



MINIMAX™

MAINTENANCE MANUAL



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Labrie **Enviroquip** Group



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MINIMAX™

MAINTENANCE MANUAL



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1

Introduction

About this Manual

This manual is designed to help qualified maintenance personnel that have to repair, service and maintain MINIMAX™ vehicles.

What You Will Find in this Manual

This manual outlines maintenance procedures related to the various components and systems of the MINIMAX™ (body, hopper, automated arm, packer, electrical/hydraulic systems, etc.).

Topics not included in this Manual

Maintenance of the chassis

This is dealt in the chassis manufacturer's service manual.

Cameras and backing-accident prevention systems

For these options, refer to the appropriate manufacturer's service manual.

Operating the MINIMAX™

For procedures related to the operation of the MINIMAX™, please refer to the *Operator Manual* (part# 153164_R0).

Parts and assemblies

For parts and assemblies used on the MINIMAX™, with their respective Labrie numbers for ordering purposes, please refer to the MINIMAX™ *Parts Manual* (part# 153169_R0).

About the Schematics

For schematics concerning body parts, refer to the MINIMAX™ Parts Manual;

For maintenance of the chassis, refer to the chassis manufacturer's service manual;

For electrical schematics, refer to the schematics provided with your MINIMAX™ unit;

For pneumatic and hydraulic schematics, refer to the schematics provided with your MINIMAX™ unit;

For details on how to operate the MINIMAX™, refer to the MINIMAX™ Operator Manual.

NOTE: A number of system schematics are included in this manual.

Introducing the MINIMAX™

The MINIMAX™ is a side-loading refuse truck to be operated by only one person. It is designed primarily for the automatic collection of garbage carts with the use of a joystick-controlled Helping Hand™ arm. The lifting capacity of this arm is 450 lbs at a maximum reach of 60 inches. On some units, a tipper may also be installed. Manual pickup of garbage bags or cans is also possible with the MINIMAX™.

Product Overview

On most MINIMAX™ units, a Helping Hand™ arm is installed on the right-hand side of the body. This arm has “close grab” capability, allowing the operator to pick up a cart within 12 inches from side of vehicle with no “swing out” movement.

The MINIMAX™ is composed of a small curved wall body, with a capacity of 10 cubic yards, and a 2 cubic yard tailgate, making the total loading capacity of the vehicle to be 12 cubic yards.

The hopper swept volume is 0.92 cubic yard, using an 18-inch packer, which is also used to unload the body through the tailgate opening. This feature is called “Auto-Eject Mode”.

The standard packer cycle time is 15 seconds at 1,200 RPM, and the “Auto-Eject Mode” cycle takes 40 seconds at 1,200 RPM.

The hopper may also be equipped with a full-size crusher panel (optional). It also features a hinged door on the left-hand side and 1 or 2 hinged doors on the right-hand side (2 doors if an automated arm is installed).

After many years of experience with side-loading refuse trucks, Labrie has developed this newly designed MINIMAX™ truck. This truck will deliver excellent performance and reliability thanks to its new simpler, but sturdier construction.

The MINIMAX™ is primarily designed to be operated by only one person.

If, however, the end-user chooses to operate the arm-equipped MINIMAX™ with more than one worker, they shall advise Labrie Enviroquip Group of this situation. Labrie will then determine and supply, at the customer's expense, the safety items that are required in such a case.

For more information on this, please contact LabriePlus (see page 4).

Danger!

Failure to contact Labrie Enviroquip Group to report a situation where a unit is operated by more than one worker at a time may result in unit and/or property damage, personal injury or even death.

Service and Maintenance on the MINIMAX™

Maintenance on the MINIMAX™ is of paramount importance to ensure long-lasting durability of all its moving parts as well as optimum performance in heavy work. Maintenance has to be done on almost every system involved in the operation of the MINIMAX™, such as the hydraulic, electrical and mechanical systems. Some parts are subjected to more wear and tear than others. Therefore, these parts need regular maintenance and routine check-up to prevent signs of deterioration as soon as possible.

In this manual you will find the most common maintenance and inspection procedures required for the MINIMAX™.

Warning

Your MINIMAX™ unit **MUST BE COMPLETELY LUBRICATED** before its first use. Refer to the lube chart near the hopper on the curbside to know where the lubrication points are located on the vehicle and how often the parts should be lubricated.

Initial lubrication carried out by Labrie Enviroquip Group is sufficient for production and transport purposes **ONLY**.

With your safety in mind, we would like to remind you that **ONLY QUALIFIED MECHANICS** should service the hydraulic, electrical, and pneumatic systems on your refuse vehicle. In addition, these mechanics should also be fully knowledgeable in the operation of this unit. Please read the Operator Manual prior to attempting any maintenance work on your MINIMAX™ unit.

Warranty Registration Form

Do not forget to complete the Warranty Registration Form and send it to Labrie Enviroquip Group. Make sure to indicate the “in-service” date. This date will be used to start the warranty period. Otherwise, the date of delivery from the factory will be used instead.

To Contact Labrie Plus

In the U.S.

Address: 1981 W. Snell Road
Oshkosh, WI 54904

Toll Free: 1-800-231-2771

Telephone: 1-920-233-2770

General Fax: 1-920-232-2496

Sales Fax: 1-920-232-2498

Parts and warranty: During business hours, 7:00 AM to 7:00 PM Central Standard Time

Technical Support Service: Available 24 hours

In Canada

Address: 175 Route du Pont
St-Nicolas, QC G7A 2T3

Toll Free: 1-877-831-8250

Telephone: 1-418-831-8250

Service Fax: 1-418-831-1673

Parts Fax: 1-418-831-7561

Parts and warranty: During business hours, 8:00 AM to 5:00 PM Eastern Standard Time

Technical Support Service: Available 24 hours

Website: www.labriegrup.com

E-mail (Sales Dept.): sales@labriegrup.com

E-mail (Customer Service): service@labriegrup.com

IMPORTANT: For technical support and parts ordering, the serial number of your vehicle is required. Therefore, Labrie Enviroquip Group recommends to keep record of the information found on the VIN plate, which is located in the cab.

2

Safety

It is mandatory to read the entire *Operator Manual* before performing any maintenance task on this vehicle.

Conventions

Danger!



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

Warning!



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

Caution!



Indicates a hazardous situation which, if not avoided, could result in **minor or moderate injury**.

Basic Safety Notions

The following safety notions are related to the use of the MINIMAX™. It is important to point out that the safe use of the vehicle remains the user's responsibility. He must heed all safety notions explained in this manual and on the decals found on the vehicle.

Danger!



Always be aware of the vehicle's surroundings to make sure that no pedestrians, passersby, bystanders, or other people or vehicles are in any way exposed to any danger caused by the use of the MINIMAX™.

Danger!

Never get in the hopper area when the engine is running. Only authorized personnel may do so following a lockout/tagout procedure (See *Locking Out and Tagging Out the Vehicle* on page 20).

Responsibilities

Safety is everybody's responsibility. Both employer and employee must play their part to ensure the safety of the operator, the vehicle, and its immediate surroundings.

Employer's Responsibilities

It is the responsibility of the employer:

- ◆ To ensure that the MINIMAX™ is operated in accordance with all safety requirements and codes, including all applicable regulations, the Occupational Safety and Health Act (OSHA), and the American National Standards Institute (ANSI).
- ◆ To ensure that employees are qualified for operating/servicing the vehicle and its equipment, and that they all take safety measures when working on them.
- ◆ To properly maintain all mobile equipment to meet all state/provincial and federal safety standards.
- ◆ To supply adequate instructions and training for the safe use of the vehicle and its equipment before assigning an employee to operate/service such vehicle and equipment.
- ◆ To keep the vehicle maintained and properly adjusted to meet the manufacturer's standards and recommendations. For help or for more information, please contact the manufacturer or any of its authorized representatives.
- ◆ To keep records of all vehicle breakdowns and malfunctions, as well as any inspection and maintenance.
- ◆ To ensure that all failures or malfunctions that may be affecting the safe use of the vehicle are repaired before the vehicle is put back into operation.
- ◆ To meet the appropriate lighting requirements for night shift work (if permitted).
- ◆ To regularly accompany the vehicle operator and take measures to ensure the smooth and safe operation of the vehicle.
- ◆ To make sure that the backup alarm works properly when the vehicle is in reverse.
- ◆ To take necessary measures to repair any damage or malfunction reported by an employee.
- ◆ To establish and ensure the application of a "lockout/tagout" procedure (see page 20) any time inspection, repair or maintenance is performed on the vehicle, regardless of whether it takes place on the road or in the garage.

Employee's Responsibilities

It is the responsibility of the employee:

- ◆ To enforce all safety measures to meet the requirements established by the employer.
- ◆ To operate the MINIMAX™ only after having received instruction and training.
- ◆ To perform routine daily unit inspections.
- ◆ To immediately report any damage or malfunction of the vehicle to the employer or supervisor.
- ◆ To make sure that nobody is near the vehicle before activating any of the controls, and to be prepared to stop at any indication of possible danger.

IMPORTANT: Do not use damaged equipment.

Things to Do

- ◆ Inspect the body and all systems at the start of each day.
- ◆ Make sure that the area is clear of any people or possible obstructions.

IMPORTANT: Be extremely cautious in areas where small children may be present.

- ◆ Wear safety glasses and footwear, gloves, and any other safety equipment when loading and packing refuse.
- ◆ Make sure that mirrors, windows, lights, and monitor equipment are clean and properly adjusted.
- ◆ Check for explosive trash (e.g. televisions, paint cans, fluorescent light tubes, etc.).
- ◆ Drive carefully when carrying an unevenly distributed load.
- ◆ Inspect for overhead hazards (e.g. power lines) prior to using the arm.
- ◆ *Always* use the tailgate safety prop before entering the area between the main body and the tailgate.
- ◆ Obey all warning and operation decals.

Things to Avoid

- ◆ Do not operate any vehicle while under the influence of alcohol, narcotics or other intoxicants.
- ◆ Do not talk on a cell phone or listen to loud music while driving.
- ◆ Do not wear jewelry or loose clothing.
- ◆ Do not leave the vehicle before it is brought to a complete stop and the work or parking brake is engaged.
- ◆ Do not enter the hopper or main body unless the engine is shut off, the key is removed and there is an out-of-service tag on the steering wheel. Refer to “Locking Out and Tagging Out the Vehicle” on page 20.
- ◆ Do not drive with the tailgate fully open unless it is to unload refuse at the landfill.

Warning!

Prior to its first use, your MINIMAX™ *must be completely lubricated*, as shown on the lube chart located on the curbside of the truck, near the hopper. Initial lubrication carried out by Labrie Enviroquip Group is sufficient for production and transport purposes *only!*

Only qualified personnel should service the hydraulic, electrical, and pneumatic systems of this vehicle. They should also be fully versed in operating the vehicle.

General Precautions**Danger!**

Operator and maintenance personnel must adhere to the following precautions *at all times*. Failure to do so may result in vehicle and/or property damage, personal injury, or even death.

It is the employer's responsibility to ensure that *only* qualified employees operate and maintain this vehicle.

- ◆ Read and make sure that you fully understand this manual and all safety decals before performing maintenance on the vehicle. Maintenance personnel must also read and understand the *Operator Manual* for this vehicle. In case of doubt, ask a supervisor for clarifications.
- ◆ Before every work day, inspect the body, the packing system, and any system that might compromise public and/or operator safety.
- ◆ Verify that the accelerator pedal, the steering wheel, mirrors, brakes, and turn signals are in good working order.
- ◆ When driving the vehicle, keep both hands on the steering wheel at all times.
- ◆ Stop the vehicle completely and put on the parking brake before leaving the driving position.
- ◆ When the vehicle is parked, the parking brake *must* be applied.
- ◆ Vehicle operators must have a clear view of lifting arm operations at all times. To prevent injury to surrounding people, and damage to property and/or to the lifting arm itself, operators must be able to stop arm movement at any time.
- ◆ Before activating the lifting arm, operators shall make sure that people and obstructions are far away from the vehicle.
- ◆ MINIMAX™ vehicles are primarily designed to be operated *by only one person*. However, if Labrie Enviroquip Group customers elect to operate the vehicle with more than one worker, additional safety items shall be installed *to protect the co-worker* from hazardous situations.

IMPORTANT: In such cases, Labrie Enviroquip Group *must be informed of every and all units that will be operated by more than one worker*. Labrie Enviroquip Group will then determine and supply, at the customer's expense, the required safety items. For additional information, please contact LabriePlus at 1-800-231-2771 in the U.S. or 1-877-831-8250 in Canada.

- ◆ Do not operate this vehicle if there are any signs of damage or incomplete repairs.
- ◆ Report any doubts that you might have and any safety service requirements regarding this vehicle to a supervisor.
- ◆ When removing nylon locknuts, *always* replace them with new ones.
- ◆ Before opening and closing the tailgate(s), make sure no one is behind the vehicle.
- ◆ Do not get into the hopper compartment or try to repair anything behind the packer when it is moving or when the hydraulic pump is still running. Personnel authorized to get into the hopper *must* first lock out and tag out the vehicle, as required by the employer. For more information, see *Locking Out and Tagging Out the Vehicle* on page 20.
- ◆ *Never* stand underneath a raised arm/gripper.
- ◆ *Never, under any circumstances* (maintenance or otherwise), stand underneath a *loaded* body.

Warning!

Do not operate the automated arm until you have been fully trained, and have read and understood the Operator and Maintenance Manuals supplied with this unit.

Warning!

Make sure that all people and obstructions are sufficiently cleared from the automated arm before moving it. Failure to do so may result in unit and/or property damages, personal injury or death.

Warning!

Make sure there is enough clearance between raised container and overhead power lines. The automated arm or the container must not come in direct contact with the electrical cables. If the unit comes in contact with a power line, stay in the cab and keep away from any metal parts.

Danger!

Never drive this vehicle if the automated arm is not fully retracted to its home position. The unit would be simply too wide to be driven. Failure to fully retract the arm will result in unit and /or property damage, severe injury or even death. Warning red lights on dashboard flash when the arm is not completely retracted to its home position.

Warning!

Remove all control levers from the proportional valve. These levers should be used for maintenance purposes only.

Warning!

Units with two driving positions: Prior to changing driving position, stop the vehicle, apply the parking brake, push the emergency button and stop the engine. Properly adjust mirrors and set driving control switches including the arm-controlling joystick (if applicable) to the new driving position before restarting the engine.

Welding

Danger!

Remove paint before welding or heating. Do not weld near lines that are pressurized or contain flammable fluids.

Caution!

Disconnect all batteries and electronic modules prior to welding on packer body.

Fire

The employer must inform and train all personnel on the measures that must be taken in case of a vehicle and/or loaded body catching fire.

Anytime a loaded vehicle is *brought inside a garage*, fire extinguishers shall be close at hand.

Danger!

Do not perform any repair or maintenance on a vehicle that has not been unloaded.

The employer must also inform their employees of an appropriate place near the maintenance facility to unload the body (preferably away from traffic, surface drains, and ditches).

MINIMAX™ vehicles are equipped with a 5-lb fire extinguisher, which is found inside the cab. A 20-lb fire extinguisher may be installed on the truck as an option (see Figure 2-1). Each fire extinguisher must be checked regularly by qualified personnel.

Figure 2-1 Fire extinguishers and first aid kit



Safety Kits

A first aid kit (see Figure 2-1), a flare kit and a triangle kit are provided with the truck.

Safety Features

Global Motion Sensors (Optional)

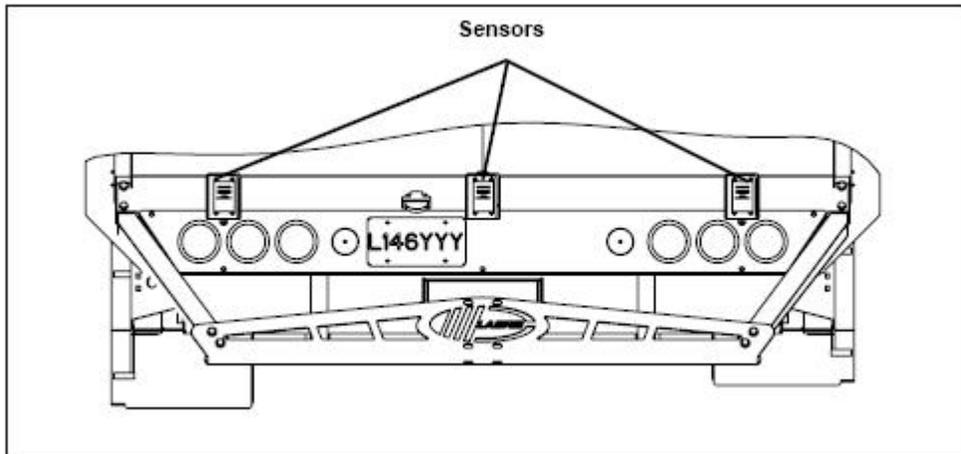
This OPTIONAL safety system is used to detect objects located behind the truck. This system is turned on by placing the transmission in reverse.

