REAR MOUNT AERIAL LADDER

1. **OVERVIEW**

1.1 This bulletin describes basic operations of the aerial ladder apparatus. Variations of model, year and make may result in differences of the control panels. In addition to this bulletin, chauffeurs should refer to the Operation and Maintenance manual for their particular apparatus.

1.2 The 100' Aerial Ladder operates by utilizing two double acting hydraulic lift cylinders which provide smooth, precise elevation from 0-80 degrees above horizontal.

1.3 Two individually controlled stabilizers can be hydraulically extended out and down to provide a firm base for aerial ladder operation.

1.4 Load capacity varies from 250-750 lbs. at the tip depending on the degree of elevation.

1.5 The controls for aerial ladder operations are in three locations:
   - □ Aerial Control Panel located in the Apparatus Cab - Permits the Ladder Company Chauffeur (LCC) to select the rating mode and engage the front brake lock.
   - □ Stabilizer Controls located at the Rear of Apparatus - Two banks of levers control the extension and retraction of the stabilizers.
   - □ Aerial Ladder Controls are located on the Apparatus Pedestal.

1.6 Description of 100' Aerial Ladder Apparatus

**Ladder:** 4 sections; one stationary and 3 sliding sections. The aerial ladder is controlled from the rear operated pedestal.

**Dimensions:** Length: 36 feet

   Width: 8' with stabilizers nested.

   18' 4" with stabilizers down (5' 2" each side)

**Height:** 10' 8"

**Weight:** 60,000 lbs. unloaded.

**Stabilizers:** One on each side near rear wheels of apparatus, operated from controls in rear compartment.
2. **AERIAL CONTROL PANEL OPERATIONS**

2.1 The power for operating the ground stabilizers, aerial ladder hoisting, extension and rotation is derived from the apparatus engine through a transmission mounted Power Take Off (PTO). Activation of the PTO sends power from the transmission to the hydraulic system instead of the apparatus drive train. (Photo 1)

![Photo 1](image)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>SWITCH/LIGHT</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Stabilizer Not Nested Light</td>
<td>When lit, indicates stabilizers are not completely retracted into the body for road travel.</td>
</tr>
<tr>
<td>2.</td>
<td>Aerial Hourmeter</td>
<td>Indicates total hours aerial has been operated.</td>
</tr>
<tr>
<td>3.</td>
<td>Hydraulic System Indicator Light</td>
<td>Indicates when hydraulic filter should be changed.</td>
</tr>
<tr>
<td>4.</td>
<td>PTO Light</td>
<td>When lit indicates PTO is engaged.</td>
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<tr>
<td>5.</td>
<td>PTO Control Switch</td>
<td>Used to start/stop PTO for aerial hydraulics.</td>
</tr>
<tr>
<td>6.</td>
<td>Front Brake Light</td>
<td>When lit, indicates front brakes are engaged.</td>
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<tr>
<td>7.</td>
<td>Front Brake Lock Switch</td>
<td>Used to set front wheel brakes during aerial ladder operation (not to be used for parking).</td>
</tr>
<tr>
<td>8.</td>
<td>Auxiliary Pump Light</td>
<td>When lit, indicates auxiliary electric hydraulic pump is activated.</td>
</tr>
<tr>
<td>9.</td>
<td>Normal/Emergency Hydraulic Switch</td>
<td>Selects normal PTO pump or auxiliary electrically operated pump.</td>
</tr>
<tr>
<td>10.</td>
<td>Generator Switch and Run Light</td>
<td>Switch to activate generator. Light “ON” indicates generator has been turned on.</td>
</tr>
</tbody>
</table>
2.2 Activating Power Take Off (PTO)
- Place automatic transmission in the NEUTRAL (N) position.
- Engage the MAXI-BRAKE.
- Move the FRONT BRAKE LOCK SWITCH to the ON position. The FRONT BRAKE LIGHT will illuminate.
- Open the red cover of the PTO CONTROL SWITCH and flip the switch to the UP position. The PTO LIGHT will illuminate.
- The apparatus is now in PTO.

