Bend Fire & Rescue Apparatus Operations Manual

2003 American LaFrance/LTI 93' Platform

Revised 8/2012

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FIRE PUMP OPERATION

MAINTENANCE

2003 AMERICAN LaFRANCE-LTI AERIAL APPARATUS

INTRODUCTION

The information contained in this operation manual will assist firefighting personnel in the operation, maintenance and troubleshooting of the 2003 American LaFrance-LTI Aerial Apparatus. This manual is divided into five sections: 1) Introduction, 2) Driving & Controls, 3) Aerial Operation, 4) Pump Operation and 5) Maintenance.

DANGER, CAUTION AND NOTES
Three types of headings are used in this manual to attract your attention. These symbols explain how methods or actions can result in personal injury, damage to the equipment, or cause the equipment to become unsafe.

DANGER

Danger is used when an operating procedure, practice, etc., if not correctly followed, could result in personal injury or loss of life.

CAUTION

Caution is used when an operating procedure, practice, etc., if not strictly observed, could result in damage to or destruction of equipment.

NOTE

Note is used when an operating procedure, practice, etc., is essential to highlight.

INTRODUCTION

General Specifications

APPARATUS DIMENSIONS AND WEIGHTS

Height (max.): Ladder Rails "	**10' 10"**
Height: Top of Cab Roof	**9' 6"**
Height: Cab Full Tilt Position	**16' 2"**
Length:	**46' 5"**
Width (including mirrors)	**10'**
GVWR (Gross Vehicle Weight Rating)	**73,000 lbs.**
Apparatus Average Weight (Fully Loaded Including Personnel)	**69,000 lbs.**
Ground Jack Spread	**18'**

COMPONENT OPERATING RANGES

Apparatus Normal System Voltage Operating Range	**12.9 – 14.4 Volts**
Engine Oil Pressure Normal Operating Range	**12 psi (min) @ idle & 50 psi (min)**
Engine Coolant Temperature Operating Range	**160º to 210º F Max. 230º**
Engine Fan Clutch Engagement	**207º F**
Transmission Fluid Temperature Operating Range	**140º to 220º F**
Air Brake System Normal Operating Range	**90 psi to 120 psi**
Fuel Tank Capacity	**56 Gallons**
Fast Idle	**1650 RPM**
Emergency Power Unit (EPU) Pump	**1.5 GPM @ 2000 PSI**

HARRISON GENERATOR

Output	**8000watts**
Amps @ 120 VAC	**68 amps**

General Specifications

HYDRAULIC SYSTEM CAPACITIES

Oil Reservoir Capacity	**40 Gallons**
Hydraulic Pump Capacity	**45 GPM**
Maximum System Pressure	**2750 PSI**

AERIAL LADDER DIMENSIONS

Retracted Length	**28' 9"**
Extended Length	**88' 1"**
Elevated Height	**93' 2"**
Elevation	**-10º to +78º**
Sections	**5**

PUMP AND PLUMBING CAPACITIES

Pump	**Hale 8FG Single Stage**
Capacity	**2009 gpm @ 150 psi at draft**
Primer Pump	**Hale oil-less positive displacement**
Intake Relief Valve	**125 psi**
Tank-to-pump plumbing	**3" – 500 gpm**
Water Tank	**273 gal.**
Aerial Waterway	**5 ½"tapers to 3 ½" 1250 gpm**
Platform relief valve	**165 psi**

BREATHING AIR SYSTEM

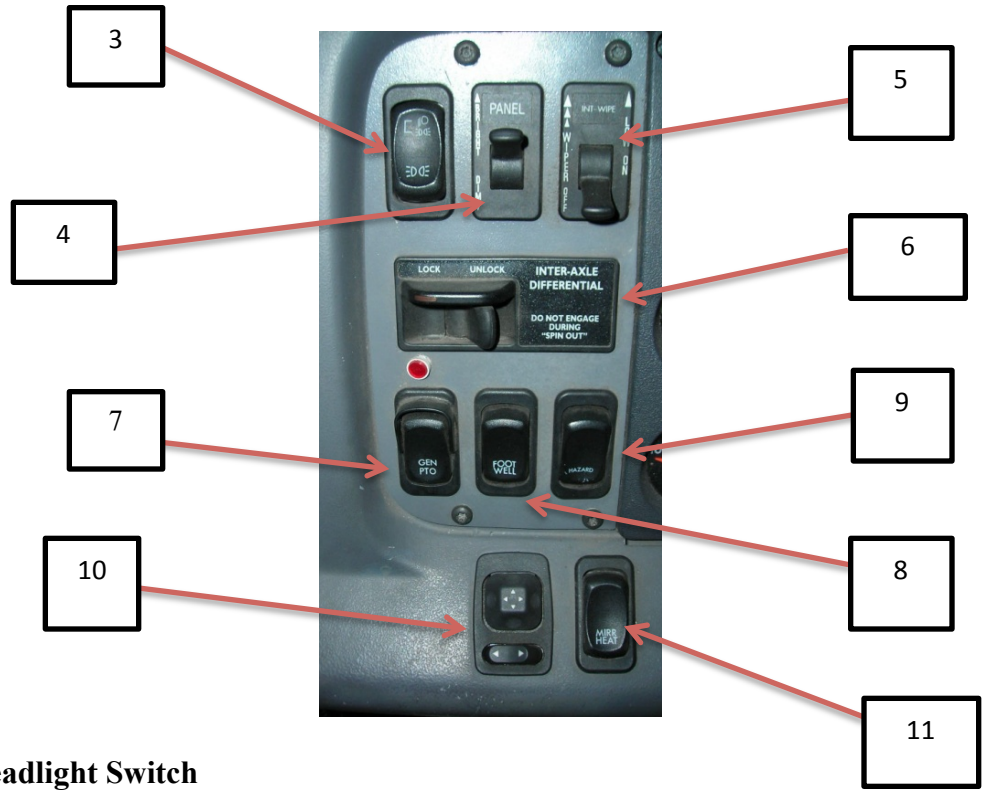
Air Tank Capacity	**444 cubic foot x 2**
Bottle fill pressure	**4500 psi**

Cab Instruments & Controls

1. **Foot Well Light**
   Illuminates when the foot well light switch is activated. The lights illuminate both the driver & passenger areas.

2. **Steering Wheel Tilt and Telescoping Control**
   Locks and unlocks tilt and telescoping adjustment function of the steering wheel.

Cab Instruments & Controls



3. **Headlight Switch**
   Activates the headlamps or parking lights
4. **Panel Lights Switch**
   Illuminates the instrument panels and adjusts light intensity.
5. **Intermittent Wiper Control**
   The intermittent delay interval is adjusted using the intermittent wiper control. With the knob all the way up, the wipers operate continuously at low speed. If the wiper switch on the turn signal lever is toward the LO position, the wipers will operate at low speed, overriding the intermittent delay feature.
6. **Interaxle Differential**
   Under normal conditions should remain unlocked to allow the rear axles to turn at different speeds and limit tire wear. See Winter Operation
7. **Generator PTO**
   Engages the PTO driven hydraulic generator. Should be engaged below 900 RPM
8. **Foot Well Lights Switch**
   Activates the lights below the driver & passenger side foot area.
9. **Hazard**
   Activates four-way flashers
10. **Driver/Passenger Side Mirror Adjustment Switch**
    Toggle switch up or down and left or right to adjust motorized mirror in or out.
11. **Mirror Heat Switch**
    Activates mirror heat in both mirrors for defogging.

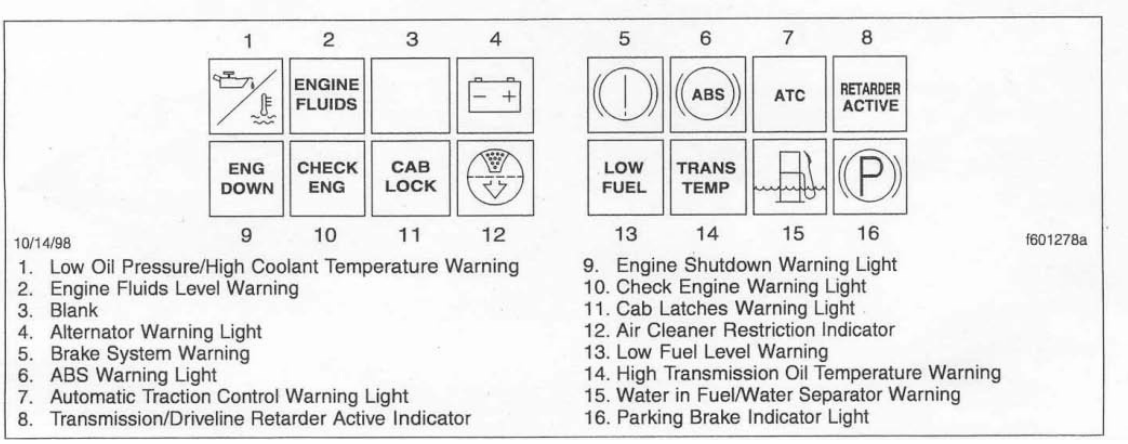
Cab Instruments & Controls

12. **Engine Oil Pressure Gauge**
    This gauge registers the engine oil pressure in pounds per square inch (psi) while the engine is running. Normal range is 12 psi @ idle to 50 psi @ rated rpm
    Observe this gauge at engine start up to determine that the engine is receiving adequate lubrication.
13. **Engine Coolant Temperature Gauge**
    This gauge registers the temperature of the engine coolant in degrees Fahrenheit. Normal range is 160º F to 210º F
14. **Voltmeter**
    The voltmeter measures the voltage across the battery terminals and gives an indication of the electrical condition of the batteries. The apparatus electrical system operating voltage is also shown while the engine is running. Normal voltage range is from 12.9 volts to 14.4 volts. Actual voltage indicated would vary with the number of accessories that are ON at any given time and whether or not the engine is running.
15. **Transmission Temperature Gauge**
    This gauge registers the temperature of the transmission fluid in degrees Fahrenheit. Normal temperature range for the transmission fluid is 140º F to 220º F.
16. **Primary/ Secondary Air Reservoir Gauge**
    Indicates the air pressure in the rear axle (primary/white needle) brake circuit and the air pressure in the front axle (secondary/red needle) brake circuit.

Cab Instruments & Controls

17. Cab Instrumentation Indicator Lights

Consists of 16 lights that alert and/or warn the driver of specific apparatus functions:



Low Oil Pressure/High Water Temp: Illuminates when oil pressure falls below 12 PSI or water temperature rises above 230º F.	**Engine Fluids:** Illuminates when the coolant level or engine oil level drops below a value considered safe for normal operating conditions.
Blank:	**Charging System Warning:** Illuminates when the alternator is not charging.
Brake System: Illuminates when air pressure falls below 65-75 PSI.	**ABS:** Illuminates when there is a fault in the ABS system.
ATC: Not active on this apparatus.	**Retarder Active:** Not active on this apparatus.
Engine Down: Illuminates when there is a critical problem with the engine.	**Check Engine:** Illuminates when there is a problem with the engine.
Cab Lock: Illuminates when the cab latches are unlocked.	**Air Cleaner Restriction:** Illuminates when the air cleaner needs to be serviced.
Low Fuel: Illuminates when approximately 1/8 tank of fuel remains.	**Trans Temp:** Illuminates when the transmission is overheating.
Water in Fuel/Water Separator: Illuminates when there is water in the fuel.	**Parking Brake:** Illuminates when ignition is on and parking brake is set.

Cab Instruments & Controls

18. No Smoke Status Light
Illuminates when No-Smoke system needs servicing

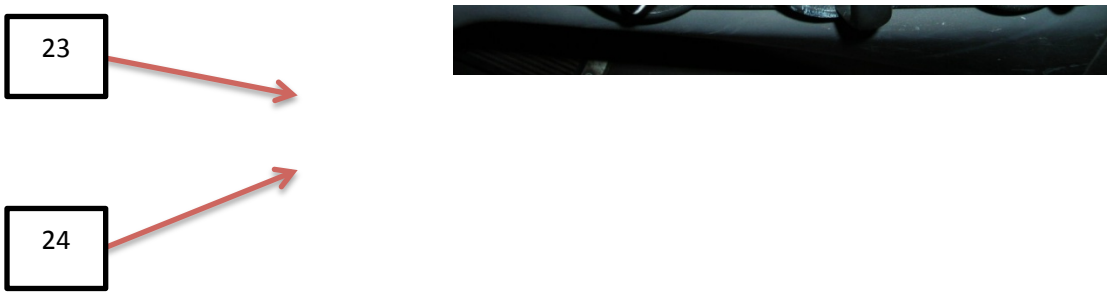
19. Fuel Re-prime
Re-primes the fuel system in the event the engine is run out of fuel

20. Jacob's Engine Brake Switches
Used to activate or de-activate the Jacob's engine brake and select the amount of braking power (High/Medium/Low).

