

KALMAR OTTAWA T2

OPERATOR'S MANUAL



Warning

Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

Proposition 65, a California law, requires warnings on products which expose individuals in California to chemicals listed under that law, including certain chemicals in diesel engine exhaust.

California Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

KALMAR OPERATOR'S MANUAL

NOTICE

The information in this manual was current at the time of publication. Contents of this manual are subject to change at the publisher's discretion.

DO NOT REMOVE THIS MANUAL FROM THE VEHICLE. STUDY THIS MANUAL. READ AND COMPLY WITH ALL WARNINGS IN THIS MANUAL. IF THE VEHICLE IS SOLD, GIVE THIS MANUAL TO THE NEW OWNER.

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Foreword

From Kalmar to the Owner

The manufacturer of these trucks cannot create a single manual that would cover every option available.

We have tried to cover all the information that would be included in a normally configured truck.

For information on some major components, you will need to refer to the component manufacturer's literature.

About the Operator's Manual

The intent of this Operator's Manual is to provide basic information on the safe operation of the Kalmar tractor.

The **Introduction** section contains important information regarding the use of safety messages as indicated by the signal words "Danger," "Warning," "Caution" or "Notice" that are found throughout this manual. This section also contains important safety and service support information.

The **Description and Operation** section provides information about the features of the tractor and basic operating information for the tractor itself.

The **Scheduled Maintenance** section covers basic operator maintenance and lubrication information.

Remember that the safe operation of the Kalmar tractor depends entirely on the operator. The operator of this vehicle must be properly trained and fully knowledgeable **BEFORE** attempting to operate it. Read this manual carefully and pay close attention to all warnings, cautions and notices. Keep this manual in the vehicle and make sure it goes to the new owner if the truck is sold.

NOTICE

Because of the many variations and options associated with Kalmar tractors, some optional equipment on your vehicle may not be covered in this manual. If there are any questions regarding the specific options or variations not covered in this manual, contact your nearest Kalmar dealer for assistance.

NOTICE

The Kalmar tractor may also be referred to throughout this manual as "vehicle" or "the vehicle". Throughout this manual reference is made to "Operator". In the context of this manual, the "Operator" refers to the actual driver of the vehicle.

1 Introduction

1.2 Safety Summary

CAUTIONS and WARNINGS

Throughout this manual you will find Warnings and Cautions.

DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in injury.

NOTICES

NOTICE

Throughout this manual you will see Notices. Notices will be used to show special procedures or point out important facts. Notices will also designate important information regarding this manual and its use.

1.5 Vehicle Towing

Towing a vehicle requires special equipment and training. Kalmar Solutions, LLC, recommends that a professional towing service be used when towing a disabled Kalmar tractor.

The best way to tow a Kalmar tractor is with the rear wheels lifted off the road. This prevents any possible damage to the transmission and drivetrain. Towing the vehicle with the rear wheels lifted avoids having to disconnect the driveline or axle shafts. Also, towing with the rear wheels lifted does not require the spring brakes to be caged unless there are spring brakes on the front wheels.

If it is impossible to tow the vehicle with the rear wheels lifted, be sure to follow the steps listed below, "Towing Vehicle with Front Wheels Suspended".

NOTICE

Some vehicles are equipped with "Off Highway" tires. Tire damage may occur if towed on the road.

Towing Vehicle with Front Wheels Suspended

It is not recommended to tow a vehicle with the front wheels lifted and the rear drive wheels on the road. This practice may result in serious vehicle damage. Pay close attention to the following rules to prevent vehicle damage if you must tow your Kalmar tractor with the rear wheels on the road.

W A R N I N G

Always obey the following when towing a Kalmar tractor with the front wheels lifted and the rear wheels on the road. Failure to do so could result in death or serious injury.

1. Always use a rigid towing bar or properly restrain the towed vehicle. Using a chain or cable to tow the vehicle is not recommended.
2. Always disconnect the driveline to the rear drive axle(s), or remove all axle shafts from all rear drive axles.
3. Always cage the spring brakes on all rear drive wheels. [See page 38, Manually Releasing Tractor Spring Brakes (Caging).] A loss of air pressure could occur while towing the vehicle. This would apply the spring/parking brakes and lock the rear wheels on the towed vehicle.

W A R N I N G

When manually releasing the spring brakes, make sure that the vehicle wheels are properly blocked. If the wheels are not blocked, the vehicle could move suddenly when the spring brakes are released and cause death or severe injury.

W A R N I N G

If the disabled vehicle is connected to a tow vehicle before the spring brakes are released, make sure that the tow vehicle's parking brakes are applied and its wheels are blocked to prevent movement. Failure to do so could result in death or serious injury.

Towing Vehicle with Rear Wheels Suspended

The recommended way to tow a disabled vehicle is with the rear wheels lifted off the ground. The steering axle must be locked in the straight-ahead position. If there are spring brakes on the front axle, the springs must be caged. [See page 38, Manually Releasing Tractor Spring Brakes (Caging).]

1.6 Vehicle Modifications

Do not make modifications to your Kalmar tractor without written approval from Kalmar Solutions, LLC. Your vehicle has been designed and manufactured with safety and reliability in mind. Any modifications by the operator or owner could decrease the safety and reliability of your vehicle. Any unauthorized vehicle modifications may also void the Kalmar Solutions, LLC Limited Warranty. Do not risk personal safety or vehicle reliability by making unauthorized modifications to your Kalmar tractor. Contact Kalmar Solutions, LLC concerning any proposed modifications to this vehicle.

1.7 Safety Checks and Precautions

All spotting applications are demanding on the vehicle. Maintenance is critical for the continued **SAFE** performance of your tractor. Before operating your Kalmar tractor, it is essential that the vehicle is in proper and safe working condition.

The following section is intended to provide a basic knowledge of important safety check procedures. These checks must be performed regularly to ensure safe vehicle operation. The frequency of these checks depends on the application of the vehicle.

In general, the best time to make the following safety checks would be during normal maintenance and during daily Pre-Operation Safety Inspections.

All operators should complete a **Kalmar Daily Inspection** before climbing into the driver's seat. This "Walk Around" is a good way to prevent potential problems. A sample daily inspection form is provided on page 10 of this section. Use this as a guide to come up with an appropriate checklist for your individual vehicle.

When performing inspections, always park the tractor on a level surface, apply the parking brakes and chock the wheels.

Inspection

 CAUTION

If the vehicle is used in a severe application, such as a rail yard operation or in 24-hour operations, a more frequent schedule should be followed. Failure to maintain the vehicle on an appropriate schedule can lead to component damage or injury.

During each scheduled maintenance interval or at least once a month, a qualified mechanic should inspect all of the following areas.

Axle — Front

Maintaining correct front axle alignment is critical and should be performed by a qualified mechanic.

Check to ensure that the axle mounting bolts are securely tightened. Regularly check the front axle for damage, binding or worn parts, and adequate lubrication. Pay special attention to the axle stops and rubber snubbers. Do not operate the vehicle without the proper axle stops in place.

Axle — Rear

Check to ensure that the axle mounting bolts are securely tightened. Regularly check the rear axle for damage and oil leaks. Unusual noises and signs of extreme heat may indicate axle damage.

Brake System

WARNING

Do not operate the vehicle until the brake system has been thoroughly inspected. Failure to conduct a complete *Kalmar Daily Inspection* prior to operation could lead to serious injury or death.

Check the following:

1. Check brake controls for proper operation. Make sure the foot-operated treadle in the cab is operating smoothly and is not damaged.
2. Visually inspect the brake drums, brake chambers, and slack adjusters. Check for loose, missing or broken components. Check brake chambers and slack adjusters for cracks and other signs of severe wear.
3. Listen for air leaks in the cab and underneath the chassis. Check air pressure regularly using the dash-mounted gauge. Be alert for any sudden drops in pressure while operating the vehicle and after the engine is shut off. A minimum air pressure of 70 P.S.I. (4.83 bar) is required to operate this vehicle.
4. Visually check hoses and pneumatic lines for damage and chafing.
5. Check the operation of both the service and parking brake systems. Be alert for any reduction in braking performance or unusual noises while braking.

Cab

Defroster — Operate the defroster to make sure sufficient air is being directed against the windshield. Make sure the blower is operating before the weather requires the defroster.

Door Latches — Check for positive closing, latching and locking.

Walkways/Steps — Check to ensure that all factory-installed walkways, platforms and steps are installed onto the vehicle securely and are not damaged or loose. Make sure that all walkways, platforms and steps are free of dirt, debris, ice, mud and any other potentially hazardous obstructions.

Handholds/Grab Handles — Check to ensure all handholds are installed and are not loose or damaged.

Glass — Check for cracked, broken, scratched or dirty glass.

Cleaning Instructions for Optional Plastic Glazing — Wash windows with a clean sponge or soft cloth using lukewarm water and mild detergent or window cleaner. Rinse with clean water. Do not use abrasive or highly alkaline cleaners. Never scrape with squeegees, razor blades or other sharp instruments. Remove ice and frost with the cab heater/defroster or by applying heat.

Mirrors — Check to be certain all mirrors are installed and that they are clean, undamaged and properly adjusted.

Seat Belt System

WARNING

Always check the seat belt system for wear and proper operation. All components must be in good condition and ready to function correctly when necessary. Failure to check the seat belt system could lead to serious injury or death.

Inspect the seat belt system every 20,000 miles (32,187 km) or more often if exposed to severe environmental conditions or vocation. Check the following:

1. **Inspect belt** on entire system for cuts, fraying, extreme or unusual wear. Most common areas of belt wear include the buckle/latch area, the shoulder loop area and any place where the belt makes contact with vehicle or seat. *Replace the entire belt system if necessary.*
2. **Inspect buckle** for proper operation by inserting latch and listening for an audible click. Verify the buckle is not damaged, cracked or broken. *Replace the entire belt system.*
3. **Inspect buckle cable** (optional component) black coating on buckle cable must not be damaged. Internal cable wires must not be exposed, frayed or broken. *Replace the entire system.*

4. **Inspect latch** for proper operation by inserting into buckle. Latch must insert smoothly and you must hear an audible click. Verify proper latching by tugging on belt. Latch must not be worn, deformed or corroded. *Replace the entire belt system.*
5. **Inspect shoulder loop web guide** (optional component) Seat belt must move freely through shoulder loop. Shoulder loop must also pivot freely and be free of obstructions. *If necessary, adjust shoulder loop hardware and/or remove obstruction.*
6. **Inspect seat belt height adjuster** (optional component) for damage. Mover adjuster up and down. It must move freely and lock at the different height positions. *Replace the entire belt system if necessary.*
7. **Inspect retractor operation.** When pulled and released slowly, seat belt must spool out and retract without locking. *Replace the entire belt system if necessary.*
8. **Inspect mounting hardware** on both sides of seat. Hardware should be tight. Hardware must not be missing, rusted, corroded or damaged. *If necessary, replace defective or missing hardware with authorized parts and/or tighten hardware.*
9. **Inspect tethers** for cuts, fraying, extreme or unusual wear. Tethers must also be inspected for proper attachment and/or adjustment. *If necessary, replace defective tethers. Tighten and/or properly adjust tethers according to the Seat Adjustment section on page 17.*
10. **Inspect Komfort Latch®** (optional component) for function and ability to clamp on web. *Replace the entire system if necessary.*

Cleaning of Seat Belt Fabric — Sponge the seat belt clean with mild soap and water. DO NOT use bleach, dye or household detergents.

Electrical

Horn — Operate the steering wheel-mounted horn to check operation. (Check optional air horns if equipped.)

Instruments — Check operation of all instruments and gauges.

Lights — Check to make sure all lights (interior, exterior, headlights, etc.) function properly. Make sure the gauge and dash backlighting is working properly.

Wiring — Check to ensure all wiring is properly secured and protected. Replace worn, cracked or chafed wires and looms. Make sure factory wiring has not been compromised by improper splicing or modifications.

Exhaust System

Maintain the exhaust system (mufflers, pipes, stacks, joints) integrity to ensure no exhaust fumes can enter the cab. Look for loose, damaged or missing exhaust components. Be alert to any exhaust fumes or unusual odors in the cab.

Frame

Check for cracks and signs of damage. Pay close attention to highly stressed areas of the frame such as the boom pivot area. Contact your dealer for instructions on frame repair. Do not weld on frame rails unless directed to do so by your Kalmar dealer or by the factory.

Fuel System

The throttle should operate smoothly and with minimal effort. Always replace damaged throttle components with factory replacement parts.

Check the fuel system for leaks and hose chafing. Repair any problems before operating the vehicle.

Check the DEF system for leaks and hose chafing. Repair any problems before operating the vehicle.

Propeller Shaft

Check the universal joints for wear. If propeller shaft vibrations occur, stop the vehicle immediately to prevent serious damage to the vehicle drivetrain.

Steering

Be alert to any change or feel in steering while driving the vehicle. This change or feel may include a change in steering effort, unusual sounds when turning, or excessive wheel play or pulling to either side.

If a problem is suspected or felt, check steering components for loose, damaged or worn parts. All steering components such as the tie rod and drag link must be tight.

Check the power steering system for leaks and hose chafing. Repair any problems before operating the vehicle. Regularly inspect all steering linkages.

 W A R N I N G

Do not operate the vehicle with broken, damaged, worn or non-OEM steering system components. If the Kalmar Daily Inspection reveals any of these issues, have the vehicle repaired immediately by a qualified technician. Failure to do so could result in serious injury or death.

Suspension

 CAUTION

Check the condition of the front and optional rear (if installed) suspension components such as mounting brackets and bushings. Check for worn and damaged parts. Failure to do so could result in injury.

Check and maintain the specified torque on all mounting bolts and nuts. Check the springs and replace broken or distorted springs.

Transmission

Follow the transmission manufacturer's guidelines for proper maintenance.

Wheels/Tires

Check the condition and maintain the specified torque on all wheel mounting nuts. Replace missing or broken studs and nuts. Check tire inflation and wear. Do not operate this vehicle with badly worn or damaged tires. Do not operate this vehicle with damaged wheels.

NOTICE

Because of the many options available on Kalmar tractors, it is critical that the owner be aware of all options that may affect the safe operation of the vehicle and take appropriate measures to maintain his/her specific vehicle. Always contact your Kalmar dealer if any questions arise regarding safe operation of this vehicle.

Kalmar Daily Inspection Form

(Walk Around Inspection)

- _____ Check tires and wheels for damage and proper inflation.
- _____ Check cab hold down latch (air suspension unit) for proper latching.
- _____ Check all fluid levels: engine oil, hydraulic and coolant.
- _____ Drain any moisture from air tanks.
- _____ Check cab doors and latches for proper operation.
- _____ Ensure that all steps, walkways and handholds are installed and in good working order.
- _____ Start engine and check transmission fluid level with parking brake applied and transmission shift selector in "neutral".
- _____ Check windshield wiper for proper operation.
- _____ Check steering system for any binding. Make sure steering effort is smooth and light.
- _____ Check accelerator for proper operation. The accelerator should operate smoothly.
- _____ Check all rear view mirrors; adjust and clean if needed.
- _____ Check cab and frame for any structural damage or cracks.
- _____ Inspect trailer electrical cable and trailer air lines for damage. Make sure both air lines are installed.
- _____ Clean all windows if needed.
- _____ Check transmission shift lever for proper operation.
- _____ Check boom control lever for proper operation.
- _____ Check all lights for proper operation: headlights, turn signals, brake lights, hazard lights and marker lights.
- _____ Check horn(s) for proper operation.
- _____ Check and fill fuel tank.
- _____ Drain fuel water separator.
- _____ Check and fill DEF tank.

1.8 Additional Manuals and Safety Information

Kalmar Solutions, LLC offers an Operator Orientation Video DVD. This video covers important information that all Kalmar operators must know. The video should be used in conjunction with this manual to instruct the operator on the proper operation of the Kalmar tractor. Shipped with every tractor, this video is also available through your Kalmar dealer or directly from Kalmar Solutions, LLC.



Figure 1
Operator Orientation Video

1.9 Service Assistance

Kalmar Solutions, LLC has an established dealer network throughout the world. Whenever assistance is needed, contact your local dealer first. For contact information, visit our website at Kalmarind.com or contact Kalmar sales.

When parts or service are required, always have the serial number of the vehicle ready before contacting your Kalmar dealer. The serial number is located on an ID plate inside of the cab.

Kalmar is proud to have been the leader in the Port and Terminal Tractor Industry for over 50 years. We strive to serve our customers in every way possible. Thank you for buying our Kalmar tractor. We know it will serve you well for many years.

If, for any reason, you are not able to obtain assistance from any Kalmar dealer, feel free to contact Kalmar Solutions, LLC directly.

**For assistance call:
Kalmar Solutions, LLC
Service Department
USA +1 (785) 242-2200
Europe +358 (0) 20 777 5000**

3 Description and Operation

The following section on **Description and Operation** should be read carefully. It covers important information that every operator must know before operating any Kalmar tractor.

This manual is intended to cover the standard Kalmar tractor and some of the most common options. Not all of the customer-ordered optional equipment or systems are covered in this manual. If the operation of any component or system on your vehicle is not covered in this manual, call your Kalmar dealer for assistance.

WARNING

All individuals who operate this vehicle must have sufficient training to operate this type of vehicle and should have a valid commercial driver's license. This manual is not intended to be a training guide for yard tractor operation. It is the operator's responsibility to obtain sufficient training in order to operate this vehicle safely. DO NOT ATTEMPT TO OPERATE THIS VEHICLE WITHOUT ADEQUATE TRAINING. OPERATING THIS VEHICLE WITHOUT ADEQUATE TRAINING COULD RESULT IN SERIOUS INJURY OR DEATH.

3.1 Cab/Deck

Vehicle Entry and Exit

The Kalmar tractor is designed for easy entry and exit. The walkways, steps and handholds are designed with operator safety in mind. As with any vehicle of this type, care must be taken when climbing in or out of your Kalmar tractor. Remember, be careful!

WARNING

Always exercise caution when entering or exiting the vehicle. To avoid serious injury or death, read the following instructions and warnings before entering and exiting the vehicle.

- 1. Entry and exit should be made slowly and carefully.**
- 2. A three-point stance should be used. Three out of the four extremities (hands and feet) should be in contact with the vehicle at all times.**
- 3. Face inward toward steps when entering and exiting.**
- 4. Keep steps, walkways and handholds in good condition.**
- 5. Keep steps, handholds, walkways and shoes free of grease, mud, dirt, fuel, ice and snow.**
- 6. Use extra care during bad weather, especially when steps and handholds may be icy or wet.**

 WARNING

Do not remove or modify factory-installed walkways, steps or handholds. Do not operate your vehicle unless all of the factory-installed steps, walkways and handholds are installed and in good working condition. If the walkways, steps or handholds have been modified or removed, or are not in good working order, anyone attempting to enter or exit the vehicle could be injured or killed.

3.1.3 Cab Tilting

The tractor comes equipped with an electrically operated cab tilt system as standard equipment. Under power assist, the cab can be tilted to 45 degrees. At 45 degrees, the safety prop is automatically engaged.

