



MAC/MAT-OPS-1

*SPECIALTY HAULAGE SOLUTIONS FOR CONSTRUCTION AND MINING*

# OPERATORS MANUAL



**MEGA CORP.®**

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# SECTION 1

## Definitions and Abbreviations

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### MANUAL USAGE

This technical manual only contains information required to safely operate a MAC/MAT. See the appropriate Maintenance and Operators Safety Manual for specific vehicle system information and maintenance procedures. If your system is not covered in this manual please contact MEGA Corp. Product Support Group at:

US toll free: 1-800-345-8889

Direct: 1-505-345-2661 or visit our website at [www.megacorpinc.com](http://www.megacorpinc.com) for more detailed contact information.

The exact location of the hazards and description of the hazards are reviewed in this section. All personnel working on or operating the machine must become familiarized with all the safety messages.

### WARNING

Due to the nature of these processes, ensure that all safety information, warnings and instructions are read and understood before any operation or any maintenance procedures are performed. Some procedures take place with heavy components and at moderate heights, ensure proper safety procedures are maintained when performing these actions. Failure to use and maintain proper safety equipment and procedures will cause injury, death or damage to equipment.

### WARNING, CAUTION AND NOTES

The following definitions are found throughout the manual and apply as follows:

### WARNING

Operating procedures and techniques, which could result in personal injury and/or loss of life if not carefully followed.

### CAUTION

Operating procedures and techniques, which could result in damage to equipment if not carefully followed.

### NOTE

Operating procedures and techniques that are considered essential to emphasize.

### USE OF SHALL, WILL, SHOULD AND MAY

**Shall** and **Will** – Used when application of a procedure is mandatory.

**Should** – Used when application of a procedure is recommended.

**May** - Used to indicate an acceptable or suggested means of accomplishment.

## SECTION 1

### Definitions and Abbreviations

#### SAFETY MESSAGES

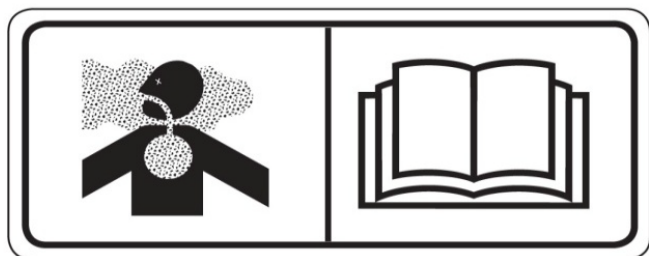
There are several specific safety messages on this machine. The exact location of the hazards and description of the hazards are reviewed in this section. All personnel working on or operating the machine must become familiarized with all the safety messages.

Make sure that all of the safety messages are legible. Clean the safety messages or replace the safety messages if you cannot read the words. Replace the illustrations if the illustrations are not legible. When you clean the safety messages, use a cloth, water and soap. Do not use solvent, gasoline or other harsh chemicals to clean the safety messages. Solvents, gasoline or harsh chemicals could loosen the adhesive that secures the safety messages. Loose adhesive will allow the safety messages to detach.

Replace any safety message that is damaged or missing. If a safety message is attached to a part that is replaced, install a new safety message on the replacement part.

#### TOXIC GAS HAZARD (1)

This safety label is located on the side of the tank and at all water fill entrances.

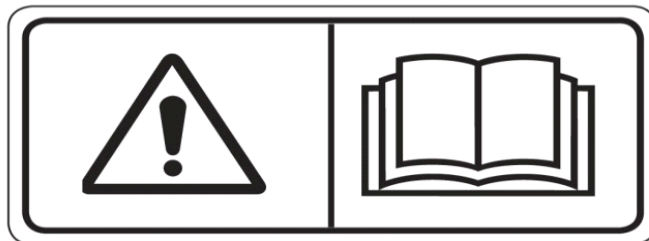


#### WARNING

Cutting or welding operation on the inside of the tank can cause the accumulation of toxic gases. Read and understand instructions and warnings in the Maintenance Manual. Failure to provide proper ventilation or breathing apparatus while conducting these operations may result in serious injury or death.

#### DO NOT OPERATE (2)

This safety label is located on the outside of the front and rear control boxes (if equipped).

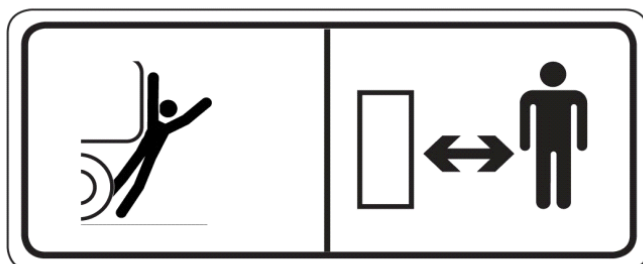


#### WARNING

Do not open this control box unless you read and understand the instructions and warnings in the Operator and Maintenance Manual. Failure to follow instructions or heed the warnings could result in serious injury or death.

#### BACKING RUNOVER HAZARD (3)

This safety label is located on the rear of the tank and inside the cab.



#### WARNING

The vehicle is equipped with a back-up alarm. Alarm must sound when operating this vehicle in reverse. Failure to maintain a clear view in the direction of travel could result in serious injury or death.

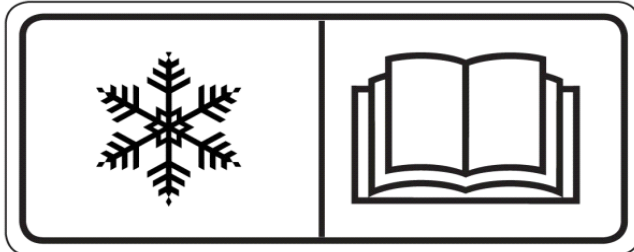


## SECTION 1

### Definitions and Abbreviations

#### FREEZING (4)

This safety label is located on the side of the tank, at the sump drain, and on the pump.



#### WARNING

Drain tank, fill pipe and valve in freezing weather. Refer to the Operator and Maintenance Manual for the procedure to follow.

#### DO NOT HOIST WHILE IN MOTION (6)

This safety label is located inside the cab.

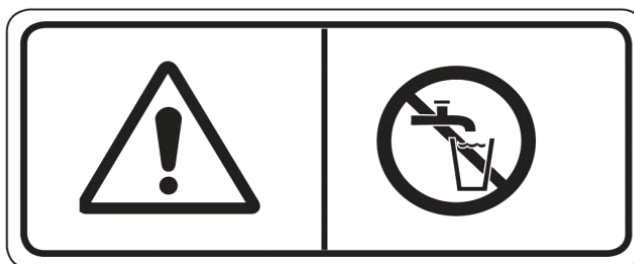


#### WARNING

Do not engage hoist cylinders while vehicle is in motion. Before engaging hoist STOP the vehicle. Do not engage hoisting cylinders unless you read and understand the instructions and warnings in the Operator or Maintenance Manual. Failure to follow instructions or heed the warnings will result in injury or death.

#### NON-POTABLE (5)

This safety label is located on the side of the tank and sump drain.



#### WARNING

Water held within tank is not potable. Do not use tank for transport of water intended for human or animal consumption or serious injury or death may result.

#### FALL HAZARD (7)

This safety label is located at the top of the front and rear of the tank.



#### WARNING

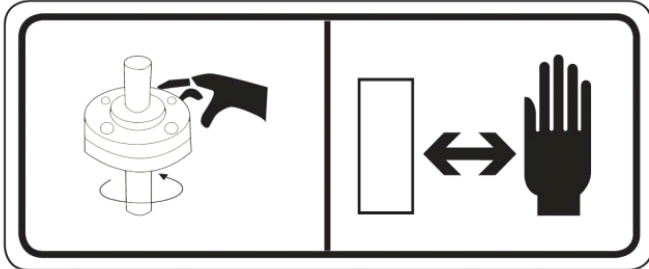
Do not walk on the top of tank without fall arrest PPE. Serious injury or death could occur from a fall.

## SECTION 1

### Definitions and Abbreviations

#### ROTATING SHAFT (8)

This safety label is located on the pump.

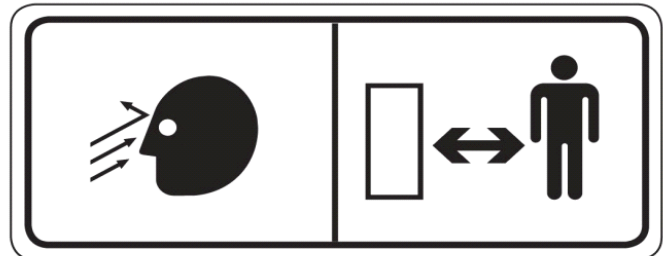


#### **⚠ WARNING**

Do not place your hand or tools within pump bell while pump is rotating and/or pressure held within the motor supply hose. Refer to the Operator and Maintenance Manual for the procedures to operate and maintain the pump. Failure to follow proper procedures could result in serious injury.

#### HIGH PRESSURE WATER CANNON (10)

This safety label is located on top of the cab control box.

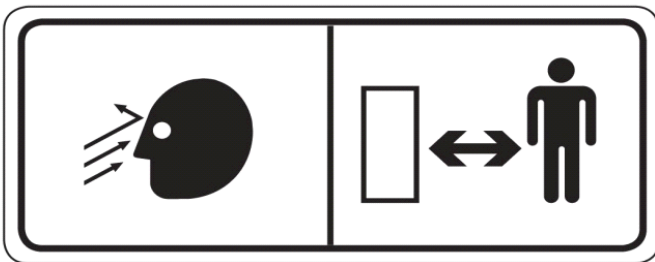


#### **⚠ WARNING**

Do not operate the water cannon until all personnel are a safe distance away from the vehicle.

#### HIGH PRESSURE SPRAY HEADS (9)

This safety label is located on the spray bar.

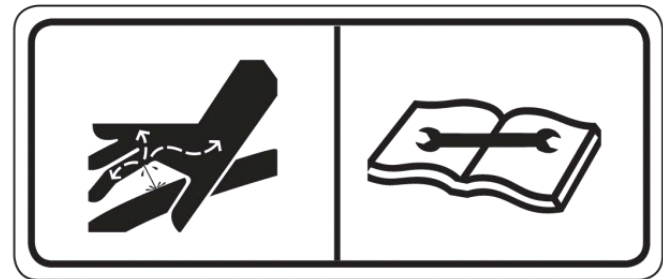


#### **⚠ WARNING**

Do not operate spray heads until all personnel are a safe distance away from the vehicle.

#### HIGH PRESSURE MOTOR (11)

This safety label is located on the hydraulic motor.



#### **⚠ WARNING**

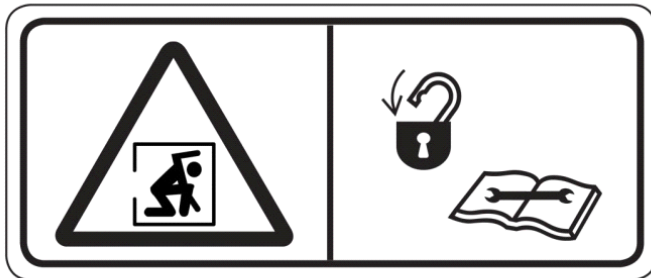
Hydraulic motor and supply lines contain oil under high pressure. Improper removal and repair procedures could cause severe injury. To remove or repair, instructions in the Maintenance Manual must be followed.

## SECTION 1

### Definitions and Abbreviations

#### CONFINED SPACE (12)

This safety label is located near the water tank access and fill ports.



#### **WARNING**

**Do not enter confined spaces without following established site specific procedures. Failure to follow proper safety procedures will result in serious injury or death.**

