

CHASSIS OPERATION MANUAL

#56223
Rockville Vol. Fire Department Inc.
Rockville, MD



CHASSIS OPERATION MANUAL

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1-1. INTRODUCTION AND SAFETY

GENERAL

The purpose of this manual is to provide information to personnel directly responsible for the operation and maintenance of your apparatus. The material is divided into sections providing a general description of the equipment, descriptions of the various systems and major components, detail specifications description of the instruments, operation, servicing and lubrication. It is extremely important that operating and maintenance personnel become familiar with the apparatus, its systems and components before operation.

Attention must be given by the operator to the Safety Precautions section. Other cautions and warnings may appear throughout the manual. Failure to observe these cautions and warnings could result in severe damage to the equipment, and bodily injury or death to the operating personnel.

This apparatus is designed to provide a safe and stable structure from which rescue and firefighting operations can be performed. This apparatus is to be operated only by personnel trained in its operations.

This manual describes the construction and operating procedures for a custom-built chassis, body and ladder for this apparatus.

The chassis cab is a forward tilting design and constructed of stainless steel. The cab is designed and constructed for maximum occupant safety and product longevity.

Access for routine checks and preventative maintenance are provided without the use of specialized tools. Hinged interior panels provide access to electrical wiring connection points and power distribution. Instrument and switch panels are removable without dismantling the cab dashes and overhead console.

The body and compartments are designed to the customer's specifications. The body is fabricated of stainless steel and segmented in a manner that allows flexing in strategic areas, minimizing undue stress.

Throughout the following pages of this manual are guidelines, cautions, warnings and operational procedures which should be strictly followed for safe operation of the apparatus.

Respect the tip-over stability of the truck.



1-2. SAFETY PRECAUTIONS

AFTERMARKET EQUIPMENT

Any equipment added to the apparatus after leaving the factory, must adhere to the following guidelines:

No alteration may be made to the configuration of the Aftertreatment diesel Particulate Filter and Exhaust system.

Extreme caution needs to be taken when mounting any items that requiring drilling into any area of the apparatus. Wiring, lines, and other unseen components may be routed throughout various areas of the cab and body. Damage to systems or injury to personnel may occur.

Do not mount any items near or around the air bag system that would cause any blockage for the air bag's proper deployment. This includes all front, side and rollover protection systems. Refer to the system vendor literature for more information.

All accessories added to the interior of the cab MUST be secured as per NFPA 1901 Regulations at the time of the contract date.

Any accessories added to the front exterior of the cab area MUST allow for tilt clearance.

All additional equipment must be loaded properly to allow for appropriate weight distribution throughout the apparatus and cannot exceed the Gross Vehicle Weight rating of the apparatus.

Improper or incorrect operation of any equipment on this unit, including driving of the apparatus, can be extremely hazardous especially in emergency or adverse conditions.

To avoid injury to personnel and/or damage to the apparatus and its contents, it is the responsibility of the owner of the apparatus and/or the jurisdiction in which the apparatus operates, to thoroughly train all operating and maintenance personnel in the proper and correct use of the apparatus and make certain these personnel have read and understand the various equipment manuals furnished with this apparatus before being allowed to operate the apparatus.



1-3. GENERAL WARNINGS AND CAUTIONS



THIS SYMBOL MEANS ATTENTION!
BECOME ALERT, YOUR SAFETY IS INVOLVED.

The notices are of 4 types, as shown in the following samples:



Deviation from, or disregard of these instructions will lead to serious personnel injury or death.



Deviation from, or disregard of these instructions will lead to serious personnel injury or death.



Deviation from, or disregard of these instructions will lead to serious personnel injury or death

NOTE: Attention is called to, or help is given, to a mode of operation, maintenance or overhaul. Its intent is to make the application easier, not to be a warning or caution as described above.

These notices are not to be considered as all inclusive, NOT as a substitute for knowledge or training, and NOT as a substitute for the manuals and operating procedures of the jurisdiction in which the apparatus operates.

The following warnings and cautions are common to all engine-powered fire fighting vehicles.



▲ WARNING

- Do NOT wear Fire Helmets when riding in enclosed driving and crew areas. Fire helmets are not designed for crash protection and will interfere with the protection provided by head rests. The use of seat belts is essential to protecting fire fighters during driving.
- Damaged or lost safety precaution labels should be replaced immediately. Order by the part number listed below the image of the label.
- Before operation, visually check the machine for leaks, broken, missing or damaged parts. Make sure all caps, dipsticks, battery covers, etc. are securely fastened. A part failure during operation can cause injury.
- Keep the interior of the cab free of dirt, loose objects, ice and snow. Remove or securely store in the compartments, any maintenance and/or personal items. Failure to keep this area clean can cause an accident.
- Use extreme caution when walking or standing on the vehicle.
- Areas for walking and/or standing that are located higher than 48 inches above the ground and unguarded by a railing or structure are designated by a safety line along the outside perimeter of the allowable standing/walking surface.
- Use extra caution in wet, icy, snowy or muddy conditions. Failure to comply may result in slipping or falling causing injury or death.
- Care must always be taken when climbing on and off the vehicle. Always face the vehicle, use steps and grab handles, and maintain three points of contact with the vehicle. Keep steps, grab handles, and walkways clean. Be extra careful in wet, icy, snowy and muddy conditions. Failure to comply may result in slipping or falling causing injury or death.
- Fire apparatus are often equipped with Power Take-Off (PTO) operated accessories. Never operate the engine with personnel near any driveshaft as they may engage without warning. Hands, clothes, hair, etc., can get caught on spinning shafts and U-joints. Failure to comply may result in slipping or falling causing injury or death.
- Internal combustion engines give off hazardous fumes and gases while running. Do not operate the engine in an area where exhaust gases can accumulate, or serious injury or death may occur.

▲ CAUTION

• In the cab, everything must be secured. All internal body contents or equipment stored in a body compartment over 25 pounds should be securely fastened.



1-4. PRIOR TO OPERATION

▲ WARNING

- Prior to operation, make certain the equipment is secure and in proper operating condition in accordance with the instructions contained in this manual and the maintenance manual.
- Be sure to check all separate warnings and precautions.
- All hardware must be fastened securely, and all preliminary checks and services must be accomplished prior to operation.
- Operator, service and maintenance personnel must have a basic understanding of the equipment and the function of the numerous controls and instruments.
- The operator must be thoroughly familiar with the vehicle height, width, and road clearances, operating capabilities and limits.
- When performing pre-operation checks and services, be sure there are no open flames that might ignite the fluid vapors during filling and servicing operation.
- If the truck is being removed from storage, brakes must be readjusted for road operation.
- Keep shoreline electrical power connected when not in use to maintain charge to the vehicle batteries.

1-5. WHILE OPERATING THE APPARATUS

▲ WARNING

- Pay attention to other moving vehicles when operating.
- Watch for stalled or parked vehicles and pedestrians.
- Be sure all warning-hazard lights are operating.
- Observe all normal speed and safety rules of the road.
- Never operate the apparatus with cab doors open.
- Do not ride on the apparatus unless seated and with the seat belts fastened.
- Do not dismount from the apparatus while it is in motion. Make sure the parking brakes are applied. Disengage the transmission whenever leaving the cab. Place wheel chocks at the front and rear of one of the front tires.
- Always maintain complete control of the apparatus. The apparatus should not be left unattended
 with component controls in operating mode or for long periods of time with power on. Always
 correct or report any faulty condition that may cause injury to personnel or result in damage to the
 equipment.
- Maintain constant surveillance on water pipe and hoses for cracks, leaks, or signs of possible failure.



BACKING UP THE APPARATUS



Backing up your apparatus can be hazardous. Always:

- Make sure that the area is clear of personnel and objects before proceeding
- Use a spotter to assist when backing up the apparatus

▲ DANGER

Backing up an apparatus without knowing what is behind you may cause injury, damage or death. Tips for safe apparatus backing are:

- Get to know your apparatus. Find the blind spots. Mirrors cannot give a 100% picture of the area that you are going to back into.
- Use ALL your Mirrors.
- Do a walk-around to check what the area you want to back into contains. Check to make sure there are no people, items in the way and enough height clearance.
- Use a spotter to assist you. Make sure you can always see your spotter.
- Verbal signals may not be heard. Develop a consistent set of hand signals to use. Some examples are:
 - o Stop
 - o Continue
 - Left or right
- Make sure that the back-up alarm on your apparatus is working. This also will alert others in the area that you are proceeding to back up the apparatus.
- Every time you back up your apparatus is different. Just because you backed into the same spot multiple times, there can be variables that will change the situation and location parameters.

1-6. APPARATUS HANDLING CHARACTERISTICS

Safe operation of any apparatus is the responsibility of the apparatus driver. A Fire Apparatus is a heavy-duty vehicle with a higher vehicle height. This gives it a higher tendency to rollover.

Your Seagrave apparatus has a lower center of gravity which will assist in easier handling of turns at high speeds. However, caution still must be taken to not make sharp turns at high or excessive speeds.

Your apparatus is built with a Seagrave exclusive, substantial three (3) inch rectangular-tube subframe. This subframe has a completely enclosed, all stainless-steel superstructure that creates a protective cage. Then this entire structure is covered with heavy gauge, stainless steel. This makes the cab stronger and safer for its occupants.



Every seat in the cab is installed with harness style, seat belts for further occupant safety. In the event of a rollover or crash, the occupants that are buckled in will more likely be less injured or die than a person not wearing a seat belt. Unbelted occupants can become a hazard to others in a crash, as they can be thrown around the cab.

Always Buckle Your Seat Belt!

1-7. ELECTROCUTION HAZZARD FROM OVERHEAD POWER LINES



- Overhead Power Lines can cause an electrocution hazard.
- Your apparatus is NOT insulated.
- Touching a charged apparatus while standing on the ground will result in DEATH.
- Do not step off a charged apparatus.

▲ WARNING

- Use caution when entering any area, especially in the dark.
- Keep the apparatus and its parts a minimum of 10 feet away from any power line.
- Look up for any overhead power lines. Tree branches can hide power lines.
- Utilize lights in whenever visibility overhead is compromised.

Overhead power lines are a source of extreme electrical hazard. Power lines may appear insulated, but they are not. The power traveling in these lines will also travel through ANY conductive path to get to the ground. This can also include being near a powered line.

When near power lines, follow these precautions:

- Make sure that the overhead work area is clear of obstacles, obstructions, and any type of lines.
- Do not work within 10 feet of any high-voltage lines. The power can arc over the space and still electrocute.
- Make sure that the vehicle is stabilized, especially when the ground surface is soft or unstable. A shifting apparatus can move into a hazard area or into obstacles or lines.
- Check carefully for power lines when trees are present. Trees can block the visibility of lines being present.
- Use lights at night to check the area.



WHAT TO DO WHEN AN APPARATUS HAS MADE CONTACT WITH POWER LINES

When you are on or in an apparatus:

- Stay Where You Are When at All Possible. It is more hazardous to leave than to stay.
- Only exit the apparatus AFTER the line has been de-energized (dead) by the power company.

If it is imperative that you leave the apparatus (i.e. apparatus is on fire or imminent danger):

- It is critical that you do not create a pathway for the current between the apparatus and the ground.
- Jump away from the apparatus as far as you can. Try to land on both feet when at all possible, trying to maintain your balance or to roll AWAY from the apparatus.

When you are outside the apparatus:

- Move away from the apparatus and Do Not Touch the Apparatus.
- Warn others to stay away from the apparatus.
- Do not go near or touch the apparatus until the power lines have been de-energized (dead) by the power company.
- Do not try to rescue anyone from an energized apparatus or is energized themselves. This will put yourself in danger of becoming energized.

1-8. HIGH PRESSURE HYDRAULIC FLUID

▲ DANGER

- High pressured hydraulic fluids can cause hazards.
 - You MUST release the pressure in the system before working on it.
 - To detect leaks **Do Not Use Your Fingers or Hands**. Use a piece of wood or cardboard and wear sturdy work gloves and goggles.
 - A high-pressured hydraulic leak can pierce your skin.
 - Hydraulic fluid that enters your skin must be surgically removed immediately by a trained doctor. If left in your skin, gangrene will result.
- Parts of your apparatus may use high pressured hydraulic fluid. Any leak in these systems are extremely dangerous.
 - If you see a hydraulic leak, shut down the equipment immediately.
 - Have the leak only serviced by a qualified, trained technician for hydraulic systems and their leaks.

Never look or search for hydraulic leaks with your hands. Due to the pressure in the hydraulic system, even at low pressure, can inject your skin with hydraulic fluid. Use a piece of wood or cardboard to search for hydraulic leaks. Make sure you wear goggles and sturdy work gloves while searching with the wood or cardboard.



If your skin has been injected with hydraulic fluid or you think it has, seek medical attention immediately with a trained doctor. This fluid is highly toxic and need medical attention no matter how small the injury may seem. If left untreated, the injury WILL lead to infection, gangrene, amputation and eventually death.

When seeking medical attention, please make sure that the doctor is trained in treating hydraulic injuries, and that they know of the potential issues and the proper treatments for them.

1-9. AREAS NOT FOR OCCUPANCY WHILE THE VEHICLE IS IN MOTION



 Certain areas of the apparatus are not designed for occupancy while the vehicle is in motion. Injury or death could result.

Certain areas of the apparatus are not designed for occupancy while the vehicle is in motion. They characteristically do not have mounted seats or have seats but no seat belts. These areas are for use only when the apparatus is stationary. A prime example is the platform on an aerial apparatus. Without the proper seat and seat belts, the occupant could be injured or be killed. Do not operate the apparatus when persons are occupying these areas.



1-10. SAFETY PRECAUTION LABELS

Safety precaution labels are placed in pertinent areas of the apparatus and serve as guidelines for safe operation of the unit. These labels are identified with their part numbers, following these general warning and caution statements.

THIS VEHICLE IS DESIGNED TO CARRY 6 PEOPLE

P0398100

P0398100 and P0627700

THIS VEHICLE IS DESIGNED TO CARRY 1 PERSON

P0627700

P0398100 and P0627700 are representations of the label in the cab or tiller cab, if applicable, of each Seagrave apparatus. (Actual capacity is job-specific)

CAUTION: CONTAINS R-134a

AVOID BREATHING A/C REFRIGERANT
AND LUBRICANT VAPOR MIST.

EXPOSURE MAY IRRITATE EYES, NOSE AND THROAT
TO REMOVE R-134a

FROM A/C SYSTEM, USE SERVICE EQUIPMENT CERTIFIED TO MEET THE REQUIREMENTS OF S.A.E. J2210

P1081400

REMOVE SAFETY PINS WHEN RETRACTING OUTRIGGERS

P1234400

P1234400

FRONT OUTRIGGERS

P1308100

REAR OUTRIGGERS

P1308200



P3422124







P103760

P3427354

(located at step area above DPF/SLR cans)



P1747300 23451-HI





P2317611





P036600



P0640500



P0640900



P0641000





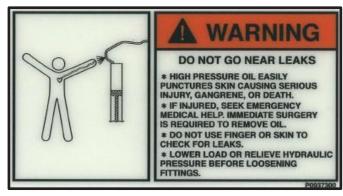
P1850100



P1850200



579101



P0937300





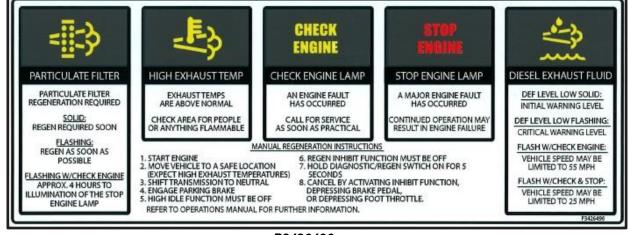
100643



T0146718-03

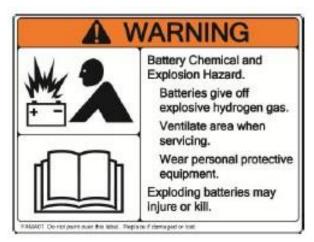


P1850300



P3426496





T0146718-01



T014671802



T0146718-05



T0146718-04



T0146718-06



T0146718-07





T0146718-08



T0146718-09



T0146718-10



T0146718-11



T0146718-12



T0146718-13



WARNING

This vehicle has a seating capacity of Personnel.

Carrying additional personnel may result in death or serious injury.

AMA14 Do not point over this label. Replace If damaged or lost.



T0146718-1401 (1 person)

T0146718-1402 (2 persons)

T0146718-1403 (3 persons)

T0146718-1404 (4 persons)

T0146718-1405 (5 persons) T0146718-1406 (6 persons)

T0146718-1407 (7 persons)

T0146718-1408 (8 persons)

T0146718-1409 (9 persons)

T0146718-1410 (10 persons)



T0146718-15



T0146718-17





T0146178-18



T0146718-20



T00146718-21



T0146718-22



T0146718-23



T0146718-24





T0146718-25



T0146718-33



T0146718-26



T0146718-41



T0146718-27





T0146718-42



T0146718-43





T0146718-22



T0146718-44



T0146718-20





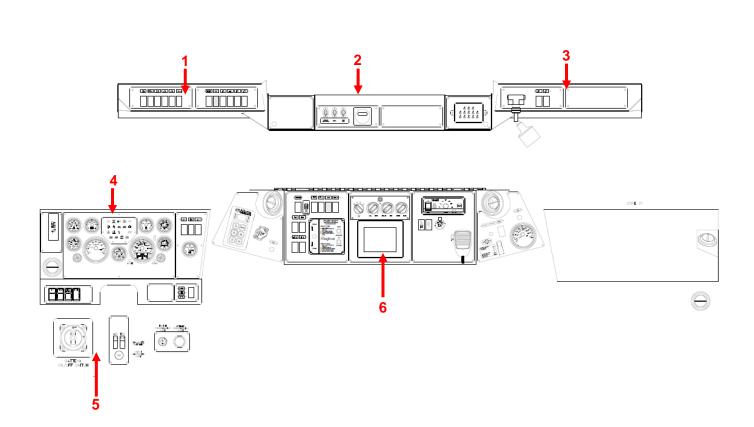
2-1. CAB INSTRUMENTS, INDICATORS AND OPERATION CONTROLS

The locations and functions of the various indicator lights, gauges, switches and operating controls are detailed in this section.

Use the following list and accompanying figures to identify the placement of the controls.



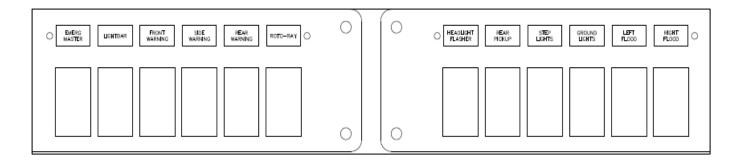
2-2. DASH LAYOUT



ITEM	INSTRUMENT SECTION
1	Driver's Overhead Control Panel
2	Center Overhead Control Panel
3 Officer's Overhead Control Panel	
4 Instrument Cluster and Switches	
5 Driver's Lower Control Panel	
6	Center Console Control Panel

SECTION 2 CAB AND CHASSIS

2-3. DRIVER'S OVERHEAD CONTROL PANEL (#1 in Dash Layout)



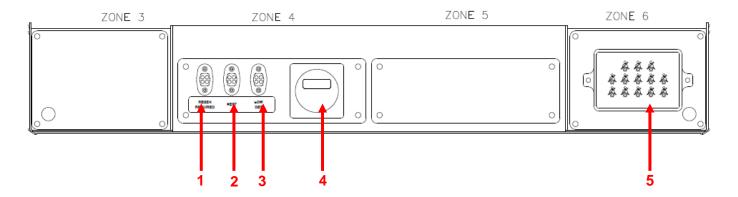
NOTE: Due to your choices of options, not all switches may be present in your apparatus, or may be in a different location than this diagram shows.

NOTE: Switches also may be different types (toggle vs. momentary) dependent on your choices.

- TOGGLE SWITCH: Push UP to turn ON, push DOWN to turn OFF
- MOMENTARY SWITCH: Push UP to turn ON, push UP to turn OFF



2-4. CENTER OVERHEAD CONTROL PANEL



ITEM	CONTROL	FUNCTION
1	REGENERATION REQUIRED	When light is illuminated, indicates that a DEF Regeneration is required
2	HEST	When light is illuminated, a High Exhaust System temperature is present
3	LOW DEF	When light is illuminated, indicates that the DEF level is low
4	NEWMAR DISPLAY	When light is illuminated, monitors the apparatus's DC voltage
5	SEATMASTER DISPLAY	Monitors the apparatus occupants and if the occupant's seat belt is buckled.



CIRCULATING FANS ON UPPER CENTER DASH *WHEN APPLICABLE



Fan On/Off Toggle Switch

These fans circulate the air in the front of the cabin.

The ON/OFF toggle switch is located at the base of the fan mounting by the cab ceiling.

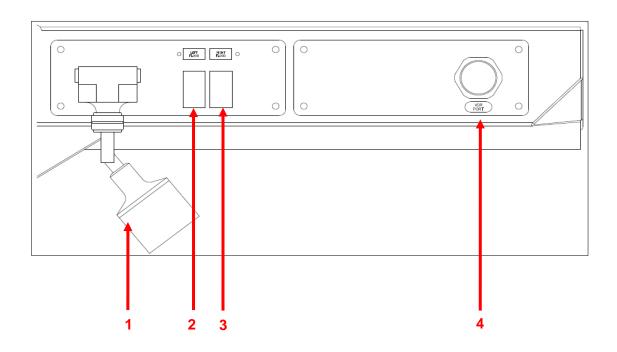
CENTER CEILING WARNING LIGHTS *WHEN APPALICABLE



These warning lights indicate if a compartment on the left or right side of the apparatus is left open when the Parking Brake is released (left and right lights), or if the Extend-A-Gun is left raised (center light - Elevation).