The cab can be tilted MANUALLY to 90 degrees if needed. This requires that the tilt cylinder be disconnected, and that a suitable hoist be used to tilt the cab all the way to the 90-degree position.

All tractors come standard with a cab air suspension. These units are designed to work with the power cab tilt, and unlatch automatically.

The electric cab tilt is designed to tilt the cab to 45 degrees at which point the cab safety prop is automatically engaged. The tilt system is not designed to provide a safety prop at any point other than 45 degrees. **Figure 3 shows proper engagement of the cab safety prop.**

 DANGER

Never work under the cab unless the safety prop is properly engaged. The cab could fall and cause serious injury or death. (See Figure 3 and Figure 4.)

 CAUTION

Only tilt the cab far enough past the 45-degree point to engage the safety bar. Attempting to fully extend the cylinder past 45 degrees can cause pump and motor damage. Check the cab tilt cylinder and bracket mounting bolt for proper torque and wear! Failure to check and operate the cab tilt system correctly can result in injury.

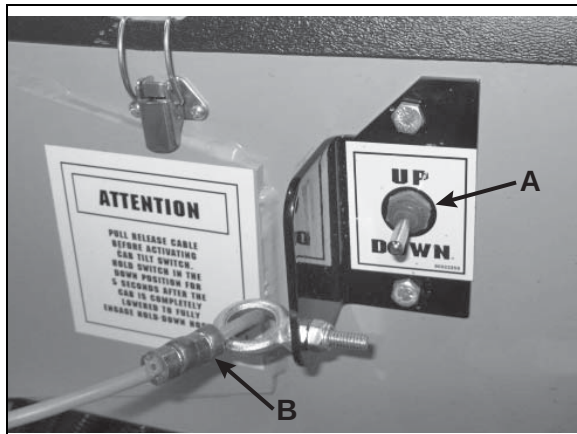


Figure 2

A — Cab Tilt Control Switch

B — Safety Prop Release Cable

To Tilt Cab

In most cases, the cab tilt control switch is located on the left-hand frame rail (Figure 2). The safety prop release cable is located on the left-hand rail, within reach of the tilt switch.

WARNING

Ensure that no part of the body is under the cab while tilting. Stand clear of the rear of the cab and ensure that the cab does not strike you when it is being raised. Failure to do so can lead to serious injury or death.

WARNING

Ensure that the safety prop is properly engaged before working under the cab. The safety prop must be able to move freely to engage automatically. Always check the safety prop before working under the cab and make sure to properly maintain this important safety system. Failure to do so can result in serious injury or death.

1. Locate the cab tilt control switch and safety prop release cable.
2. Pull the safety prop release cable and hold the cable to the rear.
3. While holding the cable to the rear, move the tilt control switch to the UP position.
4. After the cab has traveled about 15 inches (381 mm), release the safety prop cable and continue tilting the cab.
5. As the cab approaches the 45-degree position, watch for the safety prop to drop over the tilt cylinder on the driver's side of the frame. (Figure 3 and Figure 4) STOP!
6. After the safety prop has dropped over the cylinder, move the tilt control switch to the DOWN position (Figure 2) and lower the cab slightly until the safety prop rests fully on the top of the tilt cylinder (Figure 3).
7. Make sure that the safety prop is resting properly on top of the tilt cylinder. Pull on the safety prop release cable and ensure that the safety prop is secure. It should not move with the weight of the cab on the prop.



Figure 3

A — Tilt Cylinder

B — Safety Prop

C — Safety Prop Release Cable

The Safety Prop (B) is resting flush against the Tilt Cylinder (A). The Safety Prop is properly engaged.

To Lower Cab

1. Move the cab tilt switch to the UP position and raise the cab slightly until the safety prop is free from the top of the tilt cylinder.
2. Pull the safety prop release cable to the rear and hold in the rearward position.
3. Move the tilt switch to the DOWN position with the safety prop disengaged and allow the cab to lower onto the rear cab latch.
4. Hold the cab tilt switch in the DOWN position for 5 seconds after the cab has come to rest on the lower latch units to ensure that the mechanical cab latches are fully engaged.

WARNING

Ensure that the cab latch is fully engaged after lowering the cab. If the cab latch is not properly locked down, the cab could tilt while the vehicle is in motion, resulting in serious injury or death.



Figure 4

Safety Prop (B) is NOT resting flush against Tilt Cylinder (A). The Safety Prop is NOT properly engaged.

WARNING

If a cab latch fails or the tilt system malfunctions, the safety prop is designed to act as a secondary hold down. Ensure that the release cable is operating freely and that the safety prop rests against the tilt cylinder when the cab is in the lowered and latched position. Failure to do so can result in serious injury or death.

3.1.4 Seating

Suspension-Type Seats

All Kalmar tractors have an air suspension-type seat as standard equipment.

WARNING

Due to the vertical travel of suspension seats, the operator must ensure that there is adequate head clearance when the seat is at the top of its upward travel. Failure to do so can result in serious injury or death.

Seat Adjustment

Refer to the seat manufacturer's information packet provided with the vehicle or to the decal located on the seat base. Your local Kalmar dealer can assist with any questions.

Adjust the seat to the comfortable position for the operator to have full control of all cab controls and displays. This position is obtained by changing the air pressure in the suspension, which changes the height. The fore and aft position is obtained by moving the seat cushion back on its slides. Once this position is achieved, tighten the seat belt tether securely on both sides. The tether will restrain the seat from raising above this position. Now, the seat air suspension may be adjusted to the operator's desired firmness.

WARNING

Do not adjust the driver's seat unless the vehicle is parked. The seat could move suddenly and unexpectedly, resulting in loss of control of the vehicle, serious injury or death.

WARNING

The Kalmar tractor is designed and equipped to carry only the driver (unless built with a trainer seat). Never allow anyone to ride anywhere inside or outside of the cab. Carrying a passenger is extremely dangerous and can result in serious injury or death. **NEVER CARRY PASSENGERS WITH YOUR KALMAR TRACTOR.**

3.1.5 Instrument Panel Gauges, Controls and Indicators

Instrument Panel Overview

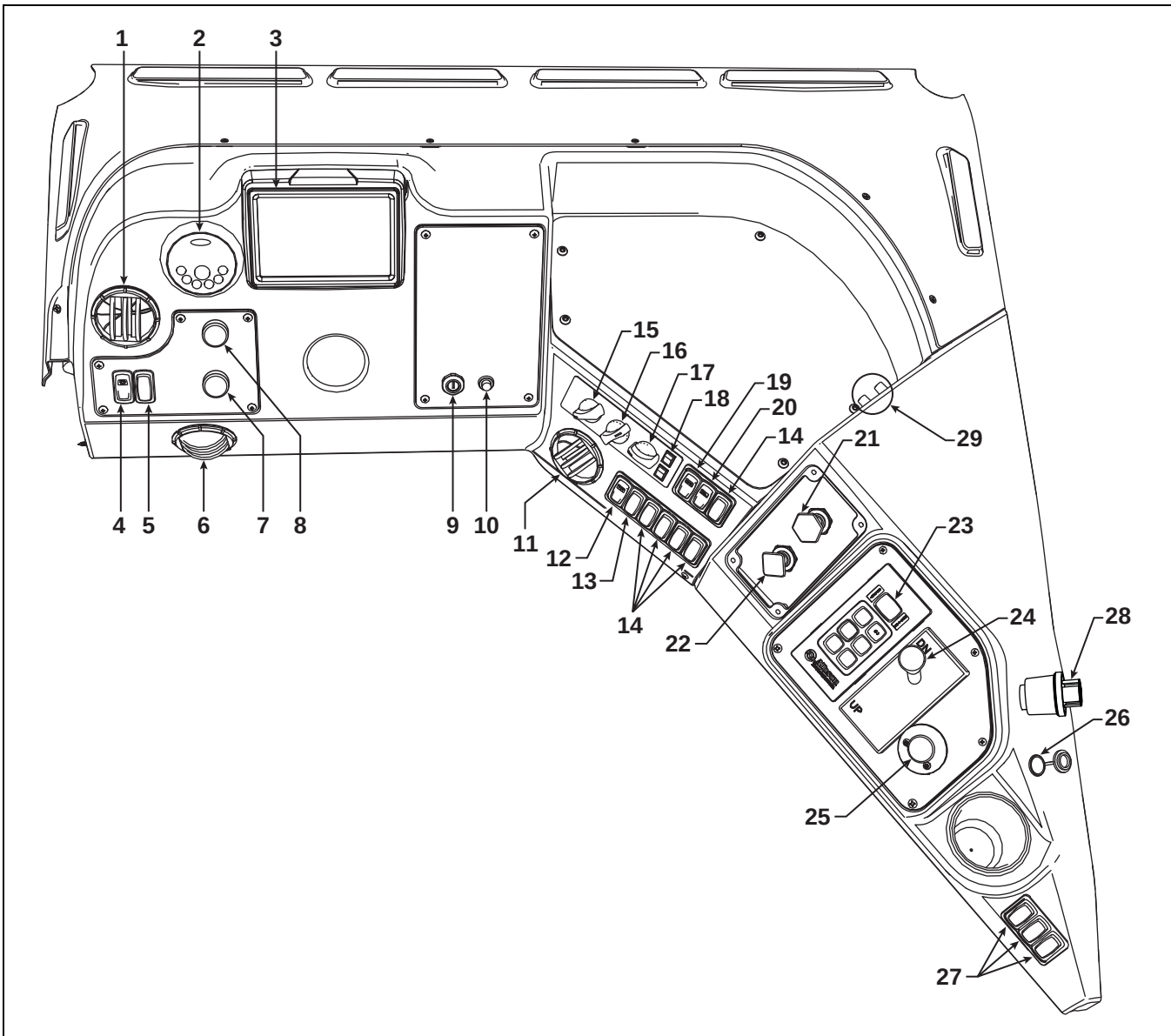


Figure 5

S=Standard A=Assigned options

U=Unassigned options

POS	Name	Standard DOT/EPA Tractor	Off-Highway Tractor
1	Air Diffuser	S	S
2	Radio	A	A
3	Main Gauge Panel	S	S
4	Headlight Switch	S	S
5	Dimmer Switch	S	A
6	Air Diffuser	S	S
7	Rear Wiper Switch	A	A
8	Front Wiper Switch	S	S
9	Ignition Switch	S	S
10	Push Button Start	A	A
11	Air Diffuser	S	S
12	Dome Light	S	S
13	Air Horn	A	A
14	Option Switches	U	U
15	Heater Control	S	S
16	Heater Control	S	S
17	Heater Control	S	S
18	Heater Control	S	S
19	Front Floodlight	S	S
20	Rear Floodlight	S	S
21	Trailer Air Supply	S	S
22	Parking Brake Control	S	S
23	Transmission Shifter	S	S
24	5th Wheel Control	S	S
25	5th Wheel Latch Control	S	S
26	Power Outlet	A	A
27	Option Switches	U	U
28	Air Restriction Indicator	A	A
29	Power Studs	A	A

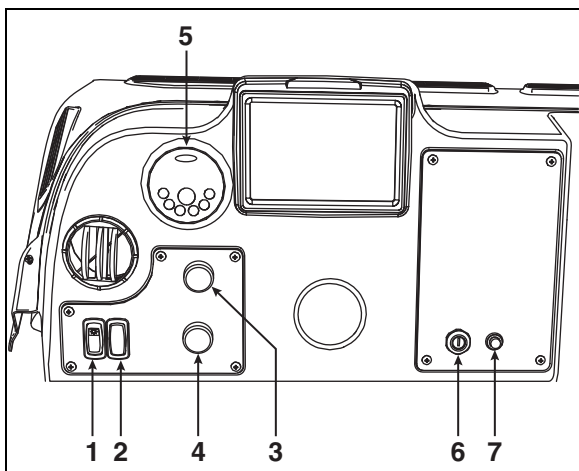


Figure 6
Left Dash Panel

Left Dash Panel

1. **Headlight Switch**
Controls headlights and running lights on the tractor and trailer. This switch also activates the interior dash and gauge lights when either the headlights or the running lights are on.
2. **Dimmer Switch (optional)**
Controls light level of dash panel controls.
3. **Front Wiper Switch**
Operates the front windshield wiper. Turning the control clockwise increases the speed of the wiper. Turning the control counterclockwise completely parks the wiper.
4. **Rear Wiper Switch (optional)**
Operates the rear windshield wiper. Turning the control clockwise increases the speed of the wiper. Turning the control counterclockwise completely parks the wiper.
5. **Radio (optional)**
Refer to the manufacturer's owner manual for features and operating information.
6. **Ignition Switch**
Standard switch used to start the tractor. Refer to page 25 for more information.
7. **Push Button Starter**
Optional method to start the tractor. Refer to page 26 for more information.

Main Gauge Panel

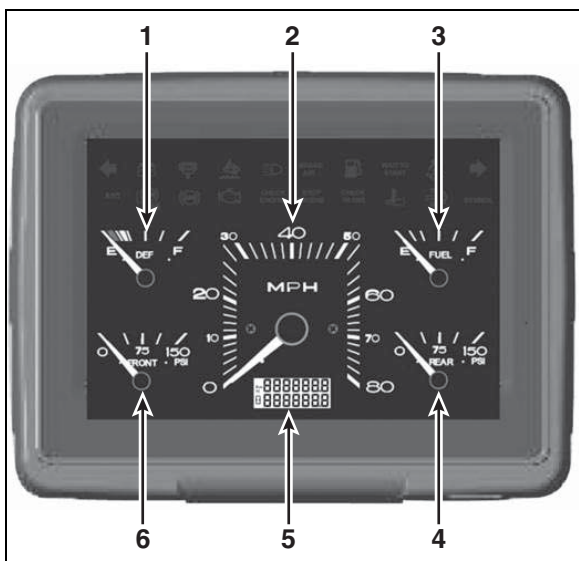


Figure 7
Main Gauge Panel

1. **DEF Gauge**
Indicates the level of diesel exhaust fluid in the tank in 1/4 increments. DOT/EPA Tractors Only.
- Volt Meter**
Indicates the status of the charging system in volts. If the engine is running, the gauge indicates the alternator output voltage. If the engine is not running, the voltmeter indicates the output voltage of the battery. Off-Highway Tractors Only.
2. **Speedometer**
Indicates vehicle speed in M.P.H. or K.P.H. This gauge may also come with an odometer feature built in.
3. **Fuel Gauge**
Indicates the level of fuel in the fuel tank in 1/4 increments.
4. **Rear Brake Air Pressure Gauge**
Indicates air pressure in the rear air system in P.S.I.
5. **Odometer and Hour Meter**
Indicates vehicle distance traveled in miles and total hours of operation.
6. **Front Brake Air Pressure Gauge**
Indicates air pressure in the front air system in P.S.I.

Tell Tale Indicator Lights

The indicator lights are located along the top of the main gauge panel (Figure 8). The standard indicators are listed below:



Figure 8
Indicator Lights on the Main Gauge Panel

Left Side Indicator Lights

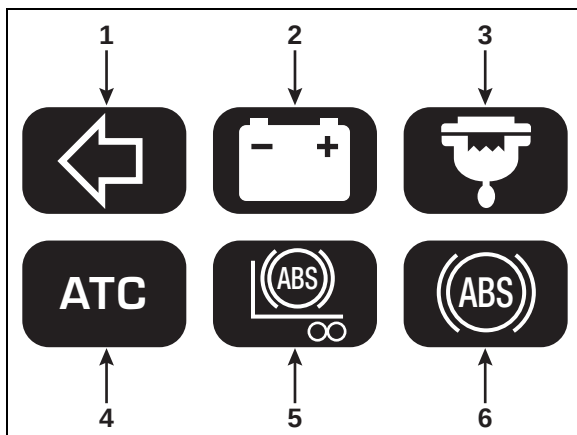


Figure 9
Left Side Indicator Lights

1. **Left Turn Signal**
Indicates left-hand turn signal is on when flashing.
2. **Charger**
Indicates the charging system is not functioning properly and the battery power is low.
3. **Water-in-fuel**
Indicates water has been detected in the fuel system and should be corrected.
4. **ATC**
Indicates the automatic traction control is operating.
5. **Trailer ABS**
Indicates the trailer anti-lock braking system is operating.
6. **Tractor ABS**
Indicates the tractor anti-lock braking system is operating.

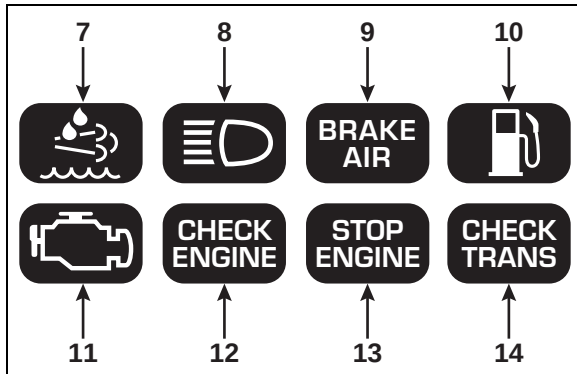


Figure 10
Center Indicator Lights

Center Indicator Lights

7. Low DEF Level

Indicates the diesel exhaust fluid level is low and should be filled. DOT/EPA Tractors Only.

Lamp function indicates the following status:

Low: First warning to the driver that the reducing agent is low. The DEF lamp light will be solid.

Warning: Intermediate warning to the driver that a derate will be activated if the reducing agent is not refilled. The DEF lamp will start to flash.

Low Level Inducement: Second warning to the driver that the reducing agent is low and inducement derate will be activated at this level. The DEF lamp will flash and the amber warning lamp will be solid.

Severe Inducement: Once the DEF tank is empty and a key cycle has occurred or after an extended idle operation, the vehicle will be restricted to 5 M.P.H. and R.P.M. limit. The DEF lamp will flash and the red lamp is solid.

8. High Beam

Indicates the high-beam lamps have been activated.

9. Brake Air

Alerts the driver that the brake system air pressure is 70 P.S.I. (4.83 bar) or lower.

10. Low Fuel

Indicates the fuel tank has 1/8 tank or less of fuel remaining.

11. Malfunction Indicator Lamp (MIL)

Indicates the engine is malfunctioning and should be checked. DOT/EPA Tractors Only.

12. Check Engine

Alerts the driver that the engine has an issue that requires immediate attention. Shut the tractor down immediately and have it serviced.

13. Stop Engine

Indicates a serious condition has occurred. Shut down the tractor immediately and have it serviced.

14. Check Transmission

Alerts the driver to check the transmission/transmission fluid level.

