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1995 SIMON-LTI AERIAL APPARATUS

INTRODUCTION

The information contained in this operation manual will assist firefighting personnel in the operation, maintenance and troubleshooting of the 1995 Simon-LTI Aerial Apparatus. Additional information required for the apparatus can be secured by contacting the Department’s Supply and Maintenance Division at (213) 485-6111. This manual is divided into five sections: 1) Introduction, 2) Driving & Controls, 3) Aerial Operation, 4) Maintenance & 5) Records.

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 Information

The 1995 Simon-LTI is equipped with a computer-controlled engine and transmission. Each of these component systems are controlled by their own ECU’s (Electronic Control Units). Each incorporates its own individual program, diagnostic capabilities and safety features.

**NOTE**

As this is an emergency fire fighting apparatus, it is important to note that the normal emergency shut down features of the computer controlled vehicle components have been eliminated. The component system’s warning and diagnostic capabilities have, however, been left intact.

Procedures for reading and understanding the diagnostic codes are explained in the maintenance section of this manual. The information provided by the diagnostic codes will assist personnel in the field to diagnose problems and communicate them to maintenance personnel. Complete diagnosis and repair of computer controlled apparatus systems can only be performed at the Supply and Maintenance Division.

**CAUTION**

All component malfunction warnings and diagnostic codes should be reported to the Supply and Maintenance Division at (213) 485-6111 as soon as possible.
# INTRODUCTION

General Specifications for Shop # 60477 - 60486

## APPARATUS DIMENSIONS AND WEIGHTS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (max.): Top of Tiller Cab</td>
<td>11' 8&quot;</td>
</tr>
<tr>
<td>Height: Top of Cab Roof</td>
<td>10' 5&quot;</td>
</tr>
<tr>
<td>Height: Cab Full Tilt Position</td>
<td>16’ 2”</td>
</tr>
<tr>
<td>Length:</td>
<td>54’ 10”</td>
</tr>
<tr>
<td>Width (including mirrors)</td>
<td>10’ 0”</td>
</tr>
<tr>
<td>GVWR (Gross Vehicle Weight Rating)</td>
<td>65,500 lbs.</td>
</tr>
<tr>
<td>GAWR (Gross Axle Weight Rating) Front Axle</td>
<td>20,000 lbs.</td>
</tr>
<tr>
<td>GAWR (Gross Axle Weight Rating) Rear Axle</td>
<td>24,000 lbs.</td>
</tr>
<tr>
<td>GAWR (Gross Axle Weight Rating) Tiller Axle</td>
<td>21,500 lbs.</td>
</tr>
<tr>
<td>Apparatus Average Weight (Fully Loaded Including Personnel)</td>
<td>58,760 lbs.</td>
</tr>
<tr>
<td>Apparatus Average Weight (Front Axle)</td>
<td>16,150 lbs.</td>
</tr>
<tr>
<td>Apparatus Average Weight (Rear Axle)</td>
<td>21,330 lbs.</td>
</tr>
<tr>
<td>Apparatus Average Weight (Tiller Axle)</td>
<td>21,280 lbs.</td>
</tr>
<tr>
<td>Ground Jack Spread - Fully Deployed</td>
<td>16 Feet</td>
</tr>
</tbody>
</table>

## COMPONENT OPERATING RANGES

<table>
<thead>
<tr>
<th>Specification</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apparatus Normal System Voltage Operating Range</td>
<td>12.9 - 14.4 Volts</td>
</tr>
<tr>
<td>Engine Oil Pressure Normal Operating Range</td>
<td>10 psi min @ idle 35-45 psi min @ rated</td>
</tr>
<tr>
<td>Engine Coolant Temperature Normal Operating Range</td>
<td>180º to 200º F</td>
</tr>
<tr>
<td>Transmission Fluid Temperature Normal Operating Range</td>
<td>140º to 220º F</td>
</tr>
<tr>
<td>Air Brake System Normal Operating Range</td>
<td>90 psi to 120 psi</td>
</tr>
<tr>
<td>Fuel Tank Capacity</td>
<td>50 Gallons</td>
</tr>
<tr>
<td>Fast Idle</td>
<td>1500 - 1600 RPM</td>
</tr>
<tr>
<td>Emergency Power Unit (EPU) Pump</td>
<td>1.5 GPM @ 2000 PSI</td>
</tr>
</tbody>
</table>
INTRODUCTION

General Specifications for Shop # 60477 - 60486

ONAN GENERATOR OPERATING RANGES

<table>
<thead>
<tr>
<th>Specification</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine Oil Pressure</td>
<td>28 - 64 PSI @ normal operating temp.</td>
</tr>
<tr>
<td>Engine Coolant Temperature</td>
<td>160° to 195° F</td>
</tr>
<tr>
<td>Output</td>
<td>7.5 kW</td>
</tr>
<tr>
<td>DC Voltmeter</td>
<td>12.5 - 15 Volts</td>
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HYDRAULIC SYSTEM CAPACITIES

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Oil Reservoir Capacity</td>
<td>40 Gallons</td>
</tr>
<tr>
<td>Hydraulic Pump Capacity</td>
<td>20 GPM</td>
</tr>
<tr>
<td>Maximum System Pressure</td>
<td>2800 PSI</td>
</tr>
<tr>
<td>Outrigger Relief Valve Setting</td>
<td>2000 PSI</td>
</tr>
<tr>
<td>Hoist Maximum Pressure</td>
<td>2800 PSI</td>
</tr>
<tr>
<td>Rotate Maximum Pressure</td>
<td>1500 PSI</td>
</tr>
<tr>
<td>Extend/ Retract Maximum Pressure</td>
<td>2000 PSI</td>
</tr>
<tr>
<td>Lowering into Cradle Maximum Pressure</td>
<td>800 PSI</td>
</tr>
<tr>
<td>Ground Jack Deployed Light Activation Pressure</td>
<td>800 PSI</td>
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AERIAL LADDER DIMENSIONS

<table>
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<tr>
<th>Specification</th>
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<tr>
<td>Elevation</td>
<td>-4° to +75°</td>
</tr>
<tr>
<td>Retracted</td>
<td>31.8 Feet</td>
</tr>
<tr>
<td>Extended</td>
<td>94 Feet</td>
</tr>
<tr>
<td>Elevated Height</td>
<td>100 Feet</td>
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<td>4</td>
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INTRODUCTION

Logbook Instructions

This logbook is to be maintained in accordance with the Manual of Operation, 7/1-01.72. It is to be kept at a designated place in quarters, properly cared for, and ready for inspection at any time.

- **ANNUAL PERFORMANCE TEST:** (Retain permanently).
- **F-377 PREVENTIVE MAINTENANCE RECORD:** Make entries as indicated in the Preventive Maintenance Instructions. (Retain the last six copies).
- **F-702 ASSIGNMENT RECORD:** When apparatus is detailed or transferred, the receiving officer is to check the apparatus and inventory and make entries as required. (Retain permanently).
- **F-704 MAINTENANCE RECORD:** Make entries as indicated by circling the appropriate maintenance task and entering the mileage/hours, date and sign initials. (Retain until filled; one year after date of last entry may be discarded).
- **F-705 REPAIR RECORD:** Make entries as indicated. If repaired in quarters, enter mechanic's name in "Repaired By" column. If repaired at the Supply and Maintenance Division, enter "Shops". (Retain permanently).
- **F-709 INVENTORY:** List ALL items assigned to apparatus.
- **F-710: TIRE RECORD:** Make entries as indicated. NOTE: All records on one sheet, not a separate sheet for each tire. (Retain permanently).
- **ADDENDUM:** This section is to be used for any addendum, updates or changes, that may occur Department wide or specific to this apparatus, tools or equipment.
**INTRODUCTION**

**O.E.M. (Original Equipment Manufacturer) Component Summary**

- *Cummins* 460 BHP, 14.0 Liter, N-14-460E, Celect Electronic Controls
- *Allison* HD 4560P 5-Speed Automatic World Transmission
- *TRW* Model TAS 85 Integral Power Steering Gear Box
- *Eaton* Model V20NF Power Steering Pump
- *Rockwell* FL 943 “Easy Steer” Front Axle, 20,000 lb. Capacity
- *Rockwell* RS23-180 Drive Axle, 5.38:1 Drive Ratio, 24,000 lb. Capacity
- *Rockwell* FL 941 “Easy Steer” Tiller Axle, 21,500 lb. Capacity
- *Rockwell* Air Disc Brakes Front, Rear and Tiller Axles
- *Bendix* Air Brake System Control Components
- *Telma* Model F2400 Focal Driveline Retarder (*60486 Only*)
- *Jacobs* Engine Brake (*60477 – 60584 Only*)
- *Spicer* 1810 Series Driveline U-Joints
- *Leece-Neville* JB A0014852 240 amp Alternator
- *AC/Delco* Group 31-900CT 12V Maintenance Free Batteries
- *AC/Delco* MT 50 Type 400 12V Starter Motor
- *David Clark* Communications System
- *Code 3* Emergency Light System
- *Michelin* 385/65R 22.5 Front Tires, Load Rating "J"
- *Michelin* 12R 22.5 Rear Tires, Load Rating "J"
- *Michelin* 425/65R 22.5 Tiller Tires, Load Rating "J"
- *ALCOA* 22.5 x 12.25 Polished Aluminum Front Wheels
- *ALCOA* 22.5 x 8.25 Polished Aluminum Rear Wheels
- *ALCOA* 22.5 x 12.25 Polished Aluminum Tiller Wheels
DRIVING & CONTROLS

Tractor Cab Instruments & Controls

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

2. **Turn Signal and Headlight High Beam Lever**
   Activates left and right turn signals and high beams. To activate the high beams, pull the lever toward you until it "clicks". To activate the high beam "flash to pass" pull on the lever gently so that it does not travel to the click position.

3. **Hazard Flasher Switch**
   Activates all turn signal flashers.
DRIVING & CONTROLS

Tractor Cab Instruments & Controls
DRIVING & CONTROLS

Tractor Cab Instruments & Controls

4. **Left Turn Indicator Light**
   Blinks when the left turn lever is actuated.

5. **Engine Coolant Temperature Gauge**
   This gauge registers the temperature of the engine coolant in degrees Fahrenheit.

6. **High Water Temperature Indicator Light**
   Illuminates when the engine coolant temperature rises above 220 degrees Fahrenheit.

7. **Windshield Wiper Switches/ Washer Switch/ Intermittent Wiper Control**
   The outer switches activate the windshield wipers. Each outer switch has three positions that enable two different wiper speeds. The intermittent delay interval is adjusted using the center switch. Slide the control knob all the way down for the maximum delay between wipes. Move the control knob up to decrease the delay. With the knob all the way up, the electric washer pump is activated.

8. **Tachometer**
   The tachometer indicates engine speed in revolutions per minute (rpm).

9. **High Beam Indicator Light**
   Illuminates when high beams are actuated.

10. **Neutral Indicator Light**
    Illuminates when the transmission is in the neutral position.

11. **Warning/Stop Indicator Light**
    Illuminates when there is a problem with the engine.

12. **Fluid Indicator Light**
    Illuminates when there is no engine coolant in the surge tank.

13. **Service Trans Indicator Light**
    Illuminates when the transmission is in need of service.

14. **Parking Brake**
    Illuminates when ignition is on and parking brake is set.
DRIVING & CONTROLS

Tractor Cab Instruments & Controls

15. Speedometer
   The speedometer registers vehicle speed in miles per hour

16. Approaching Jackknife Indicator Light
   Illuminates when the tractor and trailer are at a 65° and a 90° angle.

17. High Transmission Oil Temperature Indicator Light
   Illuminates when the transmission oil temperature is too high.

18. Transmission Temperature Gauge
   This gauge registers the temperature of the transmission fluid in degrees Fahrenheit.
   Normal temperature range for the transmission fluid is 140° F to 220° F.

19. Right Turn Indicator Light
   Blinks when the right turn lever is actuated.

20. Low Air Pressure Indicator Light
   Illuminates when the air pressure in the front axle (secondary) brake circuit falls below 60 psi.

21. Air Reservoir Gauge
   Indicates the air pressure in the front axle (secondary) brake circuit.

22. Low Air Pressure Indicator Light
   Illuminates when the air pressure in the rear axle (primary) brake circuit falls below 60 psi.

23. Air Reservoir Gauge
   Indicates the air pressure in the rear axle (primary) brake circuit.

24. Air Cleaner Restriction Gauge
   Indicates the amount of air restriction in the engine air intake. Maximum restriction at full-load and governed rpm is 25 in. H20 and maximum restriction at no-load and governed rpm is 12 in. H20.
DRIVING & CONTROLS

Tractor Cab Instruments & Controls

25. Water in Fuel/Water Separator
   Illuminates when there is water in the fuel.

26. Warning Light Test Button
   When pushed, this button illuminates all warning lights on the dash.

27. Fuel Gauge
   The fuel gauge registers the amount of fuel in the fuel tank. Total capacity of the fuel tank is 50 gallons.

