Pierce All Wheel Steering Aerial Tower Vehicle Familiarization

2007 Pierce AWS Aerial Tower

95’ Aerial Tower

Purpose

Safety is the most important reason to inspect a vehicle. Vehicle components that are overlooked on a preventative maintenance inspection may lead to malfunctioning and equipment failure during emergency responses. The importance of diligent inspections cannot be over emphasized, especially in the wake of liability issues and challenges that confront the new driver. Federal and state laws require that drivers inspect their vehicles.

New Philosophy

We drive our vehicles with the mindset that the other driver will make a mistake in the path of our vehicle.

Our operators will drive proactively by adjusting their driving to avoid collisions triggered by other drivers, traffic, and environmental conditions.

OVERVIEW

- Introduction
- Overview
- Steering Controls
- Display Operations
- Axle Values
- Control System
- System Errors
- Manual Centering

Introduction

- ALL STEER® all-wheel driving system consists of:
  - Vehicle's original front steering system.
  - Driving, steerable rear axles.
  - Rear axle hydraulic steering pump, steering cylinder(s) and hydraulic filter.
  - Various valves and sensors.
  - ALL STEER® VIM (Vehicle Interface Mode), translators, mode selectors switches and liquid crystal display.

2007 Pierce AWS Aerial Tower Command Zone

- The Command Zone inside the cab allows you to view many of the vehicle functions and functionality.

2007 Pierce AWS Aerial Tower Command Zone

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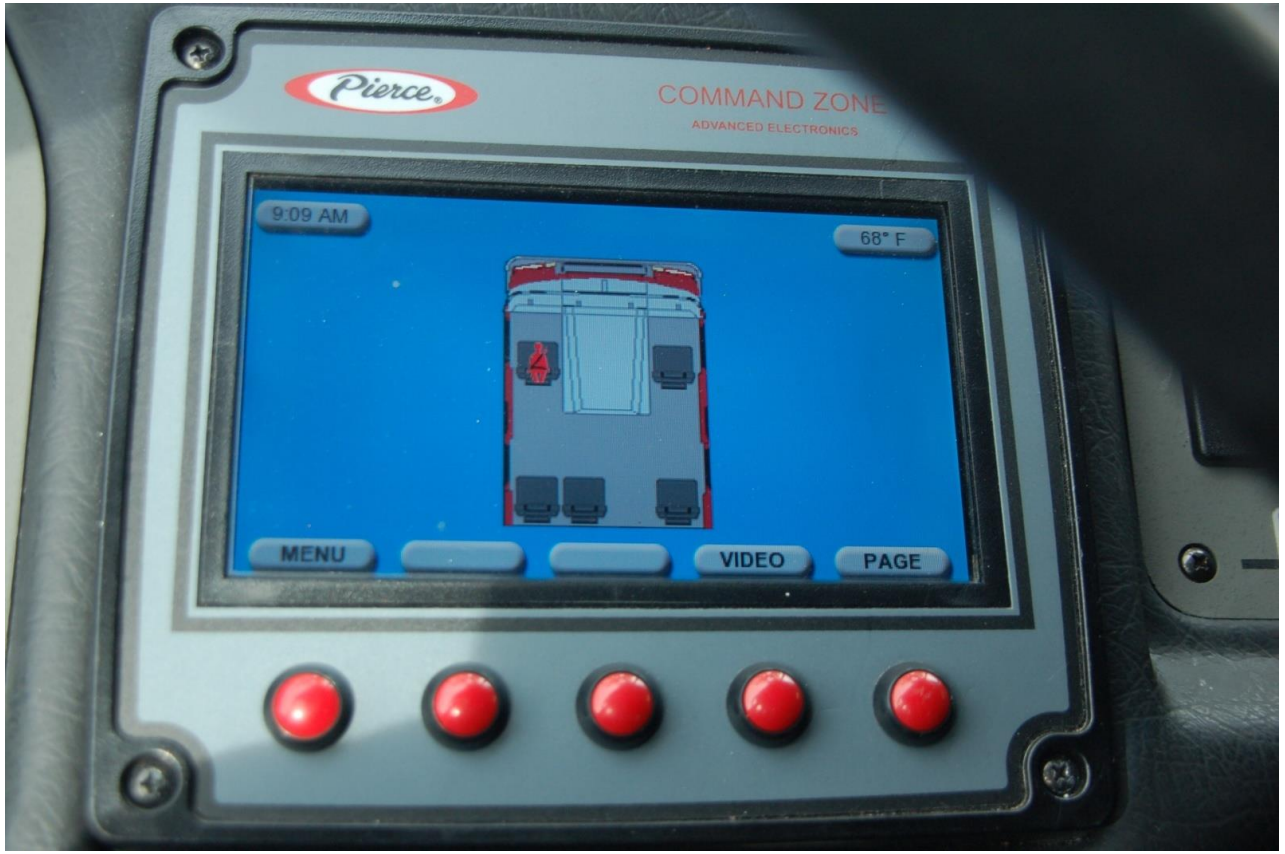


