Aerial Operational Manual
Preface

Aerial Types:
- Mid-Mounted Aerial Ladder
- Rear-Mounted Aerial Ladder
- Mid-Mounted Aerial Platform
- Rear-Mounted Aerial Platform

Aerial Vocabulary

**Base-Section** – the lowest most section on an aerial

**Mid-Section** – is any of the sections used between the base section and the fly section

**Fly-Section** – the top most section on an aerial

**Short-Jacking Operation** – operation requiring that outriggers/stabilizers not fully extend and allow for aerial operations on opposite or stable side.

**Auto Self-Level Control** – an automatic leveling mechanism designed to place aerial device in a stable position
Aerial Vocabulary

**Torque Box (tube)** – part of an aerial attached below the turntable to transfer torsion loads to the chassis and ground.

**Turntable** – part of the aerial device attached to the base ladder section designed to articulate position for rescue or firefighting

**E-Tracking** - a flexible track utilized to protect electrical, communication and control wires in aerial extension/retraction

**Soft-Touch Control** - electric manual control of aerial functions

**Auto-Alignment Control** – automatic base section alignment for bedding function

**Dead Load** – weight of aerial and attached mechanism and equipment

**Live Load (Tip Load)** – weight and forces exerted on the aerial by payload, and water stream reactions.

**Outrigger/stabilizer** – a hydraulic lifting mechanism designed to prevent aerial overturn and transfer loads to the ground
Aerial Vocabulary

**Rated Capacity** – total weight of payload at the outermost ladder rung or platform with the water unchanged

**Cab-Body Collision Protection** – program preventing aerial device from collision with chassis and equipment body

**Pinnable Waterway** – manual device designed to place the waterway at the tip or midfly position

**Modified Warren Bridge** – design of aerial structure to transfer loads up and down the aerial device.

**Bolt-On Egress** – outermost extension device designed for personnel to climb on/off the aerial

**Yield Strength** – point at which the material exhibits a permanent deformation or set

**Water Load** – stress produced by water weight and nozzle reaction in overhead stream applications

**Hot Dipped Galvanized** – a process for treating steel ladder and stabilizers to prevent corrosion and oxidation on the inside and outside of all the ladder parts
Aerial Vocabulary

**Dead Load** – the weight of the aerial device and components mounted or manufactured

**Dead load Stress** – stress produced by the aerial structure weight and any permanently mounted or manufactured equipment

**Rated Capacity** – total weight of personnel, nonmounted equipment supported on the outermost rung of aerial with the waterway uncharged.

**Rated Capacity Stress** – stress produced by the aerial rated capacity applied to the tip of the fly section

**Water Reaction Stress** - weight of the water and nozzle reaction force

**Material Yield Stress** – the stress at which a material exhibits a distortion or permanent set

**Load Limit Indicators (Load Charts)** - a load indicator or instruction plate, visible at the operators position, showing the recommended safe load at any condition of the aerial’s elevation and extension
Ladder Diagram

- Control Panel
- Planetary Gear
- Hoist Cylinders
- Turntable Structure with Swivel Unit (in center)
- Bearing
- Torque Box
- Outrigger Box Tube
- Outrigger Beam
- Outrigger Jack Tube
- Fly Section
- Retractble Pan & Monitor
- Middle (Mid) Section
- Base Section
- Waterway

Ladder Diagram
Aerial Operations
Operation Overview

- Setting Up Your Cab for Aerial Operation ........................................... 9
- Outrigger Operation/Set Up ................................................................. 11
- Options & Operating the Outrigger Control Panel ............................... 18
- How to Operate Your Aerial from the Turntable ................................... 26
- Options and Operating the Aerial Control Panel ................................. 28
- How to Operate your Aerial from the Platform ...................................... 46
- Options and Operating the Platform Control Panel ............................. 48
- How to Operate You Aerial using the Radio Remote ............................. 60
- Features of Electric over Hydraulic Controls (Soft Touch Controls) ........ 69
Settings In the Cab for Aerial Operation
Setting Up Your Cab for Aerial Operation

1. Shift transmission (1) from drive into neutral.

2. Apply the parking brake (2).

3. Turn ladder power ON (3).

- The transmission (1) must be in neutral or 4th gear (4) for water pump. The parking brake must be set before the ladder power will operate.
Outrigger Operation/Set Up
Outrigger Operation Set Up

- Once the ladder power is activated, the flashing light (1) on the inside of the outrigger jack tubes will begin to flash and the outrigger jack scene lights (2) will come on.