28. Low Engine Oil Pressure Indicator Light
   Illuminates when oil pressure falls below 3 psi.

29. Engine Oil Pressure Gauge
   This gauge registers the engine oil pressure in pounds per square inch (psi) while the engine is running. Normal range for engine oil pressure is 10 psi @ idle to 45 psi @ rated rpm. Observe this gauge at engine start up to determine that the engine is receiving adequate lubrication.

30. Starter Button
   The starter button engages the starter motor for cranking the engine. The ignition switch must be "ON" in order to crank the engine.

31. Back Up Warning Light
   Red light flashes each time back up pushbutton is depressed in front or tiller cab.

32. Panel Lights Switch
   Illuminates the instrument panels and adjusts light intensity.

33. Headlight Switch
   Activates the headlamps.

34. Back Up Warning Button
   Depress pushbutton to activate the buzzer in the front and tiller cab.
35. Ignition Switch
The ignition switch is a "rocker" style switch that when closed, allows current to flow to specific electrical accessories. The ignition switch must be in the ON position in order to crank and start the apparatus.

36. 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. Power to the Kenwood and 800 radios are also cut when the battery master switch is turned to the OFF position. The one exception to this is the MDT (Mobile Data Terminal). The MDT will continue to draw electrical current (approximately 7 to 8 amps) even though the battery master switch is turned OFF.

37. Telma Retarder Actuation Intensity Level Indicator Lights (60486 Only)
These lights illuminate when the driveline retarder is activated and indicates the level of retarding force as denoted by the number of lights illuminated.

38. Telma Retarder Intensity Control Lever (60486 Only)
A five-position lever used to select the amount of retarding effect.

39. Jacob’s Engine Brake Intensity Switch (60477 - 60485 Only)
Used to select the amount of braking power (High/Medium/Low).

40. Jacob’s Engine Brake Intensity Switch (60477 - 60485 Only)
Used to activate or de-activate the Jacob’s engine brake.
41. Master Light Switch
   Used to supply power to the emergency warning light switches.

42. Light Bar Switch
   Activates the lightbar on the tractor roof.

43. Tiller Light Bar Switch
   Activates the red lights on the rear of the trailer.

44. Front Steady Lights Switch
   Activates the two-(2) red lights in the front grille.

45. Rear Amber Lights Switch
   Activates the two amber lights on the rear of the trailer.

46. Intersection Lights Switch
   Activates the side red intersection lights on the tractor and trailer.

47. Headlight Flasher Switch
   Activates the high beam headlights to alternately flash.

48. Pick-Up Light Switch
   Activates the scene light on the rear of the tiller.
49. Telma Retarder Switch (60486 Only)
    Used to activate or de-activate the Telma Retarder.

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

51. Left Alley Light Switch
    Activates the driver side alley light in the light bar.

52. Right Alley Light Switch
    Activates the passenger side alley light in the light bar.

53. Generator Preheat Switch
    Used to preheat the Onan generator from inside the cab.

54. Generator Start/Stop Switch
    Used to start and stop the Onan generator from inside the cab.

55. Generator Run Indicator Light
    Illuminates when the Onan generator is running.

56. PTO Engaged Indicator Light
    Illuminates when the PTO switch is on and engaged.
57. **Ladder PTO Switch**
   Acts the PTO for aerial operation.

58. **Ladder Power Switch**
   Used to supply power to the aerial systems.

59. **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.

60. **Ladder Not Bedded Indicator Light**
   Illuminates when the aerial is not stowed for travel.

61. **Parking Brake Control**
   Sets and releases rear axle spring brakes.
DRIVING & CONTROLS

Tractor Cab Instruments & Controls

62. Door Ajar/Open Compartment Light
   Illuminates when a cab or compartment door is open.

63. High Idle Switch
   This switch enables the engine high idle feature and raises the engine rpm to approximately 1000-rpm.
DRIVING & CONTROLS

Tractor Cab Instruments & Controls

64. Heater Fan Speed Control
   Controls the heater fan speed.

65. Heater Temperature Control
   Controls the heater temperature inside cab.

66. Air Conditioner Fan Speed Control
   Controls the air conditioner fan speed.

67. 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.
68. Transmission T-Handle Range Selector

Allows selection of automatic and manual control of reverse, neutral and forward speeds and includes access to transmission diagnostic codes and transmission fluid level checks.
69. Radio Switch

A remote ON/OFF switch which controls the power to the Kenwood/800 radios and MDT is located in the compartment just below the Captain's seat. This switch will cut power to both the radios and MDT if placed in the OFF position.
DRIVING & CONTROLS

Ladder Compliment and Storage

70. 12’ Extension Ladder
71. 35’ Extension Ladders
72. 20’ Straight Ladders
73. 24’ Straight Ladders
74. 16’ Straight Ladders
75. 16’ Pike Poles
76. 12’ Pike Poles
77. 16’ Roof Ladder
78. 20’ Roof Ladder
79. 14’ Extension Ladder
80. 12’ Roof Ladder
81. Driving Lights Switch
   Activates the lights in front of the tiller wheels.

82. Scene Lights Switch
   Activates the scene light on the rear of the tiller cab.

83. Spare Switches

84. Left Turn Indicator Light
   Blinks when left turn lever in the tractor cab is actuated.

85. Right Turn Indicator Light
   Blinks when the right turn lever in the tractor cab is actuated.

86. Approaching Jackknife Indicator Light
   Illuminates when the tractor and trailer are approaching a jack knife position. The first buzzer goes off at 65º and the second goes off at 90º. The buzzer will de-activate after passing each angle.

87. Steering Wheel Horn Switch
   Activates the back-up warning buzzer in the front cab and allows the operator to start the apparatus.
88. Back Up Warning Light

Red light flashes each time the back up pushbutton or floor switch is depressed in the front or tiller cabs.

89. Windshield Wiper/Washer Switch

Turn knob to activate windshield wipers and push to activate washer fluid.

90. Tiller Cab Heater Activation Switch

Activates the tiller cab heater and fan.

91. Tiller Cab Heater Temperature Control

Used to adjust the temperature of the tiller cab heater (Low 2900 BTU, Medium 4100 BTU and High 6150 BTU).
92. Back Up Warning Buzzer Floor Switch

Activates the back-up warning buzzer in the front cab and allows the operator to start the apparatus.

93. Tiller Cab Windshield Washer Fluid Reservoir

Location where the tiller cab windshield washer fluid is checked and filled.
Tiller Cab Instruments & Controls

94. Tiller Cab Heater Fuel Tank
   Location where the tiller cab heater diesel fuel is checked and filled.

95. Tiller Cab Heater Exhaust Vent
   Location when the tiller cab heater exhaust is vented to the atmosphere.
DRIVING & CONTROLS

Cummins N-14 Engine Operation

The Cummins diesel, model N-14-460E, is a six-cylinder valve-in-head type engine. It has a 5-1/2” bore and a 6” stroke, with a total piston displacement of 855 cubic inches and a compression ratio of 16.3 to 1.

The N-14 develops its highest torque, 1550-ft lbs., at 1200 rpm and highest horsepower 460 at 1600 rpm. Operating range is 1200 rpm to 1600 rpm. The N-14 is designed to run at a lower rpm. 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 and 1600 rpm. The N-14 also delivers greater torque and pulling power at lower rpm. The engine can run an additional seven-percent higher than its maximum operating range.

⚠️ CAUTION

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

The Celect system is an electronically controlled fuel injection system that optimizes fuel economy and reduces exhaust emission. It does this by controlling the torque and horsepower curve, air fuel control (AFC) function, engine high speed, low idle and road speed.

The system provides additional electronic features that enhance engine and vehicle performance and control. The features include gear down protection, progressive shifting, automotive/variable speed governor and low idle adjustment.
DRIVING & CONTROLS

Cummins N-14 Engine Operation

The Cummins Celect engine is electronically controlled. Sensors and switches control many of its functions. These switches and sensors feed information to a central point. This point is the electronic control module or ECM.

The Celect ECM receives information from many different sensors. Some of these sensors include the engine position sensor, vehicle speed sensor and throttle position sensor. The engine position sensor provides engine speed and position information. The vehicle speed sensor is located in the transmission housing. The unit senses the speed of the output shaft of the transmission. From this information, the ECM computes vehicle speed. Another sensor is the throttle position sensor; which is located in the throttle foot pedal assembly.

The ECM processes the information that it receives from the sensors, and controls opening and closing of the injector solenoid. This action controls the amount of fuel metered to each injector and the precise time of injection for each injector. This will produce the correct horsepower and torque for the engine. Another system that the ECM is connected to is the diagnostic system. This system is capable of reading any fault codes recorded in the ECM.
DRIVING & CONTROLS

World Transmission Operation

Transmission T-Handle Range Selector
The T-Handle shift selector has R, N, D, 4, 3, 2, 1 a MODE button and a digital display. When a range selection is made 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. While in the D (Drive) 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 T-HANDLE RANGE SELECTOR
DRIVING & CONTROLS

N (Neutral)
Use Neutral when you start the engine, to check vehicle accessories, and for extended periods of engine idle operation. The vehicle will not start unless N (Neutral) has been selected.

D (Drive)
The transmission will initially attain first gear range when D (Drive) 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. The select indicator will display the highest range available and the monitor will display the current operating range.

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 lever shift selector is used to select individual forward ranges. Move the lever shift selector to the desired range. The select indicator will display your current choice and the monitor 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.
DRIVING & CONTROLS

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

TRANSMISSION SPEED RANGE

<table>
<thead>
<tr>
<th>GEAR</th>
<th>RPM</th>
<th>SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2100</td>
<td>15 mph</td>
</tr>
<tr>
<td>2</td>
<td>2100</td>
<td>23 mph</td>
</tr>
<tr>
<td>3</td>
<td>2100</td>
<td>33 mph</td>
</tr>
<tr>
<td>4</td>
<td>2100</td>
<td>53 mph</td>
</tr>
<tr>
<td>5</td>
<td>2100</td>
<td>68 mph</td>
</tr>
</tbody>
</table>
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. (213) 485-6111

3. Verify transmission is in N (Neutral) position.
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 10 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 35 psi at 1200 rpm and 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 at 213 485-6111.
DRIVING & CONTROLS

Gear Range Selection

1. Depress brake pedal and hold firmly.
2. Release parking brake while still maintaining pressure on brake foot pedal.
3. Select D (Drive) on transmission lever shift selector for normal (full automatic) forward speeds.

Accelerating Apparatus

1. Release pressure on brake foot pedal.

DANGER

With the parking brake released 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.

2. Depress accelerator pedal to move forward.
3. Engine response versus pedal movement may feel different from a mechanical governed engine. The electronic foot pedal assembly was designed to communicate “percentage” of foot pedal travel to the engine’s electronic control module. The engine will respond accordingly to the driver’s demand.

CAUTION

Be sure engine is at idle when shifting from N (Neutral) to D (Drive) or R (Reverse). If the engine high idle feature is engaged and a shift is attempted, the high idle feature will be disengaged.
DRIVING & CONTROLS

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 (Neutral) position.

⚠️ 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.

To Stop the Engine

1. Place the transmission in N (Neutral) 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 195º F or less.
DRIVING & CONTROLS

Braking: Dual Circuit Air Brake System

The apparatus is equipped with a dual circuit air brake (primary and secondary) 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. 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. Two air pressure gauges are located on the right side of the dash. The gauges indicate both front (secondary) and rear (primary) 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

Brakes and 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 if the brakes are in proper adjustment. Failure to properly maintain or adjust the brakes can lead to reduced brake performance, property damage, or personal injury.

DANGER

Take care to try to maintain system air pressure between 90 psi and 120 psi (governor cut out pressure) 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 may deplete the brake systems air reservoir supply.
**DRIVING & CONTROLS**

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.

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>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 section charged to less than 60 psi or property or personal injury could result.</em></td>
</tr>
</tbody>
</table>
DRIVING & CONTROLS

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.
DRIVING & CONTROLS

Braking: Telma Retarder (60486 Only)

The Telma Retarder is a device, which is attached to the rear axle of the apparatus. The drive shaft is cut, balanced and attached to two rotors that rest near the retarder with a very narrow clearance. Electromagnets with alternate polarities are located in the stator. As current flows through the stator coils, a magnetic field is created which passes through the rotors. The magnetic field creates eddy currents in the rotors, which oppose rotor rotation and slow the driveline. The result is a driveline retarding effort to the drive wheels. The retarder may be used for descending grades, driving in city traffic and whenever vehicle retarding is required.

The Telma Retarder controls consist of the following:

• An ON/OFF switch to activate or deactivate the system.
• A pressure manifold unit connected to the brake pedal.
• A low speed switch which deactivates the retarder when the vehicle speed is below 2 to 3 MPH.
• A five position handle on the steering column.
• A group of four lights, one for each stage activated.

A slight pressure on the brake pedal brings the retarder progressively into operation, carrying it through the four positions. The following pressures applied to the brake pedal activates each position:

• 3 PSI – 25% effect
• 5 PSI – 50% effect
• 7 PSI – 75% effect
• 10 PSI – 100% effect
The low speed switch deactivates the Retarder when the vehicle speed is below 2 to 3 MPH. This is to prevent the retarder from staying on once the vehicle has come to a complete stop; thus preventing a large draw on the electric system.