21. No-Smoke Operation Switch
When on (up) system will operate for 30 seconds after start-up and when in reverse. The down position disables the no-smoke system

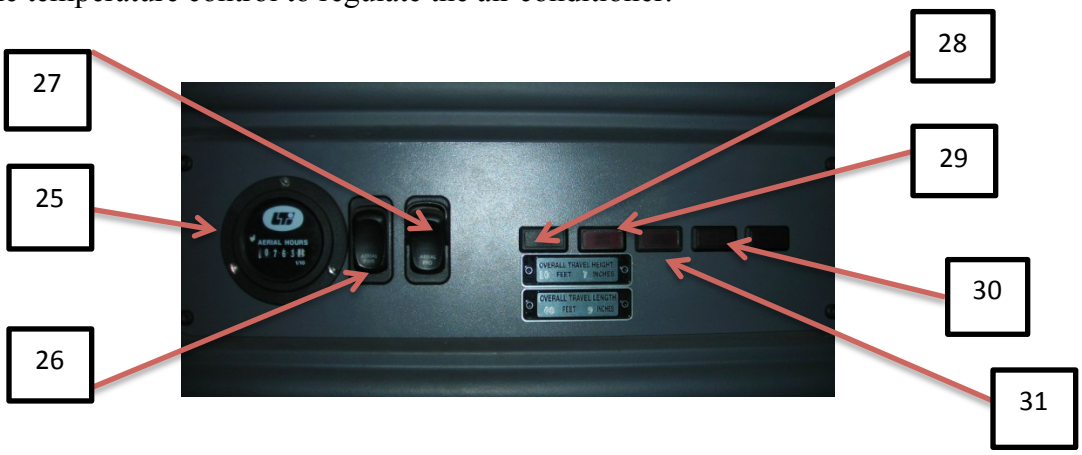
22. Driving Lights
Illuminates the driving lights mounted below the front bumper

Cab Instruments & Controls



23. Cab Air Re-circulation Switch
Opens or closes all vents to outside air for the purpose of cab ventilation.

24. Air Conditioning (A/C) Activation Switch
This switch enables the A/C compressor. The switch must be turned on in order for the temperature control to regulate the air conditioner.



25. Aerial PTO hour meter
Records time that the aerial PTO is engaged. NOT the hourmeter that lubrication is based on.

26. Aerial Power Switch
Used to supply electrical power to the aerial systems.

27. Aerial PTO Switch
Activates the PTO for aerial operation.

28. Aerial PTO Light
Illuminates when aerial PTO is engaged

29. Jacks Down Light
Illuminates when the outriggers are in the down position.

30. Left Jack Out
Illuminates when the aerial or outriggers are not stowed for travel.

31. Right jack Out
Illuminates when the aerial or outriggers are not stowed for travel.

Cab Instruments & Controls

32. Battery Master Power
The battery switch is used to disconnect electrical power to the apparatus to prevent discharge while the apparatus is not in use.

33. Ignition Switch
3 position switch, in the down position the ignition is off, neutral position accessory power is active and the up position is the momentary starter switch.

34. Parking Brake Control
Sets and releases rear axle spring brakes.

35. High Idle Switch
This switch enables the engine high idle feature and raises the engine rpm to approximately 1650-rpm.

36. Electric/Air Horn Switch
Used to select either the electric or air horn for the steering wheel horn ring.

37. Auxiliary Brake Control
Sets and releases front axle service brakes.

38. Pump Engagement Switch
Electric over air switch that engages the mid-ship fire pump

39. Pump engaged light
Indicates the pump transmission has appropriately engaged the fire pump

40. OK To Pump light
Indicates the pump is engaged and the road transmission is locked in the appropriate pump gear (4)

DRIVING & CONTROLS

Detroit Diesel Series 60 Engine Operation

The Detroit Diesel, Series 60 DDEC IV, is a six cylinder valve-in-head type engine. It has a 5.12" bore and a 6.30" stroke, with a total piston displacement of 778 cubic inches and a compression ratio of 16.0 to 1. The Series 60 develops its highest torque, 1550-ft lbs., at 1200 RPM and its rated horsepower 500 at 2100 RPM. The Series 60 is designed to run at lower RPM's. Driving at lower RPM's it delivers the best performance, largest engine life and best fuel economy. The best fuel economy is delivered between 1200 – 1800 RPM. The Series 60 also delivers greater torque and pulling power at lower RPM.

CAUTION

When the engine is cold, this additional RPM could be very harmful due to minimal lubrication and due caution should be exercised.

The Series 60 DDEC engine is equipped with an electronically controlled fuel injection system. There are no control racks or mechanical linkage to adjust. This system not only helps to improve fuel economy and vehicle performance, it also helps to reduce cold starting time and increase initial idle speed for fast engine warm-up and virtual elimination of cold smoke.

The DDEC engine has no mechanical governor. Engine horsepower, torque, idle and engine speed is contained in the internal electronics. The Electronic Foot Pedal Assembly eliminates the need for any throttle linkage.

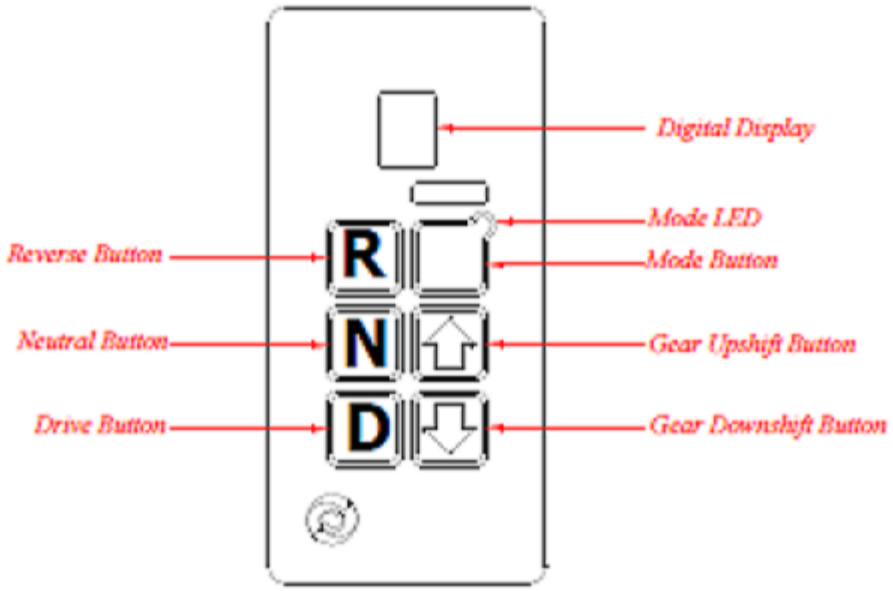
The DDEC engine has the ability to perform diagnostics for self-checks and continuous monitoring of other system components. Depending on the application, DDEC can also monitor oil temperature, coolant temperature, oil pressure, fuel pressure, coolant level and remote sensors.

DRIVING & CONTROLS

Allison World Transmission Operation

Transmission Pushbutton Range Selector
The pushbutton shift selector has **R**, **N**, **D**, ↓, ↑, a **MODE** button and a digital display. When a range select button is pressed the digital display shows the chosen operation (if the ECU determines the shift is acceptable) and the transmission will shift to the initial range as indicated on the display. In **D** (**D**rive) a specific range can be selected by pressing the ↑ (**Up**) or ↓ (**Down**) arrow buttons. While in the **D** (**D**rive) mode it is *not* necessary to select the right moment to upshift or downshift during changing road and traffic conditions, the transmission will do it all for you.

WORLD TRANSMISSION PUSHBUTTON RANGE SELECTOR



Allison World Transmission Operation

N (Neutral)
Use **N**eutral when you start the engine, to check vehicle accessories, and for extended periods of engine idle operation. (Neutral is automatically selected by the ECU at startup).

D (Drive)
The transmission will initially attain first gear range when **D** (**D**rive) is selected. As vehicle speed increases, the transmission will upshift automatically through each gear range. As the vehicle slows, the transmission will downshift automatically. Unless road conditions dictate using a specific gear, the full automatic position will provide sufficient vehicle performance. Under full acceleration (100% pedal travel) the transmission shift points occur at approximately 2100 rpm.

Gear Ranges 2-3-4
On occasion, 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 down grades (the lower the range, the greater the braking effect) and maximum torque and traction for steep grades and/or adverse road conditions. It is up to the operator to determine when changing road conditions will dictate whether or not to use a specific gear range. The pushbutton selector utilizes arrow buttons to select individual forward ranges. Push the ↑ (**Up**) or ↓ (**Down**) arrow to select the desired range for increased apparatus braking and/or maximum torque and traction. The display will show the current operating range. Even though a lower range was selected, the transmission may not downshift until vehicle speed is reduced.

First Gear Range (1)
Use this range when pulling through mud or whenever maximum traction is desired, when maneuvering in tight spaces, or while driving up or down steep grades. First range provides the vehicle with its maximum driving power and maximum engine braking power. Push the ↓ (**Down**) arrow on the pushbutton selector until first range appears in the display window.

R (Reverse)
Completely stop the vehicle before shifting from a forward range to **R**everse or from **R**everse to a forward range. When making this shift be sure to always select **N** (**N**eutral) when transitioning from reverse to a forward range and visa versa. The digital display will show **R** (**R**everse) on the pushbutton selector.

Starting Apparatus

1. Place the battery master switch in the "ON" position.
2. Turn ignition switch "ON".

NOTE

If any of the engine warning lights stay on after starting the engine, investigate the cause of the warning condition and/or notify the shops immediately.

3. Verify transmission is in **N** (**N**eutral) position (transmission automatically defaults to the neutral position when first started).
4. With your foot OFF of the accelerator pedal and ON the brake pedal, press starter button firmly and hold until engine starts.
5. 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.

NOTE

Observe the oil pressure gauge immediately after starting the engine. A good indicator that all of the moving parts are getting lubrication is when the oil pressure gauge registers pressure (at least 12 psi) at idle speed. If there is no oil pressure indicated within 10 to 15 seconds, stop the engine and check the lubricating system. The pressure should not fall below 28 psi at 1800 rpm. Normal operating pressure should be higher. If pressure does not fall within these guidelines, stop the engine and investigate. Check engine oil level and inspect for any signs of contamination i.e. fuel, coolant or debris and/or notify the shops immediately

CAUTION

*Be sure engine is at idle when shifting from **N** (**N**eutral) to **D** (**D**rive)or **R** (**R**everse). If the engine high idle feature is engaged and a shift is attempted, the high idle feature will be disengaged.*

Idling Apparatus

1. Determine if apparatus is to be idling longer than 5 minutes.
2. Set parking brake(s).
3. Place transmission in the **N** (**N**eutral) position.
4. Engage “High-idle” switch.

CAUTION

During long engine idling periods with the transmission in neutral, the engine coolant temperature may fall below the normal operating range. Incomplete combustion of fuel is the end result of this, which can cause crankcase dilution, formation of lacquer or gummy deposits on the valves, pistons, and rings, and 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 scene with all warning lights activated, engage the engine high idle feature. Doing so will assist the alternator in keeping up with the electrical current demands placed on it and prevent the Load Manager from "cutting out" electrical accessories due to insufficient current flow

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To Stop the Engine

1. Place the transmission in **N** (**N**eutral) and set the parking brake.
2. Allow the engine to idle for four or five minutes. This allows the turbocharger adequate time to slow and cool down.
3. Place the ignition switch in the OFF position. This will stop the engine.
4. Place the battery master switch in the OFF position.

CAUTION

Stopping a turbocharged engine immediately after high-speed operation may cause damage to the turbocharger as it will continue to turn without an oil supply to the bearings. Failure of turbo oil seals and/or bearings are the likely results of this practice. Try not to shut down the engine unless coolant temperature is 195° F or less.

Braking: Dual Circuit Air Brake System

The apparatus is equipped with a dual circuit air brake (primary and secondary) system, a *rear* spring brake parking system and an auxiliary *front* axle parking brake system. The front axle and the rear axle brake circuits are each supplied air by separate air reservoirs. 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, whereas the primary delivery system supplies air to the rear axle service circuit. An air pressure gauge is located on the right side of the dash monitor. This gauge indicates both front (secondary/red needle) and rear (primary/white needle) air brake system pressure. In the event air brake system pressure drops below approximately 65 psi a warning buzzer and light will come on. As soon as system air pressure increases past 65-75 psi, the warning light and buzzer will shut-off.