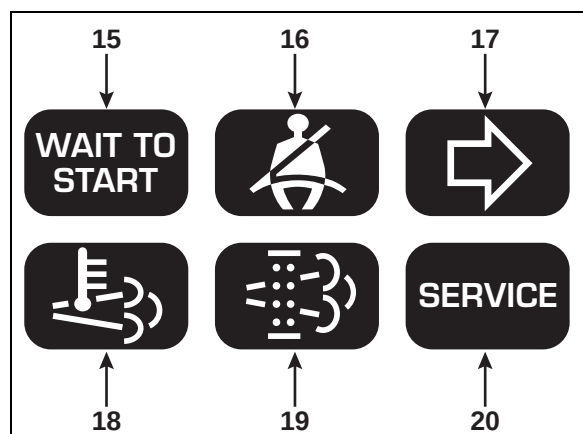


Figure 11
Right Indicator Lights

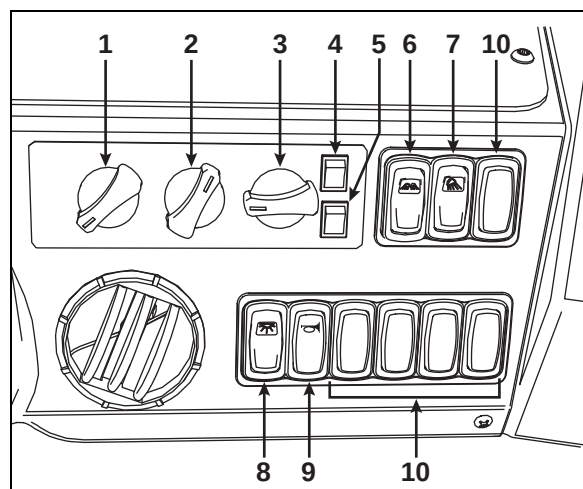


Figure 12
Center Dash Panel

Right Side Indicator Lights

15. **Wait to Start**
Indicates the engine temperature is too cool to start the engine immediately. Wait until the engine has been properly heated before starting the engine.
16. **Seat Belt**
Indicates the seat belt should be fastened.
17. **Right Turn Signal**
Indicates right-hand turn signal is on when flashing.
18. **High Exhaust System Temperature**
Indicates that high exhaust temperatures exist. Shut down the engine and allow the exhaust system to cool before restarting the engine. Refer to the Exhaust System section for more information. DOT/EPA Tractors Only.
19. **DPF (Diesel Particulate Filter) Regen Needed**
Indicates the diesel particulate filter requires regeneration within the next 2-6 hours of operation. Refer to the Exhaust System section for more information. DOT/EPA Tractors Only.
20. **Service**
Indicates the tractor requires immediate service.

Center Dash Panel

1. **Fan Speed Control**
Adjusts the fan speed. Rotate the dial clockwise to increase the speed. Full counter-clockwise is the OFF position.
2. **Mode Selector**
Directs air flow to passenger compartment vents or to the windshield for defrosting.
3. **Temperature Control**
Controls the temperature of the air flowing into the cab. The dial can be rotated between COLD (full counter-clockwise) and HOT (full clockwise) to obtain the desired amount of heat or cold air.
4. **Air Recirculation Switch**
Re-circulates air in the passenger compartment.
5. **Air Conditioner Switch (Optional)**
Activates the air conditioning compressor when the optional air conditioning is installed.
6. **Front Floodlights**
Activates the floodlights at the front of the vehicle.
7. **Rear Floodlight**
Activates the floodlight at the rear of the vehicle.
8. **Dome Light**
Activates the interior light in the cab.
9. **Air Horn**
Activates the air horn.
10. **Optional Switches**

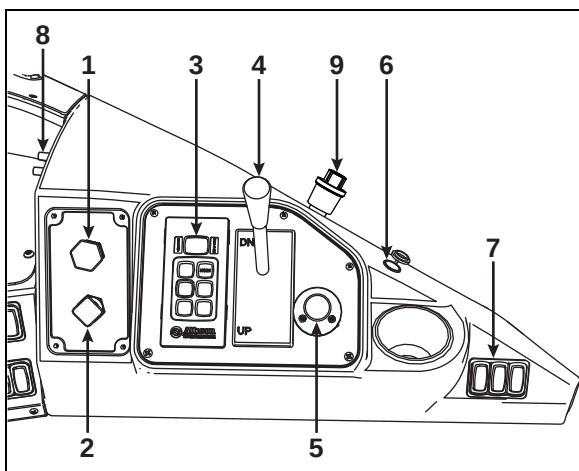


Figure 13
Right Dash Panel

Right Dash Panel

1. **Trailer Air Supply**
Activates the trailer air supply. (See page 37, Parking Brake and Trailer Air Supply Controls.)
2. **Parking Brake Control**
Operates the parking brakes on the vehicle and trailer. (See page 37, Parking Brake.)
3. **Transmission Shift Selector**
Selects the operating range of the transmission. (See page 32, Transmission.)
4. **Boom Control Lever**
Operates the hydraulic boom and fifth wheel. (See page 40, Hydraulic Boom Operation.)
5. **Fifth Wheel Unlatch Control**
Engages the fifth wheel jaw locking mechanism. (See page 40, Fifth Wheel Unlatch Control Valve.)
6. **Power Outlet**
Cigar lighter port provides 12-volts of power.
7. **Optional Switches**
8. **Power Studs**
Provides positive and negative connection points for CB radio or other devices.
9. **Air Restriction Indicator**
Monitors resistance of airflow through the air cleaner system. If a significant restriction arises, the indicator button will pop up, indicating it is time to change the air filter. Push the button back down to reset the indicator.

Turn Signal, High Beam and Emergency Flasher Control

The column-mounted control on the Kalmar tractor has three functions. It is located on the left-hand side of the steering column (Figure 14).

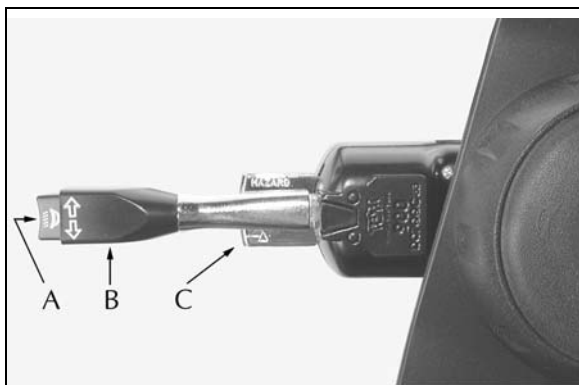


Figure 14
A — High Beam Switch
B — Turn Signal Lever
C — Emergency Flasher Switch

1. Moving the lever (Figure 14, B) forward activates the right turn signal. Moving the lever to the rear activates the left turn signal. The turn signal is not self canceling and must be returned to the center (OFF) position manually after it is engaged. The green arrows on the dash panel light up and flash when the switch is activated.
2. The button on the end of the lever operates the high beam lights (Figure 14, A). The headlights must be on for the switch to work. When the high beam headlights are on, the high beam indicator on the dash will light up.
3. The pull out switch under the lever activates the emergency flashers (Figure 14, C). Pulling out on the switch turns the flashers on. To turn the flashers off, move the turn signal lever forward or backward.

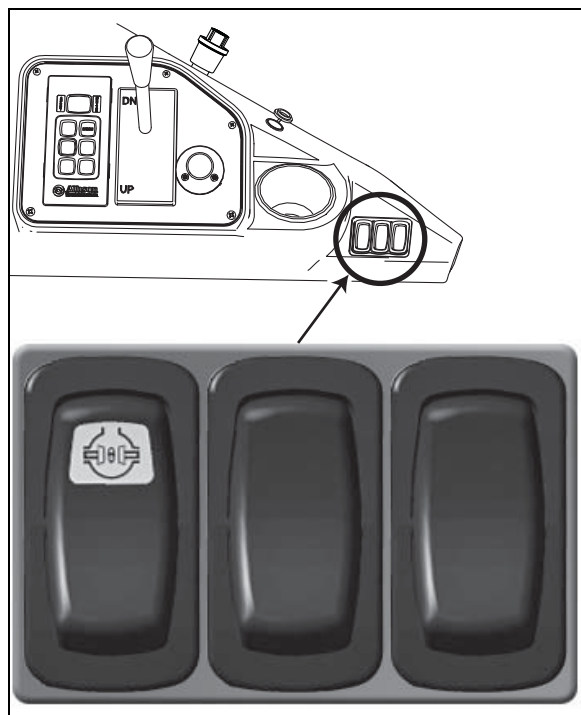


Figure 15
Driver Controlled Differential Lock

Driver Controlled Differential Lock

(Optional on drive axles)

Drive axles may be equipped with a driver controlled differential lock. This is a servo-controlled, air-actuated traction device that can be manually controlled inside the cab by the operator. By actuating a dash-mounted control, the operator can lock or unlock the differential.

⚠ WARNING

The differential must not be engaged when traveling at higher speeds or down steep grades with limited traction.

- **When the differential is fully locked, the vehicle will have reduced steering capability. Do not use the differential when driving at higher speeds or loss of vehicle control, serious injury or death can result.**
- **The differential must not be engaged when traveling down steep grades when traction is limited. This can result in loss of vehicle control, damage to components, serious injury or death. Refer to the axle manufacturer for the correct operational and maintenance procedures.**

Ignition Switches

The standard ignition switch on the Kalmar tractor is a key type, similar to the kind found on automobiles. Push button and other types of ignition switches are installed as optional equipment.

Key-Type Ignition

There are three positions: OFF, ACCESSORY and RUN/START. The full left (counterclockwise) position is the OFF position. The second position to the right (clockwise) is the ACCESSORY position. The third position to the right (clockwise) is the RUN/START position.

The RUN/START position is used to engage the starter motor. Moving the switch to the full right position engages the starter and upon release of the key, the switch automatically stays in the RUN position.

The ACCESSORY position activates the tractor's electrical accessory circuit.

The OFF position cuts all power to the electrical system and shuts down the engine.

NOTICE

The OFF position on the standard three-position key-type switch is designed to function as the engine stop. There is no other engine stop device other than the ignition switch on the standard Kalmar tractor.

Push Button Starter

Push button starters are optional on Kalmar tractors. There are two basic types of toggle ignition switches: three position and two position.

The three-position type functions like the standard key type with OFF, ACCESSORY and RUN positions. The button engages the starter when the switch is in the RUN position only.

The two-position switch has only the OFF and RUN positions. It has no provision for the ACCESSORY position. The button engages the starter in the RUN position only.

 CAUTION

If the engine does not start within 30 seconds, release the starter switch and wait 3 minutes to allow the starter motor to cool. If after three repeated attempts the engine still fails to start, stop and determine the cause. The starter motor may be damaged by repeated attempts to start the engine.

NOTICE

Some vehicles may be equipped with optional shut down systems or optional starter switches. Contact your Kalmar dealer if you have any questions regarding the operation of any optional starter switches or shut down systems.

For **starting the vehicle**, refer to page 30, Starting the Engine.

3.1.6 Electrical Equipment

Accessory Connections

The wiring harness in the Kalmar tractor is designed to support many vehicle options. These options may or may not already be on your vehicle. If any electrical equipment is installed on the vehicle after it leaves the factory, contact your Kalmar dealer first. Your dealer can provide you with information on proper electrical modifications and installations. Generally, there will be an accessory location on the harness where you will need it. Do not risk damaging your vehicle or voiding the warranty by making improper and poor electrical modifications. Contact your Kalmar dealer first.

Relays/Breakers/Fuses

The Kalmar tractor is equipped with two power boards. One power board is located in the cab under the center panel of the dash. The second power board is located in the chassis over the transmission on the left side. See following figures for fuse, breaker and relay locations.

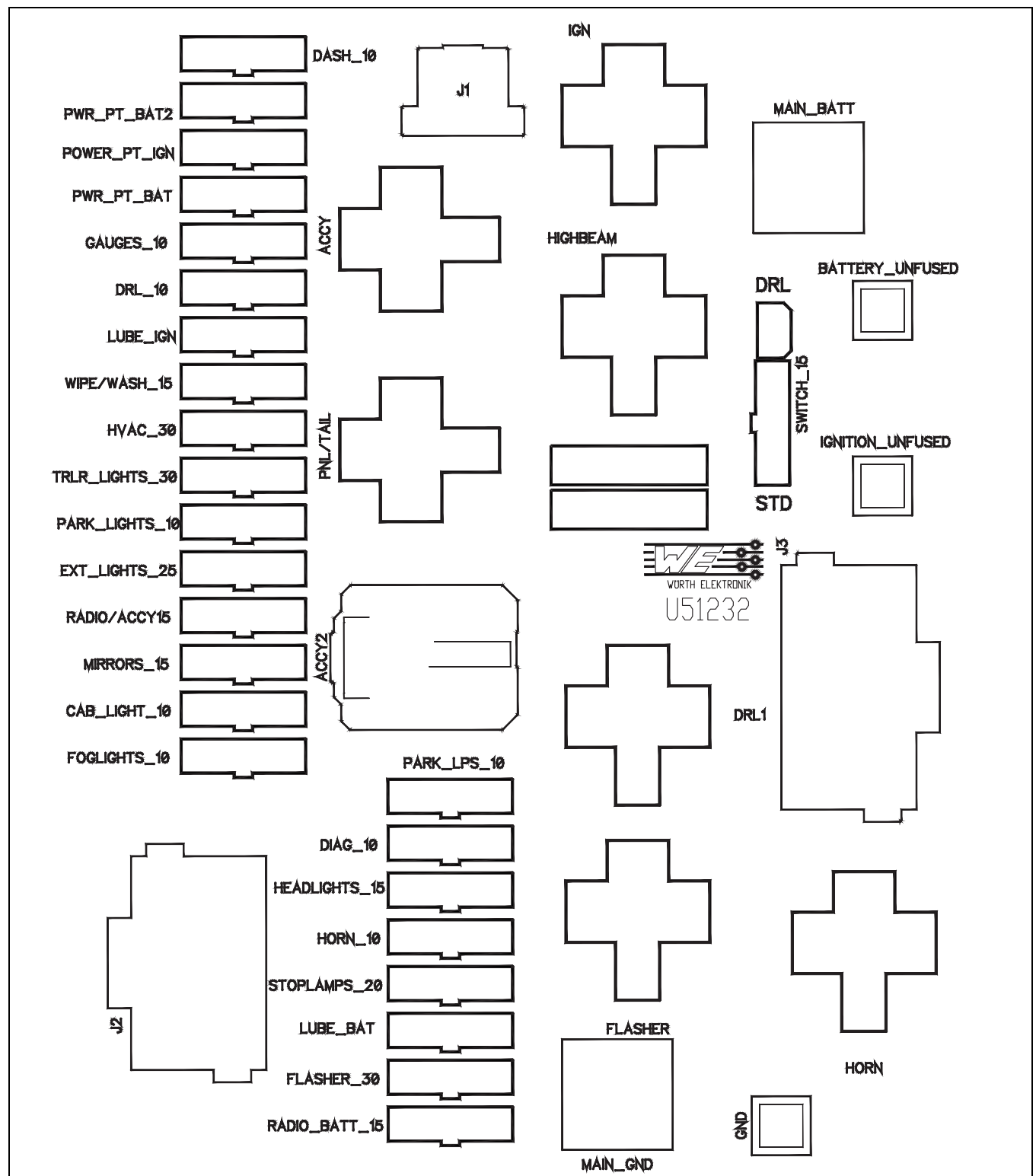


Figure 16
Cab Power Board

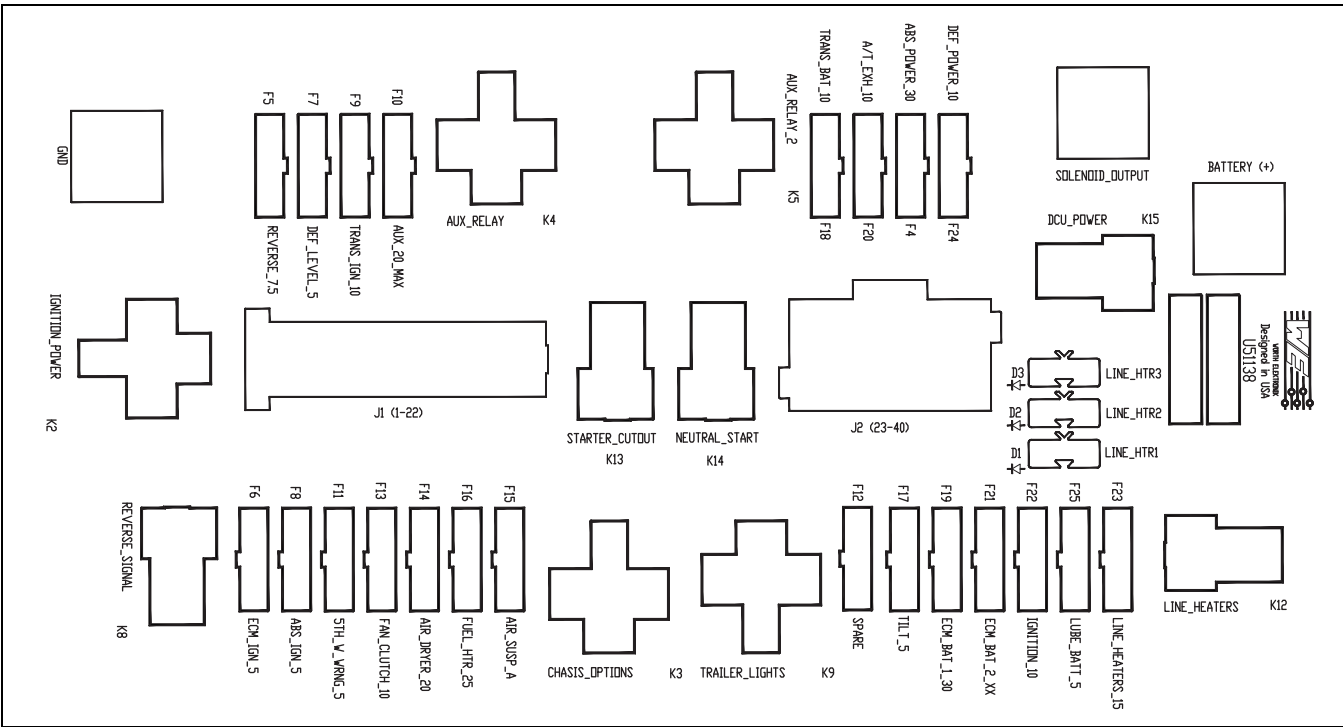


Figure 17
Chassis Power Board

3.1.9 Occupant Restraint System

THE KALMAR TRACTOR IS EQUIPPED WITH SEAT BELTS. THEY SHOULD BE USED WHENEVER THE VEHICLE IS IN OPERATION.

Seat Belt Operation

WARNING

Always use seat belts whenever the vehicle is in operation. In the event of a sudden stop or accident, unbelted riders can be thrown about the cab or into the windshield, resulting in serious injury or death.

The seat belt system used on Kalmar tractors is a lap-type restraint with an automatic retractor.

Before fastening the seat belt, be sure to adjust the seat to a comfortable driving position. To fasten the belt, pull the belt low across the hips and insert the tongue into the buckle.

To release the seat belt, press the button on the buckle and the belt will retract automatically.

3.2 Chassis

3.2.2 Powertrain

Engine

Kalmar tractors come equipped with a variety of engines. Kalmar provides the manufacturer's Engine Operation Manual with each vehicle.