2.3 Disengaging Power Take Off (PTO)
- The aerial ladder must be bedded and stabilizers fully nested.
- Store wheel chocks, stabilizer pads, and make sure all compartments doors are closed.
- Close the red cover of the PTO CONTROL SWITCH, this will toggle the switch DOWN and disengage the PTO.
- Move the FRONT BRAKE LOCK SWITCH to the OFF position.

3. STABILIZER OPERATIONS

3.1 Stabilizer Controls - Hydraulically operated “H” frame stabilizers are located behind the rear wheels. The controls for these stabilizers are located at the back of the apparatus in the Stabilizer Control Compartment, one control handle for each stabilizer. The stabilizers each require a clearance of 5’ 2” for full horizontal extension. The operator can view the stabilizer in motion permitting a one firefighter operation. (Diagram 1)
T.B. APPARATUS L-7
REARMOUNT AERIAL LADDER

May 27, 2010

<table>
<thead>
<tr>
<th>ITEM</th>
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<tbody>
<tr>
<td>1.</td>
<td>Horizontal and Vertical Stabilizer Control</td>
<td>Controls IN/OUT and UP/DOWN movement of the stabilizer.</td>
</tr>
<tr>
<td>2.</td>
<td>High Idle/Emergency Pump Switch</td>
<td>Activates engine throttle system to increase speed of stabilizer operation when the dash switch is in the “NORMAL” hydraulic mode. Activates the emergency hydraulic pump for control of stabilizers when the dash selector switch is in the “EMERGENCY” mode.</td>
</tr>
<tr>
<td>3.</td>
<td>Short-Jack Switch</td>
<td>Overrides normal valve operation to allow for Short-Jack operation (horizontally) of the stabilizer.</td>
</tr>
<tr>
<td>4.</td>
<td>Stabilizer Down Indicator Light</td>
<td>When lit indicates stabilizer has been vertically loaded.</td>
</tr>
</tbody>
</table>

3.2 **Interlock Diverter Valve** - The LCC shall pay special attention to the stability of apparatus at all times. In order to help safeguard the stability of the apparatus, an Interlock Diverter Valve is in place. The Interlock Diverter Valve (IDV) performs two functions. The IDV directs the flow of hydraulic fluid to power either the stabilizers or the aerial ladder. The stabilizers must have a positive pre-load before the aerial can become operational. When the ground stabilizers are loaded vertically, the aerial interlock valve opens and allows movement of the aerial ladder. When the ladder is moved from the cradle, it closes the stabilizer interlock valve and prevents movement of the stabilizers.

3.2.1 Overriding any interlock system must only be done when all consideration is taken for the stability of the apparatus and safety of all persons and equipment.

3.2.2 A properly placed stabilizer will cause a green STABILIZER DOWN light to illuminate in the Stabilizer Control Compartment. When both stabilizers are properly in place, both green lights will be illuminated and a signal is sent to the Interlock Diverter Valve. This signal engages the Aerial Ladder Controls allowing operation of the aerial ladder.

3.2.3 This valve will not permit operation of the aerial ladder unless the ground stabilizers are properly set. It will also not permit nesting of the ground stabilizers unless the aerial is properly bedded.

3.2.4 Should a function of the Interlock Diverter Valve system fail, the ladder or stabilizers can be moved by accessing the override controls located in the Interlock Control Compartment at the rear of the apparatus. Overriding the IDV is for EMERGENCY USE ONLY. This action should only be performed if there is a malfunction and an emergency exists. The IC should be immediately notified if the IDV override is operated.
3.3 Extending and Lowering the Stabilizers