DANGER

Take care to try to maintain system air pressure between 90 psi and 120 psi (governor cut out pressure) during normal operation. 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 may deplete the brake systems air reservoir supply.

Braking: Dual Circuit Air Brake 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 response. In an emergency situation, operator discretion must be used as to the need to operate the apparatus when there is less than 90 psi air pressure in both brake circuits.

DANGER

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 airbrake section charged to less than 60 psi or property or personal injury could result.

Braking: ABS

The antilock braking system (ABS) automatically applies and releases the brakes during low traction or 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. Rapid pumping of the brakes may deplete air pressure faster than the air compressor can supply it resulting in a loss of braking ability as well as decreasing the efficiency of the ABS system.

Braking: Parking Brakes

The apparatus spring brakes are located on the rear axle. The spring brakes are applied and released by operation of the yellow Parking Brake valve located on the engine doghouse instrument panel. Pushing the yellow valve knob IN will release the spring brakes. Pulling the yellow valve knob OUT will apply the spring brakes. The parking brake circuit is intended to hold the vehicle in a parked position only and 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 40 psi in both systems, the spring brake valve will automatically apply.

DANGER

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 vehicle control, property damage, personal injury or death. It is Department policy to always chock the wheels when on scene.

Braking: Auxiliary Front Wheel Locks

DANGER

The auxiliary front wheel lock feature uses air brake system pressure to keep the front brakes applied. It is used to augment the rear spring parking brakes in the event that the rear parking brakes cannot hold the apparatus on a steep incline. As such, if there is an air leak in the air brake system, the auxiliary front wheel locks may fail. Therefore, if the auxiliary parking brake is to be used, it should be used only with the engine running. It is a supplemental brake only, which does not meet the FMVSS (Federal Motor Vehicle Safety Standards) parking brake criteria and must be used in conjunction with the yellow parking brake valve when parking the vehicle. Failure to follow these precautions could lead to loss of vehicle control causing property damage, serious personal injury, or death.

The auxiliary front wheel lock feature allows the operator to engage the service brakes on the front axle to gain additional holding ability when parking on a grade. To apply the auxiliary front wheel lock the spring brakes MUST be applied first. In order to apply, first pull out the yellow parking brake knob and then push in the black auxiliary brake knob. When the spring brakes are released by pushing in on the yellow brake knob the auxiliary brake knob will "pop" out and the auxiliary brakes will automatically release.

Braking: Jacob's Engine Brake

The Jacob's engine brake (Jake Brake) is a device, which uses the energy of the engine compression to provide vehicle retardation. Engine brakes provide the maximum retarding power at rated speed; therefore, gear selection is important. The engine brake converts the engine to an energy-absorbing device to reduce vehicle speed. This is accomplished by a hydraulic circuit that opens the exhaust valves near the end of the compression stroke.

The Jake brake is a hydraulic engine attachment that, when energized, altars the engine exhaust valves operation which converts the diesel engine into an air compressor. This is accomplished by prematurely opening the exhaust valves near the top of the compression stroke releasing the compression pressure to exhaust. The result is an engine retarding effort to the drive wheels.

The engine brake may be used for descending grades, driving in city traffic, or when approaching stop lights and, in general, whenever vehicle retarding is required. The Jake brake is a very effective tool and can reduce brake wear if used properly.

There is no time limit with respect to the operation of the Jake brake. The engine's cooling system will continually absorb and dissipate the heat generated by its continual use.

The engine brake reacts quickly; it will activate or deactivate in less than 1/4 of a second.

Operating instructions
1. Start the engine.
2. The engine should be fairly warm before engaging the Jake brake. The engine preheater water temperature is sufficient.
3. Turn on the Jake brake "On/Off" switch located on the dashboard.
4. When the throttle pedal is released, the Jake brake will then activate.

The three-position selector switch allows the operator to choose the desired braking level:
Low – Activates two cylinders for medium engine retarding.
Medium – Activates four cylinders for moderate engine retarding.
High – Activates six cylinders for maximum engine retarding.

Selector switch position can be changed at the discretion of the operator, at any time, without the fear of damaging any of the engine components.

CAUTION

Do not engage the Jake Brake on wet or icy streets. The additional braking effort on the drive wheels (duals) can cause them to lock up which could result in an uncontrollable skid.

Electrical System: Load Manager

The Load Manager is an electronic system that maintains battery voltage by monitoring battery voltage, and by controlling electrical loads. After the battery voltage drops to a preselected setting (approximately 12.8 volts), the engine throttle will be increased to compensate for the low voltage and electrical system loads. An alarm sounds if a low voltage condition (below 11.9 volts) develops, and the Officer's Information Center displays a message that the Load Manager system is in control.

If the low-voltage condition continues (for approximately 1 minute), then the shedding of electrical loads will begin. Load shedding is prioritized. For example, a system such as the heater/air conditioning system may be shut down initially with other systems to follow. If this action does not solve the low-voltage condition, however, more systems will be shut down.

A shed system (load) will not be recognized for 5 minutes or until the unshed voltage setting is maintained for 1 minute. The fast idle system will be maintained for a minimum of 10 minutes and until a voltage reading of 13.0 is achieved, even if any system shedding did not occur.

The system is interfaced with the parking brake and the transmission so that the system shedding can occur only when the parking brake is set and the transmission is in neutral.

NOTE

In the event of electrical demand exceeding electrical supply, the first electrical load to be shed will be the air conditioning. This component will be turned off when electrical system voltage drops below 12.8 Volts. It is important to note that at minimum, when ALL electrical accessories are turned on and engine is running at idle (500-750 rpm), the alternator will be unable to keep up with the electrical demands placed on it thereby causing the air conditioning to be turned off. At idle with ALL electrical accessories ON, system voltage can drop well below 12.0 Volts. Even with the engine high idle engaged with all electrical accessories "ON", system voltage will vary between 12.9 to 13.1 Volts. This is only a few tenths of a volt above the "shed" voltage where the first electrical accessory is turned off. When there is a heavy demand placed on the electrical system such as occurs when idling on scene, always engage the ***high idle*** *feature of the engine. This will help prevent shut down of any electrical accessories by the electrical load manager when electrical demand is high.*

Electrical System: Officer's Information Center (OIC)

The Officer's Information Center (OIC) is the Captain's interface point for displaying, resetting and changing information provided by the display including: vehicle speed, clock, ambient temperature, seat belt status, English/Metric units, event timers and optional compass heading information. The OIC also includes indicators for fasten seat belts and vehicle overspeed warnings.

Speed Display
Vehicle speed appears on a three-digit LED display whenever the parking brake is not set. Once the parking brake is set, the display changes to a manual timer showing the elapsed time (in hours and minutes). This manual timer can be stopped, stopped and restarted, or stopped, reset, and restarted using the STOP/DECREASE, START/INCREASE, AND RESET BUTTONS. NOTE: The manual timer automatically stops and resets when the OIC menu is accessed.

MPH/km/h LEDs
Vehicle speed can be displayed in miles per hour or kilometers per hour. The LED for the appropriate units turns on when vehicle speed is displayed.

Message Display
The message display is a 16-digit LED display, which can display numbers, letters and symbols. When the parking brake is not set, time of day, ambient temperature and vehicle heading are displayed simultaneously.

Electrical System: Officer's Information Center (OIC)

Vehicle Overspeed Warning Indicator
When vehicle speed exceeds the values programmed into the OIC, the overspeed warning indicator illuminates and a buzzer sounds. The indicator and alarm continue to operate until vehicle speed drops to the preset value.

Stop/Decrease Switch
The STOP/DECREASE switch operates a momentary-type switch built into the OIC face. The switch is used for two distinct purposes. When the manual timer is operating, the button is used to stop the timer. The switch is also used to decrease a preset value such as vehicle overspeed limit or toggle an either/or parameter such as English/metric units.

Start/Increase Switch
The START/INCREASE switch is also used for two distinct purposes. When the manual timer is stopped, the button is used to start the timer. The switch is also used to increase a preset value such as vehicle overspeed limit or toggle an either/or parameter such as English/metric units.

Reset Switch
When the manual timer is operating (normal mode), pressing the RESET switch resets the timer to 0 minutes 0 seconds. During OIC programming, however, (clock style, units, etc.) pressing reset allows the user to save any changes made to a setting and return to the "top" of the programming menu.

Mode Switch
The MODE switch is used to advance through the various programming and information modes presented on the message display: response time, scene time, self-test, clock style, time set, units, warning speed, welcome message and interlock status.

Seat Belt Warning Indicator
The bottom seat cushion of every seat in the vehicle is fitted with a pressure-sensitive switch, and every seat belt buckle also has a switch. When the parking brake is released, and the seat belt is not latched at any occupied seat, the seat belt warning indicator illuminates and a buzzer sounds. The indicator and buzzer continue to operate until the seat belts are fastened at all occupied seating positions.

Electrical System: Onboard Generator & Lighting (110 volt)

An Harrison hydraulic driven generator, model 8.0 MAS-16R , is used to power the 110-volt lighting, electrical outlets and cord reels. The generator is permanently mounted forward of the ground ladders. Access to the generator can be gained from the lid on top of the chassis.

The generator utilizes a chassis transmission "hot-shift" PTO outlet to power a hydraulic pump assembly the output of the pump powers the hydraulic generator. It is actuated by a switch in the cab. The system should not be actuated above 900 rpm.

The system is designed to produce full power output regardless of engine speed.

Output	**8000 watts**
Amps @ 120 VAC	**68 amps**

Electrical System: Onboard Generator & Lighting (110 volt)

41. Generator System monitor
Monitors output of hydraulic generator

42. AC Circuit Breaker Panel
Circuit Breakers for electrical equipment supported by generator

DRIVING & CONTROLS

Electrical System: Onboard Generator & Lighting (110 volt)

When operating, the generator supplies power to the electrical panel located in the left forward compartment. The electrical panel consists of six (6) circuit breakers that control the following accessories:

1. Aerial 1 – 20 amp
2. Aerial 2 – 20 amp
3. Quartz lights – 15 amp
4. Main – 30 amp
5. Right cord reel – 20 amp
6. Left cord reel – 20 amp

The amount of appliance load that can be serviced is limited by the power rating of the generator. The circuit breakers will trip if the sum of the loads exceeds the circuit rating. To avoid overloading the circuit and causing shutdowns, compare the sum of the loads of the appliances that are likely to be used at the same time to the power rating of the generator and circuits. It may be necessary to run fewer appliances at the same time so that the sum of the loads is not greater than the rating.

Note that the circuit breakers may shut down due to overload, even though the sum of the loads is less than the rating, when a large motor is started last or cycles off and then on again. The reason for this is that the motor start up load is much larger than the running load.

The portable exhaust fan carried on the aerial draws 20 amps when operating. If it is to be supplied from the cord reels it must be powered by its own reel and other electrical functions supported by the other reel to avoid overloading the circuit and tripping the breaker.

If a circuit breaker in the main power distribution panel there is either a short circuit or too much load. If a circuit breaker trips, disconnect or turn off as many appliances as possible and reset the circuit breaker. If the circuit breaker trips right away, either the electrical distribution has a short or the circuit breaker is faulty.

If the circuit breaker does not trip, reconnect a combination of appliances that does not cause the circuit breaker to trip. An appliance that causes a circuit breaker to trip right away probably has a short.

DRIVING & CONTROLS

Winter Operation

Chains
When necessary to chain the apparatus the chains should be installed on the forward rear axle.

InterAxle Differential
Under slippery conditions it can be engaged to equalize wheel speed between both rear axles and improve traction. The interaxle differential on the ladder truck are designed to just get moving. They are to be shifted in at a complete stop and shifted out at a complete stop. Moving while shifting in or out can cause major damage.

Winter Fronts
Awinter frontmay be used to improve cab heating while idling. At least 25% of the grill opening should remain open. Winter fronts should only be used when the ambient temperature remains below 10° F. When in use the engine temperature should be monitored and remain below 200°. If engine temperatures begin to rise the cover should be opened or removed.

AERIAL OPERATION

General Information

The LTI aerial ladder is a 5 section, all rectangular tubular steel, welded construction, 1000 lb. platform load, pedestal with controls and indicators, hydraulic and cable extension, 15" handrails and 1-1/2" diameter K-braced rungs, spaced 14" on center with replaceable rung covers. The retracted length of the aerial ladder is 28' 9" and the extended length is 88' 1" .The elevated height of the aerial is 93'.