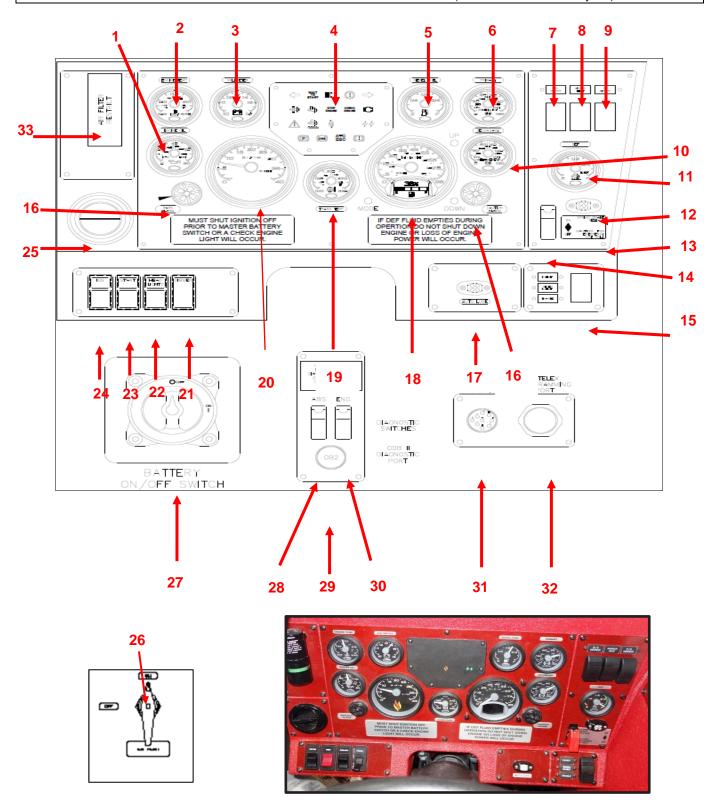
2-5. OFFICER'S OVERHEAD DASH (#3 in Dash Layout)



ITEM	CONTROL	FUNCTION
1	MAP LIGHT	Adjustable light, ON-OFF switch located on the light head.
2	LEFT FLOOD	Controls the street side (left side) flood lights Push up to turn ON, push down to turn OFF
3	RIGHT FLOOD	Controls the curb side (right side) flood lights Push up to turn ON, push down to turn OFF
4	VDR PORT	Diagnostic port to connect via a special USB cable to a laptop where the special software is installed



2-6. INSTRUMENT CLUSTERS AND SWITCHES (#4 and #5 In Dash Layout)





SECTION 2 CAB AND CHASSIS

INSTRUMENT CLUSTERS AND SWITCHES (#4 and #5 in Dash Layout) Continued

ITEM	INSTRUMENT-INDICATOR	FUNCTION
1	ENGINE OIL	Indicates the engine oil pressure
2	ENGINE TEMP	Indicates the engine coolant temperature (° F)
3	VOLTMETER	Indicates the battery voltage
4	INDICATOR PANEL	See separate section for specific information
5	FUEL GUAGE	Indicates the fuel level in the fuel tank
6	PRIMARY PSI	Indicates the primary (rear) brake system pressure
7	DRIVER SIDE (DS) MIRROR	To move the Driver Side mirror, push UP for moving the mirror outwards, push down for moving the mirror
8	MIRROR HEAT	Push up for turning on heat in the mirror to defrost or de-ice, push down to turn off the heat
9	PASSENGER SIDE (PS) MIRROR	To move the Passenger Side mirror, push up for moving the mirror outward, push down for moving the mirror inward
10	SECONDARY PSI	Indicates the secondary (front) brake system pressure
11	DEF GUAGE	Indicates the diesel exhaust fluid level in the DEF tank
12	SPRING BRAKE INDICATOR LIGHT	When lit, this light indicates that the Spring Brake is engaged.
13	SPRING BRAKE DIRECTION PLATE	This plate gives the directions of the Spring Brake switch.
14	SPRING BRAKE SWITCH	When the cover is lifted, and the switch underneath is toggled up; it engages the Spring Brake. When the switch is toggled down, it disengages the Spring Brake.
15	REGENERATION SWITCH	When the switch is pushed up, it inhibits regeneration. When the switch is pushed down, it enables regeneration
16	CAUTION ALARM SPEAKER	Speaker that audios any warnings from the system
17	AUTO LUBE INDICATOR	When lit, indicates that the auto lube reservoir is low and needs additional fluid
18	SPEEDOMETER	Indicates the vehicle speed (mph and kph)
19	TRANSMISSION TEMPERATURE GUAGE	Indicates the transmission temperature (° F)
20	TACHOMETER	Indicates the engine speed (rpm)



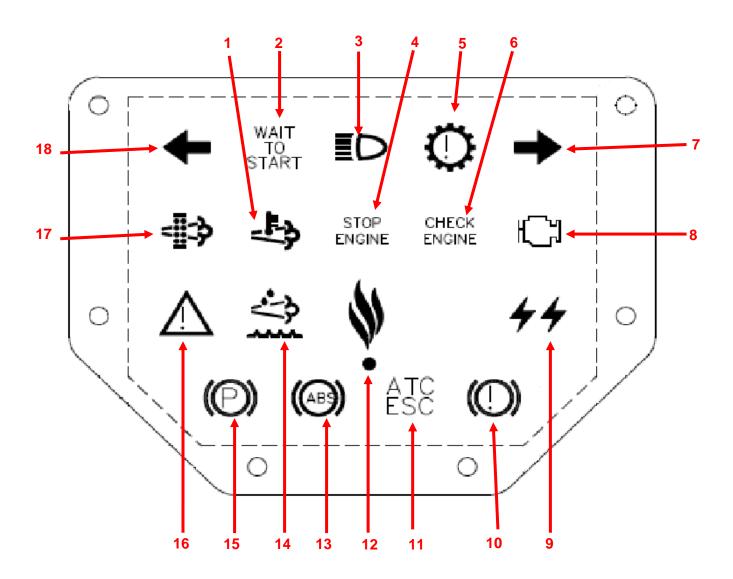
SECTION 2 CAB AND CHASSIS

INSTRUMENT CLUSTERS AND SWITCHES	(#4 and #5 in Dash Lavout)	Continued
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21	HEADLIGHTS	ON-OFF Switch, 3 positions: Off-Running-Headlights
22	DIMMER	Panel light backlighting control. Push down to decrease brightness push up to increase brightness.
23	START	Starts the engine after Ignition Switch is on, push up to turn on (momentary switch)
24	IGNITION	Push up for on - Push down for off
25	VENT	Channels flow of hot or cold air, turn or tilt to re-direct air flow
26	AIR HORN LEVER	To engage the air horn, turn clockwise to turn the three o'clock position to turn on. To Disengage the air horn, turn counterclockwise to the twelve o'clock position to turn off
27	BATTERY	Main Battery Disconnect switch, turn switch clockwise to the three o'clock position to turn on, turn switch counterclockwise to the twelve o'clock position to turn off
28	ABS	Momentary push to read out ABS codes
29	ODB2 DIAGNOSTIC PORT	The port used for reading the ODB2 compliant reader
30	ENGINE DIAGNOSTICS	Momentary switch for the engine diagnostic codes. Hold for 3 to 5 seconds to initiate a manual regeneration. Refer to your Cummins manual for diagnostic information.
31	ENGINE DIAGNOSTIC PORT	Port for connecting to engine, transmission and ABS information via a special diagnostic cable to an external laptop with that has the appropriate software installed
32	INTELEX ® PLUS PROGRAMMING PORT	Port used to access INTELEX® PLUS information via a special diagnostic cable to an external laptop with that has the appropriate software installed
33	DONALDSON AIR SERVICE INDICATOR	Indicates in red when the Air filter needs servicing



2-7. INDICATOR PANEL (#4 In Instrument Clusters and Switches)





INDICATOR PANEL (#4 in Instrument Clusters and Switches) Continued

ITEM	INDICATOR	FUNCTION			
1	DPF	DPF (amber): When illuminated or flashing, it indicates that the aftertreatment DPF requires regeneration.			
2	WAIT TO START	WAIT TO START (amber): When illuminated, the engine should not be started until the intake air heaters have completed the pre-heat cycle during cold ambient conditions.			
3		Headlight High Beam Indicator (blue): When illuminated, it indicates the headlights are set on high beam.			
4	STOP ENGINE	Stop Engine (red): When illuminated, it indicates one or more engine parameters are not within normal range(s) and the engine should be shut down. Refer to Engine Operation Manual.			
5		Check Transmission (amber): When illuminated, it indicates transmission related problems. Monitor the problem; shut down engine if needed. Notify your Maintenance Department.			
6	CHECK ENGINE	Check Engine (amber): When illuminated, it indicates that one or more engine parameters are not within normal operating range(s). Some parameters may be: low coolant level, high coolant temperature or low oil pressure. Refer to the Cummins Engine Operation Manual.			
7	-	Right Turn Signal Indicator (green): When illuminated, it indicates the intention to turn right.			
8	E.	MIL Lamp (Malfunction indicator lamp) (amber): When illuminated, indicates an OBD2 (Onboard Diagnostics)-Compliant fault is active. This includes the ABS, the transmission and engine.			
9	44	Battery ON (green): When illuminated, it indicates that the battery switch is on. The apparatus can be started, or the electrical system can be operated with the engine off.			
10		Low Air Pressure (red): When illuminated, it indicates low air pressure in one or more of the tire(s).			
11	ATC ESC	Automatic Traction Control (amber): When illuminated, it indicates that the traction control is active. If flashing it indicates that the automatic traction control (ATC) has been over-ridden. Push the ATC Deep Snow or Mud switch to reset ATC.			
12	\	Flame Icon (multi-color): When illuminated, it indicates the Ignition switch is on.			
13	(ABS)	ABS Error (red): When illuminated, it indicates that there is an ABS related problem or event.			

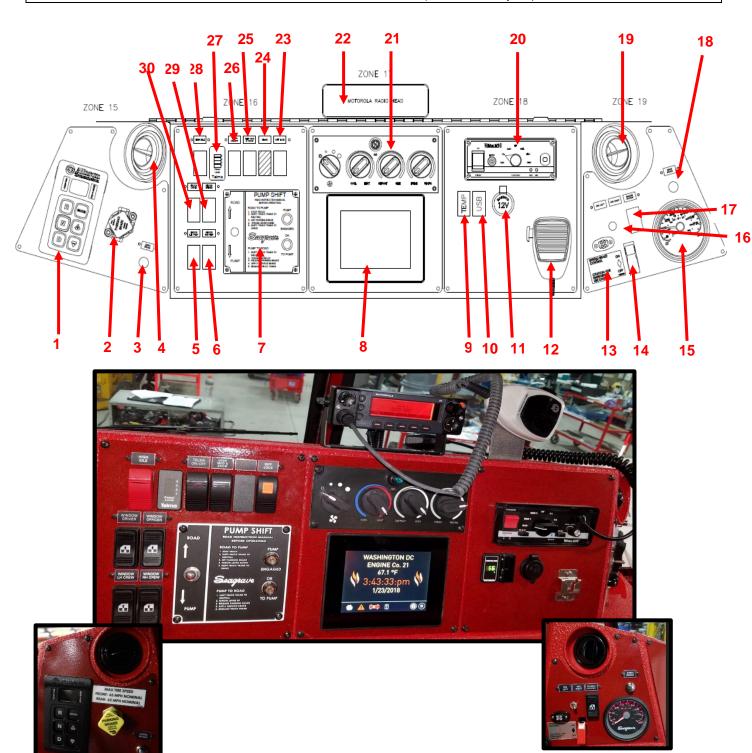


INDICATOR PANEL (#4 in Instrument Clusters and Switches) - Continued

14	DEF	DEF (amber): When illuminated, it indicates that the diesel exhaust fluid levels low. Refilling this tank with DEF is critical for your vehicle to comply with the Environmental Protection Agency (EPA) emissions regulations.
15	P	Park Brake Set (red): When illuminated, it indicates that the parking brake is set.
16	<u></u>	General Warning (red): When illuminated, it indicates one or more of the following issues: Check Engine, Stop Engine, Low Air, Cab Not Locked, ABS Fault, Hi-Lo Voltage, Air Restriction, Low Fuel, Trans Overheat, or Trailer ABS.
17	HEST	HEST (amber): When illuminated, it indicates that a high exhaust temperature exists (example: due to aftertreatment regeneration). This is normal and does not signify the need for any kind of vehicle or engine service. When illuminated, ensure that the exhaust pipe outlet is not directed at any combustible surface or
18	ŧ	Left Turn Signal Indicator (green): When illuminated, it indicates the intention to turn left.



2-8. CENTER CONSOLE CONTROL PANEL (#1 in Dash Layout)





CENTER CONSOLE CONTROL PANEL (#1 in Dash Layout) Continued

ITEM	INSTRUMENT - INDICATOR	FUNCTION			
1	TRANSMISSION ELECTRONIC SHIFT	See the separate section on the Transmission Electronic Shift Selector			
2	PARKING BRAKE	Push the actuator in and hold approximately 2-5 seconds to engage the Parking Brake, Pull the actuator out to release the Parking Brake			
3	SIREN BRAKE	(Momentary switch) depress switch to engage the clutch brake to slow down the speed of the Siren's sound			
4	VENT	Channels flow of hot or cold air, turn or tilt to redirect air flow			
5	WINDOW-LH CREW	Push down to bring window down, push up to bring window up			
6	WINDOW-RH CREW	Push down to bring window down, push up to bring window up			
7	PUMP SHIFT	See the separate section on the Pump Shift in the Pump Operation directions.			
8	INTELEX [®] PLUS DISPLAY SCREEN	Display screen for all the Intelex [®] Plus functions. See the separate section on Intelex [®] .			
9	TEMP	Digital display of the external air temperature			
10	USB	USB charging port for external devices			
11	MARINCO 12V	Twelve-volt power port for external devices			
12	RADIO TRANSCEIVER	Controls the radio transmission of operator's conversation			
13	SPRING BRAKE INDICATOR LIGHT	When lit, this light indicates that the Spring Brake is engaged.			
14	SPRING BRAKE SWITCH	When cover is lifted, and the switch is toggled up it engages the spring brake, when toggled down it disengages the spring brake			
15	SPEEDOMETER	Shows the speed that the apparatus is traveling at			
16	VRS SELECTOR SWITCH	Selects between the left or the right VRS monitoring systems			
17	WINDOW - OFFICER	Push down to bring window down, push up to bring window up			
18	SIREN BRAKE	(Momentary switch) depress the switch to engage the clutch brake to slow down the speed of the siren's sound			



CENTER CONSOLE CONTROL PANEL (#1 in Dash Layout)

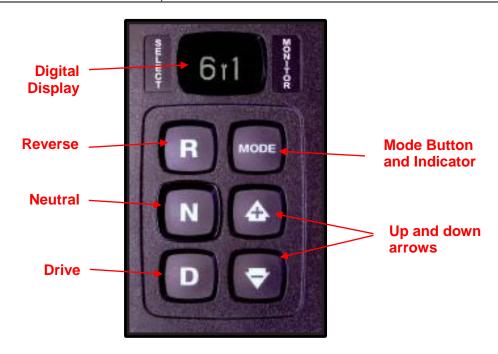
19	VENT	Channels flow of hot or cold air, turn or tilt to redirect air flow.				
20	WHELEN SIREN	Control station for the Whelen Siren. See the separate section on the Whelen Siren in this manual.				
21	CAB HVAC CONTROLS	See the separate section on the HVAC controls in this manual.				
22	MOTAROLA RADIO	CB radio installed in apparatus. See the vendor's manual and literature on the CB Radio.				
23	DEF LOCK	Controls the locking rear differential. Push up to turn on, push down to turn off.				
24		(blank - no switch)				
25	DEEP MUD & SNOW	Engages limited slip for traction control system. Push up to turn on, push down to turn off.				
26	TELMA	Engages the Telma Braking System. Push up to turn on, push down to turn off.				
27	TELMA POWER LEVEL INDICATOR	Shows the level of activation of the Telma Braking System when engaged				
28	HIGH IDLE	Controls the engine idle when in a parked position. Push up to turn on, push down to turn off.				
29	WINDOW-OFFICER	Push down to bring window down, push up to bring window up				
30	WINDOW-DRIVER	Push down to bring window down, push up to bring window up.				

The exact location of your switches, gauges and controls will be dependent on the options that you choose. For your exact locations, please refer to your Dash Layout located in the Schematics section and in the Parts Book Drawing section of your Electronic Manual.



2-9. TRANSMISSION ELECTRONIC SHIFT SELECTOR

(#1 in Center Console Control Panel)

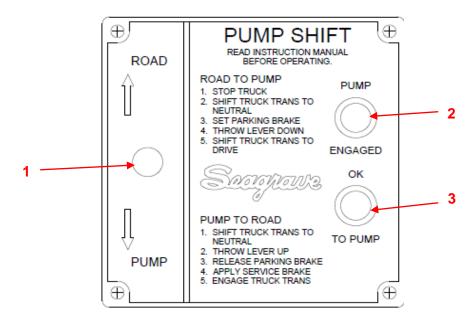


CONTROL-INDICATOR	FUNCTION
DIGITAL DISPLAY	Shows which gear is requested and attained.
REVERSE	Places transmission in reverse.
NEUTRAL	Places transmission in neutral.
DRIVE	Places transmission in drive.
MODE BUTTON AND INDICATOR	Indicates mode button status - Indicator of mode on. Used to access diagnostics including fluid level.
UP-DOWN ARROW	Used to select drive gears.

To engage the transmission, apply the brake and press the appropriate button (reverse or drive). To park the vehicle, apply the brake, press the Neutral button and apply the parking brake.

2-10. PUMP SHIFT (#7 in Center Console Control Panel)

*WHEN APPLICABLE



ITEM	CONTROL-INDICATOR	FUNCTION		
1	PUMP SHIFT LEVER	Toggle down to engage pump when ok to pump light is illuminated, toggle up to disengage pump		
2	PUMP ENGAGED	When light is lit, shows that the pump is engaged		
3	OK TO PUMP	When light is lit, shows that it is ok to use pump		

TO GO FROM ROAD TRAVELING TO PUMPING

- Stop the truck.
- Shift the apparatus transmission into N (Neutral)
- Set the Parking Brake
- Move the toggle switch on the panel left to the Pump" position
- Shift the apparatus transmission into D (Drive)

TO GO FROM PUMPING TO ROAD TRAVELING

- Shift the apparatus transmission into N (Neutral)
- Move the toggle switch on the panel left to the "Road" position
- · Release the Parking Brake
- · Apply the Service (Foot Pedal) Brake
- Engage the apparatus transmission.

2-11. WHELEN SIREN (#20 in Center Console Control Panel)

*WHEN APPLICABLE



ITEM	CONTROL	FUNCTION			
1	SI TEST & DIAGNOTIC	Indicates fault conditions with the siren system.			
2	POWER	Toggle up to turn on siren, toggle down to turn off			
3	MAN	Generates a variety of tones depending on the position of the rotary Function knob.			
4	FUNCTION	Rotary knob that controls the 7 siren functions			
5	RAD	Radio Repeat adjustment port			
6	HORN	Hold button in to get an Airhorn tone when power is activated.			
7	PA VOLUME (MIC)	Turn clockwise to increase the volume of the PA, turn counterclockwise to decrease the volume			

See the vendor literature for more information or down load it from whelen.com for the 295SLSA1 brochure #14109.



2-12. MIRROR CONTROL PANEL

The door-mounted mirrors can be adjusted in and out, and up and down to suit the driver's needs. The mirror position must be set prior to operating the apparatus, preferably at start of shift.

The cross-over mirror and cowl mounted convex mirrors, should be adjusted prior to operating the apparatus as well.

▲ WARNING

- The Driver should position the mirrors prior to driving
- When adjusting the mirrors while driving, the Driver's attention could be diverted from traffic and road conditions, and which could result in an unsafe operation and possible loss of apparatus control.



Mirror Controls

The mirror controls are usually located on the upper right of the Instrument Cluster and Switches.

ADJUSTING THE MIRRORS

By pushing up on either the Driver Side (D/S) Mirror button or the Passenger Side (P/S) Mirror button, the corresponding mirror will move inwards. By pushing the button down, the corresponding mirror will move outwards.

NOTE: The Driver should adjust the mirrors as needed at the beginning of his shift. This will save valuable time when responding to a call.

MIRROR HEAT *WHEN APPLICABLE

In colder climates, frost, ice or snow may build up on the outside mirrors, especially when the apparatus is outside for long periods of time. This build-up impedes the visibility in the mirrors.

By pushing up the Mirror Heat button, this will activate the heaters with the mirrors. This will defrost, deice, or melt snow that has accumulated on the mirrors.

NOTE: The Mirror Heat switch does NOT automatically shut off. Once the mirrors visibility is restored, the mirror heater must be turned off by pushing it downward.



2-13. STEERING COLUMN CONTROLS

TURN SIGNAL OPERATION

The turn signals are controlled by a lever and switch on the left side of the steering column. Pushing the lever forward allows for the right turn signals; pulling the lever back allows for left turn signals. The turn signals will self-cancel as the steering wheel is returned to a straight position.

WINDSHIELD WIPERS AND WASHER OPERATION

A rotary switch mounted on the turn signal lever controls the windshield wipers. The switch controls the following functions:

OFF: no movement

INTERMITTENT: when switch is rotated to any of 5 different positions; cycling of wiper sweeps increase as switch is rotated towards the LOW speed position (away from driver).

LOW: the wipers will cycle slightly faster than the highest intermittent speed.

HIGH: the wipers will cycle at its fastest speed

WASH: by pushing the end of the switch towards steering column will eject washing fluid and the wipers will cycle once the windshield washer reservoir is in driver's step well. It should be checked daily and filled when necessary.



Turn Signal Control Lever

HIGH AND LOW BEAM HEADLIGHT OPERATION

Pulling the turn signal lever towards the steering wheel activates the High or Low headlight beams. The headlights will cycle between High (bright) and Low (dim) when switch is activated. A blue-colored light will illuminate in the Indicator Cluster when High Beam Headlights are ON.



EMERGENCY (4-WAY) FLASHER OPERATION

Pushing in the red-colored button under the turn signal lever will turn on the Emergency (4-Way) Flashers. Both turn signal arrows in the Indicator Light Panel will flash when the Emergency Flasher is activated. The flashers will cycle between On and Off when the switch is depressed. The Emergency Flashers will operate when the Master Battery Switch is in the ON or the OFF position.



Emergency (4 Way) Flasher Button

TILT AND TELESCOPING CONTROL LEVER

The Tilt-Telescoping steering column is adjusted with a lever on the left side of the steering column. This allows the driver to adjust the steering column and the steering wheel to a more desirable position.

Continual pushing down on the lever allows the driver to telescope the steering column in and out. Releasing the lever holds the column in the selected position.

Pulling up on the lever allows the driver to tilt the column/wheel forwards and backwards. Releasing the lever holds the column in the selected position.



Tilt -Telescoping Control Lever



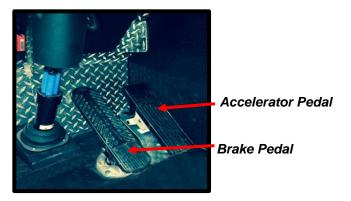
- The steering column/wheel must be adjusted prior to driving.
- Changing the position of the steering column/wheel while moving could result in an unsafe operation and possible loss of apparatus control



2-14. FOOT CONTROLS

ACCELERATOR PEDAL

The Driver uses their right foot to accelerate or decelerate the apparatus. The accelerator pedal is an electronic device that directly interfaces with engine controls to increase or decrease engine speed (RPM) and the apparatus' speed accordingly. The roller under the pedal should be checked periodically to ensure that the pedal can be depressed and released smoothly.



Brake and accelerator pedals

BRAKE PEDAL

The Driver uses their right foot to apply the service brakes to stop the apparatus. The driver should apply the brakes smoothly to avoid excessive wear on the brake linings and other components. DO NOT PUMP BRAKES in the event of an apparatus skid, the Anti-Lock Brake System (ABS) will automatically apply/release brakes to allow the driver to control the apparatus without skidding.

NOTE: The Retarder will apply when the throttle pedal is released. As the brake pedal is depressed, additional stages of the Retarder will be activated to assist in braking. The retarder cannot apply if the accelerator pedal is depressed, even slightly.

DRIVER FOOT SWITCHES

*WHEN APPLICABLE





Horn Foot Switch

The Horn Foot Switch, when depressed, will activate the air horn of the apparatus.

Q2B Foot Switch

The Q2B Foot Switch, when depressed, will activate the Q2B Siren on the apparatus.

OFFICER'S FOOT SWITCHES

*WHEN APPLICABLE



Horn Foot Switch

The Horn Foot Switch, when depressed, will activate the air horn of the apparatus.

Q2B Foot Switch

The Q2B Foot Switch, when depressed, will activate the Q2B Siren on the apparatus.

2-15. HVAC SYSTEM AND CONTROLS

The cab interior is heated, cooled and ventilated by the HVAC system, which consists of multiple heating and cooling components.

The front heater/defroster unit distributes filtered heated, fresh and recirculated air to the windshield or through ducting to the rear facing vents for cab interior ventilation. The front cab HVAC is controlled by a panel located on the center console control panel, and the crew heater and A/C controls are located on the Rear Evaporator unit on the center ceiling.

The overhead A/C units provide filtered, cool air to the front cab areas through ducting of the A/C unit housing, allowing for adjustable air outlet volume and air outlet temperature.

The rear heater units provide filtered heated air to the crew cab area. The rear heater units are located under the rear facing outboard seats, one on each side.

The Air Conditioning Control button forcibly engages the frontal AC system circuit. The A/C function is not controlled, neither engaged or disengaged, with this button.

When full defrost is selected with the Defrost / Vent Outlet Control, the AC system circuit will engage to provide a drying effect on the air provided to the defroster vents and windshield area. The Air Conditioning Control button will not override the AC system engagement when full de- frost is selected on the Defrost /

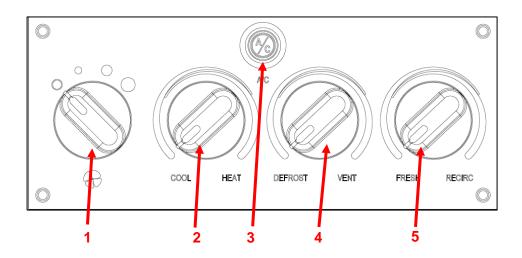


Vent Outlet Control dial.

The air filters in the HVAC units need to be checked, cleaned, or replaced on a regular basis.

Please refer to the Maintenance Manual on Filters for more information.