Command Zone at the Pedestal

2007 Pierce Aerial Tower Dash

2007 Pierce Aerial Tower Dash

2007 Pierce Aerial Tower Dash

Overhead Switches

Raise the Cab

Controls are located on the officers side behind the cab. Batteries and ignition must be on.

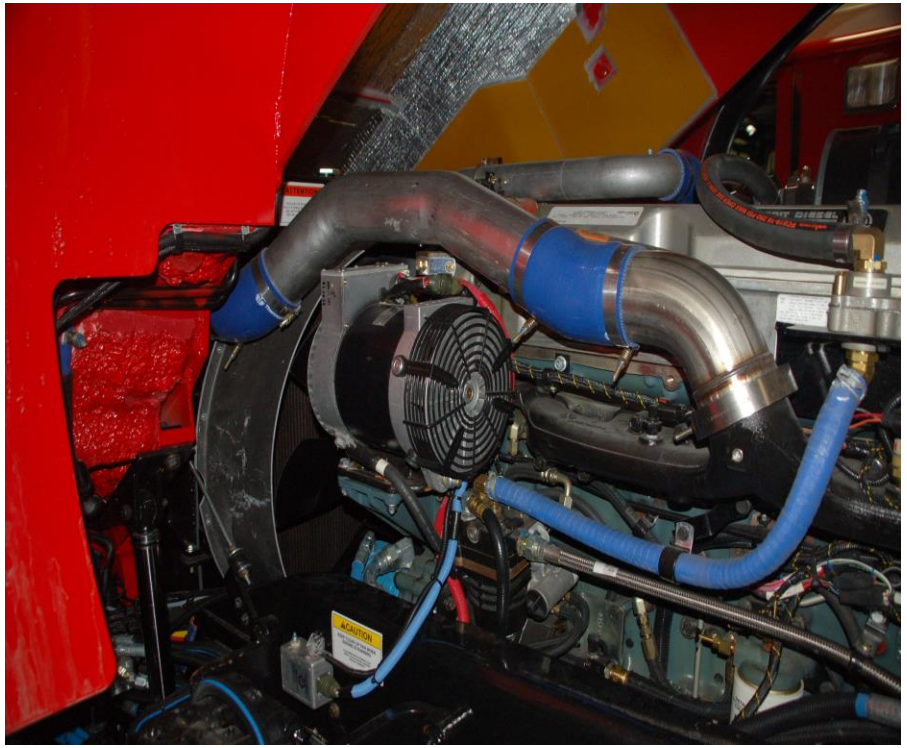
Contents in the cab MUST be secured.

Turn the red switch to raise. Hold up the activate switch until the cab is fully raised.

Watch overhead for clearance.