The aerial ladder and ground jacks are hydraulic operated systems. A direct drive power take off (PTO), off of the chassis transmission, powers a hydraulic pump. The hydraulic pump is a variable displacement type pump with a capacity of 45 gpm. Hydraulic oil is supplied from a steel reservoir with a capacity of 40 gallons.

The outrigger system consists of double-box beams and jacks, powered by double-acting hydraulic cylinders, integral-holding valves and manual pin locks as back-up locks.

Dual, double-acting hydraulic cylinders with integral holding valves are used to elevate the aerial ladder. The ladder elevation ranges from –10º to +78º. A liquid filled gauge mounted to the base section of the aerial, shows the angle of elevation of the ladder. Angle values are used to determine proper loading as identified by the Aerial Load Chart.

The Aerial Load Chart, mounted to the control pedestal, identifies aerial capabilities of reach, height and capacity to permit safe and efficient use of the unit. Instructions relating to proper aerial use and special instructions are also included on the chart.

An anti-friction ball bearing and ring gear attach the aerial to the chassis; thus providing 360 º continuous rotations. Rotation is achieved through a planetary gear reduction drive powered by a hydraulic motor. An automatic disc-type brake is used to stop the rotation of the aerial.

Extension and retraction of the aerial is provided by dual, extension/retraction cylinders and cable-drive combination. Reflective tape on the ladder sections and the extension indicator on the pedestal indicate the ladder's extended length.

AERIAL OPERATION

Aerial System: Hydraulic

A power take off (PTO) unit is mounted on the transmission. Transmission fluid goes to the PTO when the power take off switch is turned on. A clutch within the PTO engages the shaft that transfers power to the hydraulic pump. The primary power is supplied by the engine that drives the mechanically coupled heavy duty PTO. The PTO transmits the mechanical force developed by the engine to drive the main hydraulic pump. The switch will not be energized until the transmission is in the neutral position, and the parking brake is set. The PTO should not be engaged if engine RPMs are above 900. A pressure switch mounted on the PTO senses pressure inside the PTO and energizes the PTO engaged indicator light adjacent to the PTO switch.

CAUTION

Engine RPMs must be below 900 to engage PTO

A variable displacement pump operates on what could be defined as a supply and demand principle. Pressure will increase in the circuit to that required for moving the actuators and performing elements, integral of the pump, and will not allow pressure to build up beyond the circuit's operating requirement. As the control is returned to neutral (centered), pressure decreases. With the pump operating and all function controls in neutral, the oil merely circulates within the pump cavity under negligible pressure. When a load or restriction is introduced into the system (moving a control), pressure develops immediately in the selected circuit. Pressure will continue to increase until the control is returned to, or reversed toward neutral, or until pressure reaches the limit of the circuit's pressure control valves. Relief valves also protect components from damage due to excessive pressure build up. The variable displacement type pump will create 2750 psi and approximately 45 gpm.

The hydraulic oil reservoir is an all steel welded construction with removable clean out access, integral baffles, filter, and strainer; gated suction, drain valves and magnetic drain plugs. Capacity is 40 gallons.

The aerial main control valve opens to let hydraulic fluid to the aerial control spool valves. The aerial main control valve opens when the dead-man is depressed or the interlock override is actuated.

AERIAL OPERATION

Aerial System: Electrical System

The aerial power switch when turned on provides primary aerial systems and accessories with electrical power. Electrical power is supplied by the engine's electrical system. The aerial electrical system is a single wire; negative ground return type, utilizing the apparatus frame as ground. Power from the engine's system is transferred to the aerial through the electrical swivel coupling. The coupling consists of numerous sets of brushes and brush holder assemblies, collector rings and connectors which provide uninterrupted current flow to the aerial circuits through 360º of aerial rotation.

The emergency power (EPU) switch is spring loaded and mounted at each outrigger control box. Activating and holding the switch in the on position activates the emergency power unit during electrical or hydraulic failure. The electric switch is wired to work even with the battery switch off.

Aerial System: Communication System

The communication system provides two-way conversational capabilities between personnel at the platform and the aerial control pedestal. Components of the system include: a master control unit installed at the aerial pedestal console, a "talkback" (hands free) speaker at the platform and assorted hardware and electrical wiring. Operating controls are located on the master control unit and provide the following: LISTEN VOLUME, PUSH TO TALK and TALK VOLUME.

AERIAL OPERATION

Safety: Capacities

It is the responsibility of the operator to study and learn the load limitations of the apparatus. A load chart is installed on the aerial pedestal. Always refer to the Load Chart while operating the apparatus. Regardless of built-in design factors, never exceed the published load limitations.

DANGER

Do not rely on apparatus tipping to determine maximum load capacities.

Personnel on the ladder should maintain a distance of 10 feet apart. Load distribution (distance and weight) shall not exceed rated capacities shown on the Load Chart.

Safety: Set-up

Parking brakes must be applied before outrigger operation can be initiated. Chock blocks must be in place ahead of and behind the front steering axle tires. Restraining the front axle provides additional friction to prevent movement (walking) of the apparatus on its outrigger system. This is particularly important when operating on uneven terrain. Keep away from dangerous banks and areas of uncertain footing. Avoid areas such as streams, canals, riverbanks and sandy terrain. The auxiliary jack pads are intended for use every time the outriggers are deployed.

CAUTION

When using the auxiliary jack pads under icy or slippery conditions, "rough up" the standing surface before placing the jack pad under the outrigger to prevent a sliding condition. If load spreader shoring is used, be sure that the material is of adequate strength and size to support the loading imposed by the aerial apparatus. Ensure that the shoring is properly placed under the outrigger jack pads to prevent the apparatus from slipping. Never set the outrigger jack over a storm drain or manhole cover. Also, beams should not bridge the street and the curb.

AERIAL OPERATION

Safety: Set-up

Always extend and set the outriggers before attempting any aerial function. Capacities are based on all weight being removed from the vehicle springs, with the load forces being absorbed by the aerial torque box and chassis frame. All outriggers must be fully deployed (all beams extended to full travel with jacks extended, as necessary, to contact solid, load-bearing surface) before aerial is rotated through 360 degrees. Operating "over the side" requires that the beams on the applicable side of the apparatus be extended to full limit travel, with the respective jack extended to contact solid, load-bearing surface.

DANGER

Never operate the aerial ladder on the same side as a short-jack outrigger.

Safety: Aerial Operation

Never support the aerial. The aerial is designed with its maximum strength available in the unsupported configuration. "Reverse loading" introduces component stress, resulting in reduced load capacities. Position the ladder approximately six inches to twelve inches above the objective.

Never rapidly reverse swing directions. Feather the control lever movement in both directions.

CAUTION

Suddenly reversing swing direction could dislodge personnel, resulting in serious injury and can cause damage to the swing system and/or the ladder structure.

Keep constant eye contact with an aerial in motion. Watch for hazards in all directions. If you must look in another direction, stop the operation immediately, but smoothly.

Never use the aerial ladder to pull or push sideways or use as a ram. The aerial is not structurally designed for side loading or opposite pressure against the extension rams.

Safety: Environmental Hazards

Avoid close proximity with electrical wiring and cables. Always keep the aerial at least 10 feet away from all wiring. If the aerial should contact power lines, all personnel should remain on the apparatus until power is shut off or aerial is freed. Always assume that power lines and electrical devices are "live." Electricity in an overhead wire of almost any voltage can cause personal injury and even result in death. Even though the amount of voltage present plays an important part it is actually the amount of current (amps) passing through the body which determines the severity of injury. Voltage is the vehicle, which acts as the driving force in pushing the current through the body.

DANGER

Death or serious injury will result from contact with or adequate clearance from, energized conductors. Maintain safe clearances from power lines and electrical devices. You must allow for ladder sway, rock and sag when operating near power lines and cables. The apparatus is not insulated. Contact between the apparatus and ground, should the unit become energized, will result in death or serious injury. If the aerial should contact power lines, all members should remain fully on or fully off the apparatus until power is shut off or aerial is freed.

Use extreme caution when operating in windy conditions. Careful considerations must be given to the following: apparatus supporting surface, aerial profile (elevation, extension and position relative to wind direction) and the intensity of wind gusts. All of these elements combined can affect operating limits. Beware of wind tunnel effect when positioned between buildings with the ladder elevated. When operating an elevated ladder in high or gusty wind conditions, be aware that concentrated wind of maximum velocity will be directed at the aerial.

CAUTION

Do not operate with personnel on the ladder in wind conditions exceeding 30 mph and no operation is permitted with winds exceeding 45 mph.

Safety: Personnel on Aerial

When operating in the platform, members must be strapped in with a ladder belt to D" rings located at various points in the platform. Never use a leg lock on the aerial. Arms and legs caught between moving ladder sections will be seriously mangled or severed.

Position the aerial first, and then climb. Never allow climbing operations during any ladder functions. Do not permit members to climb the aerial until the rungs of all sections are aligned for climbing. Never permit members to climb an aerial ladder until the operator indicates that the ladder is set for climbing.

Never initiate extend or retract function with personnel on ladder. The power available to extend and retract the ladder is more than enough to mangle and severe a limb which may have slipped between the rungs.

DANGER

Never climb a ladder in motion. Arms and legs caught between moving ladder sections will seriously be mangled or severed.

DANGER

Never use a "leg lock" on the ladder. Legs caught between moving ladder sections will be seriously mangled or severed.

Avoid distractions when climbing the aerial. Direct your concentration to climbing the ladder. Be especially cautious when climbing at maximum angles of elevation and at maximum ladder extension. Stay alert in windy conditions.

Expect shift in ladder position when changing direction of water stream. When operating the water tower, expect a shift in aerial position when the direction of the water stream is changed.

Safety: Roading the Apparatus

Always completely stow outriggers before moving apparatus. Ensure that members are clear from apparatus to avoid injury when operator initiates stowing of outriggers. The distance from the ground to the apparatus will be reduced rapidly. Release jack pressure one side at a time.

Never move apparatus unless ladder is retracted and bedded. Do not move the apparatus with the ladder in other than the stowed position, as whipping loads can impose undue stresses, resulting in structural damage to the ladder or chassis, or both.

AERIAL OPERATION

Capacities and Limitations: Aerial Capacities

DANGER

Aerial operating capacities are governed by the Aerial Load Chart; installed at the aerial pedestal control. Any deviation from these rated capacities could cause death or serious injury and/or structural failure of the ladder.

As the operator of an elevating platform, the well-being of personnel rests with your performance skills and ability to make proper judgment on the spot as conditions demand. These factors make it all the more imperative that you are not only aware of your limitations, but also aware of the physical and structural limitations of the apparatus.

The following limitations are taken from the Aerial Load Chart:

1. Load capacities are established at maximum permissible extension and operation throughout 360 degrees, with outriggers fully extended and set, turntable level (within 6%/3.5º), waterway drained and with the aerial ladder unsupported.

2. Full, rated capacities are allowable on lateral grades up to, but not including, 6%/3.5º. On grades between 6% and 14%/3.5º and 8.0º, capacities are reduced by 50% (one-half).

3. Full, rated capacities are allowable on longitudinal grades up to 5º. On grades between 5º and 10 º, capacities are reduced by 50% (one-half).

4. Wind, ice and other factors affecting stability, as well as strength of supporting surfaces and skill of the operator, must be considered when utilizing the aerial at its fullest potential.

5. Certain capacities are limited by structural strength; therefore, stability factors (as evidenced by apparatus tipping) must not be relied upon as the capacity limitation.

6. Reduction in load capacities must be made to compensate for ice and/or snow accumulation.

7. Capacities are established for the unit based on standard unit configuration.

Capacities and Limitations: Reading the Load Chart

CAUTION

Capacities are established with no additional equipment at the tip (other than "as delivered" items). The weight of tip equipment (nozzles, pike poles, hoses, axes, ladders, etc.) must be deducted from tip load capacities.

The Load Chart presents a graphic display of the elevating platform apparatus' load lifting and weight distribution limitations. The chart is representative of ladder and platform operational capacities, dry or with water flowing. Basic operating precautions and emergency shutdown instructions are also included on the chart as applicable.

When used with the aerial elevation indicator, the Aerial Load Chart enables the operator to determine the rated load capacity of the aerial and platform under specific load conditions.

Capacities and Limitations: Lifting and Rescue use

Platform mounted lift points and lifting arms list the rated capacities of these attachment points. The Aerial is designed and rated for lifting free-standing loads within these capacities. Free-standing means that the load cannot be attached or otherwise stuck in position. For example: the rescue of a person stuck partially buried in a trench would not be an appropriate use. Lifting the individual in a litter after he is removed from the trench would be appropriate.