CAUTION

It is the operator's responsibility to read the Engine Operation Manual and follow all instructions provided by the engine manufacturer. Failure to do so can result in injury.

Engine performance is very important to the efficient operation of the Kalmar tractor. Failure to properly maintain and operate any engine can lead to very costly repairs and extensive down time. **KNOW YOUR ENGINE AND MAINTAIN IT!**

NOTICE

This manual only contains basic information on engine operation that applies specifically to the Kalmar tractor, or is applicable to all diesel engines. For additional information, contact the individual component manufacturer directly or via the internet to obtain manuals.

If you did not receive an Engine Operation Manual, contact your Kalmar dealer.

 CAUTION

Failure to read and follow the engine manufacturer's instructions regarding engine operation may lead to severe engine damage. Read the Engine Operation Manual before operating this vehicle.

Starting the Engine

 DANGER

Never attempt to start the vehicle from any position other than the driver's seat. Attempting to start the vehicle while standing, outside of the cab, or in the engine compartment may cause the vehicle to move uncontrolled and cause serious injury or death.

 WARNING

Always set the parking brake and place the shifter in neutral before attempting to start the engine. Failure to do so may cause the vehicle to move suddenly and unexpectedly when the starter is engaged. Serious injury or death can result.

 CAUTION

All Kalmar tractors are designed to start in **NEUTRAL ONLY**. If the vehicle you are operating starts while it is in gear, **DO NOT OPERATE THE VEHICLE**. Shut the vehicle down and have the neutral lock-out system repaired before operating the vehicle.

The following is provided as general guideline information. Always follow all instructions provided in the manufacturer's Engine Operation Manual. Different makes and models of engines have different operating characteristics and requirements. There are some important guidelines to follow when starting any Kalmar equipped with a diesel engine. These are listed below.

To start a vehicle equipped with the standard electrical starting system, follow these steps:

Starting Procedure

NOTICE

*All Kalmar tractors are designed to start in **NEUTRAL ONLY**. The starter should not operate if the vehicle is in any other gear.*

1. Set the parking brake.

2. Place the transmission control in NEUTRAL.
3. Apply the service brakes using the foot-operated treadle valve and hold the brakes in this position.
4. Turn the ignition switch to the OFF position (if your vehicle is not equipped with an ignition-operated engine shut down, then use the engine shut down button or control to stop the engine).
5. Wait for the “Wait to Start” light on the dash to go out if the vehicle is equipped with one.
6. Turn the key to the START position. When the engine starts, release the key and allow the switch to remain in the RUN position.

NOTICE

If the engine does not start within 30 seconds, release the starter switch and wait 3 minutes to allow the starter motor to cool. If after three repeated attempts, the engine still fails to start, stop and determine the cause. The starter motor may be damaged by repeated attempts to start the engine.

Engine Shut Down

Diesel engines generate large amounts of heat. Internal engine parts on any diesel engine need to cool down before the engine is shut off. The operator should allow the engine to idle for at least 3 minutes prior to shutting the engine down. This cool down period allows the coolant to dissipate internal engine heat. Shutting a hot engine down without a cool down period may cause an immediate and excessive increase in engine temperature. This could severely damage internal engine components.

NOTICE

Always refer to the Engine Operation Manual for complete information on engine shut down procedures.

Shut Down Procedure

1. Place the transmission in NEUTRAL.
2. Set the parking brake.
3. Allow the engine to idle at low idle for at least 3 minutes.
4. Turn the ignition switch to the OFF position (if your vehicle is not equipped with an ignition-operated engine shut down, then use the engine shut down button or control to stop the engine).
5. Make sure all electrical accessories and lights are off and the vehicle is in NEUTRAL.

NOTICE

Failure to follow the engine manufacturer's guidelines regarding engine shut down procedures may cause severe engine damage.

Engine Oil

Always refer to the Engine Operation Manual for complete information on engine oil requirements. Service intervals, oil types and refill quantities are all covered in the Engine Operation Manual. **READ IT!**

Transmission

Standard tractors are equipped with an Allison Automatic Transmission. This heavy-duty transmission is designed for stop-and-go operation. An Allison Transmission Operator's Manual is provided with every Kalmar tractor. This manual provides important information on operation of the transmission.

The following information can be found in your Allison Operator's Manual:

1. Gear selection
2. Shifting the transmission
3. Driving tips
4. Care and maintenance
5. Check oil level with shifter
6. Check/clear fault codes
7. Prognostics

 CAUTION

The operator of this vehicle must read and follow the instructions in the Allison Operator's Manual. Failure to do so may lead to serious vehicle damage or personal injury.

The forward to reverse shifts of the transmission are controlled by the ECM.

Parking with an Automatic Transmission

The Allison transmission does not have a PARK position like an automobile transmission. For information on how to properly park your Kalmar tractor, see the following sections in this manual:

Page 37, Parking the Vehicle
Page 37, Parking Brake

Axles

Kalmar tractors may be ordered with a variety of axle configurations, makes and models. It is important to refer to the axle manufacturer's information for your specific axle. You can obtain axle operation and maintenance information from

your local Kalmar dealer. The following is general axle information and may not apply to your particular axle.

NOTICE

This manual does not contain complete operational information on any axle. The operator must obtain and refer to the axle manufacturer's information on operation, service and maintenance.

Axle Operating Temperature

Normally, axle operating temperatures will not exceed more than 100°F (37°C) above ambient temperature. Operating temperatures above 230°F (110°C) significantly increase the rate of lubricant oxidation and shorten the effective life of the lubricant. This makes more frequent changes necessary.

Rear Axles with Locking Differentials

Kalmar tractors may be equipped with a variety of special axle and differential combinations. Because of the affect of special differentials on vehicle operation, it is important to understand how your particular differential operates. Locking or limited slip differentials are not standard on Kalmar tractors. If you do not know if your vehicle is equipped with a special axle and differential, contact your Kalmar dealer.

“No Spin” Positive Locking Differential

Kalmar tractors may be equipped with an optional “No Spin” differential. This locking differential has very special operating characteristics. IT IS VERY IMPORTANT FOR THE OPERATOR OF A VEHICLE EQUIPPED WITH THIS FEATURE TO OBTAIN AND FOLLOW ALL OF THE OPERATION AND MAINTENANCE INFORMATION PROVIDED BY THE DIFFERENTIAL MANUFACTURER. Contact your Kalmar dealer for assistance on operating and maintaining this differential.

3.2.4 Air System and Brakes

DANGER

Brakes must be kept in proper working condition. Operating a vehicle with poorly maintained brakes or worn out brakes can cause a loss of vehicle control. This may lead to serious injury or death. Never operate the vehicle unless the brakes are working properly.

CAUTION

Do not allow moisture to collect in the air tanks. The air tanks must be drained daily. Failure to drain the air tanks can damage the air brake system and lead to injury.

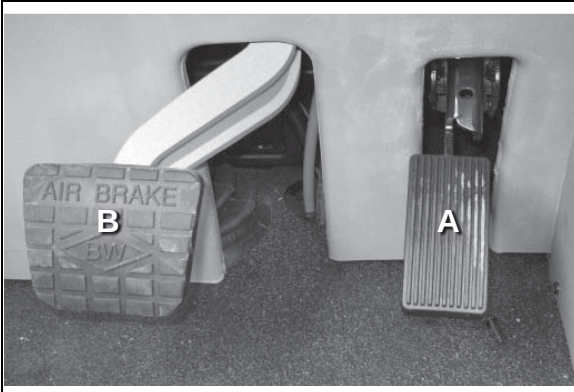


Figure 18

A — Accelerator Pedal
B — Brake Treadle/Pedal

Kalmar tractors come equipped with a pneumatic (air) brake system. This system has two basic parts: the service brakes and the spring parking brakes.

The service brakes are the part of the system that the driver uses when he operates the foot-operated treadle valve (or foot pedal) in the cab (Figure 18).

The service brakes are the primary brakes used by the operator. The service brakes require air to operate. If there is insufficient air in the system, the service brakes will not operate.

The spring brakes are used for parking the vehicle. They are also called the parking brakes because the parking brake control applies the spring brakes. The spring brakes use the mechanical force of a spring to operate. They do not need air to operate, but they do need air to be released. If there is a loss of pressure in the system, these brakes will automatically apply. This is why the spring brakes are sometimes called “emergency” brakes. Remember, if there is no air in the system, the spring (parking) brakes will not fully release.

Low Air Pressure Indicators

When air pressure in the brake system is below 70 P.S.I. (4.83 bar), the warning buzzer will sound and the Low Air warning indicator on the dash panel will light up. The air pressure gauge should indicate low air pressure in the system. The warning buzzer will shut off after air pressure has reached 70 P.S.I. (4.83 bar) (see page 22).

If the warning light and buzzer do not shut off at least 5 minutes after start-up, shut the engine down and determine why the air system is not charging.

If the Low Air indicator light or buzzer indicates a loss of air pressure while driving, the vehicle should be stopped immediately. The vehicle should not be operated until the air system is repaired and functioning properly.

DANGER

Do not operate the vehicle if the air brake system is not working properly. If the air brakes are not working properly, have the vehicle repaired immediately by a qualified technician. Operating a vehicle when the air brake system is not working properly can result in serious injury or death.

Service Brakes

The service brake system is controlled by a foot-operated treadle valve (foot pedal) in the cab. This is the left-hand pedal, located to the right of the steering column (Figure 18). The amount of foot pedal pressure determines the amount of air pressure delivered to the brakes. The more pressure applied on the treadle valve (pedal), the more braking force is applied to the brakes. The service brakes should be applied in a smooth, constant application. They should not be pumped or fanned while slowing or stopping the vehicle. Even in an emergency stop situation, the service brakes should not be rapidly “pumped”.

W A R N I N G

Do not pump the air brakes like a car during an emergency stop. Rapidly pumping the brakes is more likely to use up all of the air in the system and cause the spring brakes to apply and lock the rear wheels. This can result in an out of control skid, serious injury or death.

While the engine is running, the air compressor replenishes the brake system air supply. This air supply provides the pressure necessary to operate the service brakes.

The service brakes require at least 70 P.S.I. (4.83 bar) to operate effectively. If the system is not up to at least 70 P.S.I. (4.83 bar), there may not be enough air in the system to stop the vehicle. Several hard brake applications can quickly deplete the pressure in the air system and could possibly cause the pressure to drop below 43 P.S.I. (2.96 bar). If this happens, the spring brakes will apply automatically, possibly causing the operator to lose control of the vehicle.

The service brake system is integrated with the parking brake system. Should the service brake system fail because of a lack of air pressure (below 43 P.S.I. [2.96 bar]), the spring brakes will automatically be applied for emergency braking.

W A R N I N G

Rapid successive brake application and release, sometimes referred to as “fanning” or “pumping” the brakes, should be avoided. This is an improper way to slow or stop a vehicle with air brakes and may use up all of the air in the system before the vehicle is stopped or slowed completely. This could result in serious injury or death.

** WARNING**

Always connect both trailer air lines when towing a trailer. Failure to connect both the trailer service (BLUE), and the trailer supply (RED) air lines greatly reduces braking ability of the tractor trailer combination and creates a serious hazard. This increases the possibility of an accident and could result in serious injury or death.

** WARNING**

Never operate the vehicle when system air pressure is below 70 P.S.I. (4.83 bar). There may not be enough air in the system to stop or slow the vehicle. Have the brake system checked by a certified air brake mechanic if there is any doubt about the brake system performance. Failure to ensure sufficient air pressure can result in serious injury or death.

ABS

Some trucks may be equipped with the Anti-lock Braking System (ABS). The ABS is designed to prevent wheel lockup during hard braking.

Trucks equipped with ABS have an indicator light located in dash panel 1. The indicator light will warn the operator if there is a potential problem in the system.

Trucks should not be operated if the indicator light is on. Contact your nearest Kalmar dealer for qualified service on the ABS.

Trucks built with ABS after March of 2002 have the capability to check the trailer for a properly operating system. After connecting a trailer to the truck, the system will run a diagnostics check. If a problem is detected with the trailer side of the ABS, a trailer warning indicator light on the dash will illuminate.

Traction Control

Automatic traction control (ATC) is available as an option on trucks equipped with the Anti-lock Braking System. When activated, the ATC active/warning lamp will be on and the system will limit wheel spin during hard acceleration. The system is activated by turning on the ATC enable/disable switch located on the dash. During activation, the warning lamp will blink to advise the driver that drive-wheel spin is occurring.

ATC can be disabled while the vehicle is stationary or in motion. However, ATC will not re-enable until the vehicle comes to a complete stop, even with the switch turned to the ENABLE position.

DANGER

Never operate the vehicle if the truck or trailer ABS warning (indicator) lights remain illuminated. This indicates the ABS is not functioning properly. Shut the vehicle down and have the ABS repaired immediately. Operating a vehicle without a properly operating ABS can result in loss of vehicle control, personal injury or death.

Parking Brake

Kalmar tractors are equipped with spring brakes for parking. The parking system is operated manually by a cab-mounted parking brake control valve (Figure 19). (Also see page 21, items 5 and 6.)

The purpose of the parking (spring) brakes is to hold the vehicle while in the PARK position.

WARNING

Never apply the parking brake during normal driving. Doing this will lock the rear wheels, possibly causing an uncontrolled stop.

Parking Brake and Trailer Air Supply Controls

Air pressure in the system must be at least 70 P.S.I. (4.83 bar) before the parking brake control or the trailer air supply control can be pushed in (releasing the spring brakes).

NOTICE

If the tractor air system is completely discharged, the trailer parking brake control will be applied. The trailer parking brake should not be released until the tractor brakes are rolling.



Figure 19
Parking Brake and Trailer Air Supply Controls

Parking the Vehicle

(Refer to Transmission on page 32 and Parking Brake above for additional information.)

Standard Kalmar tractors are equipped with an Allison automatic transmission and spring-operated parking brakes. Allison transmissions are unlike an automobile transmission in one important regard. They do not have a PARK position.

When parking your Kalmar tractor, there are some important rules that must be followed.

! DANGER

Failure to observe the following rules when parking the vehicle may lead to death or serious injury.

1. Always apply the parking brake.
2. Never park the vehicle by leaving it in gear. Always place the transmission shifter selector in the "Neutral" position.
3. Never park a tractor trailer combination unless the trailer parking brakes are operational and applied.

NOTICE

If the vehicle is parked in gear, the vehicle will not start.

Manually Releasing Tractor Spring Brakes (Caging)

When air pressure in the system drops below approximately 43 P.S.I. (2.96 bar), the spring parking brakes will apply automatically. To release the spring brakes, the air pressure must be returned to 70 P.S.I. (4.83 bar). If the system cannot be recharged and the vehicle must be moved, the spring parking brakes can be released manually (caged).

To release the spring brakes, the actual spring in the brake canisters must be mechanically compressed. A release stud, or spring caging tool, must be used to manually compress the brake chamber.

! DANGER

Never manually release (cage) the spring brakes before the wheels are properly blocked. If the wheels are not properly blocked before releasing the spring brakes, the vehicle may move unexpectedly. This could result in serious injury or death.

The following steps can be used to release the standard brake chambers used on most Kalmar tractors. If your vehicle is equipped with other optional brake chambers, refer to that manufacturer's operation or service manual.

1. Shut the engine off and remove the key.
2. BLOCK ALL wheels front and rear to prevent the vehicle from rolling forward and backward.
3. Determine whether the chamber has an internal (Figure 20) or external (Figure 21) caging tool. Proceed to step 4 with an external-mounted tool. See step 8 for internal types.
4. Remove the access plug from the brake canister.
5. Insert the caging tool into the access hole, "T" end first.

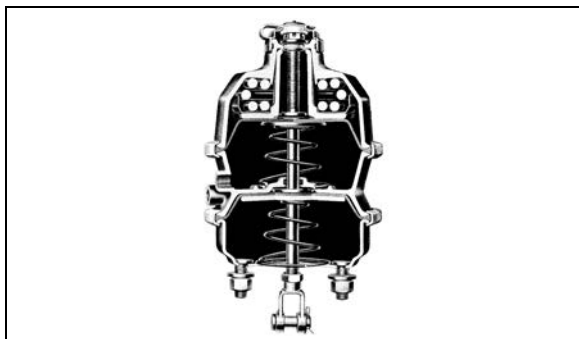


Figure 20
Internal Caging Tool

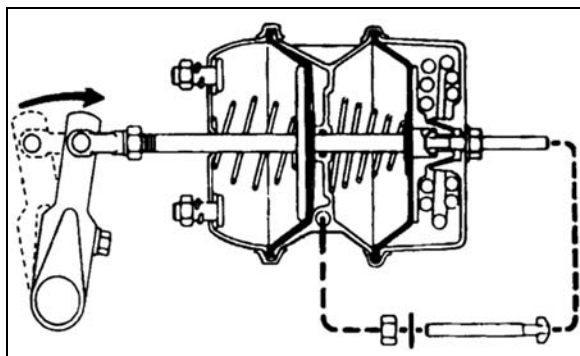


Figure 21
External Caging Tool

6. Turn the caging tool 1/4 turn to engage with the slot on the pressure plate.
7. Try to pull the caging tool out; it should not pull out. If it does, repeat steps 5 and 6.
8. Thread the nut and washer down onto the threaded end of the caging tool all the way to the canister.
9. Tighten the nut until the threaded portion of the release tool is out. It should extend approximately 3 inches (76.2 mm) out of the nut.

3 inches (76.2 mm) — Type 2430 and 3030 Chambers

4 inches (101.6 mm) — Type 3036 and 3636 Chambers

NOTICE

Never use an impact wrench to tighten the nut onto the release bolt. Never exceed the above lengths and never exceed 50 ft. lbs. (67.79 N•m) of torque on the release nut or the chamber may be damaged.

Trailer Brakes

Kalmar tractors are designed to use the trailer's brakes when towing trailers. All Kalmar tractors are equipped with a trailer **Supply** air line and trailer **Service** air line. The service line is BLUE. The supply line is RED.

When the vehicle is towing a trailer and service and supply lines are connected to the trailer, the trailer brakes become part of the tractor's brake system. The tractor service brakes control the trailer service brakes. The tractor parking brake control operates the tractor and trailer spring brakes. This is why it is critical that the operator always connect both air lines to the trailer.

Trailer Air Lines

The service air line (blue hose) operates the trailer service brakes. The supply air line (red hose) only supplies air to the trailer spring brakes to release them. If only the supply air line is attached to the trailer, the trailer service brakes will not operate. The tractor service brakes will be doing all the braking for the combination and braking distances will be dramatically increased. Without the trailer service brakes working, jack-knifing and loss of vehicle control is much more likely during heavy braking.

WARNING

Always connect both trailer air lines when towing a trailer. Failure to connect both the trailer service (BLUE), and the trailer supply (RED) air lines greatly reduces braking ability of the tractor trailer combination and creates a serious hazard. This increases the possibility of an accident and could result in serious injury or death.