Raise the Cab

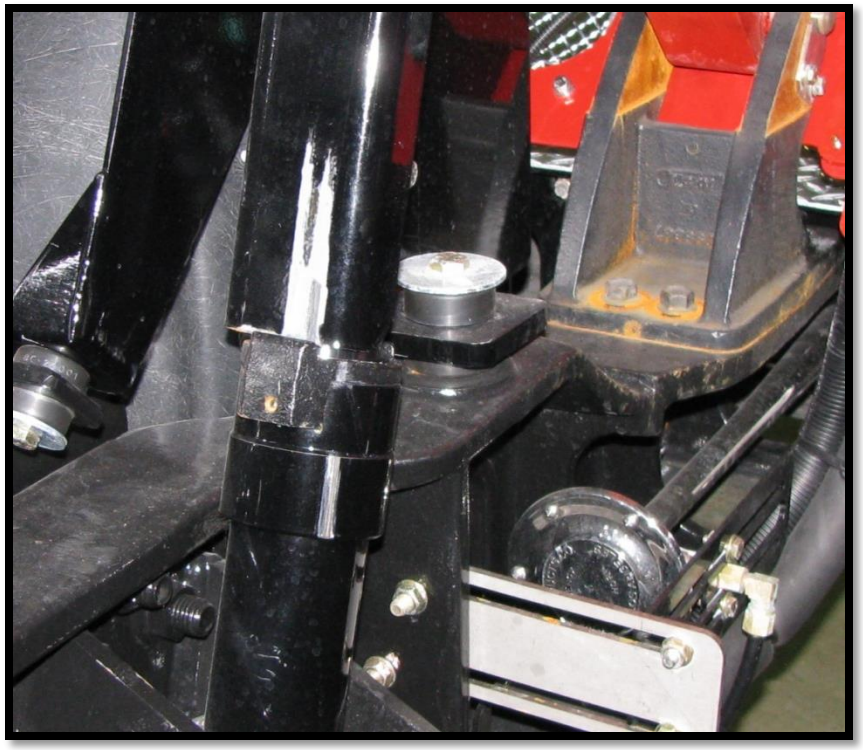
Raise cab during weekly checks and start engine check on the driver's side.



Raise the Cab

The lock for the cab tilt is on the officers side.

The locking channel must NOT rest on the collar of the piston. It must fall against the piston and behind the safety.



Raise the Cab

Full cab tilt feature:

Offers wide open access to the motor, transmission, pto's, batteries, fluids, etc.

Engine Compartment

FLUIDS:

Engine Oil

- Proper level
- Doesn't smell like diesel
- Not milky or froth

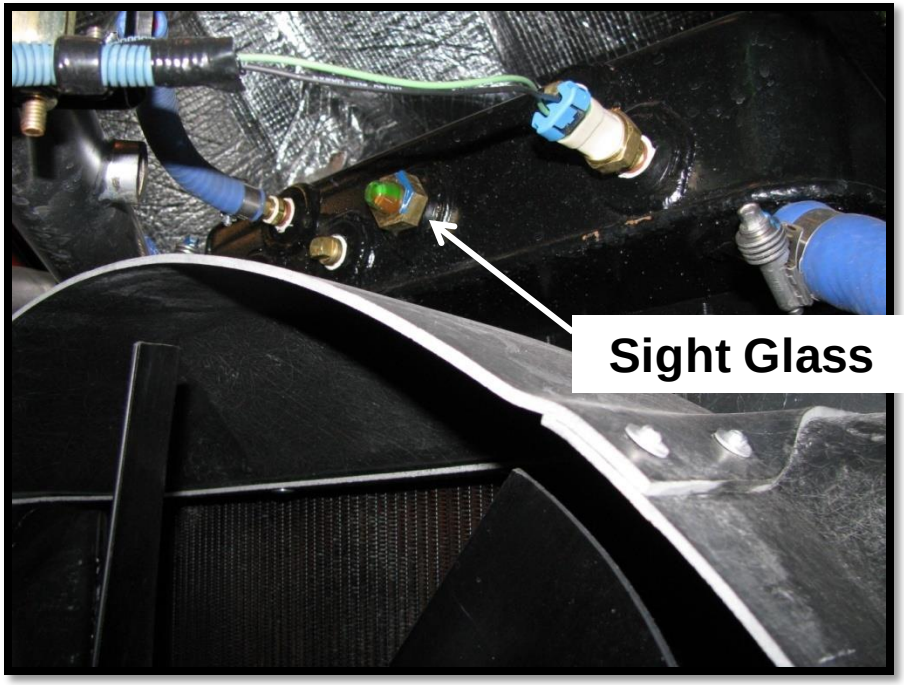
Transmission Fluid

- Checked with the engine running.
- Proper fluid levels
- Doesn't smell burned
- No antifreeze bubbles