Warning!

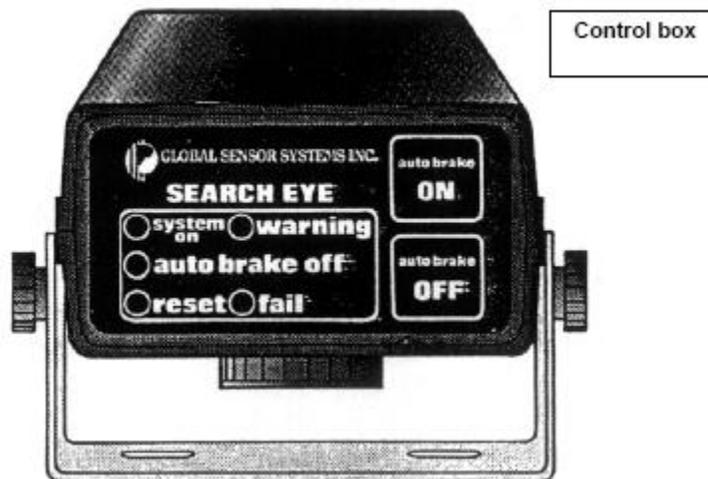


The operator must read the installation manual of the system manufacturer before using the system.

The main components of this system are a control box placed in the cab, a set of sensors fixed on the rear bumper, and a solenoid valve mounted on the chassis.



When the system is turned on, a green light on the cab control box should light up to indicate that the system is operating. When an object is detected, a yellow light comes on and an audible alarm is heard. The vehicle brakes are automatically applied. The brakes can be disabled by pressing the AUTO BRAKE OFF switch on the control box. This will cause a red warning light to turn on indicating the brakes will not automatically engage. The yellow light and audible alarm will still operate in this mode as a safety precaution.



Warning!

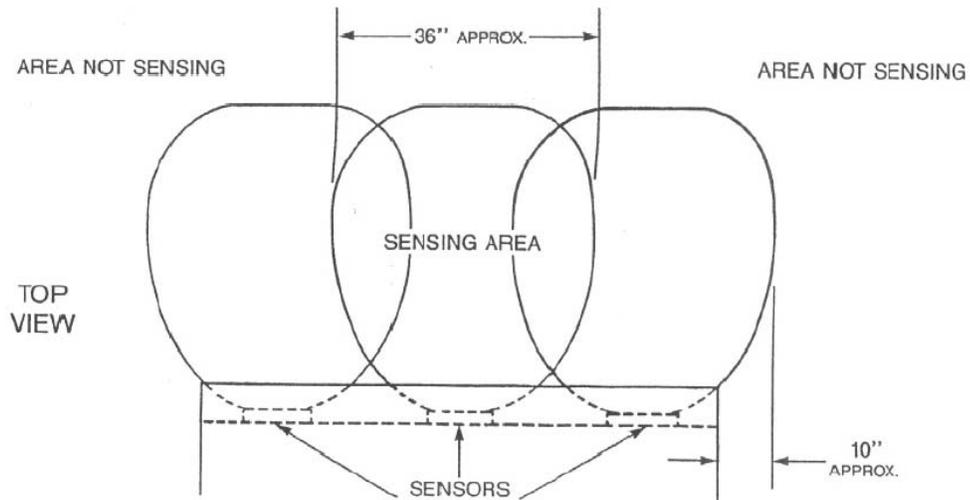
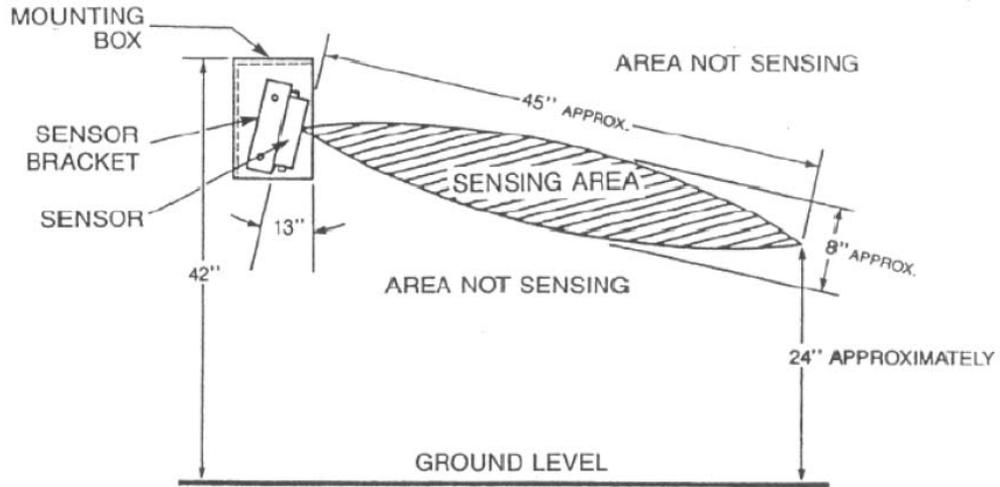


Sensor lenses must be kept clean to ensure proper operation of the system. If the lenses are allowed to become dirty, system range will be decreased.

The sensors are installed on the rear bumper and adjusted in order to obtain low coverage to ground. For details on how to adjust the sensors, refer to the *Installation Manual of the sensor manufacturer*.

Troubleshooting and Maintenance

For information on troubleshooting and maintenance, refer to the *Troubleshooting Guide of Global Sensor Systems Inc.*



NOTE: Above illustrations taken from the *Installation Manual of Global Sensor Systems Inc.*

Back Up Alarm

The back up alarm sounds when the truck is in reverse or the tailgate is open.

Tailgate Safety Prop

Setting the Tailgate Safety Prop

The tailgate safety prop (see Figure 2-2) is used to support and keep the tailgate open during inspection or maintenance procedures. It is mandatory to set the safety prop each time the tailgate is open for such purposes.

IMPORTANT: Make sure the body is empty before setting safety props.

Figure 2-2 Tailgate safety prop



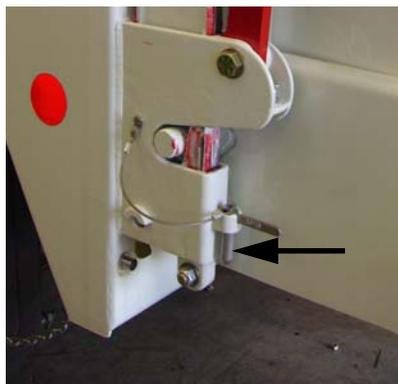
Danger!



The safety prop shall be set each time the tailgate is opened for inspection and maintenance purposes.

To set the tailgate safety prop:

1. Make sure that the body is empty.
2. Remove the tailgate-locking mechanism safety pins (see Figure 2-3).

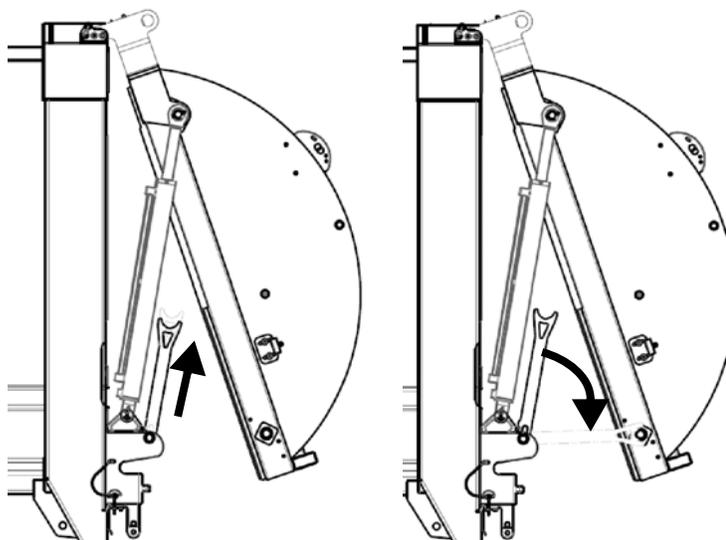
Figure 2-3 Safety pin


3. Start the engine.
4. Turn on the pump.

Danger!


Prior to raising the tailgate, make sure that no one is standing behind the vehicle and that the body is empty.

5. With the TAILGATE UP switch on the multiplexed control module (see Figure 3-7), raise the tailgate about 3 feet (enough to raise the safety prop).
6. Pull the safety prop upward and set it down (see Figure 2-4).

Figure 2-4 Pulling the safety prop upward (left) and setting it down (right)


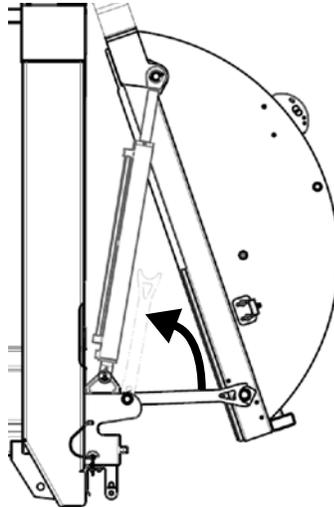
7. Lower the tailgate onto the safety prop.

Putting the Tailgate Safety Prop Back in Place

To put the tailgate safety prop back in its home position:

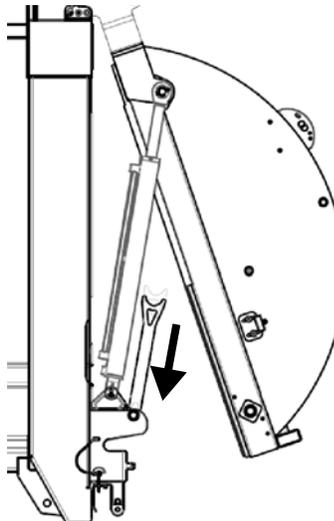
1. Start the engine.
2. Turn on the pump.
3. Raise the tailgate by about 3 feet.
4. Raise the tailgate safety prop.

Figure 2-5 Raising the tailgate safety prop



5. Release your grip on the safety prop to set it in its home position.

Figure 2-6 Setting the safety prop in its home position



6. With the TAILGATE DOWN switch on the multiplexed control module (see Figure 3-18), fully close the tailgate.

The switch should turn from green to blue, indicating that the tailgate is completely closed.

7. Put the safety pins back in place.

Camera System (optional)

MINIMAX™ units can be equipped with up to four (4) cameras; one inside the hopper (see Figure 2-7), one on the tailgate (see Figure 2-8), one on the outside of the right hopper wall (see Figure 2-9), and one on the left-hand side mirror (see Figure 2-10).

The operator can switch from one camera to the other thanks to a selector switch located on the 7" LCD color monitor installed in the cab (see Figure 2-11).

Refer to the camera manufacturer's manual for more information.

Figure 2-7 Camera inside the hopper



Figure 2-8 Camera on the tailgate



Figure 2-9 Camera on the right hopper wall



Figure 2-10 Camera on the left-hand side mirror



Figure 2-11 LCD color monitor



Tailgate Holding Valve

Located under the rear section of the body, this holding valve (see Figure 2-12) ensures that the tailgate will not open during the packing cycle.

Figure 2-12 Tailgate holding valve



Prior to Start Up

Before starting the vehicle:

1. Inspect vehicle for leaks.
2. Make sure the main valve (ball valve) on the suction line is fully open before starting the vehicle (see Figure 2-13).

Figure 2-13 Main valve (ball valve) on suction line



Warning!



Failure to fully open the main valve will cause immediate damage to the pump, even if the pump is turned off.

3. Start the engine.
4. Engage the hydraulic system by pressing the pump switch (see Figure 2-14).

The switch should turn to a green light.

Figure 2-14 Hydraulic pump switch on the multiplexed module



Locking Out and Tagging Out the Vehicle

For any inspection, repair or general maintenance being done on the vehicle, whether on the road or at the shop, it is the employer's responsibility to establish and see to the application of a proper lockout and tagout procedure.

To lock out and tag out a MINIMAX™ vehicle:

1. Park the vehicle on safe level ground, and apply the parking brake (see Figure 2-15).

Figure 2-15 Parking brake sign



2. Make sure that the body is completely unloaded.
3. Switch off the hydraulic pump.
4. Turn off the engine, remove the key from the ignition, store it in a safe and controlled area (preferably on yourself), and tape over the ignition switch.
5. Turn off and lock the master switch.
6. Chock all wheels.

IMPORTANT: If the MINIMAX™ is equipped with a master switch on the battery set (see Figure 2-16), you must turn it off. This switch is offered as an option.

Figure 2-16 Master switch



7. Put an “OFF SERVICE” tag on the driver’s wheel and on the front windshield.
8. Use safety props to block any system that could move by gravity (open tailgate, etc.).
9. Drain all air tanks.

Verify and inspect any security device and/or mechanism to make sure that there is no bypass and that they are all functional.

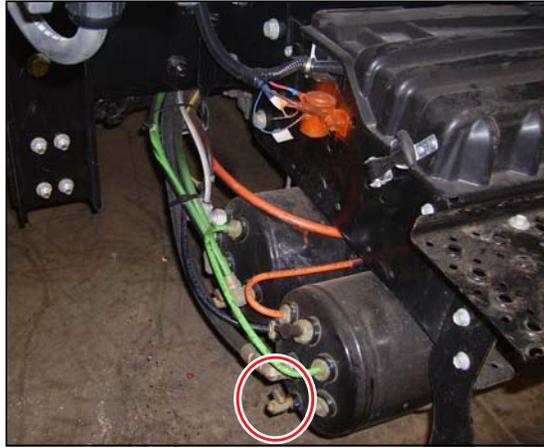
Shutting Down the Vehicle

If the vehicle has to be stored for an extended period of time, follow the chassis manufacturer’s shutdown and maintenance requirements.

Also:

1. Park the vehicle on hard level ground, and apply the parking brake.
2. Make sure that all moving parts are in their home position (tailgate, arm, crusher panel, packer, etc.).
3. Turn off, in sequence, the hydraulic pump, the electrical system, the engine and the master switch.
4. Drain all air tanks (see Figure 2-17).

Figure 2-17 Drain valve on air tank



3

General Maintenance

Danger!



Always lock out and tag out the vehicle when inspecting or performing maintenance on the vehicle (see *Locking Out and Tagging Out the Vehicle* on page 20).

Cleanliness is part of safety.

As such:

- ◆ Clean all vehicle lights, warning lights and safety decals so that you and the vehicle surroundings are safe at all times.
- ◆ Clean the contact surface between the body and chassis. Labrie Enviroquip Group recommends cleaning the chassis after every unloading.
- ◆ Remove any stacked garbage from the hopper area after each body unloading.
- ◆ Use the provided hoe to rake debris out of the clean-out doors (see Figure 3-1).
- ◆ Make sure that the side step and/or hopper step (if installed) are clean and free of any slippery material.

Caution!



Keep the cab floor dry and clean to prevent slippage and accidents.

Figure 3-1 Clean-out door



Preventive Maintenance Chart

Component/System	Verification	Daily	Weekly	Monthly	Yearly	Page
Limit switches	Proper adjustment of the limit switches is imperative		X			See page 37
	Check and clean area around switches	X				
Lubrication	Lubricate the packer and its accessories. See lubrication chart on side of the vehicle	X				See page 68
Wiring System	Check for damaged harnesses and/or bad connections				X	See page 103
Battery Cables	Ensure cables are not coming in contact with an area that could rub through the insulation			X		
Operator controls	Check for proper operation	X				
Air tanks	Drain	X				See page 115
Air system	Check for leaks		X			See page 115
Safety systems	Check for proper operation (tailgate alarm and special devices)		X			See page 11
Lifting arm	Check hydraulic pressure	X				See page 85

Component/System	Verification	Daily	Weekly	Monthly	Yearly	Page
Hydraulic system	Check oil level in tank, and refill if necessary	X				See page 81
	Check if the ball valve on suction line is open	X				See page 73
	Check on ground for overnight leaks	X				
	Check cylinders, pump, control valve and system for leaks. Repair or replace if required		X			See page 73
	Replace hydraulic filter ^a				Twice a year	See page 95
	Clean strainer and refill				X	See page 92
	Check pressure			X		See page 83
Hopper area	Clean traps on each side	X				See page 23
	Clean dirt around the packer	X				See page 23
Visual inspection	Rollers, hydraulic cylinder and cylinder pins, hoses, pipes and connections, wear of floor and hopper sides.	X				See page 25
Body and chassis	Check for corrosion			X		
	Keep the contact surfaces clean between the body and the chassis.	X				

a. Also replace the return filter after the first 50 hours of use.