The Telma Retarder is ready to function as soon as the ON/OFF switch is activated and the apparatus is under way. At low speed, the Telma Retarder is very effective for slowing down or stopping and requires little or no use of the service brakes. It is advisable to combine the use of the Telma with that of the transmission, in order to benefit from the braking effect of the engine.

⚠️ **CAUTION**

Since the Telma Retarder operates by the use of electromagnets, there is an increased draw on the apparatus electrical system. Each stage of the Telma draws approximately 50 – 60 amps. When all four stages are activated, the Telma draws approximately 250 amps. With these factors in mind, operators should pay greater attention to the apparatus charging system. If the voltmeter drops below set standards, turn off the Telma toggle switch and consult the Shops.

☑️ **NOTE**

This apparatus has been equipped with a high idle switch. This switch when activated, will raise the engine to 1000 RPM. In order for the switch to operate, the maxi-brakes must be set and the transmission in neutral. This switch has been provided due to the increased electrical draw from many components on the apparatus. Use this switch any time you feel that the electrical system is low. One example would be to turn on the switch once you have arrived on scene of an incident. This will allow the charging system to replenish some of the capacity taken from the batteries.
DRIVING & CONTROLS

Braking: Jacob’s Engine Brake (60477 - 60485 Only)

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.

Jake brake control consists of the following:

- A three-position selector switch.
- An on/off switch to activate or deactivate the system.
- A throttle sensor.

Diesel engines have substantially less retarding effect upon vehicles than do gasoline engines. This is due to lack of restriction in the diesel intake manifold. The gasoline engine has a butterfly valve in the carburetor, which creates a vacuum and subsequent engine braking.

The Jake brake is a hydraulic engine attachment that, when energized, alters 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.
DRIVING & CONTROLS

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 streets.* The additional braking effort on the drive wheels (duals) can cause them to lock up which could result in an uncontrollable skid.

⚠️ CAUTION

*Do not engage the Jake Brake during aerial operations.* This practice causes undesirable retardation, possible engine and component damage, and engine stalling.
DRIVING & CONTROLS

Electrical System: ShoreLine Power Hook Up

When parked in quarters, plug the power cord into the "shore line power" receptacle located on left side of apparatus just below the driver side door. After plugging in the cord, turn switch to the ON position. The block heater lamp will illuminate. To disconnect, turn switch to the OFF position and remove power cord. Keeping the power cord plugged into the shoreline power outlet will aid in quick, dependable engine starts and increased engine and battery life.

⚠️ CAUTION

Be sure to manually disconnect the power cord from the receptacle when pulling out of quarters or damage to the equipment will result.
DRIVING & CONTROLS

Electrical System: Onboard Generator & Lighting (110 volt)

An Onan Mobile Genset, model 7.5HDKAL-1C, is used to power the 110-volt lighting and electrical outlets on the apparatus. The generator is permanently mounted behind the compartment on the tractor chassis. Access to the generator can be gained from the lid on top of the chassis compartment and the right door on the chassis compartment.

The Onan is powered by a Diesel engine. A pressurized, closed-loop liquid cooling system cools the engine. Coolant is pumped through passages in the engine block and head and is cooled in a genset-mounted radiator.

The Genset uses the apparatus batteries to power its controls and starting circuits. Controls are located in three locations: 1) switches mounted on the generator itself, 2) control box inside the left compartment on the chassis and 3) switches located on the dash board of the tractor cab. The controls located on the generator consist of a start/stop/pre-heat switch, oil pressure gauge, temperature gauge, volts gauge and hour meter. The control box in the left compartment on the chassis consists of a start/stop/pre-heat switch and circuit breaker panel. The tractor cab dashboard controls consist of a star/stop/pre-heat switch and indicator light.

<table>
<thead>
<tr>
<th>Model No.</th>
<th>7.5HDKAL-1C</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC Volts</td>
<td>120/240</td>
</tr>
<tr>
<td>KVA</td>
<td>7.5</td>
</tr>
<tr>
<td>kW</td>
<td>7.5</td>
</tr>
<tr>
<td>Amps</td>
<td>31</td>
</tr>
<tr>
<td>Hz</td>
<td>60</td>
</tr>
<tr>
<td>RPM</td>
<td>1800</td>
</tr>
</tbody>
</table>
DRIVING & CONTROLS

Electrical System: Onboard Generator & Lighting (110 volt)

96. Start/Stop/Pre-heat Switches
Switch used to pre-heat, start and stop the generator.

97. Breakers
These two circuit breakers are the main breakers for the generator.

98. DC Control Breaker
Circuit breaker that protects the 12-volt components of the generator.

99. Hourmeter
Indicates the amount of hours that the generator has been operating.
100. Generator Start/Stop Switch
Switch used to activate the generator start and stop sequence.

101. Pre-heat Switch
Switch used to preheat the Onan engine prior to starting (30 seconds max.).

102. AC Volts Gauge
Indicates the voltage that the generator is putting out.
DRIVING & CONTROLS

Electrical System: Onboard Generator & Lighting (110 volt)

103. **Cab Quartz Lights**

   Controlled by switches in the left cab compartment and one on each light assembly. Lights are removable and can be raised on mounting poles.

104. **Cord Reel**

   Reel contains 200’ of electrical cord with two 20-amp receptacles.

105. **Electric Cord Reel Outlet Box**

   Electrical box contains two 20-amp receptacles, each on their own circuit.

106. **Trailer Quartz Lights**

   Controlled by switches in the left cab compartment and one on each light assembly. Lights are removable.
DRIVING & CONTROLS

Electrical System: Onboard Generator & Lighting (110 volt)

107. Aerial Ladder Quartz Light Holder
108. Tractor 110 Volt Electric Receptacles
109. Left Side Trailer 110 Volt Electric Receptacles
110. Right Side 110 Volt Electric Receptacles
DRIVING & CONTROLS

Electrical System: Onboard Generator & Lighting (110 volt)

When operating, the Genset supplies power to the electrical panel located in the left compartment of the tractor chassis. The electrical panel consists of ten (10) circuit breakers that control the following accessories:

1. Cord Reel Receptacle
2. Main
3. Cord Reel Receptacle
4. Main
5. Front Cab Quartz Lights
6. Rear Trailer Quartz Lights
7. Left Front Receptacle (Tractor)
8. Right Front Receptacle (Tractor)
9. Left Rear Receptacle (Trailer)
10. Right Rear Receptacle (Trailer)

The Genset can power the air cushion fans, submersible pump, water vacuum, lights and other appliances. How much appliance load can be serviced depends upon the Genset power rating. The Genset will shut down or its circuit breakers will trip if the sum of the loads exceeds the Genset rating. To avoid overloading the Genset 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 Genset. It may be necessary to run fewer appliances at the same time so that the sum of the loads is not greater than the Genset rating.

Note that the Genset may shut down due to overload, even though the sum of the loads is less than the Genset 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.
DRIVING & CONTROLS

If a circuit breaker in the main power distribution panel or on the Genset trips, there is either a short circuit or too much load. Note that the Genset will continue to run after a circuit breaker trips.

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 overload the Genset or cause the circuit breaker to trip. An appliance that causes a circuit breaker to trip right away probably has a short.

Keep a no-load operation to a minimum. During no-load operation combustion chamber temperatures drop to the point where the fuel does not burn completely, causing slobbering and white smoke. Always have some load connected when the Genset is running for long periods.

The following is the procedure for starting the Onan generator:

1. Disconnect all loads from the Genset.
2. Push the start button once (cab, generator or electrical panel). The generator will automatically pre-heat and start when complete.
3. Connect the electrical loads after the Genset has warmed up for a few minutes.
4. Check for fuel, exhaust, oil and coolant leaks.
5. When stopping the Genset, let it cool down by running at no-load for three to five minutes. Then push the stop button (cab, generator or electrical panel) to stop the generator.
AERIAL OPERATION

General Information

The LTI QS-100 aerial ladder is a 4 section, all rectangular tubular steel, welded construction, 250 pound tip 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 31.8’ and the extended length is 94’. The elevated height of the aerial is 100’.

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 an axial piston, variable displacement type pump with a capacity of 20 gpm. Hydraulic oil is supplied from an all 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 –4º to +75º. A liquid filled gauge mounted to the main 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 antifriction ball bearing and ring gear attach the aerial to the chassis; thus providing 360º continuous rotation. 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.
AERIAL OPERATION

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 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.

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 2800 psi and approximately 20 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.
AERIAL OPERATION

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 emergency blocking valve solenoid is actuated. Three other spool valves are the aerial control spool valves; which operate hoisting cylinders, rotation motor, and extension cylinders. The three aerial control spool valves are mechanically linked to the aerial control levers.

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 tractor's electrical system. The aerial electrical system is a single wire; negative ground return type, utilizing the apparatus frame as ground. Power from the tractor'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 360° of aerial rotation.

The power take off (PTO) switch is an electric switch that energizes a solenoid, which allows transmission fluid to the PTO. The switch will not be energized until the transmission is in the neutral position, and the parking brake is set.

A pressure switch mounted on the PTO senses pressure inside the PTO and energizes the PTO engaged indicator light adjacent to the PTO switch.

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 OPERATION

Aerial System: Communication System

The communication system provides two-way conversational capabilities between personnel at the ladder tip 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 tip of the ladder fly section 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

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.
AERIAL OPERATION

When riding the aerial or during a ladder pipe operation, members must be strapped in with a safety strap to both "D" rings and using the footrests at the end of the fly section. Never use a leg lock on the aerial. Arms and legs caught between moving ladder sections will be seriously mangled or severed.

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.

Do not use the aerial as a crane. The aerial is designed to support the weight of approved attachments and accessory equipment (as delivered) and the number of personnel within the distribution and weight restrictions of the Aerial Load Chart. No other application of this apparatus is permitted beyond original design intent.

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.*
AERIAL OPERATION

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 ladder elevated in wind conditions exceeding 30 mph.

Safety: Personnel on Aerial

Position the aerial first, 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 the 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.
AERIAL OPERATION

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 ladderpipe, 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 aerial ladder, the well being of various personnel rests with your performance skills and ability to make proper judgements 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%/3.5°), ladderpipe drained and with the aerial ladder unsupported.

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

3. 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.

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

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

6. Capacities are established for the unit based on standard unit configuration.
AERIAL OPERATION

Capacities and Limitations: Aerial Capacities

LOAD CHART NOTES
1. OUTRIGGERS SET WITH HORIZONTAL BEARS AT MAXIMUM EXTENSION AND WEIGHT RELIEVED FROM CHASSIS SPRINGS.
2. OPERATING CONDITIONS - INCLUDING SUPPORTING SURFACES, WIND CONDITIONS, AND OTHER FACTORS AFFECTING STABILITY; HAZARDOUS SURROUNDINGS; EXPERIENCE LEVEL OF PERSONNEL, ETC.
3. GRADEABILITY: CAPACITIES ARE ALLOWABLE ON GRADES UP TO 8%25 DEGREES (8 FOOT RISE IN 100 FEET); ON GRADES OF 0% TO 14%6 DEGREES, REDUCE CAPACITIES BY 50% (ONE-HALF).
4. AERIAL LOAD CAPABILITIES HAVE BEEN ESTABLISHED WITH THE LADDER TIP UNSUPPORTED.

GENERAL OPERATING GUIDELINES

DANGER
THIS APPARATUS IS NOT INSULATED. DEATH OR SERIOUS INJURY WILL RESULT FROM CONTACT WITH, OR INADEQUATE CLEARANCE FROM, ELECTRICAL POWER LINES AND ENERGIZED CONDUCTORS.
1. DO NOT ATTEMPT TO OPERATE AERIAL APPARATUS UNTIL YOU ARE FAMILIAR WITH UNIT. READ AND STUDY YOUR OPERATOR'S MANUAL THOROUGHLY.
2. READ AND COMPLY WITH ALL INSTRUCTIONAL AND SAFETY DECALS ON THIS APPARATUS.
3. ALWAYS TURN WATER SUPPLY "ON" AND "OFF" SLOWLY.

WARNING
CERTAIN CAPACITIES ARE LIMITED BY STRUCTURAL STRENGTH; TIPPING SHOULD NOT BE RELIED ON AS A CAPACITY LIMITATION.
1. CAPACITIES ARE ESTABLISHED USING STANDARD MODEL CONFIGURATIONS. THE WEIGHT OF ADDITIONAL EQUIPMENT (HOSE, LADDERS, AXES, ETC.) MUST BE SUBTRACTED FROM GIVEN LOAD CAPACITIES.
2. CAPACITIES MUST BE REDUCED TO ALLOW FOR SNOW AND ICE DEPOSITS.

EMERGENCY POWER UNIT OPERATION

1. SHUT OFF WATER SUPPLY AND DUMP ALL WATER FROM LINES.
2. ACTIVATE BATTERY-OPERATED EMERGENCY POWER UNIT (EPU), AS NECESSARY.
3. OPERATE APPROPRIATE CONTROLS TO STOW LADDER AND OUTRIGGERS.
AERIAL OPERATION

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.

Capacities and Limitations: Reading the Load Chart

The Load Chart presents a graphic display of the aerial ladder apparatus’ load lifting and weight distribution limitations. The chart is representative of both ladder and ladderpipe operational capacities, as well as combined operational capacities. 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 under specific load conditions.