- Outriggers are ready to operate.
Outrigger Operation Set Up

Once the Aerial Power is on and all the interlocks are set, the operator leaves the driving position to set the wheel chalks.

- Chalking the tires is a back up safety to the parking break.
- The tire chalks are stored under the fire truck body compartments.
- Chalk tires on the down hill side of the front tire and rear tire.
- On a level surface chalk front tire on front side and rear tire on rear side.

With tire chalks set the operator will proceed to the outrigger station. The Outrigger Not Extended Light (4) will be illuminated. This light will stay illuminated until all outriggers have been fully extended.
1. Activate Outrigger On/Off Switch (1) to the ON position.

☐ With the outrigger switch On, the engines RPM’s will go to the pre-set high idle. If the water pump is engaged the high idle of the aerial will be disengaged.

☐ The outrigger controls are located to the back, outside of the truck to provide the operator a good clear vision to set up the outriggers.
Outrigger Operation Set Up

2. Use Controllers to Extend Outriggers
   - Once all outrigger beams are extended the Outrigger Not Extended Light (4) will go out.

3. Position outrigger pads.
   (65-07-1150)
Outrigger Operation Set Up

4. Lower Outrigger Jacks

☐ Take the bubble out of the truck tire or level truck as much as possible.

☐ As the truck is leveled or the bubble is taken out, each Jack Indicator Light (3) will come on.

☐ All Jack Indicator Lights (3) must be on or flashing in order to operate aerial.
Outrigger Operation Set Up

5. When outriggers are set turn the Outrigger On/Off Switch (1) to the OFF position.

6. Install outrigger jack safety pins.

7. Check tire chalks to make sure they are secure.

8. Outrigger operation set up completed.

☐ The Aerial safety interlock Control system will not activate until the outriggers are placed securely on the ground.
Options and Operating the Outrigger Control Panel
Outrigger Control Panel Diagram

1. Outrigger On/Off Switch
2. Aerial/Outrigger Override Switch
3. Jack Lights
4. Outrigger Not Extended Light
5. Hour Meter
6. Emergency Hydraulic Backup Pump Switch
1. Outrigger On/Off Switch

- The Outrigger On/Off Switch must be turned On before the outriggers can begin to operate.
2. Aerial/Outrigger Override Switch
   - With the aerial out of the bed the outriggers can no longer be moved. If a case arises where the outriggers need to be readjusted activate the momentary Aerial/Outrigger Override Switch down to Outrigger Override.
3. Jack Lights

The Jack Lights are provided for each outrigger extension to indicate precisely 1/8” outrigger extension movement.

Each individual outrigger status Jack Light has four conditions to provide at a glance the position of each outrigger’s condition.

- The Jack Light will remain unlit when the outrigger is fully retracted and the jack is not set on the ground.

- The Jack Light will flash rapidly (five flashes per second) if the outrigger is not fully extended and the jack is not set on the ground.

- The Jack Light will flash slowly (twice per second) if the jack is set on the ground but the outrigger is not fully extended.

- The Jack Light will remain lit solidly if the jack is set on the ground and the outrigger is fully extended.
4. Outrigger Not Extended Light

- The Outrigger Not Extended Light will be lit solidly if any outrigger is not fully extended.
- The Outrigger Not Extended Light will be lit solidly if any jack is not set on the ground.
- The indicator will flash rapidly (5 times per second) if the Aerial is out of the Bed preventing outrigger operations.
5. **Hour Meter**
   - The Hour Meter keeps track of the hours the aerial operates.

6. **Emergency Back-Up Pump On/Off Switch** *(50-01-1300)*

   Emergency Back-Up Pump which is only used to stow your aerial in case of hydraulic failure.

   **To Use Emergency Back-Up Pump**
   - First, select the operation required (outrigger or aerial) and turn switch to the ON position
   - Second, engage the outrigger or aerial control handle.
   - Third, activate momentarily the Emergency Back-Up Pump

   - To ensure that the Emergency Back-Up Pump doesn’t overheat, it can only operate 5 minutes out of 60.
Short Jacking

- A red warning light at the outrigger and aerial operator’s control consoles will warn the operator that one or more outriggers have been short jacked.