Engine Compartment

RADIATOR:

- Unit securely mounted
- Unit is not leaking
- Filled to proper level
- Proper cap
- Check all hoses



Engine Compartment

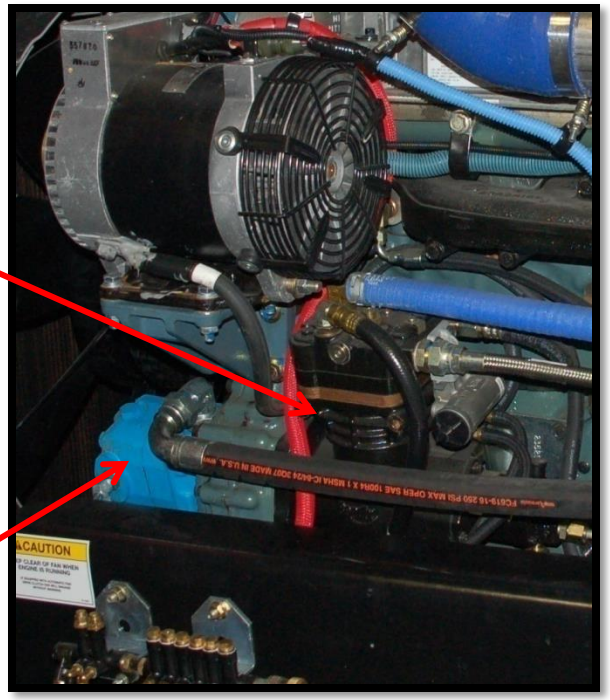
ALTERNATOR:

- Unit is securely mounted
- Belt is not frayed, cut or broken
- Belt has no more than ¾ inch deflection
- Electrical connections are not loose, frayed or broken

Engine Compartment

AIR COMPRESSOR:

Securely mounted and
no audible air leaks



POWER STEERING PUMP:

Securely mounted and
no visual fluid leaks

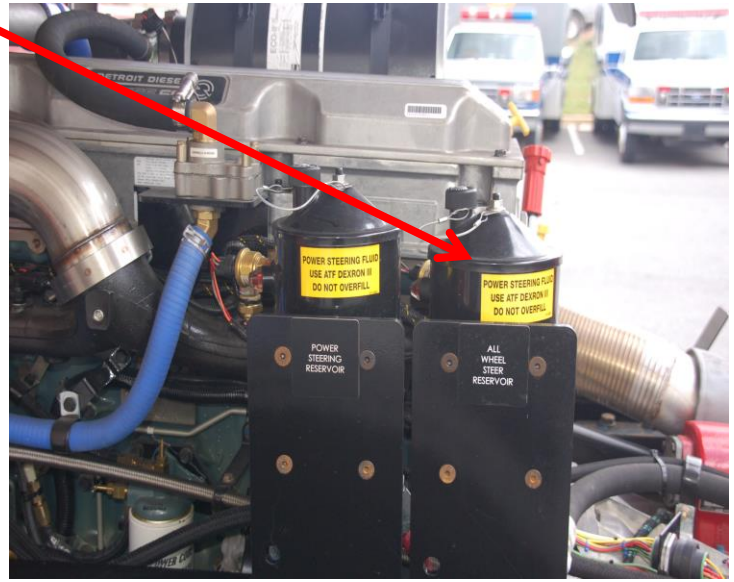
Engine Compartment

POWER STEERING RESERVOIRS:

Securely mounted and no visual fluid leaks

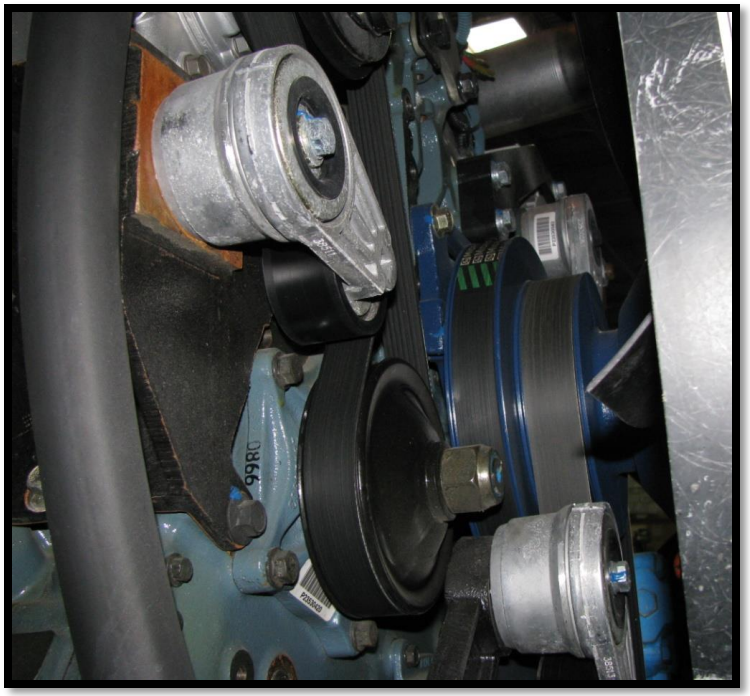
Reservoirs are filled to proper level

Use either sight glass or dipstick



Engine Compartment

BELTS AND HOSES:



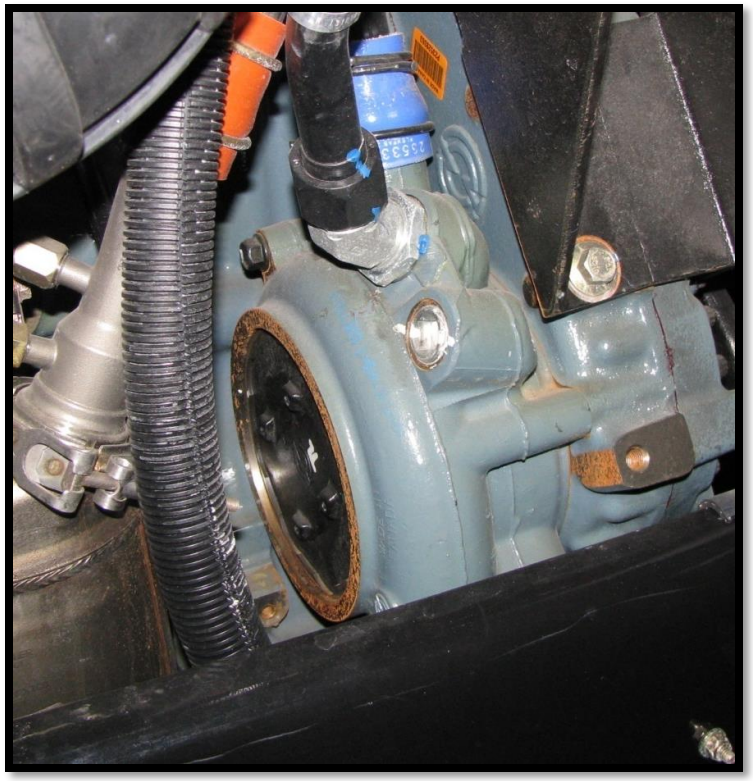
Engine Compartment

WATER PUMP:

Secure, not leaking

Lower radiator hose connection not leaking

By-pass hoses not bulging or leaking.



ALLSTEER ® All Wheel Steering System Controls

Gives maximum amount of maneuverability possible.

Computer-based, electronic system.

Follow maintenance schedules to avoid malfunction of components.