2-16. CAB HVAC CONTROLS (#21 in Center Console Control Panel)



ITEM	CONTROL	FUNCTION			
1	FAN SPEED CONTROL	Turn dial to control air output speed of the fan unit. Turn clockwise (right) for increased air output speed. Off- Low - Med-High.			
2	HVAC TEMPERATURE CONTROL	Turn dial to control air output temperature. Turn clockwise for warmer output air temperature. Turn counterclockwise for cooler output air temperature.			
3	A-C ACTIVATION SWITCH	Push to activate the A/C. Light will illuminate when activated.			
4	VENT - DEFROSTER	Turn counterclockwise for windshield defrosting. Turn clockwise to turn the blower vents on.			
5	AIR SOURCE	For fresh or recirculated air. Turn clockwise for recirculating the air. Turn counterclockwise for bringing in fresh air			

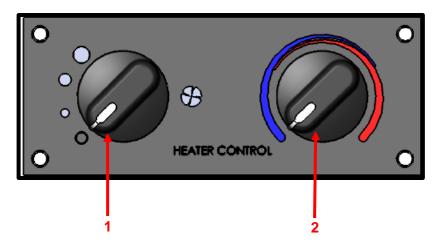




2-17. CREW HEATER CONTROLS (On Rear Evaporator Unit On Center Ceiling) *WHEN APPLICABLE



Rear Evaporator Unit

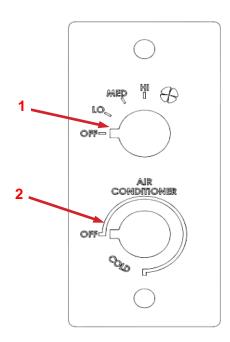


ITEM	CONTROL	FUNCTION			
1	FAN SPEED CONTROL	urn dial to control air output speed of the fan unit. Turn ockwise for increased air output speed. Off- Low - Med-High.			
2	HEATER TEMPERATURE CONTROL	Turn dial to control air output temperature. Turn clockwise for warmer output air temperature. Turn counterclockwise for cooler output air temperature.			



2-18. CREW A/C CONTROLS (On Rear Evaporator Unit on center of ceiling)

*WHEN APPLICABLE



ITEM	CONTROL	FUNCTION
1	FAN SPEED	Turn to Low – Med – High for desired fan speed.
2		Turn dial to control air output temperature. Turn clockwise for warner temperatures and counterclockwise for cooler temperatures



2-19. MOBILE DATA POWER SYSTEM

*WHEN APPLICABLE

NEWMAR MDP-25



The NewMar MDP-25 mobile data power computer uninterrupted power supply (UPS) with interactive power signals prevents system crashes, and data and hard drive corruption due to low voltage or loss of power. This delay timer switch contains a 9 AH battery that switches on when primary voltage drops, supplying 25 amps of 12V power -- assuring continued operation. An internal 3-step, temperature-compensated charger maintains the MDP-25 reserve battery at full charge.

Keeps your mobile computing devices operational regardless of DC input problems or dips in voltage. For more information see the vendor literature from NewMar or go to www.powering the network.com for manuals.



2-20. KNOXBOX

*WHEN APPLICABLE

KEYSECURE 4 WIFI



With one key, the Knox Rapid Access System removes barriers to entry when first responders respond to an emergency call.

Responders can then gain rapid access into secure perimeters, gates, buildings, campuses, residential and commercial properties. Removes barriers to entry reduces injuries to responders and minimizes property damage.

Knox KeySecure 4 maintains a history of unit activity including when and who released the key. It records the date and time if the faceplate is removed even if unit power is disabled. With Knox KeySecure 4 all administrator functions may be performed from a central office using either Wi-Fi or Ethernet connectivity or they may still connect directly to a PC via the USB port. Knox KeySecure 4 comes with an eight-character scrolling LED informational display.

For more information see the Knox vendor literature or visit knoxbox.com.

2-21. VEHICLE DATA RECORDER (VDR)

WHEN APPLICABLE

FIRE RESEARCH



Vehicle Data Recorder

The VDR is the brain of the Seat Monitor and Data Acquisition system. Waterproof, and installed permanently in your apparatus, it logs, and time stamps information required by the system. Most of this information can be obtained over a simple connection to the vehicle's J1939 database, but connections to sensors or switches on the seats and seatbelts provide some of the data.

The vehicle data recorder records the following data once per second and stores it in a 48-hour loop:

- Vehicle Speed
- Acceleration
- Deceleration
- Engine Speed
- Engine Throttle Position
- ABS Event
- Seat Occupied Status
- Seat Belt Status
- Master Optical Warning Device Switch
- Time
- Data

Additionally, the VDR records the following data once per minute and has enough memory to store it for 100 engine hours:

- Maximum Vehicle Speed
- Maximum Acceleration
- Maximum Deceleration
- Maximum Engine Speed
- Maximum Engine Throttle Position
- ABS Event
- Seat Occupied with Seat Belt Unbuckled
- Master Optical Warning Device Switch
- Time
- Date



Stored data is password protected and can be downloaded from the VDR by a paired device (this can either be a nearby PC with an attached interface wireless module or a Data Collector) via wireless connection. VDR data retrieved in this manner can be viewed and analyzed with FRC's HAWK Software.

HAWK Software stores data retrieved from the VDR in a relational database, provides the means to manage users and vehicles with VDRs, provides graphical displays of the stored data, and allows users to produce formatted reports of that data. HAWK software can manage data from many different vehicles in a fleet.



HAWK Software CD

Refer to the FRC system manual for further information on software updates are found at www.fireresearch.com.



2-22. RECHARGEABLE LANTERNS

*WHEN APPLICABLE

STREAMLIGHT FIRE VULCAN LED PORTABLE LANTERN



Throughout the cab, these lanterns can be installed. They are set into a Charging Rack that is wired into the electrical system of the apparatus.

Always make sure that the lantern IS FULLY CHARGED before its first use.

Charging

- Slide the lantern into the Charging Rack, setting the rear of the lantern in first.
- Align the front foot with the grove and push the lantern back until it locks into place.
- A red LED will illuminate on the rack on its side.
- When charging is complete, a green LED will illuminate. The lantern is ready for use.

To Remove Lantern from the Charging Rack

- Depress the Release Latch on the rear of the Charging Rack
- Pull the lantern forward and then upward from the Charging Rack

Using the Lantern

The Fire Vulcan LED Lantern has a 3-position mode switch located below the carrying handle.

It is factory-programmed to operate in the startup configuration as in the table below.

STARTUP CONFIGURATION						
LEFT RIGHT						
MAIN	TAIL	MAIN	TAIL			
Н	ON	н	FLASH			

- Push the switch left or right momentarily to turn ON.
- Push the switch again left or right momentarily to turn OFF.

Alternate Mode Selection

Pushing the switch to the left produces a steady, always on light. Pushing the switch to the right produces a blinking light.

To select a different mode other than the Startup configuration,



- Push the switch left or right (depending on the alternate mode desired)
- HOLD for 10 seconds to advance the mode.
- The lantern will proceed through each of the different Switch Modes as listed in the following table:

ALTERNATE MODE SELECTION							
LE	SWITCH		RIGHT				
MAIN	MAIN TAIL		MODE		MAIN	TAIL	
Н	ON		1		Н	FLASH	
LOW	ON		2		LOW	FLASH	
Н	OFF		3		FLASH	OFF	
OFF	ON		4	/	OFF	FLASH	

Optional User Programmable Starting Mode

You can program the lantern to start a mode of your choice.

- Turn on the lantern
- Go to the mode of your choice
- Push and hold the switch in the same directions used to select the mode until all the lights extinguish (about 30 seconds)
- Release the switch
- The next time the switch is pushed in that direction it will start in the mode chosen

USER PROGRAMMABLE MODE						
LEFT		SWITCH		RIGHT		
MAIN	TAIL	MODE		MAIN	TAIL	
Optional Mode (2-4)		Hold For Ten (10) Seconds to Advance		Optional Mode (2-4)		
HI	ON		1		HI	FLASH
LOW	ON		2		LOW	FLASH
Н	OFF		3		FLASH	OFF
OFF	ON		4/		OFF	FLASH



2-23. HAND HELD SPOTLIGHT

*WHEN APPLICABLE

MOBILE PATROL #2150-1





Features

- Indestructible, one-piece, molded neoprene housing,
- Pistol grip,
- Momentary action trigger switch
- Heavy duty coil cord.
- 110,000 candlepower sealed beam bulb with filament shield to minimize glare through glass, smoke and fog.

To Operate

- Remove from storage bracket by removing Velcro strap and pull up and out.
- For illumination, pull and maintain pressure on the switch.
- Point in direction where illumination is wanted.
- When done, replace spotlight in storage bracket and replace Velcro strap.



2-24. SEATBELTS

NOTE: Never perform seatbelt operations when the apparatus is in motion.

NOTE: Always disengage latch from the buckle when removing the seat belt.

How to Latch the Seatbelt

- Adjust the seat to the proper position, if adjustable.
- Hold the latch and pull the seat belt across the body.



Insert the latch into the buckle until you hear a "click".



- Give a short tug on the latch to ensure the buckle is locked. The belt must lay flat across the chest.
- Tighten the seat belt by pulling up on the shoulder belt.



Shoulder strap is centered on your shoulder and chest, not rubbing against face or neck, and not hanging off shoulder. If not, use the Height Adjuster to correct.

Never wear behind your back or under your arm. Lap belt should be firm across hips and pelvis, and below your belly.

Improper wearing of seatbelts can cause injury.

Adjusting Seat Belt Height

- Adjust the seat to the proper position if adjustable.
- Pinch the top and bottom levers together as you move the shoulder loop.

Top lever

Bottom lever and shoulder loop



- Move the shoulder loop until it clicks into a locked position.
- Gently tug on the shoulder belt to make sure the shoulder loop is locked.



How to Unlatch the Seat Belt

• Push the button on the end of the buckle to release the latch.

Buckle button-



Allow the belt to rewind into the retractor.

For more information on your seatbelts and for maintenance information, see the IMMI seatbelt vendor literature or go to imminet.com.



2-25. INTERCOMM SYSTEM

*WHEN APPLICABLE

DAVID CLARK 3800 INTERCOM SYSTEM

The David Clark 3800 Intercom System is installed into the cab area. It allows for communication between the crew members inside cab.



U3800 Master station

ITEM	CONTROL	FUNCTION
1	SYSTEM VOLUME	Changes the volume for the entire system of headsets. Turn Clockwise to increase the volume, counterclockwise to decrease the volume.
2	ON-OFF	Illuminates when the system is on. Push to turn on, push to turn off.
3	HEADSET JACK PORT	Connection port for headset
4	HEADSET VOLUME CONTROL KNOB	Volume controls for each of the individual headsets. Turn Clockwise to increase the volume, counterclockwise to decrease the volume.
5	EXTERNAL 1-AMP FUSE	Slow-blowing fuse and holder assembly



REMOTE HEADSET STATION



A Remote Headset Station is installed throughout the cab, usually by each occupant's seat,

The occupant connects their headset cord via the jack connection by simply pushing in the plug into the jack connection port.

The volume is adjusted by turning the volume control knob, clockwise for louder, counterclockwise for quieter.

HEADSETS



#H3441 Driver headset



#H3442 Crew headset

These headsets are a behind the head, single ear style that fits under helmets.

Located on one side is an ON-OFF switch for the microphone, and the microphone bar on the other side.

The headset headband can be rotated to accommodate the microphone boom from either side. The #H3441 Driver's headset is slotted to allow for hearing of external, ambient sounds.

2-26. HAVIS DOCKING STATION

*WHEN APPLICABLE



For mounting Getac F110 tablets to a power supply inside the cab.

Docking

- 1. Ensure Docking Station is unlatched by lifting Latch Handle
- 2. Hold tablet in landscape orientation, with bottom angled toward the Docking Station. Lower tablet into the bottom of the Docking Station.
- 3. Pivot tablet so the top aligns with the Locator Pin at the top of the Docking Station. Lower the Latch Handle to secure tablet in place.
- 4. For theft deterrence, secure tablet by locking Docking Station with supplied key

Undocking

- 1. If previously locked, unlock Docking Station using supplied key.
- 2. While holding tablet with one hand, lift the Latch Handle on the top of the Docking Station.
- 3. Once unlatched grab both sides of tablet, rock the top forward and carefully lift out of the Docking Station, top end first.

For more information see the vendor literature on this item or download the Owner's Manual from havis.com.



2-27. CAMERA SYSTEM

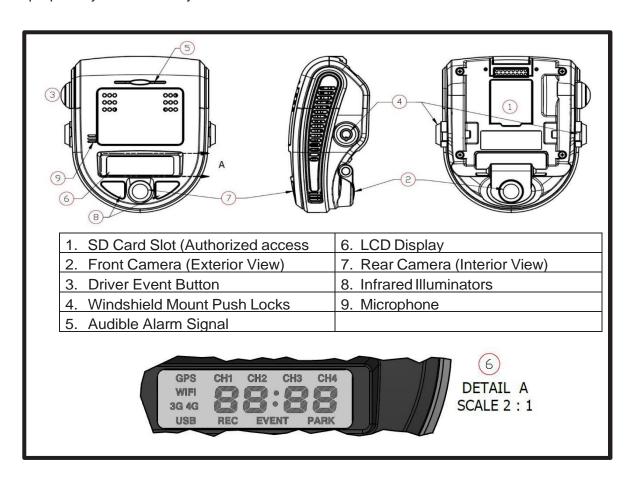
*WHEN APPLICABLE

ROSCO DUAL VISION CAMERA XC4

Dual-Vision XC4 by Rosco provides HD recording of exterior/interior video, and continuously logs vehicle travel data. Data is recorded in a continuous loop, with oldest video erased by more recent video. The compact system can hold many hours of data before any over-writing takes place. An internal GPS antenna enables capture of vehicle location, speed, and direction. Important "Events" such as excessive GForce and speeding are placed in special protected files along with video segments identified by the driver as being important.



All the data is stored in proprietary files located on a removable SD card. Video, audio, location information, and G-force data may ONLY be reviewed by accessing the contents of the SD card using Rosco's proprietary DV-P ro5 Player software.





Drive Recording

Your DVXC4 is supplied with an SD card configured with the factory default settings.

Insert the SD card into a PC and add identifying information. You can also change the values of any configurable setting as desired.

After re-inserting the SD card into the back of the Recorder, proceed to "click-in" the recorder into the Mounting Bracket.

Turn the ignition on. "boot" will appear on the LCD display indicating that the Recorder is initializing. Approximately 30 seconds after powering on, the LCD will briefly display "F1XX" indicating the firmware version, and a chime will sound indicating that initialization is complete. Although GPS still may not be active, recording begins when "REC" is displayed.

Within two minutes of start (assuming outdoor location), the GPS signal will be acquired, and the GPS icon will light up. Subsequent vehicle starts will acquire GPS signal significantly faster than the original start-up. GPS location data will be continuously analyzed, and each video file will contain embedded location, speed and direction data.

NOTE: When the vehicle is in motion, the LCD displays vehicle speed. When the vehicle comes to a complete stop, the LCD speed indicator will display the time after a few seconds. The option to show speed can be disabled by changing the SD card configuration.

Continuous (Normal) Recording

When the ignition is OFF, Dual-Vision™ XC4 Recorder remains powered for an additional 5 seconds to finish recording. If Parking Surveillance is ON, the LCD Display will show the "PARK" icon on and count-down the parking time in minutes while the LCD will be blinking and dimming slowly, and the recording will be continued until the parking time ends.

Dual-Vision™ XC4 creates proprietary files (identified as ".nvr" files) which contain video, audio, and tracking data. Proprietary .nvr files will only playback on DV-Pro5 Player program.

Continuously recorded .nvr files are NOT protected against overwriting. When the capacity of the SD Card has been reached, the oldest non-Event files are overwritten.

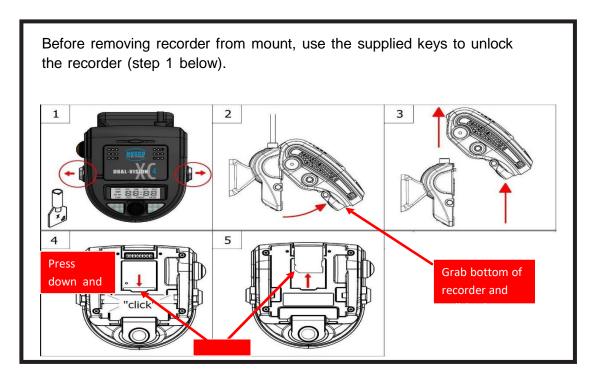
Recorder Removal & SD Card Retrieval

IMPORTANT: Follow proper shutdown procedure. Recorder must be completely powered off before detaching recorder or removing SD card.

Always power off the vehicle prior to removal of SD card from dual-vision™ xc4 recorder.

- If parking surveillance mode is OFF, turn ignition off. It is safe to remove the SD card after the Recorder's LCD display turns off.
- If parking surveillance mode is ON, turn ignition off and wait for few seconds until the LCD display begins blinking/dimming. Then press and hold the Driver Event Button for at least 5 seconds until the LCD indicates "SHUT", and then goes dark. It is now safe to remove the recorder and SD card as shown below.

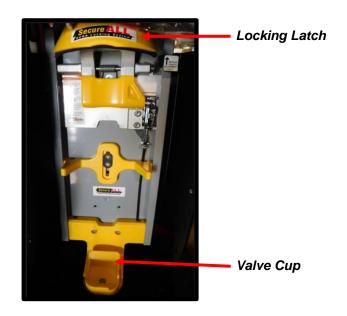




For more information see your vendor literature or go to roscovison.com for a downloadable pdf User Manual.

2-28. SECUREALL[™] SCBA LOCKING SYSTEM

*WHEN APPLICABLE



- For safe and secure SCBA cylinder storage
- Patented auto-lock system secures SCBA in all directions

How to Store Your SCBA Cylinder:

- Place the SCBA valve on the cylinder into the cup on the bottom of the locking system. Make sure that the valve is against the front edge of the cup.
- Place the other cylinder end against the locking plate to engage the latch.
- Push cylinder towards the locking system until it clicks into place.
- Check that the latch is properly engaged by firmly pulling on the SCBA cylinder.

NOTE: If latch doesn't engage properly, make sure that the valve is sitting in the Valve Cup and not on the edge. Additional adjustments to the Clamp Assembly and for cylinder height may need to be completed.

How to Remove Your SCBA Cylinder:

- Pull up on the handle located in the front center of the seat cushion.
- Remove the cylinder.

For additional information, see the vendor literature that came with your apparatus.

2-29. WATER TANK FILL TOWER

*WHEN APPLICABLE



The Water Fill Tower is located on the roof of the pumper, just above and to the right of the Driver's Side Operator Stand. It is a combination vent and manual, water only fill tower with a removable screen and a hinged cover.

To Fill the Tank

- Flip up the hinged cover.
- Fill tank with outside water source through the tower.
- Flip cover down when done



2-30. AKRON APOLLO DECK GUN

*WHEN APPLICABLE





Features

- 360° rotation mounted in the deck mode
- Vertical travel from 90° above to 45° below horizontal, with built-in 35° safety stop
- 3" waterway with cast-in turning vanes for efficient flow
- Akron #3488 aluminum barrel stream straightener
- Akron #2499 stacked tips
- Akron #3502 mounting bracket

Operating Instructions

The hand wheel and the brake knob are used to control the monitor.

To change the horizontal monitor position toward the "RIGHT" or "LEFT":

- Turn the brake knob counterclockwise until the unit can be easily rotated.
- Turn the same knob to the right to lock the unit in the desired horizontal position.

To change the vertical monitor position upward or downward:

• Turn the hand wheel clockwise or counterclockwise until it is aimed in the desired direction.

To raise the unit for operation over obstructions:

- Make sure that the unit is properly installed on the direct mount deck flange and that NO water is flowing through the unit.
- With one hand, pull the ring for the release pin on the top of the elevating arm with the other hand grab hold and pull up on the outlet end of the elevating arm until the release pin clicks in place.

NOTE: If the unit is difficult to elevate, turn the handwheel to relieve pressure on the elevation stop.

To lower the unit for storage or ground base operation:

- Make sure no water is flowing through the unit.
- With one hand pull the ring for the release pin on the bottom of the elevating arm and with the other hand grab hold and push down on the outlet end of the elevating arm until the release pin clicks in place.

For more information see the vendor literature with your apparatus or go to akronbrass.com for downloadable Installation, Operating and Maintenance Instructions.



2-31. BOOSTER REEL

*WHEN APPLICABLE

HANNAY BOOSTER REEL #EPF26-23-24RT



Booster Reels are located over the Operator's Stand.

This reel is powered by a 12 volt, 1/2 HP electric motor and with a chain drive drum, along with an automatic brake and a manual rewind ability.

It has a capacity of 200' of 3/4" booster hose. A Rewind button for the reel is located on both side's Operator Stands with the discharge controls on only the Driver's side Operator Stand.



2-32. CAB TILTING AND LOWERING OPERATION

There are two methods to raise and lower the cab - Electronic and Manual operation. Cab tilt procedures are to be performed ONLY by authorized maintenance personnel.

These procedures must be carefully read and understood prior to performing cab tilt operation.

▲ WARNING

- Cab tilting and lowering must always be done slowly, in a well-lit area.
- Failure to comply could result in injury or death to personnel.

▲ WARNING

- Do not attempt to perform maintenance with the cab only partially tilted. maintenance with the cab only partially tilted.
- Failure to comply could result in injury or death to personnel.

▲ WARNING

- Ensure there are no loose tools, equipment or any other miscellaneous items in the cab, on the cab roof, or on the bumper when the cab is tilted.
- Failure to comply could result in damage to the cab or equipment.
- Check the front bumper components and any front cab skin mounted components for clearance during and after tilting.

▲ WARNING

Keep all personnel clear of pinch points when lowering the cab to prevent injury.

▲ WARNING

- Do not lower cab before releasing the redundant mechanical stay arm.
- In not doing so, damage to the cab could result.
- The redundant mechanical stay arm release cable is located under the Officer's side step well.



▲ WARNING

Do NOT move the apparatus unless the cab is in the fully lowered position and locked.



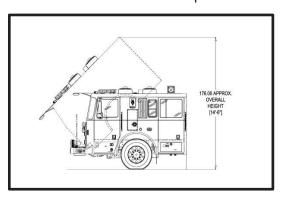
 Do not lower a raised cab to rest on the redundant mechanical stay arm or damage to cab may occur.

Failure to comply with these warning could result in injury or death to personnel.

CAB TILTING

Ensure there is adequate forward and overhead clearance for the cab when fully tilted.

In the example below, the extended raised tilt cab requires 14.6 feet of overhead clearance.



Cab Tilt Clearance example

BEFORE TILTING THE CAB

- **STEP 1:** Clear all personnel and obstacles from the cab area.
- **STEP 2:** Confirm there will be adequate forward and overhead clearance for the cab when fully tilted.
- **STEP 2:** Ensure there are no loose items in the cab, on the cab roof, or on the cab bumper that would fall or make contact when the cab is tilted.
- **STEP 3:** Check the front bumper components and any front cab skin mounted components (i.e. Roto-Ray, etc.) for clearance during and after tilting.





STEP 4: Confirm parking brake is engaged and transmission is in neutral.

STEP 5: Place wheel chocks on both sides of one of the front wheels.

STEP 6: Close front cab doors.

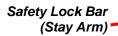
ELECTRONIC CAB TILITING







Hand Control





Continuing from "BEFORE TILTING THE CAB" directions.

STEP 7: Turn Battery Master switch ON.

STEP 8: Plug the hand control into the outlet at the front driver-side corner of the cab.

STEP 9: Stand clear of the cab. With the RED side up of the Hand Control, press the UP button. Continue to hold switch until cab is in the maximum tilted position.

STEP 10: Make sure the end of the Safety Lock Bar (Stay Arm) is slid into place, past the end of the cylinder barrel. Make sure that it drops onto the cylinder rod located on the right-hand cab tilt cylinder and that the cab is secured in tilted position. DO NOT lower the cab to rest on the Safety Lock Bar – it is a safety lock only, not a cab prop. Lowering the cab onto the lock can cause damage to the cab and will void your warranty.