- It is possible to operate over short-jacked outriggers. Ramping up and ramping down of all ladder functions, controlled by the programmable logic controller for outrigger placement which. This allows outrigger short jacking and the aerial to rotate over the short jacked outrigger if proportionally extended and elevated to meet programmable logic control programming.

- In the event the aerial logic controller will not allow the aerial to safely operate over a short-jacked outrigger, the aerial will automatically ramp to a feather-soft stop and shall allow the operator to return to safe operating parameters.
How to Operate Your Aerial from the Turntable
Aerial Operation: Soft Touch Control Panel

1. Activate Aerial Power
   High/Off/Low Switch (1) to either the high or low position.

   *(50-01-1300)*
   - For full operation explanation see Options and Operating the Aerial

2. To operate the three independent control levers, extend/retract (5), left/right (6), and raise/lower (7), the operator must lift locking mechanism on control handle before activating controllers.

   *(50-01-1300)*
   - For full operation explanation see Options and Operating the Aerial
Options and Operating the Aerial Control Panel
Aerial Control Panel Diagram

1. Aerial Power High/Low Switch (50-01-1300)
2. Panel Lights On/Off Switch (50-01-1300)
3. Telescopic Lights On/Off Switch (50-01-1300)
4. Tracking Lights On/Off Switch (50-01-1300)
5. Aerial Extend/Retract Controller (50-01-1300)
6. Aerial Right/Left Controller (50-01-1300)
7. Aerial Lower/Raise Controller (50-01-1300)
8. Emergency Stop Button (50-01-1300)
9. Outrigger Not Extended Light (50-01-1300)
10. Rungs Alignment Light (50-01-1300)
11. Left Rotation Disabled Light (50-16-1200)
12. Lower Disabled Light (50-16-1200)
13. Right Rotation Disabled Light (50-16-1200)
14. Hydraulic System Pressure (50-01-1300)
15. Flowminder (50-01-1300)
16. Reset Flowminder (50-01-1300)
17. Aerial Loading Lights (50-01-1300)
18. Emergency Back-Up Pump (50-01-1300)
19. Radio Remote On/Off Switch (50-01-1300)
20. Rung Light On/Off (50-01-1300)
1. Aerial Power High/Low Switch

- The aerial control system provides two users selectable speed levels (high and low) and a control disable function (off). All operations provide smooth starting or stopping through acceleration and deceleration limits. The aerial ladder will automatically slow down before reaching any physical extent and then ramp off to a feather-soft stop. Ladder up/down and rotate speed is proportionally reduced as ladder extension length is increased. At all times, the operator remains in precise control of the ladder’s position.

- This switch can be found both at the Aerial Control Panel and the Platform Control Panel.
Panel, Telescopic & Tracking Lights

2. Panel Lights On/Off Switch
   - This switch turns on the lights for the control panel.
   - This switch can be found both at the Aerial Control Panel and the Platform Control Panel.

3. Telescopic Lights On/Off Switch
   - The Telescopic Light are . . .

4. Tracking Lights On/Off Switch
   - The tracking lights are located at the bottom of the base section a head of the hoist cylinders.
Soft Touch Controller Capabilities

- Control handles are provided for Rotation, Elevation, and Extension. Each control handle has a lock in the neutral position. Unlocking and moving a control in an allowable direction will activate the hydraulic system and cause an increase to the engine speed to an average of 1250 RPM. The hydraulic system activation and engine RPM increase will remain in effect until 5 seconds after all motion of the ladder has ceased.

- All controllers will ramp up and down to a feather-soft stop.

- The Aerial Control System is managed by a Programmable Logic Controller (PLC). The PLC monitors position and load sensors, communicates with other truck PLC’s and adjusts operations up to 50 times a second to maintain maximum safety for the aerial ladder.
  - This switch can be found both at the Aerial Control Panel and the Platform Control Panel.
Aerial Extend/Retract & Left/Right Controllers

5. Aerial Extend/Retract Controller
   - Extend
     - The Aerial will proportionally slow down, starting at 70% of its extension and ramp to off at full extension.
   - Retract
     - The aerial will proportionally slow down at 98% of its retraction and ramp to a feather –soft stop at full retraction.
     - This controller can be found both at the Aerial Control Panel and the Platform Control Panel.

