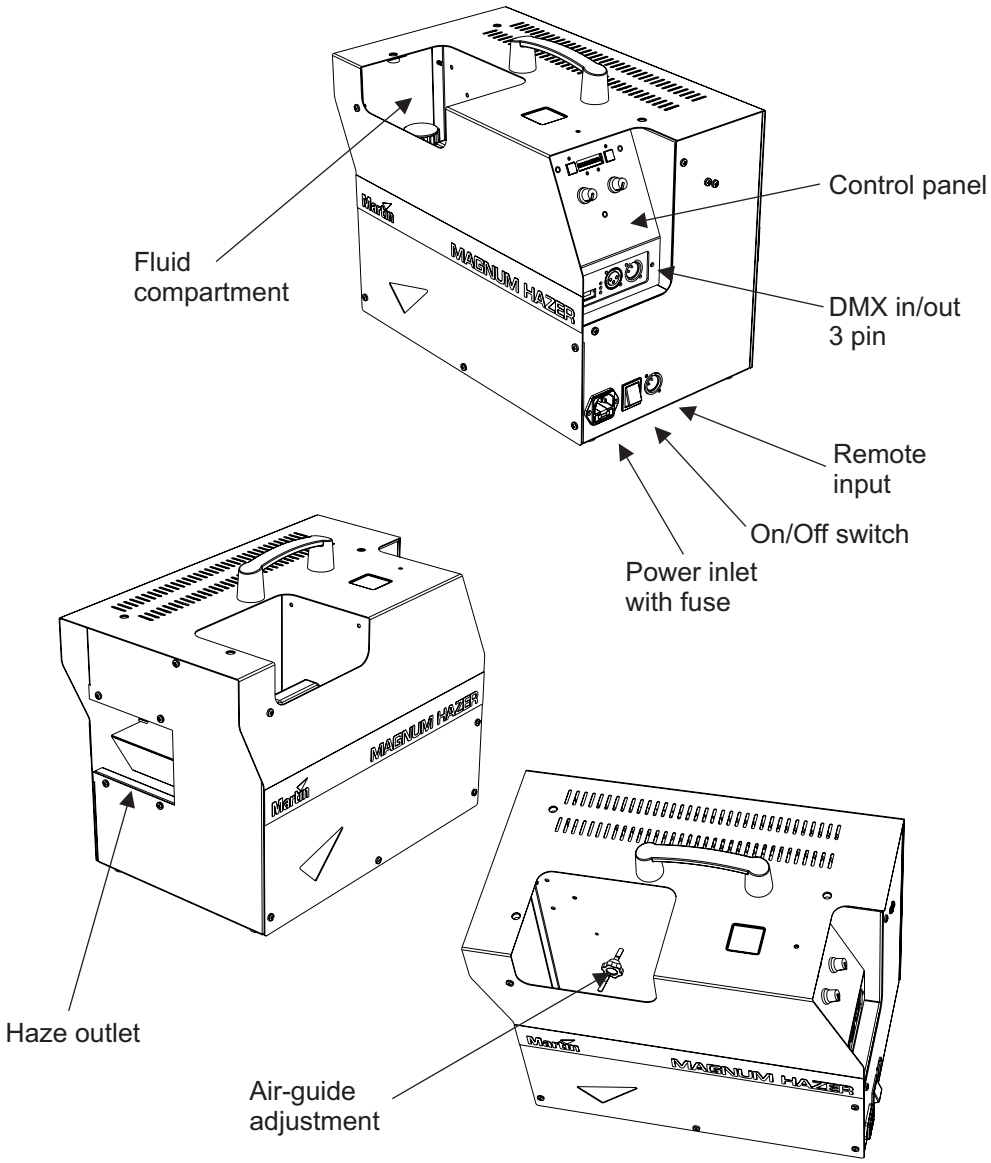
UK/EU cable colours:
Brown = Live
Blue = Neutral
Green / Yellow = Earth



The Magnum Hazer is fitted with an IEC power inlet with integral fuse drawer. 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 Magnum 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 Magnum Hazer by using an indirect electronic fluid sensing system, ensuring that the pump is shut down when the fluid level is too low. The control panel will show a **Fluid Out** LED 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 **Fluid Out** error by entering the **Prime** level on the Fog level control. This will clear the error and prime the fluid system ready for use. The prime function will run the pump at maximum output for 10 seconds, but only if the machine is at operating temperature. DMX users can access the prime function via Ch1, at level 220 - 230.

Unlike the ZR24/7, the Magnum Hazer can only use JEM/Martin haze fluid. This is due to the absence of any means for the user to alter the operating temperature of the machine.