CAB TILT

- 1. SET PARKING BRAKE AND SHIFT TRANSMISSION TO NEUTRAL BEFORE TILTING THE CAB.
- REMOVE LOOSE EQUPWIT, CLOSE DOORS
 CHECK FRONT BUMPER COMPONENTS FOR
 CAB CLEARANCE DURING AND AFTER TILTING. TILT CAB TO FULL TILT. STAY CLEAR WHILE
- 5. CHECK TO ENSURE THAT CAB STAY ARM ON CAB TILT CYLINDER ROD IS FULLY ENGAGED.
 NEVER WORK ON CAB WITHOUT STAY ARM IN
 THE SUPPORT POSITION.
- CAB TILT $\mathbb{D}(\mathbb{Q})$ 6. DISENGAGE CAB STAY ARM WITH PULL CABLE LOCATED UNDER FRONT CAB DOOR PRIOR TO LOWERING CAB.

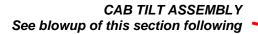
 7. LOWER CAB INTO LOCKS. STAY CLEAR WHILE
- LOWERING.
- AFTER CAB HAS RETURNED TO THE LOCKS, "CAB NOT LOCK LIGHT" SHOULD BE OFF.

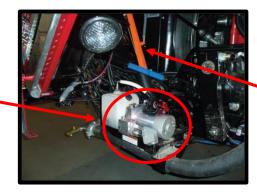




DO NOT tilt cab to rest on the Safety Lock Bar (Stay Arm).

MANUAL CAB TILTING





Safety Lock Bar (Stay Arm)





Manual Cab Tilt Handle Receptacle

Continuing from "BEFORE TILTING THE CAB" directions.

- **STEP 7:** Turn the Battery Master Switch ON.
- **STEP 8:** Insert the Pump Extension Handle into the Manual Cab Tilt Handle Receptacle on the bottom of the Cab Tilt Assembly.
- **STEP 9:** Pump the handle until the cab is fully tilted.
- STEP 10: Make sure the end of the Safety Lock Bar (Stay Arm) is slid into place, past the end of the cylinder barrel. Make sure that it drops onto the cylinder rod located on the right-hand cab tilt cylinder and that the cab is secured in tilted position. DO NOT lower the cab to rest on the Safety Lock Bar it is a safety lock only, not a cab prop. Lowering the cab onto the lock can cause damage to the cab and will void your warranty.



CAB LOWERING

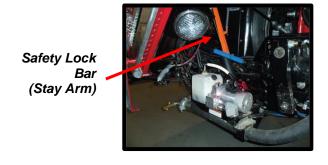


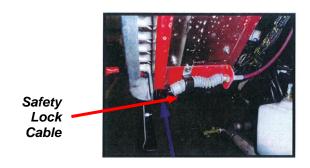
Keep all personnel clear of pinch points when lowering the cab to prevent injury.



Serious damage may result if the Safety Lock Bar is not released prior to attempting to lower the cab.

ELECTRONIC CAB LOWERING





- STEP 1: Clear all personnel from the cab area.
- **STEP 2:** Pull the Safety Lock Cable to raise the Safety Lock Bar off the cylinder rod. Hold the Safety Lock Cable until the cab has moved downwards enough so the Safety Lock Bar does not catch the end of the cylinder.

NOTE: If you are unable to release the Safety Lock from the cylinder, the cab may need to be raised slightly.

- **STEP 3:** Stand clear of the cab. With the BLACK side up of the Hand Control, push and hold down the DOWN button on the hand control. Continue to hold the button down until the cab is returned to its normal locked position.
- **STEP 4:** On the Center Overhead Control Panel, check to make sure that the "CAB NOT LOCKED" message is not displayed in the Intellex[®] Plus display screen.



▲ WARNING

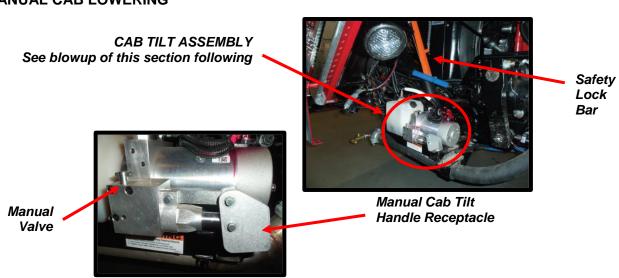
DO NOT attempt to drive the unit when the "Cab Not Locked" message is displayed on the IQAN display in the cab. The cab is not locked when this message is displayed.

STEP 5: Remove the hand control plug from the outlet and return the control to its designated storage area.

STEP 6: Turn the Battery Master switch to OFF.

STEP 7: Return the front bumper components to their normal, "in use" positions.

MANUAL CAB LOWERING



Cab Tilt Assembly

▲ WARNING

Keep all personnel clear of pinch points when lowering the cab to prevent injury.

▲ WARNING

Serious damage may result if the Safety Lock Bar is not released prior to attempting to lower the cab.





STEP 1: Clear all personnel from the cab area.

STEP 2: Pull the Safety Lock Cable to raise the Safety Lock Bar off the cylinder rod. Hold the Safety Lock Cable until the cab has moved downwards enough so the Safety Lock Bar does not catch the end of the cylinder.

NOTE: If you are unable to release the Safety Lock from the cylinder, the cab may need to be raised slightly.

▲ WARNING

The cab will begin lowering WITHOUT the use of the Pump Extension Handle. Lowering of the cab may be stopped by returning the Manual Valve to the CLOSED position.

STEP 3: The Cab lowers automatically.

STEP 4: On the Center Overhead Control Panel, check to make sure that the "CAB NOT LOCKED" message is not displayed in the Intellex[®] Plus display screen.

▲ WARNING

DO NOT attempt to drive the unit when the "Cab Not Locked" message is displayed. The cab is not locked when this message is displayed.

- **STEP 5:** Once the cab has been lowered into position, move the Manual Valve on the Cab Tilt Assembly CLOCKWISE to the closed/tightened position.
- **STEP 6:** Remove the Pump Extension Handle from Cab Tilt Valve and store the handle in it designated storage area.

STEP 10: Turn Battery Master Switch OFF.

STEP 11: Return the front bumper components to their normal "in use" positions.

3-1. GENERAL INFORMATION

The following procedures are essential to perform before using your apparatus in operations. All operating personnel must be thoroughly familiar with these procedures. When placing the apparatus in operation, it is desirable that it be placed on the most level spot available consistent with the emergency requirements. A space free from overhead wires, cables, and other obstructions is also desirable.



Read and understand all cautions, warnings and dangers in this manual and all such plates, decals and stickers on the apparatus before attempting any operation of this vehicle.

3-2. PRE-DRIVING CHECKLIST



Operation of this apparatus must not be undertaken unless the following criteria has been met:

- All operators have been trained in the safe operation of the apparatus.
- All operators have read and understand the safety recommendations contained in this manual.
- All operators are familiar with and understand all applicable federal, state, and local government Regulations.
- All personnel traveling in the cab are wearing seat belts.
- All personnel traveling in the cab are NOT wearing fire helmets. Fire helmets are not designed for crash protection and will interfere with the protection provided by head rests.
- The apparatus is being operated within the rated load capacity.
- The apparatus has been visually inspected for defects before its operation and use.
- Death or serious injury may result if these precautions are not met.

3-3. ENGINE OPERATION

OPERATION OF THE ENGINE IN A FUEL-RICH ATMOSPHERE



Diesel engines do not require a spark for ignition and will continue to run as long as there is fuel available. Do not operate the engine where there are or could possibly be combustible vapors. These vapors can be pulled into the engine and cause the engine to increase speed. This increase in engine speed cannot be controlled. Turning off the ignition or battery switches will not affect the speed.

AIR FILTER SERVICE INDICATOR

Dirty air is a common cause of air restriction to an engine. The engine air filter ensures that dust and dirt are not allowed into your engine. A dirty air filter restricts the amount of air into the engine. Too little air causes reduction in horsepower and heavier exhaust and can cause engine failure.

DIESEL FUEL REQUIREMENTS

Ultra-low sulfur diesel fuel must be used in your apparatus. Ultra-low sulfur diesel is defined as diesel fuel NOT exceeding 0.0015 (15 PPM) mass percent sulfur content. There is no acceptable substitute.

- Use of #2 diesel fuel OR #1 diesel fuel will give optimum engine performance.
- Ultra-low sulfur diesel is required. The aftertreatment system may be damaged if not used.
- Do not use diesel fuel blended with lubricating oil.



Never blend diesel fuel with gasoline, gasohol, alcohol or other volatile substances. This mixture can cause an explosion.



Keep your diesel fuel free of dirt and water. Dirt and water in the fuel system can cause severe damage to the fuel pump and fuel injectors.



3-4. ENGINE OIL REQUIREMENTS

Your apparatus oil requirements is located in the Lubrication Chart, posted on the inside of the driver's door and included in the Parts Book Drawings in your electronic manual.

Maintain the oil at the proper level at all time. Use the oil dipstick to regularly check the level.

"Break-in" oils are not recommended for your engine. Use the regular recommended oil during the break-in period as used in normal operations.



Extending the oil and oil filter change interval beyond the recommendations in your Maintenance Manual service interval checklists will decrease the engine life.



Aftermarket oil additives are not recommended in your engine. They are not needed for enhanced engine performance and may reduce the ability to protect your engine.

COLD WEATHER ENGINE OPERATION *WHEN APPLICABLE

Cold weather conditions require special additional actions to protect your apparatus engine. Cold weather conditions can cause oil pressure delays. Special grade oils need to be used in these conditions. Using a 5W-40 viscosity heavy duty engine lubricating oil that meets the requirements of CES20086 or CES20081 is needed.

The Diesel fuel used must also use a cold weather operating aid during cold weather conditions.

Your engine is equipped with a High Idle Switch located on the driver side of the center console control panel. When this is enabled, this elevates the idle speed of the engine to shorten the time necessary to warm up the engine. This feature is only available when the apparatus is in park. It is disabled when the transmission is in the road mode.

▲ CAUTION

When the "Wait To Start" Indicator Light is illuminated, the engine should not be started until the intake air heaters have completed the pre-heat cycle during cold ambient conditions. Once the light goes off, the engine can be started. It will be normal for this light to stay on longer than normal in cold weather conditions.

Do not operate the engine at low idle for long periods when the engine coolant temperature is below the minimum specifications for your engine. See your Cummins Owner Manual for more information.

3-5. COLD WEATHER PUMPING

*WHEN APPLICABLE

Cold weather conditions require additional actions during pumping.

- Make sure that the Engine Cooler Valve on the driver's side Operator Stand is closed.
- Turn the cab heaters to low or off when not occupied. This will draw less heat from the engine.
- Operation of the engine in a high idle mode is of limited benefit unless the engine is under load. See the Waterous pump operator's manual for further information.

3-6. DIESEL PARTICULATE FILTER SYSTEM

WHAT IS A DIESEL PARTICULATE FILTER?

The Aftertreatment Diesel Particulate Filter is a ceramic filter that captures soot and ash from the exhaust.

Over time, soot and ash build up in the filter and MUST be removed. Soot build-up is removed by heating the filter until the soot turns into carbon dioxide gas. This is called the Aftertreatment Regeneration. The ash build-up is removed from the filter by periodic cleaning the filter in a special cleaning machine.

▲ CAUTION

- Ultra-low-sulfur diesel fuel is required for an engine equipped with an Aftertreatment Diesel Particulate Filter.
- If ultra-low-sulfur fuel is not used, the engine might NOT meet emissions regulations, and the Aftertreatment Diesel Particulate Filter or the Aftertreatment Diesel Oxidation Catalyst can be damaged.

NOTE: Please refer to the latest Cummins Engine Operations Manual for additional engine information.



3-7. INDICATOR LAMPS

HIGH EXHAUST SYSTEM TEMPERATURE (HEST) LAMP



HEST Lamp

This indicator lights when there is a higher than normal exhaust temperatures due to an Aftertreatment Regeneration.

The High Exhaust System Temperature (HEST) Lamp provides an indication to the apparatus operator than an Automatic Regeneration has been initiated. It shows that exhaust system temperatures will be elevated above 1050° F (566° C).

This lamp will only come on if the temperature is 1050° F (566° C) or above.

The HEST lamp will remain on until the exhaust system temperatures have dropped below 1000° F, 538° C.

▲ WARNING

When the HEST Lamp is illuminated, follow these precautions:

- Keep the exhaust outlet away from people and anything that can burn, melt or explode.
- Keep the area clear within 2 feet of the exhaust outlet
- Keep anything that can burn, melt or explode (such as gasoline, wood, paper, plastics, fabric, compressed gas containers, or hydraulic lines) a minimum of 5 feet from the exhaust outlet
- In case of emergency, turn off the engine to stop the flow of exhaust

NOTE: The HEST Lamp does not signify the need for any kind of apparatus or engine service. It merely alerts the apparatus operator to high exhaust temperatures. It will be common for the HEST Lamp to illuminate on and off during normal apparatus operation as the engine completes an Automatic Regeneration.



AFTERTREATMENT DIESEL PARTICULATE FILTER (DPF) LAMP





DPF Lamp

Check Engine

The DPF Lamp indicates that the DPF is becoming filled with soot and that the driver's assistance is needed. Three code levels provide an indication for various types of regeneration requirements.

- On
- Flashing
- Flashing with CHECK ENGINE Lamp

The DPF lamp provides an indication that the filter has not been able to regenerate under the previous engine operating conditions and will need assistance to perform an Automatic Regeneration.

Assistance can be provided by changing the duty cycle (load of the engine), or by initiating a Stationary Regeneration.

The lamp will turn off acknowledging when effective assistance (changing duty cycle or initiating a Stationary Regeneration) has been provided. However, if assistance has not been sufficiently long enough to complete a regeneration, the lamp will return to the appropriate indication stage.

DPF INHIBIT SWITCH

Allows a driver to manually turn off an Automatic Regeneration and prevent the Automatic Regeneration from occurring. Only use this switch when necessary.

NOTE: If the DPF Inhibit switch is engaged and the DPF needs to Regenerate, the Amber DPF lamp and Check Engine light will illuminate.

3-8. REGENERATION

Regeneration is the removal of soot from the Aftertreatment Diesel Particulate Filter. There are two kinds of regeneration: Automatic and Stationary.

AUTOMATIC REGENERATION

Automatic Regeneration occurs while driving. You do not have to do anything to start an Automatic Regeneration.

When driving at high speeds or with heavy loads, the exhaust will be hot enough to turn the soot into carbon dioxide. When driving at lower speeds or with lighter loads, the exhaust is not normally hot enough to remove soot. The soot will build up. It is then that an Automatic Regeneration will initiate.

NOTE: When the exhaust is automatically heated, turbocharger noise can increase slightly due to the turbocharger changing position for increasing exhaust temperatures.

During an Automatic Regeneration, the internal exhaust temperatures can be hotter than when the engine is operating at full load. The exhaust during an Automatic Regeneration could reach 1100° F (600° C). 1500° F (800° C) under certain conditions. The High Exhaust System Temperature Lamp (HEST) will illuminate to indicate the exhaust temperature is unusually hot.

Under normal operation, an Automatic Regeneration only occurs when the vehicle is moving. If the vehicle is moving slower than 6.0 mph, the Automatic Regeneration will not occur. However, if an Automatic Regeneration is taking place when the vehicle slows down, or stops, the HEST dash lamp may illuminate to let the driver know that the Aftertreatment System may still be above 1050° F (566° C).



When the HEST lamp is illuminated, see the "High Exhaust System Temperature (HEST) Lamp" in this section for precautions.

NOTE: Seagrave uses an exhaust diffuser. The temperature at the tailpipe outlet can be 200-250 ° F lower than the outlet temperature of the Diesel Particulate Filter.





STATIONARY REGENERATION

Stationary Regeneration is considered a normal maintenance practice and is not covered by the Cummins Inc. warranty.

STEP 1: Select an appropriate location to park the apparatus.

- Allow for approximately 40 minutes or more for the regeneration process to complete.
- Park on an outdoor surface that will not burn or melt under high temperatures, such as clean concrete or gravel, NOT grass or asphalt.
- Park away from anything that can burn, melt or explode, (such as gasoline, wood, paper, plastics, fabric, compressed gas containers, hydraulic lines) that is not within 1.5 m (5 ft.)
- Make sure that nothing is within 0.6 m (2 ft.) of the exhaust outlet.
- There should be no gas or vapors nearby that could burn, explode, or contribute to a fire (such as LP gas, gasoline vapors, oxygen, nitrous oxide).

STEP 2: Park the apparatus securely.

- Set the parking brake.
- Place the transmission in Neutral.
- Set wheel chocks in the front and the rear of at least one FRONT tire.
- The Regeneration Inhibit (DPF Inhibit) must be off.

STEP 3: Set up a safe exhaust area.

- Set up barriers to keep people at least 1.5 m (5 ft.) from the exhaust outlet during the regeneration process.
- Keep a fire extinguisher nearby and within reach.

STEP 4: Check exhaust system surfaces.

• Confirm that nothing is on or near the exhaust system surfaces such as tools, rags, grease, or debris.

STEP 5: Prepare for engine speed changes during regeneration.

- Do NOT operate any PTO powered devices. Disconnect these devices before starting the regeneration process.
- Stay clear of the engine compartment.

STEP6: Begin Stationary Regeneration by holding the Engine Diagnostic Switch in the ON position for 5 Seconds.

- The engine speed will increase, and the turbocharger can whistle loudly during the Regeneration process.
- The engine will create enough heat to Regenerate the Aftertreatment Diesel Particulate Filter.
- Once the Aftertreatment Diesel Particulate Filter is Regenerated, the engine will automatically return to normal idle speed.

STEP 7: Monitor the area.

- Make sure the apparatus and the surrounding area are monitored during Regeneration.
- If any unsafe condition occurs, shut off the engine immediately.

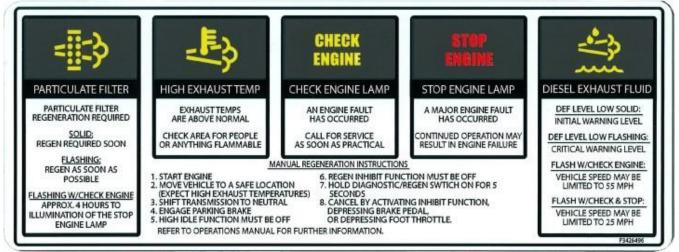


▲ WARNING

Do not perform a stationary regeneration while connected to an exhaust extraction system. Damage to the exhaust extraction system may occur.

NOTE: Stationary Regeneration is considered a normal maintenance practice and is not covered by the Cummins Inc. warranty.

DPF INSTRUCTIONS (Located on Driver Side Visor)



P3426496

INTERRUPTING A STATIONARY REGENERATION

If for any reason, the apparatus is needed while a Stationary Regeneration is in process, the regeneration process can be stopped.

To stop a Stationary Regeneration, complete one of the following:

- Engage the DPF Inhibit switch.
- Engage the service brake.
- · Release parking brake.
- Depress throttle pedal.
- Turn off engine.



DPF LAMP IS ON – NOW WHAT?

- The DPF lamp indicates that the soot load is high, and Regeneration is needed.
- It Does NOT indicate a fault condition.
- It does NOT indicate that something has failed.
- It does NOT mean "Take the truck out of service."
- It does NOT mean "Ignore and it will go away."
- It is NORMAL and should be expected, especially for a fire apparatus, which has a relatively light duty cycle.

When the DPF lamp comes on, the operator should take the next convenient opportunity to either:

- Change to a more challenging duty cycle by increasing the engine loads by:
 - Activating the vehicle's driving and headlights,
 - Activating the engine fan,
 - Activating the air conditioner or the Defroster,
 - Driving and maintaining a road speed of approximately 50 miles per hour or greater until the DPF lamp deactivates.
 - Continue driving for an additional 20 minutes further to provide for adequate Aftertreatment Diesel Particulate Filter Regeneration.
- Park the truck and perform a Stationary Regeneration (see Stationary Regeneration)
 - o Recommended in next 2-6 hours
 - No need to discontinue operations
 - No need to take truck out of service

DPF LAMP IS FLASHING

If a driver continues to operate the apparatus but was unable to perform a Regeneration, the DPF lamp will begin flashing. The Aftertreatment Diesel Particulate Filter needs to be regenerated at the next possible opportunity. The driver can do this by either changing to a more challenging duty cycle (see "DPF Lamp On - Now What?") or by performing a Stationary Regeneration.

▲ CAUTION

- The driver should not ignore the DPF Lamp.
- When this lamp illuminates, the system needs help.
- The lamps are there to protect the equipment.

DPF LAMP IS FLASHING AND THE CHECK ENGINE LAMP IS ON

If the driver still hasn't found the time to do a Regeneration when the DPF lamp was flashing and an Automatic or Stationary Regeneration hasn't occurred, the particulate matter build-up will continue to increase. Now, the Check Engine lamp will come on along with the DPF lamp.

When this happens, the Automatic Regeneration has been disabled. Changing to a more difficult duty cycle, is no longer an option. The driver MUST pull over in a safe area and perform a Stationary Regeneration immediately.

If a Stationary Regeneration cannot be initiated, the driver should take the truck to a service location immediately. The truck should return to normal operation after Regeneration.

▲ WARNING

- Drivers should not ignore the flashing DPF lamp and the CHECK ENGINE lamp.
- If lamps are ignored and the next stage is reached, damage to the Diesel Particulate Filter and engine could occur.

NOTE: If the DPF Inhibit switch is engaged and the DPF needs to regenerate, the amber DPF Lamp and the Check Engine Light will illuminate.

NOTE: If the amber Check Engine lamp is still on after a Stationary Regeneration, the driver should seek service at the next opportunity to inspect the engine system.

NOTE: If a Stationary Regeneration is not performed, the Stop Engine lamp will illuminate, and the vehicle will need to be taken to a Cummins authorized repair location.



DPF LAMP IS FLASHING AND THE RED STOP ENGINE LAMP IS ON

If the driver continues to drive without a Regeneration, after the DPF lamp is flashing and the CHECK ENGINE lamp comes on...then the red STOP ENGINE lamp will illuminate. The Diesel Particulate Filter is now full and there will be a severe derating in power to protect the system.

▲ WARNING

- At this point, there may be damage to the engine and the Aftertreatment System if the driver continues to operate the engine.
- If the red STOP ENGINE lamp illuminates, all driver-initiated Regeneration options will be disabled. The operator must seek service and stop the engine immediately.
- A qualified service technician will need to inspect the system and perform a supervised Regeneration to avoid Diesel Particulate Filter damage.



Once Regeneration is complete, exhaust gas and exhaust surface temperatures will remain elevated for 3 to 5 minutes.

3-9. AIRLESS SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM

WHAT IS AN AIRLESS SELCTIVE CATALYTIC REDUCTION (SCR) SYSTEM?

The SRC system is used to decrease the NOx emissions from the apparatus tailpipe. This is achieved by spraying diesel exhaust fluid (DEF) into the exhaust gas prior to the Aftertreatment SCR catalyst. The diesel exhaust fluid vaporizes and decomposes to form carbon dioxide and ammonia. The ammonia then reacts with the NOx emissions over the Aftertreatment SCR catalyst to form nitrogen and water.

NOTE: Please refer to your Cummins Engine-Owner's Manual for more detailed information.

NOTE: Engine sounds may vary at times with the aftertreatment system. Please refer to the Cummins Driver Tips Guide or your Engine Owner's Manual for more information.

DIESEL EXHAUST FLUID

The SCR system requires an on-frame storage tank for the Diesel Exhaust Fluid (DEF). Refilling this tank with DEF fluid is critical for the apparatus to comply with the EPA emission regulations.

The DEF tank should be checked regularly to maintain fluid levels. The capacity is monitored with the DEF gauge on the dash and the DEF lamp on the Indicator Panel.

DEF GAUGE



DEF Gauge

The DEF gauge is located on the driver's side dash area and indicates the DEF storage tank level. A warning light will illuminate when the DEF level is low in conjunction with the DEF lamp.

DEF LAMP





Illuminated: An illuminated DEF Lamp indicates that the DEF level is low. Correct this by refilling the DEF tank.

Flashing DEF Lamp: A flashing DEF lamp indicates that the DEF is below critical level. Correct this by refilling the DEF tank.

Flashing DEF Lamp with the Check Engine Lamp: A flashing DEF lamp combined with an illuminated Warning or Check Engine lamp indicates that the DEF level is critically low and the apparatus speed may be limited to 55 mph. Normal engine power will be restored after refilling the DEF tank.

Flashing DEF with the Check Engine Lamp and the Stop Engine Lamp: If the engine has been shut down or has idled for 20 hours after the DEF tank has been run dry, the Stop Engine lamp will also be illuminated along with the flashing DEF lamp and Check Engine lamp. The apparatus may be limited to 25 mph. Normal engine power will be restored after refilling the DEF tank.