#### ABBREVIATIONS

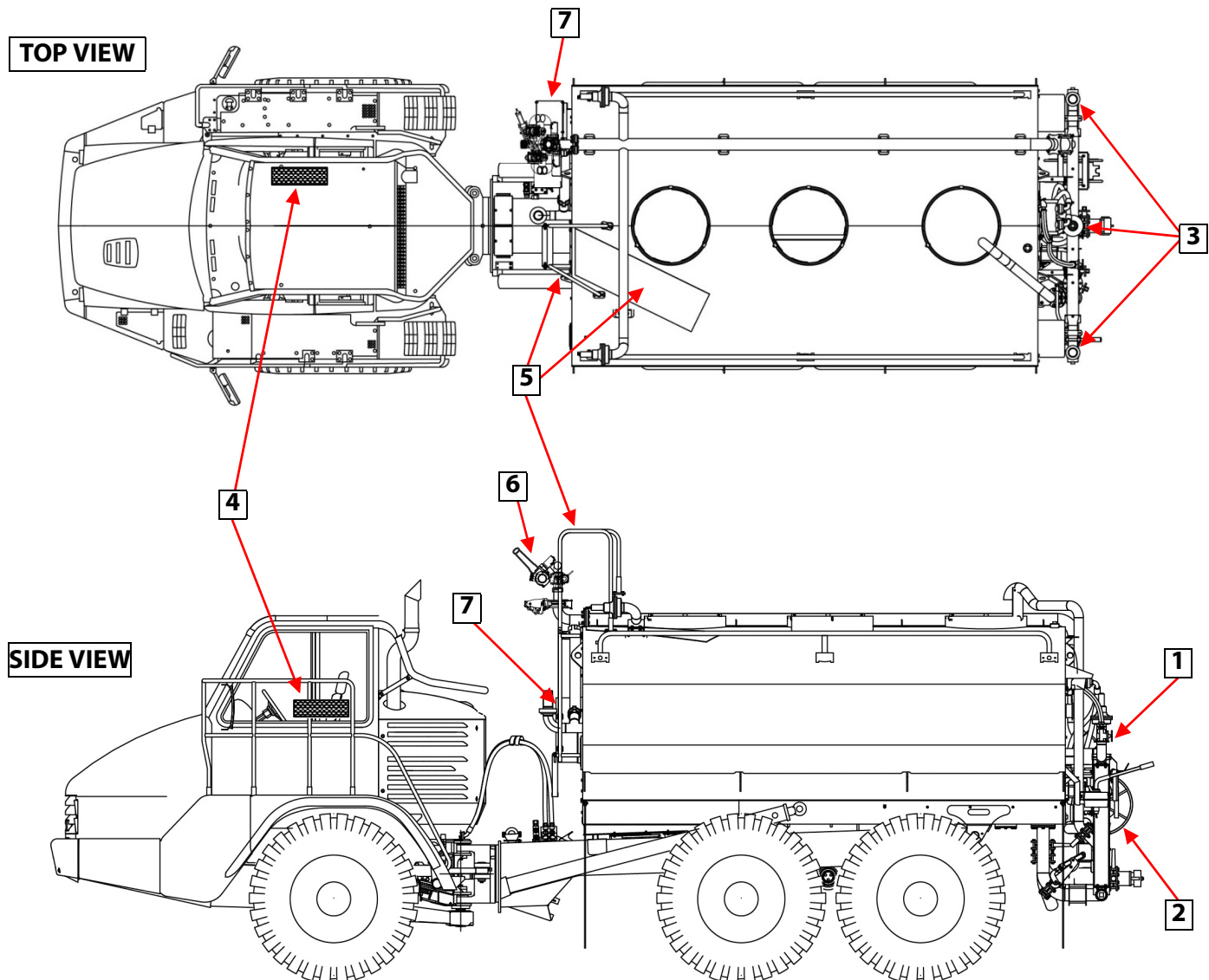
BFV - Butterfly Valve  
 cc - Cubic Centimeters  
 CCW - Counter Clockwise  
 CW - Clockwise  
 fl. oz. - Fluid Ounce  
 FT - Feet  
 FPM - Feet Per Minute  
 GPM - Gallons Per Minute  
 IN/SQ FT - Inches per Square Feet  
 KM-H - Kilometers Per Hour  
 Kg - kilograms  
 Kpa - Kilopascals  
 l - liters  
 lpm - Liters per minute  
 LT - Left as viewed from the operators  
     position facing forward  
 m - meters  
 MPH - Miles Per Hour  
 MAC - Mega Articulated Truck Conversion  
 MAT - Mega Supplied Articulated Truck and Tank  
 MSC - Mega Scraper Conversion  
 MST - Mega Supplied Scraper Tractor and Tank  
 Nm - Newton meters of torque  
 psi - pounds per square inch  
 RPM - Revolutions Per Minute  
 RT - Right as viewed from the operators  
     position facing forward  
 SQ FT - Square Feet  
 VDC - Volts, Direct Current



## SECTION 1

### Definitions and Abbreviations

#### MAC OVERVIEW (TYPICAL)



- 1** WATER PUMP & HYDRAULIC MOTOR
- 2** HOSE REEL
- 3** SPRAY HEADS
- 4** CAB CONTROL
- 5** HAND RAIL & WALKWAY
- 6** WATER CANNON
- 7** HYDRAULIC CONTROL BOX

## SECTION 2

### System Description

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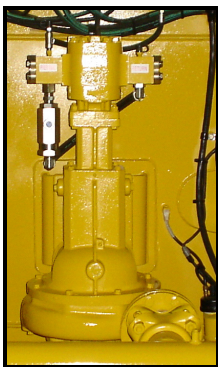
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#### WATER TANK (MAC)

The MEGA steel water tank consists of a water tunnel, primary floor, vertical baffles, bulkheads, outer skins, internal piping and external piping. The tank design is patented and known as the Magnum Anti-surge Stabilization System (MASS)

The tank structure is built around and on top of the tunnel super structure. The tunnel provides support to the floor plate, pivot structure, baffles and mounting for the water pump. The floor plates carries loads while the baffles and bulkheads add to tank strength and dampen water surges. External and internal piping is also used to carry water from the water pump to spray heads, monitor, spray bar, hose reel, dump bar and tank drain.

#### WATER PUMP



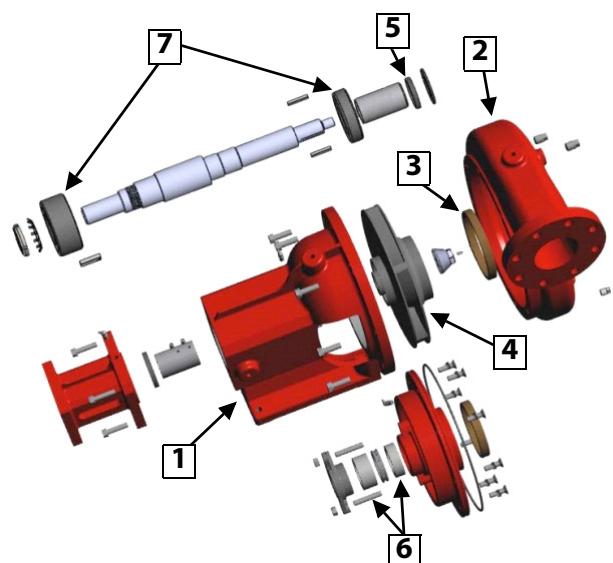
MAC/MAT units are configured with different types of water pumps, based on the size of the water tank. Typically the 5,000 – 7,000 gallon tanks are configured with the Mega M-3, while larger tanks are configured with the B-4, Mega M-4, or Mega M-4B pumps. These water pumps are similar in design, so for the purposes of this manual the Mega M-4 (6 inch inlet

& 4 inch outlet) is used to present component information.

#### M-4 Water Pump major components and their functions are:

1. **Bracket** – Main frame of the pump that allows a pump to be bolted to the tanker and provides the means to direct mount the hydraulic drive motor.

2. **Volute Case** – A “snail shell” shaped case that encloses the impeller. It is narrow at the center and enlarges from there to the discharge area.
3. **Wear Ring** – Acts as a bearing surface between the impeller and volute case. Constructed of bronze material.
4. **Impeller** – Rotating wheel attached to the shaft that accelerates the speed of the water producing water flow and pressure.
5. **Shaft Seal** – Confines grease to the inner and outer bearing area while keeping foreign material from entering the bearing area and seals water inside the volute case.
6. **Rope Seal** – Provides a seal around the rotating pump shaft at the volute case. Constructed of a graphite rope material that is designed to drip water and allow shaft lubrication.
7. **Upper/Lower Bearings** - Provide roller surface for the pump shaft.

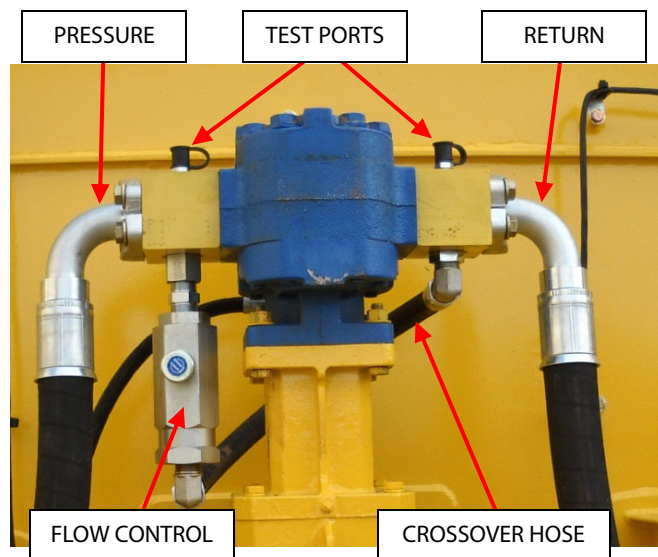


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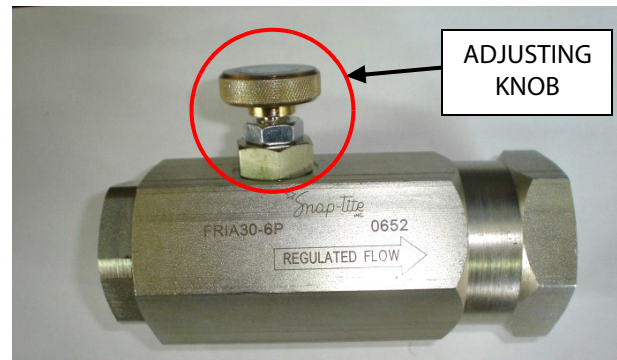
### System Description

#### HYDRAULIC DRIVE MOTOR

A gear type motor that drives the water pump. The hydraulic motor is mounted to the top of the water pump and receives hydraulic pressure from the vehicle hoist at 1800-2500 PSI and flow rates up to 85 GPM to operate. The hydraulic motor is coupled directly to the water pump shaft and rotates in a clockwise (CW) direction. A cross-over line with a flow control valve is used to bleed off hydraulic oil flow to precisely set the speed of the hydraulic drive motor.



#### HYDRAULIC FLOW CONTROL VALVE



Typical 135 lpm (35 gpm) Adjustable Hydraulic Flow Control

The hydraulic flow control is directional. The arrow on the body indicates the direction of oil flow to meter the bypassing oil. The adjusting knob on the valve will allow adjustment of the oil flow to bypass the drive motor, up to 135 LPM (35 GPM) or up to 700 RPMs (RPM increase/decrease will vary depending on the size of hydraulic drive motor the unit is equipped with). If the flow control is reversed, the flow control adjusting knob will not function and the full flow capacity of the valve will bypass. This can result in water pump rpm being below specifications with no adjustment capability of the adjusting knob. By turning the adjusting knob clockwise the hydraulic oil that is bypassing will be reduced, increasing the speed of the water pump. Turning the knob counter-clockwise will increase the volume oil being bypassed reducing the water pump speed. The flow control valve is typically mounted on the PRESSURE manifold of the hydraulic drive motor.

#### HYDRAULIC DRIVE MOTOR ACTIVATION

The hydraulic drive motor on MAC is typically driven by the chassis hoist hydraulic system. The activation can be controlled by the existing electric hoist valve. The MEGA cab control pump switch commands the hoist valve to operate by sending an electric signal to the electric actuator on the hoist valve. This operates the hoist valve, diverting the hydraulic oil to the water pump drive motor.

## SECTION 2

### System Description

#### CAB CONTROLS (ANALOG)



Multi-function control box that is mounted in the vehicle cab to control all water tank functions. Controls are available for the monitor, intermittent spray, water pump, work lights, foam suppression, adjustable nozzle, system, spray heads, spray bar, gravity dump bar, and tank drain valve. The control box also provides indications of tanker water level and a system fuse holder. The cab controls requires 24 VDC vehicle power to operate.

The control functions operate as follows:

Control	Function
Joystick	Sends command signals to the logic box (electric monitor) or hydraulic control valve assembly (hydraulic monitor) to move the monitor left, right, up and down.
TIMER ON	Sets ON time (variable adjustment 5-100 sec) of selected spray heads and dump bar when the timer switch is in the intermittent position
TIMER OFF	Sets OFF time (variable adjustment 5-100 sec) between timer cycles of selected spray heads and dump bar when the timer switch is in the intermittent position.
PUMP	Routes vehicle hydraulic system pressure and flow to the water pump hydraulic drive motor.
MONITOR	Opens the water cannon BFV.

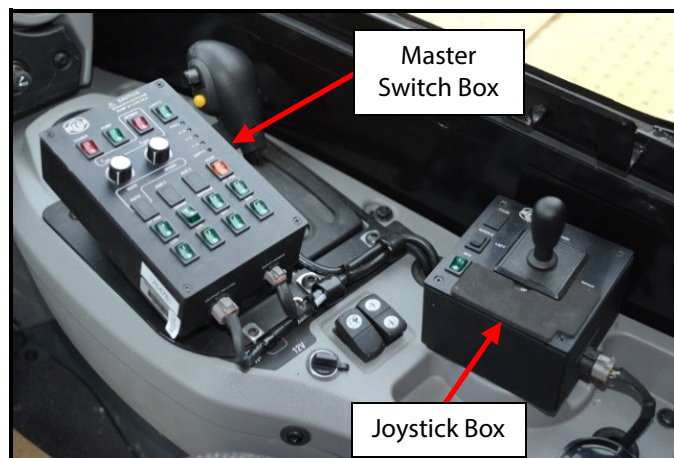
Control	Function
LIGHTS	Provides power to work lights.
FOAM	Open or closes the foam concentrate tank in-line control valve.
INTERMITTENT/CONSTANT	Activates or deactivates system timer function.
AUX	Reserved for specialized functions.
ADJUSTABLE NOZZLE	Adjusts monitor nozzle from FOG/FAN to STREAM.
AUX	Reserved for specialized functions.
WATER LEVEL	Indicates tank water level.
SYSTEM	Provides power for all cab control functions.
LT BUMPER	Opens or closes left front bumper spray head.
LT VSS	Opens or closes left vertical side spray head.
LT REAR	Opens or closes left rear spray head.
LT CENTER	Opens or closes left center rear spray head.
RT CENTER	Opens or closes right center rear spray head.
RT REAR	Opens or closes right center rear spray head.
RT VSS	Opens or closes right vertical side spray head.
RT BUMPER	Opens or closes right front bumper spray head.
DUMP BAR	Opens or closes dump bar BFV.
DRAIN	Opens or closes tank drain BFV.



## SECTION 2

### System Description

#### CAB CONTROLS (DIGITAL)



This system is designated as a Digital integrated Spray Control System (DiSCS). The system is comprised of control boxes, logic controllers, sensors, and cabling. It is a multi-function control system with a separate joystick box that is mounted in the vehicle cab. These two boxes control all water tank functions. The master switch box operates the water pump, spray heads, intermittent spray, work lights, hose reel, dump bar, suction loading, and tank drain valve. The master switch box also provides indications of tanker water level and water pump protection features. The remote mounted joystick box operates the water cannon, adjustable nozzle and foam suppression. The cab controls require 12/24 VDC vehicle power to operate.