Packer

The MINIMAX™ packer (see Figure 3-2) is submitted to intensive use during a work day (1000 to 3000 cycles). Therefore, some of its components have to be regularly looked at: the wear pads, which are located at both sides of the packer and inserted in the body side rails, the follower panels, and the rollers, which are also inserted in the body side rails (see Figure 3-3).

Labrie Enviroquip Group recommends that *operators* perform a daily visual inspection of the packer and its components.

Maintenance personnel *must* perform weekly inspection and maintenance. Greasing all moving parts on a daily basis is very important and proper adjustment of the limit and proximity switches is mandatory, especially on vehicles equipped with a multi-cycle feature. For more information on the lubrication schedule, see *Lubrication Charts* on page 62.

Any problems found on the packing system must be corrected immediately. In case of problem, contact your distributor.

Danger!

Always lock out and tag out the vehicle when inspecting it or performing maintenance on it (see *Locking Out and Tagging Out the Vehicle* on page 20).

Figure 3-2 The packer

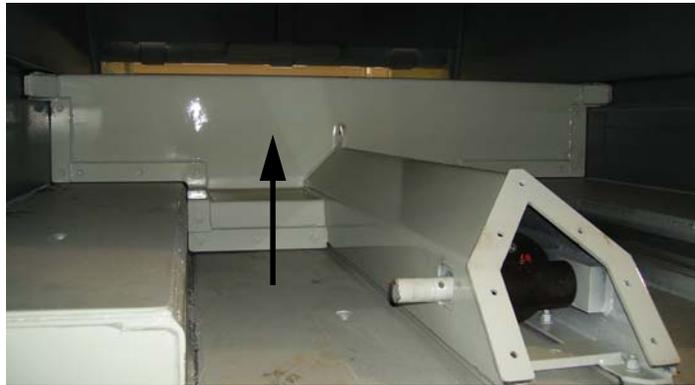


Figure 3-3 Packer components



Preparing for Packer Inspection

To prepare the packer for inspection:

1. Park the vehicle on level ground and apply the parking brake.
2. Fully extend the arm.
3. Remove the tailgate safety pins (see Figure 3-6).

4. Fully open the tailgate by pressing the TAILGATE UP switch on the multiplexed control module (see Figure 3-7).
5. Fully extend the packer by pressing the green PACK button on the control packer station (see Figure 3-8).

Danger! Never enter the hopper while the packer is moving.



-
6. When the packer has reached its fully extended position, press the red EMERGENCY STOP button on the control packer station (see Figure 3-10).
 7. Install the tailgate safety prop.

Danger! Always use the tailgate safety prop while working under a raised tailgate. The safety prop should be used even if the tailgate is in fully raised position.



-
8. Perform the lockout/tagout procedure (see *Locking Out and Tagging Out the Vehicle* on page 20).

Inspecting the Packer

Proceed this way during the packer inspection:

1. Inspect the follower panel hinges and surface in search of any wear or damage.
2. Check for any sideways or up-and-down movement of the packer and inspect the wear pads (plastic strips) on both sides of the packer.
3. Inspect the cover wear pads. These wear pads act as additional protection against intruding refuse that may get inside the automated arm mechanism, where they can damage the cylinder and the limit switches (see Figure 3-4).

Figure 3-4 Protective wear pads



4. Inspect both body side rails and packer rollers for any premature wear (see Figure 3-3).

5. Inspect the hydraulic system, including hoses, pipes, connectors, and cylinder (see Figure 3-5). There should neither be dirt or garbage on the cylinder rod ends nor scratches on the rod itself. There should not be leaks on the hoses and pipes.

Figure 3-5 Packer hydraulic system



Removing the Packer

The following procedure details how to remove the packer for maintenance purposes.

To remove the packer:

1. Ensure the parking brake is applied.
2. Start the engine and engage the hydraulic system.
3. Remove the tailgate safety pins (see Figure 3-6) and fully open the tailgate by pressing the TAILGATE UP switch on the multiplexed control module (see Figure 3-7).

Figure 3-6 Safety pin

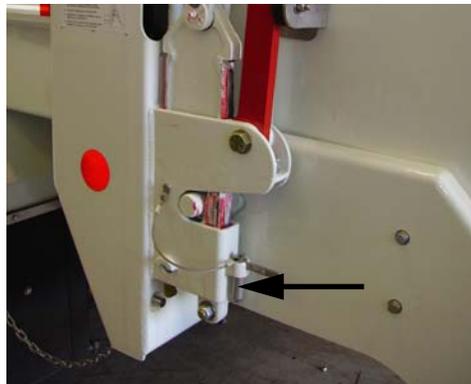


Figure 3-7 Tailgate up switch


4. On the packer control station, press the green PACK button to fully extend the packer (see Figure 3-8). When the packer has reached its fully extended position (see Figure 3-9), press the red EMERGENCY STOP button to stop the packer (see Figure 3-10).

Figure 3-8 Pack button


Danger!

Never enter the hopper while the packer is moving.



Figure 3-9 Packer in fully extended position

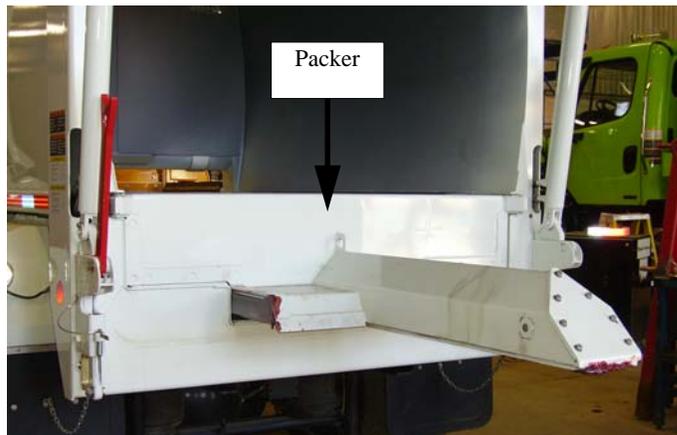
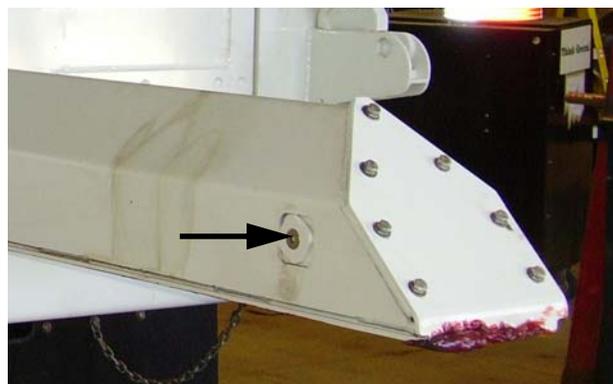


Figure 3-10 Emergency stop button

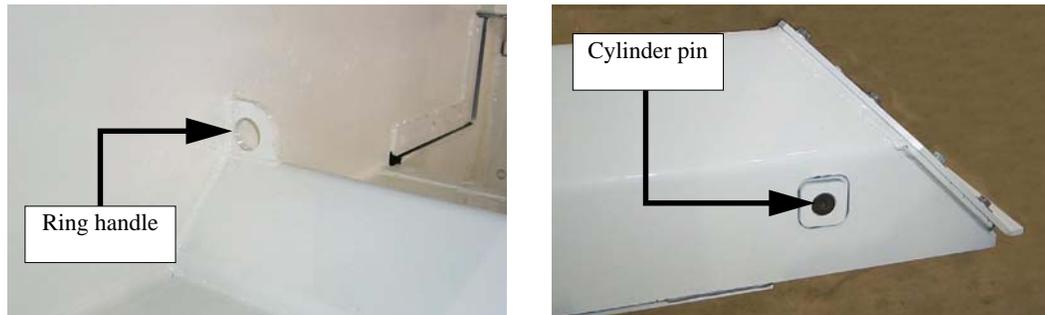


5. Proceed with the tagout/lockout procedure. Refer to “Locking Out and Tagging Out the Vehicle” on page 20.
6. Unscrew the nut (see Figure 3-11) at the left-hand side of the packer tip to remove the cylinder pin.

Figure 3-11 Nut to unscrew



7. Remove the cylinder pin (see Figure 3-12).

Figure 3-12 Removing the packer

8. On the packer control station, press the yellow PACKER RETRACT button to retract the cylinder (see Figure 3-13).
9. Install any safe lifting device and hook the packer by the ring handle (see Figure 3-12).
10. Pull the packer out of the side rails and place it in a safe work area.

Figure 3-13 Packer retract button

Warning! When you pull out the packer, always ensure total clearance until it is placed in a safe area to avoid any accidents.

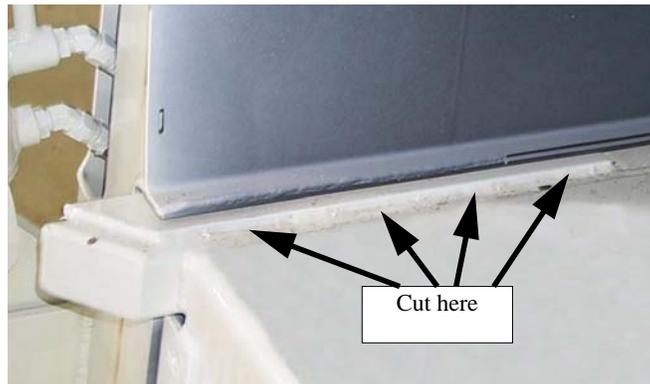


Replacing Packer Wear Plates

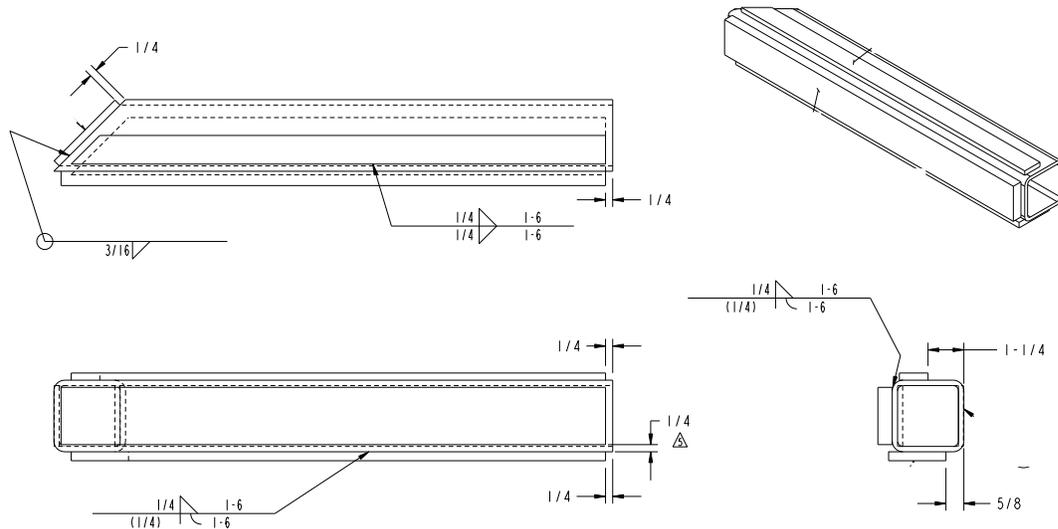
When the packer wear plates are worn out, you must replace them to achieve packer optimal performance.

To replace the wear plates, proceed this way:

1. Remove the packer from the body. See *Removing the Packer* on page 28.
2. Once the packer is placed in a safe work area, cut off the wear plate panel (see Figure 3-14).

Figure 3-14 Cutting the wear plate panel

3. Weld the new wear plate panel to the packer (see Figure 3-15 for welding specifications).

Figure 3-15 Welding specifications

NOTE: This operation is valid for the wear plate panels located on both sides of the packer.

Reinstall the packer inside the body (see *Reinstalling the Packer* below).

Warning! When reinstalling the packer, always ensure total clearance to avoid any accidents.



Reinstalling the Packer

The following procedure details how to reinstall the packer inside the body of the MINIMAX™.

To reinstall the packer, proceed this way:

1. Make sure the tailgate is properly open, and all packer components are properly assembled.
2. Proceed with the tagout/lockout procedure. Refer to “Locking Out and Tagging Out the Vehicle” on page 20.
3. Use a safe lifting device and hook the packer by the ring handle (see Figure 3-12).
4. Lift the packer and align it with the side rails inside the body.
5. Insert the wear plate panels in the rails and push the packer in.
6. On the packer control station, press the green PACK button (see Figure 3-8) to fully extend the packer cylinder.

Warning! Slowly extend the cylinder in order to properly align it with the packer and to avoid impact that could cause damage to the equipment.



7. Insert the cylinder into the packer, then the pin through the tip of the packer and into the cylinder to fix them properly.
8. Turn on the engine and the hydraulic system (PUMP switch set to “ON”).

Caution Make sure the ball valve on the suction line is fully open before starting the vehicle.



9. On the packer control station, press the yellow PACKER RETRACT button to retract the packer to its home position (see Figure 3-16).

Figure 3-16 Packer retract button



10. Extend and retract the packer in EJECT mode for a full cycle to make sure the packer has been properly installed.
To activate this mode, press and hold the AUTO-EJECT switch on the multiplexed control module (see Figure 3-17).

Figure 3-17 Auto-eject switch



11. Put the tailgate safety prop back to its home position.
12. Close the tailgate completely by pressing the TAILGATE DOWN switch on the multiplexed control module (see Figure 3-18).

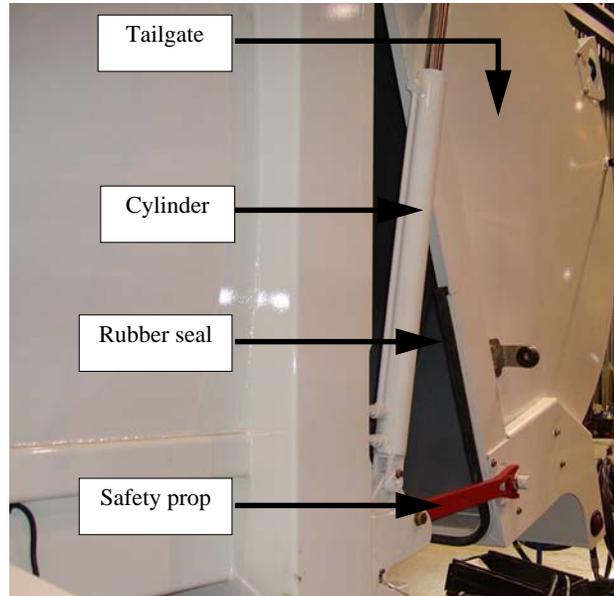
Figure 3-18 Tailgate down switch



Tailgate

The tailgate of the MINIMAX™ is subject to frequent movements, and therefore, must be frequently inspected and maintained to keep its high level of performance. The hinges and pins are parts of the tailgate that should particularly be looked at in search of any type of wear or metal fatigue. Tailgate rubber seal should also be looked at for signs of wear or damage that may hinder its effectiveness. Always replace the parts that are faulty.

Figure 3-19 Tailgate



Proximity and Limit Switches

Proximity and limit switches act as remote electrical on/off switches and must be adjusted properly.

Warning



Proximity and limit switches must function properly. Serious damage to the equipment, injuries or death may occur if you operate the machinery with improperly adjusted switches.

Figures 3-20 and 3-21 show where the proximity and limit switches are located on the truck.