Do not disconnect the apparatus batteries during the initial 60 seconds, after turning off the Ignition Switch to the OFF position and the Battery Switch to the OFF position, to avoid system damage.



During this time, a pumping sound may be heard from underneath the apparatus. This is normal. The aftertreatment DEF dosing unit purges any unused DEF from the system and returns it to the tank.

NOTE: Under certain conditions, condensation in the form of water vapor may be seen coming from the apparatus tailpipe. This is normal and will clear within a few minutes of normal apparatus operation.

3-10. TRANSMISSION

GENERAL DESCRIPTION

The Allison Transmission is fully electronically controlled with their Electronic Shift Selector. This controls the operation of the transmission, controlling transmission upshifts and downshifts, and provides important information on the operation of your drive system.

Through readouts on your shift selector, you will be able to monitor transmission oil levels, read diagnostic codes and prognostic information.

In your Manual Binder, you will find copies of the following publications on the Allison Transmission:

- Operator's Manual
- Operation + Code Manual
- Warranty Information

These manuals will give more in-depth information about the Allision Transmission, features and use. It is extremely important that operating and maintenance personnel become familiar with the systems and components before operation.

DIGITAL DISPLAY

Digital Display*
(Select)
Highest available gear
Service Icon
Lowest available gear
(Monitor)
*Displays maintenance, prognostics,
faults diagnostic's mode.



During normal operation when D (drive) is selected, the digital display shows the highest forward range attainable for the shift schedule in use. Abnormal operation is also indicated by the digital display. When all segments of the digital display are illuminated for more than 12 seconds, the ECU did not complete initialization.



- When the digital display is blank, there is no power to the selector.
- When the display shows a "cat-eye" or '/, a selector-related fault code has been logged.
- Conditions which illuminates the Check Trans light, the digital display will show the actual range attained.
- The transmission will not shift into range if a Check Trans code is active. When the display shows
 either R or D has been requested and the display is flashing, the requested range has not been
 achieved due to an inhibit function.
- Some inhibit functions are vehicle related and will not result in diagnostic codes.

R (REVERSE)

Completely stop the vehicle and let the engine return to idle before shifting from a forward range to Reverse or from Reverse to a forward range. The digital display will display R when Reverse is selected.



If you leave the vehicle and the engine is running, the vehicle can move suddenly and you or others could be injured. If you must leave the engine running, do not leave the vehicle until you have completed the following steps:

- Put the transmission in N (Neutral)
- Ensure that the engine is at low idle (Approx. 700 rpm)
- Apply the parking brake and emergency brakes and make sure they are properly engaged.
- Chock the wheels and take any other steps necessary to keep the vehicle from moving.

▲ WARNING

- "R" (Reverse) may not be obtained due to an active inhibitor.
- Always apply the service brakes when selecting R (Reverse) to prevent unexpected vehicle movement
- When the "R" is flashing, it indicates that the shift to R (Reverse) is inhibited.
- Check for active diagnostic codes if R (Reverse) is not obtained.



Do not idle in R (Reverse) for more than five minutes. Extended idling in R (Reverse) may cause transmission overheating and damage. Always select N (Neutral) whenever idle time exceeds five (5) minutes.

NOTE: Visually check the digital display window whenever a button is pushed, or the lever is moved to be sure the range selected is shown (i.e., if the N (Neutral) button is pressed, N should appear in the digital display). A flashing display indicates that the range selected was not attained due to an active inhibit.



N (NEUTRAL)

Use N (Neutral) when you start the engine, to check vehicle accessories, and for extended periods of engine idle operation (longer than five minutes). For vehicles equipped with the lever selector, the vehicle will not start unless N (Neutral) has been selected. If the vehicle starts in any range other than N (Neutral), seek service immediately. N (Neutral) is also used during stationary operation of the power takeoff (if your vehicle is equipped with a PTO). The digital display will show N when Neutral is selected. Always select N (Neutral) before turning off the vehicle engine.



When starting the engine, make sure the service brakes are applied. Failure to apply the service brakes may result in unexpected vehicle movement.

▲ WARNING

Vehicle service brakes, parking brake, or emergency brake must be applied whenever N (Neutral) is selected to prevent unexpected vehicle movement. Selecting N (Neutral) does not apply vehicle brakes, unless an auxiliary system to apply the parking brake is installed.

▲ WARNING

If you let the vehicle coast in N (Neutral), there is no engine braking and you could lose control. Coasting can also cause severe transmission damage.

To help avoid injury and property damage, do not allow the vehicle to coast in N (Neutral).

D (DRIVE)

The transmission will initially attain first range when D (Drive) is selected. As vehicle speed increased, the transmission will upshift automatically through each range. As the vehicle slows, the transmission will downshift automatically through each range. The digital display will show the highest range available in D (Drive).

▲ WARNING

- D (Drive) may not be obtained due to an active inhibitor.
- Always apply the service brakes when selecting D (Drive) to prevent unexpected vehicle movement.
- When the "D" is flashing, it indicates that the shift to D (Drive) is inhibited.
- Check for active diagnostic codes if D (Drive) is not obtained.



▲ CAUTION

- Do not idle in D (Drive) for more than five minutes.
- Extended idling in D (Drive) may cause transmission overheating and damage.
- Always select N (Neutral) if idle time is longer than five minutes. Turn off the vehicle High Idle switch, if
 present, before shifting from N (Neutral) to D (Drive) or R (Reverse). D (Drive) or R (Reverse) will not
 be attained unless the shift is made with the engine at idle.

NOTE: Turn off the vehicle High Idle switch, if present, before shifting from N (Neutral) to D (Drive) or R (Reverse). D (Drive) or R (Reverse) will not be attained unless the shift is made with the engine at idle.

FIRST GEAR (1st)

Use this range when pulling through mud and deep snow, when maneuvering in tight spaces, or while driving up or down grades. First range provides the vehicle with its maximum driving torque and maximum engine braking effect.

GEAR RANGES 2nd, 3rd and 4th

Occasionally, road conditions, load, or traffic conditions will make it desirable to restrict automatic shifting to a lower range. Lower ranges provide greater engine braking for going downgrades (the lower the range, the greater the braking effect).

The digital display will show your choice of range. Even though a lower range was selected, the transmission may not downshift until vehicle speed is reduced (this prevents excessive engine speed in the lower range.

FIFTH GEAR (5th)

Fifth gear (5th) may be used for vehicle speeds more than 46 mph and may only be activated by pressing the MODE button.



If you just downshift or use service brakes when going downhill, you can lose control and cause injury and property damage.



▲ WARNING

- To help avoid loss of control, use a combination of downshifting, braking, and other retarding devices. Downshifting to a lower transmission range increases engine braking and helps you to maintain control. The transmission has a feature to prevent automatic upshifting above the lower range selected.
- However, during downhill operation, if engine governed speed is exceeded in the lower range, the transmission may upshift to the next higher range.
- This will reduce braking and could cause a loss of control. Apply the apparatus brakes or other retarding device to prevent exceeding engine governed speed in the lower range selected.

Transmission Speed Range

GEAR	RPM	SPEED
1	2100	14 MPH
2	2100	27 MPH
3	2100	36 MPH
4	2100	46 MPH
5*	2100	69 MPH

*NOTE: 5th gear range may only be activated by pressing the MODE button.

3-11. STARTING THE APPARATUS

- **STEP 1:** Place the Battery Master switch to the ON position.
- **STEP 2**: Turn the ignition switch ON.
- **STEP 3:** Verify that the transmission is in the N (Neutral) position (the transmission will automatically default to the neutral position when first started).
- **STEP 4:** Wait until the system has completed the prove out, the dials on the gauges to sweep fully and return, before pressing the start button. This ensures that the dash module has connected to the engine ECU.
- **STEP 5:** After the gauge module and the engine module are connected, with your foot OFF the accelerator pedal and ON the brake pedal, PUSH DOWN the Start Switch.

NOTE: Allow the gauges and indicator lights to self-check prior to starting the engine. Not allowing them to self-check, will cause engine codes to appear.

▲ WARNING

If the engine warning lights stay on after starting the engine, investigate the cause of the warning condition.

- If the start switch is toggled before the system has completed its prove out, some systems may be affected.
- Truck may start but will not have throttle (truck will only idle). Truck will need to be shut down and restarted.
- Truck may not start, (crank over only). Turn OFF the Ignition switch and the Battery switch and go back to Step 1.
- o Other intermittent electrical issues may be experienced.

If the engine fails to start within 15 seconds, release the starter button and allow the starting motor to cool for approximately 15 seconds before trying again. If the engine fails to start after four attempts, an inspection should be made to determine the cause.

If there is no oil pressure indicated within 10 to 15 seconds, stop the engine and check the lubricating system.

If the oil pressure does not fall within these guidelines, stop the engine and investigate.

Check the engine oil level and inspect for any signs of contamination (i.e. fuel, coolant or debris).



NOTE: Observe the oil pressure gauge immediately after starting the engine. A good indicator, all the moving parts are getting lubrication, is when the oil pressure gauge registers a pressure of at least 10 psi at idle speed.

GEAR RANGE SELECTION

- STEP 1: Depress the brake pedal and hold firmly.
- STEP 2: Release the Parking Brake while still maintaining pressure on the brake foot pedal.
- STEP 3: Select D (Drive) with the Transmission Shift Selector.
- **STEP 4:** Select the appropriate gear for the situation you are traveling through.

ACCELERATING THE APPARATUS

- **STEP 1:** Release pressure on the brake foot pedal.
- **STEP 2:** Depress the accelerator pedal to move forward.
- STEP 3: Engine response versus pedal movement may feel different from a mechanically governed engine. The Electronic Foot Pedal Assembly was designed to communicate a "percentage" of foot pedal travel to the Engine's Electronic Control Module. The engine will respond according to the driver's demand.

▲ WARNING

- With the Parking Brake release and the transmission in D (Drive), the apparatus may move forward without touching the accelerator pedal.
- Prior to accelerating the apparatus, always maintain pressure on the brake foot pedal.

▲ CAUTION

- Be sure the engine is at idle when shifting from N (Neutral) to D (Drive) or R (Reversed).
- If the engine's HIGH IDLE feature is engaged and a gear shift is attempted, the High Idle feature will be disengaged.



IDLING THE APPARATUS LONGER THAN 5 MINUTES

STEP 1: Determine if the apparatus is to be idling longer than 5 minutes.

STEP 2: Set the Parking Brake.

STEP 3: Place the transmission into N (Neutral) with the Transmission Selector.

STEP 4: Engage the High Idle Switch.

▲ CAUTION

- During long engine idling periods with the transmission in N (Neutral), the engine coolant temperature may fall below the normal operating range. Incomplete combustion of fuel is the result.
 It can cause crankcase dilution, formation of plaque or gummy deposits on the valves, pistons, and rings, and a rapid accumulation of sludge in the engine.
- Always engage the high idle feature of the engine when long periods of idling are expected.

NOTE: When on a scene with all the warning lights activated, engage the engine's High Idle feature. Doing so will assist the alternator in keeping up with the electrical current demands placed on it. This will also prevent the Load Manager from "cutting out" electrical accessories due to insufficient flow.

STOPPING THE APPARATUS

STEP 1: Bring apparatus to a complete stop.

STEP 2: Put transmission into N (Neutral).

STEP 3: Engage the Parking Brake.

STEP 4: Allow the engine to cool down for 5 minutes.

STEP 5: Push DOWN on the Ignition Switch to the OFF position.

STEP 6: Turn the Battery Switch to the OFF position.

▲ CAUTION

- Stopping a turbocharged engine immediately after a high-speed operation may cause damage to the turbocharger as it will continue to turn without an oil supply to the bearings.
- Failure of the turbo seals and/or the bearings are the likely results of this practice.

3-12. EMMERGENCY ENGINE SHUTDOWN

Do NOT use Emergency Shutdown for a normal engine stop!

The air supplied to the engine is shut off completely when an emergency engine shutdown is initiated. When operating with volatile vapors, the engine may exceed normal maximum engine speed. In this case, the emergency engine shutdown should be used to shut the engine down to protect the engine.

EMERGENCY ENGINE SHUTDOWN PROCEDURE

- **STEP 1:** The operator must confirm that firefighters are safe prior to shutting the engine down.
- STEP 2: Find a safe place to immediately bring the truck to a complete stop.
- **STEP 3:** Set the Parking Brake.
- **STEP 4:** Turn off the ignition switch.

AFTER AN EMERGENCY ENGINE SHUTDOWN PROCEDURE

After an emergency engine shutdown, verify that the engine can be re-started safely by doing a visual check, making sure that external conditions are appropriate before starting the engine, (i.e. environmental conditions as well as the apparatus and its components).

- STEP 1: The Ignition Switch and then the Master Battery Switch MUST be turned off.
- **STEP 2:** Visually inspect all intake hoses from the air cleaner to the turbo to make sure they are not collapsed or if they need to be attached.
- **STEP3:** Open the Engine Tunnel Access Door to access the reset on the emergency engine shutdown.
- **STEP 4:** Check the elbows and the boots to make sure the system is intact.
- STEP 5: Rotate the lever on the reset arm forward to reset the emergency engine shutdown.
- STEP 6: Close the Engine Tunnel Access Door.
- STEP 7: Verify that engine will start after reset of emergency shutdown system.

After resetting, the ignition and the battery switch must be shut off in this order.

3-13. BRAKING

DUAL CIRCUIT AIR BRAKE SYSTEM

The apparatus is equipped with a dual circuit (primary and secondary) air brake system, and a rear spring brake parking system. The front axle and the rear axle brake circuits are each supplied air by separate air reservoirs. The air brake operating system pressure for safe operation is between 90 and 120 psi. The secondary delivery system of the dual circuit air brake system supplies air to the front axle service circuit. The primary delivery system supplies air to the rear axle service circuit. Two air pressure gauges are located on the right side of the dash monitor for the front (secondary) and rear (primary) air brake system pressure. In the event air brake system pressure drops below approximately 75 psi, an audible alarm will sound and indicator(s) on the dash will light up. If the pressure drops below approximately 65 psi, the spring brakes will apply.

The brakes and the brake systems must be maintained and adjusted properly. It is the responsibility of the operator to correctly assess the condition (thickness) of brake lining, proper operation of brakes and are properly adjusted. Failure to properly maintain and adjust the brakes can lead to reduced brake performance, property damage, or personal injury.

Maintain system air pressure between 90 and 120 psi. (the governor cut out pressure is 125 psi) during normal operation. Doing so will insure availability of air pressure to adequately stop the apparatus. When applying the brakes, it is recommended that a firm, constant pressure be applied to the brake pedal as opposed to "pumping" the brake pedal. Pumping the brake pedal will adversely affect the operation of the ABS system.

The apparatus dual circuit air brake system has a quick buildup feature that allows the pressure to be built up in the rear brake (primary) section first, to enable release of the parking brakes before the pressure in the front (secondary) section is adequately charged. This feature is meant to allow the vehicle to be driven as soon as possible in the event of an EMERGENCY. In an emergency the operator's discretion must be used, to operate the apparatus, when there is less than 90 psi air pressure in both brake circuits.

NOTE: Drain air tanks daily.

▲ CAUTION

- A warning alarm will sound if the system pressure is below 90 psi.
- A system pressure below 90 psi may cause brake drag and could result in premature break pad or lining wear.
- The quick build up feature allows the vehicle to be driven even though the front brake section may not have sufficient air pressure to enable sustained or full force braking.
- Use extreme caution when operating the vehicle with either air brake system charged to less than 90 psi or property or personal injury could result.





Brakes and Brake Systems must be maintained and adjusted properly.

ANTI-LOCK BRAKING SYSTEM (ABS)

The Anti-Lock Braking System (ABS) automatically applies and releases the brakes during panic brake applications to prevent wheel lock-up. This improves both braking efficiency and steering control. The ABS system is integral to the air brake system and therefore cannot be turned off or overridden. There is no On or Off switch for the ABS.

When braking, always maintain a firm steady pressure on the brake foot pedal to achieve the necessary change in speed or to bring the apparatus to a complete stop. This technique will allow the ABS brake system to perform as designed. This allows driver to steer vehicle away from obstacles or other vehicles during severe brake applications. Rapid pumping of the brakes decreases the effectiveness of the ABS system.

When you activate the ABS, the retarder is automatically deactivated. Once the ABS is deactivated, the retarder will engage as needed.

AUTOMATIC TRACTION CONTROL (ATC) *WHEN APPLICABLE

The Automatic Traction Control (ATC) is an optional system that helps improve traction when the apparatus is on slippery surfaces, by reducing drive wheel overspin. The ATC works automatically in two different manners:

- If a drive wheel starts to spin, the ATC applies air pressure to brake the spinning wheel. This transfers the engine torque to the wheel(s) for better traction.
- If all drive wheels spin, the ATC limits engine torque which reduces wheel spin to provide improved traction.

When the ATC is active, the ATC indicator will light continuously.

ELECTRONIC STABILITY CONTROL (ESC)

SINGLE AXLE *WHEN APPLICABLE

In compliance with the latest edition NFPA 1901 regulations at the time of the contract date, the apparatus is equipped with a Meritor-WABCO Electronic Roll Stability Control system as specified. The system shall utilize a centrally mounted pitch & yaw sensor and a steering shaft position sensor interacting with the chassis' ABS traction control, the auxiliary braking system and the engine ECM to minimize the vehicle's potential for rollover in a turning at speed maneuver.

Requires ATC. Not available on tractor-drawn aerials.



TANDEM AXLE *WHEN APPLICABLE

In compliance with the latest edition NFPA 1901 regulations at the time of the contract date, the apparatus shall be equipped with a Meritor-WABCO electronic Roll Stability Control system as specified. The system shall utilize a centrally mounted pitch & yaw sensor and a steering shaft position sensor interacting with the chassis' ABS traction control, the auxiliary braking system and the engine ECM to minimize the vehicle's potential for rollover in a turning at speed maneuver.

Requires ATC. Not available on tractor-drawn aerials. ABS (anti-lock brakes) must be 6 channel. Mandatory on Aerialscopes.

MERITOR WABCO 1200 SYSTEM SAVER AIR DRYER

*WHEN APPLICABLE

The Air Dryer is installed as part of the air brake system. It has a minimum capacity of 30 cfm air flow. The Air Dryer is equipped with an integral, automatic, 12-volt heated moisture ejector which is thermostatically controlled. This system includes a pressure-controlled check valve installed between the wet tank and the secondary air reservoir. The air dryer canister shall be easily accessible for maintenance and replacement.



Brake Switches on the Center Overhead Control Panel

3-14. TELMA FOCAL RETARDER

*WHEN APPLICABLE

The Telma Focal Retarder system dissipates the braking energy by generating eddy currents.

The Telma Focal Retarder is comprised of a fixed stator and a pair of rotors that are attached to and rotate with the driveline. The stator and the rotors are mounted co-axially, opposite to one another, and are separated by a narrow air gap, thereby avoiding any friction.

The stator plays the role of the inductor; it contains several electromagnets, which generate magnetic fields when electricity continuously flows through the stator coils, thereby producing eddy currents in the mass of the rotor.

The rotors play the role of the armature. Manufactured with a specially designed conducting material, the rotors are subjected to eddy currents generated when they rotate through the magnetic fields created by the stator.

Eddy currents originate from conducting metallic masses when the latter are placed in variable magnetic fields. In the case of Telma induction braking systems, the variability of the magnetic fields to which rotors are subjected is a result of the rotation of the rotors. Eddy currents, also known as swirling currents, wrap around the magnetic flow lines.



The generation of eddy currents in the mass of the rotor leads to the appearance of Laplace forces that counteract with the rotation of the rotor. The braking torque that is thus generated and applied to the drive shaft slows the vehicle.

The eddy currents produce a gradual rise in rotor temperature and the heat is then dissipated into the air through the rotor cooling vanes. With Telma induction braking systems, it is thus possible to effectively slow down a rotating shaft without friction and therefore without wear.

Your apparatus may be equipped with a Telma Retarder, which will reduce the use of the service brakes. This results in the service brakes remaining cool and fully effective for the occasions when they are really needed - such as emergency stops.

See your Telma Owner's Manual or go to telmausa.com for more information.

3-15. ENGINE BRAKE

*WHEN APPLICABLE

Your apparatus may be equipped with an engine brake. The engine brake is internal to the engine. When the engine brake is activated, the engine exhaust valve opens prior to the peak of the compression stroke. This diverts energy that would be transferred to the drivetrain during normal operation, effectively acting as a brake.

Using your Engine Brake will reduce the use of the service brakes. This results in the service brakes remaining cool and fully effective for the occasions when they are really needed -such as emergency stops.

3-16. TRANSMISSION RETARDER

*WHEN APPLICABLE

Your apparatus may be equipped with a transmission retarder. The transmission retarder is integral to the transmission. The transmission output shaft rotates a vanned rotor within a vanned housing in the transmission. Upon activation of the retarder, transmission fluid fills the housing. The output shaft now turns against the transmission fluid dissipating some of the energy that would be transferred to the drivetrain during normal operation, effectively acting as a brake. The transmission fluid is removed from the housing when the retarder is turned off.

Using your Transmission Retarder will reduce the use of the service brakes. This results in the service brakes remaining cool and fully effective for the occasions when they are reallyneeded such as emergency stops.

3-17. DEEP SNOW AND MUD SWITCH

This function increases the available traction on extra soft surfaces like snow, mud or gravel. It slightly increases the permissible wheel spin.

The driver must PUSH UP the switch to use the Deep Snow and Mud system, as it overrides the ATC system.

When the Deep Snow and Mud system is active, the ATC lamp blinks continuously. Once the apparatus is moving, the driver should switch the Deep Snow and Mud feature OFF. If the driver forgets to shut off the Deep Snow and Mud Switch, it will default to OFF once the ignition is turned OFF.

NOTE: Tire chains may be used with the Deep Snow and Mud system. There are conditions where tire chains may be required. Chains must be removed as soon as possible once conditions improve and chains are no longer needed.

3-18. PARKING BRAKES



Parking Brake Valve

The apparatus parking brakes are located on the rear axle. The parking brakes are applied and released by operation of the Parking Brake valve located on the center right dash panel. Pulling the valve knob out will APPLY the Parking Brakes. Pushing the valve knob in will release the parking brakes. The parking brake circuit is intended to hold the apparatus in a parked position only. It should never be used for normal driving.

If air pressure is lost in the rear (primary) service brake section, the spring brakes will be modulated by pressure from the secondary reservoir allowing a few brake applications before the spring brakes are automatically applied. If air pressure is reduced to approximately 65 psi in both systems, the spring brake valve will automatically apply. The parking brake indicator light will activate to alert driver to this situation when the air brake system pressure drops below 65 psi.

When parking the apparatus, whether on level terrain or on a grade, always chock the wheels. Failure to follow these procedures may lead to loss of apparatus control, property damage, personal injury or death.





It is recommended to always chock the wheels when on scene.

3-19. SPRING BRAKE

SPRING BRAKE CONTROL - OFFICER SIDE *

*WHEN APPLICABLE

In emergency conditions, the officer may be able apply the spring brakes to stop the apparatus if the apparatus is so equipped.

When applying the Spring Brake Control, the Accelerator Pedal of the apparatus will be disabled. The Drive Axle brakes will be fully applied, and the rear wheels will lock.

This will allow for a safer emergency stopping of the apparatus.



To apply the Spring Brake Control, activate the switch on the Center Console Control Panel, lifting the switch cover and then moving the switch UP will activate the Spring Brake. The Indicator light next to the switch will light up showing it is active.

To deactivate the Spring Brake Control, move the switch down. The Indicator light will now go off.



The driver's accelerator pedal will be disabled during the application of the Officer's Spring Brake Control.



When activating the Spring Brake Control, the drive axle brakes will fully apply, and the rear wheels will lock, nor will the ABS brakes be operational.



SPRING BRAKE RELEASE - DRIVER SIDE



The Spring Brake Release switch is located on the left side of the center control panel.

The switch will deactivate the spring break and the driver will regain accelerator pedal operation.

3-20. ELECTRICAL SYSTEM – ALTERNATOR

▲ CAUTION

- Always observe proper polarity when making connections to the electrical system.
- Improper connection of batteries, jumper cables, and charging systems can cause damage to the electrical system or the alternator

Your alternator is a brushless style. Without the brushes of a typical alternator, there are fewer components that wear out, thus extending the life of the alternator.