Sharing the load between the two lifting points or the two lifting arms reduces twist in the ladder and adds a margin of safety with redundant attachments.

CAUTION

In all cases the total load of the platform must not exceed the rated capacity of the aerial.

Capacities and Limitations: Water Tower Capacities

DANGER

Operating capacities are governed by the Aerial Load Chart; installed at the aerial pedestal control. Any deviation from these rated capacities could cause death or serious injury and/or structural failure of the ladder.

Keep in mind that capacities for water tower operation are in addition to (combined with) those for elevating platform operation. Therefore, one must be thoroughly familiar with the ladder's load limitations before attempting any waterway operation.

CAUTION

When operating the water tower, refer to the Aerial Load Chart for rated capacities and related information.

Some of the following items also appear on the Aerial Load Chart:

1. Water Tower/load capacities are established with outriggers fully extended and set, turntable level (within 6%/3.5º) and the aerial unsupported.

2. Know your capacities. Study the Aerial Load Chart. Verify all load limitations before initiating any operation.

3. All aerial functions may be performed simultaneously with water tower operation. Movement of the nozzle and aerial should be slow and deliberate.

4. Snow and ice deposits reduce load capacities due to excess weight

5. A qualified operator must remain at the turntable control console during all aerial operations.

Controls and Indicators: Outriggers

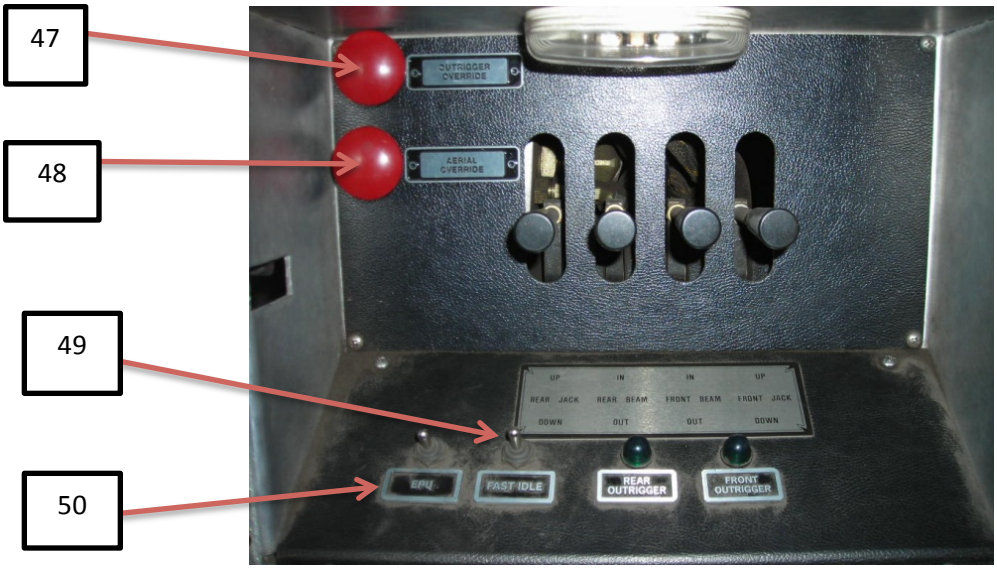
43. Bumper Jack Override
Push to manually open the interlock to operate the bumper jacks in the event of an Aerial electrical failure

44. EPU Switch
Activates the emergency power unit (electric hydraulic pump) when a hydraulic failure within the main system occurs.

45. Fast Idle Switch
When actuated a preset engine speed of 1500-1600 is obtained.

46. Outrigger Circuit Pressure Gauge
A 0-5000 psi pressure gauge is piped directly into the outrigger valve bank. The gauge shows selected circuit operating pressure when the outrigger system is activated.

Controls and Indicators: Outriggers



47. Outrigger Interlock Override Control
Emergency/manual controls, which allow operation of system functions if the Aerial electrical system is not functional.

48. Aerial Interlock Override Control
Emergency/manual control that allows operation of aerial (elevation, rotation, extension) functions if the Aerial electrical system is not functional.

49. EPU Switch
Activates the emergency power unit (electric hydraulic pump) when a hydraulic failure within the main system occurs.

50. Fast Idle Switch
When actuated a preset engine speed of 1500-1600 is obtained.

Controls and Indicators: Outriggers

51. Inclinometer

Used to evaluate front to rear slope. Each line indicates a 5 degree increment. The apparatus can be used to full operating capacity when stabilized up to one line. Conditions between the first and second line indicates 50 percent operating capacity. Beyond two lines aerial operation is prohibited

52. Apparatus Level Indicator

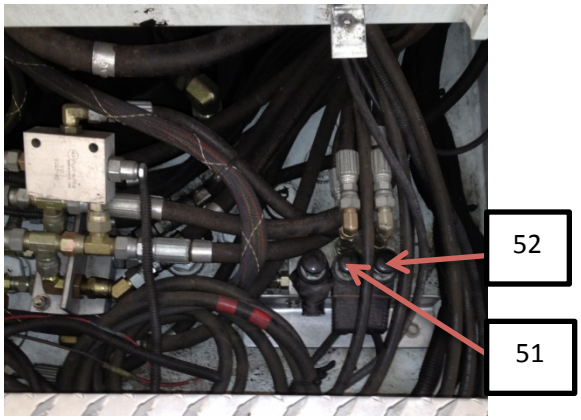
The apparatus level indicator is located on both sides of the apparatus and represents lateral grade. Used in conjunction with the aerial load chart to determine aerial operating limits. Green indicates full operating capacity, yellow indicates 50 percent operating capacity (3.5 to 8.0 degrees) and red indicates aerial operation prohibited.

53. Left Rotation Interlock Override

Manual control that allows rotation of aerial. Used in conjunction with the Aerial Interlock Override Control if the Aerial electrical system is not functional.

54. Right Rotation Interlock Override

Manual control that allows rotation of aerial. Used in conjunction with the Aerial Interlock Override Control if the Aerial electrical system is not functional.



DANGER

When using the Rotation Interlock Override the aerial must be used in accordance with limits defined by the outrigger set-

AERIAL OPERATION

Controls and Indicators: Aerial Control Pedestal

55. Aerial Hourmeter
Indicates the amount of hours that the aerial has been operating. The aerial lubrication is based on this hourmeter

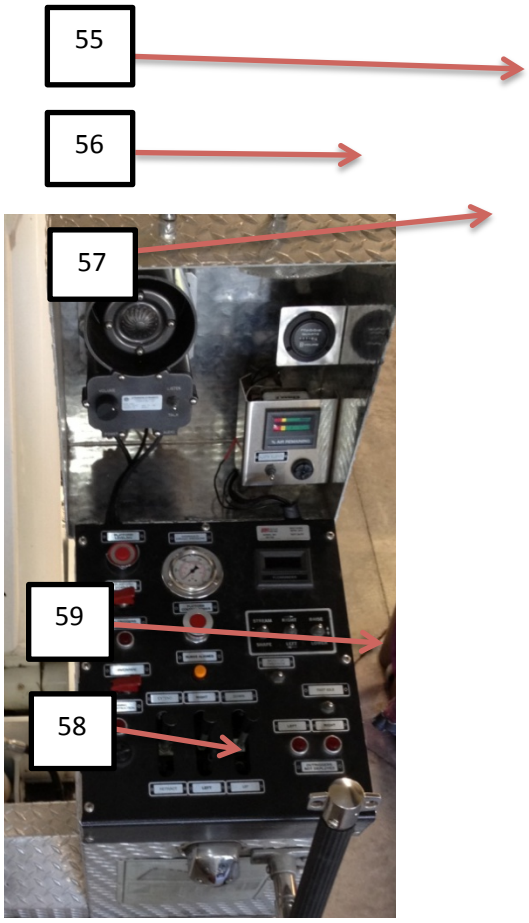
56. Intercom System
Communication system consisting of a master station at the pedestal; with volume, squelch and push to talk controls. A hands-free station on the platform has volume control.

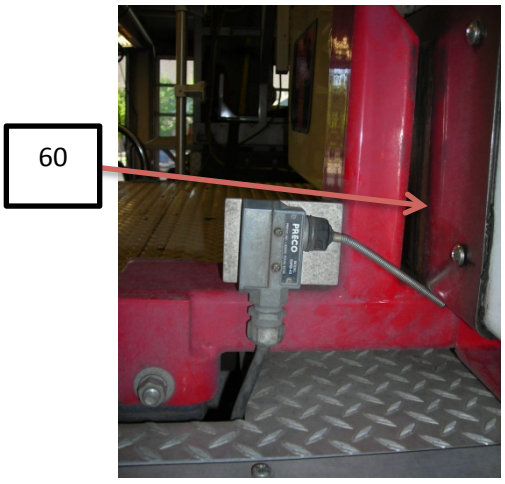
57. Air System Monitor
Indicates remaining breathing air system capacity. Provides a visual alarm at approx. 20% capacity and an audible alarm at 10% capacity

58. Aerial Power Foot Switch
The operator must depress and hold the switch in the "ON" position to operate the aerial from the pedestal console.

59. Aerial Load Chart
The Load Chart presents a graphic display of the aerial ladder apparatus' load lifting and weight distribution limitations.

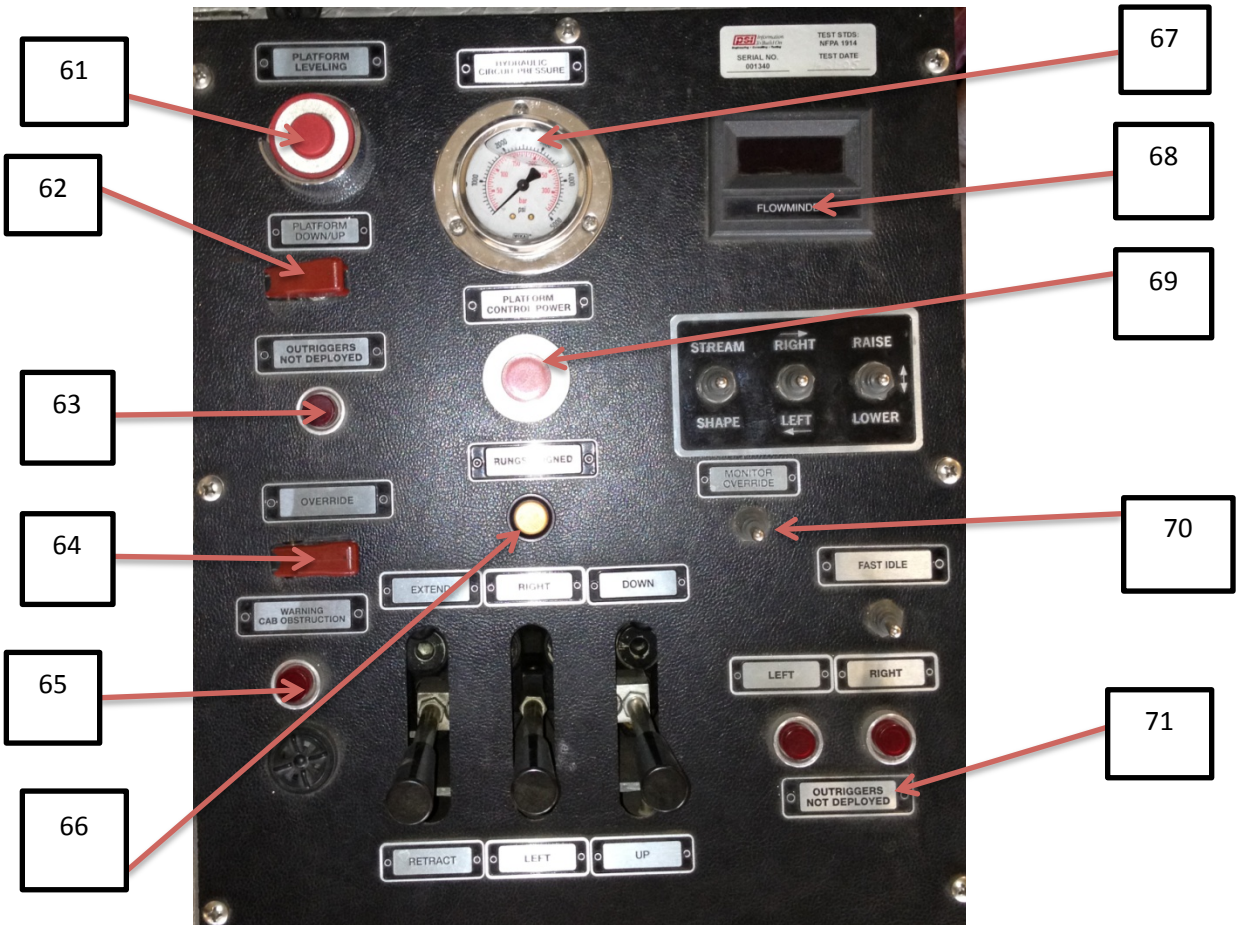
60. Bedded Ladder Sensor
If the aerial apparatus is shut down during training, upon start up the front bumper jack green light will no longer be illuminated and the outrigger functions are disabled. By pressing down on this switch while briefly actuating the jacks the green light is restored and normal function can resume.