#### ABBREVIATIONS AND DEFINITIONS

**AUX1** – Auxiliary or additional optional function

**BFV** – Butterfly Valve

**DMPBAR** – Dump bar for heavy spray of water close to ground. Can be either a gravity or pressure dump bar (pressure dump bar requires water pump activation to operate).

**DRAIN** – Drain (gravity or pressure) for evacuation of water from tank, mounted typically at the rear of the tank.

**KPH** – Kilometers per hour

**LT VSS** – Left Vertical Side Spray

**LTC** – Left Center Spray Head

**LTR** – Left Rear Outer Spray Head

**MPH** – Mile per hour

**RAMP** – Ramping Control feature. Rate of increase or decrease in speed of water flow during PUMP engagement or disengagement

**RT VSS** – Right Vertical Side Spray

**RTC** – Right Center Spray Head

**RTR** – Right Rear Outer Spray Head

The master switch box control functions operate as follows:

Control	Function
POWER	Provides power for all cab control functions.
PUMP	Routes vehicle hydraulic system pressure and flow to the water pump hydraulic drive motor.
INTMNT	Intermittent setting. Activates or deactivates system timer function.
LIGHTS	Provides power to work lights.
t ON (Intermittent timer—manual mode)	Sets ON time of selected spray heads when the timer switch is in the intermittent (INTMNT) position. Scale: adjustable from 5 seconds to 30 seconds.
RATE (GPS Auto Mode)	Increases or decreases amount of water dispersed during a cycle when AUTO switch is on (see extended description).
t OFF (Intermittent timer—manual mode)	Sets OFF time between timer cycles of selected spray heads when the timer switch is in the intermittent (INTMNT) position. Scale: adjustable from 5 seconds to 30 seconds.
SPEED (GPS Auto Mode)	Sets desired ground speed for maximum flow (OPEN continuously) of selected spray heads (see extended description).
WATER LEVEL	Indicates tank water level.
AUTO	Controls activation of GPS Auto mode.
AUX 1	Reserved for user-added option.
AUX 2	Reserved for specialized function.
HOSE	Controls activation of hose reel function ONLY.



## SECTION 2

### System Description

Control	Function
SUCTION LOAD	Controls activation of suction load station ONLY.
LT VSS	Opens or closes left vertical side spray head.
DRAIN	Opens or closes tank drain BFV.
DUMP BAR	Opens or closes dump bar BFV.
RT VSS	Opens or closes right vertical side spray head.
LT REAR	Opens or closes left rear spray head.
LT CENTER	Opens or closes left center rear spray head.
RT CENTER	Opens or closes right center rear spray head.
RT REAR	Opens or closes right rear spray head.

The joystick box functions operate as follows:

Control	Function
Joystick (LEFT-RIGHT-UP-DOWN)	Sends command signals to the hydraulic control valve assembly to move the water cannon.
FOAM	Open or closes the foam concentrate tank in-line control valve.
NOZZLE	Adjusts monitor nozzle from FOG to STREAM.
BFV	Opens or closes the monitor butterfly valve.

#### BASIC SYSTEM THEORY OF OPERATION

Spray system power is provided by chassis 12/24 volt DC power. Power is routed to cab controllers and logic control panels by turning on the switched power via the ignition key switch.

When the chassis ignition switch is turned ON, the master switch box will undergo a functional self-test. During this process, ALL LEDs will first turn ON, then off. While this is occurring, the water level indicator lights will initially register a FULL tank, and will then decrease down to EMPTY. The EMPTY light will blink, and then the water level indicator will count up to

register the current water level of the tank.

Cab control power is then activated by turning the cab control POWER switch ON while logic controllers are switched on when the chassis ignition switch is turned ON.

The spray system will function normally when cab control power is applied (cab control POWER switch ON) and sufficient water level (water level EMPTY light not flashing) is present. Activation of a specific function is accomplished by depressing the selected function switch on the master switch box or joystick box.

Depressing the switch sends a signal to the logic control panel in the solenoid box to activate a given function. The logic control then receives the signal and provides an output command to the given coil or function.

Once the logic control panel output is processed, the logic control sends a feedback signal back to the cab control box to illuminate the LED on the selected function switch. If the switch LED does not illuminate, a malfunction may exist in the logic control, wiring harness or cab control box.

#### NOTE

If a function switch is depressed with no corresponding switch LED, check to ensure system power switch is ON and the water level empty LED is not flashing. If the switch LED is not illuminated, a malfunction may exist.

#### NOTE

If the selected function switch LED illuminates and the component on the water tanker is not functioning, the component (water-way valve, spray head or water cannon) may have malfunctioned.

As functions are turned on and off, the water pump switch will remain illuminated unless all spray system functions (water-way valves, spray heads or water cannon) are turned off. The logic control will automatically turn the water pump off if all valves are closed to prevent over-temp of the water pump volute case. As the water level of the tank drops and

## SECTION 2

### System Description

the EMPTY LED begins to flash, the logic controls will deactivate the water pump to prevent cavitation or dry running of the water pump.

#### WATER PUMP PROTECTION FEATURES

Soft Start and Stop – The water pump is protected from sudden starts and stops whenever the pump is turned ON or OFF via the switch or any auto/logic control feature. This is accomplished by the logic control system slowly commanding the appropriate proportional hydraulic control valve to open or close slowly to prevent hard starts or stops that can reduce water pump service life.

Low Water Protection – The water pump is automatically turned off by the logic control system when a low water condition is detected. The logic control system monitors tank water level and commands the water pump to turn off when a predetermined low water condition is noted. This prevents the water pump from running in a dry sump that will over-heat shaft seals due to lack of water. Continued use will damage the shaft seals.

No-Flow Conditions – The water pump is automatically turned off after about 100 seconds, whenever all water discharge valves are closed. The logic control system monitors all discharge valves and begins a TIME OUT cycle to turn off the water pump after about 100 seconds. Any time a discharge valve is opened during the timing cycle, the clock is reset. This feature prevents the water from heating up due to the water pump impeller spinning in a sump with no flow. The heating of the static water will also heat the water pump causing deterioration of grease and premature bearing failure.

#### MASTER SWITCH BOX EXTENDED FUNCTION DESCRIPTIONS



**POWER** – Turns POWER ON and OFF to cab controls and digital controllers.

**PUMP** – Sends request for pump engagement/disengagement to the digital control processor. The digital controllers will activate the hydraulic circuit to slowly ramp-up or ramp-down the water pump.

The water pump switch will flash whenever the switch is on and the following conditions apply:

- Low water condition is sensed (EMPTY LED is flashing).
- No flow condition is sensed (for about 100 seconds, no waterway valves are open)

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE will result in water pump component damage and reduced service life.

#### INTMNT (Intermittent Function)

Intermittent spray function sends request for adjustable timing of spray head and dump bar as commanded by the tON and tOFF dials.

Intermittent will only operate if at least 1 discharge function (spray head or dump bar) switch is activated. Water discharge can be stopped at any time when in INTMNT mode by turning discharge function switches OFF. The timer will continue to cycle even if no water is being sprayed

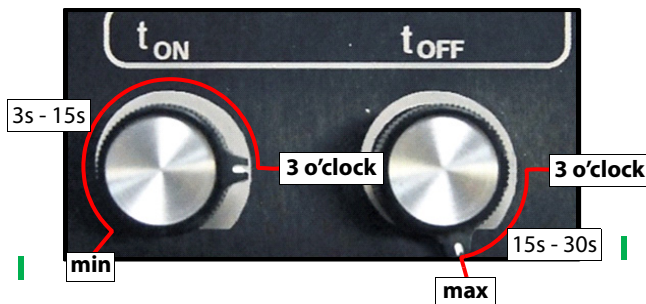
## SECTION 2

### System Description

The tON and tOFF adjusting knobs command timing as follows:

- **t ON** – Adjusts spray head ON time.
- **t OFF** – Adjusts spray head OFF time.

The relationship between dial rotation and ON/OFF time is as follows:



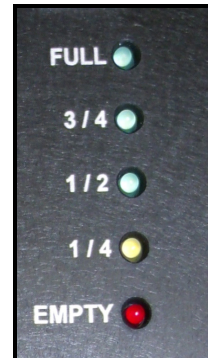
- zero to 3 o'clock position: 3 sec to 15 sec
- 3 o'clock to max position: 15 sec to 30 sec

#### NOTE

The above time ON/OFF scale applies to firmware versions 3.7.0 and above. For firmware versions 3.6.x and below, the range is 5 seconds to 30 seconds, scaled linearly across the rotation of the dial.

The intermittent function will turn selected spray head or dump bar on and off. Duration of tON and tOFF cycle times are selected by setting the appropriate dials on the master switch box. When the INTMNT switch is ON and functions are selected, the operator will observe different switch LEDs conditions to indicate operation within the tON and tOFF cycles. When a selected function switch (spray head or dump bar) is operating during an ON cycle, the selected function switch LED will be illuminated as well as the INTMNT switch LED. When the INTMNT cycles automatically to an OFF cycle, INTMNT switch and function switch LEDs will extinguish. As the ON cycle is about ready to engage, the INTMNT switch LED will flash 3 times at the end of the OFF cycle to indicate the selected spray functions are about to be turned ON. These light conditions will change back and forth until intermittent or function switches are turned off.

**Water Level Indicator** – Indicates tank water level as sensed by the water level pressure sensor in the rear of the water tank. When the red **EMPTY** LED light flashes, the tank is at minimum water level. This low level signal is also sent to the logic control to automatically ramp-down the water pump to prevent component damage. Water pump operation can only be restored if sufficient water is in tank to extinguish **EMPTY** light.



#### NOTE

In order to re-activate the water pump after low-water shut-off, first fill the water tank with sufficient water capacity to permit pump operation. Then turn the PUMP and POWER switches OFF. Cycle the chassis ignition key OFF/ON. Wait for the Master Switch Box to complete its lights check. Then, if the water level gauge reads above EMPTY, turn the POWER and the PUMP switches on.

#### NOTE

Certain terrains and water level fluctuations may allow low water protection to capture a low water level condition, causing the pump ramp-down. If conditions allow water pump activation after water level/terrain fluctuations have ceased, then the water pump may be re-activated by following the steps in the previous note.

#### Pressure Discharge Function Descriptions:

**Spray Heads** – Control opening or closing of the associated valve when selected, or automatically controlled when INTMNT function is selected.

**Dump Bar (Pressure)** – Controls opening or closing of the BFV when selected, or automatically controlled when INTMNT function is selected.

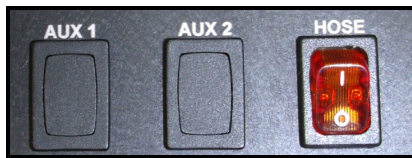
**Suction Load** – Allows continuous hydraulic water pump drive circuit flow during a low water level condition. Also disables use of any other master switch box waterway valve



## SECTION 2

### System Description

#### AUX FUNCTIONS



**AUX 1** – Sends request for operation of auxiliary functions or additional non-standard options of spray system. This function is unique to a specific tank serial number.

**AUX 2 (Suction Load Station)** – If equipped, sends a request to the hydraulic water pump drive circuit to allow suction load pump drive motor operation during a low water level condition while also disabling the timed-out function. When turned ON, the AUX2 switch LED will flash rapidly and all pressure discharge functions are disabled.

**HOSE** – Allows continuous water pump operation for hose reel use while also disabling the use of any other master switch box waterway valves.

#### NOTE

Ensure all discharge function switches are OFF when using HOSE function. Activating the HOSE switch requests all discharge function to turn OFF (All Spray heads, Water Cannon BFV, Drain, Dump Bar and FOAM).

#### Non-Pressure Discharge Function Descriptions:

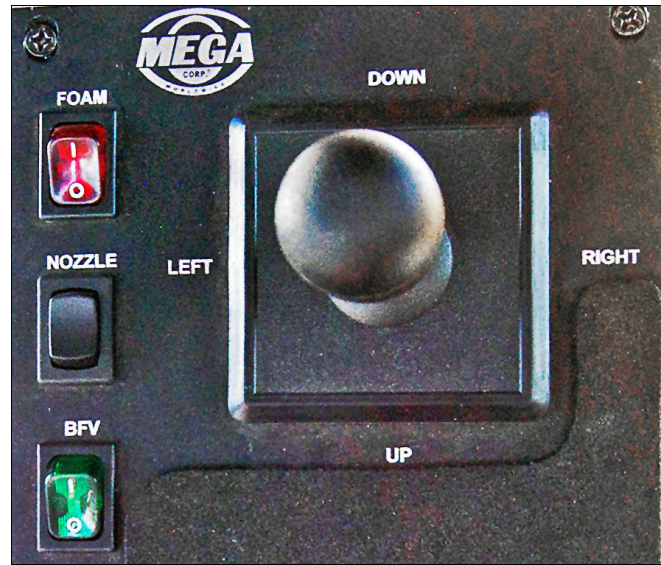
**Dump Bar (Gravity)** – Controls opening and closing of the BFV when selected, or automatically controlled when the INTMNT function is selected.

#### JOYSTICK BOX EXTENDED FUNCTION DESCRIPTIONS

The joystick box houses logic controls for the joystick and the FOAM, NOZZLE, and BFV switches. These switches and the joystick control requests for water cannon operation.

**FOAM** – Sends request for FOAM agent valve to open or close.

**NOZZLE** – Sends request for adjustable nozzle on water cannon to move from FAN/FOG to STREAM spray patterns.



#### Joystick Box Functions

**BFV** – Sends request to open or close butterfly valve. The butterfly valve controls water flow to the Water Cannon. Activating the BFV switch requests the water PUMP to stay ON with NO other pressure discharge functions activated providing, sufficient water is in tank to allow command to be sent.

**JOYSTICK** – Sends requests for rotation and elevation motion for water cannon operation.

#### GROUND SPEED SENSING (GPS) CONTROL

The MEGA ground speed sensing control system is an independent and self-contained GPS unit and antenna that provides speed information to the existing Mega Digitally Integrated Spray Control System (DiSCS). The DiSCS's logic control uses the ground speed signal to automatically cycle and pulse spray heads to obtain a desired lay-down of water regardless of ground speed. The system contains controls to adjust maximum water discharge speed as well as actual rate of flow. This automatic control reduces water usage and prevents over-watering of haul roads and intersections.