The following are general notes to capacities and limitations:

1. All capacities are based on outriggers set with extension beams at maximum stroke. The unit’s weight should be removed from the chassis springs, rear tires off the ground, front (steering axle) tires chocked and maintaining ground contact.

2. Published capacities are permissible on grades up to 6% (6 ft. rise within 100 ft.). On grades of 6% to 14%/3.5° to 8.0°, capacities must be reduced by 50% (one-half). Operating on grades in excess of 14%/9° is prohibited.

3. Certain capacities are limited by structural strength; therefore, tipping cannot be relied upon as a load limitation.

4. Capacities are determined for apparatus based upon standard unit configuration. The weight of any additional equipment (hose, ladder, axe, etc.) must be deducted from rated capacity.
AERIAL OPERATION

Capacities and Limitations: Ladderpipe 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.

CAUTION

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

Keep in mind that capacities for ladderpipe operation are in addition to those for aerial ladder operation. Therefore, one must be thoroughly familiar with the ladder’s load limitations before attempting any ladderpipe operation.

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

1. Ladderpipe/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, except rotate, may be performed simultaneously with the ladderpipe operation. Movement of the nozzle and aerial should be slow and deliberate.

4. A qualified operator must remain at the turntable control console during ladderpipe operations.
AERIAL OPERATION

Controls and Indicators: Aerial Power & PTO

1. **Ladder Power Switch**
   
   When activated, a relay is energized which connects electrical power from the batteries to the aerial circuits.

2. **Ladder Power Take-Off (PTO) Switch**
   
   Activating the switch energizes a solenoid, which allows transmission fluid to go to the PTO. A clutch within the PTO engages the shaft, which transfers power to the hydraulic pump. The truck transmission must be in the neutral position and the parking brake set before engaging the PTO.

3. **PTO Engaged Light**
   
   Illuminates when the Ladder PTO switch is activated.
4. **Outrigger Control Box**

The outrigger control box is mounted on each side of the trailer next to the outriggers. Each control box will control both outriggers.

5. **Outrigger Override Controls**

Emergency/manual controls, which allow operation of system functions if the electrical control box is not functional.
AERIAL OPERATION

Controls and Indicators: Outriggers

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

7. **Interlock Override Switch**  
   Allows the jack (vertical) cylinder of an outrigger to be lowered to the ground without the beam (horizontal) cylinder being in its fully extended position. This is identified as a “short jack” condition, which will reduce the safe movement of the aerial.

8. **Left Outrigger In/Out Switch**  
   When activated this switch will extend or retract the left outrigger beam.

9. **Panel Light**  
   Illuminates the outrigger controls when the aerial power switch is “on.”

10. **Right Outrigger In/Out Switch**  
    When activated this switch will extend or retract the right outrigger beam.
AERIAL OPERATION

Controls and Indicators: Outriggers

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

12. Right Outrigger Fully Deployed Indicator Light
Working in conjunction with the outrigger interlock system, each outrigger has limit and proximity types switches, which must be activated before the aerial can be operated. Switches activate when cylinders are in their full travel position. When all switches are activated for a particular outrigger, its green indicator light will illuminate.

13. Right Outrigger Up/Down Switch
When activated this switch will lower or raise the right outrigger beam.

14. Left Outrigger Up/Down Switch
When activated this switch will lower or raise the left outrigger beam

15. Left Outrigger Fully Deployed Indicator Light
Working in conjunction with the outrigger interlock system, each outrigger has limit and proximity types switches, which must be activated before the aerial can be operated. Switches activate when cylinders are in their full travel position. When all switches are activated for a particular outrigger, its green indicator light will illuminate.
AERIAL OPERATION

Controls and Indicators: Outriggers

16. Outrigger Override Control Buttons
   The control buttons are momentary switches, which will shift necessary flow of oil to
   the appropriate outrigger jack in the event of an electrical failure. There are four
   control buttons pictured and four more directly behind those pictured.

17. 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.

18. Aerial Hourmeter
   Indicates the amount of hours that the aerial has been operating.

19. Four-way Solenoid with Manual Control Handle
   Pulling the handle out directs oil into the outrigger override control button valves.

20. Relief Valve
   Outrigger system relief valve relieves at 2000 psi.
controls and indicators: outriggers

21. apparatus level indicator

The apparatus level indicator is located on both sides of the trailer next to the outriggers. 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.
AERIAL OPERATION

Controls and Indicators: Aerial Control Pedestal

22. Manual Circuit Selector

In the event of an electrical failure, the outrigger controls and the aerial controls will become disabled because of the interlock system. The circuit selector requires a quarter turn to the left or right for engagement. When activated the manual circuit selector allows hydraulic fluid to the outrigger valve bank and aerial controls, which can then be controlled using standard operating procedure. The EPU needs to be activated if there was also a hydraulic failure.

When operation of aerial control levers are complete, push and turn the solenoid knob to the right to re-engage valve for outrigger operation.

DANGER

With the blocking solenoid disengaged, the aerial must be used in accordance with limits defined by the outrigger set-up (aerial must not be used on the same side as a “short-jacked” outrigger).
AERIAL OPERATION

Controls and Indicators: Aerial Control Pedestal

23. Aerial Power Foot Switch
The operator must depress and hold the switch in the “ON” position to operate the aerial from the pedestal console. Should the operator become immobilized, or leave the pedestal the aerial would immediately become inoperable from the pedestal console.

24. Aerial Load Chart
The Load Chart presents a graphic display of the aerial ladder apparatus’ load lifting and weight distribution limitations. The chart is representative of ladder and ladderpipe operational capacities, as well as combined operational capacities. Basic operating precautions and emergency shutdown instructions are also included on the chart as applicable.

25. Load Chart Light
Illuminates the Aerial Load Chart when the aerial power switch is “On.”
AERIAL OPERATION

Controls and Indicators: Aerial Control Pedestal

26. Rung Alignment Indicator
Amber light that illuminates when the rungs of all ladder sections are properly aligned for climbing.

27. Fast Idle Switch
Actuating the switch increases the engine to the preset "fast idle". It is used to maintain higher rpm values for faster aerial ladder and outrigger movement. The fast idle is set between 1500 to 1600 rpm.

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

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

30. 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 fly section has no controls to operate when communicating or listening to the master station on the pedestal.
AERIAL OPERATION

Controls and Indicators: Aerial Control Pedestal

31. 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.

32. Extension Gauge

Operated by a small wire that extends and retracts with the aerial ladder; the gauge displays ladder extension in feet.

33. Engine Start Switch

The engine start switch engages the starter motor for cranking the engine.

34. Rung Alignment Buzzer

When activated, the buzzer sounds each time all rungs are aligned.
AERIAL OPERATION

Controls and Indicators: Aerial Control Pedestal

35. Aerial Control Levers
   These levers are mechanically linked to the spool valve. When a control lever is moved, the spool is lifted proportionally to the control lever movement. The ladder speed is directly proportional to the control levers movement.

36. Extension/Retraction Control Lever
   Permits extension and retraction of the ladder with dual, extension-retraction cylinders and cable drive combination. Pull to retract and push to extend.

37. Rotation Control Lever
   Permits rotation of the ladder. An anti-friction ball bearing and ring gear attaches the aerial ladder to the trailer providing 360° continuous rotation. A hydraulic motor powers the planetary gear reduction. When the lever is in the neutral position a disc type brake applies automatically.

38. Hoist Control Lever
   Permits raising and lowering of the ladder with dual, double acting hydraulic cylinders with integral holding valves. Provides ladder travel of -4° to +75° from horizontal. In the lower position, it is used to power the ladder into the cradle (800-psi). This will aid in preventing aerial ladder bounce during travel.
AERIAL OPERATION

Controls and Indicators: Aerial Ladder Features

39. Inclinometer

A floating ball-type angle indicator calibrated from -20° to + 80°. Used in conjunction with the aerial ladder load chart and the extension meter, the inclinometer enables the operator to determine the rated capacity at the given angle and length.

40. Inclinometer Light

Illuminates the inclinometer when the aerial power switch is on.

41. Combination Spot/Flood Light

Illuminates the tip of the aerial ladder and is controlled by the aerial power switch and a switch at the base of the light.
AERIAL OPERATION

Controls and Indicators: Aerial Ladder Features

42. Swing Drive System

Located on the 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 controls the braking.
43. Aerial Extension Indicators

Located along the handrails of the main section are extension indicators marked off in 5-foot increments. At the tip of the inner-mid section is a red tape indicator. When the red tape indicator is lined up with one of the main section indicators, the length in feet that the ladder is extended can be determined.
44. Folding Steps

Steps fold down so that a member can safely stand on the aerial while it is extended during a ladderpipe operation. Locking pins on each step must be removed for them to flip down.
AERIAL OPERATION

Controls and Indicators: Aerial Ladder Features

45. Aluminum Folding Ladder Brackets

Located in the center of the fly section of the ladder is the aluminum folding ladder brackets. The 10’ aluminum-folding ladder is stored in these brackets.
AERIAL OPERATION

Controls and Indicators: Aerial Ladder Features

46. Intercom Speaker
A two-way communication speaker is located at the tip of the aerial. It is hands free and has no controls to operate when communicating or listening to the operator at the pedestal.

47. Flood Light
The light is activated by the aerial power switch and can be controlled by a switch at the base of the light.
AERIAL OPERATION

Controls and Indicators: Aerial Ladder Features

48. Aerial Ladder Quartz Light Holder
   Holder for either quartz light at the rear of the trailer.

49. Extension Gauge Control
   When the aerial is extended, the small wire connected to the tip of the inner-mid section is pulled out of this unit. The movement of this wire is transferred to the extension gauge located on the aerial pedestal console.
AERIAL OPERATION

Priority Considerations for Setting Up

The following factors must be taken into consideration prior to positioning the aerial ladder apparatus for use:

1. Required reach and intended use of aerial.
2. Ground conditions and slopes effecting stability.
   NOTE: Even though aerial operation is permissible with the tiller trailer in line, optimum stability is attained with the trailer jack-knifed away from the working side.
3. Overhead obstructions and hazards.
4. Conditions favorable to operating over the rear. (Over the rear operation is defined as angles up to and including 45 degrees to either side of the apparatus centerline). Over the rear affords the most stable operating position for the aerial.
5. Accessibility to onboard equipment.
6. Existing fire, fire ground conditions, and those likely to develop.
7. Not obstructing approach or exit, or otherwise interfering with simultaneous fire ground operations.

CAUTION

Due to the overall length of the aerial, it is most important to position and set-up the apparatus to the best advantage of existing conditions. Avoid situations which could deteriorate and result in apparatus tipping, overloading the ladder, subjecting the aerial to contact with charged conductors, or any other known hazardous environment.

CAUTION

Greatest reach is attained over the side, however, stability is reduced in this configuration. Best stability is over the rear, within the rear tire tracks.
AERIAL OPERATION

Outrigger System

The LTI QS Series aerial utilizes an electric over hydraulic system for normal outrigger operation. An outrigger control box is located next to the outriggers on each side of the trailer.

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 16 feet.
AERIAL OPERATION

Outrigger System

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 and tiller 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.
AERIAL OPERATION

Outrigger System

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. Actuating the switch at the pedestal opens the circuit so that when the dead-man switch is depressed the engine is increased to the preset fast idle. These controls are used to maintain higher rpm values for faster aerial ladder and outrigger movement, lights and auxiliary equipment. The preset fast idle is 1500 to 1600 rpm.

Outrigger control switches are an electric over hydraulic control system for normal outrigger operation. Switches are spring loaded. Beam control switches operate horizontally with the OUT position toward the outside of the box and the IN position toward the center of the box. The beam control switches may be operated simultaneously, but this is not recommended. Jack control switches operate vertically. Jack control switches operate only after beams are fully extended or interlock override switch is used to short jack. Jack control switches may be operated simultaneously, but this is not recommended. For emergency response the beam IN and jack UP can be operated simultaneously after jack pressure is released.

NOTE

Beam control and jack control switches shall be operated as a single function to watch each beam and jack extend and/or retract.

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.
AERIAL OPERATION

When all switches are activated for a particular outrigger, its green light, at the outrigger control box, will light at 800 lbs. Although the parameters needed to activate the light are met, the outrigger may not be fully deployed.

Fully deployed outriggers meet the following criteria:
1. Both beams are extended to full travel.
2. Jacks extended, as necessary (see apparatus leveling indicator).
3. Jacks must be in contact with a solid, load-bearing surface.
4. Outrigger pads done properly.
AERIAL OPERATION

Cab Operation

The following is a guideline for standard operation. The exact sequence listed may not produce the desired results.

BEFORE OPERATIONS
1. Apparatus running.
2. Emergency lights on.
3. Parking brakes on.
4. Tillerman horn signal.
5. Check parking brake indicator light.
6. Transmission in neutral.
7. Aerial switch ON.
8. PTO switch ON.
9. Check PTO ENGAGED Indicator Light.
10. A/C Off (voltage draw consideration).

AFTER OPERATIONS
1. PTO Switch OFF.
2. Check PTO ENGAGED Indicator Light.
3. Aerial Switch OFF.