6. Aerial Right/Left Controller
   - The aerial will proportionally slow down at 70% extension and under 55° elevation for safer operations.
     - This controller can be found both at the Aerial Control Panel and the Platform Control Panel.
Aerial Lower/Raise Controller

7. Aerial Lower/Raise Controller
   - Lower
     - The aerial will proportionally slow down with the aerial extended beyond 70% or the aerial operated below 5° elevation and ramp to off at -12°.
   - Raise
     - The aerial will proportionally slow down when the aerial is extended at 70% or above 55°.
     - When elevating, the aerial will proportionally ramp to off at full elevation.

   - This controller can be found both at the Aerial Control Panel and the Platform Control Panel.
Automatic Ladder Bedding

- Aerial control system will lock out rotation when the aerial ladder elevation is at a +5° or below elevation and the extension is less than 70% fully extended and aligned with ladder bed.

- The aerial rotation will ramp to low when the aerial elevation is at +5° or below and the aerial extension is less than 70% and the aerial is within 3° (each side of the aerial being aligned with the ladder bed.)
Aerial Control Panel Operations

8. Emergency Stop Button

- The emergency stop button will be used for instantaneous stopping and will return the system to the “off” position, the engine speed will return to normal idle speed and the hydraulic system de-energizes.

- The button on the Aerial Control Panel and the Platform Control Panel must be On (pulled up) in order to operate Aerial.
  - This switch can be found both at the Aerial Control Panel and the Platform Control Panel.

9. Outrigger Not Extended Light

- The Outrigger Not Extended Light will be lit solidly if any outrigger is not fully extended or if any jack is not set on the ground. The indicator will flash rapidly (5 times per second) if the Aerial Out of Bed Interlock is preventing outrigger operations.

- The flashing at the Aerial Control Panel alerts the operator of outrigger override movement.
  - This switch can be found both at the Aerial Control Panel and the Platform Control Panel.
10. Rung Alignment Light

- Rung Alignment Lights is an option to have lighting run all the way up the inside of the aerial.

- As the ladder extends and the rungs align the Rung Alignment Light will come on. The light will stay on as long as the rungs stay aligned.

- When the light is on, the top section rungs are slightly ahead of the ones below.
A Aerial Control System provides indicators for monitoring cab and body protection. A Left Rotation Disabled Light, Down Rotation Disabled Light, or Right Rotation Disabled Light indicate the operation restrictions.

- The three lights will turn on when the aerial gets to close to the cab or body and will ramp the aerial to a slow, soft stop. The operator will be able to rotate the aerial away from the cab and body without the use of any extra switches or controls (overrides). Ladder bedding can occur when both Left and Right Rotation Disabled Lights are lit and the Down Rotation Disabled light is not lit.

- The “Auto-Bedding” system will indicate when the elevation of the aerial is below a pre-set level, and the aerial rotation is at a pre-set rotation point. The automatic alignment location feature will stop rotation of the aerial, and only allow the aerial to be lowered into the bed. In order to continue rotation, it will be necessary to elevate the aerial slightly before rotating.
  - These lights can be found both at the Aerial Control Panel and the Platform Control Panel.
14. Hydraulic System Pressure Gauge
   - They Hydraulic System Pressure Gauge will show full system pressure when the aerial controls are activated and return to zero when controllers are deactivated.
15. Flowminder
   - The Flowminder reads the gallons per minute that are being pumped to the tip of the aerial.
   - The Flowminder can be found at the Aerial Control Panel and the Platform Control Panel.

16. Flowminder Reset Button
   - The Flowminder Reset Button, otherwise known as a totalizer, displays the total amount of water that has been flowed since the unit was turned on. When in totalizer mode, all decimal points will flash to indicate this mode.
   - The Flowminder Reset can be found at the Aerial Control Panel and the Platform Control Panel.
17. Aerial Loading Lights

- The green light indicates safe loading below 90% of rated load.
- The yellow light indicates caution load with the aerial at 90% to 100% of rated load.
- The red light indicates overloaded rated load on aerial and flashes from 105% plus rated load and turns on an audible alarm.
Emergency Back-Up Pump

18. Emergency Back-Up Pump Switch

- Emergency Back-Up Pump which is only used to stow your aerial in case of hydraulic failure.