AERIAL OPERATION

Controls and Indicators: Outriggers



61. Platform Leveling
Turns on the automatic platform leveling that will level the platform to the horizon. Used when operating on slopes.

62. Platform Manual Level
Used to align the platform with the ladder rails for bedding after auto level use or when the platform is resting out of line with the ladder.

63. Outriggers Not Deployed Light
A red light that illuminates when an outrigger has not been fully deployed and a "short-jack" condition exists.

64. Interlock Override
Holding the switch in the on position allows the aerial to be operated without the outriggers being fully deployed.

65. Cab Obstruction Warning
Audible and visual warning that activates when the ladder is in a position to contact the cab while rotating at low angles or lowering when operating over the cab.

66. Rung Alignment Indicator
Amber light that illuminates when ladder rungs are properly aligned for climbing.

Controls and Indicators: Outriggers

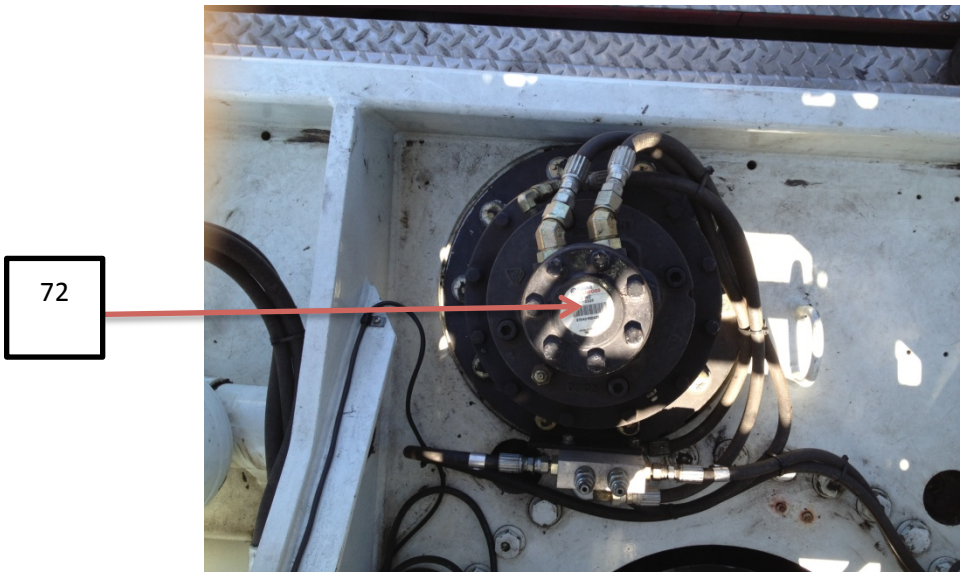
67. Hydraulic System Pressure Gauge
The gauge registers working pressure in the hydraulic system from zero to 5000 psi. With all controls in neutral, the gauge registers static pressure in the system. When a control lever is actuated, the gauge registers pressure developed to perform that specific function. Pressure to hoist should not exceed 2800 psi. Pressure to rotate should not exceed 1500 psi. Pressure to extend/retract should not exceed 2000 psi.

68. Flowmeter
Displays flow in that is being discharged through the aerial water-way

69. Platform Control Power
Supplies power to the aerial controls located in the platform

70. Monitor Override
Overrides monitor controls in the platform

71. Outriggers Not Deployed – Right and Left
Indicates the side of the apparatus that is "Short-set"



72. Swing Drive System
Located just below the aerial on the turntable is the swing drive. It is made up of a gear reduction drive powered by a hydraulic motor. An automatic disc-type brake provides positive braking of the turntable.

AERIAL OPERATION

Outrigger System

The LTI aerial utilizes the hydraulic system for normal outrigger operation. An outrigger control box is located one each side of the apparatus. The construction for the outriggers are double box horizontal beams and vertical jacks, powered by double acting hydraulic cylinders with integral holding valves and manual pin locks. Total outrigger spread when fully deployed is 18 feet.

The fast idle switch receives electrical power through the aerial switch in the cab. A fast idle switch is installed at each outrigger control box and on the pedestal. Actuating the switch at the outrigger control box increases the engine to the pre-set fast idle. The fast idle switch at the outrigger control box must be turned off or high idle is maintained throughout aerial operations. These controls are used to maintain higher rpm values for more efficient operation of the hydraulic pump, and auxiliary lights. The preset fast idle is 1650 rpm.

Individual outriggers are controller at the outrigger control on each side of the apparatus. The handles manually control the hydraulic valves. Multiple functions can be done simultaneously. The bumper jacks have a single control on the driver's side and adjust individually when ground contact is achieved.

Fully deployed indicator lights work in conjunction with the interlock override system. Each outrigger has limit and proximity type switches that must be activated before the aerial can be operated. Switches activate when cylinders are in their full travel position. Although the parameters needed to activate the light are met, the operator must set the apparatus up keeping in mind other set-up requirements (grade, weight transfer, etc.).

Chock blocks are used to provide additional friction to prevent movement (walking) of the apparatus on its outriggers. The chock block should be positioned in front and behind both front tires. If on a hill, place on the downhill side of the front axle and rear drive axle tires.

Auxiliary jack pads are portable oversized metal plates that give greater surface bearing area for the jacks. The auxiliary jack pad should be centered under the jack and handle. They are to be placed under the jack pad each time the outriggers are deployed.

CAUTION

When operating on slopes or slippery terrain, keep one set of braking tires (wheels with air-actuated, spring brake applied brakes) firmly on the ground.

Outrigger Operation: Platform Leveling

The aerial platform is kept in a safe level operating position by one of two systems, the dual master/slave cylinders or the automatic platform leveling function. The platform can also be adjusted for bedding or correcting platform droop once bedded with a manual leveling switch.

The dual master/slave function operates automatically whenever the ladder is raised to keep the platform level relative to the apparatus turntable. The masters are located on the outboard sides of the base section of the ladder. The "slaves" are connected from the fly section of the ladder to the base of the platform. Whenever the ladder is raised or lowered hydraulic oil is displaced by the masters and directed through closed circuit hosing to the slave cylinders.

The aerial is also equipped with "Auto" leveling. Platform auto level is enabled when the Platform level mushroom switches on both the pedestal and platform are in the on (up) position. When the system is operating the platform is kept level relative to the horizon through the full range of ladder elevation.

Auto Leveling Use

When arriving at a fire scene that requires the aerial to operate on steep terrain:

1. Raise the aerial out of the cradle approx. five feet.
2. Activate auto leveling switch.
3. At the completion of aerial operations lower the ladder to within approx. five feet of the cradle.
4. Turn Auto-Leveling off
5. Utilize Manual Leveling up/down to raise platform handrails to a position in-line with ladder section handrails.
6. Ladder can now be lowered to bedded position
7. Final leveling of the platform in relation to the ladder rails can now be done with the manual leveling switch.

CAUTION

Before leveling platform, clear all personnel and loose equipment from platform.

Outrigger Operation: Interlock

The outrigger system is equipped with an interlock feature which interfaces with the aerial controls to prevent the use of the aerial if the outriggers have not been correctly or only partially set up. This system is designed to protect the user from the possibility of tipping the truck over because of improperly positioned outriggers.

A properly set outrigger is indicated by a green light at its corresponding control station. Illumination of the light confirms that the outrigger has been fully extended horizontally and vertically, and that the apparatus' weight has shifted to the outrigger. If any of these conditions are not met, the light will not activate.

With all green lights illuminated, electrical power is available for use of the aerial. After the ladder has been taken out of the cradle, any movement of the outriggers will not affect aerial operations.

Outrigger Operation: Interlock Override/Emergency Operation

The outrigger interlock override system is designed to allow use of the aerial in situations where lives are at risk and no other options are available. The system allows the outrigger, on the side opposite where the aerial is to be used, to be "short-jacked", or not fully extended in the horizontal direction. By activating the interlock override switch, full horizontal extension of one outrigger is not necessary and aerial functions can be accessed.

With an outrigger in a "short-jacked" condition, the outrigger not deployed light at the aerial pedestal will be illuminated. In order to actuate aerial functions, it will be necessary to hold the interlock override switch in the actuated position throughout the use of the control lever. This is designed to make each movement of the aerial deliberate and thought out. The interlock override switch can be released when aerial movement is complete.

CAUTION

Use of the aerial while in an override situation MUST be limited to the area parallel with the truck forward, to parallel with the truck rearward, and on the side opposite of the "not fully deployed" outrigger.

DANGER

Utilization of the outrigger interlock override must be used as a last resort, when all other options have been exhausted. Operators must be trained and aware of the potential danger if procedures are not followed properly while the system is in the override condition.

Aerial System Emergency Operation: Interlock Override

Aerial Interlock Override/Manual Operation
The control levers for aerial operation act directly on the aerial main control valve. In the event of an electrical failure manual operation of the interlock blocking valves will be necessary for all aerial functions to facilitate bedding of the aerial and stowing of the outriggers.

- **Rotation**
  - Pull Aerial Override
  - Push and hold Rotation override control
  - Actuate aerial rotation function
- **Retract/Lower**
  - Pull Aerial override
  - Actuate aerial control levers to bed ladder
- **Outriggers**
  - Bumper jacks
    - Push bumper jack override
    - Actuate bumper jack control
  - Main Beams
    - Outrigger override
    - Actuate jack functions

In the event that a hydraulic and electrical failure has occurred, it will be necessary to utilize the EPU to supply hydraulic pressure in addition to the Interlock overrides.

NOTE: An additional operator will be necessary to activate the EPU at the outrigger control station.

DANGER

Movement of the aerial to the same side as a "short-set" outrigger will cause the apparatus to tip over. Do not under any circumstances move the aerial in to these positions.

Aerial System Emergency Operation: Emergency Power Unit (EPU)

The EPU is a 12-volt dc electric motor and a 1.5 gpm at 2000-psi hydraulic pump. When the EPU is activated it will move the aerial or outriggers in the event of a main hydraulic system failure. The system is capable of all functions in a no-load condition. Because of the short continuous use time limit, functions should be limited to those associated with bedding the aerial and stowing of the outriggers to allow truck movement in a situation of impending danger.

The EPU is rated for a maximum of three minutes continuous operation. The EPU can be used over a long period of time at a 7% duty cycle, which is approximately 21 seconds in every 5= minutes or 3 minutes(approx.) continuous use. Actual operating time is dependent upon batteries; state of charge and hydraulic pressure in control being moved. An EPU switch is at each outrigger control box. The EPU operation is independent of the aerial electrical system.

Actuate the EPU switch to the on position and hold for emergency power then release. This electric switch is wired to work even with the battery switch off.

The EPU should be operated every 10 hours of aerial use to circulate oil in the system and ensure proper operation.

Aerial System Emergency Operation: Emergency Power Unit (EPU)

1. Disengage Aerial PTO
2. Activate emergency power unit switch.
3. Operate appropriate controls to bed the aerial ladder and stow the outriggers

Aerial Breathing Air System

The platform is equipped with a supplied air breathing system that is supported by two 444ft^2 cylinders located on each side of the base section. The cylinders are charged to 4500 psi. The system is controlled by a regulator at the driver side bottle that controls the system up to the platform and is set at 120 psi. In the platform it is regulated down to 80 psi to be compatible with our MSA packs located on the truck and rescue. Adjustment of the regulators should not be necessary and may cause relief valves further down the system to activate. There are two supplied air ports in the platform and two supplied air hoses.

The system is equipped with a low air alarm that will activate a visual alarm at 20% and an audible alarm at 10% remaining capacity.

System Operation

1. Turn on both bottles before lifting aerial out of cradle ensure system is pressurized and operational.
2. Personnel in the platform can plug in to supplied air as conditions dictate.
3. Engineer should monitor breathing air status during operations.

PUMP OPERATION

Fire Pump Operation

The truck is equipped with a Hale 8FG single stage 2000 GPM pump. The pump is located mid-ship with a typical left side pump panel arrangement. It is primed via oil-less rotary vane positive displacement pump powered by a 12 volt motor.