3.2.5 Hydraulic System

Hydraulic Fifth Wheel Lifting System

The standard fifth wheel lifting system on Kalmar tractors is hydraulically operated. A P.T.O. and hydraulic pump mounted on the transmission provide the hydraulic power to operate the Hydraulic Fifth Wheel Lifting System. The fifth wheel is mounted to a hydraulically operated “Boom” (Figure 22). This “Boom” assembly is attached to the frame at a pivot behind the cab. The system operates like a large hydraulic floor jack.

The following are general operating instructions and may not apply to your particular vehicle. If there are any questions regarding the operation of your vehicle or a particular option, contact your Kalmar dealer.

Hydraulic Boom Operation

The hydraulically operated boom is controlled by a lever inside the cab. The lever is located on the console to the right of the seat and next to the shift lever (page 24).

DANGER

Never raise or lower the boom while the tractor and trailer combination is moving. Raising the boom while the tractor and trailer are moving creates a “rollover” hazard and may cause the vehicle to rollover possibly resulting in serious injury or death. DO NOT OPERATE THE BOOM CONTROL LEVER WHILE THE VEHICLE IS MOVING A TRAILER.

To Raise the Fifth Wheel: To raise the boom, the engine must be running. Pushing the lever to the UP position indicated on the boom operating lever, raises the fifth wheel. To increase the rate of travel of the boom, the engine may be idled higher while the vehicle is in NEUTRAL ONLY.

To Lower the Fifth Wheel: To lower the boom, the engine must be running and the transmission in NEUTRAL. Pulling the boom control lever to the DOWN position marked on the boom operating lever, lowers the boom and fifth wheel. To increase the rate of travel of the boom, the engine may be idled higher while the vehicle is in NEUTRAL ONLY. Standard configuration of the boom allows both power up and down capability.

Fifth Wheel Unlatch Control Valve

The Kalmar tractor comes standard with an air-operated fifth wheel unlatch cylinder. The cylinder is operated by a “push-type” valve located on the right-hand console behind the shifter (page 24). Pressing the fifth wheel unlatch valve opens the kingpin jaws in the fifth wheel. After the jaws are opened, they remain open until the fifth wheel is connected to a trailer kingpin.

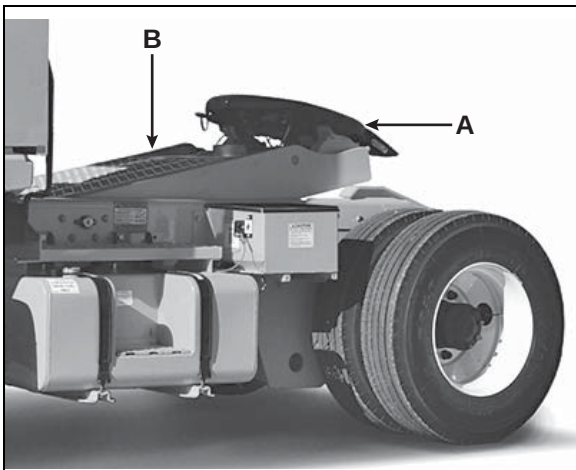


Figure 22

A — Fifth Wheel Plate

B — Boom

NOTICE

When pulling out from under a trailer, the control must be depressed and held until the fifth wheel is clear of the trailer kingpin.

Basic Trailer Spotting Steps**NOTICE**

The following information is for reference only. Kalmar Solutions, LLC highly recommends using the following information to create procedures that match your particular application and vehicle. It is the operator's responsibility to ensure that proper trailer moving procedures are used for a particular situation and vehicle application.

1. Maintain optimum tractor air pressure (120 P.S.I.). The fifth wheel should be in the FULL DOWN position. Be absolutely positive that the fifth wheel jaws are in the UNLATCH position by depressing the unlatch control valve located to the right of the shifter. (See page 24.)
2. Line the tractor up to the front of the trailer by centering the fifth wheel to the center line of the trailer. Make sure that the tail of the fifth wheel is BELOW the trailer skid ramp.
3. Back the tractor UNDER the trailer until the ENTIRE fifth wheel DISAPPEARS UNDER the front edge of the trailer floor/skid plate.
4. With your foot firmly on the brake treadle and the tractor shift lever in NEUTRAL, move the boom control lever to the UP position and raise the trailer until the trailer support is JUST OFF THE GROUND. DO NOT raise the trailer any more than a few inches to provide clearance between the trailer landing gear and the ground at this step.
5. After you have obtained adequate ground clearance at the trailer landing gear, place the shift selector in REVERSE, release your foot from the brake treadle and back FIRMLY into the kingpin jaws until you feel full engagement. REMEMBER, the latching jaws in the fifth wheel MUST BE FULLY IN THE OPEN POSITION BEFORE attempting kingpin engagement.
6. Place the transmission shift lever into a forward drive gear and give a "TUG" at the kingpin to ensure positive lock of the jaws around the kingpin. BE PREPARED to stop if the fifth wheel jaws have not fully latched to avoid pulling out from under the trailer and dropping it.
7. Place the shift lever in the NEUTRAL position and raise the boom using the boom control lever. Raise the fifth wheel to the necessary height to maintain ground clearance while towing the trailer to the new location. Be aware of potential overhead damage to a trailer if it is raised too high.
8. Once proper trailer height is reached, apply the tractor parking brake. Now hook BOTH the trailer emergency and service air lines to the trailer (blue and red air lines) and plug in the trailer electrical cable.

9. With the brake treadle FULLY applied, push in BOTH the parking brake control (yellow) and the trailer air supply (red). This will charge the trailer air supply and release the trailer spring/parking brakes.
10. After the tractor air system is fully charged, move the transmission shift lever to the proper gear and release pressure on the foot-operated brake treadle. Allow the vehicle to roll a VERY SHORT distance and then depress the brake treadle again to stop the vehicle. This procedure will ensure that the service brakes on the trailer are working properly. NOW, and ONLY NOW, are you ready to move ("SPOT") the trailer.
11. Once the trailer is relocated and the vehicle combination is completely stopped, place the shift lever in NEUTRAL and pull out on the trailer air supply control (red). This will apply the trailer parking brakes only. The parking brake control (yellow) should remain "in" with the tractor parking brake released.
12. Using the boom control lever, lower the trailer until the trailer supports are resting completely on the ground.
13. Disconnect and STORE the air lines and electrical cable.
14. DEPRESS and HOLD the fifth wheel unlatch control valve as you slowly pull away from the trailer. Once the fifth wheel is completely clear of the kingpin, release the fifth wheel unlatch control and go to the next trailer.

FAILURE TO READ AND FOLLOW ANY OF THE FOLLOWING WARNINGS MAY LEAD TO SERIOUS INJURY OR DEATH.

** WARNING**

When the vehicle is operated on public streets or highways, the fifth wheel manual secondary lock **MUST** be engaged and the fifth wheel **MUST** be in the DOWN position.

** WARNING**

NEVER raise or lower the boom while the vehicle has a trailer attached and is in motion.

** WARNING**

DO NOT EXCEED 15 M.P.H. (24 K.P.H.) WHEN TOWING TRAILERS. Operating at speeds in excess of 15 M.P.H. (24 K.P.H.) may lead to loss of vehicle control. **NEVER** take turns at excessive speeds, as this may cause the vehicle to roll over. The majority of all rollover accidents are caused by excessive cornering speed. **ALWAYS SLOW DOWN WHEN CORNERING.**

⚠ WARNING

Never tow trailers without BOTH the service and emergency brake lines connected to the trailer. Never tow trailers without functioning service and emergency brake systems. Operating the vehicle while towing trailers without functioning trailer brake systems may lead to loss of control of the vehicle, serious injury or death.

⚠ WARNING

Never tow a trailer above the minimum height required to clear the landing gear from the ground. Lifting the fifth wheel and trailer too high drastically raises the center of gravity of the trailer and increases the chance of a rollover.

3.2.7 Exhaust System — DOT/EPA-Approved Engines

⚠ WARNING

Exhaust system components can become extremely hot from engine operation. Wait for the exhaust system to cool down completely before performing exhaust system service. Wear protective gloves when working around exhaust system components. Failure to do so can result in serious personal injury.

Diesel Particulate Filter (DPF) Regeneration

To meet current emissions regulations, this vehicle is equipped with a Diesel Particulate Filter as part of its exhaust aftertreatment system. The DPF traps diesel particulates and requires periodic service to ensure its proper functionality. Servicing involves regeneration (burning) of the trapped particulates. The engine's ECM senses when regeneration is required and can automatically, under the correct conditions, initiate regeneration. If the correct conditions cannot be met, the operator must initiate a "Stationary" regeneration. Not performing a "Stationary" regeneration, when required, will necessitate the removal of the DPF for service.

High Exhaust Temperature Lamp

The "High Exhaust Temperature" lamp illuminates to indicate that high exhaust temperatures exist. When this lamp is illuminated, the engine should be stopped and the exhaust system allowed to cool before restarting the engine.



Figure 23
High Exhaust Temperature Lamp



Figure 24
DPF Regen Needed Lamp

DPF (Diesel Particulate Filter) Regen Needed Lamp

The "DPF Regen Needed" lamp indicates, when illuminated or flashing, that the diesel particulate filter requires regeneration.

When the "DPF Regen Needed" lamp illuminates, the diesel particulate filter needs to regenerate within the next 2-6 hours of operation. This is accomplished by:

1. Changing to a more challenging duty cycle, such as highway driving or similar, for at least 20 minutes,

OR

2. Performing a "Stationary" Regeneration.

If a regeneration is not completed in a timely manner after the "DPF Regen Needed" lamp illuminates, the lamp will begin to flash. When this happens, the actions on page 43 should be performed within 1-2 hours. In addition, engine power may be reduced automatically.

Performing a "Stationary" Regeneration

1. Park the vehicle in an area where it can safely idle for up to 50 minutes. The regeneration period may be from 5 to 50 minutes, depending upon severity.
2. Set the parking brake and let the truck idle.
3. Turn the Regen switch to the "ON" position. The switch is located on the dash, to the right of the steering column.
4. Do not throttle the engine or apply the brake pedal until the regeneration is complete and the DPF light goes out. Throttling the engine and/or applying the brake will stop the regeneration process.
5. Turn the Regen switch to the "OFF" position after regeneration is complete.

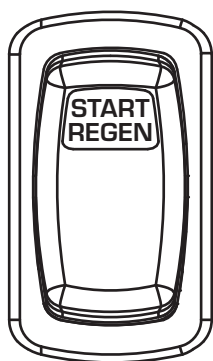


Figure 25
Regen Switch

Check and Stop Engine Lamps

A flashing "DPF Regen Needed" lamp combined with an illuminated "Check Engine" lamp indicates that the Diesel Particulate Filter needs to be regenerated immediately. Engine power will be reduced automatically. A "Stationary" regeneration is required immediately.

NOTICE

If a "Stationary" regeneration is not performed, the red "Stop Engine" lamp will illuminate. The vehicle should be stopped as soon as it can safely be done and remain shut down until it can be serviced by an authorized repair location.

Driver Tips

- The electric-actuated variable geometry turbocharger causes the engine sound to vary at times. This is normal. A slight turbo whistle may also be observed at idle conditions.

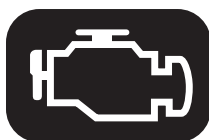


Figure 26
Malfunction Indicator Lamp



Figure 27
Diesel Exhaust Fluid (DEF) Lamp



Figure 28
Diesel Exhaust Fluid (DEF) Lamp



Figure 29
Lamp Combination

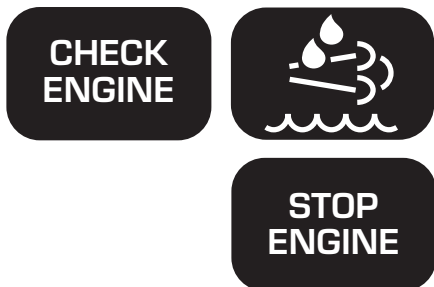


Figure 30
Lamp Combination

- After prolonged idle, you may notice momentary white vapor and odor. This is normal.
- Use only Ultra Low Sulfur Diesel (ULSD) fuel.
- Oil classification CJ-4 (low ash) is the recommended oil. This will increase the time between regeneration events.

Exhaust-Related Engine Indicator Lamps

Malfunction Indicator Lamp

The MIL illuminates when the On-Board Diagnostics system detects a malfunction related to the emissions control system. The illuminated MIL indicates that the engine and aftertreatment system should be diagnosed and serviced at your next available opportunity.

Diesel Exhaust Fluid (DEF) Lamp Illuminated

An illuminated DEF lamp is an indication that the DEF level is low. This can be corrected by refilling the DEF tank.

Flashing

A flashing DEF lamp indicates that the DEF level has fallen below a critical level. This can be corrected by refilling the DEF tank.

Flashing with Warning or Check Engine Lamp

A flashing DEF lamp combined with an illuminated Warning or Check Engine lamp indicates that the DEF level is critically low and you will experience a power loss. Normal engine power will be restored after refilling the DEF tank.

Stop Engine Lamp with Flashing DEF and Warning or Check Engine Lamp

If the engine has been shut down or has idled for one hour after the DEF tank has been run dry, the Stop Engine Lamp will also be illuminated along with the flashing DEF lamp and illuminated Warning or Check Engine lamp. Engine power will continue to be reduced automatically. The vehicle will also be limited to 5 M.P.H. (8 K.P.H.). Normal engine power and vehicle speed will be restored after refilling the DEF tank.

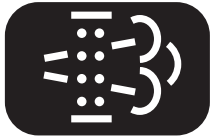


Figure 31
DPF Regen Needed Lamp

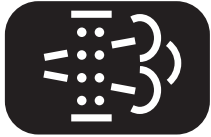


Figure 32
DPF Regen Needed Lamp



Figure 33
Lamp Combination



Figure 34
Stop Engine Lamp

Illuminated

An illuminated DPF Regen Needed Lamp is an indication that the truck needs to perform a regeneration.

Flashing

If a regeneration is not performed in a timely manner after the DEF lamp is illuminated, the DEF lamp will begin to flash. This indicates a higher level of soot in the DPF. In addition engine power may be reduced automatically.

Flashing with Warning or Check Engine Lamp

A flashing DPF lamp combined with an illuminated Warning or Check Engine Lamp indicates that the Aftertreatment DPF needs regeneration immediately. Engine power will be reduced automatically. Parked regeneration is required.

Stop Engine Lamp

If Parked regeneration is not performed, the Stop Engine Lamp will illuminate. The vehicle should be stopped as soon as it can safely be done until it can be repaired.

6 Scheduled Maintenance

General Maintenance Program

One of the keys to safe and dependable operation of your Kalmar tractor is proper maintenance. Yard tractors are used in very abusive operations. Moving trailers through rough yards 10 to 24 hours a day can take a toll on even the best built piece of equipment. It is the operator's job to ensure that every time he or she climbs into the cab, that the vehicle is ready to roll, safely and reliably.

Because all spotting applications are not the same, it is critical that a good "Total Maintenance Program" is developed for your particular vehicle and application. A vehicle that runs 24 hours a day in a railroad yard will need a more intensive maintenance program than a vehicle running 8 hour days in a smooth, paved lot.

If you need assistance on determining a good maintenance program, call your Kalmar dealer for assistance.

NOTICE

The Kalmar Daily Inspection, or "walk around" will assist the operator in identifying obvious problems that could affect normal operation of the vehicle (a sample Daily Inspection Form is provided on page 10). The daily inspection form is not intended to be a substitute for a Preventative Maintenance Program.



A vehicle that has not been properly maintained, may not be safe to operate. The operator of a Kalmar tractor must be satisfied that his/her vehicle has been properly maintained and is in safe working condition, before operating that vehicle. Operating an improperly maintained vehicle may lead to loss of vehicle control, which could severely injure or kill the operator.

Vehicle maintenance, other than routine operator maintenance (checking fluids, cleaning, filling fuel tank), should only be performed by a professional, trained mechanic. Many maintenance procedures require special training and tools to be done safely. Attempting to perform maintenance procedures without proper training and equipment may lead to serious injury or death.

6.1 Checklists

Chassis Lubrication Diagram

(left-hand drive chassis shown)

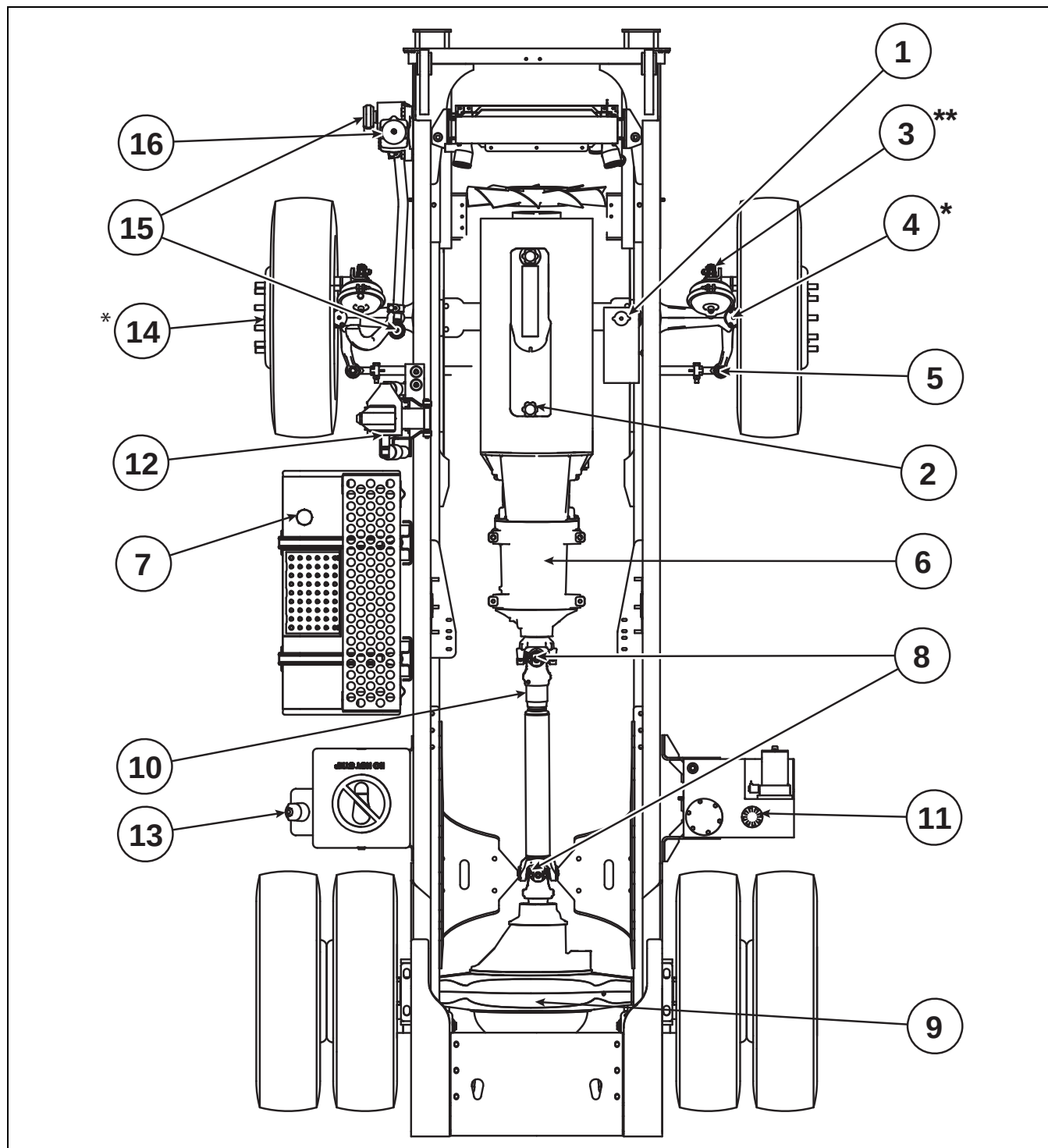


Figure 35
Chassis Lubrication Diagram
*Both Sides
**Both Sides Front and Rear

Key No.	Part/Description	Lubricant Used/Note
1	Coolant/Anti-Freeze	50/50 Ethyl-Glycol/Water
2	Engine Oil	SAE 15W-40 See Engine Operator Manual
3	Slack Adjusters Brake Cam Pivot	Lithium Grease
4	Front Axle King Pins	Lithium Grease
5	Tie Rod Ends	Lithium Grease
6	Transmission Fluid	Transynd See Transmission Operator Manual
7	Diesel Fuel	ULSD See Engine Operator Manual
8	Universal Joints	Lithium Grease
9	Rear Axle Differential	EP 85-140 See Axle Operator Manual
10	Driveline Slip Yoke	Lithium Grease
11	Hydraulic/Steering Fluid	Dexron III
12	Cab Suspension Latch	Lithium Grease
13	Diesel Exhaust Fluid	See Engine Operator Manual
14	Front Wheel Bearings	EP Grade No. 1 See Axle Operator Manual
15	Drag Link Ends	Lithium Grease
16	Steering Slip Joint	Lithium Grease