To Use Emergency Back-Up Pump

- First, select the operation required (outrigger or aerial) and turn switch to the ON position
- Second, engage the outrigger or aerial control handle.
- Third, activate momentarily the Emergency Back-Up Pump Switch

- To ensure that the Emergency Back-Up Pump doesn’t overheat, it can only operate 5 minutes out of 60.
Emergency Back-Up Pump

19. Radio Remote On/Off Switch
   - The Flowminder Reset can be found at the Aerial Control Panel and the Platform Control Panel.

20. Rung Light On/Off Switch
   - This light turns on the rung lighting along the aerial.
Aerial Control Panel Operations

Two Way Intercom System

The two way intercom system provides communication from the turntable control panel to the platform.

Intercom:

- Turntable intercom push to talk station
- Tip intercom hands free station
- Pump panel intercom push to talk station. (Option)
Standard Feature

Safety Warning Labels

Safety Warning are located inside the control cover lid on the top side of the turntable control panel listing the different dangers that can happen without proper training.

Safety Warning Labels are also located on the platform.
How to Operate Your Aerial from the Platform
Platform Operation: Controllers

1. Activate Aerial Power High/Low Switch (1) to either the high or low position.

   *(50-02-0015)*

2. Operate the three independent control levers, extend/retract (5), left/right (6), and raise/lower (7), operator must lift locking mechanism on control handle before activating controllers.

   *(50-02-0015)*
Options and Operating the Platform Control Panel
Platform Control Panel Diagram

1. Aerial Power High/Low (50-02-0015)
2. Panel Lights On/Off (50-02-0015)
3. Tip Lights On/Off (50-02-0015)
4. Telescopic Lights On/Off (50-02-0015)
5. Extend/Retract Controller (50-02-0015)
6. Right/Left Controller (50-02-0015)
7. Lower/Raise Controller (50-02-0015)
8. Emergency Stop Button (50-02-0015)
9. Outrigger Not Extended Light (50-02-0015)
10. Rung Alignment Light (50-02-0015)
11. Left Rotation Disabled (50-02-0015)
12. Lower Disabled (50-02-0015)
13. Right Rotation Disabled (50-02-0015)
14. Aerial Loading Lights (50-02-0015)
15. Flowminder (50-02-0015)
16. Flowminder Reset (50-02-0015)
17. Airminder Gauge (50-02-0015)
18. Under Floor Scene Lights On/Off
Aerial Power, Panel, Tip, & Telescopic Lights

1. Aerial Power High/Low
   - See instructions from Aerial Control Panel

2. Panel Lights On/Off
   - See instructions from Aerial Control Panel

3. Tip Lights On/Off
   - See instructions from Aerial Control Panel

4. Telescopic 110VAC Lights
   - See instructions from Aerial Control Panel
Platform Controllers

5. Extend/Retract Controller
   - See instructions from Aerial Control Panel

6. Right/Left Controller
   - See instructions from Aerial Control Panel

7. Lower/Raise Controller
   - See instructions from Aerial Control Panel
8. **Emergency Stop Button**
   - See instructions from Aerial Control Panel

9. **Outrigger Not Extended Light**
   - See instructions from Aerial Control Panel

10. **Rung Alignment Light**
    - See instructions from Aerial Control Panel
Cab and Body Protection

11. Left Rotation Disabled Light
   - See instructions from Aerial Control Panel

12. Lower Disabled Light
    - See instructions from Aerial Control Panel

13. Right Rotation Disabled Light
    - See instructions from Aerial Control Panel
15. Flowminder
   - See instructions from Aerial Control Panel

16. Flowminder Reset
   - See instructions from Aerial Control Panel
17. Airminder

- The Class 1 Airminder provides a visible indication of breathing air remaining and an audible warning when less than 20% air remaining. This alarm will not activate when there is less than 50 PSI air in the system.