The pump is engaged by means of an electric over air switch in the apparatus cab. Next to the switch are two green lights that indicate pump status. The "Pump engaged" light will illuminate when the pump shift has been completed, and the "ok to pump" will illuminate once the chassis transmission has locked in to pump gear.

Once the apparatus has been placed in pump gear the high idle function for aerial deployment will be disabled until the apparatus is shut down.

Intakes
Six-inch diameter master intake valves are located on both the right and left side pump enclosures. Each master butterfly valve is controlled at the pump panel by a 12-volt electric motor switch to regulate the speed of the valve opening and closing. Manual override control knobs for both master intake valves are located on the pump enclosures adjacent to master intakes. An additional 2 ½" suction inlet at the left side pump panel.

The Aerial Discharge Inlet at the right side pump panel is a 6" direct intake for the ladder pipe.

The tank-to-pump piping is 3" diameter with a minimum flow of 500 GPM.

Discharges
There are two 2 ½" discharges on the left side pump enclosure and one on the right side pump enclosure, There is also a 4" discharge at the right side pump enclosure that is electrically actuated at the pump panel.

There is one 2 ½" pre-connect discharges that supports the 200' 2 ½" and a 1 ½" front bumper discharge all controlled by levers at the pump panel. The two 1 ½' Pre-connects are not connected and are beneath the stretch bed.

The aerial discharge is a 5" electrically controlled butterfly valve that services the aerial waterway. In the platform the waterway supplies the monitor, 2 ½" discharge and 100 gpm shower nozzle. There is a hand operated butterfly valve that controls flow to the monitor. This valve should remain open unless the platform is supplying pre-connects and opened before the ladder is extended or retracted. The is a 1 ½" drain valve for the waterway located beneath the aerial inlet on the right side of the apparatus that is to be opened after use of the waterway.

The tank fill line is 1 ½" flexible hose

All discharges are equipped with ¼ turn drain valves

PUMP OPERATION

Fire Pump Operation

Relief Systems
Each of the 6" master intake valves are equipped with relief valves that dump to the atmosphere at approximately 125psi.

The Aerial water way is equipped with two relief valves, a 2 ½" drain in the lower section of the aerial waterway that is set at 250 psi, and a 1 ½" relief valve located beneath the platform set at 165 psi. Both valves relieve to the atmosphere.

Coolers
The pump is equipped with two coolers. The Auxiliary Cooler uses water from the pump to cool the apparatus engine. The Pump Cooler uses water from the pump and discharges it back to the tank keeping the pump cool when water is not being discharged. Both are operated by a ¼ turn valve on the lower pump panel.

Fire Pump Operation

Detroit Diesel (by Class 1) Electronic Fire Commander (EFC)

The EFC is located in the center of the pump panel and provides the engineer with information about engine conditions, and serves as a pressure governor, or as a remote throttle for the apparatus.

The "Engine Data" panel on the left side of the EFC continually displays RPM, oil pressure, coolant temperature and voltage. Any operating condition that would result in a "Check Engine" or "Stop Engine" situation will be displayed on the "Information Center" LED screen at the bottom of the EFC. In addition, the DDEC system activates the apparatus horn to attract the attention of the Engineer and warn of potential engine damage related to oil pressure, engine temp. The EFC will not automatically shut down the apparatus engine in these cases. It is the responsibility of the Engineer to notify the appropriate officer of the need to shut down engine operations prior to damage.

The EFC may be used as a remote throttle with the transmission in neutral and the brake set or in the "RPM" mode. Engine RPM can be increased or decreased by 25 RPM increments by depressing the "INC" or "DEC" buttons on the Governor Control panel.

The EFC may be used as a pressure governor in the "Pressure" mode with the brake set, pump engaged and transmission in pump gear. Pressure is adjusted in 4 PSI increments when in the pressure mode by depressing the "INC" or "DEC" buttons. To change modes of operation, depress the "Mode" button at any time. Depress the "Preset" button to automatically adjust to predetermined RPM or pressure settings these are not currently programmed to any department standard.

To return the engine to idle speed (emergency shutdown only) depress the "Idle" button.
If at any time the pump discharge pressure falls below 30 psi **and** the engine RPMs increase to above 2000 for more than five seconds, the engine will return to normal curb idle speed.

Emergency pump shift procedure

In the event that the apparatus will not shift in to pump gear, the pump engagement procedure should be repeated. If that is unsuccessful it may be necessary to shut down the apparatus and the batteries and re-start. In the event that this also fails the pump may be manually engaged.

Manual Engagement

1. Set the parking brake.
2. Move the in-cab pump transmission lever to the center (neutral) position.
3. Shut down the engine. **Caution: Never attempt a manual pump shift while the engine is operating.**
4. Exit the cab, set the wheel chocks and proceed to the Engineer's pump panel.
5. Pull out the manual pump shift handle on the lower pump panel
6. Return to the cab and restart the engine.
7. Move the in-cab pump transmission lever downward to the "Pump" position.
8. Check to see if the pump shift warning lights on the dash have illuminated indicating the shift is complete.
9. Place the truck transmission in "Drive" and note that the display reads 4 – 4 indicating the transmission is in fourth gear for pump operations.
10. Exit the cab and proceed to the pump panel.
11. Check to see that the pump panel shift indicator light is illuminated (green).
12. Establish water supply and operate as normal barring other problems.

MAINTENANCE

Cab Tilt Procedure (Power Assist) American *LaFrance Cab full tilt height: 16' 2"*

To Raise Cab (Power Assist)

1. Ensure engine is off and apparatus is on a flat, level surface.
2. Set parking brakes and chock wheels.
3. Remove the remote cab tilt control from the storage location and insert the plug into the receptacle on the left front cab access stepwell.
4. Hold the switch on the cab remote tilt control in the RAISE position to lift the cab. (Releasing pressure on the switch will stop the cab from lifting).
5. Continue holding the switch in the RAISE position until the cab has reached the full tilt position (approximately 50 degrees). The tilt strut lock will swing into place when the cab reaches full tilt position. Raise the cab only enough to allow the tilt strut lock to engage and observe that the lock is securely in place. **DO NOT LOWER THE CAB ONTO THE SAFETY LOCK.**

To Lower Cab (Power Assist)

1. Turn the battery switch and the ignition switch to the ON position.
2. If necessary, raise the cab just enough to clear the tilt strut lock in order to release it.
3. While lowering the cab observe the position of the tilt strut lock make sure it is clear.
4. Continue holding the switch in the LOWER position until the cab has settled on its supports and continue to hold for another five (5) seconds to insure that the cab locks are fully engaged.

DANGER

Remove all loose items from the cab compartment before tilting as contents may shift or fall through the front windshield causing personal injury or property damage.

DANGER

When tilting the cab, always raise cab to the full tilt position and engage safety lock. Do not raise cab to any other position other than full tilt position. Do not work under the raised cab without the safety lock securely engaged.

Manual Cab raising/lowering

The manual cab jack and manual hydraulic release is located behind the forward anchor point on the driver side of the apparatus.

MAINTENANCE

Fluid Level Check Locations

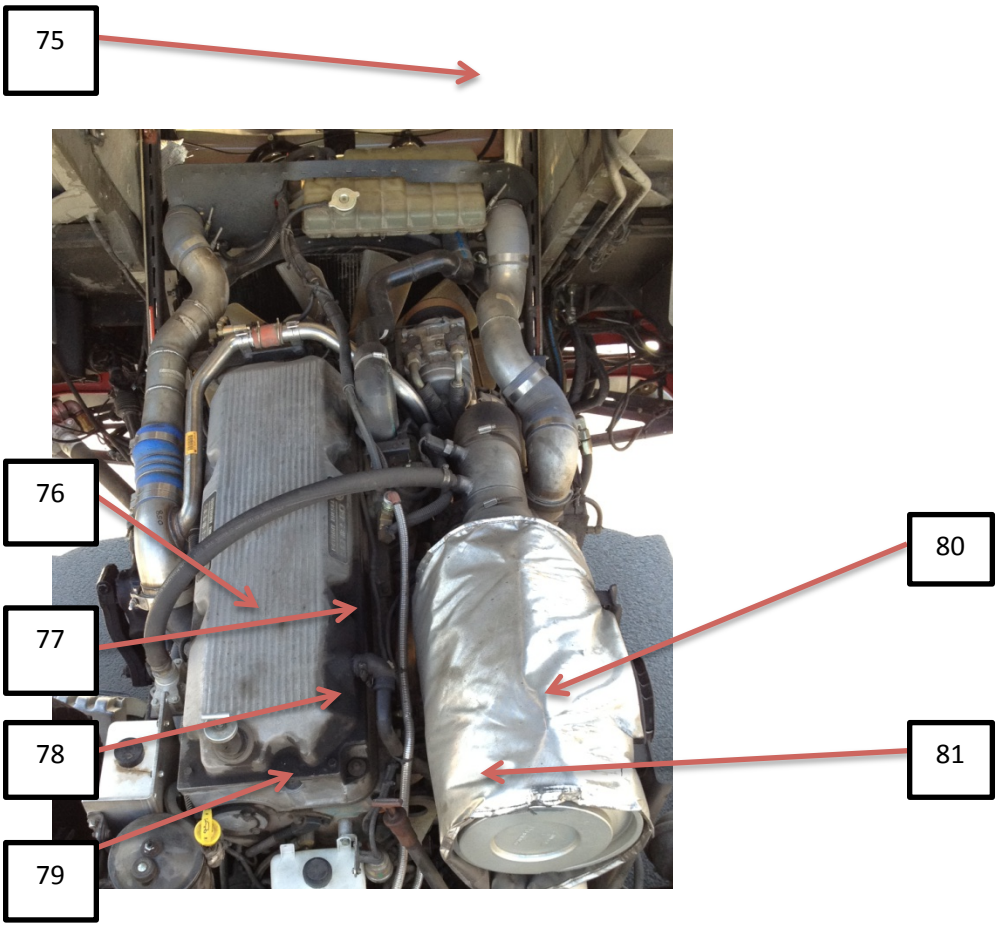
73

74

73. Hydraulic Oil Reservoir Sight Tube
Used to check the oil level in the hydraulic oil reservoir. Should be roughly at the halfway mark of the sight bubble

74. Hydraulic Oil Reservoir
Location where hydraulic oil can be added. Contact City shops

Fluid Level Check Locations



75. Radiator Expansion Tank
Location where engine coolant is checked and added.

76. Radiator Recovery Tank
Location where excess coolant from the engine radiator accumulates.

77. Engine Oil Fill
Location where motor oil is added to the engine.

78. Engine Oil Dipstick
Used to check the oil level in the engine.

79. Power Steering Fluid Reservoir
Location where power steering fluid is checked and added.

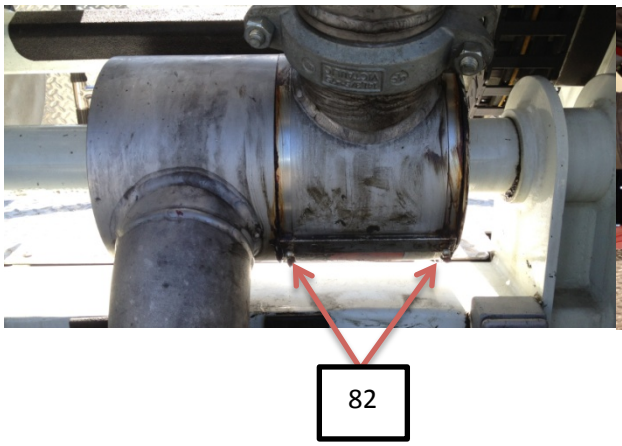
80. Road Transmission Dipstick
Used to check the oil level in the road transmission.

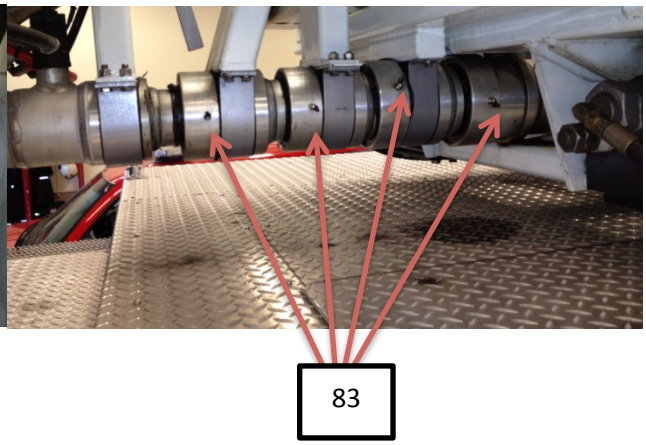
81. Windshield Washer Fluid Reservoir
Location where windshield wiper fluid is checked and added.