⚠️ CAUTION

If at anytime the road transmission is shifted into gear while performing aerial operations, the Chelsea Hot Start will automatically disengage the PTO.
AERIAL OPERATION

Outrigger Operation: Deploying

The proper method for deployment of the outriggers is to relieve the weight from the tractor’s rear springs (tractor’s rear tires and tiller steering axle tires maintaining ground contact), allowing the frame and aerial support structure to assume the operating load.

Outrigger system should normally activate when the aerial ladder is bedded, transmission in neutral, parking brake is set, aerial and PTO switches ON.

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.

1. Perform the Cab Operation.
2. Place chock blocks in front of and behind both front tires. If on a hill, place on downhill side of front and tiller tires.
3. Place auxiliary jack pads beneath ground jacks.
4. Fast idle switch ON.
5. Extend out beams (check instructions if short jack situation exists).
6. Read aerial level indicator.
7. Extend down low side jack until bubble in the aerial leveling indicator moves just past level (1/8”). The fully deployed light should be illuminated for that side and the weight removed from the tractor’s rear springs by taking the bulge out of the duals, but not off the ground.
8. Extend down the other jack until bubble in the aerial leveling indicator shows level. The fully deployed light should be illuminated for that side and the weight removed from the tractor's rear springs by taking the bulge out of duals, but not off the ground.
9. Fast Idle Switch OFF.
10. Choose a hole that is a minimum 1/4” below jack skirt. Fully insert manual locking pin and then back pin out 1/2” (if leveling is not required).
AERIAL OPERATION

Outrigger Operation: Deploying

CAUTION

All manual locking pins and auxiliary outrigger pads must be properly installed/used when the outriggers are deployed. Allow ¼” minimum clearance above the locking pin when inserted through holes in skirt. Continuous operation with weight on pins will elongate holes.

DANGER

If the angle of the turntable is between 6% and 14%/3.5º and 8.0º, reduce capacities through 360 degrees rotation by one-half (50 percent).

If leveling of the apparatus is necessary, level apparatus as follows:

1. Using applicable outrigger controls, raise the low side of the apparatus slightly above horizontal: lower opposite jack to level the apparatus.
2. If raising the low side above horizontal cannot be accomplished due to grade, fully extend jack on that (low) side.

CAUTION

Rear tractor tires must remain in contact with the ground. If the apparatus cannot be leveled without raising the tires, do not level and operate within the reduced capacities. Front (steering) axle tires must remain in contact with the ground.

3. Lower opposite jack to adjust the apparatus as near as level as the grade will allow, ensuring that the outriggers are “loaded” with as much chassis weight as possible, and turntable angle is less than 6%/3.5º from horizontal.
4. Insert locking pin in each outrigger skirt.

NOTE: Street grades from 6% to 14% (3.5º to 8.0º on inclinometer) reduce capacities of the aerial ladder by 50%. Street grades in excess of 14% (>8.0º on inclinometer) prohibit the operation of the aerial.
AERIAL OPERATION

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.

The aerial pedestal control station contains a red outrigger not deployed indicator, which warns that an outrigger has not been fully deployed and that use of the override switch will be necessary for any aerial functions.
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.

The following steps identify correct use of the system:

1. When arriving on scene, placement of the apparatus must be carefully considered to avoid the need for repositioning the truck.
2. Perform the Deploying Outriggers Operation to attempt a set-up.
3. When it is determined that an outrigger cannot be extended fully, or lowered fully, it will be necessary to move the object(s) that block full deployment.
4. If the objects cannot be moved, consider repositioning the truck.
5. When the determination has been made that an outrigger must be “short-jacked”, extend the outrigger (opposite the side which the aerial will be used) to the farthest point possible.
6. Extend the opposite outrigger’s beam cylinder fully.
7. Place the outrigger pads under each jack pad.
8. Extend the jack cylinders until the weight is relieved from the suspension, while using the apparatus level indicator for proper leveling of the unit.
   NOTE: It will be necessary to activate the interlock override switch to lower the “short-jacked” outrigger.
9. Install locking pin in each outrigger skirt.
AERIAL OPERATION

Outrigger Operation: Override/Emergency Operation

A manually operated, emergency override system control and manually operated outrigger function controls are located at the main outrigger controls station, on the left side of the trailer. Prior to actuating the applicable button(s) on the outrigger valve bank, the 4 way solenoid handle must be pulled and held in the actuated position, for the duration of the outrigger operation.

This manually shifts the blocking solenoid valve, shutting off the oil to the aerial system and directing the flow to the outrigger valve bank. Controls for override of the individual outrigger functions are located on the applicable sections of the outrigger valve bank. By actuating the “button” for the selected outrigger function, the valve spool is physically shifted for the corresponding circuit. A placard adjacent to the valve bank denotes “button” functions.
AERIAL OPERATION

Outrigger Operation: Stowing

DANGER

Ensure that members are clear from the apparatus before initiating any stowing operations. The distance from ground to the apparatus will be reduced rapidly.

1. Remove manual locking pin and place in pin holder.
2. Fast Idle Switch ON. High idle on retraction does not increase speed.
3. Retract UP the jacks. (Last jack down, first jack up).
4. Retract in the beams, one beam at a time.
5. Fast Idle Switch OFF.
7. Stow chock blocks.
8. PTO and Aerial Switch OFF.
AERIAL OPERATION

Raising the Ladder

NOTE

The following is a guideline for standard operation. The exact sequence listed may not produce the desired results.

1. Perform the Cab Operation
2. Chock blocks placed in the front of and behind both front tires. If on hill, place on downhill side of front and tiller tires.
3. Auxiliary jack pads down.
4. Fully deploy outriggers.
5. Open aerial control pedestal.
6. Fast Idle Switch ON.
7. Deadman pedal depressed.
8. Raise ladder until ladder reaches desired angle, ensuring that path is clear of obstructions and members.
9. Rotate ladder until it reaches the desired objective, ensuring that path is clear of obstructions and members.
10. Extend ladder until ladder reaches desired length, ensuring path and rungs are clear of obstructions and members.
11. Check rung alignment indicator light.
12. Lower or raise ladder until ladder is approximately six inches to twelve inches above objective in an unsupported position.
13. Release the deadman pedal.

CAUTION

During aerial operations, if the deadman pedal is ever inadvertently released, return control levers to their neutral position. Failure to do so, prior to re-depressing the deadman pedal, will cause a hydraulic pressure surge resulting in momentary loss of control of the aerial ladder.
AERIAL OPERATION

Lowering the Ladder

**NOTE**

The following is a guideline for standard operation. The exact sequence listed may not produce the desired results.

1. Deadman pedal depressed.
2. Retract ladder fully ensuring rungs are clear of obstructions and members.
3. Rotate ladder to be bedded, ensuring that rotation path is clear of obstruction and members.
4. Lower ladder to tiller cab roof, ensure that ladder is fully retracted, visual to alignment of red marks on main and third fly section (full retraction) and/or extension gauge is at 30’ mark. Ladder is rotated to correct position, ladder pipe and all obstructions are clear.
5. Bed ladder and hold hoist control in the "lower" position to "power" ladder into cradle.
6. Fast Idle Switch OFF.
7. Close aerial control pedestal.
8. Stow outriggers.
9. Auxiliary jack pads UP.
10. Chock blocks removed and stowed.
11. Aerial switch and PTO switch OFF.
AERIAL OPERATION

Aerial Operation Interlock Override Mode

With an outrigger in a “short-jacked” condition, the outrigger not deployed light at the aerial pedestal console 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.

Aerial Manual Override/Emergency Procedure

The control levers for aerial operation act directly on the aerial main control valve. In the event of an electrical failure it will be necessary to activate the blocking solenoid mounted forward of the turntable rear step. A slight push and turn to the left of the control knob will allow hydraulic flow to the aerial valve. Aerial controls can now be used.

When all procedures are complete, it will be necessary to return the blocking solenoid to the normally closed position by pushing and turning the knob slightly to the right, until engaged in the detent.

In the event that a hydraulic failure has occurred, it will be necessary to utilize the EPU to supply hydraulic fluid to the valve bank.

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

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 pump. EPU operation is independent of the aerial electrical system and the PTO switch should be turned off. When the EPU is activated it will move the aerial or outriggers in the event of a main system failure.

The system is capable of all functions in a no-load condition. Because of the short continuous use time limit, it is important that only required functions be used to move personnel and equipment to safety.

Function should then be limited to those associated with bedding the aerial and stowing 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. 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. 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.

In case of electrical system malfunction and the chassis engine ceases to run, there will be no hydraulic pressure or electrical power to the appropriate circuits to retract the aerial and outriggers.

In this extreme case the aerial ladder and outriggers can be retracted and bedded so the apparatus can be moved. This can be accomplished because the emergency power unit is wired directly to the batteries. As long as there is sufficient energy stored in the batteries to power the EPU, these emergency functions can be accomplished.
AERIAL OPERATION

Aerial System Emergency Operation: Emergency Power Unit (EPU)

To accomplish this, the following steps must be followed to retract and bed the aerial:

1. Activate the blocking solenoid mounted forward (see page 67) of the turntable rear step. A slight push and turn to the left of the control knob will allow hydraulic fluid to flow to the aerial function controls.
   
   **NOTE:** steps 2 and 3 must be done simultaneously.

2. Activate the emergency power unit switch located in each outrigger control panel. The system is capable of all functions in a no-load condition, however, because of the short continuous use time limit (approximately three minutes, depending on the circuit being activated) function should be limited to those associated with wrap-up of the aerial and outrigger operations.

3. Operate appropriate controls to bed the aerial ladder.

4. After aerial is bedded, return the blocking solenoid located forward of the turntable rear step to its original position with a slight push and turn to the right.

The following steps must be followed to retract the outriggers:

1. Open the cabinet that houses the outrigger override controls located to the rear of the left outrigger control panel.

2. Pull the red handle and hold the blocking solenoid valve, shutting off hydraulic fluid to the aerial system and directing flow to the outrigger valve bank.
   
   **NOTE:** steps 3 and 4 must be done simultaneously.

3. Activate the emergency power unit located in the left side outrigger control panel.

4. By activating the appropriate button on the outrigger valve bank, the valve spool is physically shifted for the corresponding circuit. A placard adjacent to the valve bank denotes "button" function.
MAINTENANCE

Cab Tilt Procedure (Power Assist)

Simon-Duplex Cab full tilt height: 16' 2”

**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.

**CAUTION**

Check to make sure there is enough clearance to safely raise the cab to the full tilt position.

**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 locks securely in place.

**NOTE**

The cab hydraulic lift system has internal stops and will raise the cab to a specific height and then stop even though the motor will still run. It is only necessary to raise the cab high enough to engage the cab safety locks.

**NOTE**

The brakes must be set for the hydraulic lift system to operate.

**NOTE**

If the cab is to be left up for an extended period of time, turn off ignition and battery switch after the cab is raised.
MAINTENANCE

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 in the left front tractor compartment.
4. Turn the battery switch and the ignition switch to the ON position.
5. 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). If the hydraulic motor is running but the cab will not lift, check to make sure that the pump flow control knob on the lift pump itself is turned clockwise until it stops.
6. Continue holding the switch in the RAISE position until the cab has reached the full tilt position (approximately 50 degrees).
7. Insert both cab safety locks onto the cab tilt rams. **DO NOT LOWER THE CAB ONTO THE SAFETY LOCKS.**
8. Turn the ignition and battery switch to the OFF position.

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 safety locks in order to remove them.
3. Remove both cab safety locks from the cab tilt cylinders.
4. Hold 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.
MAINTENANCE

To Raise Cab (Manual Procedure)

1. Before tilting the cab ensure that the vehicle is on a flat and level surface with the engine off.
2. Set parking brakes and chock wheels.
3. Insert the pump handle in the tube at the hydraulic pump located on the rear side of the tractor compartment. (The pump handle is located next to the hand pump).
4. Make sure the hydraulic fluid control valve knob is turned in clockwise until it stops.
5. Operate the hand pump and lift the cab to the full tilt position.
6. Insert both cab safety locks onto the cab tilt rams.

To Lower Cab (Manual Procedure)

1. If necessary, operate the hand pump until the cab has raised high enough to clear the cab safety locks.
2. Remove both cab safety locks from the cab tilt rams.
3. Place the pump handle on the pump release valve and turn it slowly counterclockwise until the cab begins to lower.
4. Allow the cab to slowly return to the service position.
5. Turn the flow control knob clockwise until it stops.

NOTE

When the cab is returned to the service position the cab latches will engage and the cab lock indicator should be off.

All Warnings, Cautions and Notes listed for the Cab Power Tilt Procedure are all applicable to the Cab Manual Tilt Procedure. The cab manual lift system is to be used only if there is a need to gain access to components under the cab in the event of an electrical system power failure on the apparatus.
Brakes: Service Brake Adjustment Check Procedure

This procedure will require two people. One will remain in the driver seat operating the brakes and the other will be underneath the apparatus inspecting the brakes.