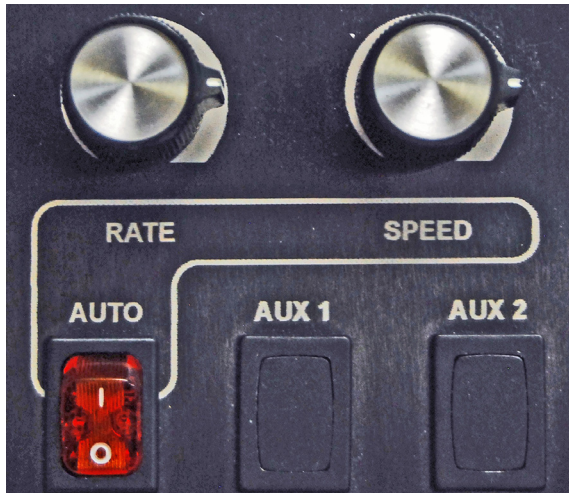
The system will automatically close all discharge functions (spray heads) below 5 KPH/3 MPH to prevent puddling of water at intersections. The system also opens selected discharge functions when accelerating above 5KPH/3 MPH.

## SECTION 2

### System Description

The system warns the operator of all malfunctioning system functions and provides full manual control of all spray system functions in the event of an AUTO mode failure. All automatic system protection features of low water level conditions, no-flow conditions and water pump soft start/stop feature still operate normally in the AUTO mode.

#### GPS EXTENDED FUNCTION DESCRIPTIONS



**AUTO** – This function has priority over intermittent mode. The intermittent light will illuminate steadily when operating conditions are met and AUTO is ON. AUTO enables vehicle speed signal from the GPS module to activate the speed sensing mode, and operates the spray system based on **RATE** and **SPEED** adjustments. Pulse will begin when the AUTO function requests reduced volume.

#### NOTE

Near or below 4.8 KPH/3 MPH, AUTO will switch to INTERMITTENT mode and discharge functions may operate continuously or ramp down the water pump to OFF. When vehicle speed rises above 4.8 KPH/3 MPH, AUTO will resume control of the system.

**RATE** – Is the distance traveled/time for spray head ON cycle.

- Knob turned counterclockwise **reduces** ON distance/ ON time
- Knob turned clockwise **increases** ON distance/ ON time

**SPEED** – Above what vehicle speed the command is sent for maximum flow of all selected discharge functions (spray heads). Below this vehicle speed, timed cycles and/or reduced water volume flow occur.

#### NOTE

The scale for the SPEED function is 0 KPH/0 MPH (Full LEFT) to 48 KPH/30 MPH (Full RIGHT).

When vehicle speed goes below the set SPEED, application rate of water discharged will be either pulse the requested discharge functions and/or reducing the number of discharge functions based on the RATE selected.

#### NOTE

IF vehicle speed is GREATER than set SPEED the RATE has little or no effect on water discharge. Typically all requested pressure discharge functions are ON and no timing cycle.

**Reduced Volume Mode** – Reduction in discharge volume by reducing the number of spray heads requested to activate.

- If 4 rear spray heads are requested, reduced volume allows only the 2 outer spray heads to turn ON and the 2 center spray heads are OFF.
- If 3 rear spray heads are requested 1 spray head will be OFF, typically the center head adjacent to the outer head requested.
- If 2 spray heads are requested 1 spray head will be OFF typically the center spray head unless no center spray heads are requested, then NO spray heads will be OFF.

**Pulsing** – Reference to Pulse Width Modulation or ON/OFF cycle.



## **SECTION 2**

### **System Description**

#### **WATER CANNON SYSTEM**

The system is comprised of a water cannon (hydraulic or electric), hydraulic control valve assembly or logic box, butterfly valve assembly, nozzle and controls.

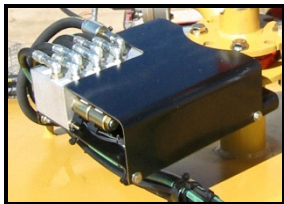
#### **WATER CANNON (Hydraulic)**



A metal waterway that directs a stream of water in both elevation (up-down) and rotation (right-left). Hydraulic motors move the waterway based upon hydraulic flow from the hydraulic control valve assembly as commanded by the cab control joystick. The water cannon is threaded to a flanged pipe

that mounts directly above the BFV. The water cannon also provides mounting for a variety of different nozzles.

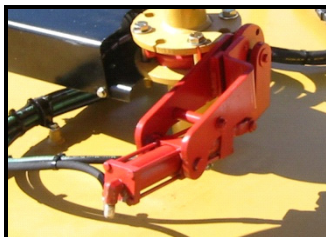
#### **HYDRAULIC CONTROL VALVE ASSEMBLY**



The assembly contains three hydraulic solenoid valves that direct hydraulic pressure to the hydraulic motors on the water cannon and BFV cylinder as commanded by

the cab control box. A pressure relief valve is incorporated in the manifold block to protect the water cannon system against any over pressurization conditions. The assembly is mounted to the tank lower flange and receives hydraulic pressure from the vehicle hydraulic pump.

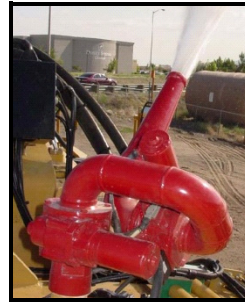
#### **HYDRAULIC BFV ASSEMBLY ASSEMBLY**



A hydraulically operated valve that opens or closes to control water flow to the water cannon. The hydraulic cylinder receives hydraulic pressure from the hydraulic control valve

or solenoid control box assembly as commanded by the cab control water cannon switch. The assembly is clamped between upper and lower pipe flanges.

#### **WATER CANNON (ELECTRIC)**



A metal waterway that directs a stream of water in both elevation (up-down) and rotation (right-left). 24 VDC electric motors move the waterway based upon filtered electronic signals from the logic box as commanded by the cab control joystick. The water

cannon is threaded to a flanged pipe that mounts directly above the BFV. The water cannon also provides mounting for a variety of different nozzles.

#### **ELECTRO-PNEUMATIC BFV ASSEMBLY**



An electro-pneumatic valve that controls the flow of water to the water cannon. A 24 volt DC solenoid receives commands from a cab control MONITOR / BFV switch through the logic box to route pressurized air to

an air chamber which opens or closes a 3" valve. The assembly is clamped between upper and lower pipe flanges.

#### **WATER CANNON NOZZLES AND STREAM SHAPERS** **Smooth Bore Nozzle**



A cone shaped 1.5" diameter nozzle that directs water flow. The nozzle has a built in stream shaper that smooths water flow to increase water stream distance.

#### **Smooth Bore (Stackable)**



A segmented cone shaped nozzle that directs water flow. The nozzle opening is adjusted by removing segments to acquire the most efficient nozzle opening for a given water pump operating pressure. Nozzle segment diameters are 1", 1½", 1¾" and 2". The nozzle requires

and in-line stream shaper to increase water stream distance.

## SECTION 2

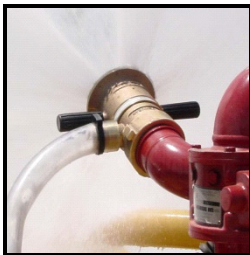
### System Description

#### In-Line Stream Shaper



A performance enhancer that is mounted between the water cannon outlet and the selected straight bore nozzle. The stream shaper pathway is a honeycomb style channel designed to efficiently shape a water stream to maximum water stream distance.

#### Manual Adjustable Nozzle



Fog/Stream: A modified straight bore nozzle that allows the operator to manually adjust selected water stream patterns from fog to stream. Some nozzles are configured for fire suppression foam education.

Fan/Stream: A modified straight bore nozzle that allows the operator to manually adjust selected water stream patterns from flat fan to stream. The flat fan pattern orientation is adjustable from horizontal to vertical by reorienting the nozzle on the water cannon.

#### Remote Adjustable Nozzle (Electric/Hydraulic)



A modified straight bore nozzle that allows the operator to remotely adjust selected water stream patterns from fog to stream from the cab control. The nozzle inner or outer barrel is moved by an electric or hydraulic actuator to obtain the fog or stream pattern. Some nozzles are configured for fire suppression foam education.

#### Fan/Stream



A modified straight bore nozzle that allows the operator to remotely adjust selected water stream patterns from flat fan to stream from the cab control. The nozzle inner or outer barrel is moved by an electric actuator to obtain the fan or stream pattern. The flat fan pattern orientation is adjustable from horizontal to vertical by reorienting the nozzle on the water cannon.

#### SPRAY SYSTEM

The spray head system consists of 4, 6 or 8 hydraulic or pneumatic actuated spray heads, cab controls, solenoid control box assembly and hydraulic or pneumatic hosing.

#### PNEUMATIC SPRAY HEAD



A two piece aluminum valve body and adjustable ring mounted to a water supply header pipe. The upper portion of the valve body is an air chamber with a diaphragm and guide disk assembly attached to the bottom. The air chamber receives pressurized air from the solenoid control box as commanded by the cab control switch. When the upper portion of the valve body is pressurized the guide disk will seal the opening on the lower portion of the valve and stop water flow.

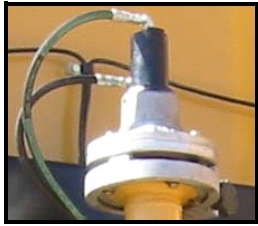
When the cab control system is OFF and the water pump is OFF the air chamber incorporates a spring that will apply pressure to the guide disk assembly and seal the opening on the lower portion of the valve and stop flow. When air pressure is removed from the upper portion of the valve body when the water pump is ON and the cab control switch ON, pressurized water from the header pipe will unseat the guide disk and water will flow from the lower portion of valve.



## SECTION 2

### System Description

#### HYDRAULIC SPRAY HEAD

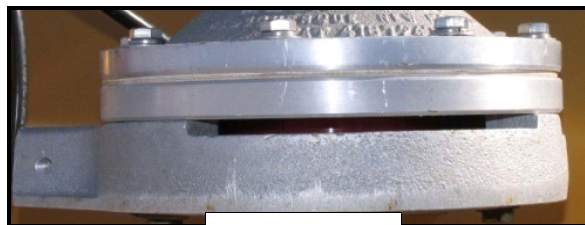


A two piece aluminum valve body, hydraulic cylinder and adjustable ring mounted to a water supply header pipe. The upper portion of the valve body contains a hydraulic cylinder that receives hydraulic pressure

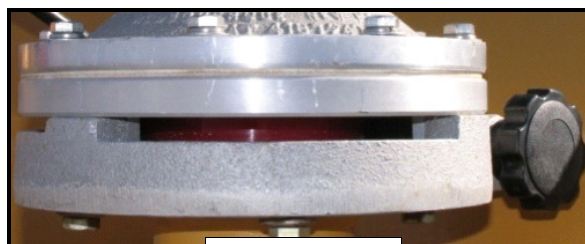
from the system solenoid control box as commanded by the cab control switch. When the hydraulic cylinder on the upper portion of the valve body is pressurized the cylinder extends to contact the guide disk and seal the opening on the lower portion of the valve and stop water flow. When the cab control system is OFF and the water pump is OFF the upper valve body incorporates a spring to apply pressure to the guide disk to seal the opening on the lower portion of the valve and stop flow. When the spray head switch is turned on hydraulic pressure retracts the hydraulic cylinder and pressurized water from the header pipe will unseat the guide disk and water will flow from the lower portion of valve.

#### Spray Head Adjustable Rings

The adjustable ring is used to control fan width and water flow. The ring may be loosened and rotated to expose more or less of the lower valve opening to control water fan width from 15° to 90°. The ring also may be used rotated to a 1/4" or 3/8" slot as shown in figure 2-2 and 2-3 to increase or decrease overall water flow. The greater the opening, the greater the water flow.

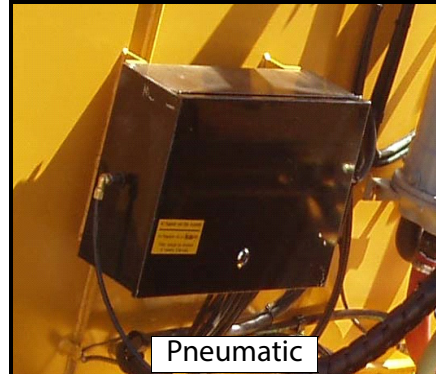


1/4" Opening

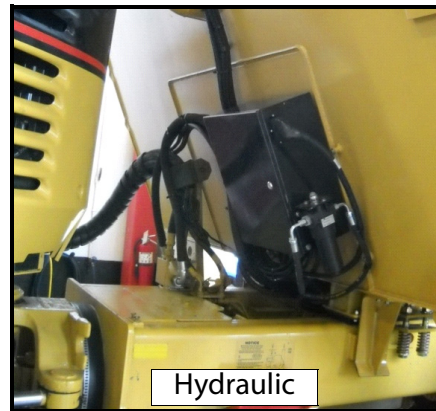


3/8" Opening

#### SOLENOID CONTROL BOX



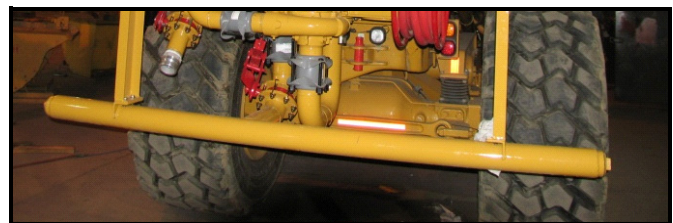
Pneumatic



Hydraulic

The control box assembly is mounted to the forward bulkhead or top skin of the MTT. The assembly contains pneumatic or hydraulic solenoid valves that direct pneumatic or hydraulic pressure to the spray head as commanded by the cab control box. The solenoids receive pneumatic pressure from the vehicle or hydraulic pressure from water pump oil circuit and 24 VDC power from the cab control box.