- Begin extending and lowering the inboard stabilizer (working side) first.
- Be sure the area is clear of members, civilians, hose or obstructions.
- Activate the HIGH IDLE switch to assist in faster operation.
- Move the STABILIZER CONTROL HANDLE toward the OUT/DOWN position until the stabilizer is fully extended horizontally and beginning to lower to the ground. A stabilizer that is not fully extended horizontally is considered Short-Jacked.
- Pause operation prior to contact with the ground in order to place Ground Stabilizer Pad. Ground stabilizer pads must be used at all times to help disperse the weight of the apparatus over a larger area.
- With pad in place, resume lowering the stabilizer until it reaches the end of its stroke.
- Ensure that the green STABILIZER DOWN INDICATOR LIGHT is illuminated. Both STABILIZER DOWN INDICATOR LIGHTS must be illuminated before the aerial can be operated.
- Deactivate the HIGH IDLE switch.
- Before operating the Aerial Ladder Controls, Manual Safety Pins must be placed in the highest hole possible in the stabilizers. This will prevent collapse of the stabilizers in the event of a hydraulic fluid leak. (Diagram 2)
- Repeat above procedure for the outboard stabilizer (non-working side).

When the ground is not level and the apparatus is leaning, start with the stabilizer on the lowest side first (the direction the apparatus is leaning). The low side stabilizer shall be fully extended horizontally and lowered to its maximum. The high side stabilizer shall then be extended as necessary and then lowered to a point that levels the apparatus. Utilize the Inclinometer mounted at the rear of the apparatus to aid in leveling the apparatus (Diagram 3). If the inboard stabilizer (working side) is also the high side, it must be fully extended horizontally and then lowered the distance necessary to level the apparatus for a safe operation.

![Diagram 2](image-url)
3.4 Returning the Stabilizers to the Nested Position

- Activate the HIGH IDLE switch.
- Move the STABILIZER CONTROL HANDLE to the UP/IN position, until the stabilizer is fully nested.
- Deactivate the HIGH IDLE switch.
- Repeat operation on other side.

4. PEDESTAL CONTROL OPERATIONS

Diagram 3

Diagram 4
<table>
<thead>
<tr>
<th>ITEM</th>
<th>SWITCH</th>
<th>FUNCTION</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>Extension/Retraction Lever</td>
<td>Controls ladder extension and retraction.</td>
</tr>
<tr>
<td>2.</td>
<td>Rotation Lever</td>
<td>Controls rotation of the turntable.</td>
</tr>
<tr>
<td>3.</td>
<td>Hoist/Lower Lever</td>
<td>Controls ladder hoisting and lowering.</td>
</tr>
<tr>
<td>4.</td>
<td>Ladder Light Switches</td>
<td>Provides current to the ladder lighting system.</td>
</tr>
<tr>
<td>5.</td>
<td>Throttle Control</td>
<td>Increases engine speed allowing for faster operation of aerial functions.</td>
</tr>
<tr>
<td>6.</td>
<td>System Pressure Gauge</td>
<td>Indicates operating pressure of the hydraulic system.</td>
</tr>
<tr>
<td>7.</td>
<td>Lower Cylinder Pressure Gauge</td>
<td>Indicates hydraulic pressure at the bottom of the hoisting cylinder. Provides indication of unsupported ladder load.</td>
</tr>
<tr>
<td>8.</td>
<td>Low Voltage Indicator Light</td>
<td>Light indicates a low voltage condition exists.</td>
</tr>
<tr>
<td>9.</td>
<td>Turntable Alignment light</td>
<td>Light indicates the turntable is aligned to the ladder cradle for bedding of the aerial ladder.</td>
</tr>
<tr>
<td>10.</td>
<td>Safe Rotation Limit Exceeded light</td>
<td>Light indicates when aerial ladder is rotated past its safe limit when operating on the Short-jacked side or during a mechanical malfunction</td>
</tr>
<tr>
<td>11.</td>
<td>Ladder Overload Light</td>
<td>Light indicates (and warning horn sounds) when ladder is subjected to an overload condition.</td>
</tr>
<tr>
<td>12.</td>
<td>Emergency Override Rotation Limit switch</td>
<td>When activated, overrides the rotation limit system.</td>
</tr>
<tr>
<td>14.</td>
<td>Rung Alignment Indicator</td>
<td>Light indicates when rungs are lined up between ladder sections when ladder is ready to climb.</td>
</tr>
<tr>
<td>15.</td>
<td>Aerial Enable Foot Switch</td>
<td>Allows operation of aerial control valve.</td>
</tr>
<tr>
<td>16.</td>
<td>Ladder Overload Actuator Switch</td>
<td>Controls aerial ladder tip-over alarm system.</td>
</tr>
<tr>
<td>17.</td>
<td>Ladder Overload Warning Horn</td>
<td>Horn sounds a warning (and the light comes on) when ladder is subjected to an overloaded condition.</td>
</tr>
</tbody>
</table>