Figure 3-20 Switches on the street side

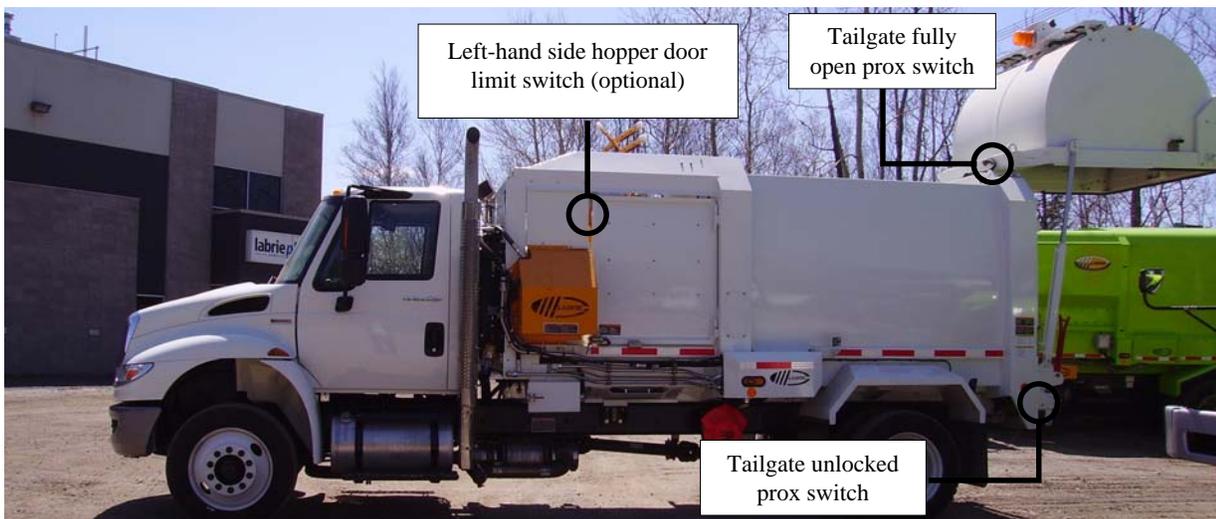
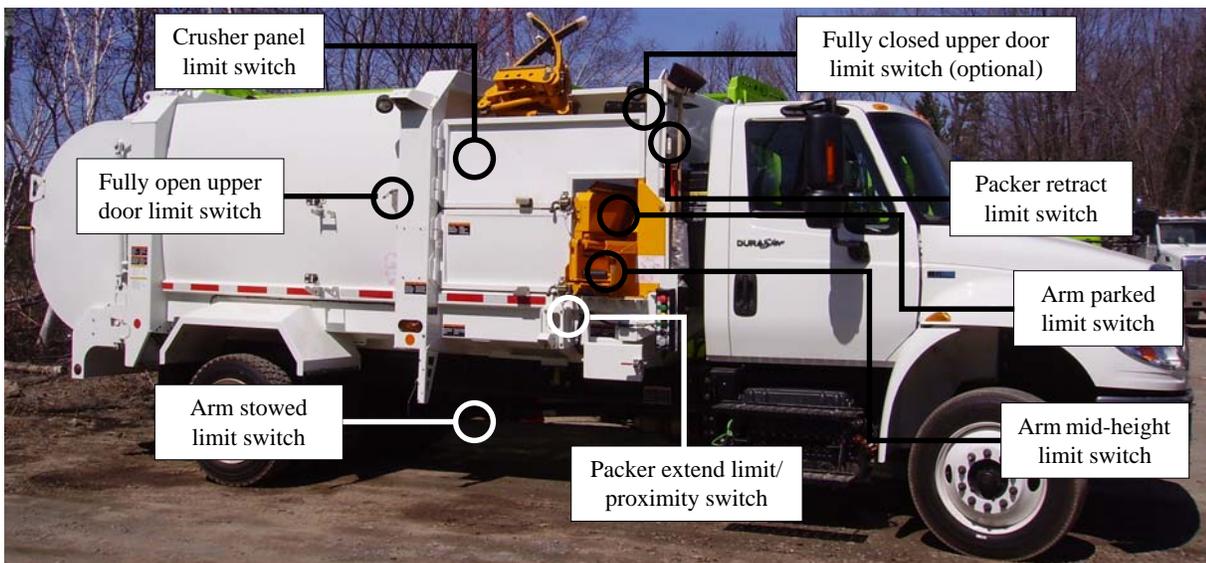
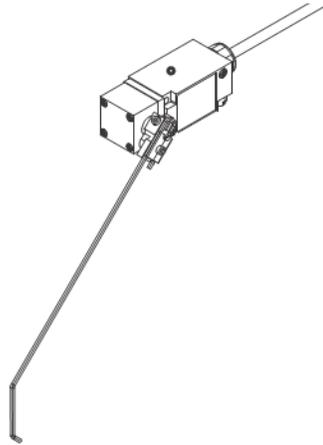


Figure 3-21 Switches on the curb side



Limit Switch Adjustment

The following is the general procedure for adjusting all the limit switches used on the MINIMAX™, except for the mid-height limit switch, which calls for a different method of adjustment (see *All limit switches MUST be working at all times. Otherwise, the operator may not be aware that the arm is not fully retracted or that the grabber is open or closed. This may cause an accident, injuries or property damages. on page 55*).

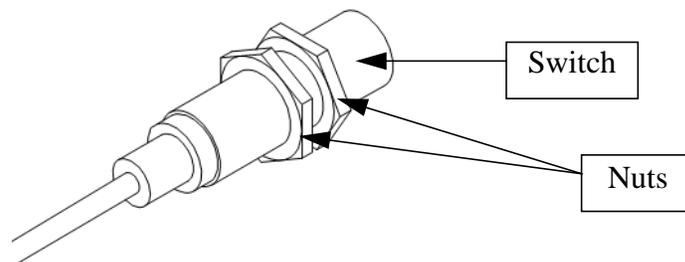


To adjust a limit switch:

1. Loosen limit switch nut.
2. Move the lever arm to the approximate position where the switch is to be triggered.
3. Tighten nut.
4. To fine tune the adjustment, loosen nut slightly.
5. With a flathead screwdriver, turn the adjusting screw located at the center of the nut until a click is heard.
6. Tighten the nut.
7. Test the operation.
8. If necessary, repeat steps 1 through 7.

Proximity Switch Adjustment

The following is the general procedure for adjusting all the proximity switches used on the MINIMAX™.



To adjust a proximity switch:

1. Loosen the proximity switch nuts.
2. Adjust the proximity switch so that there is a gap of approximately 3/16 of an inch (4.8 mm) between the plate (target) and the switch.
3. Tighten up the nuts.
4. Test the operation.

The proximity switch light should turn on when the target is detected; if not, repeat the adjustment procedure.

In the following sections, you will learn how to adjust limit/proximity switches based on the function for which they are used.

Adjusting Packer Extend Limit/Proximity Switch

Danger!

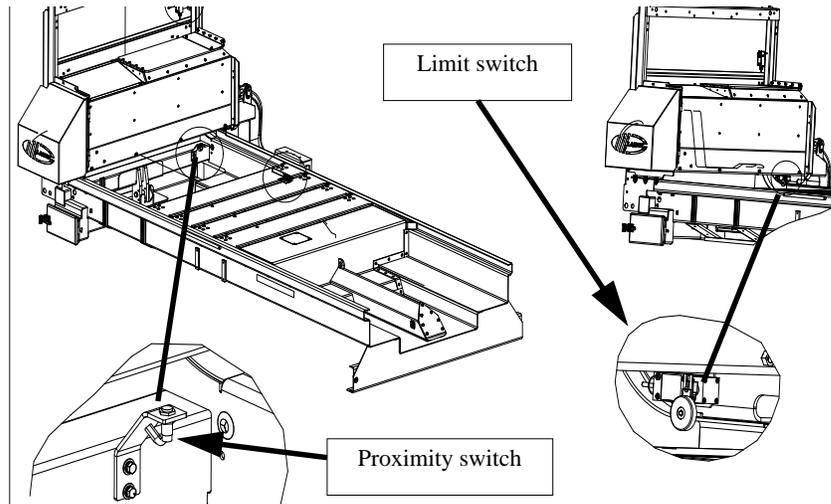


Always lock out and tag out the vehicle when inspecting it or performing maintenance on it (see *Locking Out and Tagging Out the Vehicle* on page 20).

Packer limit/proximity switches were adjusted at the factory for optimal packer operation. If the area behind the packer is not properly cleaned *daily*, limit/proximity switches may no longer stop the packer or may prevent automatic cycles from working properly.

Furthermore, over time, misalignment of the components may occur due to the frequent back and forth motion of the packer. An adjustment might be necessary to prevent cylinders from completely extending and retracting to the end of their strokes.

On some units, the packer range of motion is controlled by two limit switches and on other units, it is controlled by a set of one limit switch and one proximity switch. The limit/proximity switch that stops the packer during extension (packer extend) is located near the hopper floor, on the curbside, just under the automated arm housing (see Figure 3-22). The limit switch that stops the packer during retraction (packer retract) is located on front right-hand side hopper corner, behind the cab (see Figure 3-23).

Figure 3-22 Packer extend limit/proximity switches


The Packer Extend limit/proximity switch sends a signal to the controller module that the packer panel has reached its extended packing position. Once the signal from the limit/proximity switch is received, the module prompts the packer to retract to complete its packing cycle.

When this limit/proximity switch needs adjustment, the following procedure is recommended.

A. To adjust the packer extend *limit* switch:

1. Set the parking brake.
2. Turn on the engine and the hydraulic system (PUMP switch activated).

Usually, the packer extend limit switch needs adjustment when the last follower panel moves past the limit switch without triggering any signal. In such a case, the packer continues its forward motion inside the body as in Eject mode.

3. Press and hold the Auto-Eject switch on the multiplexed control module (see Figure 3-17). Keep this switch down until the tailgate is fully open and the last follower panel clears the limit switch in the hopper.

As soon as you release the Auto-Eject switch, the packer will stop moving.

Caution! Make sure no one is standing behind the truck when you operate the tailgate.



-
4. Turn off the engine.

5. Proceed with the tagout/lockout procedure. Refer to “Locking Out and Tagging Out the Vehicle” on page 20.

Danger! Never get on the hopper area while the engine is running.



-
6. Get on the hopper area.
 7. Free the limit switch from any dirt or debris that may cause the switch to malfunction.
 8. Turn on the engine and the hydraulic system (PUMP switch activated).

Caution Make sure the ball valve on the suction line is fully open before starting the vehicle.



-
9. Press the yellow PACKER RETRACT button (see Figure 3-13) to retract the packer and bring it back to the position where the target, which is located at the tail of the last follower panel, must make contact with the Packer Extend limit switch lever. Use the red EMERGENCY STOP button to stop retraction at such position (see Figure 3-10).
 10. Turn off the engine.
 11. Proceed with the tagout/lockout procedure. Refer to “Locking Out and Tagging Out the Vehicle” on page 20.

Danger! Never get on the hopper area while the engine is running.



-
12. Use an Allen key to loosen the locknut on the limit switch and determine the contact point where the triggering should occur by moving the lever.
 13. Once you have determined the contact point where the triggering should occur, tighten back the locknut.
 14. Turn on the engine and engage the hydraulic system (PUMP switch activated).

Caution Make sure the ball valve on the suction line is fully open before starting the vehicle.



15. Fully retract the packer and press the green PACK button to start a complete cycle and test the efficiency of the limit switch.

NOTE: Repeat this procedure until you achieve the proper settings for the limit switch.

B. To adjust the packer extend *proximity* switch:

1. Set the parking brake.
2. Turn on the engine and the hydraulic system (PUMP switch activated).
Usually, the packer extend proximity switch needs adjustment when the last follower panel moves past the switch without triggering any signal. In such a case, the packer continues its forward motion inside the body as in Eject mode.
3. Press and hold the Auto-Eject switch on the multiplexed control module (see Figure 3-17). Keep this switch down until the tailgate is fully open and the last follower panel clears the proximity switch in the hopper.

As soon as you release the Auto-Eject switch, the packer will stop moving.

Caution! Make sure no one is standing behind the truck when you operate the tailgate.



-
4. Turn off the engine.
 5. Proceed with the tagout/lockout procedure. Refer to “Locking Out and Tagging Out the Vehicle” on page 20.

Danger! Never get on the hopper area while the engine is running.



-
6. Get on the hopper area.
 7. Free the proximity switch from any dirt or debris that may cause the switch to malfunction.
 8. Turn on the engine and the hydraulic system (PUMP switch activated).

Caution Make sure the ball valve on the suction line is fully open before starting the vehicle.



-
9. Press the yellow PACKER RETRACT button (see Figure 3-13) to retract the packer and bring it back to the position where the target, which is located at the tail of the last follower panel, must make contact with the Packer Extend proximity switch. Use the red EMERGENCY STOP button to stop retraction at such position (see Figure 3-10).

10. Turn off the engine.
11. Proceed with the tagout/lockout procedure. Refer to “Locking Out and Tagging Out the Vehicle” on page 20.

Danger! Never get on the hopper area while the engine is running.



-
12. Adjust the Packer Extend proximity switch.
 - 12 a. Loosen the proximity switch nuts.
 - 12 b. Adjust the proximity switch so that there is a gap of approximately 3/16 of an inch (4.8 mm) between the plate (target) and the switch.
 - 12 c. Once you have determined the contact point where the triggering should occur, tighten back the nuts.
 13. Turn on the engine and engage the hydraulic system (PUMP switch activated).

Caution Make sure the ball valve on the suction line is fully open before starting the vehicle.



-
14. Fully retract the packer and press the green PACK button to start a complete cycle and test the efficiency of the proximity switch.

The proximity switch light should turn on when the target is detected; if not, repeat the adjustment procedure.

Adjusting Packer Retract Limit Switch

The Packer Retract limit switch (see Figure 3-23) sends a signal to the controller module that the packer has reached its fully retracted position.

Figure 3-23 Packer retract limit switch



When the Packer Retract limit switch needs adjustment, it is usually because it no longer stops the packer (bottoming out) or prevents automatic cycles from working properly. A well adjusted Packer Retract limit switch should prevent the packer from making a knocking noise when it stops during retraction in speed-up mode.

When this limit switch needs adjustment, the following procedure is recommended.

To adjust the Packer Retract limit switch:

1. Set the parking brake.
2. Start the engine and engage the hydraulic system (PUMP switch activated).
3. Press the yellow button to retract the packer to (+/-) 1/16" before the fully retracted position (this is the measurement between the packer blade and the arm base wiper).

NOTE: When in stowed position the packer blade must always make contact with the wiper.

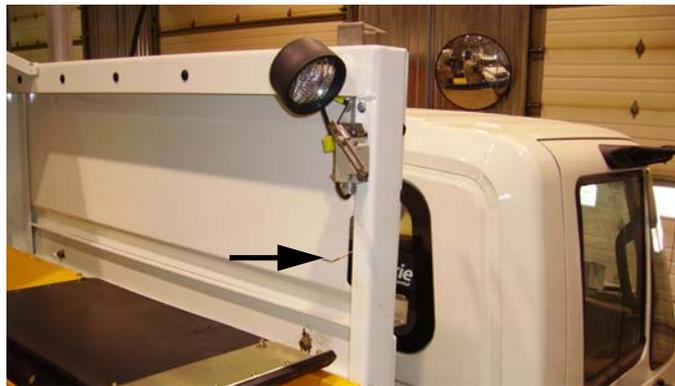
4. When the packer reaches the correct position, push the red emergency STOP button (see Figure 3-10).
 5. Disengage the hydraulic pump and turn off the engine.
 6. Proceed with the tagout/lockout procedure. Refer to "Locking Out and Tagging Out the Vehicle" on page 20.
-

Danger! Never get on the hopper area while the engine is running.



7. Locate the Packer Retract limit switch lever (see Figure 3-24).

Figure 3-24 Packer retract limit switch lever



8. Use an Allen key to loosen the locknut on the limit switch and determine the contact point where the triggering should occur by moving the lever.
9. Once you have determined the contact point where the triggering should occur, tighten back the locknut.

10. Turn on the engine and engage the hydraulic system (PUMP switch activated).

Caution Make sure the ball valve on the suction line is fully open before starting the vehicle.



11. Fully retract the packer and press the green PACK button to start a complete cycle and test the efficiency of the limit switch.

NOTE: Repeat this procedure until you achieve the proper settings for the limit switch.

Adjusting Tailgate Unlocked Proximity Switch

Warning! Ensure that no one is standing behind or near the tailgate when adjustment procedure is carried out.



MINIMAX™ vehicles are equipped with a tailgate proximity switch located on the back left-hand side body corner. When the tailgate is being unlocked (see Figure 3-26), the cylinder pushes the plate downward which triggers the proximity switch. This switch then activates the backup alarm and a warning buzzer inside the cab.

When the tailgate is being locked, the plate goes upward (see Figure 3-25). As the proximity switch is no more triggered by the plate, the warning buzzer and the backup alarm stop sounding.

Figure 3-25 Tailgate proximity switch (locked position)

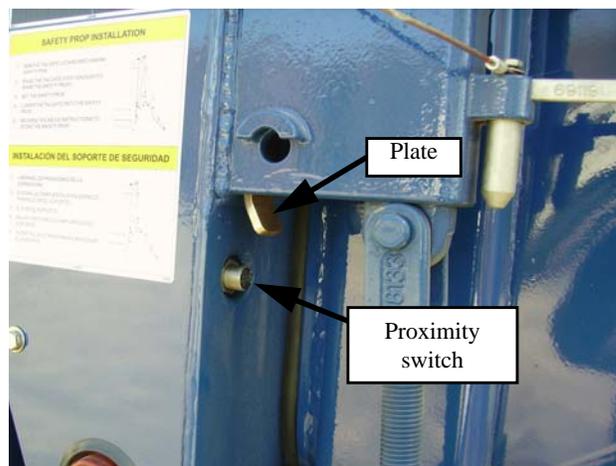
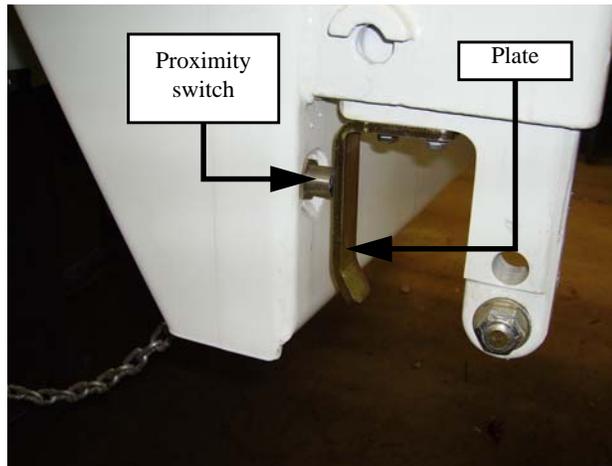


Figure 3-26 Tailgate proximity switch (unlocked position)



To adjust the tailgate unlocked proximity switch:

1. Start the engine and engage the hydraulic system.
2. Loosen the nuts located on each side of the proximity switch bracket (see Figure 3-27).