1. Build up air pressure in apparatus until governor cutout pressure is reached (approximately 120 psi).
2. Stop engine, chock wheels and release brakes.
3. With brakes released, using appropriate ruler or tape measure, measure and record the distance from the edge of the brake chamber to the center of the brake push rod/slack adjuster clevis pin (position A).
4. Brakes applied: have an assistant hold down brake foot pedal as far as it will go without moving. Measure and record the distance from the edge of the brake chamber to the center of the brake push rod/slack adjuster clevis pin (position B).
5. Subtract the distance recorded in position A from position B. This is the amount of actual brake push rod travel. If the distance measured exceeds 2” on the REAR BRAKES, the brakes are out of adjustment and require immediate attention. If the distance measured exceeds 2” on the FRONT BRAKES, the brakes are out of adjustment and require immediate attention.

6. Repeat this procedure on ALL four wheels.

![DANGER]

It is recommended that safety glasses be worn while inspecting the brakes. The possibility of air exhausting from the brake relay valve and/or dirt and debris falling from the undercarriage into the eyes poses a health hazard. Always be aware of the location of the brake relay exhaust port and be sure to move away when the driver releases pressure on the brake pedal.

![NOTE]

When inspecting the brake adjustment, it is recommended that the flexible air lines to the brake chambers and brake diaphragms be inspected for air leakage at the same time. The following steps describe the procedure for this inspection:

With spring brakes released, wheels chocked and service brakes applied and held down by an assistant:

1. Grasp each flexible air hose connected to each brake chamber and shake gently.

2. Listen for any air leakage at or around each air hose. Inspect hoses for any cracks, cuts, routing problems or wear.

3. Listen for any air escaping from around air brake chamber clamps and brake chamber push rod hole. If necessary, place finger around each area and "feel" for any leakage. Any leakage around these areas most likely indicates a defective brake diaphragm.
MAINTENANCE

Brakes: Service Brake Inspection Procedure

Inspect the brake lining using a flashlight.
This is done by focusing the flashlight beam on the mirror and pointing the beam on the brake components. The lining should not be less than $\frac{1}{4}$ of an inch on either pad. A good rule of thumb is that the lining should not be less than the steel backing plate of the shoe.

Inspect for proper brake adjustment.
This is done by measuring the amount of brake push rod travel. With the brakes released, measure the distance from the brake housing to the center of the slack adjuster clevis pin.

With the brakes applied, measure the distance from the brake housing to the center of the slack adjuster clevis pin. Subtract the recorded distance with the brakes released from the recorded distance with the brakes applied. The total travel should not be more than 2 inches. If the distance exceeds these parameters, call the shops for a brake adjustment. Use this procedure for all six wheels.
MAINTENANCE


Spring brake chambers require air pressure to release. If sufficient pressure is not available and if the vehicle must be towed, the spring brakes can be manually released or “caged”. To manually release the spring brake chamber, unscrew (turn counter-clockwise) the 1/2” diameter bolt located at the end of the spring brake chamber utilizing a 3/4” box end wrench or socket assembly. The bolt should be unscrewed until it can no longer be turned in the counter-clockwise direction. If possible and there is enough air in the system, release the spring brakes by pushing in on the yellow brake knob before attempting to "cage" the brakes. This will supply air to the spring brakes thus compressing the internal spring making the caging process much easier.

After the need for caging the brakes has past, charge the spring brake chambers with air pressure (push dash yellow parking brake in and release brakes) and turn the caging bolt clockwise until it stops.

NOTE

The instructions on how to "cage" the spring brake are inscribed on the spring brake housing. The spring brakes should only be "caged" in an emergency situation where the apparatus must be moved or towed to a new location.

DANGER

Never attempt to disassemble a spring brake chamber as the release of a powerful spring could result in severe personal injury or death. Qualified shop personnel should only perform this procedure.
MAINTENANCE

Brakes: Spring Brake Caging Procedure

Remove the $\frac{1}{2}$” diameter bolt located on the spring brake chamber ($\frac{3}{4}$” box end wrench or socket).

Place the “T” shaped end of the bolt into the hole located on the front of the brake chamber. Turn the bolt a $\frac{1}{4}$ of a turn to lock it in place.

**NOTE:** If possible and there is enough air in the system, release the spring brakes by pushing in on the yellow brake knob before attempting to "cage" the brakes. This will supply air to the spring brakes thus compressing the internal spring making the caging process much easier.

Tighten the nut on the bolt until it can no longer be turned in the clockwise direction. The bolt should stick out of the brake chamber approximately 4 inches when fully caged.
World Transmission Diagnostic Codes

Diagnostic codes are numerical indications relating to a malfunction in transmission operation. Each code consists of a two digit main code and a two-digit subcode. These codes are logged in a list in the World Transmission ECU memory with the most severe or otherwise most recent code listed first. A maximum of five codes (numbered d1 through d5) may be listed in memory at one time. As codes are added, the oldest nonactive code is dropped from the list. If all codes are active, the code with the lowest priority that is not included on the severity list is dropped from the list. Access to the diagnostic codes and code information is through the lever shift selector or the diagnostic data reader tool (at shops).

The World Transmission ECU separately stores the active and historical (nonactive) codes. An active code is any code that is current in the ECU decision making process. Historical codes are codes that are retained in the ECU’s memory and will not necessarily affect the ECU decision making process. Historical codes are useful in determining if a problem is isolated, is intermittent, or results from a previous malfunction.

To enter the transmission diagnostic mode, press the Display Mode button on the lever shift selector twice. This will start the transmission diagnostic code sequence(s). The first code sequence starts with the alpha-numeric code designation d1, then main code (two digits), sub-code (two digits), and ends with alpha-numeric designation d1 and then the sequence repeats. Press the mode button momentarily to display codes for position(s) d2 through d5 in the same manner. After a fixed number of ignition cycles, a code may be deleted from memory if it has not recurred. If there is a problem, displayed transmission codes can be called in to the shops for interpretation and diagnosis.

NOTE

Before checking codes, bring the vehicle to a stop at a safe location and apply the parking brakes.
World Transmission: To Display Stored Codes:

1. Simultaneously press the DISPLAY MODE button *once* for transmission oil level and *twice* to access the diagnostic display mode.
2. Observe the digital display for codes.
3. Press the MODE button to see the next code-repeat for subsequent codes.
4. Press and hold the MODE button for approximately ten seconds to clear active indicators and resume vehicle operation. Some codes are self-clearing and others require ignition cycles to clear.
NOTE

Because the transmission fluid cools, lubricates, and transmits hydraulic power, it is important that the proper fluid level be maintained at all times. If the fluid level is too low, the converter and clutches do not receive an adequate supply of fluid. If fluid level is too high, the fluid can aerate. Aerated fluid can cause the transmission to shift erratically or overheat.

1. Park the apparatus on a level surface, shift to neutral and apply parking brake.
2. On the lever shift selector, press the Display Mode button once.

SUMMARY OF FLUID LEVEL DIAGNOSTIC READ OUTS

- **Correct Fluid Level:** “OL” is displayed (OL represents Fluid (Oil) Level Check Mode), followed by “OK”. The “OK” display indicates the fluid is within the “OK” zone. The sensor display and the transmission dipstick may not agree exactly because the oil level sensor compensates for fluid temperature.

- **Low Fluid Level:** “OL” is displayed (OL represents Fluid (Oil) Level Check Mode), followed by “LO” (LO represents Low Oil Level) and the number of quarts the transmission fluid is low. Example: “02” indicates 2 additional quarts of fluid will bring the fluid level within the middle of the “OK” zone.

- **High Fluid Level:** “OL” is displayed (OL represents Fluid (Oil) Level Check Mode), followed by “HI” (HI represents High Oil Level) and the number of quarts the transmission is overfilled. Example: “01” indicates 1 quart of fluid above the full transmission level.

- **Invalid for Display:** “OL” is displayed (OL represents Fluid (Oil) Level Check Mode), followed by --- and a numerical display. The numerical display is a fault code and indicates conditions are not proper to receive the fluid level information, or that there is a system malfunction.
MAINTENANCE

FLUID LEVEL CODE SUMMARY

<table>
<thead>
<tr>
<th>DISPLAY</th>
<th>CAUSE OF CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>OL - - 0 X</td>
<td>Settling time too short.</td>
</tr>
<tr>
<td>OL - - 5 0</td>
<td>Engine speed (rpm) too low.</td>
</tr>
<tr>
<td>OL - - 5 9</td>
<td>Engine speed (rpm) too high</td>
</tr>
<tr>
<td>OL - - 6 5</td>
<td>Neutral must be selected.</td>
</tr>
<tr>
<td>OL - - 7 0</td>
<td>Sump fluid temperature too low.</td>
</tr>
<tr>
<td>OL - - 7 9</td>
<td>Sump fluid temperature too high.</td>
</tr>
<tr>
<td>OL - - 8 9</td>
<td>Output shaft rotation.</td>
</tr>
<tr>
<td>OL - - 9 5</td>
<td>Sensor failure.</td>
</tr>
</tbody>
</table>

To exit the fluid level display mode, press the display button on the lever shift selector twice or momentarily move the shift selector to any range and back to neutral.

NOTE

If, when checking the fluid level in the transmission, there is not a close correspondence between the digital readout on the transmission range selector and the dipstick reading, always refer to the dipstick for an accurate reading.

NOTE

In order for the digital readout on the transmission pushbutton range selector to display transmission fluid level readings, the following conditions must be met:
1. The fluid temperature must be above 140° F and below 220° F.
2. The transmission must be in N (Neutral).
3. The apparatus has been stationary for approximately two minutes to allow the fluid to settle.
4. The engine is at idle.
MAINTENANCE


1. Be sure fluid has reached an operating temperature of (160ºF – 200ºF).
2. Park the vehicle on a level surface, apply the parking brake, chock the wheels and shift to N (Neutral).
3. Raise the cab to the full tilt position and engage the safety lock. The transmission oil dipstick is located on the right side rear of engine. Clean the area around the dipstick to insure that no dirt or debris enters the transmission.
4. Start and run the engine at idle (500 to 800 rpm).
5. After wiping the dipstick clean check the fluid level. The safe operating level is anywhere within the HOT RUN band on the dipstick.
6. If the level is not within this band, add or drain fluid as necessary to bring the level within the HOT RUN band.

⚠️ DANGER

Whenever checking fluid level, the transmission shift selector must be in N (Neutral) and the parking brake applied.

✔️ NOTE

A transmission fluid “cold check” can be made in lieu of the “hot check” to determine if the transmission has enough fluid to be operated safely until the proper “hot check” can be made. To do this, remove the transmission fluid dipstick and be sure that the static fluid level is near the “HOT FULL” mark on the dipstick. It is important that the fluid level be at or near the "HOT FULL" mark because the fluid level will drop.
MAINTENANCE

Electrical System: Alternator

The alternator is a Leece-Neville JB A0014852 240 amp and is of the self-energizing type.

⚠️ 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.

Electrical System: Batteries

The batteries in the apparatus are of the maintenance free design. To ensure a proper electrical supply, battery terminals must be clean and tight. Observe and note the condition of the battery maintenance "eye". It must register a "green" color. Any other indicates a malfunctioning battery.

⚠️ DANGER

Batteries give off hydrogen gas, which is highly explosive. 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. Inhaling of hydrogen gas produced by the normal operation of the battery could result in partial or permanent damage to the respiratory system. Whenever disconnecting battery terminals, always disconnect the ground terminal first. When reconnecting, always connect the ground terminal last. Do not check battery condition by shorting across terminals. Failure to observe these instructions could result in property damage, personal injury, or death.
Electrical System: Apparatus Jump Starting

The following is the proper sequence to jump start apparatus:

**DANGER**

*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.*

**DANGER**

*The following procedures 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 positive terminal of the battery.*

**CAUTION**

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

1. Position the vehicles so the jumper cables will reach easily between the batteries. Do not allow the vehicles to touch.
2. Stop the engines and 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.
3. Apply the parking brake and shift the transmission to N (Neutral) in both vehicles.
4. Connect the first jumper cable from the positive (+) terminal of the dead battery to the positive (+) terminal on the booster battery.
5. Connect one end of the second jumper cable to the negative (-) terminal on the booster battery, and the other end to the frame of the disabled vehicle at least 18 inches away from the battery. Do not attach the other end directly to the battery negative (-) terminal because a spark could occur and cause an explosion of battery gasses.
MAINTENANCE

Electrical System: Apparatus Jump Starting

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).
7. Start the engine in the vehicle with the discharged batteries.
8. Now remove the battery jumper cables by reversing the above sequences exactly.
1. Fuel Tank Fill Locations

   The fuel tank can be fill from either side of the apparatus. Use diesel fuel only.
MAINTENANCE

Fluid Level Check Locations – Tractor Compartment (Top)

2. **Hydraulic Oil Reservoir**
   Location where hydraulic oil can be added.

3. **Radiator Expansion Tank**
   Location where engine coolant is checked and added. (Radiator expansion tank may also be located on the top right side of the engine)
MAINTENANCE

Fluid Level Check Locations – Tractor Compartment

4. **Radiator Recovery Tank (Front of Tractor Compartment)**
   Location where excess coolant from the engine radiator accumulates.