Maximizing All-wheel Steering System

- Front Mode is conventional steering: use for normal driving conditions.
- Coordinated All-steer Mode: used for additional maneuverability or emergency response.
- Fireground/Crab Mode: used on fire-scenes. Less than 5mph.

Instrument Panel Controls

3 Position ALL STEER Mode Switch

Instrument Panel Controls

- 3-Position ALL STEER Mode Switch:

  Front Steer Position:

  - Rear wheels locked in straight-ahead position regardless of front wheel position.
  - Only front wheels steer.

  Coordinated Steer Mode:

  - Front wheels turn past the programmed deadband.
  - Rear wheels turn in opposite direction for better turning radius.
  - Maximum operating speed of 38mph.

Instrument Panel Controls

Fireground Steer Mode Switch

Instrument Panel Controls

Fire-ground Steer Mode:

Coordinated Steer:

- Rear wheels turn proportionately in the opposite direction to the front wheels.
- Allows tighter turn than normal coordinated mode.
- Maximum speed 10mph.

Crab Steer:

- Rear wheels turn proportionately in the same direction as the front wheels.
- Vehicle moves sideways in diagonal manner.
- Maximum speed 6mph.

Axle Status Screen

Axle Status Screen

- Chassis outline displays status of wheels.
- Wheels turned in accordance of wheels of truck.
- Top of screen displays front of truck.
- “Unlocked” – pins in raised position.
- “Locked” – pins are seated in tapered hole of lock block.
- Current Mode – actual driving mode of truck.
- Previous Mode – mode that truck will return to after overspeed condition.

Axle Status Screen

- Message Box: displays conditions to be satisfied to change a requested mode to a current mode, error message details, and calibration instructions.
- Enter/Exit Button: “blue” button allows for entering/exiting screen adjusting.

Input/Output Screen

- To access the Input/Output screen, press the fourth pushbutton from the left . After pressing the pushbutton, 5 boxes emerge from the bottom of the screen.
- The fourth pushbutton from the left has a box above it that is labeled “NEXT”. Press the fourth pushbutton again. The Input/Output screen will be shown on the display.

Input/Output Screen

- Hydraulic Filter Input Button:

  - This input is from the differential pressure switch on the high-pressure filter located between the ALL STEER hydraulic pump and the ALL STEER hydraulic manifold.

  - This input is on when the hydraulic filter is clean and oil is flowing freely. This input is off when the filter is plugged and oil flow is restricted, or there is a break in continuity between the filter switch and the VIM.

Input/Output Screen

- Calibrate Switch Input:

  - This input will normally read “OFF”. When the calibration switch is actuated the input will change to “ON”. This is to be used ONLY by the Mechanics!

- Alarm Feedback Input:

  - This input will read “OFF” when the crab alarm is off. This input will read “ON” when the crab alarm is sounding.

Input/Output Screen

- Lock 2 Feedback Input:

  - This input will read “OFF” when the lock pin on the forward rear axle of a tandem rear axle truck or the rear axle of a single rear axle truck is up, or outside the range of the lock proximity switch.

Input/Output Screen

- Lock 3 Feedback Input:

  - This input will read “OFF” when the lock pin on the rear most axle of a tandem rear axle truck is up or outside the range of the lock proximity switch.

  - This input will read “ON” when the lock pin is fully seated in the tapered hole or within the range of the lock proximity switch. This input will be omitted on single rear axle trucks.

Steering Valves

- The four steering valve outputs display a “Ø” when the valve is off or not steering, and will display a number when the valve is steering.
- The number is only used as an indicator that the valve is on.
- When a number is displayed, this means voltage is being sent to the valve.
- The coil is energized, shifting the spool in the valve, causing the rear axle to turn.

Steering Valves

- Axle 2 Left Valve:

  - This output is for the left valve on the forward rear axle of a tandem rear axle truck or the rear axle of a single rear axle truck.

  - This output reads “Ø” when the valve is turned off and reads a number when the valve is on.