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** button set to OFF, go through the following sequence.
Allow the machine to reach operating temperature.
R**un** LED flashes fast while heating.
When the machine is ready (after approx. 2 minutes warm-up time) haze can be produced by setting **run** to ON.
Run LED is continuous
Set the **fog** level to 6
Set the **fan** level to 8

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 **Prime** level on the **FOG** control.
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.
To repeat the prime operation, reduce the level to zero before setting the prime level again.

Set the Timer button to ON to produce timed output (read the Timer section to see how to configure the timer).

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 ¾ 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** control to set the level.

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 wait for the machine to heat.

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 Magnum Hazer provides the user with 2 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 connectors marked DMX on the interface panel, and uses the usual DMX electrical standards (RS 485). The inputs are protected against overvoltage and an ouput connector is provided to allow multi-drop 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 can be achieved, at distances of up to 25m.

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 DMX Ready LED will be lit when valid dmx is detected. A flashing LED indicates invalid data.

The machine requires two channels, with the address of the first channel set using the binary Dip-switch. The channels control the Fog and Fan settings in the following manner.

Channel 1
- Fog output level
- 0 - 19 zero output (dead-band)
- 20 - 220 proportional output level control
- Implemented in 20 discrete steps
- 220 - 230 Prime function

Channel 2
- Fan speed setting
- 0 - 19 Fan off
- 20 - 220 proportional speed control
- Implemented in 20 discrete steps
- 220 - 230 Auto fan mode
- 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 Dip-switch.

The onboard timer functions are not accessable 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.
Note that the Dip-switch is also used for setting the ON time of the timer when the timer is active. However, DMX data input will cause the system to read the Dip-switch as DMX address, and stop the timer operation.

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 pressing the timer button.
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 timer is set to OFF. The timer will only function when the timer is set to ON and the machine is ready (RdY). Switching the **Timer** button to OFF at any time during the cycle will halt the operation.

While the timer is running, the Dip-switch will represent the ON time in seconds (10 seconds per switch). The total repeat rate for the timer is fixed at 90 seconds, and the OFF period will be 90 - ON time.
To set the ON time period, select an integral multiple of 10, in the range 0 to 90 seconds, and then set the required switches to ON.
Example:
60 seconds, set 1,2,3,4,5,6 to ON.
OFF time will be 90-60 = 30 seconds.

The current Fog and Fan levels will be used by the timer system when in the ON period.
If DMX is used with the timer running, the Dip-switch setting will be read as the DMX address, and the timer will stop running.

THE REMOTE CONTROL

The Magnum 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 Magnum Hazer.
However, there is always a situation where DMX is not available or appropriate, and the digital remote control available for the Magnum Hazer provides a solution.

The *Universal Digital Remote* allows access to all the key control parameters via the digital interface connector mounted on the rear of the machine. The unit uses a high brightness LED display, and will allow the adjustment of all parameters supported by this machine.

The remote is supplied with a 5m link cable, but can be used with cables up to 25m long.

The pin allocations on the remote connector are as follows:

Pin	**Function**
1	Ground
2	+15V
3	Data (0 - 5V)

Note that the remote allows access to the Auto Fan mode and the Prime function via the Alt menu. The functions of the menu are as follows:
Alt:

0 All Alt Menu functions are disabled.

1 Auto Fan Mode, in which the fan will cycle between 50% and 100% over a 2 minute (approx) cycle time.

2 An alternative way to engage the Prime Mode.

3 This option is currently not allocated, but may support new features on future versions of the machine.

Setting of the base address of the DMX control system via the Dip-switch, requires the decimal address to be converted to a binary (base 2) number. Many pocket calculators can perform this conversion, or the user can read off the settings from a printed conversion table.
An alternative is to use a simple process of subtracting the largest of the binary weightings that leave a positive result.
Example:
Decimal 289.
Largest subtraction possible is 256, leaving 33.
Now, 33-32 = 1, and 1-1 =0.
So, we need a binary representation with 1's in the positions corresponding to weightings of 1,32,256.
Or, 100100001, where 256 is the leading column.
The weighting on the Dip-switch is reversed, so the number 100001001 is entered from left to right.
The binary weightings on the Dip-switch read as folows (from left to right):