5. **Hydraulic Oil Reservoir Sight Tube**
   Used to check the oil level in the hydraulic oil reservoir.
6. Batteries

There are three batteries on each side of the apparatus. A green eye on top of the battery indicates that the battery is good.
Fluid Level Check Locations – Engine Compartment

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

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

9. **Road Transmission Dipstick**
   Used to check the oil level in the road transmission.
MAINTENANCE

Fluid Level Check Locations – Right Side of Tractor

10. Batteries

There are three batteries on each side of the apparatus. A green eye on top of the battery indicates that the battery is good.

11. Fuel Filter/Water Separator

Filters debris and water from the fuel system.
12. **Onan Engine Coolant Fill**
   Location where coolant is checked and added to the Onan engine.

13. **Onan Engine Oil Dipstick**
    Used to check the oil level in the Onan engine.

14. **Onan Engine Oil Fill**
    Location where motor oil is added to the Onan engine.

15. **Power Steering Fluid Reservoir**
    Location where power steering fluid is checked and added.
16. Swing Drive Unit

Location where the oil is checked and added to the swing drive unit.
Fluid Level Check Locations – Tiller Cab

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

18. Tiller Cab Heater Diesel Fuel Reservoir
   Location where diesel fuel is checked and added for the tiller heater system.
## MAINTENANCE

### Daily Schedule Check List

*(Operators of apparatus or members responsible shall conduct daily checks as soon as practicable following relief).*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Fuel supply</td>
</tr>
<tr>
<td>2.</td>
<td>Oil, engine</td>
</tr>
<tr>
<td>3.</td>
<td>Coolant, engine radiator</td>
</tr>
<tr>
<td>4.</td>
<td>Oil, Onan engine</td>
</tr>
<tr>
<td>5.</td>
<td>Coolant, Onan engine</td>
</tr>
<tr>
<td>6.</td>
<td>Brakes, air reservoir pressure</td>
</tr>
<tr>
<td>7.</td>
<td>Tires/wheels</td>
</tr>
<tr>
<td>8.</td>
<td>Signal &amp; lighting system</td>
</tr>
<tr>
<td>9.</td>
<td>Electrical system</td>
</tr>
<tr>
<td>10.</td>
<td>Engine</td>
</tr>
<tr>
<td>11.</td>
<td>Running Gear (Powertrain)</td>
</tr>
</tbody>
</table>
MAINTENANCE

Weekly Schedule Check List

1. Engine
   Run engine for 10 minutes at high idle (1000 rpm) with air conditioning at maximum cool and all electrical accessories activated. Monitor dash gauges during test for any abnormal readings. After test inspect for any fluid leakage under and around engine.

2. Parking brakes
   - Set parking brake.
   - Start engine
   - Depress and hold brake pedal.
   - Place transmission in D (Drive).
   - Remove foot pressure from brake pedal and observe if brakes hold apparatus.

3. Windshield wipers
   Check blades for wear. Inspect hose for cracks and leaks. Wipers shall not be operated on a dry windshield or with defective blades.

4. Brakes
   Check disc brake lining thickness: at 1/4” note and report. Less than 1/4” call in and schedule brake job. Inspect rotors for any cracks extending to the edge of the rotor. Look for any excess oil or grease on brake rotors/lining and calipers.

6. Water filter
   Inspect for proper fluid color, level & leaks.

7. Tires
   Check pressures by gauge (105-psi front, 100-psi rear and 110 psi tiller). Check for loose, broken, and/or missing wheel lugs.

8. Fuel Filter/Water Separator
   Check for water or debris. Drain as needed.

9. Air tank(s)
   Drain each and every air tank of water and oil contaminants. Inspect for any abnormal amounts of oil drained from air tanks.
<table>
<thead>
<tr>
<th></th>
<th>Weekly Schedule Check List</th>
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</thead>
<tbody>
<tr>
<td>10.</td>
<td>Air conditioning unit</td>
</tr>
<tr>
<td>11.</td>
<td>Batteries</td>
</tr>
<tr>
<td>12.</td>
<td>Power steering</td>
</tr>
<tr>
<td>13.</td>
<td>Exhaust system</td>
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<tr>
<td>14.</td>
<td>Engine water pump</td>
</tr>
<tr>
<td>15.</td>
<td>Transmission fluid</td>
</tr>
<tr>
<td>16.</td>
<td>Springs, suspension and frame</td>
</tr>
<tr>
<td>17.</td>
<td>Emergency Power Unit (EPU)</td>
</tr>
</tbody>
</table>
### Weekly Schedule Check List

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>18. Aerial swing drive</strong></td>
<td>Check fluid level. Pipe plug is located near the top of the swing drive. Remove check/fill cap. Oil should be clearly visible above top face of the gear, but not higher than bottom of check/fill plug opening. Refill as needed. Check with apparatus level and hydraulic system shut down.</td>
</tr>
<tr>
<td><strong>20. Aerial ladder</strong></td>
<td>Operate and test aerial and outrigger jacks. Inspect drive pinion bearing gear teeth for wear, alignment and lubrication. Inspect aerial control console and communication system. Inspect collector rings under turntable for corrosion and brushes for wear. Inspect hoses, lines, etc. under turntable.</td>
</tr>
<tr>
<td><strong>21. Hydraulic oil reservoir</strong></td>
<td>Check fluid level.</td>
</tr>
<tr>
<td><strong>22. Tiller cab</strong></td>
<td>Inspect door hinges and latches.</td>
</tr>
<tr>
<td><strong>23. Onan generator</strong></td>
<td>Run the engine with an electrical load until warm. Check operation and check for leaks.</td>
</tr>
<tr>
<td><strong>24. Fifth wheel pivot shafts</strong></td>
<td>Lubricate at each pivot shaft zerk.</td>
</tr>
</tbody>
</table>
MAINTENANCE

Instructions for Bi-Monthly Preventive Maintenance Record (F-377)

Proper maintenance of apparatus is dependent on an orderly procedure and an established inspection routine. The following maintenance operations are to be performed every other month for this apparatus in accordance with the following schedules. These are minimum requirements. All of these preventive maintenance checks are to be performed during the first two weeks of every even month for heavy apparatus. Fill out the F-377 form and have the Station Commander review and sign it. Retain one copy and keep in the logbook. The other copy goes to the Station Commander for filing.

The Preventive Maintenance Form F-377 applies to all light and heavy apparatus and trailers (active, reserve, and standby) that are serviced by field personnel. All preventive maintenance items are to be inspected for each apparatus where applicable.

Items checked on the apparatus that are in good condition and not in need of service, repair, etc., shall be marked OK in designated column on the F-377 form. A brief statement of the trouble in the repair comments column shall indicate items requiring attention. All repairs will be reported as directed in Vol. 4, 8/3-40.40 and 40.50 (this includes brake adjustment, emergency lighting, steering, warning devices, etc.)

Members calling in needed repairs shall log, on the F-377, the name of the person contacted, instructions received, and the date. If a reserve apparatus has had limited use within the two-month period, it is not necessary to fill out the entire F-377. Fill out only the checks that you feel are necessary and those listed in Vol. 3, 7/1-48.84 and 48.86, of the Manual of Operations. However, the entire F-377 shall be completed on those apparatus at each six-month oil change.

The F-377 will be reviewed at the station level, with the determination made that needed repairs have been properly reported.
MAINTENANCE

F-377 Bi-Monthly Inspection List

1. **Steering Box and Steering Linkage** *(Engine shut down).* Position front wheels straight ahead (wheels on ground). Have an assistant move the steering wheel back and forth with short (40 to 60) rapid movements. At the same time inspect steering linkage and connections for any looseness or excessive movement. You can place your finger on the two mating parts of each steering connection and "feel" for any disproportionate movement between the two. Any detectable movement should be noted and reported. The following steering components can be checked in this fashion:

- Steering box input shaft/slip joint/u-joints.
- Steering box mounts.
- Steering box output shaft/Pittman arm.
- Pittman arm/drag link ball joint connection.
- Draglink/steering arm ball joint connection.
- Right and left side tie-rod ball joints.
- Right side steering arm/idler arm ball joint.

2. **Steering Column**

Grasp top of steering column and attempt to move back and forth. If any movement is detected make note and report.

3. **Brakes** *(Engine shut down).* Inspect all mechanical components for looseness, wear, breakage and/or missing components. Inspect air lines for leakage, wear and/or breaks. Inspect brake linings and rotors for wear, cracks and breaks. Inspect brake push rod travel for a maximum 2” stroke on all six wheels. When applying and holding the brakes for brake push rod travel measurement, grasp and shake the brake line(s) to the brake chamber and listen for any air leakage.
4. **Drive Line**

   Park apparatus on level surface, chock wheels and release parking brake. Inspect drive line(s) tubes for damage (cracked welds, bending, misalignment). Inspect driveline u-joints for wear/looseness. The most effective procedure is to position yourself directly under the u-joint, place both hands on the end of the drive line tube next to the u-joint and try to move the tube up and down. Try to observe or "feel" for any measurable up and down movement. If any movement is detected it should be noted and reported. Any excess movement in the road transmission and drive axle bearings can be detected in this manner. Check all drive lines and u-joints in this manner.

5. **Differential**

   Check oil level. Oil level should be even with the plug opening.

6. **Radio**

   Inspect all accessible components for secure mounting. Inspect wiring for proper connections, cleanliness and routing.

7. **Air Cleaner**

   (Cab full tilt) Inspect hose(s), ducts, pipe, connections, etc. between air cleaner and engine intake for wear, breaks, and mounting. Air cleaner element is to be replaced every other year or on an "as needed" basis. This is determined by the amount of inlet restriction measured by the engine's diagnostic system.

8. **Air Compressor**

   (Cab full tilt) Inspect for secure mount to engine, audible air leaks, water and oil leaks around compressor area and general condition of hose(s) attached to compressor.

9. **Alternator**

   (Cab full tilt) Inspect for secure mount to engine. Inspect belts for wear and tension. Inspect wiring to alternator for signs of looseness, corrosion, chafing/rubbing and proper routing.
## F-377 Bi-Monthly Inspection List

<p>| | | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>10. Fuel pump</td>
<td><em>(Cab full tilt)</em></td>
<td>Inspect fuel pump for signs of loose mounting and examine fuel lines for hard or spongy condition.</td>
</tr>
<tr>
<td>11. Cooling System</td>
<td><em>(Cab full tilt)</em></td>
<td>Inspect radiator for secure mount, signs of leakage, obstruction of cooling fins (front and rear sections of radiator), fit of radiator cap, proper coolant level. Inspect coolant hoses for signs of leakage, wear, bulging, chafing, cuts and incorrect routing. Inspect radiator sight glass for signs of contamination. Coolant should be green in color. Inspect water pump for proper mount and any signs of leakage around the &quot;weep&quot; hole and the pump to block mount area. Inspect fan for cracks, missing blades, shroud to blade clearance.</td>
</tr>
<tr>
<td>12. Drive Belts</td>
<td><em>(Cab full tilt)</em></td>
<td>Inspect all belts for wear, cuts and tension. Report defect if belt tension is loose enough to allow more than 1/2&quot; deflection measured at a point midway between pulleys.</td>
</tr>
<tr>
<td>13. Starter</td>
<td><em>(Cab full tilt)</em></td>
<td>Inspect starter for mounting and wiring. Operate starter motor and listen for any unusual noise or operating characteristics. While cranking, observe starter for any movement; movement will indicate looseness at mounts.</td>
</tr>
<tr>
<td>14. Wiring</td>
<td><em>(Cab full tilt)</em></td>
<td>Perform visual ONLY of all wiring in engine compartment for routing, connections, wear and/or corrosion.</td>
</tr>
<tr>
<td>15. Engine Mounts</td>
<td><em>(Cab full tilt)</em></td>
<td>Inspect engine mounts for looseness and/or damage to rubber mounts.</td>
</tr>
<tr>
<td>16. Tires</td>
<td></td>
<td>With the approved tire tread depth gauge, measure depth at the center of the tire tread. A reading of 1/8” or less should be reported on the F-377 and called in for needing replacement.</td>
</tr>
</tbody>
</table>
## MAINTENANCE

### F-377 Bi-Monthly Inspection List

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. Door Hinges/Locks</td>
<td>Check for worn hinges, proper alignment and lock mechanism function.</td>
</tr>
<tr>
<td>18. Odometer Reading</td>
<td>Note and record current mileage.</td>
</tr>
<tr>
<td>19. Engine Hours</td>
<td>Note and record current engine hours.</td>
</tr>
<tr>
<td>20. Aerial Hours</td>
<td>Note and record current aerial hours.</td>
</tr>
<tr>
<td>21. Generator Hours</td>
<td>Note and record current Onan generator hours.</td>
</tr>
</tbody>
</table>

### Special Lube Instructions

**King Pins (Steering Axles)**

The correct method for lubricating the front axle kingpin thrust bearings is to jack up each wheel at the axle. This will remove the load on the bearings.

**Universal Joints**

When lubricating the universal joints, it is most important to observe the grease seeping past all four cross bearing seals. If grease does not show at any of the seals, tap the opposite side yoke firmly with a plastic or similar type hammer while applying lube gun pressure. If you are unable to get the grease through, report this condition to the Shops.