- Axle 2 Right Valve:

  - This output is for the right valve on the forward rear axle of a tandem rear axle truck or the rear axle of a single rear axle truck.

  - This output reads “Ø” when the valve is turned off and reads a number when the valve is on.

Steering Valves

- Axle 3 Left Valve:

  - This output is for the left valve on the rear most axle of a tandem rear axle truck This output reads “Ø”when the valve is turned off and reads a number when the valve is on.

  - This output will be omitted on single rear axle trucks.

- Axle 3 Right Valve:

  - This output is for the right valve on the rear most axle of a tandem rear axle truck This output reads “Ø”when the valve is turned off and reads a number when the valve is on.

  - This output will be omitted on single rear axle trucks.

Miscellanous VIM Outputs

- Axle Lock Power:

  - This is the 12-volt output to the electric over air lock valve(s). This output reads “ON” when the locks are unlocked and “OFF” when they are locked.

- Tire Chain Power:

  - This is the 12-volt output that engages the automatic tire chains. This output is “ON” when the tire chains are engaged and “OFF” when the tire chains are disengaged.

- Alarm Power:

  - This is the 12-volt output to the crab alarm. This output is “ON” when the crab alarm is on and is “OFF” when the crab alarm is off.

Input/Output Switches

- Coord Switch:

  - This input reads the Coordinated mode input on the three-position mode switch. This input reads “ON” when the Coordinated Mode has been selected and reads “OFF” when any other mode has been selected.

- Front Switch:

  - This input reads the Front mode input on the three-position mode switch. This input reads “ON” when the Front Mode has been selected. This input reads “OFF” when any other mode has been selected.

Input/Output Switches

- Crab Switch:

  - This input reads the Crab Mode input on the two-position mode switch. This input reads “ON” when Fireground on the three-position switch and Crab on the two-position switch has been selected. This input reads “OFF” when any other mode has been selected.

- Coordinated Fireground Switch:

  - This input reads the Coordinated Fireground input on the two-position mode switch. This input reads “ON” when Fireground on the two-position mode switch and Coordinated on the three-position mode switch has been selected. This input reads “OFF” when any other mode has been selected.

Input/Output Switches

- Tire Chains Switch

  - This input reads the automatic tire chains switch input. This input reads “ON” when the tire chain switch is on and “OFF” when the tire chain switch is off.

Valve Thresholds

- Valve Threshold numbers are set up during the calibration and learn cycle. These numbers represent the minimum electrical signal required to turn the rear axle.
- These numbers vary from left to right and axle to axle but usually are between 350 and 550 for a tandem aerial ladder fire truck.
- These numbers do not change during normal operation.

Valve Thresholds

- Axle 2 Left Threshold:

  - This represents the threshold number of the left valve for the forward rear axle of a tandem or a single rear axle truck.

- Axle 2 Right Threshold

  - This represents the threshold number of the right valve for the forward rear axle of a tandem or a single rear axle truck.

Valve Thresholds

- Axle 3 Left Threshold:

  - This represents the threshold number of the left valve for the rear most axle of a tandem axle truck. This threshold will be omitted if this is a single rear axle truck.

- Axle 3 Right Threshold

  - This represents the threshold number of the right valve for the rearmost axle of a tandem axle truck. This threshold will be omitted if this is a single rear axle truck.

Encoder Value Screen

- The encoder value screen shows the calibrated center positions, full cramp positions, real time encoder values, and calibrated deadband values of each axle.
- This screen will be used by the technician for troubleshooting. This screen will not be used for normal ALL STEER operation.

Screen Adjustments

- Contrast and lighting may be adjusted to aid in reading the display. The screen will retain the adjusted settings until it is powered down. When the display is repowered it will revert to the default settings.
- To access screen adjustments, press the blue pushbutton located to the far right.

Key Switch

To activate ALL STEER:

- Insert the key into the key switch and turn the key clockwise to activate. The key may be removed to prevent unauthorized de-activation of ALL STEER.

Key Switch

- **To deactivate ALL STEER:**

  - Place the ALL STEER mode switch in the FRONT STEER position.