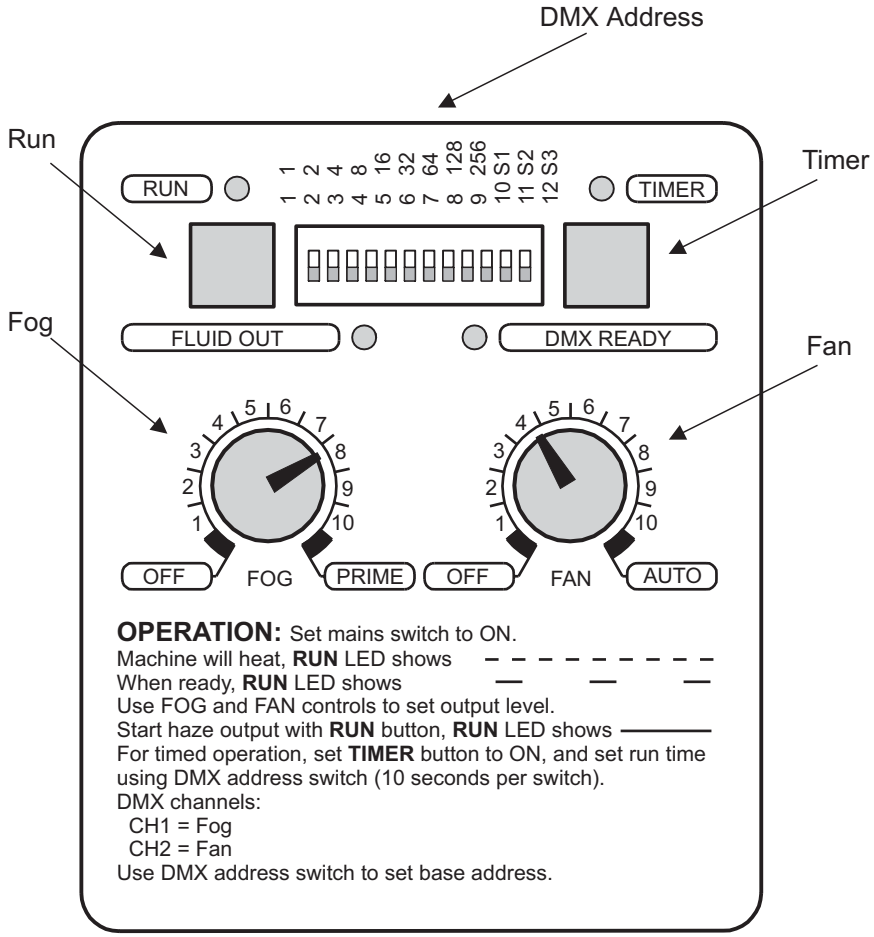
1,2,4,8,16,32,64,128,256

The remaining 3 switches, marked S1,2,3, are function switches that enable special operating modes on the machine.

THE CONTROL PANEL

An analogue control panel is used in the Magnum Hazer to allow local control and display machine status.

Located below the Dip-switch are the two potentiometers, and two switches to the left and right. The functions of the controls are shown in the following drawing.



The status of the machine is indicated by the Run LED, positioned above the Run button. When the machine is heating, but not ready to give output, the LED will flash rapidly. Once operating temperature has been reached, the flash rate will reduce to indicate that the ready state has been reached. Pressing the Run button will now start the haze output (assuming there are no errors present). The Run LED will be permanently illuminated when the machine is in the run mode. Pressing the Run button again will stop the haze output.

The timer function is enabled using the Timer button, and will illuminate the Timer LED when selected. The timer function will override the continuous operation of the run function, and the Run LED will revert to the slow flashing of the ready state. Pressing the Timer button again will switch the timer off, but the machine will not re-enter the run mode until the Run button is pressed again. See the Timer section for full details of how to operate the timer..

When the fluid detection system senses a ‘fluid out’ condition, the Fluid Out LED will be illuminated. This will shut down the machine until the fluid supply is replenished, and the Fluid Out condition reset by using the Prime function on the Fog level control. This is explained in the section covering the fluid system.

If a valid DMX data stream is present on the DMX inputs, the DMX Ready LED will be illuminated. A flashing LED indicates that data is present, but not in the correct format.

The Fog and Fan controls allow the output level of the machine to be controlled, and include other special functions.
FOG: When set to OFF, this control will stop all haze production. Setting the control in the range 1 to 10 will allow haze production at that level, with the fan running at a speed equal to or above the minimum for that fog level. The Prime function will run the pumps for 10 seconds at maximum output, and will reset the Fluid Out condition.
FAN: The OFF position stops the fan if FOG = off. Setting 1 to 10 will set the fan speed, while the Auto mode will cycle the fan speed between minimum and maximum.

The section entitled *The Remote Control* contains details of how to use the Auto Fan mode from the remote control.