Boom and Fifth Wheel Lubrication Diagram

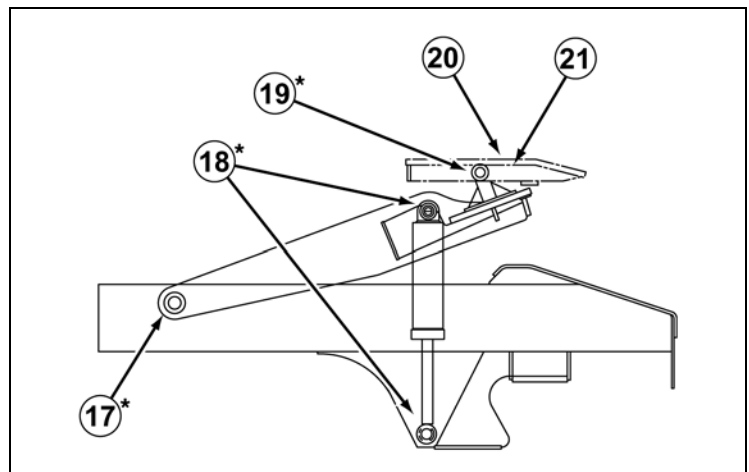


Figure 36
Boom and Fifth Wheel Lubrication Diagram
*Both Sides

Key No.	Part/Description	Lubricant Used/Note
17	Boom Pivot	Lithium Grease #1
18	Boom Cylinder Bearings	Lithium Grease #1
19	Fifth Wheel Pivot	Lithium Grease #1
20	Fifth Wheel Top Plate	Lithium Grease #1
21	Fifth Wheel Jaws	Lithium Grease #1
NI	Cab Door Hinge	Silicone Spray
NI	Steering Column Slip Yoke	Lithium Grease #1
NI	Rear Door Rollers	Silicone Spray

NI = Not Illustrated

**KALMAR TERMINAL TRACTOR PREVENTATIVE MAINTENANCE FORM
NON-SYNTHETIC (NON – TES-295) LUBE USED IN THE TRANSMISSION**

TRUCK NUMBER	LOCATION	TECHNICIAN	HOURS	DATE					
EACH OF THE FOLLOWING ITEMS SHOULD BE CHECKED AND THE CORRESPONDING BOX MARKED WITH THE APPROPRIATE NOTATION. √ = SATISFACTORY 0 = ADJUSTMENT NECESSARY X = REPAIRS NEEDED. “A” INSPECTIONS SHOULD BE PERFORMED AT 250 HOUR INTERVALS, “B” INSPECTIONS AT 500 HOUR INTERVALS, “C” INSPECTIONS AT 1000 HOUR INTERVALS, AND “D” INSPECTIONS AT 2000 HOUR INTERVALS.									
OPERATION	A	B	C	D	OPERATION	A	B	C	D
CAB – INTERIOR					UNDER VEHICLE				
CHECK OPERATION OF NEUTRAL START					CHECK STEERING GEAR				
CHECK OPERATION OF ALL GAUGES					CHECK BRAKE LININGS AND DRUMS				
CHECK LOW AIR BUZZER AND LIGHT					CHECK SPRINGS				
CHECK WINDSHIELD WIPER OPERATION					CHECK SHOCK ABSORBERS (IF APP.)				
CHECK WINDSHIELD WASHER OPERATION (IF APP.)					TORQUE FRONT AXLE MOUNTING BOLTS				
CHECK THROTTLE OPERATION					TORQUE FRONT AXLE KING PIN DRAW KEY NUT(S)				
CHECK HORN(S) OPERATION					CHECK POWER STEERING PUMP				
CHECK AIR SYSTEM – MINIMUM 120 PSI, MAXIMUM 130 PSI					CHECK STARTER MOUNTING AND CONNECTIONS				
CHECK AIR SYSTEM FOR LEAK DOWN					CHECK ENGINE AND TRANSMISSION FOR LEAKS				
CHECK OPERATION OF BACK UP ALARM					CHANGE ENGINE OIL AND FILTER				
CHECK HVAC SYSTEM					CHANGE TRANSMISSION FILTERS				
BLOWER MOTOR OPERATION					CHANGE TRANSMISSION FLUID				
TEMPERATURE CONTROL					CHECK ENGINE AND TRANSMISSION MOUNTS				
DEFROSTER OPERATION					CHECK WHEEL SEALS FOR LEAKS				
A/C OPERATION (IF APP.)					CLEAN REAR AXLE BREATHER				
AUXILIARY FAN(S) (IF APP.)					CHECK DIFFERENTIAL FOR LEAKS				
CHECK 5 TH WHEEL UNLATCH CONTROL					CHECK DIFFERENTIAL OIL LEVEL				
CHECK OPERATION OF BOOM					CHANGE DIFFERENTIAL OIL				
CHECK OPERATION OF WINDOWS					CHECK LIFT CYLINDERS FOR LEAKS				
CHECK SEAT BELT SYSTEM PER 10-STEP INSPECTION					TORQUE REAR AXLE MOUNTING BOLTS				
CHECK OPERATION OF DOOR LATCHES					CHASSIS				
CHECK DOME LIGHT OPERATION					CHECK FRONT WHEEL BEARINGS				
CHECK ALL GLASS AND MIRRORS					CHECK FRONT AXLE OIL LEVEL (IF APP.)				
CHECK FIRE EXTINGUISHER CHARGE (IF APP.)					REPACK FRONT WHEEL BEARINGS (IF APP.)				
CAB DOWN – EXTERIOR					CHECK BATTERY CABLES & HOLDDOWNS				
CHECK SIDE DOOR HINGE (IFF APP.)					CHECK BATTERIES FOR CRACKS OR DAMAGE				
CHECK CAB ACCESS STEPS AND HANDLES					CLEAN BATTERY CABLE CONNECTIONS				
CLEAN HEATER / AC FILTER (IF APP.)					CHECK BATTERY BOX COVER HOLDDOWNS				
CHECK REAR DOOR ROLLERS / SLIDE ADJUSTMENT					DRAIN WATER FROM AIR TANKS				
CHECK GLADHAND SEALS AND TRAILER AIR LINES					CHECK AND TORQUE ALL WHEEL NUTS				
CHECK TRAILER LIGHT CORD					CHECK WHEELS				
CHECK HEADLIGHTS / MARKER LIGHTS					CHECK TIRE AIR PRESSURE, TREAD DEPTH & CONDITION				
CHECK TURN SIGNALS					CHECK REAR AXLE PLANETARY FLUID LEVEL (IF APP.)				
CHECK STROBE LIGHT (IF APP.)					INSPECT PLATFORMS				
CHECK SPOTLIGHTS					CHECK FRAME FOR CRACKS				
CHECK WIPER BLADES					CHECK MUD FLAPS / FENDERS (IF APP.)				
CHECK WINDSHIELD WASHER FLUID LEVEL					CHANGE HYDRAULIC SYSTEM FILTER				
CHECK TRANSMISSION FLUID LEVEL					CHECK HYDRAULIC FLUID LEVEL				
CHECK ENGINE OIL LEVEL					CHANGE HYDRAULIC FLUID				
CAB UP					CLEAN HYDRAULIC TANK VENT				
CHECK OPERATION OF CAB TILT PUMP					CHECK CAB HINGE PINS AND BUSHINGS				
CHECK CAB SAFETY PROP					LUBRICATION				
CHECK CAB SUSPENSION AND LATCH					CHECK / LUBRICATE REAR DOOR ROLLERS				
CHECK INTAKE DUCTING FOR LEAKS					CHECK / LUBRICATE STEERING SLIP JOINT				
CHECK RADIATOR FOR LEAKS					CHECK / LUBRICATE STEERING U-JOINTS				
CHECK RADIATOR MOUNTS					CHECK / LUBRICATE ALL STEERING LUBE POINTS				
CHECK COOLANT LEVEL AND CONCENTRATION					CHECK / LUBRICATE SLACK ADJUSTERS				
CHECK AND ADJUST COOLANT ADDITIVE (IF APP.)					CHECK / LUBRICATE DRIVELINE U-JOINTS				
CHANGE ENGINE COOLANT					CLEAN, CHECK, ADJUST AND LUBE 5 TH WHEEL JAWS				
CHECK COOLANT HOSES AND CLAMPS					CHECK AND LUBRICATE 5 TH WHEEL TOP PLATE				
CHECK FAN CLUTCH FOR OPERATION (IF APP.)					CHECK AND LUBRICATE 5 TH WHEEL PIVOT PINS				
CHECK ENGINE COOLING FAN FOR CRACKS					CHECK AND LUBRICATE BOOM PIVOT BEARINGS				
CHECK ENGINE BELT(S) AND TENSIONER					CHECK AND LUBE BOOM CYLINDER BEARING				
CHANGE ENGINE COOLANT FILTER (IF APP.)					ADD GREASE TO AUTOLUBE RESERVOIR (IF APP.)				
CHECK ENGINE AND TRANSMISSION FOR LEAKS					TEST DRIVE				
DRAIN FUEL WATER SEPARATOR					DRIVE VEHICLE TO CHECK FOR OVERALL OPERATION				
CHANGE FUEL FILTER / FUEL WATER SEPARATOR									
CHECK AIR RESTRICTION GAUGE (IF APP.)									
CHANGE AIR FILTER				AS NEEDED					
CHANGE AIR DRYER DESICCANT (IF APP.)				AS NEEDED					
CHECK EXHAUST SYSTEM									
CLEAN TRANSMISSION BREATHER									

KALMAR TERMINAL TRACTOR PREVENTATIVE MAINTENANCE FORM											
SYNTHETIC (TES-295) LUBE AND ALLISON HIGH-CAPACITY FILTERS USED IN THE TRANSMISSION											
TRUCK NUMBER	LOCATION	TECHNICIAN				HOURS	DATE				
EACH OF THE FOLLOWING ITEMS SHOULD BE CHECKED AND THE CORRESPONDING BOX MARKED WITH THE APPROPRIATE NOTATION. √ = SATISFACTORY 0 = ADJUSTMENT NECESSARY X = REPAIRS NEEDED. “A” INSPECTIONS SHOULD BE PERFORMED AT 250 HOUR INTERVALS, “B” INSPECTIONS AT 500 HOUR INTERVALS, “C” INSPECTIONS AT 1000 HOUR INTERVALS, AND “D” INSPECTIONS AT 2000 HOUR INTERVALS.											
OPERATION		A	B	C	D	OPERATION		A	B	C	D
CAB – INTERIOR						UNDER VEHICLE					
CHECK OPERATION OF NEUTRAL START						CHECK STEERING GEAR					
CHECK OPERATION OF ALL GAUGES						CHECK BRAKE LININGS AND DRUMS					
CHECK LOW AIR BUZZER AND LIGHT						CHECK SPRINGS					
CHECK WINDSHIELD WIPER OPERATION						CHECK SHOCK ABSORBERS (IF APP.)					
CHECK WINDSHIELD WASHER OPERATION (IF APP.)						TORQUE FRONT AXLE MOUNTING BOLTS					
CHECK THROTTLE OPERATION						TORQUE FRONT AXLE KING PIN DRAW KEY NUT(S)					
CHECK HORN(S) OPERATION						CHECK POWER STEERING PUMP					
CHECK AIR SYSTEM – MINIMUM 120 PSI, MAXIMUM 130 PSI						CHECK STARTER MOUNTING AND CONNECTIONS					
CHECK AIR SYSTEM FOR LEAK DOWN						CHECK ENGINE AND TRANSMISSION FOR LEAKS					
CHECK OPERATION OF BACK UP ALARM						CHANGE ENGINE OIL AND FILTER					
CHECK HVAC SYSTEM						CHANGE TRANSMISSION FILTERS					
BLOWER MOTOR OPERATION						CHANGE TRANSMISSION FLUID					
TEMPERATURE CONTROL						CHECK ENGINE AND TRANSMISSION MOUNTS					
DEFROSTER OPERATION						CHECK WHEEL SEALS FOR LEAKS					
A/C OPERATION (IF APP.)						CLEAN REAR AXLE BREATHER					
AUXILIARY FAN(S) (IF APP.)						CHECK DIFFERENTIAL FOR LEAKS					
CHECK 5 TH WHEEL UNLATCH CONTROL						CHECK DIFFERENTIAL OIL LEVEL					
CHECK OPERATION OF BOOM						CHANGE DIFFERENTIAL OIL					
CHECK OPERATION OF WINDOWS						CHECK LIFT CYLINDERS FOR LEAKS					
CHECK SEAT BELT SYSTEM PER 10-STEP INSPECTION						TORQUE REAR AXLE MOUNTING BOLTS					
CHECK OPERATION OF DOOR LATCHES						CHASSIS					
CHECK DOME LIGHT OPERATION						CHECK FRONT WHEEL BEARINGS					
CHECK ALL GLASS AND MIRRORS						CHECK FRONT AXLE OIL LEVEL (IF APP.)					
CHECK FIRE EXTINGUISHER CHARGE (IF APP.)						REPACK FRONT WHEEL BEARINGS (IF APP.)					
CAB DOWN – EXTERIOR						CHECK BATTERY CABLES & HOLDDOWNS					
CHECK SIDE DOOR HINGE (IF APP.)						CHECK BATTERIES FOR CRACKS OR DAMAGE					
CHECK CAB ACCESS STEPS AND HANDLES						CLEAN BATTERY CABLE CONNECTIONS					
CLEAN HEATER / AC FILTER (IF APP.)						CHECK BATTERY BOX COVER HOLDDOWNS					
CHECK REAR DOOR ROLLERS / SLIDE ADJUSTMENT						DRAIN WATER FROM AIR TANKS					
CHECK GLADHAND SEALS AND TRAILER AIR LINES						CHECK AND TORQUE ALL WHEEL NUTS					
CHECK TRAILER LIGHT CORD						CHECK WHEELS					
CHECK HEADLIGHTS / MARKER LIGHTS						CHECK TIRE AIR PRESSURE, TREAD DEPTH & CONDITION					
CHECK TURN SIGNALS						CHECK REAR AXLE PLANETARY FLUID LEVEL (IF APP.)					
CHECK STROBE LIGHT (IF APP.)						INSPECT PLATFORMS					
CHECK SPOTLIGHTS						CHECK FRAME FOR CRACKS					
CHECK WIPER BLADES						CHECK MUD FLAPS / FENDERS (IF APP.)					
CHECK WINDSHIELD WASHER FLUID LEVEL						CHANGE HYDRAULIC SYSTEM FILTER					
CHECK TRANSMISSION FLUID LEVEL						CHECK HYDRAULIC FLUID LEVEL					
CHECK ENGINE OIL LEVEL						CHANGE HYDRAULIC FLUID					
CAB UP						CLEAN HYDRAULIC TANK VENT					
CHECK OPERATION OF CAB TILT PUMP						CHECK CAB HINGE PINS AND BUSHINGS					
CHECK CAB SAFETY PROP						LUBRICATION					
CHECK CAB SUSPENSION AND LATCH						CHECK / LUBRICATE REAR DOOR ROLLERS					
CHECK INTAKE DUCTING FOR LEAKS						CHECK / LUBRICATE STEERING SLIP JOINT					
CHECK RADIATOR FOR LEAKS						CHECK / LUBRICATE STEERING U-JOINTS					
CHECK RADIATOR MOUNTS						CHECK / LUBRICATE ALL STEERING LUBE POINTS					
CHECK COOLANT LEVEL AND CONCENTRATION						CHECK / LUBRICATE SLACK ADJUSTERS					
CHECK AND ADJUST COOLANT ADDITIVE (IF APP.)						CHECK / LUBRICATE DRIVE LINE U-JOINTS					
CHANGE ENGINE COOLANT						CLEAN, CHECK, ADJUST AND LUBE 5 TH WHEEL JAWS					
CHECK COOLANT HOSES AND CLAMPS						CHECK AND LUBRICATE 5 TH WHEEL TOP PLATE					
CHECK FAN CLUTCH FOR OPERATION (IF APP.)						CHECK AND LUBRICATE 5 TH WHEEL PIVOT PINS					
CHECK ENGINE COOLING FAN FOR CRACKS						CHECK AND LUBRICATE BOOM PIVOT BEARINGS					
CHECK ENGINE BELT(S) AND TENSIONER						CHECK AND LUBE BOOM CYLINDER BEARING					
CHANGE ENGINE COOLANT FILTER (IF APP.)						ADD GREASE TO AUTOLUBE RESERVOIR (IF APP.)					
CHECK ENGINE AND TRANSMISSION FOR LEAKS						TEST DRIVE					
DRAIN FUEL WATER SEPARATOR						DRIVE VEHICLE TO CHECK FOR OVERALL OPERATION					
CHANGE FUEL FILTER / FUEL WATER SEPARATOR											
CHECK AIR RESTRICTION GAUGE (IF APP.)											
CHANGE AIR FILTER						AS NEEDED					
CHANGE AIR DRYER DESICCANT (IF APP.)						AS NEEDED					
CHECK EXHAUST SYSTEM											
CLEAN TRANSMISSION BREATHER											

Lubrication and Fluids

This section contains basic fluid and lubricant requirements and their minimum service intervals for the standard Kalmar tractor. It also contains basic information on filter change intervals. If your vehicle has any optional or special factory-installed equipment, such as planetary axles or a central lube system, contact your Kalmar dealer for specific lubrication requirements for your vehicle.