  - Steer the vehicle into the straight ahead position to ensure that the rear wheels are locked in the straight ahead position.

  - Verify that LOCKED appears on the LCD display.

  - Insert the key into the lock switch and turn the key counter-clockwise to deactivate.

  - Remove the key.

Key Switch

- When ALL STEER is deactivated:

  - The system is powered down.

  - The rear axle(s) remain in whatever position it was (they were) in when the system was powered down.

  - The controller is inactive and does not check for errors or axle misalignment.

  - The vehicle drives as if it is not equipped with ALL STEER all wheel steering system.

Control System Operation

- Automatic features that simplify the operation of your vehicle and reduce the risk of unintended over-steering.
- Although ALL STEER aids in maneuverability, YOU are in control of the system.
- Drive using ALL STEER modes only when added maneuverability is necessary.

Control Operations - Deadband

- The deadband is the number of degrees you must turn the front wheels, right or left, before the rear wheels also turn.
- The angle of rear axle wheel turn is always proportional to the number of degrees that you steer the front wheels beyond the programmed deadband for any given speed.

Deadband and Speed

- From 0 to 2 mph the deadband is at its maximum and the rear axle will not steer.
- From 2 to 10 mph the deadband decreases to 7 degrees.
- From 10 to 20 mph the deadband is fixed at 7 degrees.
- When vehicle speed exceeds 38mph, the ALLSTEER controller automatically switches to the front steer mode.
- When the vehicle slows down to a speed less than 38 mph, the ALL STEER controller automatically switches back to the coordinated steer mode.

Switching Modes

- The mode switches can be moved at any time; however, the mode changes will not become effective until the front axle crosses through center.
- The new mode must be selected and then the front axle must be steered through its center position to become effective.

Front Steer Mode

- In Front Steer mode the vehicle drives as if it is not equipped with the Oshkosh ALL STEER all-wheel steering system.
- The rear wheels are mechanically locked in the straight-ahead position at all vehicle speeds, and in any front wheel position.
- You can switch to the front steer mode at any time.

Coordinated Steer Mode

- The Coordinated Steer Mode may be selected with the vehicle moving or stopped, and make the change from either the front steer or the fire ground modes.
- After moving the selector switch, you must steer the front wheels to their straight-ahead position before the ALL STEER controller completes the mode change.

Manual Centering

- If the rear wheels are not in the straight-ahead position:

  - Set the parking brake and place the transmission shift control in neutral.

  - Leave the engine running to provide hydraulic pressure to the steering system.

  - Place the mode selector switch in the FRONT MODE position.

Manual Centering

- Locate the ALL STEER hydraulic manifold assembly located near the rear axle(s).
- A hydraulic proportional valve with a black button on each end is mounted to this assembly.
- Use the black buttons to manually center the rear wheels. When you press one of the buttons at a time, the rear axle steers.

Manual Centering

- Press and hold one of the black buttons until the wheels are in their straight-ahead position.
- If the wheels move in the wrong direction, press the other button.
- When the wheels are centered, the mechanical lock automatically engages and the wheels lock in their straight-ahead position.

System Errors

- In the event an error code is displayed while operating the Oshkosh ALL STEER all-wheel steering system, the system responds based on the type of the error code.
- If a critical error code occurs, the entire screen will flash “Warning-ALLSteer Disabled”.

System Errors

- If a minor error code occurs, the entire screen will flash “Warning-ALLSteer Going Into Front Mode”.
- The operator is able to read the error code and return to a full suite of screens to aid in trouble--shooting by pushing the Enter/Exit (far right/blue) button on the LCD display.

System Errors

- If the ALL STEER system develops an error during vehicle operation:

  - Shut the vehicle down.

  - Restart the vehicle and check the operation of the ALLSTEER system.

  - If after shutting down and restarting the vehicle the ALL STEER system rear wheels are still in the position they were when the error occurred, perform the Manual Centering procedure or consult the vehicle's Service Manual for error code retrieval.

Review Questions

- Add questions here.