**Driveshaft Slip Yoke**

To prevent drive shaft slip yoke galling or seizure, it is necessary to apply grease to the fitting until it appears at the relief hole in the end of the yoke plug.

**Brake Caliper Assembly**

NOTE: Your apparatus has plugs instead of grease fittings, do not remove. The brake caliper assembly takes a special, high temperature, high-pressure grease required by Rockwell. The Shops will lube these parts at Annual Aerial Test or whenever a brake job is performed.
MAINTENANCE

Special Lube Instructions

Aerial Ladder
Clean aerial ladder prior to lubing. Stabilize the apparatus, raise ladder, rotate to the side, lower ladder to horizontal and extend ladder fully. Clean all residual grease from the sliding surfaces that are in contact with each other. Use red rags and an approved cleaning solution to do this. Do not use a wire brush to clean with. 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. 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.

Fifth Wheel
When lubricating the fifth wheel, inject grease with the tractor inline, 60° to the left and 60° to the right of the trailer. This will allow the grease to travel completely around the fifth wheel race.
MAINTENANCE

Chassis Lubrication Key: Tractor Chassis

1. Steering driveline to steering wheel shaft u-joint zerk.

2. Steering driveline angle-drive box input u-joint zerk.

MAINTENANCE

Chassis Lubrication Key: Tractor Chassis

4. Steering driveline slip joint zerk.

5. Steering box driveline input u-joint zerk.

MAINTENANCE

Chassis Lubrication Key: Tractor Chassis

7. Pitman arm to draglink ball-joint zerk.

8. No. 1 axle left side front spring shackle pin(s) zerks.

9. No. 1 axle left side slack adjuster zerk.
MAINTENANCE

Chassis Lubrication Key: Tractor Chassis

10. Left side upper kingpin zerk
11. Left side draglink to steering arm ball-joint zerk
12. Left side tie rod end zerk
13. Left side lower kingpin zerk
14. No. 1 axle left side rear spring shackle pin(s) zerks
Chassis Lubrication Key: Tractor Chassis

15. Right side cab hoist ram zerk.

16. Right side power steering ram to frame ball-joint zerk.

17. No. 1 axle right side front shackle pin(s) zerks.
MAINTENANCE

Chassis Lubrication Key: Tractor Chassis

18. Right side upper kingpin zerk

19. No. 1 axle right side slack adjuster zerk.

20. Right side steering arm to power steering ram ball joint zerk.

21. Right side lower kingpin zerk

22. Right side tie rod end zerk

23. No. 1 axle right side rear spring shackle pin(s) zerks.
MAINTENANCE

Chassis Lubrication Key: Tractor Chassis


25. Driveline center u-joint zerk.

27. Differential input shaft driveline u-joint zerk.

28. Right side No. 2 axle slack adjuster zerk.

29. Left side No. 2 axle slack adjuster zerk.
Chassis Lubrication Key: Tractor Chassis

30. Fifth wheel bearing zerk. Lubricate inline, 60º left and 60º right.

31. Fifth wheel pivot pins zerks (1 zerk on each side)
MAINTENANCE

Chassis Lubrication Key: Tiller Axle

32. Steering driveline to steering wheel shaft u-joint zerk

33. Steering driveline angle-drive box zerk. (Located at the top of the angle-drive box. Unable to see.)
MAINTENANCE

Chassis Lubrication Key: Tiller Axle

34. Sector shaft extension support bearing zerk.

35. Pittman arm to draglink ball-joint zerk

36. Left side upper kingpin zerk

37. Left side draglink to steering arm ball-joint zerk

38. Left side slack adjuster zerk

39. Left side lower kingpin zerk

40. Left side tie rod end zerk
MAINTENANCE

Chassis Lubrication Key: Tiller Axle

41. Right side upper kingpin zerk.
42. Right side slack adjuster zerk.
43. Right side lower kingpin zerk.
44. Right side tie rod end zerk.
MAINTENANCE

Chassis Lubrication Key: Fifth Wheel and Aerial Ladder

45. Ladder heal pin zerks (2 zerks)

46. Swing bearing zerk

47. Hoist cylinder blind – end shafts zerks (2 zerks)
MAINTENANCE

Chassis Lubrication Key: Fifth Wheel and Aerial Ladder

48. Hoist cylinder rod – end shafts zerks (2 zerks)

49. Base section aft sheave wheels zerks (2 zerks)
MAINTENANCE

Chassis Lubrication Key: Fifth Wheel and Aerial Ladder

50. Extension/Retraction cylinders aft sheave wheels zerks (2 zerks)

51. Extension/Retraction cylinders forward sheave wheels zerks (2 zerks)

52. Section 2 aft sheave wheels zerks (2 zerks)
MAINTENANCE

Chassis Lubrication Key: Fifth Wheel and Aerial Ladder

53. Base section forward sheave wheels zerks (2 zerks)

54. Section 3 aft sheave wheels zerks (2 zerks)

55. Section 2 forward sheave wheels zerks (2 zerks)
MAINTENANCE

Chassis Lubrication Key: Fifth Wheel and Aerial Ladder

56. Section 3 forward sheave wheels zerks (2 zerks)

57. Apply lube along the bottom and side of the base rails

58. Apply lube along the channel of the extension/retraction cylinders
## MAINTENANCE

### SERVICE INTERVAL SUMMARY

<table>
<thead>
<tr>
<th>ITEM/ COMPONENT</th>
<th>DAILY</th>
<th>WEEKLY</th>
<th>MONTHLY</th>
<th>BI-MONTHLY</th>
<th>ANNUALLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerial Ladder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Air Cleaner</td>
<td></td>
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<td>X</td>
<td></td>
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<tr>
<td>Air Compressor, Engine</td>
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<td>X</td>
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<tr>
<td>Air Conditioning System</td>
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<tr>
<td>Air Tank(s)</td>
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<tr>
<td>Alternator</td>
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<tr>
<td>Batteries</td>
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<td>Brakes</td>
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<tr>
<td>Cab Tilt System</td>
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<tr>
<td>Coolant, Onan Engine Radiator</td>
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<tr>
<td>Coolant, Radiator</td>
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<td>Coolant Filter</td>
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<td>Coolant Pump, Engine</td>
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<td>Cooling System</td>
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<td>Differential</td>
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<td>Door Hinges/Locks</td>
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<tr>
<td>Drive Belts, Engine</td>
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<td>Drive Line</td>
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<td>Electrical System</td>
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<tr>
<td>Emergency Power Unit (EPU)</td>
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<tr>
<td>Engine</td>
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<tr>
<td>Engine Mounts</td>
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<tr>
<td>Fifth Wheel Pivot Shafts</td>
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<td>Exhaust System, Engine</td>
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<td>Fuel Filter(s), Primary &amp; Secondary, Engine</td>
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<tr>
<td>Fuel Supply, Engine</td>
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</tbody>
</table>
## MAINTENANCE

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</thead>
<tbody>
<tr>
<td>Oil, Engine</td>
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<tr>
<td>Oil Filter, Engine</td>
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<tr>
<td>Oil, Hydraulic Reservoir</td>
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<tr>
<td>Oil, Onan Engine</td>
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<tr>
<td>Onan Generator</td>
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<tr>
<td>Parking Brake</td>
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<tr>
<td>Power Steering System</td>
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<tr>
<td>Powertrain: (trans, driveline, drive axle)</td>
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<tr>
<td>Racor Fuel/Filter Water Separator</td>
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<tr>
<td>Radio</td>
<td></td>
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<tr>
<td>Seat Belts</td>
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<tr>
<td>Signal &amp; Lighting System</td>
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<tr>
<td>Starter, Engine</td>
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<tr>
<td>Steering Column</td>
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<tr>
<td>Springs, Suspension, Frame</td>
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<tr>
<td>Steering Gear and Linkage</td>
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<tr>
<td>Swing Drive Gear</td>
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<tr>
<td>Swing Drive Unit</td>
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<tr>
<td>Transmission Fluid</td>
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<tr>
<td>Windshield Wipers</td>
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<tr>
<td>Wiring</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Tires/Wheels</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MAINTENANCE

FLUID CAPACITIES AND TYPE

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>FLUID TYPE</th>
<th>CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine</td>
<td>15W-40 Motor Oil</td>
<td>44 quarts¹</td>
</tr>
<tr>
<td></td>
<td></td>
<td>38 quarts²</td>
</tr>
<tr>
<td>Road Transmission</td>
<td>ATF (Dexron II)</td>
<td>51 quarts</td>
</tr>
<tr>
<td>Drive Axle</td>
<td>90W-140 Oil</td>
<td>24 quarts</td>
</tr>
<tr>
<td>Engine Coolant</td>
<td>S&amp;M supplied coolant mix</td>
<td>45.5 quarts</td>
</tr>
<tr>
<td>Power Steering</td>
<td>15W-40 Motor Oil</td>
<td>11 quarts</td>
</tr>
<tr>
<td>Aerial Hydraulic Reservoir</td>
<td>AW Hyd. Oil 32 Chevron</td>
<td>40 gallons</td>
</tr>
<tr>
<td>Cab Lift Hydraulic</td>
<td>ATF (Dexron II)</td>
<td>4 quarts</td>
</tr>
<tr>
<td>Onan Generator Oil</td>
<td>15W-40 Motor Oil</td>
<td>4 quarts</td>
</tr>
<tr>
<td>Onan Generator Coolant</td>
<td>S&amp;M supplied coolant mix</td>
<td>5 quarts</td>
</tr>
<tr>
<td>Swing Drive Oil</td>
<td>90W Gear Oil</td>
<td>N/A</td>
</tr>
</tbody>
</table>

¹ Including filter
² Not including filter

ENGINE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine Make</td>
<td>Cummins</td>
</tr>
<tr>
<td>Displacement</td>
<td>14.0 Liters (855 Cu. In.)</td>
</tr>
<tr>
<td>Engine Model</td>
<td>N-14 460E</td>
</tr>
<tr>
<td>Bore &amp; Stroke</td>
<td>5.5 X 6.0</td>
</tr>
<tr>
<td>Number Of Cylinders</td>
<td>6 Cylinder Inline</td>
</tr>
<tr>
<td>Air System</td>
<td>Turbocharged Air To Air Charged Cooling</td>
</tr>
<tr>
<td>Compression Ratio</td>
<td>16.3 to 1</td>
</tr>
<tr>
<td>Torque</td>
<td>1550 ft. lbs. @ 1200 RPM</td>
</tr>
<tr>
<td>Governed Speed</td>
<td>2100 RPM</td>
</tr>
<tr>
<td>Fuel Control System</td>
<td>Celect</td>
</tr>
</tbody>
</table>
Tire Maintenance and Replacement Criteria

Replacement Criteria

- Tires shall be replaced when tread depth is at or less than 4/32” measured at any point on a major tread groove. The measurements shall NOT be made where the tie bars, humps or fillets are located.
- Tires showing evidence of the tread separating from the tire case must be replaced as soon as possible.
- Tires showing ANY exposed fabric through tread or sidewall area are to be replaced immediately.

General Tire Information

**Over inflation** imposes excessive strain on the tire cords, weakening their resistance to impact. This could cause tire rupture and blowouts.

**Under inflation** is the principal enemy of tire life and one of the primary causes of tire failure. Increased flexing due to underinflation causes heating, reduced strength, breakdown, and possible separation of the tire components. Low inflation also increases the rolling resistance of the tire which increases fuel consumption and reduces tread life.

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation pressures should always be checked when tires are cold. NEVER bleed air from tires when hot to relieve normal pressure buildup. Tire pressure should be maintained at 105 psi (cold) on front axle, 100 psi (cold) on rear axle and 110 psi (cold) on tiller axle.</td>
</tr>
</tbody>
</table>

**Unequal Inflation** on a set of dual tires causes more of the load to be absorbed by one tire than the other. This overload condition may cause an overheat condition leading to premature failure of one or both tires.
MAINTENANCE

Information Required for Tire Changing

When calling for apparatus tire replacement, the following information may be required to determine the closest replacement match:

1. Apparatus make
2. Shop number
3. Tire size
4. Tire location
5. Tread design
6. Tread groove depth (if necessary for match up)
7. Circumference or height (if necessary for match up)
8. Inner or outer
9. Finish on wheel

Tires

<table>
<thead>
<tr>
<th>SIZE</th>
<th>TIRE PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRONT 385/65R 22.5</td>
<td>105 PSI (COLD)</td>
</tr>
<tr>
<td>REAR 12R 22.5</td>
<td>100 PSI (COLD)</td>
</tr>
<tr>
<td>TILLER 425/65R 22.5</td>
<td>110 PSI (COLD)</td>
</tr>
</tbody>
</table>

Wheels

<table>
<thead>
<tr>
<th>MAKE</th>
<th>SIZE</th>
<th>FINISH</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRONT</td>
<td>Alcoa</td>
<td>22.5 x 12.25</td>
</tr>
<tr>
<td>REAR</td>
<td>Alcoa</td>
<td>12R 22.5</td>
</tr>
<tr>
<td>TILLER</td>
<td>Alcoa</td>
<td>22.5 x 12.25</td>
</tr>
</tbody>
</table>