Another feature of your alternator is the Remote Sense. This can help reduce the battery charging time. It uses a second wire that reads the actual voltage at the battery. This in turn signals to the alternator to boost its output to compensate for any voltage drop, resulting in a battery that is at a full state of charge.

3-21. ELECTRICAL SYSTEMS – BATTERIES

The batteries in your apparatus are of the maintenance free design. This is a valve regulated sealed battery and never needs to have water or electrolyte (acid) added.

The battery cables are heavy duty to maximize the power available to the electrical system.



Avoid exposing battery to gasoline or diesel fuel.



SECTION 3 CHASSIS OPERATION

- Batteries can emit explosive gases. To reduce the possibility of personal injury or death, always ventilate the compartment before servicing the batteries ignition. Keep all sources of ignition away when working around batteries. Sparks caused by connection of battery terminals, jumper cables, or charging systems can be a source of ignition.
- Always wear safety goggles and protective clothing when working on or around batteries. Do not short circuit your battery terminals. Remove any metallic items such as watches, bracelets and other personal jewelry to ensure safe installation.
- Never attempt to remove the top decal cover, as it will cause the battery to fail. Failure to comply could result in injury or death to personnel.

▲ WARNING

- The apparatus has a 12V negative ground electrical system. Before using jumper cables, make sure the booster vehicle also has a negative ground system (negative terminal attached to a metal part of the vehicle).
- If unsure of the booster vehicle's voltage or ground, do not attempt to jump start as personal injury or severe damage to the electrical system may result.
- The use of a higher voltage than 12 Volt DC will damage the electrical system. When using an external source to jump start the engine, turn the battery disconnect switch to OFF before connecting cables. Once the cables are connected correctly, turn the battery disconnect switch ON, then start the engine.
- Never attempt to jump start a frozen battery as the battery may rupture or explode. If you suspect a battery is frozen, thaw out before using or recharging.

▲ CAUTION

To avoid damage to the apparatus's electronic components, the voltage supplied to a vehicle's electrical system must not exceed 16.0 volts.

ELECTRICAL SYSTEM BATTERY CHARGER

When the apparatus is parked in its bay at the station, plug in the power cord to the red "Battery Charger" automatic ejection receptacle. This receptacle usually located on the driver's side of the Apparatus, just below the driver's door. The auto eject, ejects the plug the shoreline power cord, when you depress the apparatus Start Button. Keeping the cord plugged into the stations power outlet will aid in quick, dependable engine starts and increased engine and battery life.



Battery Charger Receptacle



AUTO CHARGE STATUS CENTER

The Auto Charge Status Center can be in different spots, depending on your choice. If a dash location was chosen, see your Dash Layout in your Schematics and in the Parts Book Drawings of you r electronic manual.





Auto Charge Status Center samples

The Auto Charge Status Center shows the charge condition of the battery in levels from "LOW" TO "HI", showing it at Low - Charging - Charged - Hi. This device indicates a defective battery when the indicator does not rise to the fully charged level after an extended period of charging.

NOTE: If a battery is being charged with an external load of 4 to 10 amperes across its terminals, the indicator may move down or 2 levels. This does not indicate a defective battery.

BATTERY CHARGER *WHEN APPLICABLE

The battery charger is usually located behind the cab access door, just behind the officer's cab door.

The charger a precision voltage controller to maintain the battery's charge. Automatic electronic remote sensors measure the true battery voltage.



3-22. EMERGENCY JUMP STARTING

JUMP STARTING YOUR APPARATUS

Your apparatus has a special receptacle located underneath on the left side of the pump panel for connecting to electrical jumper cables. Special cables are required which are carried by Heavy Rescue. Ordinary jumper cables can, if needed, be used to successfully jump-start the apparatus if the special cables are unavailable.

▲ WARNING

- The apparatus has a 12V negative ground electrical system.
- Before using jumper cables, make sure the booster vehicle also has a negative ground
- system (negative terminal attached to a metal part of the vehicle).
- If unsure of the booster vehicle's voltage or ground, do not attempt to jump start as personal injury or severe damage to the electrical system may result.

▲ CAUTION

To avoid damage to the apparatus's electronic components, the voltage supplied to a vehicle's electrical system must not exceed 16.0 volts.

▲ WARNING

- The Battery Jumping procedure must be performed exactly as outlined. Otherwise, personal injury and damage to equipment may occur.
- To prevent shorting of the electrical system, remove metal rings, watches or other metallic accessories and do not allow metal tools to contact the positive terminal of the battery.
- Batteries can emit explosive gases.
- To reduce the possibility of personal injury, always ventilate the compartment before servicing the batteries.
- The use of a higher voltage than 12 Volt DC will damage the electrical system.
- When using an external source to jump start the engine, turn the battery disconnect switch to OFF before connecting cables.
- Once the cables are connected correctly, turn the battery disconnect switch ON, then start the engine.

▲ CAUTION

- When using the jumper cables to start the engine, make sure to connect the cables in parallel to the Battery Jump Start Studs: Positive (+) to Positive (+) and then Negative (-) to Negative (-).
- To reduce the possibility of arcing, remove the negative (-) cable first, and attach the negative (-) cable last. Use only equal voltage for jump starting (12 Volt DC).



SECTION 3 CHASSIS OPERATION

Apparatus Jump Starting Procedure

The following is the proper sequence to jump start apparatus using ordinary jumper cables:

- **STEP 1:** Position the vehicles so the jumper cables will reach easily between the batteries. Do not allow the vehicles to touch.
- **STEP 2:** Turn off all electric motors and accessories in each vehicle. Turn off all lights not needed to protect the vehicles or to light the work area. In each vehicle, stop the engine, turn off the Warning Light Master Switch.
- **STEP 3:** Apply the Parking Brake and shift the transmission to N (Neutral) in both vehicles.
- **STEP 4:** Connect the first jumper cable from the positive (+) terminal of the dead battery of the disabled apparatus to the positive (+) terminal on the boosting battery.
- **STEP 5:** Connect one end of the second jumper cable to the negative (-) terminal on the boosting battery and the other end to the frame of the disabled vehicle at least 18 inches away from the battery on the disabled apparatus. Do not attach the other end directly to the battery negative (-) terminal because a spark could occur and cause an explosion of battery gases.
- **STEP 6:** With the jumper cables properly attached, start the engine of the vehicle with the good (charged) batteries. Run the engine at moderate speed (1000 to 1500 rpm).
- **STEP 7:** Start the engine in the vehicle with the discharged batteries.
- **STEP 8:** Now remove the battery jumper cables by reversing the above sequences exactly:
 - Negative from previously disabled apparatus.
 - Negative from booting battery.
 - Positive from the boosting battery.
 - Positive from the previously disabled apparatus.



3-23. INTELEX®PLUS (IQAN)



The INTELEX[®] PLUS (IQAN) information center consists of several informational display screens and provides system diagnostics.

Some of the items included are:

- Digital clock.
- Door Open Indicators.
- Warning Indicators.
- Not Stowed Indicators.
- Engine Hour meter.
- Pump Hour meter.
- PTO Hour meter.

These features can be accessed by pressing the appropriate area on the INTELEX[®] PLUS display screen.

This system is connected directly to the engine, transmission, ABS, and Vehicle Data Recorder (VDR). This enables it to provide real-time information about the vehicle status.



ICONS

ICON	ICON NAME	FUNCTION	
	Home	Pressing the Home Icon will take you to the HOME display screen.	
\triangle	Warning	Pressing the Warning Icon will take you to the WARNINGS display screen.	
	Truck	Pressing the Truck Icon will take you to the DOOR OPEN display screen.	
<u></u>	Stowed	Pressing the Stowed Icon will take you to the NOT STOWED display screen.	
①	Information	Pressing the Information Icon takes you directly to the hourmeters screen.	
	Main Menu Screen	Pressing the Main Menu Screen icon will take you to the Main Menu Screen.	

DISPLAY SCREENS

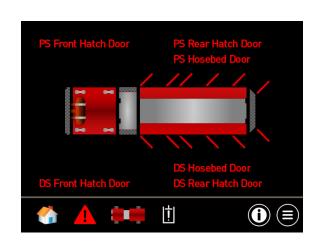


MAIN STARTUP SCREEN (Home Icon)

This is the default display screen. The HOME screen displays the current time and date, and features icons for:

- HOME Screen
- WARNINGS Screen
- DOOR OPEN Screen
- ITEM NOT STOWED Screen

SECTION 3 CHASSIS OPERATION



DOOR OPEN DISPLAY SCREEN (Truck Icon)

This screen shows the status of the vehicle doors.

- Drivers & Officer Side Cab Access Doors
- Drivers & Officer Side Crew Cab Doors
- Drivers & Officer Side Body Compartment Doors
- Front & Rear Body Compartment Doors
- Cab Interior EMS Compartment Doors
- Tiller Door

Displaying of a red line on the truck body or a listing on the screen indicates that door is open.



WARNINGS DISPLAY SCREEN (Warning Icon)

This screen displays critical warnings in RED as text. The "button" next to the listing lights up when there is an issue. Your listing will vary from screen and list below.

- Air Restriction
- Display Voltage (w/ listing)
- Cab Not Locked (tilt)
- Low Air Pressure
- ABS Fault
- Load Manage Enabled
- Water In Fuel
- Trailer Jack Knife
- Trailer ABS Fault
- Hydraulic Filter Restriction
- Tractor position jackknife
- · High Idle Active



SECTION 3 CHASSIS OPERATION



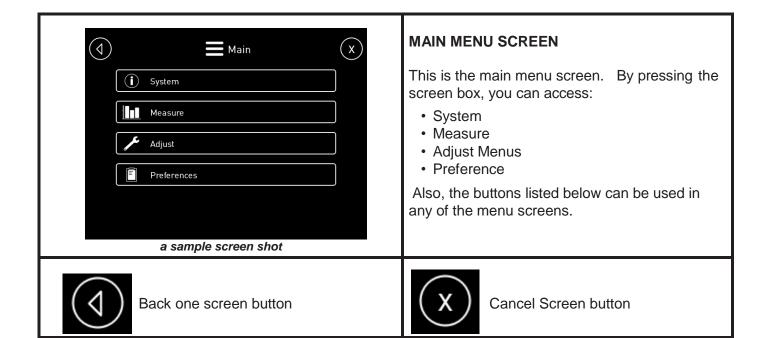
a sample screen shot

NOT STOWED DISPLAY SCREEN (Stowed Icon)

This screen displays blank. When there are items that need to be stowed, they will appear on the screen. Your listing will vary from screen and list below.

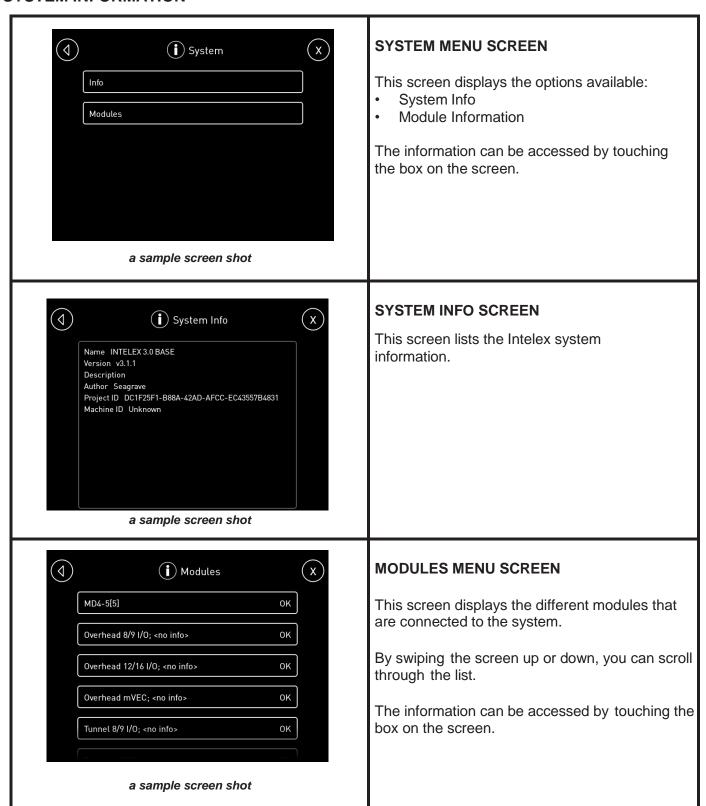
- Q2B Bell, Compartments
- · Steps Not Nested
- DS Rear Light
- PS Rear Light
- Seat Belts not buckled
- Deck Gun
- Ladder Not Nested
- Rack Down
- Jacks/Outriggers Down
- Light Tower
- All chutes closed

SYSTEM MENU



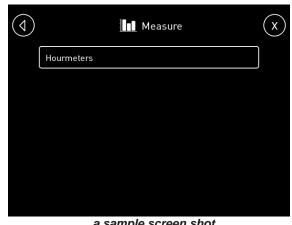


SYSTEM INFORMATION





MEASURE

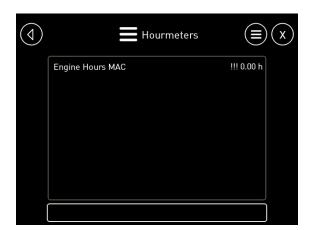


a sample screen shot

MEASURE SCREEN

This screen lists the various areas of the apparatus that are being measured.

By touching the listed item, you will be taken to a new screen listing the specific items in that area being measured.



a sample screen shot

HOURMETERS LISTING SCREEN

This screen lists the running hours of various areas of the apparatus.

There may be additional items listed here that are being measured by hour meters.

- Hour meters
- Pump Hour meters
- PTO



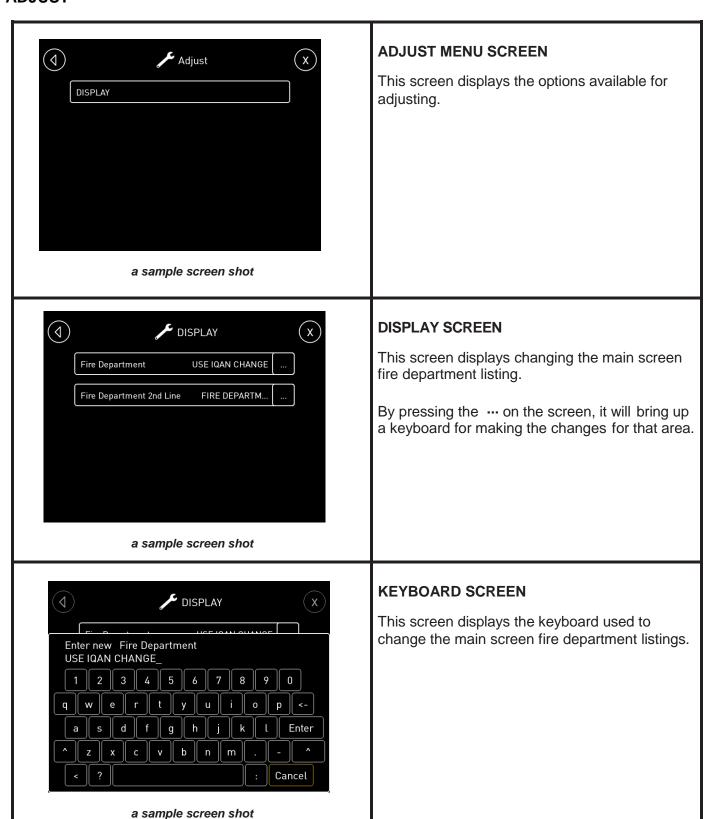
a sample screen shot

ENGINE HOUR METERS SCREEN

This screen lists the running hours of a specific area of the apparatus.

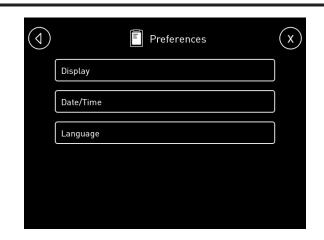


ADJUST





PREFERENCES

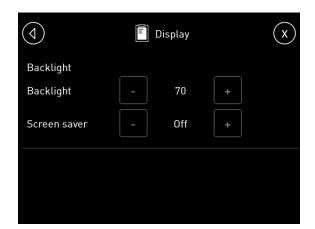


sample screen shot

PREFERENCES MENU SCREEN

This screen displays the options available for setting:

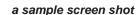
- Display brilliance settings
- Date/Time preferences
- Language preference

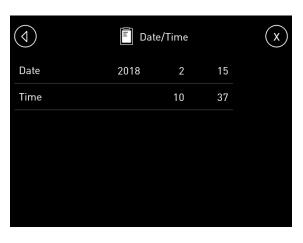


DISPLAY SCREEN

This screen displays adjusting the backlight and the screen saver.

By pressing the + or -, it will change the brightness of the item being changed accordingly.





a sample screen shot

DATE-TIME MENU SCREEN

This screen allows you to change the date and the time that the system uses.

- Year
- Month
- Day
- Hour
- Minutes

By pressing on the item box you wish to change, it will expand the settings where the particular items can be changed.

SECTION 3 CHASSIS OPERATION

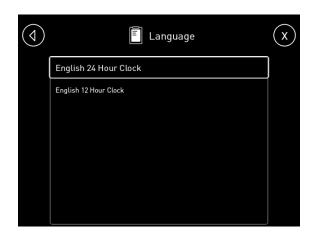


a sample screen shot

DATE-TIME EXPANDED MENU SCREEN

This screen allows you to change the date or time.

By pressing on the + or - to change the item that you want to change.



a sample screen shot

LANGUAGE MENU SCREEN

This screen displays the options available for setting the language used and the clock for:

- 12 Hour Clock, English
- 24 Hour Clock, English



4-1. PUMP

WATEROUS PUMP #CMU C20E



The Waterous fire pump is a two stage (twin impeller) centrifugal water pump. As such, it is classified as a non-positive displacement pump since it does not pump a definite amount of water with each revolution. Rather, it imparts velocity to the water and converts it to pressure within the pump itself.

Essentially, the centrifugal pump consists of two primary parts: an impeller(s) and housing. The impeller transmits energy in the form of velocity to the water. The housing collects the water and confines it (the water) within the housing, thus converting water velocity to water pressure. It then directs the water to the discharge side of the pump.

Water is introduced to the pump from the inlet manifold to the pump intake and then into the eye of the impeller. As the water contacts the vanes of the impeller, it is thrown by centrifugal force to the outside of the impeller. The water is confined in its travel by the shrouds of the impeller and increases in velocity with the speed of the impeller.

The impeller is mounted off center in the housing. This placement creates a water passage that gradually increases in cross sectional area as it nears the discharge outlet of the pump. This section of the pump is known as the volute. The gradually increasing size of the waterway reduces the velocity of the water, thus enabling the pressure to build up proportionately.

Since the incoming pressure adds directly to the pressure being developed by the pump, incoming pressure changes will be reflected in the discharge pressure. By nature of design, the centrifugal pump has no positive mechanical blockage between the intake and the discharge outlet.

Isolation of discharge pressure from intake pressure in the impeller occurs entirely by the velocity of the moving water. Water will flow through a centrifugal pump even if the impeller is not turning. When water is supplied to the eye of the impeller under pressure, it moves through the impeller by itself. Any movement of the impeller increases both the velocities of the water and the corresponding pressure buildup in the volute.



TWO STAGE (TWIN IMPELLER) PUMP

The two impellers are identical in size, have the same capacity each and share a single shaft. The two stages are identified as SERIES and PARALLEL. During the parallel (volume) operation, each of the impellers takes water from a source and delivers it to the discharge. During series (pressure) operation, water does not re-circulate through the pump; rather, it is forced into the eye of the impeller of the second stage where the pressure is increased.

NOTE: Pump discharge pressure and capacity can be regulated by adjusting pump speed, transfer valve setting, discharge valve opening and nozzle size.

NOTE: The first indication that wear is becoming a problem in the pump is when increased engine rpm is required to pump the rated capacity in pump tests.

NOTE: Whenever the pump is delivering more than approximately 70% (>1050 gpm) of its capacity of 1500 gpm, the parallel (volume) position should be selected on the transfer valve.

For further information on your Waterous pump, please see the vendor's manual electronic edition included in your Manual binder.

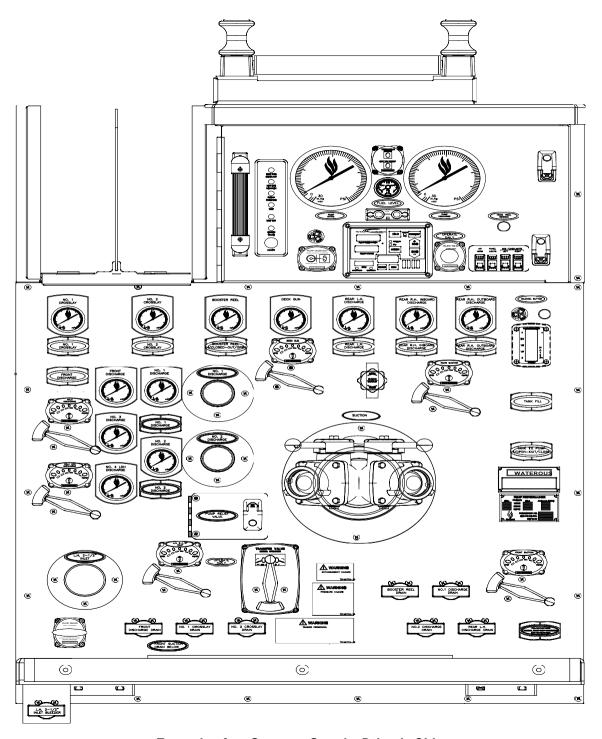


4-2. PUMP PANEL CONTROLS

The following pages will give the locations and a brief description of the components on the pump operator control panels.



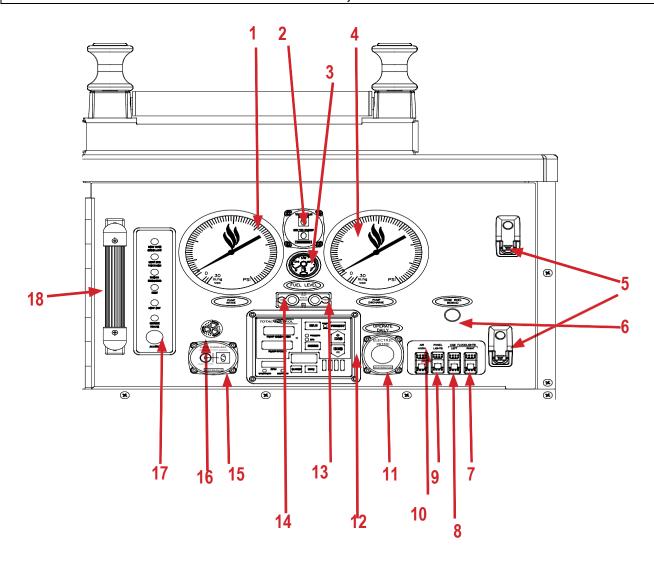
4-3. PUMP PANEL - DRIVER'S SIDE



Example of an Operator Stand - Driver's Side



4-4. UPPER SECTION - PUMP PANEL, DRIVER'S SIDE





Example of an Upper Section, Pump Panel – Driver's Side



ITEM	CONTROL/INDICATOR	FUNCTION
1	PUMP INTAKE GUAGE	Shows the Pump Intake pressure level.
2	THROTTLE READY - OK TO PUMP	When illuminated, indicates that the throttle is operational OR the that the pump is ready for operation.
3	FUEL GUAGE	Indicates the level of fuel in the apparatus.
4	PUMP DISCHARGE GUAGE	Shows the Pump Discharge pressure level.
5	PANEL LATCH	Latches to access behind panel.
6	HOSE REEL REWIND	Momentary Switch - when engaged, the Hose Reel will rewind
7	CAB FLOOD LIGHTS - RIGHT	For the Cab Flood Lights on the Officer's side of the apparatus. Push UP to turn ON, Push DOWN to turn OFF *
8	CAB FLOOD LIGHTS - LEFT	For the Cab Flood Lights on the Driver's side of the apparatus. Push UP to turn ON, Push DOWN to turn OFF *
9	PANEL LIGHTS	For the lights on the Operator panel. Push UP to turn ON, Push DOWN to turn OFF *
10	AIR HORN	For the Air Horn. Push UP to turn ON, Push DOWN to turn OFF *
11	ELECTRIC PUMP PRIME	When pushed, engages the Water Pump Primer
12	"TOTAL CONTROL" FRC CONTROL PANEL	see panel diagram & descriptions
13	TEST PORT - PRES	Test Port for calibration and testing of the pressure gauges
14	TEST PORT - VAC	Test Port for calibrations and testing of the vacuum
15	PUMP OVERHEAT - TEST BUTTON AND INDICATOR LIGHT	When illuminated, indicates the water pump is overheated. Push button is used to test to make sure system is functioning.
16	AUDIBLE ALARM	Gives an audible signal of a warning from the system
17	INDICATOR LIGHTS PANEL	See panel diagram & descriptions
18	G RAB HANDLE	Handle for use when accessing higher areas of apparatus

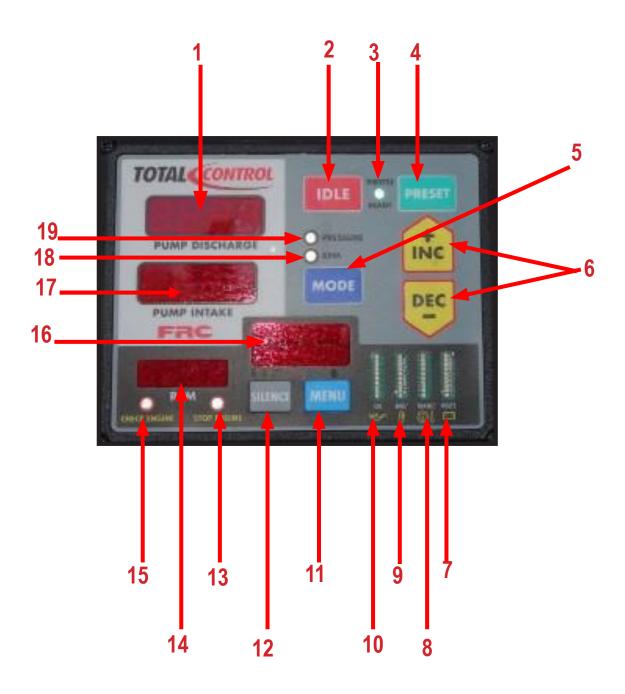
^{*} Actual movement of switch will depend on style of switch as part of your options.