The fluids and lubricants covered in this section are listed below. If a specific lubricant or fluid used on your vehicle is not covered in this section, contact your Kalmar dealer for the information.

Automatic Transmission Fluid
Axle Differential Lubricant
Coolant/Anti-Freeze
Diesel Fuel
Engine Oil
Multi-Purpose Grease
Hydraulic System Fluid

The Lubrication Diagrams on page 48 and page 49 show the location of specific lubrication and fluid points for easy reference. The Preventative Maintenance Forms (see pages 51 and 52) indicates services that need to be performed at every 250, 500, 1000 and 2000 hour interval.

The chart also indicates the type of lubricant or fluid required or indicates the page number where that information can be found.

 CAUTION

The maintenance and service intervals in this manual are provided for reference. These intervals are the maximum allowable on a vehicle used in normal operation. These intervals may not apply to your specific vehicle application. It is the operator's responsibility to ensure that the vehicle is properly maintained. Failing to maintain a vehicle properly may lead to an unsafe vehicle, serious vehicle damage, or injury.

NOTICE

Never add any type of fluid or lubricant unless it is the same grade and type which is currently being used. Mixing of different lubricants and fluid grades or types should be avoided. If the grade or type of fluid is unknown, the system must be drained and flushed before the new fluid or lubricant is added.

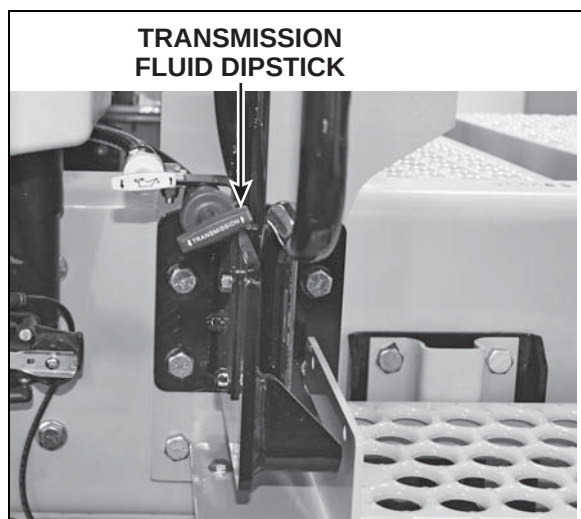


Figure 37
Transmission Fluid Dipstick

Automatic Transmission Fluid

The transmission fluid level can be conveniently checked using the dipstick located near the base of the driver step hand rail.

All Kalmar tractors come with a Transmission Operator's Manual provided by the manufacturer. This manual covers the specific transmission in your vehicle. Refer to this Transmission Operator's Manual for transmission fluid requirements and service intervals.

CAUTION

Kalmar Solutions, LLC requires that the operator of any Kalmar tractor comply with the transmission manufacturer's transmission fluid requirements. Failure to comply with the transmission manufacturer's requirements for transmission fluid may void the warranty on the transmission and cause severe transmission damage and injury. Contact your Kalmar dealer if you did not receive a Transmission Operator's Manual with your new Kalmar tractor.

Axle Differential Lubricant

Axle lubricant requirements vary with make of axle and customer requirements. Refer to the Axle Manufacturer's Operator's Manual for required specifications and operating information.

NOTICE

Synthetic gear lubricant is available as an option. Contact your Kalmar dealer if you need more information.

NOTICE

Front axles equipped with optional "WET" wheel seals require the lubricant described previously. They do not use the lithium-based grease used on standard front hubs. The fluid in these front hubs needs to be checked every 250 hours.

Coolant/Anti-Freeze

The cooling system of the new Kalmar tractor is filled at the factory with the following solution:

50% ethyl-glycol heavy-duty anti-freeze with rust inhibitor, and 50% water. Coolant system additive must be aluminum-compatible.

Proper level of fill for the cooling system is indicated by the presence of coolant in the sight glass of the radiator top tank. It is not necessary to fill the top tank to the filler neck.

A 50/50 mixture provides freeze protection down to -34°F (-36.7°C) and maintains proper heat transfer properties. This is the recommended solution mixture.

Always refer to the Engine Operator's Manual before changing the factory-recommended anti-freeze-to-water ratio in the coolant mixture. Some engine manufacturers have specific coolant mixture requirements needed to satisfy engine warranty requirements. Remember to check and maintain the anti-freeze solution in your Kalmar tractor regularly. Contact your Kalmar dealer if you need more information.

Some engines, specifically "sleeved" engines, require the use of supplemental coolant additives to prevent liner cavitation. Refer to the Engine Operator's Manual for more information.

 WARNING

Never attempt to open the radiator cap when the engine is hot. Always allow the engine and coolant to cool completely before opening the radiator. Failure to allow the coolant to cool will cause hot coolant to spray from the radiator when it is opened. This could cause severe burns or blindness.

 CAUTION

The coolant should be tested every 250 hours and replaced every 2000 hours at the very minimum. Exceeding these intervals may damage the cooling system, or lead to injury.

NOTICE

A coolant mixture below 30% does not provide adequate corrosion protection and may lead to radiator damage. A coolant mixture above 68% does not provide proper freeze protection and reduces heat transfer capabilities of the solution.

Fuel

All Kalmar tractors come with an Engine Operator's Manual provided by the engine manufacturer. This manual is for the specific engine in your vehicle. Refer to this Engine Operator's Manual for fuel requirements.

 DANGER

Never mix diesel fuel with gasoline, gasohol and/or alcohol. This practice creates an extreme fire hazard and may cause an explosion which could result in serious injury or death.

 CAUTION

Kalmar Solutions, LLC requires that the operator of any Kalmar tractor comply with the engine manufacturer's fuel requirements. Failure to comply with the engine manufacturer's fuel requirements may cause severe

engine damage, injury and void the warranty on the engine. Contact your Kalmar dealer if you did not receive an Engine Operator's Manual with your new Kalmar tractor.

WARNING

NEVER smoke in or around the fueling area when filling the fuel tank. Flammable materials can ignite an explosion, resulting in serious injury or death.

Engine Oil

The engine oil level can be conveniently checked using the dipstick located near the base of the driver step hand rail.

All Kalmar tractors come with an Engine Operator's Manual provided by the engine manufacturer. This manual is for the specific engine in your vehicle. Refer to this Engine Operator's Manual for engine oil requirements.

CAUTION

Kalmar Solutions, LLC requires that the operator of any Kalmar tractor comply with the engine manufacturer's engine oil requirements. Failure to comply with the engine manufacturer's requirements for engine oil may void the warranty on the engine and cause severe engine damage and injury. Contact your Kalmar dealer if you did not receive an Engine Operator's Manual with your new Kalmar tractor.

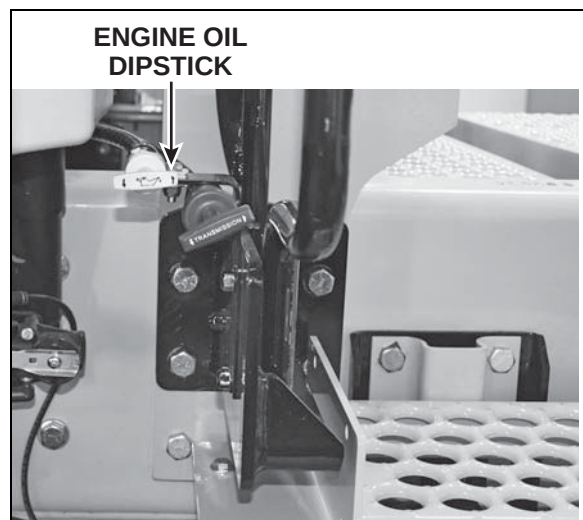


Figure 38
Engine Oil Dipstick

Diesel Exhaust Fluid (DEF)

WARNING

Do not allow Diesel Exhaust Fluid to contact the eyes. In case of contact, immediately flood eyes with large amounts of water for a minimum of 15 minutes. Avoid prolonged contact with skin. In case of contact, immediately wash skin with soap and water. Do not swallow internally. In the event the Diesel Exhaust Fluid is ingested, contact a physician immediately.

CAUTION

It is unlawful to tamper with or remove any component of the after-treatment system. It is also unlawful to use a catalyst solution that does not meet the specifications provided or to operate the vehicle/equipment with no catalytic solution.

If the Diesel Exhaust Fluid level is found to be low, Diesel Exhaust Fluid must be added.

The following are other common names used for DEF:

- Urea
- AUS 32 (Aqueous Urea Solution 32)
- AdBlue
- NOx Reduction Agent
- Catalyst Solution

Regardless of what the Diesel Exhaust Fluid is called, the Diesel Exhaust Fluid must meet the engine manufacturer's specification. See your engine operator's manual.

Hydraulic System Fluid

Proper fluid level can be checked using the gauge found on the outside of the hydraulic tank. Add fluid to keep it level with the "Full Cold" line. The level should be checked after moving the boom to the DOWN position with the engine running.

Three systems requiring hydraulic fluid operate out of a single, high-capacity reservoir located on the frame rail. The three systems are:

1. Boom lift
2. Power steering
3. Cab tilt

Dexron® III should be used whenever replenishing or replacing the fluid.

NOTICE

The fluid in the hydraulic system and the filter must both be replaced at least once a year at the very minimum. Never exceed this interval.

Multi-Purpose Grease

The following lubricants are recommended:

1. API Grade 1 Multi-Purpose Grease
2. Any high quality lithium-based grease that has extreme pressure properties, is water resistant and is recommended for use in automotive and heavy-duty applications.
3. Base Oil Timken 40 rating minimum

Filters

Refer to your Kalmar Parts Manual for the required part numbers. Remember, your parts manual is custom built to match your specific vehicle. If you are in doubt of the correct part numbers, contact your Kalmar dealer for help.

See the Preventative Maintenance Form (on pages 50 and 51) for the recommended MAXIMUM filter replacement intervals.

These intervals are the absolute maximum allowable under normal conditions. Intervals for your vehicle may be shorter due to actual vehicle operating conditions. Operating a vehicle in harsh conditions, or for extended periods of heavy use, will make more frequent filter changes necessary.

CAUTION

Never exceed the maximum time intervals. Doing so may lead to vehicle damage and void the vehicle and component warranties.

Preventative Maintenance Guidelines

Cab Interior

Check Operation of Neutral Start — Move the gear selector to any position other than “N” and attempt to start the engine. The engine should not crank with the selector in any position other than “N”.

Check Operation of All Gauges — With the engine running, verify that all gauges are functional.

Check Low Air Buzzer and Light — Apply and release the brake pedal until air pressure drops below 90 P.S.I. At that point, the low air buzzer and dash warning light should come on.

Check Windshield Wiper Operation — Turn on the windshield wiper and confirm full and smooth travel of the wiper arm. Listen for any noises that might indicate a worn wiper motor.

Check Windshield Washer Operation *(if applicable)* — Depress the washer button and confirm the flow and pattern of the washer fluid.

Check Throttle Operation — Depress and release the foot throttle and check for binding and ease of operation.

Check Horn(s) Operation — Sound the electric and air horns *(if applicable)* to confirm proper operation.

Check Air System. Minimum 120 P.S.I. (8.27 bar), Maximum 130 P.S.I. (8.96 bar) — Start the engine and run at fast idle. Maximum system pressure should be limited to a minimum of 120 P.S.I. (8.27 bar) and a maximum of 130 P.S.I. (8.96 bar).

Check Air System for Leak Down — Disconnect the gladhands from the trailer. Run the engine at fast idle and allow air pressure to stabilize at 120 P.S.I. for at least 1 minute. Shut off the engine and observe the dash gauge(s) for 2 minutes. The drop in pressure should not exceed 2 P.S.I. (0.137 bar) over the 2-minute period.

Check Operation of Back-Up Alarm — With the engine running, move the gear selector to reverse and listen for the back-up alarm.

Check HVAC System

- **Blower Motor Operation** — With the key on, ensure that the blower motor operates at each position of the blower speed switch.
- **Temperature Control** — Confirm proper operation of the temperature control switch.
- **Defroster Operation** — With the engine running and the defroster control turned on, confirm air flow from the defroster vents.
- **Air Conditioner Operation (if applicable)** — With the engine running and the air conditioner control turned on, confirm cooled air flow from the defroster vents.
- **Auxiliary Fan(s) (if applicable)** — With the key on, turn on the auxiliary fans and confirm operation.

Check Fifth Wheel Unlatch Control — With the system air pressure above 100 P.S.I., confirm that the fifth wheel jaws unlatch when the dash control is activated.

Check Operation of Boom — With the engine running at fast idle, activate the boom control and ensure full extension and retraction.

Check Operation of Windows — Confirm that all regulated and sliding windows open and close fully.

Check Door Latch Operation — Operate the door latch from inside and outside the cab to ensure proper operation.

Check Dome Light Operation — With the key on, turn on the cab dome light and confirm operation.

Check All Glass and Mirrors — Inspect all glass and mirrors for cracks and breaks.

Check Fire Extinguisher Charge (if applicable) — If the vehicle is equipped with a fire extinguisher, confirm that it is properly charged.

Seat Belt System

Inspect the seat belt system every 20,000 miles (32,187 km) or more often if exposed to severe environmental conditions or vocation. Check the following:

1. **Inspect belt** on entire system for cuts, fraying, extreme or unusual wear. Most common areas of belt wear include the buckle/latch area, the shoulder loop area and any place where the belt makes contact with vehicle or seat. *Replace the entire belt system if necessary.*
2. **Inspect buckle** for proper operation by inserting latch and listening for an audible click. Verify the buckle is not damaged, cracked or broken. *Replace the entire belt system.*
3. **Inspect buckle cable** (optional component) black coating on buckle cable must not be damaged. Internal cable wires must not be exposed, frayed or broken. *Replace the entire system.*
4. **Inspect latch** for proper operation by inserting into buckle. Latch must insert smoothly and you must hear an audible click. Verify proper latching by tugging on belt. Latch must not be worn, deformed or corroded. *Replace the entire belt system.*
5. **Inspect shoulder loop web guide** (optional component) Seat belt must move freely through shoulder loop. Shoulder loop must also pivot freely and be free of obstructions. *If necessary, adjust shoulder loop hardware and/or remove obstruction.*
6. **Inspect seat belt height adjuster** (optional component) for damage. Mover adjuster up and down. It must move freely and lock at the different height positions. *Replace the entire belt system if necessary.*
7. **Inspect retractor operation.** When pulled and released slowly, seat belt must spool out and retract without locking. *Replace the entire belt system if necessary.*
8. **Inspect mounting hardware** on both sides of seat. Hardware should be tight. Hardware must not be missing, rusted, corroded or damaged. *If necessary, replace defective or missing hardware with authorized parts and/or tighten hardware.*
9. **Inspect tethers** for cuts, fraying, extreme or unusual wear. Tethers must also be inspected for proper attachment and/or adjustment. *If necessary, replace defective tethers. Tighten and/or properly adjust tethers according to vehicle manufacturer's specifications.*
10. **Inspect Komfort Latch®** (optional component) for function and ability to clamp on web. *Replace the entire system if necessary.*

Cab Down — Exterior

Check Side Door Hinge (*if applicable*) — Inspect the door hinge for wear or damage.

Check Cab Access Steps and Handles — Inspect all steps and grab handles for proper mounting and the absence of cracks.

Clean Heater/AC Filter — Remove the HVAC filter and vacuum or blow clean with low-pressure air.

Check Rear Door Roller/Slide Adjustment — Inspect the rear door rollers and slide for wear or damage.

Check Gladhand Seals and Trailer Air Lines — Inspect the seals for tears and wear. Check the air lines for kinks or cracks.

Check Trailer Light Cord (*if applicable*) — Inspect the light cord for cuts and abrasions. As the lights of the truck are checked, confirm that a trailer connected with the light cord also has lights. This can be done either with a trailer connected or with a “test box”.

Check Headlights/Marker Lights — Start the engine, turn on the light switches and confirm the lights are illuminated.

Check Turn Signals — With the key on, activate the turn signal switch and the flasher to confirm that the turn signals are working.

Check Strobe Light (*if applicable*) — With the key on, turn on the strobe light to confirm its operation.

Check Spotlights — With the key on, turn on the spotlight(s) to confirm its operation.

Check Wiper Blades — Inspect the wiper blades for tears or excessive wear.

Check Windshield Washer Fluid Level — Fill the washer bottle as necessary.

Check Transmission Fluid Level — With the engine running, use the transmission dipstick to check the fluid level per the guidelines in the Transmission Operator's Manual.

Cab Up

Check Operation of Cab Tilt Pump — Pull the safety prop release cable and activate the cab tilt switch. The cab should rise.

Check Cab Safety Prop — Inspect the cab safety prop that encloses the cab lift cylinder. It should drop freely into place to support the cab when it is in the raised position. The lower cab cylinder pin and bracket should be inspected for signs of fatigue.

Check Cab Suspension and Latch — Inspect the linkages of the suspension system for excessive wear and proper alignment. Inspect the air bag for leaks or signs of abrasion. Inspect the lock jaw for excessive wear and proper operation.

Check Engine Intake Ducting for Leaks — Inspect all engine clean air tubes and hoses for leaks. All clamps should be checked for proper torque and all joints should be properly aligned.

Check Radiator for Leaks — Inspect the radiator core and tanks for signs of coolant leaks.

Check Radiator Mounts — Inspect the radiator mounts for wear or excessive looseness.

Check Coolant Level and Concentration — Check the cooling system level. Coolant should be visible in the radiator sight glass. It is not necessary for the coolant to be at the top of the sight glass. Test and maintain the proper anti-freeze level of concentration as outlined in the appropriate Engine Operator's Manual.

Check and Adjust Coolant Additive (if applicable) — Using the appropriate test method for the supplemental coolant additive being used (i.e., DCA or Nalcool), maintain the recommended level of concentration as outlined in the applicable Engine Operator's Manual.

Change Engine Coolant — Flush the cooling system and replace with clean coolant of the appropriate concentration.

Check Coolant Hoses and Clamps — Inspect all hoses for abrasion, cracks, holes and routing. Check all clamps for proper torque.

Check Fan Clutch for Operation (if applicable) — Run the engine to confirm that the fan clutch engages at the proper temperature.

Check Engine Cooling Fan for Cracks — Shut the engine off if running. Inspect the fan blades for signs of cracking.

Check Engine Belts and Tensioner — Inspect the belt(s) for cracking and wear. The belt tensioner should be checked for proper operation.

Change Engine Coolant Filter (*if applicable*) — Replace the engine coolant filter. A filter containing the proper supplemental coolant additive should be used to maintain the SCA concentration level.