#### DUMP BAR



A spray bar that contains several rows of 3/8" drain holes to dispense water. A hydraulically operated BFFV controls the water supply to the dump bar. The BFFV is controlled electrically from the cab control box and is actuated by a hydraulic cylinder. The actuators receive hydraulic pressure from the solenoid control box assembly. Dump bars can be either gravity or pressure fed.

## SECTION 2

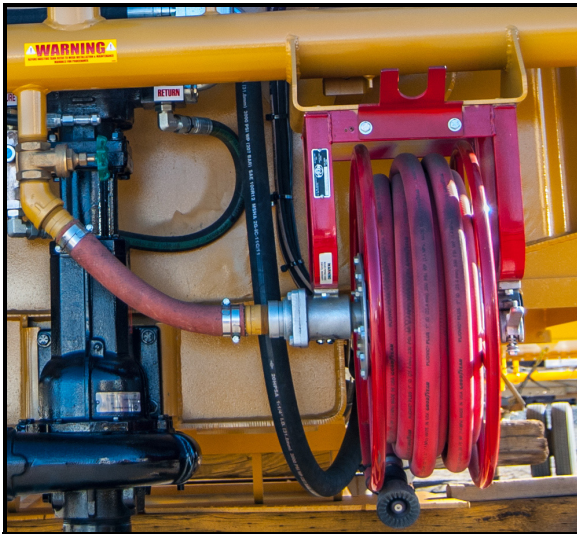
### System Description

#### FRONT BUMPER SPRAY BAR



A spray bar equipped with 1 or 2 spray heads mounted to the front bumper of the tractor. Pressurized water is supplied by a discharge hose attached to a pipe swivel at the forward bulkhead of the water tank that is connected to the water pump discharge piping.

#### HOSE REEL



A reel assembly that is located on the bottom aft end of the water tank fitted with a 1" or 1.5" diameter reinforced rubber hose and a fire fighting style nozzle. The hose reel assembly receives pressurized water from the pressurized manifold on the back of the tank to operate.

#### TANK DRAIN



A hydraulic BFV attached to the water tank pressure pipe is used to drain water from the water tank. The BFV is controlled electrically from the cab control box and is actuated by a hydraulic actuator. The actuators receive hydraulic pressure from the solenoid control box assembly. Tank drains can be either gravity or pressure fed.

#### OIL COOLER (IF EQUIPPED)



A water to oil heat exchanger that is located near the top aft bulkhead of the water tank. Hot oil from the drive motor return passes through the cooler, which receives pressurized cold water flowing from the spray bar and passing through the heat exchanger to cool the oil before returning the water to the water tank.



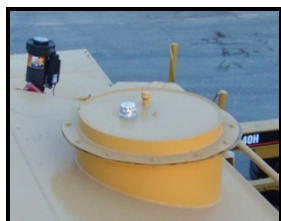
## **SECTION 2**

### **System Description**

#### **FIRE SUPPRESSION SYSTEM**

A system that consists of a 120 or 60 gallon stainless steel holding tank, an electric or pneumatic actuated shut-off valve, in-cab control switch, hosing and a foam eduction nozzle mounted to the water cannon.

#### **FOAM CONCENTRATE TANK**



A stainless steel tank mounted in the forward upper portion of the water tank. The holding tank contains a supply tube that extends to the bottom of the tank and connected to a

flexible hose at the top of the tank and then routed to the foam agent shut-off valve. The tank also contains a pressure/vacuum cap which keeps foreign matter out of the tank while providing for pressure relief and air displacement during temperature changes.

#### **ELECTRIC/PNEUMATIC SHUT-OFF VALVE**

The in-line shut-off valve is mounted on the foam tank upper lip and is controlled by the in-cab control FOAM switch. The shut-off valve is actuated by either an electric or pneumatic actuator that is controlled by the in-cab control switch. Once the shut-off valve is opened, foam concentrate will flow from the holding tank to the monitor nozzle if the monitor and water pump switches are ON.

#### **FOAM EDUCTION NOZZLE**



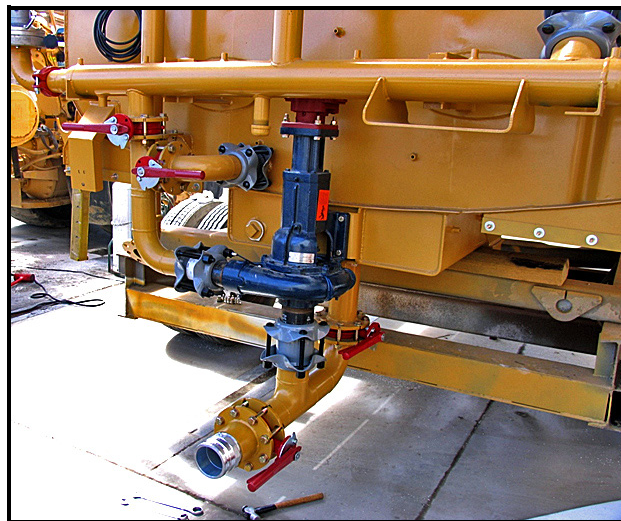
A manual or remote adjustable (fog/stream) nozzle is attached to the water cannon waterway. The nozzle inner housing uses monitor high pressure water to create a venture effect that will create a suction

force that pulls foam concentrate from the holding tank. Once foam concentrate is flowing, the nozzle proportions foam concentrate, water and air to produce finished foam. The nozzle can be adjusted to allow control of foam solution at a rate of 1%, 3% or 6%. Rate adjustment is obtained by replacing a removable disk.

#### **WATER CIRCULATION SYSTEM**

A system that consists of a hydraulic butterfly valve assembly and a perforated 4" pipe located inside the water tank. The system diverts the flow of water from the spray system to the perforated pipe, circulating the water in the tank. The circulation valve must be closed to operate the spray system, and water cannon.

#### **SUCTION LOADING (IF EQUIPPED)**



A second water pump mounted typically to the water pump sump at the rear of the MAC. The suction loading station is equipped with a manual diversion valve that will switch the hydraulic oil flow from the main discharge pump drive motor to the suction loading pump drive motor. When oil is diverted to the suction loading drive motor, it can pull water from a holding pond and fill the MAC. The suction loading option includes lengths of 4" suction hose equipped with quick couplers and a check valve inlet foot with a debris screen. The suction hoses are typically stored in tubes either built into the MAC or a hanging tube arrangement.



## SECTION 3

### Limitations

#### Contents

Water Pump .....3-1

#### **WATER PUMP**

The following cautions are operational limitations of Mega water pumps. Failure to heed these cautions may result in reduced pump life and severe water pump damage.

#### **CAUTION**

Do not operate the water pump in a dry sump. Operating the water pump with a dry sump will result in water pump component damage and reduced service life.

#### **CAUTION**

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

#### **CAUTION**

Limit water pump operation to 2.5 minutes when in a no-flow condition (not flowing water through spray heads, dump bar, water cannon, drain valve or hose reel). Water pump operation in a no flow condition will cause overheating of the water pump and damage to the shaft bearings and seals.

#### **CAUTION**

Avoid any sudden stoppage of water pump e.g.; disengaging water pump above LOW IDLE. Stopping water pump suddenly above LOW IDLE will result in shaft, impeller and drive motor damage.

#### **CAUTION**

Water pump RPM must not exceed the specifications listed below with engine at HIGH IDLE. Failure to ensure water pump speed is at or below specifications will result in reduced spray system component service life.

<b>PUMP MODEL</b>	<b>RPM</b>
M-3 PUMP	2350 ± 50
M-4 PUMP	1,900 ± 50
B-4 PUMP	2,000 ± 50
M-4B PUMP	2,000 ± 50

If water pump RPM is to out of the desired range, adjust the water pump hydraulic drive motor flow control valve to obtain specified RPM.

#### **NOTE**

The suction loading pump has a maximum vertical lift capability of 8-10 feet. Attempting to pump water into the tank from a reservoir that is more than 8-10 feet below the pump station will result in reduced suction loading performance.

## **SECTION 3**

### **Limitations**

## SECTION 4

### Normal Operations

#### Contents

Description .....	4-1	After Operations.....	4-6
Before Operations.....	4-1	Cold Weather Operation And Storage .....	4-6
Operations.....	4-2		

#### DESCRIPTION

This section provides the vehicle operator with step by step operating procedures for the installed MAC system. The information is separated into before operations, operations and after operations. A pocket size checklist of all listed procedures is also provided in the Appendix for use in the vehicle cab.

#### BEFORE OPERATIONS

These procedures are used to perform a walk-around inspection of the MEGA water tanker system before use or the beginning of a shift. This inspection is in addition to and does not replace the vehicle manufacturer's inspection requirements.

1. Chocks – As Required
2. Vehicle Parking Brake – ON
3. Cab Control Switches – SET OFF
4. **(If Equipped)** Foam Concentrate Level – CHECKED. At least 1" from the top of the foam tank.

#### ⚠ WARNING

Ensure PPE fall arrest harness is worn, adjusted properly and attached to an anchor point. Failure to use PPE properly may result in personnel injury or death.

5. Water Cannon – CHECKED & SECURED
  - a. Nozzle – Check for security and kinking of foam concentrate supply line.
6. Solenoid Control Box – CHECKED AND SECURED
7. MAC Front Mounts – CHECKED AND SECURE
8. Vehicle Hydraulic Tank – SERVICED
9. LH Hydraulic Hoses and Cabling – CHECKED FOR SECURITY AND LEAKS.

10. Chassis Pivot Bore Pins – INSTALLED AND SECURED
11. Tank Drain Petcocks – CLOSED
12. Spray Heads – SECURED & SET
13. **(If Equipped)** Oil Cooler – CHECKED FOR SECURITY AND LEAKS
14. Water Pump Assembly – CHECKED
  - a. Water Pump – Check to ensure volute case drain valve is closed.
  - b. Water pump and drive motor for evidence of overheating.
15. Hose Reel – CHECKED
16. **(Rear Bulkhead Location Only)** Solenoid Control Box – CHECKED.
17. RH Hydraulic Hosing & Cabling – CHECKED FOR SECURITY AND LEAKS.
18. **(If Equipped)** Front Bumper Spray Heads & Plumbing – SECURED AND SET.

## **SECTION 4**

### **System Description**

#### **OPERATIONS**

Use these procedures to safely operate the standard and optional systems installed on the MEGA water tanker.

#### **CAUTION**

Limit water pump operation to 2.5 minutes when in a no-flow condition (not flowing water through spray heads, dump bar, monitor, drain valve or hose reel). Water pump operation in a no flow condition will cause overheating of the water pump and damage to the shaft bearings and seals.

#### **SPRAY HEAD SYSTEM**

#### **NOTE**

Operating more than 4 spray heads simultaneously will greatly reduce the width and flow of active spray heads.

1. Cab Control SYSTEM/POWER Switch – ON
2. INTERMITTENT TIMER – SET
  - a. TIMER ON/OFF Dials – SET
  - b. INTERMITTENT Switch – SET
3. PUMP Switch – ON

#### **CAUTION**

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

4. Individual Spray Heads – SELECTED

*Once operations are complete:*

5. PUMP Switch – OFF

#### **CAUTION**

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

6. Cab Control SYSTEM/POWER Switch – OFF

#### **GPS AUTO MODE**

1. Cab Control POWER Switch – ON
2. PUMP Switch ON

#### **CAUTION**

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

3. AUTO – SET AS REQUIRED
  - a. RATE and SPEED Dials – SET
  - b. AUTO Switch – ON
4. Individual Spray Head Switches – ON

*Once operations are complete:*

5. Individual Spray Head Switches – OFF
6. PUMP Switch – OFF

#### **CAUTION**

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

7. Cab Control POWER Switch - OFF

#### **DUMP BAR**

1. Cab Control SYSTEM/POWER Switch – ON
2. INTERMITTENT – SET AS REQUIRED
  - a. TIMER ON/OFF Dials – SET
  - b. INTERMITTENT Switch – SET
3. PUMP Switch – ON

#### **CAUTION**

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

4. DUMP Bar Switch – ON

## SECTION 4

### System Description

Once operations are complete:

5. PUMP Switch – OFF

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

6. Cab Control SYSTEM/POWER Switch – OFF

#### WATER CANNON

1. Cab Control SYSTEM/POWER Switch – ON
2. PUMP Switch – ON

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

3. Water Cannon – Pointed in a safe direction.
4. MONITOR/BFV Switch – ON
5. Water Cannon Joystick – As Required.
6. MONITOR/BFV Switch – OFF

Once operations are complete:

7. Water Cannon Nozzle - STOW

#### CAUTION

Manual and remote adjustable nozzles must be stowed pointing vertically to reduce wear on water cannon joints. Leaving the nozzle in any other position will cause increased wear on water cannon joints and result in premature joint failure.

8. PUMP Switch – OFF

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

9. Cab Control SYSTEM/POWER Switch – OFF

#### FIRE SUPPRESSION SYSTEM

1. Cab Control SYSTEM/POWER Switch – ON
2. PUMP Switch – ON

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

3. Water Cannon – Pointed in a safe direction.
4. FOAM Switch – ON
5. MONITOR/BFV Switch – ON
6. Water Cannon Joystick – As Required.

Once operations are complete:

7. FOAM Switch – OFF
8. Water Cannon – Flow water through the monitor nozzle with the FOAM switch off to flush foam from the nozzle.
9. MONITOR/BFV Switch – OFF
10. Water Cannon Nozzle – STOW

#### CAUTION

Manual and remote adjustable nozzles must be stowed pointing vertically to reduce wear on water cannon joints. Leaving the nozzle in any other position will cause increased wear on water cannon joints and result in premature joint failure.