- Toggle Switch: Push UP to turn ON, Push DOWN to turn OFF
- Momentary Switch: Push UP to turn ON, Push DOWN to turn OFF



4-5. DISCHARGE CONTROL PANEL (#12 in the Driver's Side Upper Section Pump Panel)

TOTAL CONTROL FRC #TCA101-D00





"TOTAL CONTROL" CONTROL PANEL #TCA101-D00 Continued

ITEM	CONTROL - INDICATOR	FUNCTION
1	PUMP DISCHARGE DISPLAY	Show digitally the pump discharge during normal operations.
2	IDLE BUTTON	When pressed, immediately sets the engine RPM to idle.
3	THROTTLE READY LED	When illuminated, the required interlock conditions are met, and the governor is ready to begin pump operations.
4	PRESET BUTTON	Press to change or select a pre-programed value for pressure or RPM setting.
5	MODE BUTTON	Press to select either the RPM mode or the Pressure mode of operation. Selection will light the corresponding mode LED
6	+ INCREASE/- DECREASE BUTTONS	During operations, these buttons increase or decrease the pressure or the RPM setting.
7	VOLTS LED DISPLAY (BATTERY VOLTAGE)	Shows the voltage of the battery. Green LEDs indicates a safe range. Flashing Red LEDs indicates the voltage is outside normal limits.
8	TRANS LED DISPLAY (PUMP TRANSMISSION TEMPERATURE)	Shows the pump transmission temperature. Green LEDs indicates a safe range. Flashing Red LEDs indicates the temperature is high.
9	ENG LED DISPLAY (ENGINE COOLANT TEMP)	Shows the engine coolant temperature. Green LEDs indicates a safe range. Flashing Red LEDs indicates the temperature is high.
10	OIL LED DISPLAY (ENGINE OIL PRESSURE)	Shows the engine oil pressure. Green LEDs indicates a safe range. Flashing Red LEDs indicates the pressure is low.
11	MENU BUTTON	Used to access detailed information and program features. Includes exact measure and units for monitored functions. Each time the button is pressed, the display scrolls to show the next value.
12	SILENCE BUTTON	When engaged, suppresses the audio alarms. Used when accessing program features.
13	STOP ENGINE LED	Repeats the Stop Engine warning from the cab.
14	RPM DISPLAY	Digitally shows the engine RPM during normal operations.

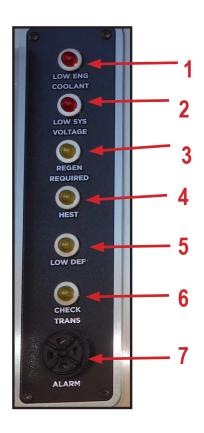


"TOTAL CONTROL" CONTROL PANEL #TCA101-D00 Continued

ITEM	CONTROL - INDICATOR	FUNCTION
15	CHECK ENGINE LED	Repeats the Check Engine warning from the cab.
16	MESSAGE DISPLAY	Shows the pressure or RPM setting during normal operations and warning alarms as they occur. Shows time and date when the throttle ready LED is off. Also shows stored data and program features.
17	PUMP INTAKE DISPLAY	Show digitally the intake pressures during normal operations.
18	RPM LED	When illuminated, Indicates the RPM mode of operation is being used
19	PRESSURE LED	When illuminated, Indicates the Pressure mode of operation is being used



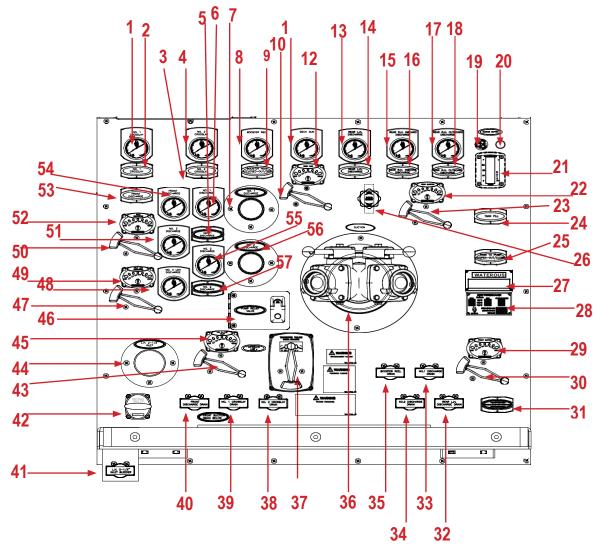
4.6 INDICATOR LIGHTS PANEL (#17 in the Driver's Side Upper Section Pump Panel) .*WHEN APPLICABL



ITEM	CONTROL/INDICATOR	FUNCTION
1	LOW ENG COOLANT	When illuminated, indicates the Engine Coolant is low.
2	LOW SYS VOLTAGE	When illuminated, indicates the system voltage is low.
3	REGEN REQUIRED	When illuminated, a Regeneration is required.
4	HEST	When illuminated, it indicates that a High Exhaust System temperature is present.
5	LOW DEF	When illuminated, the DEF tank is low and needs filling.
6	CHECK TRANS	When illuminated, the transmission fluid is low and needs additional transmission fluid.
7	ALARM	The speaker for the audible alarm that accompanies any of the above warnings initiating.



4-7. LOWER SECTION, PUMP PANEL - DRIVER'S SIDE





Example of an Upper Section, Pump Panel - Driver's Side



ITEM	INDICATOR/CONTROL	FUNCTION
1	NO. 1 CROSSLAY PRESSURE GAUGE	Reads the discharge pressure of the #1 Crosslay.
2	NO. 1 CROSSLAY VALVE	PULL to OPEN the valve, PUSH to close the valve.
3	NO. 2 CROSSLAY PRESSURE GAUGE	Reads the discharge pressure of the #2 Crosslay.
4	NO. 2 CROSSLAY VALVE	PULL to OPEN the valve, PUSH to close the valve.
5	NO. 1 DISCHARGE VALVE	PULL to OPEN the valve, PUSH to close the valve.
6	NO. 1 DISCHARGE PRESSURE GAUGE	Reads the discharge pressure of the #1 discharge.
7	NO. 1 DISCHARGE	Discharge where a hose is connected.
8	BOOSTER REEL GAUGE	Reads the pressure of the Booster Reel discharge.
9	BOOSTER REEL VALVE	PULL to OPEN the valve, PUSH to close the valve.
10	DECK GUN HANDLE	Turn CLOCKWISE to INCREASE the water flow to the deck gun, turn COUNTER-CLOCKWISE to DECREASE the water flow to the deck gun.
11	DECK GUN PRESSURE GAUGE	Reads the pressure of the water released through the deck gun.
12	DECK GUN VALVE POISITION INDICATOR	Shows how open the deck gun valve is.
13	REAR L.H DISCHARGE PRESSURE GAUGE	Reads the discharge pressure of the Left-Hand Discharge.
14	REAR L.H. DISCHARGE VALVE	PULL to OPEN the valve, PUSH to close the valve.
15	REAR R.H INBOARD DIS- CHARGE PRESSURE GAUGE	Reads the discharge pressure of the Right-Hand Inboard discharge.
16	REAR R.H INBOARD DISCHARGE VALVE	PULL to OPEN the valve, PUSH to close the valve.
17	REAR R.H OUTBOARD DIS- CHARGE PRESSURE GAUGE	Reads the discharge pressure of the Rear Right Hand Outboard discharge.



ITEM	INDICATOR/CONTROL	FUNCTION
18	REAR R.H OUTBOARD DISCHARGE VALVE	PULL to OPEN the valve, PUSH to close the valve.
19	SILENCE HORN	Audible alarm for the Tank Level Gauge.
20	SILENCE HORN BUTTON	Press button to silence the audible alarm. This button will reset itself upon shutdown.
21	TANK VISION PRO WATER TANK GAUGE	Shows the level of water in the water tank.
22	REAR SUCTION INDICATOR	Shows the valve position for the Rear Suction valve.
23	ENGINE COOLER VALVE	Turn COUNTER-CLOCKWISE to OPEN the valve, turn CLOCKWISE to CLOSE the valve.
24	TANK FILL VALVE	For filling the water tank, PULL to OPEN the valve, PUSH to close the valve.
25	REAR SUCTION VALVE ACTUATOR	Turn CLOCKWISE to OPEN the valve, turn COUNTER- CLOCKWISE to CLOSE the valve
26	TANK TO PUMP VALVE	For moving from the water tank to the water pump. PULL to OPEN the valve, PUSH to close the valve.
27	WATEROUS SERIAL NUMBER PLACARD	Lists the Serial Number of the pump.
28	PUMP PERFORMANCE LABEL	Lists and defines the pump's performance.
29	FRONT SUCTION	Suction for bringing water into the pump.
30	FRONT SUCTION VALVE ACTUATOR	Turn CLOCKWISE to OPEN the valve, turn COUNTER-CLOCKWISE to CLOSE the valve.
31	MANUAL PUMP SHIFT OVERRIDE	PULL for PUMP mode, PUSH for ROAD mode.
32	REAR L.H. DISCHARGE DRAIN VALVE	To drain the Rear Left-Hand Discharge water line. Turn COUNTER-CLOCKWISE to OPEN the valve, CLOCKWISE to CLOSE the valve.
33	NO. 1 DISCHARGE DRAIN VALVE	To drain the #1 Discharge water line. Turn COUNTER-CLOCKWISE to OPEN the valve, CLOCKWISE to CLOSE the valve.
34	NO. 2 DISCHARGE DRAIN VALVE	To drain the #2 Discharge water line. Turn COUNTER- CLOCKWISE to OPEN the valve, CLOCKWISE to CLOSE the valve.



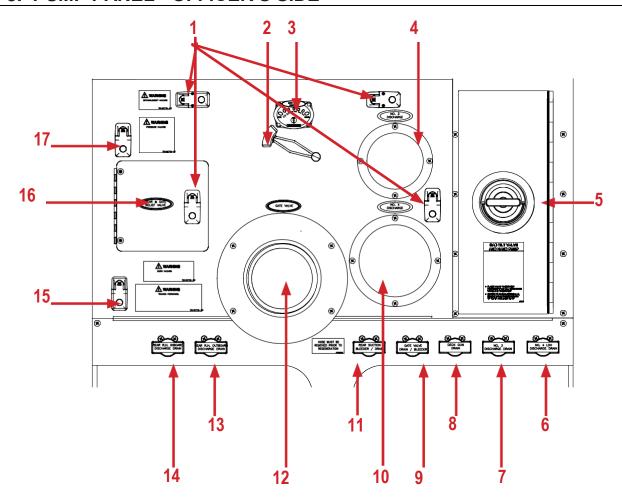
ITEM	INDICATOR/CONTROL	FUNCTION
35	BOOSTER REEL DRAIN VALVE	To drain the Booster Reel water line. Turn COUNTER-CLOCKWISE to OPEN the valve, CLOCKWISE to CLOSE the valve.
36	MAIN INLET SUCTION	The main intake water connection to the water source.
37	TRANSFER VALVE MANUAL OPERATION	Switches the pump between the Pressure Operation Mode and the Volume Operation Mode.
38	NO. 2 CROSSLAY DRAIN VALVE	To drain the #2 Crosslay water line. Turn COUNTER- CLOCKWISE to OPEN the valve, CLOCKWISE to CLOSE the valve.
39	NO. 1 CROSSLAY DRAIN VALVE	To drain the #2 Crosslay water line. Turn COUNTER- CLOCKWISE to OPEN the valve, CLOCKWISE to CLOSE the valve.
40	FRONT DISCHARGE DRAIN VALVE	To drain the Front Discharge water line. Turn COUNTER-CLOCKWISE to OPEN the valve, CLOCKWISE to CLOSE the valve.
41	L.H. 2-1/2" INLET BLEEDER	To drain the Left Hand 2-1/2" Inlet water line. Turn COUNTER-CLOCKWISE to OPEN the valve, CLOCKWISE to CLOSE the valve. ALSO used to relieve air from the water line.
42	PUMP DRAIN	PULL to DRAIN, PUSH to CLOSE. DO NOT OPEN OR CLOSE UNDER PRESSURE!
43	LH 2-1/2 VALVE ACTUATOR	Turn CLOCKWISE to OPEN the valve, turn COUNTER-CLOCKWISE to CLOSE the valve
44	L.H. 2-1/2" INLET	Left Hand side water intake where the hose is connected.
45	L.H. 2-1/2" INLET POSITION INDICATOR	Shows how open the Left-Hand Inlet Valve is.
46	PUMP RELIEF VALVE ACCESS DOOR	Allows to access to the area behind the panel.
47	NO. 4 LDH VALVE ACTUATOR	Turn CLOCKWISE to OPEN the valve, turn COUNTER-CLOCKWISE to CLOSE the valve.
48	NO. 4 LDH DISCHARGE GAUGE	Reads the discharge pressure of the NO. 4 LDH Discharge.
49	NO. 4 LDH DISCHARGE VALVE POSITION INDICATOR	Shows how open the NO. 4 LDH Discharge valve is.



ITEM	INDICATOR/CONTROL	FUNCTION
50	NO. 3 VALVE ACTUATOR	Turn CLOCKWISE to OPEN the valve, turn COUNTER-CLOCKWISE to CLOSE the valve.
51	NO. 3 DISCHARGE GAUGE	Reads the discharge pressure of the NO. 3 Discharge
52	NO. 3 DISCHARGE VALVE POSITION INDICATOR	Shows how open the NO. 3 Discharge valve is.
53	FRONT DISCHARGE GAUGE	Reads the discharge pressure of the Front Discharge.
54	FRONT DISCHARGE VALVE	Turn COUNTER-CLOCKWISE to OPEN the valve, CLOCKWISE to CLOSE the valve.
55	NO. 2 DISCHARGE GAUGE	Reads the discharge pressure of the NO.2 Discharge.
56	NO 2. DISCHARGE	Discharge where a hose is connected.
57	NO. 2 DISCHARGE VALVE	Turn COUNTER-CLOCKWISE to OPEN the valve, CLOCKWISE to CLOSE the valve.



4-8. PUMP PANEL - OFFICER'S SIDE





Example of a Pump Panel - Officer's Side



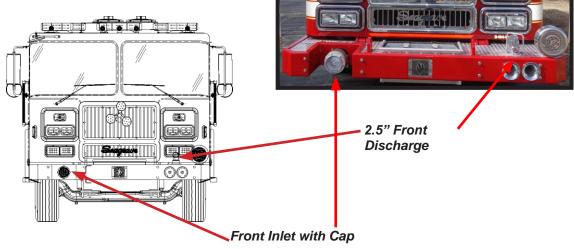
PUMP PANEL - OFFICER'S SIDE Continued

ITEM	CONTROL-INDICATOR	FUNCTION
1	DOOR LATCHES	Latches that opens and closes the access panel to the area behind the panel.
2	GATE VALVE CONTROL ACTUATOR	Turn CLOCKWISE to OPEN the valve, turn COUNTER-CLOCKWISE to CLOSE the valve.
3	GATE VALVE CONTROL POSITION INDICATOR	Shows how open the Gate valve is.
4	NO. 3 DISCHARGE	Discharge where a hose is connected.
5	DOOR TO CAB TILT VALVE AND HAND PUMP	Access Door to get to the Cab Tilt Valve and the Hand pump.
6	No. 4 LDH DISCHARGE DRAIN VALVE	Turn COUNTER-CLOCKWISE to OPEN the valve, CLOCKWISE to CLOSE the valve.
7	NO. 3 DISCHARGE DRAIN VALVE	Turn COUNTER-CLOCKWISE to OPEN the valve, CLOCKWISE to CLOSE the valve.
8	DECK GUN DRAIN VALVE	Turn COUNTER-CLOCKWISE to OPEN the valve, CLOCKWISE to CLOSE the valve.
9	GATE VALVE DRAIN/ BLEEDER VALVE	Turn COUNTER-CLOCKWISE to OPEN the valve, CLOCKWISE to CLOSE the valve.
10	No. 4 DISCHARGE	Discharge where a hose is connected.
11	REAR SUCTION BLEEDER/ DRAIN	To drain the Rear Suction water line, Turn COUNTER-CLOCKWISE to OPEN the valve, CLOCKWISE to CLOSE the valve. ALSO used to relieve air from the water line.
12	GATE VALVE	Main water intake where a hose is connected to the water source.
13	REAR R.H. OUTBOARD DISCHARGE DRAIN VALVE	Turn COUNTER-CLOCKWISE to OPEN the valve, CLOCKWISE to CLOSE the valve.
14	REAR R.H. INBOARD DISCHARGE DRAIN VALVE	Turn COUNTER-CLOCKWISE to OPEN the valve, CLOCKWISE to CLOSE the valve.
15	LATCH	Latch that opens and closes the access panel to the area behind the panel.
16	DOOR TO REAR & GATE RELIEF VALVE LABEL	Label that indicates where the access door leads to.
17	LATCH	Latch that opens and closes the access panel to the area behind the panel.

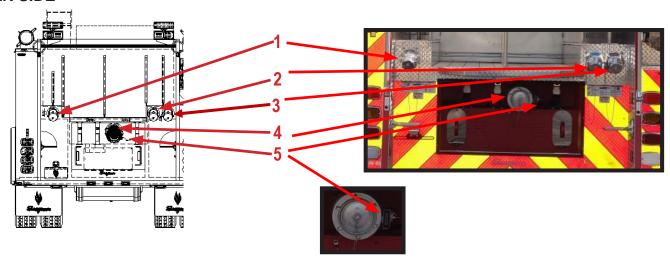


4-9. ADDITIONAL CONTROLS LOCATIONS

FRONT SIDE



REAR SIDE



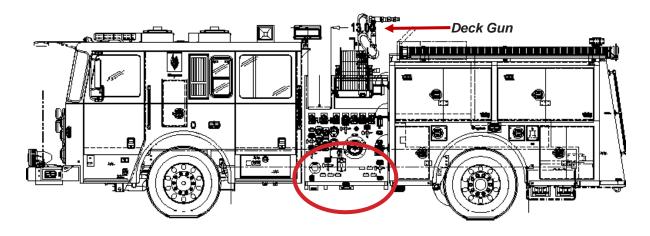
ITEM	CONTROL - ITEM	FUNCTION
1	REAR LEFT HAND DISCHARGE	Discharge outlet to connect hose to.
2	REAR RIGHT HAND INBOARD DISCHARGE	Discharge outlet to connect hose to.
3	REAR RIGHT HAND OUTBOARD DISCHARGE	Discharge outlet to connect hose to.
4	REAR SUCTION	Rear water intake connection to water source.
5	REAR SUCTION BLEEDER VALVE	Bleeds air from the line when priming the rear Intake.

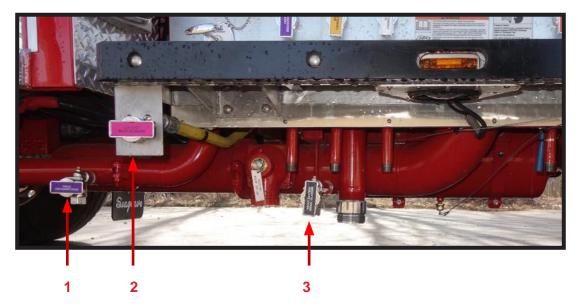
Examples of additional locations of controls



ADDITIONAL CONTROLS LOCATIONS Continued

LOWER DRIVER'S SIDE CONTROLS (Below Operator Stand)





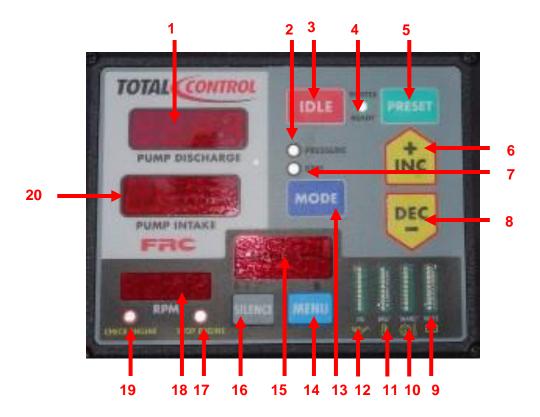
ITEM	CONTROL/ITEM	FUNCTION
1	FRONT DISCHARGE DRAIN & BLEEDER VALVE	Turn COUNTER-CLOCKWISE to OPEN, CLOCKWISE to CLOSE.
2	L.H. 2-1/2" INLET BLEEDER VALVE	Turn COUNTER-CLOCKWISE to OPEN, CLOCKWISE to CLOSE.
3	FRONT SUCTION DRAIN/ BLEEDER VALVE	Turn COUNTER-CLOCKWISE to OPEN, CLOCKWISE to CLOSE.



4-10. PRESSURE GOVERNOR

*WHEN APPLICABLE

Your apparatus is installed with an FRC Total Control Pressure Governor with the J1939 control panel. Additional information can be found in your vendor literature or at fireresearch.com in their on-line manual section.





ITEM	INDICATOR - CONTROLLER	FUNCTION
	PUMP DISCHARGE	
1	DISPLAY	Shows the pump discharge pressure during pumping operation.
2	PRESSURE MODE LED	When lit, indicates that the pressure mode is in use.
3	IDLE BUTTON	When pressed, immediately sets the engine RPM to IDLE. For emergencies or normal shutdown after operations.
4	THROTTLE READY LED	When lit, indicates that the required interlock conditions are met, and the governor is ready to begin pump operations.
5	PRESET BUTTON	Press to change/select a pre-programmed value for a pressure or an RPM setting.
6	INC BUTTON	Pressing button will INCREASE the pressure or the RPM setting
7	RPM MODE LED	When lit, indicates that the RPM mode is in use.
8	MODE BUTTON	Selects the pressure or the RPM mode of operation.
9	DEC BUTTON	Pressing button will DECREASE the pressure or the RPM setting.
10	BATTERY VOLTAGE DISPLAY	Shows the battery voltage - SAFE with GREEN LEDS, OUTSIDE SAFE LIMITS with flashing RED LEDS.
11	PUMP TRANSMISSION TEMPERATURE DISPLAY	Shows the pump transmission temperature - SAFE with GREEN LEDS, TOO HIGH with flashing RED LEDS
12	ENGINE COOLANT TEMPERATURE DISPLAY	Shows the engine coolant temperature - SAFE with GREEN LEDS, TOO HIGH with flashing RED LEDS.
13	ENGINE OIL PRESSURE DISPLAY	Shows the oil pressure - SAFE with GREEN LEDS, LOW with flashing RED LEDS.
14	MENU BUTTON	Used to access detailed information and program features. Each time the button is pressed, the display scrolls to the show the next value.
15	MESSAGE DISPLAY	Shows the pressure or RPM setting during normal operations. Will show warning alarms as they occur, the time and date when the throttle ready LED is off and shows stored data and program features.
16	SILENCE BUTTON	When pressed, suppresses the audio alarms. Used when accessing program features.
17	STOP ENGINE LED	When lit, repeats the Stop Engine lighting in the cab.
18	RPM DISPLAY	Shows the engine RPM during normal operations.
19	CHECK ENGINE LED	When lit, repeats the Check Engine lighting in the cab.
20	PUMP INTAKE DISPLAY	Shows the pump intake pressure during pumping operation.