NOTE: The second nut is on the hidden side of the body wall.

Figure 3-27 Tailgate proximity switch



3. Adjust the proximity switch so that the switch can be triggered by the plate as the cylinder head moves down. There should be a gap of approximately $\frac{3}{16}$ of an inch between the plate and the switch.
4. Tighten up both nuts.
5. Open the tailgate a little using the TAILGATE UP switch on the multiplexed control module (see Figure 3-7), and listen if the warning buzzer and backup alarm start to sound as the tailgate unlocks.
6. Repeat the procedure if need be.

IMPORTANT: Remove both tailgate-locking pins before proceeding with this test.

Warning!



Ensure that no one is standing behind or near the tailgate when adjustment procedure is carried out.

Adjusting Tailgate Fully Open Proximity Switch

The MINIMAX™ has a feature that allows the operator to unload all the refuse collected during his run with the press of a single switch. This feature is called “Auto-Eject mode”. And for this feature to work correctly, the tailgate fully open proximity switch must be adjusted properly (see Figure 3-28).

Otherwise, the Auto-Eject mode will be inoperative.

In Auto-Eject mode as well as in Manual Eject mode, the packer panel moves only when the tailgate is fully open. If it does not, the tailgate fully open proximity switch may need adjustment.

Figure 3-28 Tailgate fully open proximity switch



This switch is located on the street side near the tailgate hinge.

To adjust the tailgate fully open proximity switch:

1. Open the tailgate to 90 degrees (see Figure 3-28).

Warning!



Ensure that no one is standing behind or near the tailgate when adjustment procedure is carried out.

2. Adjust the switch so that it can detect the target.

The proximity switch light should turn on when the target is detected.

3. Slightly close the tailgate a couple of inches.

As the target should not be detected by the proximity switch at such a position, the switch light should be off.

4. Repeat the procedure until the proximity switch is properly adjusted.

Adjusting Left-Hand Side Hopper Door Limit Switch (optional)

This limit switch (see Figure 3-29) turns off all hydraulic power when the left-hand side hopper door is not closed. It also allows control of the crusher panel from inside the cab.

NOTE: The left-hand side hopper door limit switch is found only on units equipped with an automated arm.

NOTE: In Ontario, provincial regulations require the use of this limit switch.

Figure 3-29 LHS hopper door limit switch



If installed, this limit switch is located on the inside hopper door frame.

To verify that the switch needs adjusting, open the LHS hopper door by approximately 2 inches (5 cm) and try to operate any hydraulic function. No hydraulic function should be working.

Warning Injury or death may occur if you attempt to enter the body while the packer or arm is in operation.



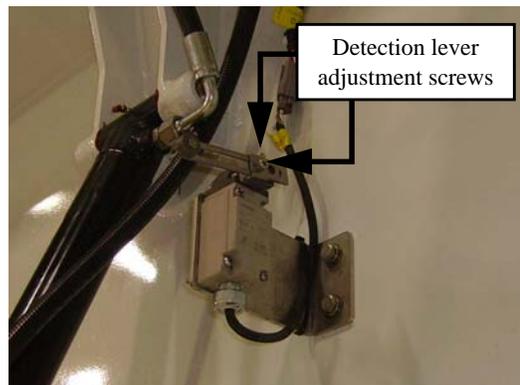
To adjust the LHS hopper door limit switch:

1. Unscrew the lever adjustment screws of the limit switch (see Figure 3-30).
2. Raise or lower the detection lever a little bit and tighten up the screws.
3. Test the operation.

The hydraulic system should be working when the LHS hopper door is closed.

4. Repeat the adjustment procedure if need be.

Figure 3-30 Limit switch



Adjusting Crusher Panel Up Limit Switch

The crusher panel up limit switch disables the arm operation when the crusher panel is not in its stowed position and redirects the arm power to the crusher panel up function when the arm joystick deadman switch is activated. This forces the crusher panel to rise to the up position in order to let the arm works.



This switch is located behind the crusher panel itself.

NOTE: The crusher panel has to be lowered to access this limit switch.

To adjust the crusher panel up limit switch:

1. Lower the crusher panel.
2. Adjust the crusher panel up limit switch so that it is triggered when the crusher panel is in the up position.

- 2 a. Unscrew the lever adjustment screws of the limit switch (see Figure 3-30).
- 2 b. Raise or lower the detection lever a little bit and tighten up the screws.
3. Depress deadman switch on joystick until crusher panel reaches the up position.
The crusher panel should go up, and the arm should start to move when the crusher panel reaches the up position.
4. Repeat the procedure until the limit switch is properly adjusted.

Adjusting Fully Open Upper Door Limit Switch

When triggered the fully open upper door limit switch enables the arm operation (see Figure 3-31). If the upper door is not fully open and properly latched, the operator cannot operate the arm. This lockout function is provided to prevent the arm from colliding against the upper door.

Figure 3-31 Fully open upper door limit switch



This switch is located on the right middle side post.

If the automated arm function cannot be activated by the operator despite of the fact that the upper door is fully open, an adjustment of the fully open upper door limit switch may be required.

To adjust the fully open upper door limit switch:

1. Unscrew the lever adjustment screws of the limit switch (see Figure 3-30).
2. Raise or lower the detection lever a little bit and tighten up the screws.
The detection lever must touch the side of the upper door for the switch to be triggered.
3. Test the operation.
The automated arm should be working fine when the upper door is fully open.
4. Repeat the adjustment procedure if need be.

Adjusting Fully Closed Upper Door Limit Switch (optional)

When triggered the fully closed upper door limit switch (see Figure 3-32) prevents the arm from colliding against the upper door so that no damage is done to the equipment.

If the arm is still operative despite of the fact that the upper door is fully closed, an adjustment of the fully closed upper door limit switch is required.

Figure 3-32 Fully closed upper door limit switch



NOTE: In Ontario, provincial regulations require the use of this limit switch.

If installed, this switch is located on the right front side post.

To adjust the fully closed upper door limit switch:

1. Unscrew the lever adjustment screws of the limit switch (see Figure 3-30).
2. Raise or lower the detection lever a little bit and tighten up the screws.
The detection lever must touch the inside of the upper door for the switch to be triggered.
3. Test the operation.
The automated arm should not be working when the upper door is fully closed.
4. Repeat the adjustment procedure if need be.

Adjusting Arm Stowed Limit Switch

The arm stowed limit switch turns on the ARM EXTENDED warning light on the dashboard (see Figure 3-35) when the operator extends the arm or closes the gripper. If this limit switch is misaligned, the warning light on the dashboard may continue to flash even if the gripper is fully open and the arm is fully retracted. The arm stowed limit switch also activates an audible alarm when the arm is out and the vehicle speed is greater than about 3 mph (5 km/h).

Figure 3-33 Arm stowed limit switch



This limit switch is located behind the left gripper finger when facing the arm.

To adjust the arm stowed limit switch:

1. Park the vehicle on safe and level ground.
2. Fully open the gripper and retract the arm alongside the body.
3. Adjust the limit switch in such a way that the ARM EXTENDED warning light on the dashboard stop flashing when the gripper is fully open and the arm is fully retracted. To do this:
 - 3 a. Loosen limit switch nut.
 - 3 b. Adjust the rod (see Figure 3-34) so that the gripper finger will trigger the limit switch (click sound) and turn off the warning light.

Figure 3-34 Limit switch rod



- 3 c. Tighten back up nut.
4. Slightly close the gripper or extend the arm out (about 1 inch). The ARM EXTENDED warning light should start flashing.

- Repeat the procedure until the limit switch is properly adjusted.

Danger!

All limit switches **MUST** be working at all times. Otherwise, the operator may not be aware that the arm is not fully retracted or that the grabber is open or closed. This may cause an accident, injuries or property damages.

Caution!

This procedure must be done correctly before adjusting the gripper auto-closing system.

Figure 3-35 Arm extended warning light



Adjusting Arm Parked Limit Switch

Centrally located inside the Helping-Hand™ arm assembly, near the top cover, the arm parked limit switch (see Figure 3-36) sends a signal to the controller module that the automated arm is in parked travel position inside the hopper and turns off the ARM EXTENDED warning light on the dashboard.

To adjust this limit switch, apply the following procedure:

- Take down the grabber completely by using the joystick.
- Fully extend the arm.

Danger!

Do not stand directly in the path of the arm while carrying out these tasks.

- Turn off the engine.
- Proceed with the tagout/lockout procedure. Refer to “Locking Out and Tagging Out the Vehicle” on page 20.

5. Open the black plastic spring equipped retracting cover that is on top of the arm base (see Figure 3-37).
Use a stepladder for easy access to that part of the arm.
6. Unscrew the lever screws of the limit switch (see Figure 3-38).
7. Raise or lower the detection lever a little bit and tighten up the screws (see Figure 3-38).
The detection lever or actuator must touch the black curved plastic cover when the arm is in the hopper for the switch to be triggered.

Warning Injury or death may occur if you attempt to enter the body while the packer or arm is in operation.



-
8. Close the black plastic springed cover.
 9. Start the engine and engage the hydraulic pump.

Caution Make sure the ball valve on the suction line is fully open before starting the vehicle.



-
10. Test the operation.
 11. Repeat the procedure until the limit switch is properly adjusted. The ARM EXTENDED warning light should turn off when the arm is in parked travel position (see Figure 3-35).

Figure 3-36 Arm parked limit switch

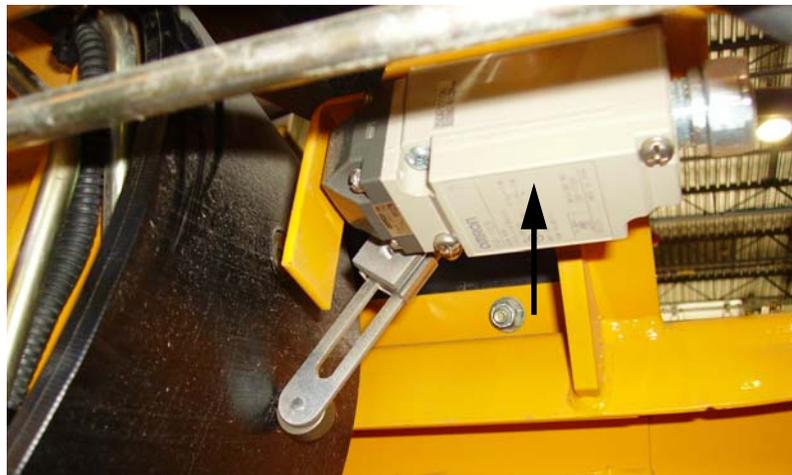


Figure 3-37 Helping-Hand™ arm base

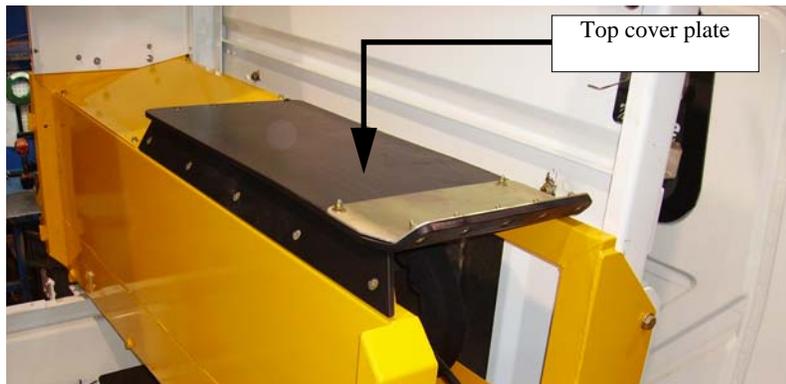
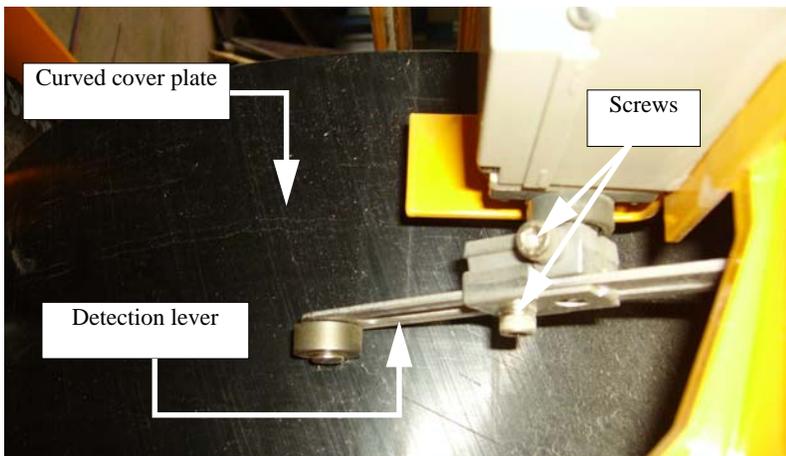


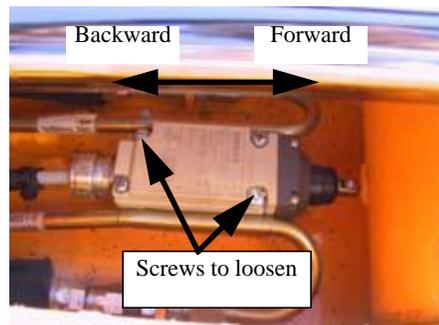
Figure 3-38 Arm parked limit switch adjustment



Adjusting Mid-Height Limit Switch

The mid-height limit switch is located at the base of the Helping-Hand™ arm (Figure 3-39). This limit switch is part of the grabber auto-closing system. Each time the grabber reaches a certain height, it closes automatically in order not to hit the vehicle.

Figure 3-39 Mid-height limit switch



To adjust the mid-height limit switch:

1. Fully extend the arm.

Danger!

Do not stand directly in the path of the arm while carrying out these tasks.



-
2. If not already done, raise the grabber to 90 degrees.
 3. Turn off the engine.
 4. Proceed with the tagout/lockout procedure. Refer to “Locking Out and Tagging Out the Vehicle” on page 20.
 5. Locate the mid-height limit switch at the base of the Helping-Hand™ arm.
 6. Loosen the two screws indicated in Figure 3-39.
 7. Slide the limit switch forward or backward to achieve proper contact with the target.
 8. Tighten back up the screws.
 9. Test the operation.
 10. Repeat the procedure until the limit switch is properly adjusted.

NOTE: The roller located at the front end of the limit switch must be vertically positioned. In case it is not, you will have to unscrew all 4 screws that secure the front end to the rest of the switch, and turn the front end either clockwise or counterclockwise in order to position the roller vertically. Then replace all 4 screws and tighten them up.

IMPORTANT: All limit switches **MUST** be working at all times. Otherwise, the operator may not be aware that the arm is not fully retracted or that the grabber is open or closed. This may cause an accident, injuries or property damages.

Painting and Finishing

Type of surface finishing and painting finishing recommended:

- ◆ SURFACE PREPARATION:

Grit blasting or sandblasting for a 1.5 to 2.5-mil deep profile.

- ◆ PRIMARY COAT:

Urethane Primer to get a minimum thickness of 2 mils (dry).

- ◆ FINISHING COAT:

Topcoat polyurethane: 2-mil deep single coat (dry).

At the end of the painting process, the product must have a minimum of 4-mil surface thickness.

4

Lubrication

LUBRICATE, LUBRICATE, LUBRICATE!

Insufficient lubrication is a major cause of component failure on all refuse vehicles. The MINIMAX™, like most equipment, has many points that require grease.

See the following sections for detailed lubrication points on packer, cylinder pins, hopper door hinges and body-chassis hinges.

Also, refer to the lubrication chart located on the side of the vehicle for a complete list of lube locations and the frequency with which they should be greased.

Recommended Lubricants

You will find below the recommended types of lubricants.

Grease

Any lithium-base commercial multipurpose grease may be used.

Hydraulic Oil

Minimum requirements for hydraulic oil:
Viscosity of 320 cSt at 104 °F (40 °C) and 6.4 cSt at 212 °F (100 °C).