Note: See Diagram 4 in reference to items 1-17 above.
4.1 Raising Bed Ladder
   - Depress AERIAL ENABLE FOOT SWITCH at the base of the pedestal.
   - Raise ladder by pulling back slowly on the HOIST/LOWER lever.
   - Release HOIST/LOWER lever when sufficiently elevated.

4.2 Rotating Ladder
   - Depress AERIAL ENABLE FOOT SWITCH at the base of the pedestal.
   - Rotate ladder by moving ROTATION LEVER as required for proper direction.
   - Release ROTATION LEVER when ladder has reached desired rotation.

4.3 Extending Fly Sections
   - Depress AERIAL ENABLE FOOT SWITCH at the base of the pedestal.
   - Push the EXTENSION/RETRACTION lever to extend to the desired length.
   - Release EXTENSION/RETRACTION lever when ladder has reached desired length.
   - If possible make sure RUNG ALIGNMENT INDICATOR light is ON before permitting personnel to climb ladder.

Note: Always move control levers at a slow deliberate speed to avoid jerky motions and consequent “whip” of the ladder which could cause personal injury or ladder damage. Turning off the THROTTLE CONTROL SWITCH on the Pedestal Control Panel will reduce pressure in the system and help with feathering the control lever.

Photo 2

4.4 Extension Footage numbers are located on the base section vertical struts and the corresponding bright colored vertical strut of the second section. When the colored strut is lined up with a footage number, the ladder is extended to that respective length. (Photo 2)
4.5 Refer to the Inclinometer, located on the inside of the Aerial Base section, to determine the hoisted degrees of the ladder above horizontal. Always match the Inclinometer and Extension Footage numbers for proper load capacity. (Photo 3)

4.6 Bedding Ladder (return to cradle)

- Depress AERIAL ENABLE FOOT SWITCH at the base of the pedestal.
- Raise ladder from operating position by pulling back slowly on the HOIST/LOWER lever.
- Pull the EXTENSION/RETRACTION control lever and retract the ladder sections.
- Rotate the ladder with the ROTATION LEVER to line up with the cradle.
- Push the HOIST/LOWER lever away from you slowly and return ladder to cradle.

4.7 Apparatus Preparation Prior to Driving

- Aerial ladder bedded and stabilizers fully nested.
- Store wheel chocks, stabilizer pads, and make sure all compartments doors are closed.
- Close the red cover of the PTO CONTROL SWITCH, this will toggle the switch DOWN and disengage the power take off.
- Move the FRONT BRAKE LOCK SWITCH to the OFF position
5. AERIAL EMERGENCY HYDRAULIC OPERATIONS

5.1 The aerial ladder has an emergency hydraulic system. **This system is to be used when the normal PTO fails or the engine shuts down, and the aerial ladder or jacks need to be used.** Components of the system consist of an electrical auxiliary hydraulic pump and four emergency switches.

5.1.1 If the aerial or jacks can’t be moved because of a loss of hydraulic fluid this emergency system may not work. However, an attempt should still be made to activate the system. The reason for the failure must be addressed before the emergency system can function.

5.1.2 The steps required to use the emergency system **MUST** be followed in a precise order. When using the emergency system, a no rush approach shall be taken in order for the electrical pump and batteries not to fail. All functions will operate at a reduced rate of speed when the emergency system is activated.

5.1.3 The electrical pump and batteries need a cool-down period between operations (retract ladder, cool-down period, rotate ladder, cool-down period and so on). Sometimes a cool-down period may be needed during a partially completed operation, depending on the operating conditions.