## SECTION 4

### System Description

11. PUMP Switch – OFF

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

12. Cab Control SYSTEM/POWER Switch – OFF

13. Vehicle – Wash or fresh water rinse areas exposed to the foam spray.

#### TANK DRAIN

1. Cab Control SYSTEM/POWER Switch – ON

2. PUMP Switch – ON

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

3. DRAIN Switch – ON

4. Water Level – Drain to desired level.

#### CAUTION

Do not operate the water pump in a dry sump. Dry running operation will cause water pump failure.

*Once operations are complete:*

5. DRAIN Switch – OFF

6. PUMP Switch – OFF

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

7. Cab Control SYSTEM/POWER Switch – OFF

#### HOSE REEL

1. Hose Nozzle – CLOSED
2. Hose – Deploy desired length.
3. Gate Valve – OPEN
4. Cab Control SYSTEM/POWER Switch – ON
5. PUMP Switch – ON

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

6. Vehicle RPM – SET
7. Hose Nozzle – OPEN as desired.

*Once operations are complete:*

8. Hose Nozzle – CLOSE
9. Vehicle RPM – LOW IDLE
10. PUMP Switch – OFF

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

11. (If Equipped) Cab Control SYSTEM/POWER Switch- OFF

12. Gate Valve – CLOSED

13. Hose – Reel in and stow hose nozzle.

#### WATER CIRCULATION SYSTEM

1. Fill water tank with appropriate fluid.
2. Start engine.
3. Cab Control SYSTEM/POWER Switch – ON.

## SECTION 4

### System Description

4. PUMP Switch – ON

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

5. DRAIN Switch – ON. (Opens BFV that allows water pressure to mix water tank contents)

*When operation is complete:*

6. DRAIN Switch – OFF.

#### NOTE

Keep the switch ON until water cannon or spray system is used to flow the water mixture. If switch is left ON, circulation system will significantly reduce water cannon reach.

7. PUMP Switch – OFF

8. SYSTEM/POWER Switch – OFF

#### SUCTION LOAD STATION

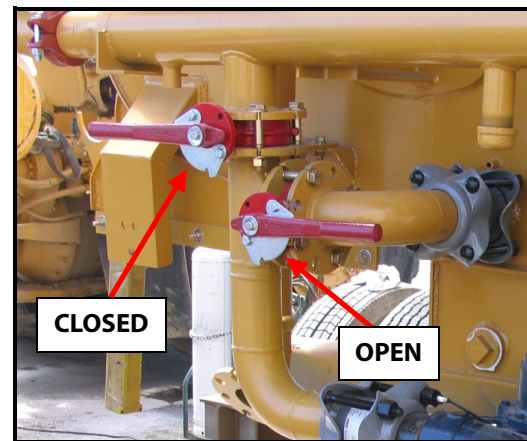
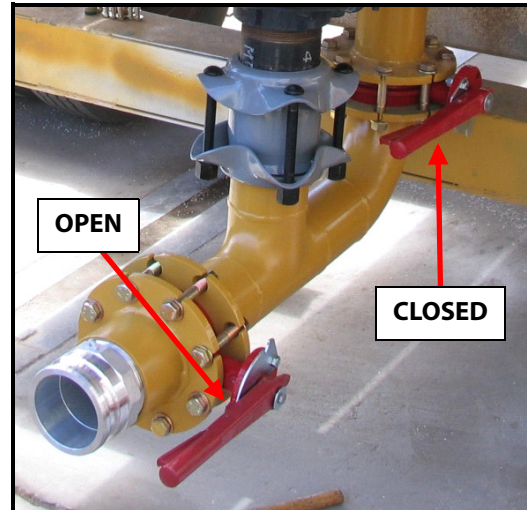
1. Place vehicle near water holding pond.
2. Secure vehicle and make unit safe for exiting cab.
3. Foot Valve – Serviceable
4. Suction Hoses – Inspect suction hoses for serviceability. Ensure suction hoses are connected properly to each other and the suction load inlet to prevent air leaks while in use.
5. Suction Hoses – Immerse in pond or water supply.

#### NOTE

The suction loading pump has a maximum vertical lift capability of 8-10 feet. Attempting to pump water into the tank from a reservoir that is more than 8-10 feet below the pump station will result in reduced suction loading performance.

6. Position all butterfly valves as indicated in the following pictures and in the order as follows:

- a. SUMP VALVE - **CLOSE**
- b. SUCTION VALVE - **OPEN**
- c. SPRAY BAR VALVE - **CLOSE**
- d. TANK FILL VALVE - **OPEN**



#### NOTE

Opening and closing valves in this sequence allows the water in the suction loading sump built inside of the tank to flood the water pump and suction hose. This will allow water pump to lift water from pond.

7. Ensure water pump and suction hoses are full of water before operating pump.

#### CAUTION

Operating the water pump in a dry sump will result in shaft seal damage.

## SECTION 4

### System Description

8. Ensure foot valve remains submerged in water.
9. Start chassis engine.
10. At LOW IDLE turn SYSTEM/POWER switch ON.
11. (DiSCS Only) AUX2 - ON
12. Turn PUMP Switch – ON
3. Chocks – As Required
4. Water Cannon – CHECKED & SECURED
5. Vehicle Hydraulic Tank - CHECKED
6. Tank Lines and Hoses – SECURED
7. Tank Drain Petcocks – As Required.

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

13. Increase engine RPM to HIGH IDLE.

*When unit is full of water*

14. Reduce engine RPM to LOW IDLE.

15. PUMP Switch – OFF

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

16. AUX2 - OFF
17. SYSTEM/POWER Switch OFF.
18. Turn engine OFF.
19. Disconnect, drain and stow suction hoses.

#### AFTER OPERATIONS

These procedures are used to perform a walk-around inspection after using the MEGA water tanker systems. This inspection is in addition to and does not replace the vehicle manufacturer's inspection requirements.

1. Vehicle parking brake – ON
2. Cab Control Switches – SET OFF

8. Spray Heads – SECURED & SET
9. **(If Equipped)** Oil Cooler – CHECKED FOR SECURITY AND LEAKS
10. Water Pump – CHECKED
  - a. Water Pump – Check for damage and volute case drain valve set as required.
11. Hose Reel – CHECKED
12. Solenoid Control Box – CHECKED

#### COLD WEATHER OPERATION AND STORAGE

#### CAUTION

Ice will cause serious damage to water pump, spray heads, butterfly valves, water-to-oil cooler, and the water cannon if water is allowed to freeze in the volute case, water piping, or on top of a closed butterfly valve. Ensure **all water is drained** from system when the temperatures are expected to fall **below 4.4°C (40°F)** for any period of time. Failure to ensure all systems are drained and free from standing water will result in shaft, operator, diaphragm, drive motor, water pump, water-to-oil cooler, or butterfly valve damage when operation is attempted with ice in the housings.

To ensure all water is drained from tank check the following:

1. Park unit on a slight nose up angle to allow water to flow to the rear of the tank.
2. Drain the tank using an appropriate method until the Water Level Gauge reads EMPTY.

## SECTION 4

### System Description

3. Open all drain petcocks (water pump, suction load pump, rear spray bar, front spray bar, etc.).
  4. Remove water pump sump cover.
  5. Start engine.
  6. Cab Control SYSTEM/POWER Switch – ON
  7. MONITOR/BFV Switch – ON
  8. DUMP BAR Switch – ON
  9. DRAIN Switch – ON
  10. Water Cannon Nozzle – Pointed fully DOWN
  11. Cab Control SYSTEM/POWER Switch – OFF
  12. Turn engine off.
  13. Hose Reel – DRAIN
    - a. Hose – UNWIND
    - b. Nozzle – Fully OPEN
    - c. Gate Valve – OPEN
    - d. Allow water to drain.
    - e. Hose – REWIND
    - f. Gate Valve – CLOSED
    - g. NOZZLE – CLOSED
  14. Check to ensure all water has drained from tank.
7. Individual Spray Head Switches – OFF
  8. DUMP BAR Switch – OFF
  9. DRAIN Switch – OFF
  10. MONITOR/BFV Switch – OFF
  11. Cab Control SYSTEM/POWER Switch – OFF
  12. Turn engine off.

#### TO REACTIVATE UNIT:

1. Lubricate water pump bearings as instructed in -2 technical manual.
2. Inspect tank interior to ensure it is clean, if the tank is coated, ensure coating integrity, clean or repair as required.
3. Install sump cover with new gasket.
4. Close all drain valves and petcocks.
5. Start engine.
6. Control SYSTEM/POWER Switch – ON



# **SECTION 4**

## **Normal Operations**

## SECTION 5

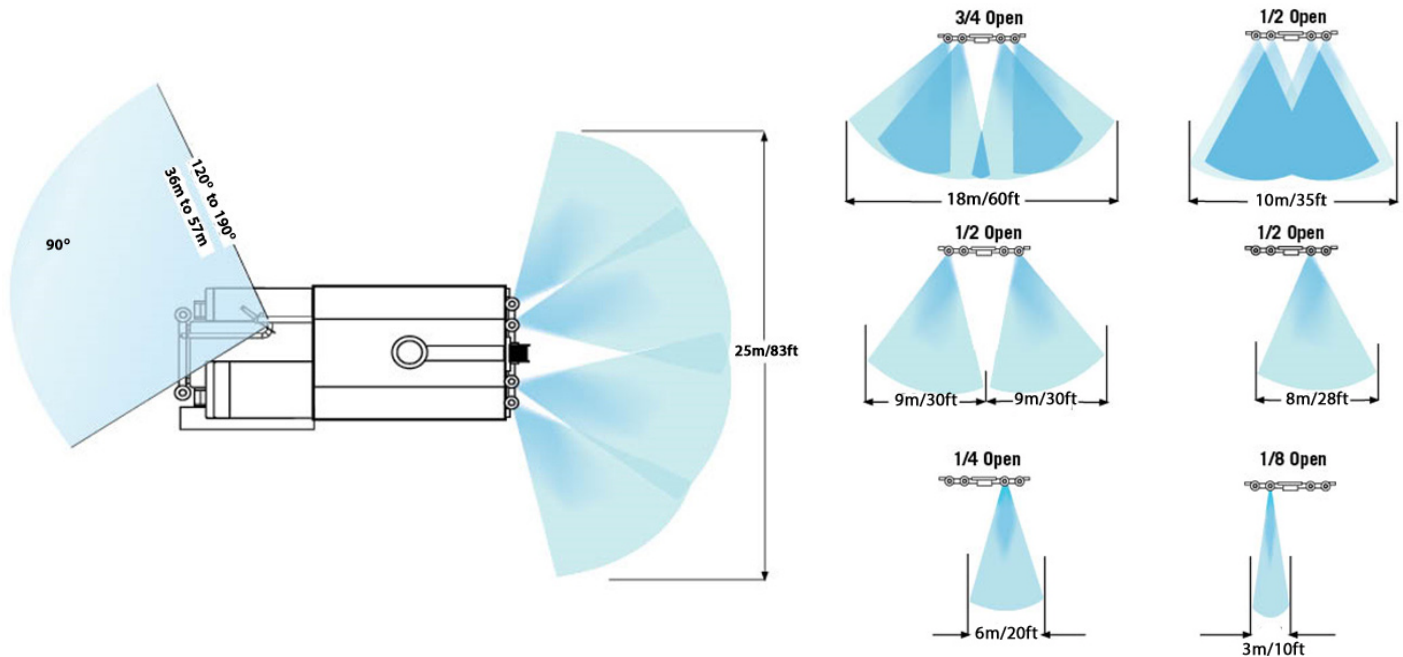
### Performance

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#### SPRAY PATTERN AND REACH (TYPICAL)

The figures below illustrate width and reach of spray heads and water cannon. Typical spray head deflector fan adjustments are also depicted.



#### TYPICAL SPRAY SYSTEM DURATION

The table below contains a standard vehicle spray duration based on spray head deflector opening, vehicle speed and 18,927 liter (5,000 gallon) capacity.

Number of Spray Heads and Opening Width	LPM/GPM	Ground Speed (KPH/MPH)	Max. Distance (Km./Miles)
2 Spray Heads@ 1/4"	3611/954	16/10	1.6/1.0
2 Spray Heads@ 1/4"	3611/954	24/15	2.5/1.6
2 Spray Heads@ 3/8"	4705/1243	16/10	1.2/0.8
2 Spray Heads@ 3/8"	4705/1243	24/15	1.9/1.2
4 Spray heads @ 1/4"	5693/1504	16/10	1.1/0.7
4 Spray heads @ 1/4"	5693/1504	24/15	1.6/1.0
4 Spray heads @ 3/8"	5950/1572	16/10	0.9/0.6
4 Spray heads @ 3/8"	5950/1572	24/15	1.6/1.0

## SECTION 5

### Performance

#### PRECISION WATERING

The following tables provide precision watering calculations for the installed spray system. Each table is categorized by size of spray head deflector opening at a full fan width for 2 or 4 spray heads.