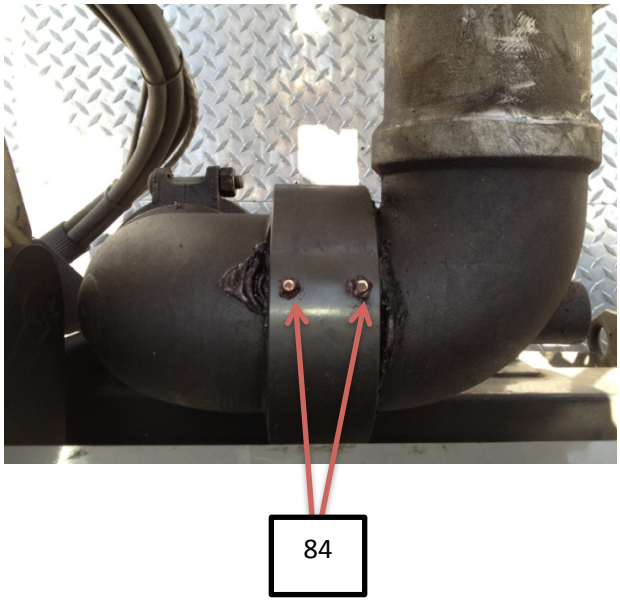
MAINTENANCE

Special Lube Instructions

Waterway Lubrication:
Lubricate the entire waterway after every time it is charged and pressurized. Ten (10) grease Zerks are located…







82. **Lower pivot point on the turntable**, two (2) on the underside of the pivot canister (the aerial must be raised to reach these).
83. **Waterway section ends**, total of four (4).
84. **Upper pivot point at the platform**, two (2) on top of the pivot.
85. **Master stream device pivot points**, total of two (2).

Use the grease gun to insert grease until it starts to discharge from the seams or relief valves.

Thoroughly clean around all zerks and any hoses or surfaces contaminated with grease.

MAINTENANCE

Special Lube Instructions

Lubricate the ladder and platform after every ten hours of use as indicated by the hour meter on the aerial pedestal.

Aerial Ladder Beam Lubrication:

Set up the aerial device according to department standard. Fully extend the aerial ladder to one side of the truck and lower the platform to within six inches of the ground. With the ladder horizontal and fully extended, inspect all pulleys for worn bushings. Also inspect the surfaces of the ladder beams for excessive wear, dents and cracks.

Aerial beams and beam channels clean all residual grease from the sliding surfaces that are in contact with each other. Use blue rags and spatulas. Do not use a wire brush or degreaser. Reapply a light coat of grease. Squirt a bead and smear it to spread.

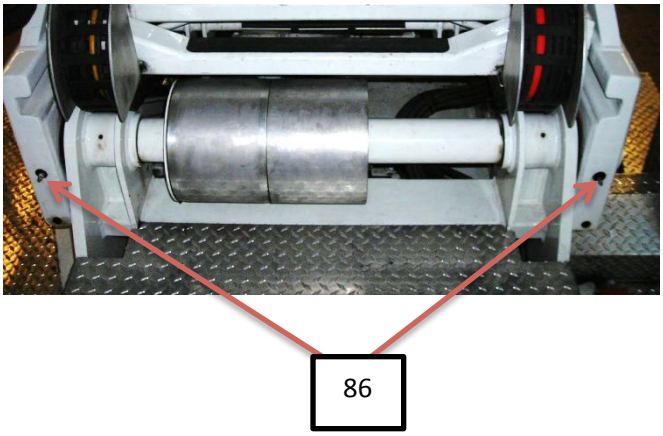
Use disposable towels or rags to wipe down the rungs, beams, handrails etc. (everywhere you didn't apply grease). You may use degreaser sprayed onto the towel or rag for this.

Aerial and Platform Rams and Aerial Gear Lubrication:

Lubricate all the ladder and platform hydraulic ram pivots and the aerial gear each time the ladder is lubricated.

Apply grease to each pivot and ram zerk until old grease discharges from their pivot points.

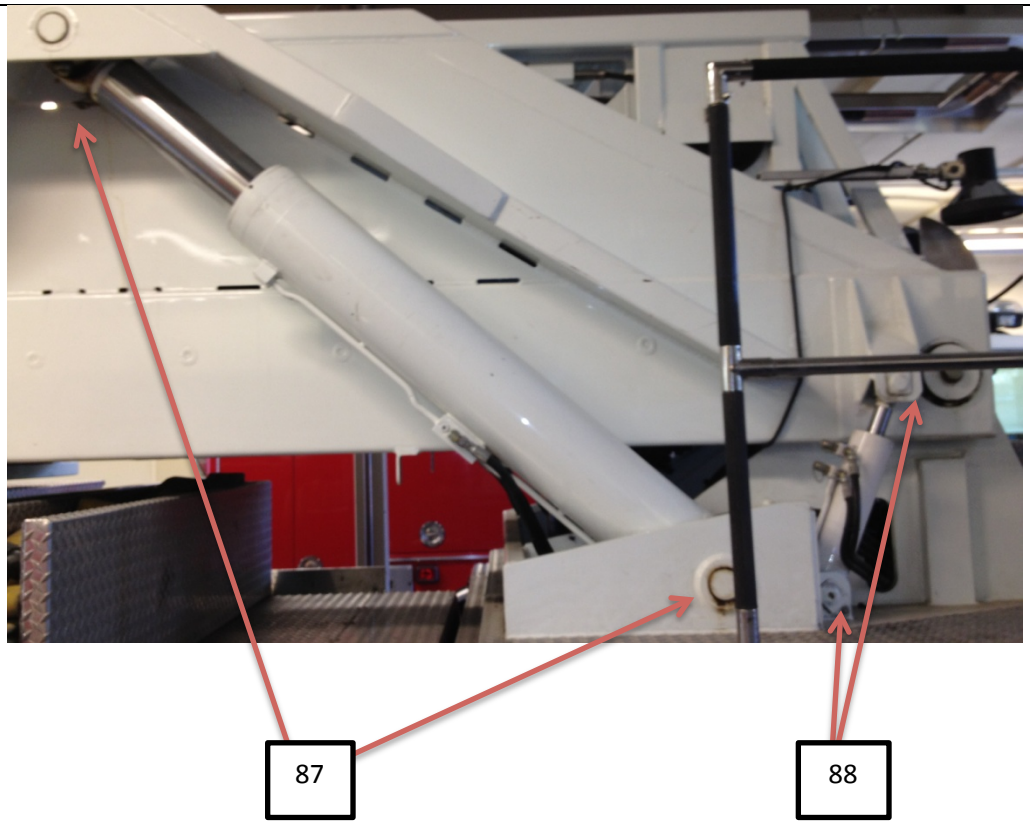
Eighteen (18) grease zerks are located:



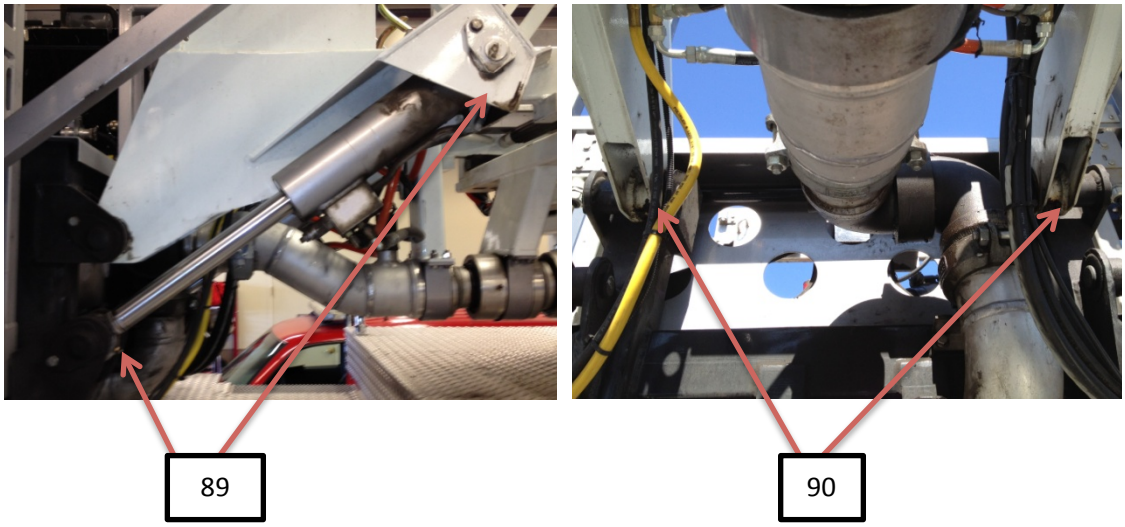
86. **Heel pin** of the base section beam, 1 ea. right and left.

MAINTENANCE

Special Lube Instructions



87. **Main hoisting rams**, 2 ea. Right and left.
88. **Hydraulic ram forward of the main ram**, 2 ea. Right and left.



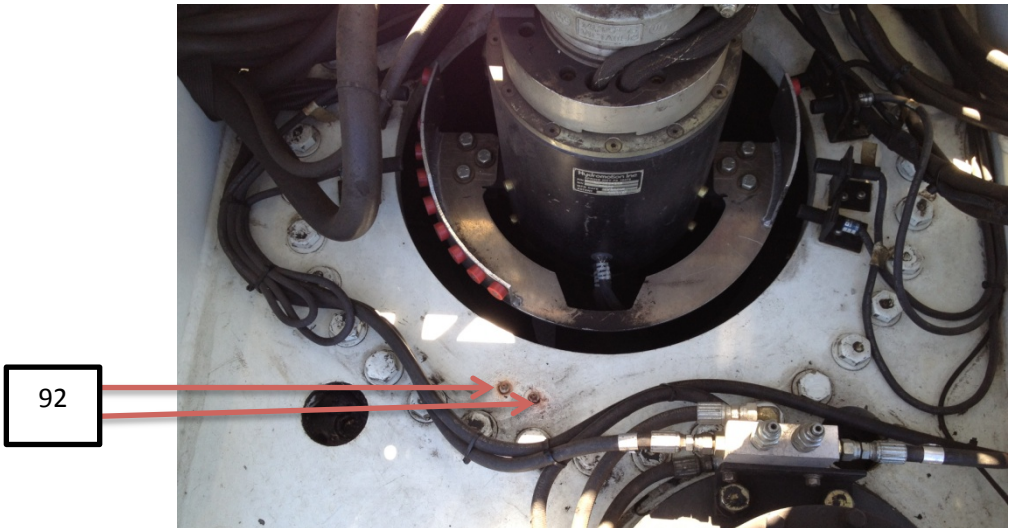
89. **Platform hydraulic rams**, 2 ea. Right and left.
90. **Platform pivots** at the top of the fly section beam, 1 ea. Right and left.

MAINTENANCE

Special Lube Instructions

91. **Extension/retraction cylinder channel**. Clean all residual grease from the both sides and re-apply lube along the channel.

When complete, hoist ladder to 60 degrees and then retract. This will prevent the newly applied grease from being scraped off when the ladder is retracted.



92. **Turntable gear** under the aerial ladder, 2 side-by-side. Apply grease to the main aerial gear with the aerial elevated while rotating slowly one revolution for each zerk.

Use disposable towels or rags to clean around all zerk fittings, the exterior of all pivots where grease discharged and surrounding areas. You may use degreaser sprayed on a towel for this. Use degreaser, soap and water to clean grease that has stained the diamond plate deck of the truck. Record lubrication in apparatus lubrication log.

MAINTENANCE

FLUID CAPACITIES AND TYPE

Engine Oil	**15W-40 Motor oil**	**Quantity**
Road Transmission	**ATF(Dextron II)**	**Quantity**
Engine Coolant	**Type**	**Quantity**
Power Steering	**Type**	**Quantity**
Aerial Hydraulic Reservoir	**Type**	**Quantity**

ENGINE SPECIFICATIONS

Engine Make: Detroit Diesel	Displacement: 12.7 liter (778 Cu.in.)
Engine Model: Series 60	Bore & Stroke: 5.12 x 6.30
Number of Cylinders: 6 cylinder inline	Air System: Turbocharged
Compression Ratio: 16:1	Torque: 1550 ft.-lb. @1200 rpm
Governed Speed: 2100 rpm	Fuel Control System: DDEC IV

TIRES

Position	Size	Pressure
Front	425/65 R 22.5	120 psi cold
Rear	12 R 22.5	110 psi cold