The oil must contain anti-wear and anti-foam additives, rust and oxidation neutralizers and self-protecting agents. It must also meet MIL-H-5606 or SAE IOW “MS” standards. TOTAL Equivis ZS32 hydraulic oil (or equivalent) may be used in the MINIMAX™. For Nordic regions, TOTAL Equivis SMG22 hydraulic oil is strongly recommended.

IMPORTANT: It is the customer’s responsibility to use oil that is appropriate to the climate.

Caution! Do not mix different brands of oil. In doubt, drain and refill with new oil.



Engine Oil

Refer to the engine manufacturer's maintenance manual for recommended type of engine oil.

Transmission Oil

Refer to the transmission manufacturer's maintenance manual for recommended type of transmission oil.

Testing Hydraulic Oil

It is recommended to have hydraulic oil tested and analysed by a lab to prevent hydraulic system or pump failures. This will also optimize the oil change frequency. Apply the following procedure to take oil samples on Labrie vehicles.

NOTE: The procedure may differ from other laboratories sample kits.

Caution! Highly contaminated hydraulic fluid must be changed promptly to avoid any damage on the hydraulic system.



Preparing to Take a Sample

Before taking hydraulic oil samples:

1. Apply all safety measures to ensure safety around the vehicle at all times.
2. Start the engine and raise the body.
3. Install the body safety prop and lower the body onto it.
4. Disengage the pump and turn off the engine.
5. Locate the oil sample coupler. It is located behind the filter cover which is on top of the hydraulic tank.

Figure 4-1 Oil sample coupler

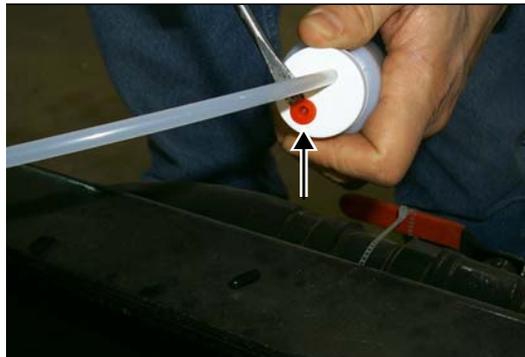

6. Remove the cap from the sample coupler and clean the coupler with a clean rag.
7. Push on the coupler spring ball using a small tip to purge oil before taking a sample. The residual pressure in the system will push the oil out of the coupler. Use a small container to recuperate the oil that will come out. Let the oil leak for a few seconds (about half a cup). In this operation, the pump must be engaged.

Taking an Oil Sample

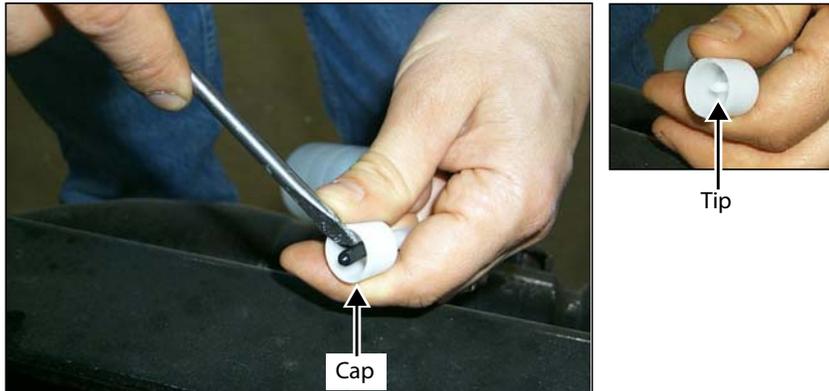
Once you have released the residual pressure, you can take the sample.

To do so:

1. Remove the sample kit from its bag and, using a screw driver, remove the vent cap from the bottle cap.

Figure 4-2 Vent cap


2. Remove the protective cap from the probe.

Figure 4-3 Probe cap and tip

3. Install the probe on the coupler to fill the sample bottle. Use an EMA coupler with M16×2.0 threads.
4. Fill the bottle to the level mark (the pump must be engaged to do this). Remove excess oil through the vent. *DO NOT OPEN THE BOTTLE!*

Figure 4-4 Recommended oil level

5. Once the sample is taken, remove the probe from the coupler and pull out the probe to remove it from the bottle (see Figure 4-5).

Figure 4-5 Pulling out the probe from the bottle

Lubrication Charts

Lubrication charts found in this manual may differ from the ones displayed on the vehicles. For indications regarding lubrication, always refer to the charts on the vehicles.

Figure 4-8 Lubrication charts on a MINIMAX™ vehicle



Figure 4-9 Lubrication chart - MINIMAX™

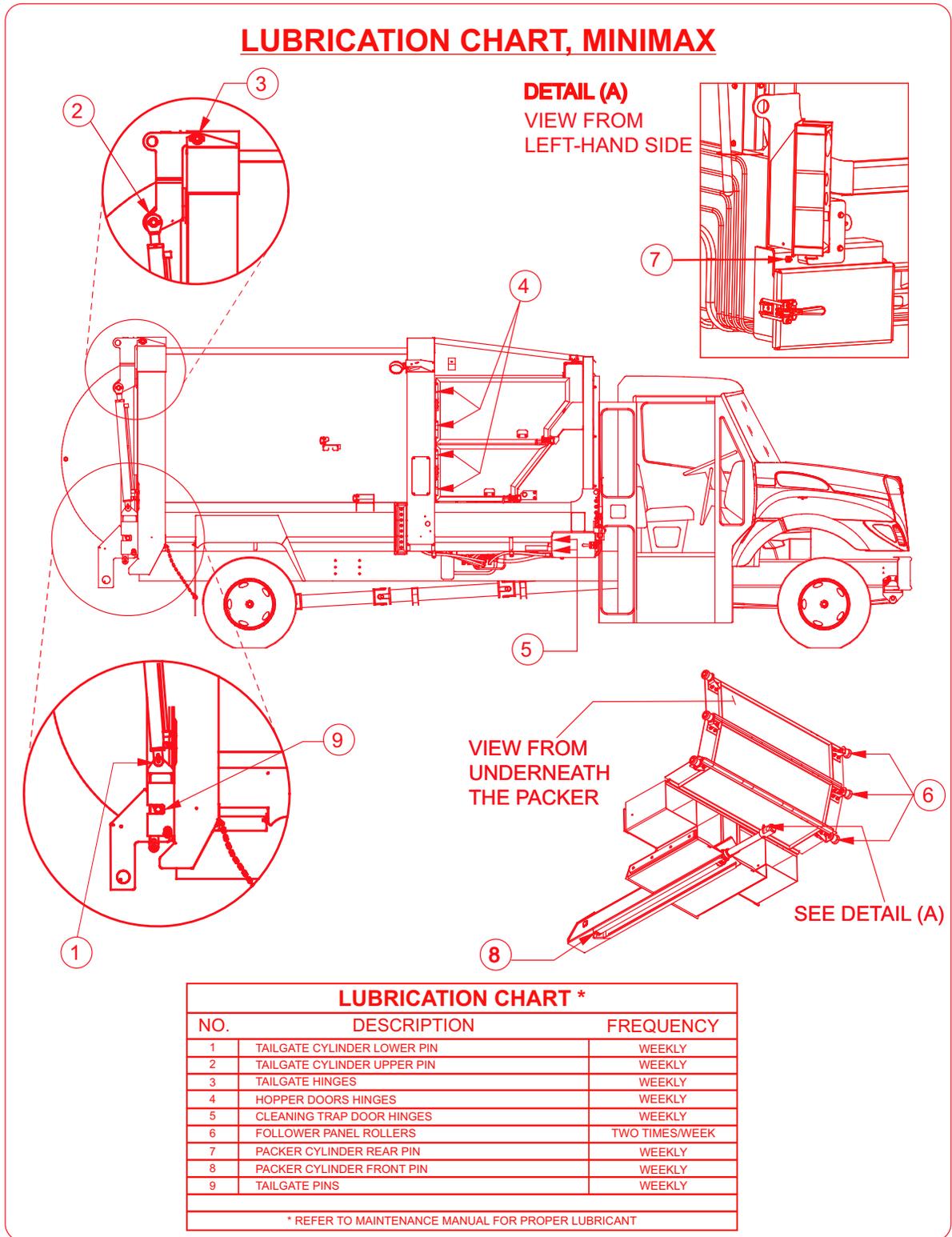
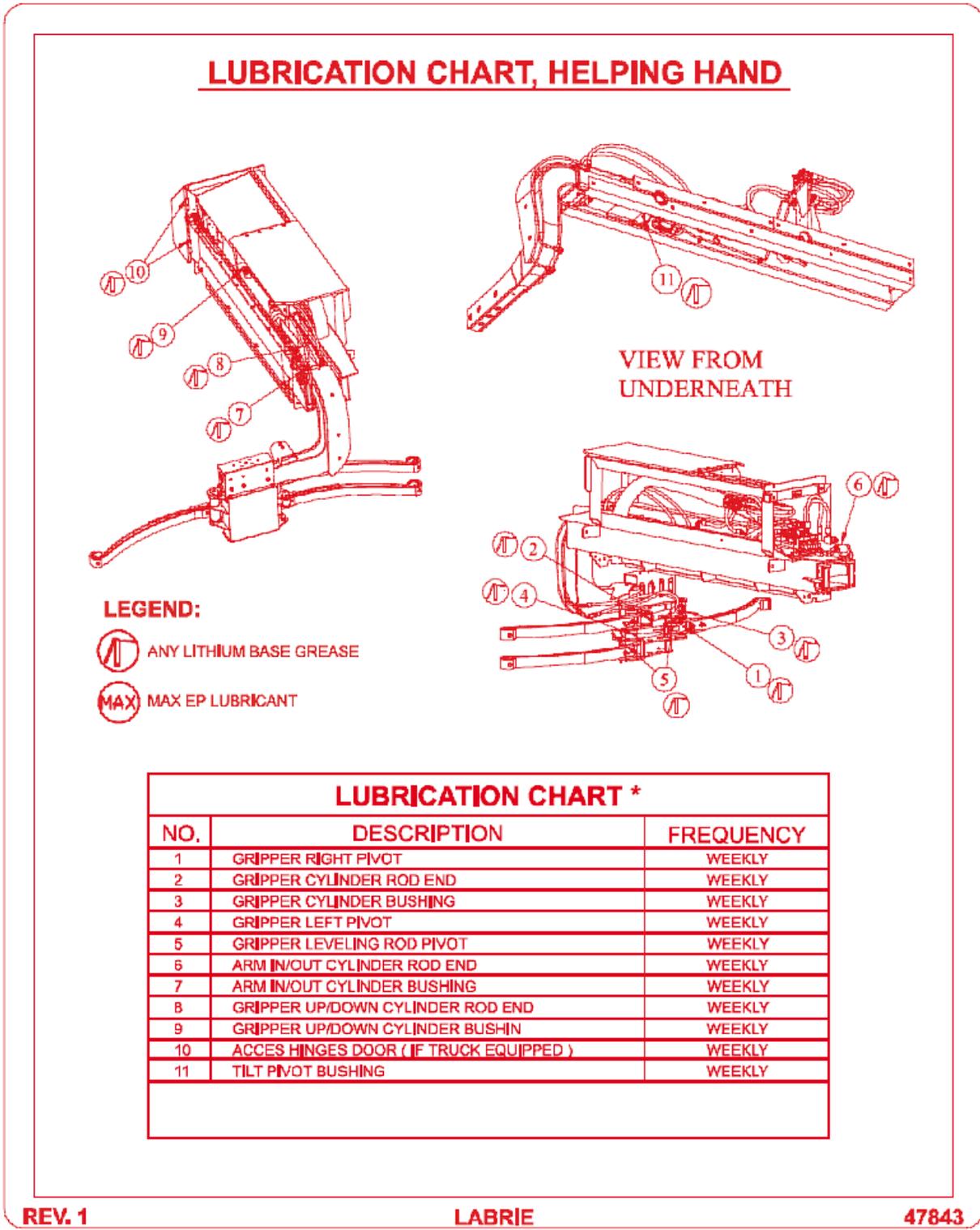


Figure 4-10 Lubrication chart - Helping Hand arm



Caution!

Never grease the side rails and the outside of rollers. Sand and other abrasives stick to grease. This results in premature component wear.

**Caution!**

Because of their intensive use, the packer and its accessories must be lubricated every working day.

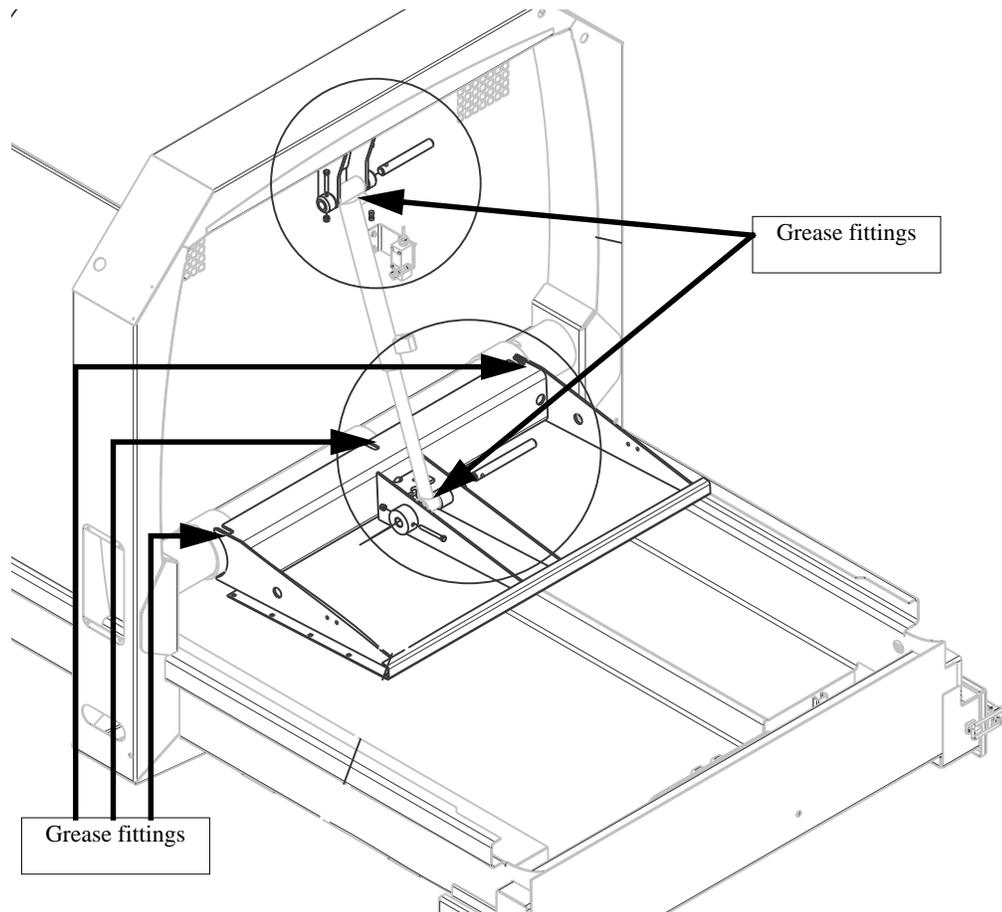


Greasing the Crusher Panel

To properly maintain the crusher panel:

1. Grease the crusher panel cylinder heads through grease fittings.
2. Grease the crusher panel bushings.

Figure 4-11 Grease areas



Tailgate

Greasing Tailgate Hinges, Locking Mechanism and Cylinder Pins

It is important to lubricate the tailgate hinges, locking mechanism and cylinder pins with multipurpose grease (see *Recommended Lubricants* on page 57) as per the lubrication schedule.

Caution! Excessive wear might compromise the proper working condition of the tailgate.



Also, inspect the welds around hinges. The proper working condition of the following components is also to be checked:

- ◆ Tailgate hydraulic cylinders
- ◆ Cylinder pins and circlips
- ◆ Tailgate hinges and pins
- ◆ Wear on the locking mechanism
- ◆ Wear on the tailgate lock pins
- ◆ Tailgate rubber seal

Danger! Do not operate this equipment if there are any signs of damage or incomplete repairs.