##### 1/4 OPENING & FULL FAN (18,927 lit/5,000 gal TANK)

			2 SPRAY HEADS (FLOW 3611 lpm/954 gpm)				4 SPRAY HEADS (FLOW 5693 lpm/1504 gpm)			
			SPRAY	TOTAL	DISPERSAL	WATER LAYER	MAX	TOTAL	DISPERSAL	WATER LAYER
			DISTANCE	COVERAGE			DISTANCE	COVERAGE		
SPEED			(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)	(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)
U S	MPH	FPM	(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)	(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)
	2	176	922	76562	0.065	0.105	585	43883	0.114	0.183
	5	440	2306	191405	0.026	0.042	1463	109707	0.046	0.073
	10	880	4612	382809	0.013	0.021	2926	219415	0.023	0.037
	15	1320	6918	574214	0.009	0.014	4388	329122	0.015	0.024
M E T R I C	KPM	MPM	(METER)	(M SQ)	(L/M SQ)	(MM)	(METERS)	(M SQ)	(M/M SQ)	(MM)
	3	53	278	6945	2.725	2.67	176	4053	4.670	4.65
	8	134	702	17559	1.078	1.07	445	10246	1.847	1.84
	16	268	1405	35118	0.539	0.53	891	20493	0.924	0.94
	24	402	2107	52677	0.359	0.35	1336	30739	0.616	0.61

##### 3/8 OPENING & FULL FAN (18,927 lit/5,000 gal TANK)

			2 SPRAY HEADS (FLOW 4705 lpm/1243 gpm)				4 SPRAY HEADS (FLOW 5950 lpm/1572 gpm)			
			SPRAY	TOTAL	DISPERSAL	WATER	MAX	TOTAL	DISPERSAL	WATER
			DISTANCE	COVERAGE		LAYER	DISTANCE	COVERAGE		LAYER
SPEED			(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)	(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)
U S	MPH	FPM								
	2	176	708	55221	0.091	0.145	560	36387	0.137	0.220
	5	440	1770	138053	0.036	0.058	1399	90967	0.055	0.088
	10	880	3540	276106	0.018	0.029	2799	181934	0.027	0.044
	15	1320	5310	414159	0.012	0.019	4198	272901	0.018	0.029
M E T R I C	KPM	MPM	(METER)	(M SQ)	(L/M SQ)	(MM)	(METERS)	(M SQ)	(M/M SQ)	(MM)
	3	53	213	5117	3.699	3.68	169	3372	5.613	5.59
	8	134	539	12937	1.463	1.47	426	8525	2.220	2.23
	16	268	1078	25874	0.731	0.74	853	17050	1.110	1.11
	24	402	1617	38811	0.488	0.48	1279	25575	0.740	0.74

## SECTION 5

### Performance

#### 1/4 OPENING & FULL FAN (22,712 lit/6,000 gal TANK)

			2 SPRAY HEADS (FLOW 3611 lpm/954 gpm)				4 SPRAY HEADS (FLOW 5693 lpm/1504 gpm)			
			SPRAY DISTANCE	TOTAL COVERAGE	DISPERSAL	WATER LAYER	MAX DISTANCE	TOTAL COVERAGE	DISPERSAL	WATER LAYER
SPEED			(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)	(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)
U S	2	176	1107	91874	0.065	0.105	702	52660	0.114	0.183
	5	440	2767	229686	0.026	0.042	1755	131649	0.046	0.073
	10	880	5535	459371	0.013	0.021	3511	263298	0.023	0.037
	15	1320	8302	689057	0.009	0.014	5266	394947	0.015	0.024
M E T R I C	KPM	MPM	(METER)	(M SQ)	(L/M SQ)	(MM)	(METERS)	(M SQ)	(M/M SQ)	(MM)
	3	53	333	8334	2.725	2.67	211	4863	4.670	4.65
	8	134	843	21070	1.078	1.07	535	12296	1.847	1.84
	16	268	1686	42141	0.539	0.53	1069	24591	0.924	0.94
	24	402	2528	63211	0.359	0.35	1604	36887	0.616	0.61

#### 3/8 OPENING & FULL FAN (22,712 lit/6,000 gal TANK)

			2 SPRAY HEADS (FLOW 4705 lpm/1243 gpm)				4 SPRAY HEADS (FLOW 5950 lpm/1572 gpm)			
			SPRAY DISTANCE	TOTAL COVERAGE	DISPERSAL	WATER LAYER	MAX DISTANCE	TOTAL COVERAGE	DISPERSAL	WATER LAYER
SPEED			(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)	(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)
U S	2	176	850	66265	0.091	0.145	672	43664	0.137	0.220
	5	440	2124	165664	0.036	0.058	1679	109160	0.055	0.088
	10	880	4248	331327	0.018	0.029	3359	218321	0.027	0.044
	15	1320	6372	496991	0.012	0.019	5038	327481	0.018	0.029
M E T R I C	KPM	MPM	(METER)	(M SQ)	(L/M SQ)	(MM)	(METERS)	(M SQ)	(M/M SQ)	(MM)
	3	53	256	6140	3.699	3.68	202	4046	5.613	5.59
	8	134	647	15524	1.463	1.47	511	10230	2.220	2.23
	16	268	1294	31049	0.731	0.74	1023	20460	1.110	1.11
	24	402	1941	46573	0.488	0.48	1534	30690	0.740	0.74



## SECTION 5

### Performance

#### 1/4 OPENING & FULL FAN (26,497 lit/7,000 gal TANK)

			2 SPRAY HEADS (FLOW 3611 lpm/954 gpm)				4 SPRAY HEADS (FLOW 5693 lpm/1504 gpm)			
	SPEED		SPRAY DISTANCE	TOTAL COVERAGE	DISPERSAL	WATER LAYER	MAX DISTANCE	TOTAL COVERAGE	DISPERSAL	WATER LAYER
	MPH	FPM	(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)	(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)
<b>U S</b>	2	176	1291	107187	0.065	0.105	819	61436	0.114	0.183
	5	440	3229	267966	0.026	0.042	2048	153590	0.046	0.073
	10	880	6457	535933	0.013	0.021	4096	307181	0.023	0.037
	15	1320	9686	803899	0.009	0.014	6144	460771	0.015	0.024
<b>M E T R I C</b>	KPM	MPM	(METER)	(M SQ)	(L/M SQ)	(MM)	(METERS)	(M SQ)	(M/M SQ)	(MM)
	3	53	389	9723	2.725	2.67	247	5674	4.670	4.65
	8	134	983	24582	1.078	1.07	624	14345	1.847	1.84
	16	268	1967	49164	0.539	0.53	1247	28689	0.924	0.94
	24	402	2950	73745	0.359	0.35	1871	43034	0.616	0.61

#### 3/8 OPENING & FULL FAN (26,497 lit/7,000 gal TANK)

			2 SPRAY HEADS (FLOW 4705 lpm/1243 gpm)				4 SPRAY HEADS (FLOW 5950 lpm/1572 gpm)			
	SPEED		SPRAY DISTANCE	TOTAL COVERAGE	DISPERSAL	WATER LAYER	MAX DISTANCE	TOTAL COVERAGE	DISPERSAL	WATER LAYER
	MPH	FPM	(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)	(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)
<b>U S</b>	2	176	991	77310	0.091	0.145	784	50941	0.137	0.220
	5	440	2478	193274	0.036	0.058	1959	127354	0.055	0.088
	10	880	4956	386549	0.018	0.029	3919	254707	0.027	0.044
	15	1320	7434	579823	0.012	0.019	5878	382061	0.018	0.029
<b>M E T R I C</b>	KPM	MPM	(METER)	(M SQ)	(L/M SQ)	(MM)	(METERS)	(M SQ)	(M/M SQ)	(MM)
	3	53	298	7163	3.699	3.68	236	4720	5.613	5.59
	8	134	755	18111	1.463	1.47	597	11935	2.220	2.23
	16	268	1509	36223	0.731	0.74	1193	23870	1.110	1.11
	24	402	2264	54334	0.488	0.48	1790	35804	0.740	0.74

## SECTION 5

### Performance

#### 1/4 OPENING & FULL FAN (30,283 lit/8,000 gal TANK)

			2 SPRAY HEADS (FLOW 3611 lpm/954 gpm)				4 SPRAY HEADS (FLOW 5693 lpm/1504 gpm)			
SPEED			SPRAY DISTANCE	TOTAL COVERAGE	DISPERSAL	WATER LAYER	MAX DISTANCE	TOTAL COVERAGE	DISPERSAL	WATER LAYER
MPH	FPM		(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)	(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)
<b>U S</b>	2	176	1476	122499	0.065	0.105	936	70213	0.114	0.183
	5	440	3690	306247	0.026	0.042	2340	175532	0.046	0.073
	10	880	7379	612495	0.013	0.021	4681	351064	0.023	0.037
	15	1320	11069	918742	0.009	0.014	7021	526596	0.015	0.024
<b>M E T R I C</b>	KPM	MPM	(METER)	(M SQ)	(L/M SQ)	(MM)	(METERS)	(M SQ)	(M/M SQ)	(MM)
	3	53	444	11112	2.725	2.67	282	6484	4.670	4.65
	8	134	1124	28094	1.078	1.07	713	16394	1.847	1.84
	16	268	2248	56188	0.539	0.53	1426	32788	0.924	0.94
	24	402	3371	84283	0.359	0.35	2138	49183	0.616	0.61

#### 3/8 OPENING & FULL FAN (30,283 lit/8,000 gal TANK)

			2 SPRAY HEADS (FLOW 4705 lpm/1243 gpm)				4 SPRAY HEADS (FLOW 5950 lpm/1572 gpm)			
SPEED			SPRAY DISTANCE	TOTAL COVERAGE	DISPERSAL	WATER LAYER	MAX DISTANCE	TOTAL COVERAGE	DISPERSAL	WATER LAYER
MPH	FPM		(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)	(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)
<b>U S</b>	2	176	1133	88354	0.091	0.145	896	58219	0.137	0.220
	5	440	2832	220885	0.036	0.058	2239	145547	0.055	0.088
	10	880	5664	441770	0.018	0.029	4478	291094	0.027	0.044
	15	1320	8496	662655	0.012	0.019	6718	436641	0.018	0.029
<b>M E T R I C</b>	KPM	MPM	(METER)	(M SQ)	(L/M SQ)	(MM)	(METERS)	(M SQ)	(M/M SQ)	(MM)
	3	53	341	8187	3.699	3.68	270	5395	5.613	5.59
	8	134	862	20699	1.463	1.47	682	13640	2.220	2.23
	16	268	1725	41399	0.731	0.74	1364	27280	1.110	1.11
	24	402	2587	62098	0.488	0.48	2046	40920	0.740	0.74

## SECTION 5

### Performance

#### 1/4 OPENING & FULL FAN (34,068 lit/9,000 gal TANK)

			2 SPRAY HEADS (FLOW 3611 lpm/954 gpm)				4 SPRAY HEADS (FLOW 5693 lpm/1504 gpm)			
	SPEED		SPRAY DISTANCE	TOTAL COVERAGE	DISPERSAL	WATER LAYER	MAX DISTANCE	TOTAL COVERAGE	DISPERSAL	WATER LAYER
	MPH	FPM	(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)	(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)
<b>U S</b>	2	176	1660	137811	0.065	0.105	1053	78989	0.114	0.183
	5	440	4151	344528	0.026	0.042	2633	197473	0.046	0.073
	10	880	8302	689057	0.013	0.021	5266	394947	0.023	0.037
	15	1320	12453	1033585	0.009	0.014	7899	592420	0.015	0.024
<b>M E T R I C</b>	KPM	MPM	(METER)	(M SQ)	(L/M SQ)	(MM)	(METERS)	(M SQ)	(M/M SQ)	(MM)
	3	53	500	12501	2.725	2.67	317	7295	4.670	4.65
	8	134	1264	31606	1.078	1.07	802	18443	1.847	1.84
	16	268	2528	63211	0.539	0.53	1604	36887	0.924	0.94
	24	402	3793	94817	0.359	0.35	2406	55330	0.616	0.61

#### 3/8 OPENING & FULL FAN (34,068 lit/9,000 gal TANK)

			2 SPRAY HEADS (FLOW 4705 lpm/1243 gpm)				4 SPRAY HEADS (FLOW 5950 lpm/1572 gpm)			
	SPEED		SPRAY DISTANCE	TOTAL COVERAGE	DISPERSAL	WATER LAYER	MAX DISTANCE	TOTAL COVERAGE	DISPERSAL	WATER LAYER
	MPH	FPM	(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)	(FT)	(SQ FT)	(GAL/SQ FT)	(IN/SQ FT)
<b>U S</b>	2	176	1274	99398	0.091	0.145	1008	65496	0.137	0.220
	5	440	3186	248496	0.036	0.058	2519	163740	0.055	0.088
	10	880	6372	496991	0.018	0.029	5038	327481	0.027	0.044
	15	1320	9558	745487	0.012	0.019	7557	491221	0.018	0.029
<b>M E T R I C</b>	KPM	MPM	(METER)	(M SQ)	(L/M SQ)	(MM)	(METERS)	(M SQ)	(M/M SQ)	(MM)
	3	53	384	9210	3.699	3.68	303	6069	5.613	5.59
	8	134	970	23286	1.463	1.47	767	15345	2.220	2.23
	16	268	1941	46573	0.731	0.74	1534	30690	1.110	1.11
	24	402	2911	69859	0.488	0.48	2302	46035	0.740	0.74

## SECTION 5

### Performance

#### FIRE SUPPRESSION SYSTEM

The table below shows consumption rates and duration of foam suppression concentrate and water based upon a standard flow rate 1893 lpm/500 gpm and 3% foam proportioning.

<b>Foam Concentrate liters/gallons</b>	<b>Water liters/gallons</b>	<b>Duration</b>
57/15	1893/500	1 minute
114/30	3786/1000	2 minutes
228/60	7571/2000	4 minutes
341/90	11,357/3000	6 minutes
455/120	15,142/4000	8 minutes



## **SECTION 5**

### **Performance**

## SECTION 6

### Employment

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#### DESCRIPTION

This section provides descriptions, guidance, and techniques used when employing the MEGA spray system. These best practices will provide operators with several different choices that will result in maximum system performance in most applications with ever changing conditions.

#### GPS GROUND SPEED SENSING

The resident software provides a consistent layer of water on haul roads regardless of ground speed. The software minimizes water usage and prevents puddling at stops and haul ramps. Nominal settings produce about 3 liters per cubic meter regardless of ground speed. This maximizes water usage and extends the duration of a given load of water. Adjustments are provided to increase or decrease the layer of water dispersed, as well as setting maximum water flow at a desired ground speed. All automatic system protection features are active regardless of auto or manual modes.