Check Engine and Transmission for Leaks — Perform a visual inspection of the engine and transmission looking for any fluid leaks visible from above.

Drain Fuel Water Separator — Open the drain valve on the fuel/water separator and allow water to drain from the filter.

Change Fuel Water Separator — Replace the fuel filter following the instructions in the Engine Operator's Manual.

Check Air Restriction Gauge (*if applicable*) — Record the reading on the gauge, reset, start the engine, run to high idle and shut off the engine. If the reading remains on zero, the gauge may be defective or the intake piping has a leak. The cause must be investigated and the gauge replaced and/or the piping repaired.

If the initial gauge reading indicates that the filter should be changed, do so at this time. See the next item on the Preventative Maintenance form.

Change Air Filter — The air filter should be changed as needed. If the truck is equipped with a restriction gauge, replace the filter when the gauge indicates it is appropriate.

Change Air Dryer Desiccant (*if applicable*) — The desiccant should be changed as needed. Change as soon as water is evident when the system air tanks are drained.

Check Exhaust System — Visually inspect all of the exhaust system components for leaks and/or damage.

Clean Transmission Breather — Confirm that the breather, located on top of the transmission, is clean and the passage is open. Do not spray directly with high pressure or cleaning solvents.

Under Vehicle

Check Steering Gear — Inspect the steering gear for fluid leaks and excessive play. Inspect the steering linkage for wear or looseness.

Check Brake Linings and Drums — Visually check the linings and drums for wear and cracks. If the lining is 0.25 inch (6.35 mm) thick or less in any location, the shoes should be replaced or relined.

Check Leaf Springs — Inspect the leaf springs for cracking or excessive deflection.

Check Shock Absorbers (*if applicable*) — Inspect the shock absorbers for leaks.

Torque Front Axle Mounting Bolts — Re-torque front axle mounting bolts to 210 ft. lbs. (284.7 N•m).

Torque Front Axle Kingpin Draw Key Nuts — Re-torque the steer axle kingpin draw key nut(s).

Check Hydraulic Pump — Inspect the hydraulic pump for leaks.

Check Starter Mounting and Connections — Confirm that the starter mounting bolts are tight. Inspect the electrical connections for good contact at the starter terminals.

Check Engine and Transmission for Leaks — Perform a visual inspection of the engine and transmission looking for any fluid leaks visible from below.

Change Engine Oil and Filter — Drain and replace the engine oil. Use oil meeting, at least, the minimum specifications provided in the Engine Operator's Manual. Replace the oil filter.

Change Transmission Filters — **Notice** — This DOES NOT include the pan screen. The screen should only be replaced during overhaul.

Change Transmission Fluid — Drain and replace the transmission fluid. Use fluid meeting, at least, the minimum specifications provided in the Transmission Operator's Manual.

Check Engine and Transmission Mounts — Re-torque the engine and transmission mounts. Inspect the isolator material and replace if deteriorated.

Check Wheel Seals for Leaks — Inspect the front and rear hubs for signs of oil leaks. Replace if leaking.

Clean Rear Axle Breather — Ensure that the rear axle vent turns freely.

Check Differential for Leaks — Inspect the rear axle housing for signs of leaks. Repair as necessary.

Check Differential Oil Level — Check the differential oil level per the component manufacturer's instructions.

Change Differential Oil — Drain and replace the differential oil. Use oil meeting, at least, the minimum specifications of the component manufacturer.

Check Lift Cylinders for Leaks — Inspect the cylinders for signs of leaking. Repair as necessary.

Torque Rear Axle Mounting Bolts — Re-torque the rear axle mounting bolts: nut at 400 ft. lbs. (542 N•m), bolt at 600 ft. lbs. (813 N•m).

Chassis

Check Front Wheel Bearings — Raise and support the front axle. Check for excessive play in the wheel bearing.

Check Front Axle Oil Level (*if applicable*) — Check the oil level in the front axle hubcaps. Fill to the proper level as necessary.

Repack Front Wheel Bearings (*if applicable*) — Remove the front hubs and repack the bearings using grease meeting, at least, the minimum specifications of the component manufacturer.

Check Battery Cables and Holddowns — Inspect the battery cables for signs of abrasion or breaking. Repair and reroute as needed. Ensure that batteries are properly secured.

Check Batteries for Cracks or Acid Damage — Inspect the batteries for signs of damage. Replace as necessary.

Clean Battery Cable Connections — Remove the cable terminals from the batteries, clean the connections, and reattach the cable terminals.

Check Battery Box Cover Holddowns — Check the bolts or rubber latches to ensure that the battery box cover is secured.

Drain Water from Air Tanks — With the air system charged, open each manual drain until all moisture is removed from the system.

Check and Torque All Wheel Nuts — Inspect all the wheel nuts for signs of wear or damage. Re-torque all the nuts to 450–500 ft. lbs. (610–678 N•m).

Check Wheels — Inspect all the wheels for signs of damage including oversized holes and cracks.

Check Tire Air Pressure, Tread Depth and Condition —

Inspect the tires for damage and wear. Adjust to the proper air pressure.

Check Rear Axle Planetary Fluid Level (if applicable) —

Check and adjust the lubricant level in planetary housings per the component manufacturer's instructions.

Inspect Platforms — Inspect the platforms for proper mounting and the absence of cracks and trip points.

Check Frame for Cracks — Inspect the frame rails and crossmembers for cracks and bending.

Check Mud Flaps/Fenders (if applicable) — If equipped with mud flaps and/or a fender, inspect these items for proper mounting and damage.

Change Hydraulic System Filter — Remove and replace the external hydraulic filter.

Check Hydraulic Fluid Level — Start the engine, raise and lower the boom two to three times to ensure that the system components are filled. Lower the boom to the FULL DOWN position, shut off the engine and check the fluid level on the tank gauge. Fill as necessary.

Change Hydraulic Fluid — Drain the hydraulic tank and refill with Dexron III automatic transmission fluid.

Clean Hydraulic Tank Vent — Remove any dirt collecting around the vent and ensure that the vent is clear.

Check Cab Hinge Pins and Bushings — Inspect the pins and bushings for wear or damage.

Lubrication

Check/Lubricate Rear Door Rollers — Inspect the upper rollers. Replace if binding or damaged. Lubricate.

Check/Lubricate Steering Slip Joint — Inspect the slip joint for wear or damage. Lubricate with lithium grease.

Check/Lubricate Steering U-Joints — Inspect the u-joints for wear or damage. Lubricate with lithium grease.

Check/Lubricate All Steering Lube Points — Inspect the kingpins, tie rod ends and drag link ends for wear or damage. Lubricate with lithium grease.

Check/Lubricate Slack Adjusters — Inspect the brake slack adjusters for wear or damage. Measure the brake actuator stroke. If this measurement exceeds the component manufacturer's recommendation, check the brake lining and adjuster to determine which is the cause of the excessive stroke and repair as necessary.

Check/Lubricate Driveline U-Joints — Inspect the driveline and u-joints for wear or damage. Lubricate with lithium grease.

Clean, Check, Adjust and Lube Fifth Wheel Jaws — Remove dirt and excessive grease from the fifth wheel jaws. Using a fifth wheel jaw gauge, measure the free play. If free play exceeds 1/8 inch (3.175 mm), determine the cause of the excessive play and either repair or replace the jaws per the component manufacturer's recommendation.

Check/Lubricate Fifth Wheel Top Plate — Clean and inspect the fifth wheel top plate for cracks or other damage. Apply lithium grease to the surface of the top plate.

Check/Lubricate Fifth Wheel Pivot Pins — Inspect the fifth wheel pivot pins for wear or damage. Lubricate with lithium grease.

Check/Lubricate Boom Pivot Bearings — Inspect the boom pivot bearings for wear or damage. Lubricate with lithium grease.

Check/Lubricate Upper Cylinder Bearings — Inspect the upper boom cylinder bearings for wear or damage. Lubricate with lithium grease.

Add Grease to Autolube Reservoir — If the vehicle is equipped with an automatic lubrication system, inspect all lubrication points for sufficient grease. Fill the system's reservoir with the proper type and quantity of grease per the component manufacturer's recommendation.

Test Drive

Drive Vehicle to Check Overall Operation — Start and drive the vehicle. Test the operation of all systems and components.

7 Environment

General

Increasing industrialization has a significant effect on our environment on a global scale. Nature, animals and people are every day exposed to risks caused by exposure to various chemicals.

In this light, the long-term objective is to develop chemicals that are completely friendly to the environment. However, many chemicals in current use, such as oils, greases and coolants, are classified as problem waste.

By using appropriate tools and procedures, we can reduce the impact on the environment.

When the machine is serviced according to the maintenance plan described in the service manual for this machine, the machine is safe for the operator and places the smallest possible burden on the environment.

By observing the instructions that follow, you do your part in the conservation of our common environment.

Environmental Policy

The management of environmental issues at the factory is based on the manufacturer's operational policy, to which this environmental policy is a supplement.

Our operations are based on making continual improvements to prevent pollution of the environment, and on developing environmentally friendly products and services.

The operations of the factory are developed in accordance with the principles of sustainable development.

Each year, the factory management looks at the main environmental concerns, determines its environmental objectives and develops an environmental management program to meet the objectives.

The management will keep track of the environmental objectives and corrective actions by conducting internal audits as part of the operations system.

Reacting to possible environmental abnormalities and taking the necessary corrective actions is the responsibility of the entire staff.

The factory adheres to the current legislation and regulations in its operations.

Our operations comply with the international environmental system standard ISO 14001 and the principles of sustainable development set by the International Chamber of Commerce.

Environmental Awareness

Aim to define your own environmental awareness. Ask your supervisor for more training if required. After the training, make sure that you can adapt the information received to your everyday tasks. Product manuals also contain environmental information about the product.

Ensure that you have sufficient general knowledge about the matters that have to do with your tasks. You can improve your product knowledge by studying user manuals and spare parts lists provided by the manufacturer. The manufacturer will also provide the necessary user training when needed. Find out about the environmental and safety instructions for using, servicing and repairing the machine. What is most important is to know how to act in exceptional cases. Follow the maintenance and adjustment schedules carefully. Use the designated oils and other liquids. Check that the oil levels are correct. In general, when using the machine, make sure that it works properly and is in the appropriate condition for the job.

Try to decrease emissions and the amount of waste produced as best you can. Do not take any risks, work with care. Try to do the right things in the right way.

Environmental Problems

By environmental problems, we mean faults detected in machine operation that will or might be harmful to the environment. The most common of these are oil and other liquid spills, toxic waste, leaks and fires. If seals on cabs are damaged or worn, this can also lead to an environmental problem, in case it causes the operator to be exposed to noise levels which are too high. If there are possible environmental problems, immediately contact your supervisor or the person responsible for environmental issues.

Continuous monitoring of the machine operation along with preventive maintenance and repairs ensures the safe and uninterrupted use of the product. Follow the maintenance instructions diligently so as not to jeopardize the machine and its user. By blocking up leaks and checking the joints and pipe installations, you can ensure that no unwanted liquids are released from the machine.

Laws and Regulations

There are several laws and regulations that have to do with using the machine. It is the employer's responsibility to make sure the requirements are met in the work. Environmental issues have become increasingly important. It is important to be aware of the current requirements, but it is equally important to follow up on the changes in the requirements. The requirements tend to become tighter all the time.

Use of Materials and Energy

Reasonable and appropriate use of materials can yield surprisingly high savings in costs and also decrease environmental load. Preventive maintenance has a decisive influence on decreasing machine downtime.

User and maintenance manuals are intended to teach how to use the machine correctly and safely. Always use spare parts recommended by the manufacturer, and perform maintenance and repairs in accordance with the instructions. Follow all fluid changing intervals. Use environmentally friendly materials when possible. Also try and use recycled materials. In this way, you will achieve the best possible results both for the environment and safety.

When using a machine, energy consumption is most influenced by the condition of the machine and the machine operator's skills. The manufacturer has installed and set the adjustable values of your machine to the optimal level for both consumption and emissions. Regular maintenance and immediate repair work when necessary are a prerequisite for optimal machine operation. Pay special attention to starting the machine from cold and the instructions given for this.

Effects of Exhaust Gases

Diesel engine emissions are the cause of both health and environmental problems. The most serious environmental problem is soil acidification, which is manifested in problems in tree growth and plant formation as well as eutrophication.

Of the diesel engine emissions, nitrous oxide (NO_x) will form nitric acid when coming into contact with water, and sulfur dioxide will form sulfuric acid. Both of these are strong acids that have an effect on plant formation by decreasing the ability of roots to absorb water and minerals.

Particles are primarily the result of poor combustion of the fuel-air mixture in the diesel engine. They consist of small carbon particles (<10 µm) on which toxic hydrocarbons have concentrated. These come from the fuel and lubricating oil. The particles are released into the air along with the exhaust gases and the mutagenic and carcinogenic hydrocarbons may then enter human lungs.

Hazardous emissions are mainly the result of incorrect adjustment of the motor and lack of maintenance. For this reason, it is essential that adjustments and maintenance are as described in the instruction manuals.

Recycling

The primary goal of environmental protection is to decrease the amount of waste produced. If waste is produced, you must try to utilize it as a material or source of energy. Appropriate and safe processing must be arranged for all kinds of waste. The sorting of the waste created in our operations is influenced by the legislation, environmental factors and general tidiness, among other things. The amount of waste driven to the landfill can be decreased by sorting the waste in the appropriate, labeled receptacles. The most effective way of protecting the environment is to save material and energy and use environmentally friendly methods and products.

Become familiar with the waste disposal and recycling instructions of your unit.

Metal waste can be collected, sorted and delivered to the industry for use as a raw material and alloying element. Recycling saves approximately half of the energy that would be consumed if the same amount of metal were obtained from a mine.

Toxic waste means waste that can be hazardous to health or the environment because of some chemical or other property. When collecting and handling toxic waste, these health and environmental risks need to be taken into account. Toxic waste typically includes batteries and accumulators, paints, solvents, other special liquids, fuel waste, coolant waste, aerosols and used fluorescent tubes. Sort all toxic waste and make sure it is treated appropriately.

Deliver the used or discarded materials (packing waste, clean metal parts, electric components, etc.) to a recycling center or another suitable location to be destroyed.

Complete Overhaul or Disposal

As the lifetime of the machine draws to a close, there are two options for dealing with the machine: complete overhaul or disposal. If complete overhaul is selected, use the manufacturer's expertise to determine the amount of repairs needed. This also ensures that any new environmental and safety requirements will be taken into account. In the case of complete overhaul, the product needs to be equipped to meet the new requirements. This is the responsibility of the person conducting the repair work.

Environmental load can be reduced by sorting materials and components. Please note that the machine mostly consists of various iron structures, which are mainly recyclable.

As to the disposal of toxic waste, you must find out the appropriate methods of disposing of the liquids, materials and components. The safety bulletins of the various liquids and materials contain instructions for disposal. You can also consult the suppliers of components and the product manufacturer for disposal and sorting.

Problem Waste

Deliver materials that are classified as problem waste, such as batteries, used filters, plastic parts and other problematic components, to a problem waste collection point.

Discard the problem waste according to the laws and environmental regulations that are in effect for the machine's operating environment.

Oils and Fluids

The main consideration for the environment is to prevent oil and other toxic liquids from entering ground water and surface water courses. Even small oil spills can cause significant damage to water courses. Pay attention to any possible spills on your machine. Make sure the hoses are in good condition to prevent unpleasant surprises.

When there is a spillage, absorb the spilled oil in sawdust, for example, and remove the contaminated sawdust according to your site instructions. In case of an accident, immediately contact your supervisor or the person responsible for environmental issues.

Use appropriate containers, an oil collection basin, a pump, a hose, etc. when removing oils and other fluids from the machine. Let companies specializing in recycling of problem waste take care of discarding the used oils and other fluids.

Pay special attention to fluid leaks. If any oil has leaked onto the ground, absorb this oil in sawdust or a similar material and deliver the contaminated sawdust to the problem waste collection point.

Properly address the cause of the leak and replace damaged parts before carrying on working with the machine!

Air Conditioning

The refrigerant of the cab's air conditioner accelerates the greenhouse effect. Refrigerant must not be discharged from the air conditioning system into the atmosphere.

NOTICE

The air conditioning system must be serviced only by skilled service personnel qualified to service refrigeration equipment.

Occupational Health and Safety

Pay attention to your working environment. Perform the necessary maintenance and repair work to prevent sickness or accidents caused by vibration, noise or other factors. Recognize the needs for safety training and get to know the safety bulletins of the hazardous substances you have to work with.

Working In an Environment That is Hazardous To the Health

If the machine must be operated in an environment that poses health hazards, the machine must be equipped, operated and serviced according to the laws and regulations established for those conditions.

Environments that are hazardous to the health include premises where asbestos particles or other dust fills the air.

When the machine has been used in such an environment, take special care when discarding the cabin and engine air filters.

If the machine has been operated in environments such as those mentioned above, the discarded filters must be kept in appropriate waste containers and delivered to the problem waste collection point.

Remember

Being tidy and systematic is the most important consideration.

Remember to:

- Act according to instructions
- Check that all liquids are filled correctly
- Check for leaks
- Make sure that everything is functioning correctly
- Return the tools used for maintenance and repair work to their right place
- Store unused components appropriately
- Recognize environmental problems
- Sort the waste that is produced
- Clear up the environment after finishing work
- Keep the working areas, emergency exits and electric cabinets clear and unobstructed

- Report all abnormal events
- Contact your supervisor or the person responsible for environmental issues if necessary.

Keeping your own working environment tidy and in good order is your personal responsibility. Tidiness and orderliness influence how the workplace functions, decrease the number of accidents at work and contribute to the positive image of the company and its employees.

Standards

Vibration Affecting the Hands

Measured at the steering wheel in accordance with standard SFS-ENV 25349: the vibration affecting the hands does not exceed 8.2 feet/s^2 (2.5 m/s^2) at normal operation.

Vibration Affecting the Whole Body

Measured at the driver's seat in accordance with standard ISO 2631: the vibration affecting the whole body when working with the terminal tractor does not exceed 1.64 feet/s^2 (0.5 m/s^2) at normal operation.

Noise Levels

Maximum noise level inside the cabin is 77dB(A) LpAZ, according to the standard SFS-EN 12053 + AC. Maximum noise level outside the cabin is 85 dB(A) LAeq, measured from the side at 24.6 feet (7.5 m), with the engine running at full power speed.

Optionally, the maximum noise level inside the cabin is 75dB(A) LpAZ, according to the standard SFS-EN 12053 + AC. Maximum noise level outside the cabin is 80 dB(A) LAeq, measured from the side at 24.6 feet (7.5 m), with the engine running at full power speed.

CE Marking

The CE marking means that, at the time of delivery, the machine complies with all applicable and essential health and safety requirements specified in Machinery Directive 98/37/EC.

Exhaust Gas Emissions

The exhaust gas and particle emissions from this machine do not exceed the limit values specified in Stage 3 A of the directive 2004/26/EC and U.S. 40 CFR 89 Tier 3.