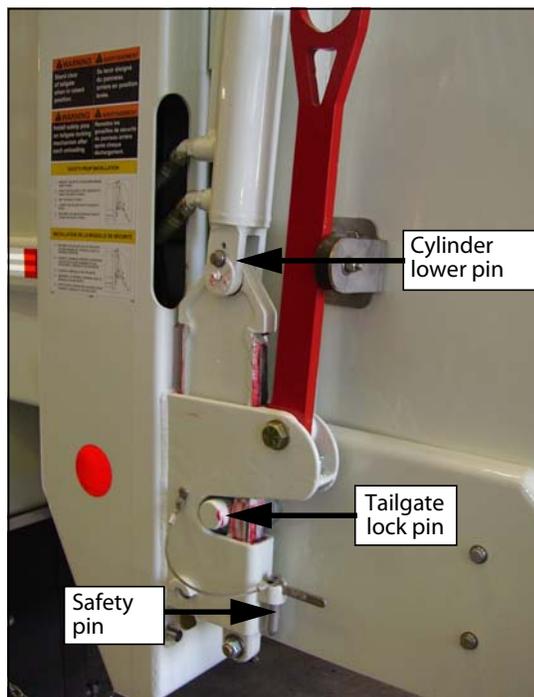
Figure 4-12 Grease fitting - Tailgate hinge



Figure 4-13 Grease fitting - Cylinder upper pin



Figure 4-14 Locking mechanism and cylinder lower section



Packer

Packer components that need to be lubricated include follower panel rollers and cylinder rear/front pins. Use multipurpose grease (see *Recommended Lubricants* on page 57) to lubricate these components as per the lubrication schedule.

Caution! Before you proceed with lubrication, make sure all safety measures have been properly taken.

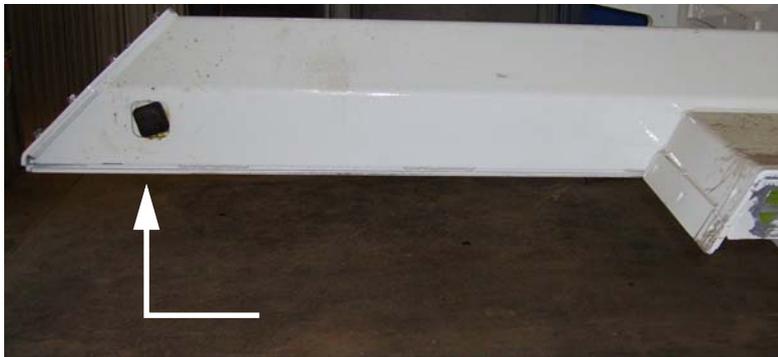


Cylinder Pins

To lubricate the packer cylinder front pin:

1. Fully open the tailgate and install the tailgate safety prop.
2. Extend the cylinder in EJECT mode to get the front of the cutter blade out of the body.
3. Proceed with the locking out procedure. See *Locking Out and Tagging Out the Vehicle* on page 20.
4. Underneath the front of the cutter blade, locate the grease fitting of the cylinder front pin.
5. Apply lubricant.

Figure 4-15 Front pin grease fitting



To lubricate the packer cylinder rear pin:

1. Turn off the engine and disengage the hydraulic pump.
2. Proceed with the lockout procedure. See *Locking Out and Tagging Out the Vehicle* on page 20.
3. Locate the remote grease fitting near the right-hand side clean-out door (see Figure 4-16).
This remote grease fitting consists of a hose going into the cylinder rear pin.
4. Apply lubricant with a grease gun.

Figure 4-16 Remote grease fitting

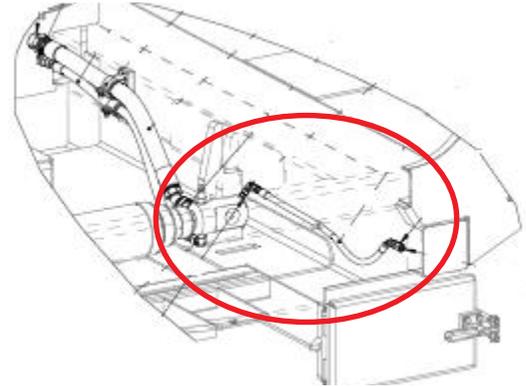
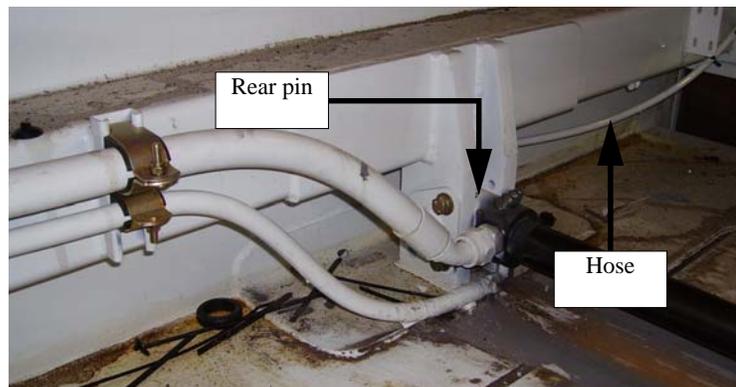


Figure 4-17 Cylinder rear pin and remote grease fitting hose



Followers Panel Rollers

To lubricate the follower panel rollers (see Figure 4-18):

1. Fully retract the packer.
2. Turn off the engine and disengage the hydraulic pump.
3. Proceed with the lockout procedure. See “Locking Out and Tagging Out the Vehicle” on page 20.
4. On the hopper front wall behind the cab, locate the access cover plates (see Figure 4-19).
5. Remove the access cover plates.
6. Proceed with the lubrication of the follower panel rollers.
7. Once the lubrication process completed, replace the access cover plates.

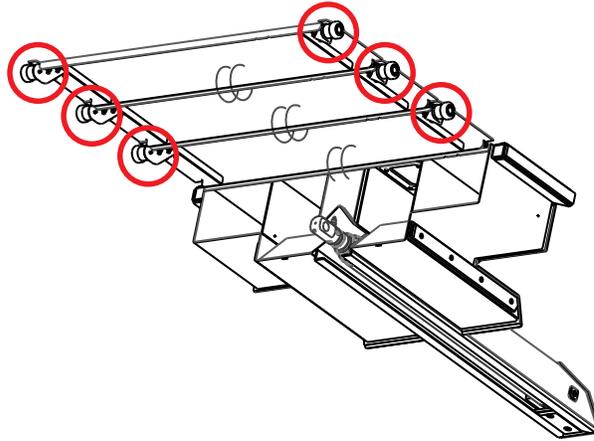
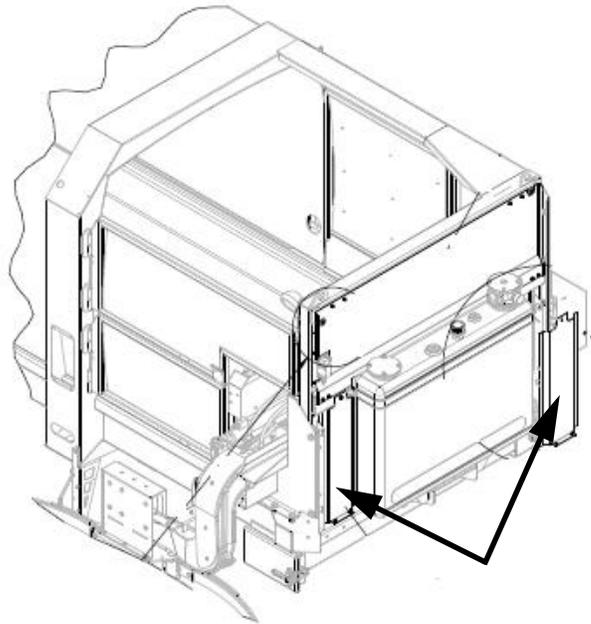
Figure 4-18 Follower panel rollers

Figure 4-19 Access cover plates

Hopper Door Hinges

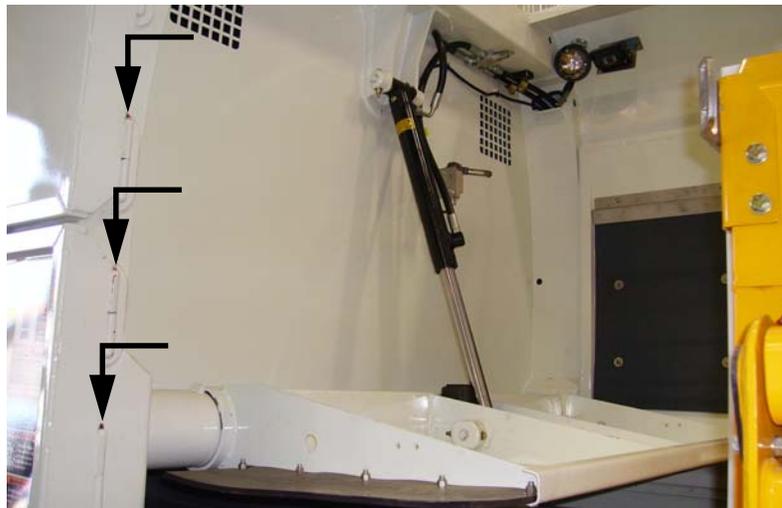
To protect and reduce wear on hopper door hinges, lubricate them regularly with multipurpose grease (see *Recommended Lubricants* on page 57).

To lubricate the hopper door hinges:

1. Turn off the engine and disengage the hydraulic pump.
2. Proceed with the lockout procedure. See *Locking Out and Tagging Out the Vehicle* on page 20.
3. Fully open all hopper doors.

4. Locate the grease fitting on top of each door hinge.
5. Apply lubricant with a grease gun.
There are 2 hinges on each hopper door for a total of 6.

Figure 4-20 Grease fitting on top of door hinges



5

Hydraulic System

Maintenance on the hydraulic system must be carefully and regularly done. The hydraulic system supports most of the functions of the MINIMAX™ body.

As with all hydraulic systems, it may be necessary to periodically check and adjust the pressure relief settings. It may be that a major hydraulic component has been changed, that the vehicle is not performing in terms of payload, or that the vehicle has recently been put into service and the system requires adjustment following a run-in period.

Danger!



Always lock out and tag out the vehicle (see *Locking Out and Tagging Out the Vehicle* on page 20) when inspecting or performing maintenance on the vehicle.

Danger!



Human skin can be easily penetrated by high pressure oil (2000 psi and above). Failure to take appropriate safety precautions may result in serious injury or death.

Danger!



Because of extreme overhead dangers, equipment must be properly supported when servicing sections on the hydraulic system.

General Maintenance

To keep the hydraulic system efficient and reliable, the following care must be taken:

- ◆ Every day, check that hydraulic lines and connections are not leaking. Correct if necessary.
- ◆ Inspect the pump for leaks or unusual noise.
- ◆ When maintenance is carried out, protect all hoses, fittings, pipes, or any other ingress points from dirt that would eventually get into the oil. Plug hoses that are not connected.
- ◆ Inspect the hydraulic system at least once a month, and adjust pressure if necessary (see *Steel hydraulic tank* on page 82).

- ◆ For new vehicles, change the return filter element after 50 hours of use, and twice a year afterwards or when the filter restriction indicator is in red (see Figure 5-1), whichever comes first (see *Replacing Filter Elements* on page 95).
- ◆ Clean the strainer inside the hydraulic tank after the first 50 hours of use, and twice a year afterwards or when the filter restriction indicator is in red (see Figure 5-1), whichever comes first (see *Cleaning the Strainer* on page 92).
- ◆ Hydraulic oil must be replaced at least once a year, or when contaminated (see *Emptying the Hydraulic Tank* on page 90).

NOTE: The ball valve on the hydraulic tank must be completely open before engaging the pump or starting the engine.

Labrie Enviroquip Group requires that the hydraulic fluid and return oil filter be changed and that the strainer be cleaned before changing the hydraulic pump.

Manufacturer's warranty on hydraulic pumps provided or sold by Labrie Enviroquip Group could be declared void if the hydraulic fluid and return oil filter are not changed, and if the strainer is not cleaned prior to replacing the hydraulic pump.

Therefore, it is mandatory to change the return oil filter and clean the strainer after the *first* 50 hours of pump operation, then twice a year or when the filter restriction indicator is in red (see Figure 5-1), whichever comes first. The hydraulic fluid must be changed once a year. Hydraulic fluid contamination will severely damage hydraulic components.

Figure 5-1 Filter restriction indicator



Inspecting Hydraulic Oil

Inspecting hydraulic oil is a very important maintenance task that must be done as per your *Preventive Maintenance Chart*. The most important items to look at when inspecting hydraulic oil are:

- ◆ color
- ◆ amount
- ◆ texture (usually in the form of air bubbles or foam) and

- ♦ temperature

To inspect the hydraulic oil color:

1. Make sure the MINIMAX™ is parked in a safe area for maintenance.
2. Turn on the engine and then the hydraulic system.
3. Return all hydraulic devices to their “home” position (retract the packer, close the tailgate, etc.).

NOTE: The “home” position is where there is little or no hydraulic oil in the cylinders, which are completely retracted. Most of the oil has flowed back into the tank.

4. Turn off the engine.
5. Use a folding stepladder to gain visual access to the oil gauge located on the hydraulic tank.
6. Inspect the oil through the gauge.

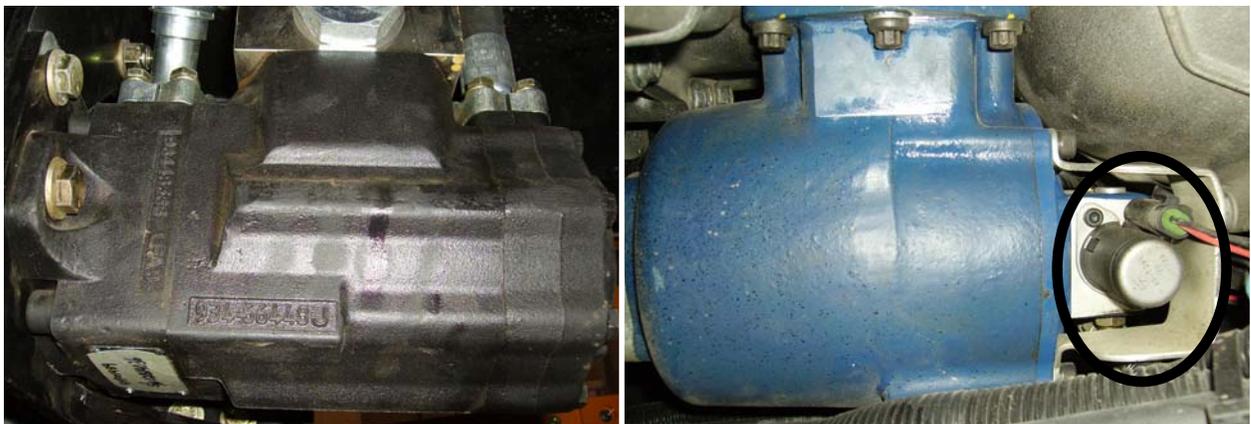
It is recommended to have the hydraulic fluid tested and analyzed by a lab to prevent hydraulic system or pump breakdown. This will also optimize the frequency of hydraulic fluid changes.

NOTE: Evidence of maintenance and/or fluid samples could be requested when filing warranty claims concerning the hydraulic system or pump.

Introducing the Dual Vane Pump

MINIMAX™ vehicles equipped with an automated arm features a dual vane pump. This pump is fitted to the rear of the PTO drive shaft and is activated by an electric solenoid coil, which is mounted on the hotshift PTO (see Figure 5-2). The electrical signal that activates the coil is sent by the pump switch on the control panel.

Figure 5-2 Hydraulic pump (left); electric solenoid coil (right)



Dump valves are no more used on MINIMAX™ vehicles. The hydraulic flow is instead controlled by modulated electrical signals produced by our new multiplex control system. This sophisticated system makes dump valves unnecessary.

When the dual vane pump is turned on, the IFM electronic control module (ECM) starts monitoring vehicle and engine speed, and allows the vane pump to engage (or not). If the vehicle is going faster than 15 mph (25 km/h) or if engine speed exceeds 900 rpm, the vane pump will not engage. After the pump is engaged, it will stay engaged at any engine speed under 2,300 rpm (for more information, see *Allison Transmission Parameters* on page 150).

The first section of the vane pump, known as the *body* vane pump, powers all body functions (tailgate, crusher panel, packer, and cart tipper [if installed]) through the body control valve (see below). It is capable of delivering a flow of 20 gallons per minute (gpm) at 1200 rpm. If the engine speed exceeds 1200 rpm, the IFM multiplexed system, installed on the truck, will send an electrical signal to the body control valve in order to vary the spool position of a specific valve section. On MINIMAX™ vehicles, only the packer section spool will vary its position according to that signal. There are no restrictions on the flow coming into the other body valve sections.

The second section of the vane pump, known as the *arm* vane pump, powers arm functions (arm up/down, arm in/out, and grabber open/close) through the arm control valve (see *Arm Control Valve* on page 77). It is capable of delivering a flow of 14 gpm at 1200 rpm. If the engine speed varies, the IFM multiplexed system, installed on the truck, will send an electrical signal to the arm control valve in order to vary the spool position of a specific valve section. On MINIMAX™ vehicles, all arm valve spools except the one that controls the grabber will vary their position according to that signal.