Here are several examples of initial system setup and adjustments:

##### EXAMPLE 1

###### *Setup:*

1. **RATE** - Set at midpoint (50%)
2. **SPEED** - Set at mid-point (approximately 15 MPH/24 KPH)
3. **AUTO** – ON
4. **Spray heads** - Select all 4 spray heads
5. **Vehicle speed** – Less than 21 KPH/14 MPH

###### *Observed Operation:*

1. 2 Outer spray heads on with a timed cycle, **shortened** ON cycle durations
2. 2 Center spray heads OFF (reduced volume)

##### EXAMPLE 2

###### *Setup:*

1. **RATE** - Set at midpoint (50%)
2. **SPEED** - Set at mid-point (approximately 24 KPH/15 MPH)
3. **AUTO** – ON
4. **Spray heads** - Select all 4 spray heads
5. **Vehicle speed** – Greater than 27 KPH/16 MPH

###### *Observed Operation:*

1. All 4 requested spray heads ON, NO timed cycle

##### EXAMPLE 3

###### *Setup:*

1. **RATE** - Set LESS than midpoint ( $\leq 50\%$ )
2. **SPEED** - Set at mid-point (approximately 24 KPH/15 MPH)
3. **AUTO** – ON
4. **Spray heads** - Select all 4 spray heads
5. **Vehicle speed** – Less than 21 KPH/14 MPH

###### *Observed Operation:*

1. 2 Outer spray heads on with a timed cycle, **shortened** ON cycle durations
2. 2 Center spray heads OFF (reduced volume)

##### EXAMPLE 4

###### *Setup:*

1. **RATE** - Set at GREATER than midpoint ( $\geq 50\%$ )
2. **SPEED** - Set at mid-point (approximately 24 KPH/15 MPH)
3. **AUTO** – ON
4. **Spray heads** - Select all 4 spray heads
5. **Vehicle speed** – Less than 21 KPH/14 MPH

###### *Observed Operation:*

1. 2 Outer spray heads on with a timed cycle, **increased** ON cycle durations
2. 2 Center spray heads OFF (reduced volume)

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### **Employment**

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# MAC/MAT OPERATOR'S CHECKLIST



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**MAC/MAT-OPS(CL)-1****13 Nov 2013****BEFORE OPERATIONS**

These procedures are used to perform a walk-around inspection of the MEGA water tanker system before use or beginning of a shift. This inspection is in addition to and does not replace the vehicle manufacturer's inspection requirements.

1. Chocks – As Required.
2. Vehicle Parking Brake – ON
3. Cab Control Switches – SET OFF
4. **(If Equipped)** Foam Concentrate Level – CHECKED  
(No more than 1" from the top of the tank.)

**WARNING**

Ensure PPE fall arrest harness is worn, adjusted properly and attached to an anchor point. Failure to use PPE properly may result in personnel injury or death.

5. Water Cannon – CHECKED AND SECURED
  - a. Nozzle – Check for security and kinking of foam concentrate supply line.
6. **(Front Bulkhead Location Only)** Solenoid Control Box – CHECK AND SECURED

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7. MAC Front Mounts – CHECKED AND SECURED
8. Vehicle Hydraulic Tank – SERVICED
9. LH Hydraulic Hoses & Cabling – CHECKED FOR SECURITY AND LEAKS
10. Chassis Pivot Bore Pins – INSTALLED AND SECURED
11. Tank Drain Petcocks – CLOSED
12. Spray Heads – SECURED AND SET
13. **(If Equipped)** Oil Cooler – CHECKED FOR SECURITY AND LEAKS
14. Water Pump – CHECKED
  - a. Water Pump – Check to ensure volute case drain valve is closed. Pump bracket for evidence of overheating.
  - b. Drive Motor – Evidence of overheating.
15. Hose Reel – CHECKED
16. **(Rear Bulkhead Location Only)** Solenoid Control Box – CHECKED

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17. RH Hydraulic Hoses and Cabling – CHECKED FOR SECURITY AND LEAKS.

18. **(If Equipped)** Front Bumper Spray Heads and Plumbing – SECURED AND SET

**OPERATIONS**

Use these procedures to safely operate the standard and optional systems installed on the MEGA water tanker.

**CAUTION**

Limit water pump operation to 2.5 minutes when in a no-flow condition (no flow from spray heads, dump bar, water cannon, drain valve or hose reel). Water pump operation in a no flow condition will cause overheating of the water pump and damage to the shaft bearings.

**SPRAY HEAD SYSTEM****NOTE**

Operating more than 3 spray heads simultaneously will greatly reduce the width and flow of active spray heads.

1. Cab Control SYSTEM/POWER Switch – ON
2. INTERMITTENT – SET AS REQUIRED
  - a. TIMER ON/OFF Dials – SET

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b. INTERMITTENT Switch – SET

3. PUMP Switch – ON

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

4. Individual Spray Head Switches – ON

*Once operations are complete:*

5. Individual Spray Head Switches – OFF

6. PUMP Switch – OFF

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

7. Cab Control SYSTEM/POWER Switch – OFF

#### GPS AUTO MODE

1. Cab Control POWER Switch – ON

2. RATE and SPEED Dials - SET

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3. AUTO – ON AS REQUIRED
4. Desired Spray Head Switches – ON
5. PUMP Switch ON

**CAUTION**

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

*Once operations are complete:*

6. PUMP Switch OFF

**CAUTION**

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

7. AUTO – OFF
8. Individual Spray Head Switches – OFF
9. Cab Control POWER Switch - OFF

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#### DUMP BAR

1. Cab Control SYSTEM/POWER Switch – ON
2. INTERMITTENT – SET AS REQUIRED
  - a. Timer ON/OFF Dials – SET
  - b. INTERMITTENT Switch – SET
3. PUMP Switch ON

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

4. DUMP BAR Switch – ON

*Once operations are complete:*

5. DUMP BAR Switch – OFF
6. PUMP Switch OFF

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

7. Cab Control SYSTEM/POWER Switch – OFF

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**MAC/MAT-OPS(CL)-1****13 Nov 2013****WATER CANNON**

1. Cab Control SYSTEM/POWER Switch – ON
2. PUMP Switch ON

**CAUTION**

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

3. Water Cannon – Pointed in a safe direction.
4. MONITOR/BFV Switch – ON
5. Water Cannon Joystick – As Required.
6. MONITOR/BFV Switch – OFF

*Once operations are complete:*

7. Water Cannon Nozzle - STOW

**CAUTION**

Manual and remote adjustable nozzles must be stowed pointing vertically to reduce wear on water cannon joints. Leaving the nozzle in any other position will cause increased wear on water cannon joints and result in premature joint failure.

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8. PUMP Switch OFF

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

9. Cab Control SYSTEM/POWER Switch – OFF

#### FIRE SUPPRESSION SYSTEM

1. Cab Control SYSTEM/POWER Switch – ON

2. PUMP Switch ON

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

3. Water Cannon – Pointed in a safe direction.
4. FOAM Switch – ON
5. MONITOR/BFV Switch – ON
6. Water Cannon Joystick – As Required.

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*Once operations are complete:*

7. FOAM Switch – OFF
8. Water Cannon – Flow water through the water cannon nozzle with the FOAM switch off to flush foam from the nozzle.
9. MONITOR/BFV Switch – OFF
10. Water Cannon Nozzle - STOW

**CAUTION**

Manual and remote adjustable nozzles must be stowed pointing vertically to reduce wear on water cannon joints. Leaving the nozzle in any other position will cause increased wear on water cannon joints and result in premature joint failure.

11. PUMP Switch OFF

**CAUTION**

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

12. Cab Control SYSTEM/POWER Switch – OFF

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13. Vehicle – Wash or fresh water rinse areas exposed to the foam spray.

#### TANK DRAIN

1. Cab Control SYSTEM/POWER Switch – ON
2. PUMP Switch ON

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

3. DRAIN Switch – ON
4. Water Level – Drain to desired level.

#### CAUTION

Do not operate the water pump in a dry sump. Dry running operation will cause water pump failure.

*Once operations are complete:*

5. DRAIN Switch – OFF

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6. PUMP Switch OFF

**CAUTION**

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

7. Cab Control SYSTEM/POWER Switch – OFF

**HOSE REEL**

1. Hose Nozzle – CLOSED
2. Hose – Deploy desired length.
3. Gate Valve – OPEN
4. Cab Control SYSTEM/POWER Switch – ON
5. PUMP Switch ON

**CAUTION**

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

6. Vehicle RPM – SET
7. Hose Nozzle – OPEN as desired.

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*Once operations are complete:*

8. Hose Nozzle – CLOSE
9. Vehicle RPM – LOW IDLE
10. PUMP Switch OFF

#### **CAUTION**

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

11. Cab Control SYSTEM/POWER Switch – OFF
12. Gate Valve – CLOSED
13. Hose – Reel in and stow hose nozzle.

#### **WATER CIRCULATION SYSTEM**

1. Fill water tank with appropriate fluid.
2. Start engine.
3. Cab Control SYSTEM/POWER Switch – ON.
4. PUMP Switch – ON.

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5. DRAIN Switch – ON. (Opens BFV that allows water pressure to mix water tank contents)

*When operation is complete:*

6. DRAIN Switch – OFF.
7. PUMP Switch – OFF
8. SYSTEM/POWER Switch – OFF

**SUCTION LOAD STATION**

1. Place vehicle near water holding pond.
2. Secure vehicle and make unit safe for exiting cab.
3. Foot Valve – Serviceable
4. Suction Hoses – Inspect suction hoses for serviceability. Ensure suction hoses are connected properly to each other and the suction load inlet to prevent air leaks while in use.
5. Suction Hoses – Immerse in pond or water supply.

**NOTE**

The suction loading pump has a maximum vertical lift capability of 8-10 feet. Attempting to pump water into the tank from a reservoir that is more than 8-10 feet below the pump station will result in reduced suction loading performance.

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6. Position all butterfly valves as indicated in the following pictures and in the order as follows:
  - a. SUMP VALVE - **CLOSED**
  - b. SUCTION VALVE - **OPEN**
  - c. SPRAY BAR VALVE - **CLOSED**
  - d. TANK FILL VALVE - **OPEN**

7. Ensure water pump and suction hoses are full of water before operating pump.

#### CAUTION

Operating the water pump in a dry sump will result in shaft seal damage.

8. Ensure foot valve remains submerged in water.
9. Start chassis engine.
10. At LOW IDLE turn SYSTEM/POWER switch ON.
11. (DiSCS Only) AUX2 - ON
12. PUMP Switch ON

#### CAUTION

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

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13. Increase engine RPM to HIGH IDLE.

*When unit is full of water*

14. Reduce engine RPM to LOW IDLE.

15. PUMP Switch OFF

#### **CAUTION**

Engaging/disengaging the water pump above LOW IDLE may result in water pump component damage and reduced service life.

16. AUX2 - OFF

17. SYSTEM/POWER Switch OFF.

18. Turn engine OFF.

19. Disconnect, drain and stow suction hoses.

#### **AFTER OPERATIONS**

These procedures are used to perform a walk-around inspection after using the MEGA water tanker systems. This inspection is in addition to and does not replace the vehicle manufacturer's inspection requirements.

1. Vehicle parking brake – ON

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2. Cab Control Switches – SET OFF
3. Chocks – As Required.
4. Water Cannon – CHECKED AND SECURED
5. Vehicle Hydraulic Tank – CHECKED
6. Tank Lines and Hoses – SECURED
7. Tank Drain Petcocks – As Required.
8. Spray Heads – SECURED AND SET
9. **(If Equipped)** Oil Cooler – CHECKED FOR SECURITY AND LEAKS
10. Water Pump Assembly – CHECKED
  - a. Water Pump – Check for damage and volute case drain valve set as required.
11. Hose Reel – CHECKED
12. Solenoid Control Box – CHECKED

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#### COLD WEATHER OPERATION AND STORAGE

##### CAUTION

Ice will cause serious damage to water pump, spray heads, butterfly valves, water-to-oil cooler, and the water cannon if water is allowed to freeze in the volute case, water piping, or on top of a closed butterfly valve. Ensure **all water is drained** from system when the temperatures are expected to fall **below 4.4°C (40°F)** for any period of time. Failure to ensure all systems are drained and free from standing water will result in shaft, operator, diaphragm, drive motor, water pump, water-to-oil cooler, or butterfly valve damage when operation is attempted with ice in the housings.

To ensure all water is drained from tank check the following:

1. Park unit on a slight nose up angle to allow water to flow to the rear of the tank.
2. Drain the tank using an appropriate method until the Water Level Gauge reads EMPTY.
3. Open all drain petcocks (water pump, suction load pump, rear spray bar, front spray bar, etc.).
4. Remove water pump sump cover.

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5. Start engine.
6. Cab Control SYSTEM/POWER Switch – ON
7. MONITOR/BFV Switch – ON
8. DUMP BAR Switch – ON
9. DRAIN Switch – ON
10. Water Cannon Nozzle – Pointed fully DOWN
11. Cab Control SYSTEM/POWER Switch – OFF
12. Turn engine off.
13. Hose Reel – DRAIN
  - a. Hose – UNWIND
  - b. Nozzle – Fully OPEN
  - c. Gate Valve – OPEN
  - d. Allow water to drain.
  - e. Hose – REWIND
  - f. Gate Valve – CLOSED
  - g. NOZZLE – CLOSED
14. Check to ensure all water has drained from tank.

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**MAC/MAT-OPS(CL)-1****13 Nov 2013****TO REACTIVATE UNIT:**

1. Lubricate water pump bearings as instructed in the Maintenance (-2) technical manual.
2. Inspect tank interior to ensure it is clean, if the tank is coated, ensure coating integrity, clean or repair as required.
3. Install sump cover with new gasket.
4. Close all drain valves and petcocks.
5. Start engine.
6. Control SYSTEM/POWER Switch – ON
7. Individual Spray Head Switches – OFF
8. DUMP BAR Switch – OFF
9. DRAIN Switch – OFF
10. MONITOR/BFV Switch – OFF
11. Cab Control SYSTEM/POWER Switch – OFF
12. Turn engine off.

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