4-11. ENGAGING THE PUMP

TO ENGAGE THE PUMP

- **STEP 1:** Stop the apparatus at the scene.
- STEP 2: Set the wheel chocks.
- **STEP 3:** Set the Parking Brake and the front auxiliary brake.
- STEP 4: Shift the transmission to N (Neutral).
- **STEP 5:** Set the parking brake and the auxiliary front brake.
- **STEP 6:** Shift the Pump Shift toggle switch to PUMP on the Pump Shift Panel on the Center Console Control Panel.
- **STEP 7:** Shift the transmission to D (drive) the transmission should default the the 4th gear.
- **STEP 8:** The "Pump Engaged" light on the Pump Shift Panel (Center Console Control Panel) should light up when the pump is engaged.
- **STEP 9:** The "OK To Pump" light just below the Pump Engaged light should light up when it is ok to use the pump.



Example of a Pump Shift Panel on the Center Console Control Panel



4-12. PUMPING

PUMPING FROM A TANK

- **STEP 1:** Park and position the apparatus at an appropriate distance to the hydrant/water source.
- STEP 2: Set wheel chocks.
- **STEP 3:** Set the Parking Brake and the front auxiliary brake.
- **STEP 4:** Shift the transmission to N (Neutral).
- STEP 5: Open by PUSHING IN the "Tank to Pump" Valve on the Driver's Side Operator's Stand Panel.
- **STEP 6:** Observe the Main Pressure Gauge for an increase in pressure. If no increase in Pressure is observed: Operate the priming pumper or crack the 2-1/2" valve to clear air from the pump.
- **STEP 7:** Hook up the hose(s) to the desired gate(s).
- STEP 8: Open the gate(s) to the hose(s).
- **STEP 9:** Throttle up the engine to bring the pump up to the required pressure.
- **STEP 10:** Set the pressure governor to the required pressure.
- **STEP 11:** Monitor the FRC water tank gauge for the water tank level.
- **STEP 12:** If pumping with NO water flowing, open the tank fill valve to circulate the water from the tank to the pump.

PUMPING FROM HYDRANT (OR ANY OTHER POSITIVE WATER SOURCE)

- **STEP 1:** Park and position the apparatus at an appropriate distance to the hydrant/water source.
- STEP 2: Set wheel chocks.
- **STEP 3:** Set the Parking Brake and the front auxiliary brake.
- **STEP 4:** Shift the transmission to N (Neutral).
- **STEP 5:** Connect the appropriate suction line(s) to the hydrant and load line. Monitor the incoming pressure on the Suction Gauge.
- **STEP 6:** Connect line(s) to discharge gate(s).



- **STEP 7:** Engage pump.
- STEP 8: Position the Transfer Valve to VOLUME or PRESSURE as needed.
- **STEP 9:** Open the Discharge gate(s) to flow water.
- **STEP 10:** Throttle up the engine to the required pressure.
- **STEP 11:** Observe any drop in Suction Pressure (water supply from hydrant).
- **STEP 12:** Set the Pressure Governor to the required pressure. There must be a 50 PSI difference between the incoming and outgoing pressures.

PUMPING FROM DRAFT

- **STEP 1:** Park and position the apparatus at an appropriate distance to the hydrant/water source.
- STEP 2: Set wheel chocks.
- **STEP 3:** Set the Parking Brake and the front auxiliary brake.
- **STEP 4:** Shift the transmission to N (Neutral).
- **STEP 5:** Connect the hard, suction hose(s).
- **STEP 6:** Position the Transfer Valve in the VOLUME setting.
- **STEP 7:** Insure all gates and inlets are closed, including the suction valve(s) connected to the hard suction(s).
- **STEP 8:** Open the Tank to Pump Valve.
- STEP 9: Crack an unused 2-1/2" gate until water flows to insure pump is flooded.
- STEP 10: Close gate.
- STEP 11: Engage the pump.
- **STEP 12**: Place the Transmission into D (Drive).
- **STEP 13:** Close the Tank to Pump Valve.
- **STEP 14:** Set the throttle at approximately 1000 rpm.
- STEP 15: Open the Suction Valve.



- **STEP 16:** Operate the Priming Pump until the main pressure gauge show a positive pressure. IF YOU ARE NOT ABLE TO ACHIEVE PRIME WITHIN 45 SECONDS STOP AND INVESTIGATE!
- **STEP 17:** Slowly open the Discharge Gate(s) as to not lose the pump prime.
- STEP 18: Position the transfer valve in VOLUME or PRESSURE as needed.
- **STEP 19:** Set the throttle to the required pressure.
- **STEP 20:** Set the Pressure governor at the required pressure.



4-13. OPERATION

PRESSURE MODE OPERATION

In the pressure mode of operation, the PRESSURE LED is on. The governor maintains a constant discharge pressure within system capabilities. It adjusts the engine RPM automatically to compensate for variations in pressure. If the discharge pressure is below 15 PSI when the operator increases the pressure setting, the display shows PRESS LOW.

NOTE: When changing from RPM to pressure mode during operations, hold the MODE button for 3 seconds. The pressure setting is the pressure that the pump was operating at in RPM mode.

- Press MODE button to select the pressure mode.
 Result: PRESSURE LED goes on.
- Press PRESET and/or INC/DEC to select pressure setting.
 Result: Message display shows pressure setting, engine RPM changes.
- Press IDLE button after operations to bring engine to idle RPM.
 Result: Message display shows IDLE ENGINE, engine at idle RPM.

OPENING/CLOSING DISCHARGE VALVES

In pressure mode, the governor maintains the pressure setting regardless of the number of discharge lines that are opened or closed providing there is sufficient water supplied. As lines are opened the discharge pressure starts to drop, and the governor raises the engine RPM to maintain the required pressure. As lines are closed and the discharge pressure starts to rise, the governor lowers the engine RPM to maintain the required pressure.

OPERATING FROM A PRESSURIZED SUPPLY

When operating from a pressurized water source (hydrant, in-relay, etc.), the intake supply should be routed through a valve. If the pressurized source fails, the pump operator can close the valve. This eliminates the chance of sharp pressure spikes at the pump intake if the supply is resumed suddenly. The operator must open this valve slowly when the supply is resumed to help prevent pressure spikes.



4-14. RUNNING AWAY FROM WATER, LOW WATER OR NO SUPPLY WATER

There are situations during pump operations when there may be low or no supply later. This can be due to an empty water tank, a problem on the intake line, air in the pump, changing the water source, or an insufficient water supply. The governor constantly monitors discharge pressure and compares it to engine RPM. It is programmed to limit RPM increases when conditions arise that fall outside of normal operating parameters.

RUNNING AWAY FROM WATER

If the discharge pressure starts dropping while operating in pressure mode, the governor increases the engine RPM and attempts to maintain the selected pressure setting. If pressure drops and an increase in RPM does not bring the pressure back up, the governor recognizes this as a running away from water condition. When this condition occurs the governor switches to the RPM limit mode and controls the engine RPM accordingly.

RPM LIMIT MODE

When the RPM limit mode is in effect the PRESSURE LED stays on. To alert the operator the RPM LED and the RPM display flash, and the message display flashes OPERATOR / RPM- LIMIT. In this mode the pressure setting does not change, and the PRESET button is disabled. When the pressure comes back up to the selected pressure setting, the RPM limit mode is canceled and the governor switches to normal operation in pressure mode at the selected pressure. In some cases, the pressure may not come back up but remains at a level above 45 PSI.

In the RPM limit mode, the governor behaves like a manual throttle and the operator can raise or lower the engine RPM by pressing the INC/DEC button. If the RPM is manually lowered to a point where the pump is not running away from water and pressure is stable, the RPM limit mode is canceled. The governor switches to normal operation in pressure mode with the current discharge pressure as the new pressure setting. If the engine is set to idle using the IDLE button, the governor comes out of RPM Limit Mode and cancels the pressure setting.

LOW WATER CYCLE

If the discharge pressure is below 45 PSI, but stays above 15 PSI, the governor enters a low water cycle and the message display flashes LO WATER. It sets the engine at 1100 RPM. If the pressure does not rise above 45 PSI in 7 seconds, the governor sets the engine RPM at idle. The governor repeats the low water cycle if the discharge pressure is between 15 and 45 PSI. When the pressure rises above 45 PSI the governor resumes normal operation. The values for RPM and PSI in the low water cycle are programmable and may vary for some engine/pump combinations.



4-15. NO SUPPLY WATER

If the discharge pressure is below 15 PSI the engine RPM is set at idle and the message display flashes NO WATER. If within 3 minutes the discharge pressure rises above 15 PSI, the governor enters the low water cycle. If the discharge pressure does not rise above 15 PSI within 3 minutes, the governor switches to idle mode and cancels the pressure setting. To restart pump operations, the operator must press PRESET and/or INC/DEC button to select pressure setting.

RPM MODE OPERATION

In the RPM mode of operation, the RPM LED is on. The governor maintains a constant engine RPM. The pump discharge pressure can vary but, as a safety feature, the governor limits the increase in pressure to 30 PSI over the last established PSI value. As the discharge pressure approaches this limit the governor automatically lowers the RPM to prevent a high-pressure surge. The RPM LED blinks as the governor sets a lower RPM. This lower RPM will be the new operating RPM setting.

NOTE: When changing from pressure to RPM mode during operations, hold the MODE button for 3 seconds. The RPM setting is the RPM that the pump was operating at in pressure mode.

- Press RPM button to select RPM mode.
 Result: RPM LED goes on.
- Press PRESET and/or INC/DEC button to select RPM setting.
 Result: Message display shows RPM setting, engine RPM changes.
- Press IDLE button after operations to bring engine to idle RPM.
 Result: Message display shows IDLE ENGINE, engine at idle RPM.

SWITCHING BETWEEN OPERATING MODES

- No variation in discharge pressure or RPM occurs when changing between pressure and RPM modes.
- When changing to RPM mode, the RPM setting is the RPM that the pump was operating at in pressure mode.
- When changing to pressure mode the pressure setting is the pressure that the pump was operating at in RPM mode.

When the engine is at idle RPM: Press MODE button, governor changes modes immediately.

When the engine RPM is above idle: Press and hold MODE button for 3 seconds, governor changes modes.



Pump Discharge Pressure is High at Engine Idle: Once the governor has set the engine RPM at idle, it can do no more to reduce discharge pressures. To reduce discharge pressure the pump operator can gate incoming water, reduce pressure at the intake relief valve, gate discharges, or disable the pump.

RPM Limit with Discharge Pressure Less than 100 PSI: The level II programming code P221 sets the maximum RPM when the pump is operating with a discharge pressure less than 100 PSI. The factory set default is for code P221 is 1500. Access to level II programming required a password. Contact the factory if this default limit needs to be changed.

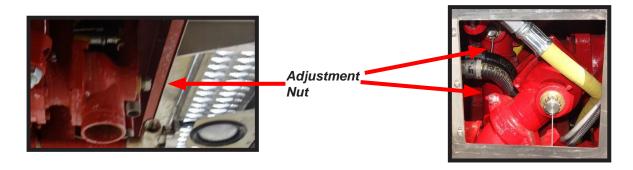
INTAKE PRESSURE RELIEF VALVES



Driver's Side Access Door



Driver's Side Access Door



When the pressure exceeds 250 psi, the excess pressure can be relieved through the Intake Pressure Relief Valves automatically.



4-16. FOAM SYSTEMS

FOAMPRO 2002



FOAMPRO 2002 system controls

NORMAL SYSTEM OPERATION

Operation is very simple and is controlled by the buttons on the Digital Display Control Module.

When the red "FOAM" button is pressed, the "ON" light below button will illuminate, indicating that the system is ready.

- The "ON" light will flash when foam is being injected.
- Using the to change the foam percentage used.
- The white "SELECT" button will display the water flow, total water flowed, foam concentration and the total foam flowed. Use the ▲ ▼ keys together to reset total values.

When the "FOAM" button is again pressed, the "ON" status lamp will extinguish, indicating that the system is in Stand-By mode and the pump will stop but other system monitoring functions will continue. Without foam concentrate injection, the water flowmeter will display the current flow rate of the water.

If water flow requirements exceed the capacity of the pump to deliver foam concentrate, the pump will run at maximum rate and "HI FLO" will flash on the Digital Display Control Module so the operator realizes that the system capacity is being exceeded.

If the flow decreases such that the required injection rate is less than the lowest rating of the pump, the pump will run at its minimum rate and "Lo.Flo" will flash on the display so the operator will know the system is running rich on foam percentage.



FOAMPRO Model 2002 SPECIFICATIONS	
CONCENTRATE CLASS TYPE	A and/or B
CONCENTRATE PROPORTIONING RATE	0.1 - 10%
CONCENTRATE INJECTION RATE	0.01 - 5.0 GPM
OPERATING PRESSURE RANGE	0.0 - 400 PSI
MAXIMUM SOLUTION CAPABILITY	0.5% @ 1,000 GPM
	1.0% @ 500 GPM
	3.0% @ 166 GPM
	6.0% @ 83 GPM
(Readable water flows vary by plumbing diameter)	
Use only concentrates that are compatible with this foam proportioning system. Refer to the manufacturer's operating manual	

DISPLAY INFORMATION

The five digit display on the Digital Display Control Module shows the value of the selected display function or provides warnings to the operator when the system is operating. A function is selected by pressing the grey "SELECT" button in the upper right hand corner of the Digital Display Control Module. Each time the button is pressed, a new function mode is selected and displayed. A LED lamp above the digital display denotes which function is being displayed. Pressing the SELECT button changes the value displayed but does not alter system operation.

The Display Functions:

- Flow: The display shows the current flow rate of water or foam solution per minute.
- **Total Water:** The display shows the total amounts of water or foam solution pumped. This totalized value may be reset. See "Reset Functions" paragraph.
- % (Percent): The display will show the foam concentrate injection rate setting in the "%" mode.
- **Total Foam:** The display shows the total amount of foam concentrate pumped. The value will be in the same unit of measure as the water flow. This totalized value may be reset. See "Reset Functions" paragraph.

RESET FUNCTIONS

The totalized values for water and foam concentrate pumped can be cleared from memory by performing a RESET function. Using the "SELECT" button, select either "TOTAL WATER" or "TOTAL FOAM". By pressing and holding both the (up arrow) and (down arrow) buttons at the same time, the value shown is cleared and displayed as zero.



FOAM PERCENTAGE (%)

When the concentrate percentage (%) is selected, the (up arrow) and (down arrow) buttons will respectively increase or decrease foam concentrate percentage. The percentage can be changed anytime during normal operation. Whenever the (up arrow) or (down arrow) buttons are momentarily pressed, the display will switch to the "%" display and show the current percentage that is set, in any display mode. If either button is held down for a period of 2 seconds, the value will increase or decrease accordingly. Once released, the display will return to the last selected display. When a reset is performed in the "%" display mode (pressing both the (up arrow) and (down arrow) buttons at the same time) the foam concentrate injection rate is returned to the default value. The default value is set during calibration.

DISPLAY MESSAGES

Several safety features are provided to protect the foam concentrate pump and the electric motor.

LOW FOAM TANK LEVEL

The pump is interlocked with the foam concentrate tank level switch. If the tank is empty, the pump will not run for more than 2 minutes. A low foam concentrate tank level is denoted by "Lo Con" blinking on the display. This code will alternate with the normal display value shown. If two consecutive minutes of low concentrate level is detected, the display will show "No Con", the pump will stop, and the system will go to "Stand By" mode until the foam level is restored and the ON button is depressed.

PUMP ERROR

Motor stall protection is provided. If the pump motor will not run or stalls for 10 seconds, the display will show "ERR.EL" to indicate that the pump is producing no feedback to the control signal. The system will return to off status to protect the electric motor and components.

HIGH-LOW FLOW CONDITION

Whenever the foam pump cannot reach the selected level an indication of the status blink in the background as:

"Lo.Flo" - Foam delivery rate is below pump capability.

"Hi.Flo" - The water delivery rate is too high for the foam pump's capacity.

SIMULATED FLOW OPERATION

The Simulated Flow function of the system allows the operator to control the foam pump manually. The water flow rate and the concentrate injection percentage rate can be set by using the display readout and the rate adjustment buttons on the Digital Display Control Module. This function provides the manual control requirement of NFPA. This function also allows the operator to empty the foam concentrate tank for cleaning or changing foam types. It also provides a means of checking the operation of the foam pump at all normal rates of flow and injection without running the water pump

NOTE: When operating the FoamPro in the Simulated Flow function, an outlet for the foam concentrate injection must be provided. Otherwise, dangerous excessive pressure may be built up in the apparatus water piping and or hoses. This outlet for the foam concentrate can be provided by turning the CAL/INJECT valve to the CAL position. A suitable container must be provided to collect the foam concentrate.



HALE FOAMLOGIX FOAM SYSTEM



Hale FOAMLOGIX system controls

For specific information on your foam system, please see the vendor literature that came with your manuals.



4-17. HIGH PRESSURE STREAM

Some apparatus uses an Ultra High-Pressure stream of water or foam solution to fight fires. This type of stream presents unique hazards and should only be used by trained personnel.

▲ WARNING

- An Ultra High-Pressure stream will injure and pierce the skin.
- If an Ultra High-Pressure stream pierces the skin, seek medical treatment immediately.
- Keep all hoses, nozzles and couplings tight.
- Never place body parts into an Ultra High-Pressure stream.
- Never point an Ultra High-Pressure stream at people.
- Placing people or body parts in an Ultra High-Pressure stream will cause injury or death.

An Ultra High-Pressure stream is discharged at pressure over 1000 PSI. Any fluid, even water, injected into the skin is extremely dangerous and must be treated immediately by a qualified medical doctor. Make sure that the doctor is aware of potential problems and that the recommended surgical procedure is done to treat the injury.

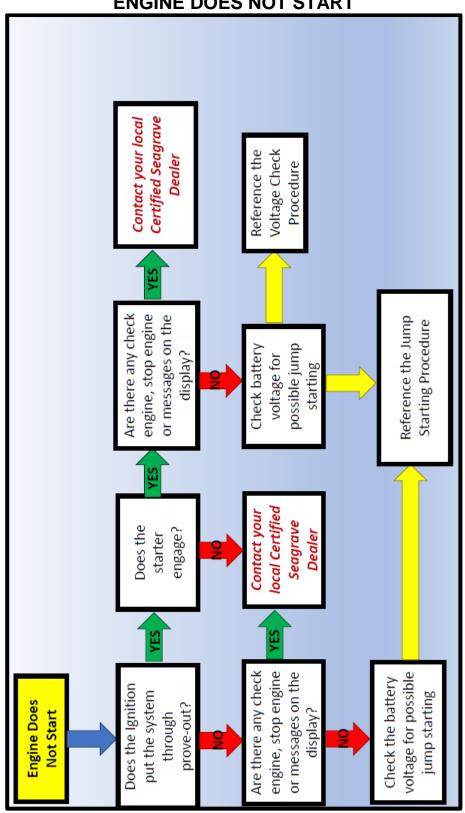
Tighten all connections before operating this type of equipment. Check all hoses, nozzles, and couplings after each use. Leaks are just as dangerous as a stream from a nozzle.

Use Personal Protection Gear (gloves, boots, face shield mask, and turn-our gear) whenever using an Ultra High-Pressure equipment.



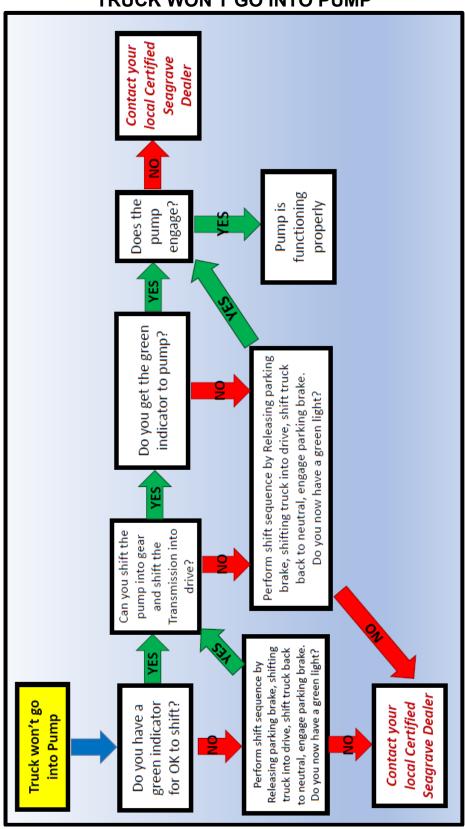
TROUBLESHOOTING

ENGINE DOES NOT START



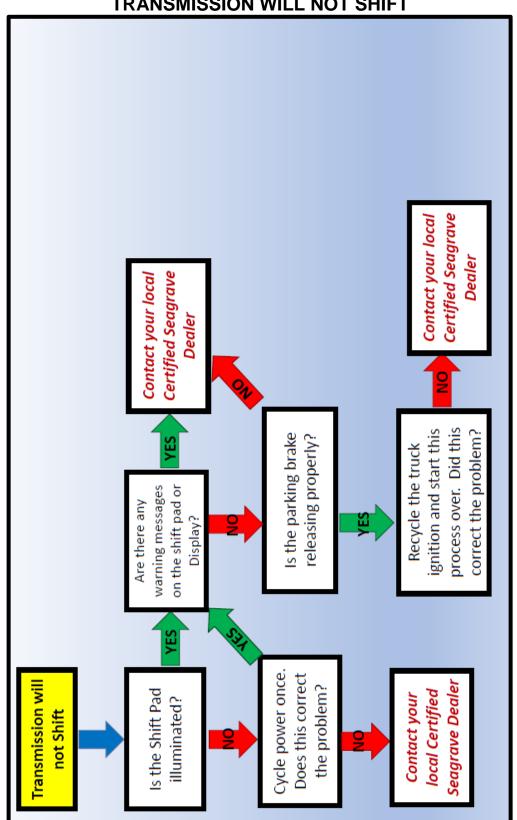


TRUCK WON'T GO INTO PUMP



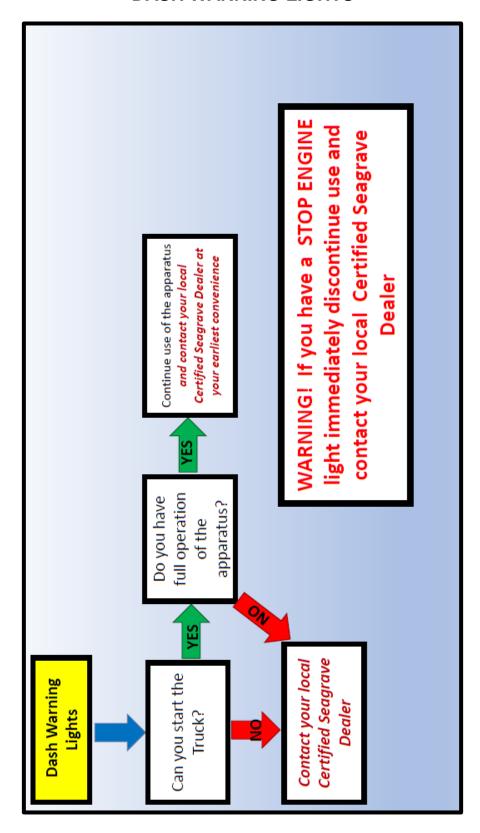


TRANSMISSION WILL NOT SHIFT





DASH WARNING LIGHTS





START UP ALARMS