- When the relative volume of air remaining reaches 25%, the bars will begin to flash and the alarm output becomes active when system pressure drops to 20%.
18. Under Floor Scene Light On/Off Switch

- These lights are located under the platform.
Lifting Eyes

The Rope Rescue Eyelets are rated at 500lbs. a piece and 1000lbs. together with no live load in the bucket.

The Lifting Eyes are located at the bottom rear of the platform.
Repelling Arms

1. Rotate arms to front

2. Repelling arms are now ready for repelling.

- Each arm holds up to 250lbs. Together they can support 500lbs.
Stokes Basket

1. The Stokes Basket is placed on the front of the platform on top of repelling arms.

2. Insert pins
How to Operate Your Aerial Using the Radio Remote
1. On/Off Switch
2. Frequency Button
3. 50% to 100% Switch
4. Enable Button
5. Extend/Retract Controller
6. Clockwise/Counter Clockwise Controller
7. Raise/Lower Controller
8. Aerial Water Monitor Stream/Shape Switch
9. Aerial Water Monitor Clockwise/Counter Clockwise Switch
10. Aerial Water Monitor Lower/Raise Switch
Radio Remote

- Radio, hand held, remote controller for proportional ladder movement and nozzle functions, operates up to 300 feet away from truck.

- The Radio On/Off Switch, located on the Aerial Control Panel, must be in the On position to operate Radio Remote.
Radio Remote

1. On/Off Switch
   - When switch is turned On the green indicator light will illuminate.
   - Red light will illuminate when the battery is low and needs to be recharged.

2. Frequency Button
   - The frequency may need to be changed in order to get a better single.
3. **50% or 100% Button**

- The speed needs to be selected either full speed 100% or half speed 50% before operating.
4. Enable Button

- The enable button must be pushed in order to activate the aerial controllers.
- When aerial controller is operating the enable button can be released.
- Moving a control in an allowable direction will activate the hydraulic system and cause an increase to the engine speed to an average of 1250 RPM’s.
- The hydraulic system activation and engine RPM increase will remain in effect until 5 seconds after all motion of the ladder has ceased.
- The controllers can be reengaged without the reuse of the enable button for up to five seconds after operation has ceased.
5. **Extend/Retract Controller**
   - **Extend**
     - The Aerial will proportionally slow down, starting at 70% of its extension and ramp to off at full extension.
   - **Retract**
     - The aerial will proportionally slow down at 98% of its retraction and ramp to a feather-soft stop at full retraction.

6. **Clockwise/Counter Clockwise Controller**
   - The aerial will proportionally slow down at 70% extension and under 55° elevation for safer operations.
Radio Remote

7. Lower/Raise Controller

- Lower
  - The aerial will proportionally slow down with the aerial extended beyond 70% or the aerial operated below 5° elevation and ramp to off at -12°.

- Raise
  - The aerial will proportionally slow down when the aerial is extended at 70% or above 55°.
  - When elevating, the aerial will proportionally ramp to off at full elevation.
Radio Remote

8. Aerial Water Monitor Stream/Shape Switch

9. Aerial Water Monitor Clockwise/Counter Clockwise Switch

10. Aerial Water Monitor Lower/Raise Switch
Features of Electric over Hydraulic Controls
(Soft Touch Controls)
Features of Electric over Hydraulic Controls
(Soft Touch Controls)

1. Raises and lowers R.P.M.’s (when that water pump is not engaged) with the movement of the aerial control handles. No need for a foot switch.

2. Ramps all ladder controls, starting and stopping.

3. Ramps the extension and retraction of the ladder sections to a slow speed when sections are at the end of their travel.

4. Ramps ladder to soft stop at full elevation.

5. Changes the speed from high to low at 5° when lowering for safer aerial bedding.
Features of Electric over Hydraulic Controls (Soft Touch Controls)

6. Ramps the aerial to soft stop at lowest elevation.

7. Short Jacking allows the aerial to ramp to a slow stop and return the opposite way without another operator.

8. Cab and body protection stops the aerial from hitting the cab or body. (50-16-1200)

9. Auto bedding alignment of aerial to the ladder bed stops aerial rotation when lined up with the ladder bed at the preset elevation. (50-16-1200)

10. Aerial over load protection stops the aerial from extending and lowering with ladder overload.