5.1.4 The **engine cannot be running** when the Normal/Emergency Hydraulic Switch is placed in the Auxiliary position enabling the electric hydraulic pump.

5.2 Emergency Aerial Ladder Operation - The following steps must be taken to return the Aerial Ladder to the bedded position.

- With the engine OFF, place the ignition ON, place the transmission in the NEUTRAL (N) position and apply all brakes.

- On the Aerial Control Panel place the PTO CONTROL SWITCH to the ON position and move the NORMAL/EMERGENCY HYDRAULIC SWITCH to the AUXILIARY position (a red indicator light will illuminate).

- At the Pedestal Controls depress the AERIAL ENABLE FOOT SWITCH.

- Activate the EMERGENCY PUMP SWITCH (this is a momentary switch which means you must hold the switch in the “ON” position) and at the same time activate the function (control lever) that you want the ladder to perform.

- Once the ladder has completed the required function release both the control lever for that function and the EMERGENCY PUMP SWITCH at the pedestal and allow for a cool down period before attempting another function.

5.3 Emergency Stabilizer Operation - The following steps must be taken to return the Stabilizers to the nested position.

- With the engine OFF, place the ignition ON, place the transmission in the NEUTRAL (N) position and apply all brakes.

- On the Aerial Control Panel place the PTO CONTROL SWITCH to the ON position and move the EMERGENCY HYDRAULIC SWITCH to AUXILIARY position (a red indicator light will illuminate).
Remove the Stabilizer Manual Safety Pins from the Stabilizer legs.

At rear compartment for the Stabilizer function hold the STABILIZER CONTROL HANDLE in the UP/IN position.

Then hold the momentary AUXILIARY PUMP SWITCH to the ON position. Release both when the Stabilizer is nested. Allow for a cool-down period before attempting to nest the opposite Stabilizer.

5.4 **Emergency Override Rotation Limit Switch** - The aerial ladder system is equipped with a Rotation Limiting Device. This is a safety device that limits turntable rotation to keep the apparatus from overturning during operations where the stabilizers are not fully extended horizontally (Short-Jacked). Operating the aerial ladder on the Short-Jacked side of the apparatus can cause the apparatus to overturn onto that same side.

5.4.1 This device will activate when either the apparatus stabilizers have not been fully extended horizontally (Short-Jacked), or there is a mechanical malfunction. When either of these situations occurs, this device will not allow ladder rotation of more than 15 degrees from the center line of the apparatus towards the side which has the Short-Jacked condition or is experiencing a mechanical malfunction.

5.4.2 If a mechanical malfunction occurs and you have confirmed that the stabilizers are fully extended horizontally and loaded vertically, the Rotation Limiting Device, if activated, can be overridden. This is done by use of the EMERGENCY OVERRIDE ROTATION LIMIT SWITCH on the Pedestal Control Panel. This is a momentary switch which must be held while depressing the AERIAL ENABLE FOOT SWITCH at the base of the pedestal and operating the ROTATION LEVER.

5.4.3 When using the EMERGENCY OVERRIDE ROTATION LIMIT SWITCH, an alarm will sound and the SAFE ROTATION LIMIT EXCEEDED INDICATOR LIGHT will illuminate on the Pedestal Control Panel.

5.4.4 Use override only when absolutely necessary. Failure to ensure the stabilizers are properly set and that the vehicle is stable before activating the EMERGENCY OVERRIDE ROTATION LIMIT SWITCH can endanger members operating on or near the apparatus. As with all Aerial Ladder Operations, ensure the mechanical locking devices for jacks are in place before activating the EMERGENCY OVERRIDE ROTATION LIMIT SWITCH.

5.4.5 Members must take the necessary actions to provide for the **full horizontal extension** and necessary vertical loading of the inboard stabilizer (working side). This may require chauffeurs to forego a better position for the use of the aerial ladder to a less desirable location; one that allows for the full horizontal extension of the inboard stabilizer (working side), such as moving the apparatus forward several feet to deploy the stabilizer into the space between two parked vehicles.

5.4.6 If there is a malfunction of the Rotation Limiting Device, notify Fleet Services as soon as possible.