Body Control Valve

MINIMAX™ vehicles are equipped with a body control valve (see Figure 5-3). As part of the *body* vane pump, this control valve powers all body functions (tailgate, crusher panel, packer, and cart tipper [if installed]).

Figure 5-3 Body control valve



- **Tailgate:** 4 ways, 3 positions
- **Packer:** 4 ways, 3 positions
- **Crusher panel:** 4 ways, 3 positions

NOTE: All sections are electro-hydraulically actuated.

For more information on the body control valve, see *Main Hydraulic Schematic* on page 99. To learn how to adjust hydraulic pressure, see *Adjusting Hydraulic Pressure* on page 83.

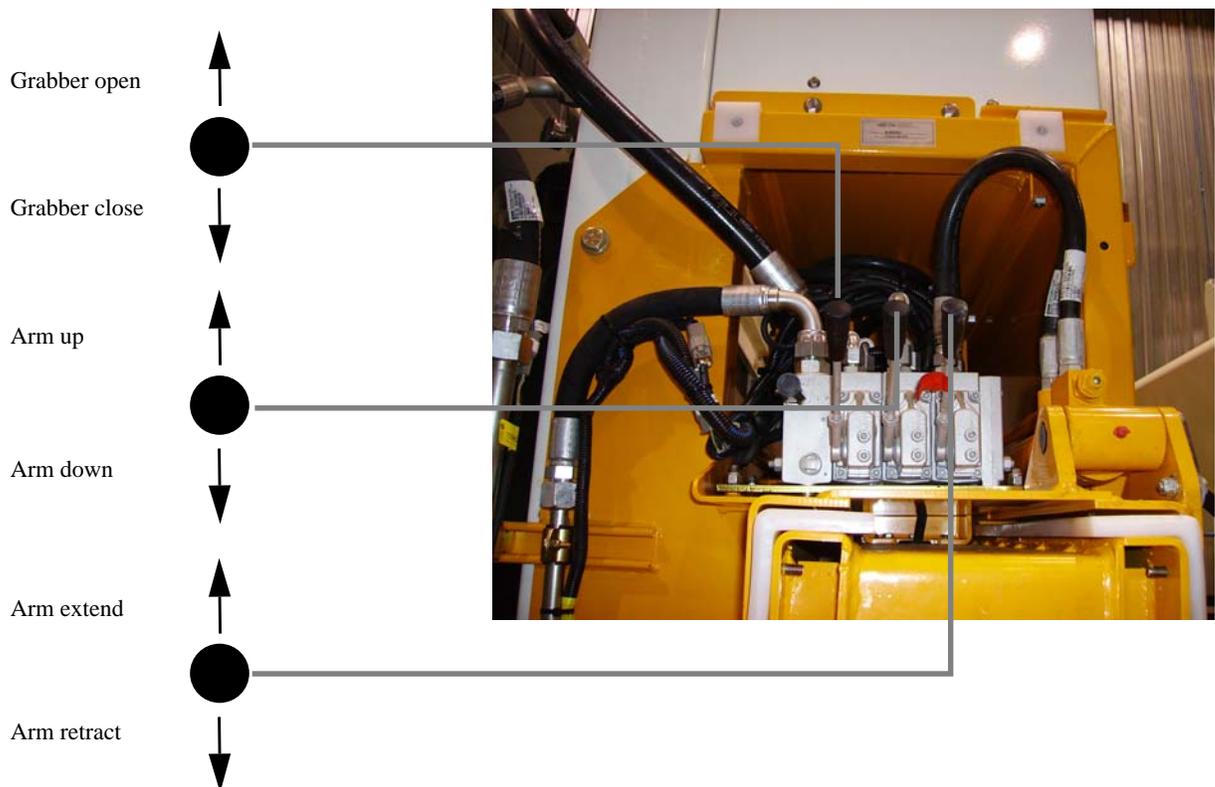
Arm Control Valve

MINIMAX™ vehicles are also equipped with an arm control valve (see Figure 5-4). As part of the *arm vane pump*, this valve powers all arm functions (gripper open/close, arm extend/retract, and arm up/down).

As such, the amount of flow coming out of it will be according to the position of the spool. This feature, called *proportional control*, allows infinite control of the speed and movement of the arm.

Each section of this valve is actuated by an electric coil located behind the valve.

Figure 5-4 Arm control valve



- **Input/output cover:** provided with main relief valve
- **Gripper section (open/close):** not proportional, with load sensor relief
- **Lifting arm section (extend/retract):** proportional, no load sensor relief

- **Lifting arm section (up/down):** proportional, no load sensor relief

Inspecting the Pump

The hydraulic pump is powered by the vehicle engine through a drive shaft and a PTO. The pump should be visually inspected every working day.

Figure 5-5 Pump



When inspecting the pump:

1. Start the engine and engage the hydraulic pump.
The pump should turn freely without excessive noise or vibrations.
2. Check for oil leaks under the pump and at connection points.
3. Lock out and tag out the vehicle (see *Locking Out and Tagging Out the Vehicle* on page 20).
If electrical problems occurred with the pump, see *Pump* on page 124.

Caution!



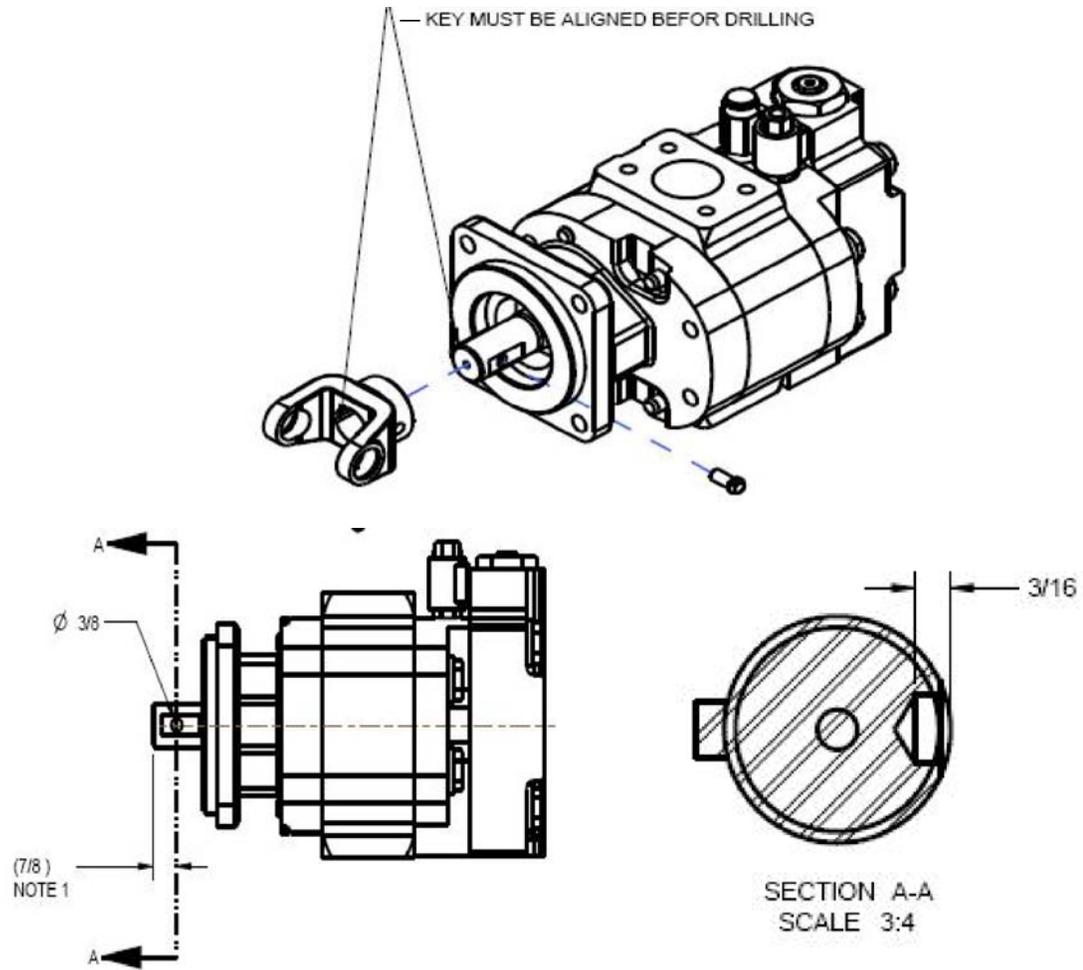
If the unit has to be driven away for repairs on the hydraulic system (e.g. following detection of an oil leakage), turn the PTO switch to the "OFF" position.

Pump Replacement

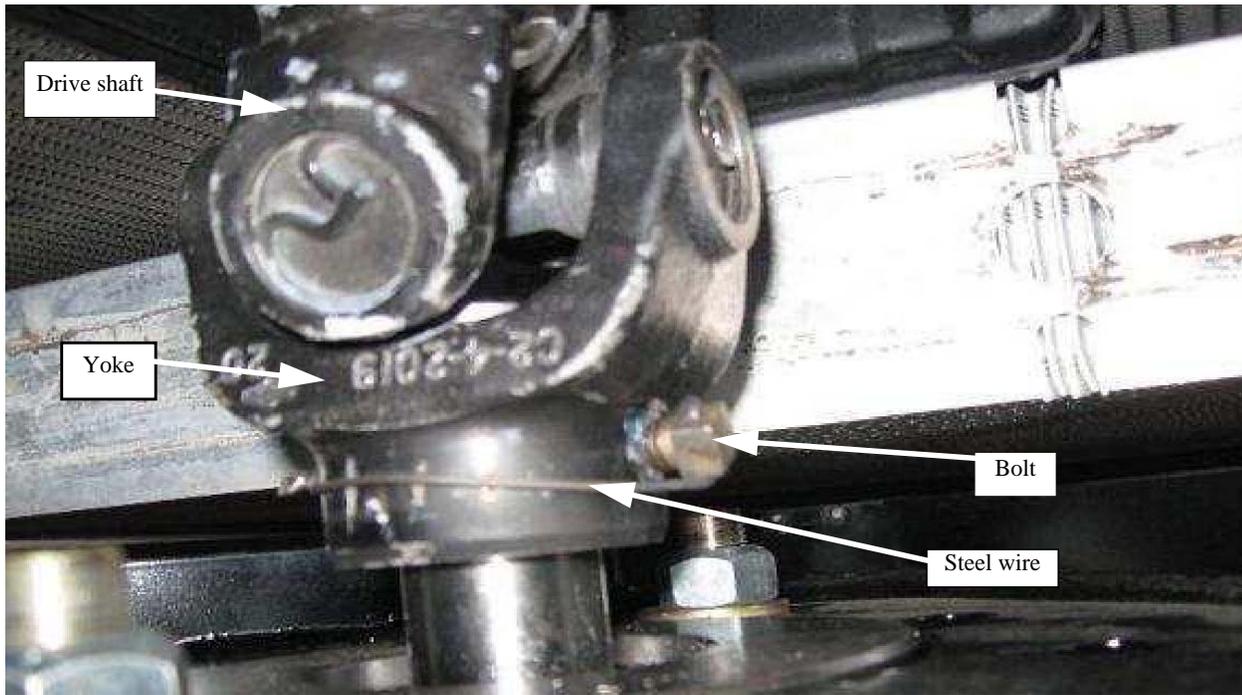
It is important to apply the following procedure after making a pump replacement or a pump drive shaft replacement.

For standard drive shaft, do the following:

1. Locate the hole with the yoke bolt (the yoke must be fully engaged on shaft).



2. Apply Loctite 243 (medium strength) on the bolt before assembly.
3. Install a steel wire on the yoke bolt (the wire must be fixed tight around the bolt).

Figure 5-6 Steel wire on yoke

4. Use the following parts: QUB00700 (bolt) and 154503 (steel wire).

Priming a New Pump

To prevent cavitation or air in the hydraulic system after installing a new pump or even when flushing the hydraulic system, make sure to prime the pump before starting the engine.

Apply the following procedure for any new installed pump:

1. Make sure the parking brake is applied and the vehicle is tagged out for maintenance purposes (refer to “Locking Out and Tagging Out the Vehicle” on page 20)..

Danger!



Apply the lockout / tagout procedure at all times when maintenance or inspection is carried out on the vehicle.

2. With the ball valve closed, fill the suction line before installing it on the pump.
3. Fill the pump housing with new oil.
4. Reinstall the pressure hose on the pump housing.
5. Open the ball valve on the suction line.
6. Crank the engine repeatedly — about five times — without letting it start in order to fill the suction hose and the pump with hydraulic oil and to push the air back into the tank.

7. Start the engine. You can slowly raise the engine RPM only after 5 minutes. When you raise the RPM, always make sure that the pump does not make excessive noise.
8. Before putting the vehicle back in service, recalibrate the system pressures.

NOTE: For units equipped with a vane pump.

Inspecting the Hydraulic Tank

Verify that the oil in the tank is clean (not colored) and always at the appropriate level.

Caution! Maximum temperature for hydraulic oil is 77 °C (180 °F).



To inspect the hydraulic tank:

1. Lock out and tag out the vehicle (see *Locking Out and Tagging Out the Vehicle* on page 20).
2. Clean the strainer and replace the filter element inside the tank after the first 50 hours of service (see *Cleaning the Strainer* on page 92 and *Replacing Filter Elements* on page 95).

Figure 5-7 Filter housing element



For more information on maintenance schedule, see *Preventive Maintenance Chart* on page 24.

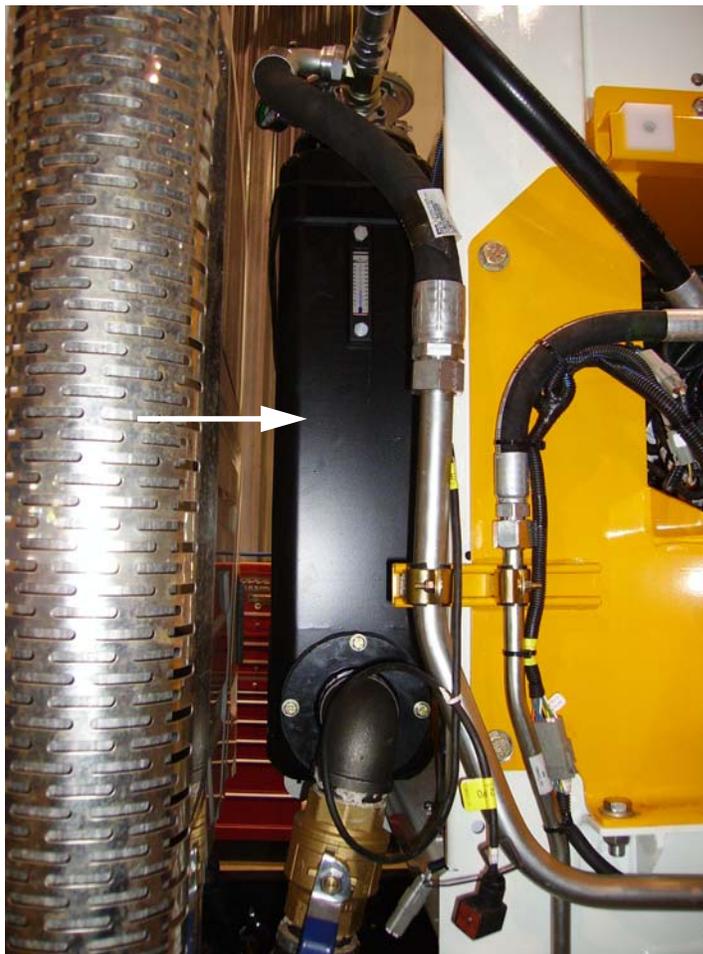
3. Make sure that the filler cap is not obstructed and works properly.
4. Make sure that the hydraulic oil is clean (not colored) and at least at 3/4 on the oil level gauge (with all cylinders retracted).

The complete system requires between 50 and 60 gallons of oil.

Figure 5-8 Oil temp/level gauge



Figure 5-9 Steel hydraulic tank



Adjusting Hydraulic Pressure

A 0–4000 psi pressure gauge as well as a set of ball-end hex keys are required to adjust system pressure (see Figure 5-10).

Figure 5-10 Pressure gauge and ball-end hex key



The pressures of the various hydraulic functions of the Minimax are set up at the factory for optimal performance. However, when you perform maintenance work on the hydraulic system of the truck, you may need to adjust the hydraulic pressure for a number of reasons. For more information, see *Troubleshooting Guide* on page 120 or *Preventive Maintenance Chart* on page 24.

Adjusting Main Pressure on Body Control Valve

MINIMAX™ vehicles is equipped with an electro-hydraulic body control valve to power body hydraulic functions, including the tailgate, the packer, and the crusher panel, if installed.

Warning!



Make sure that the ball valve on the suction line is completely open before starting the engine. Failure to do so may damage the hydraulic system.

To adjust the pressure:

1. Start the engine and engage the hydraulic system.
2. Install a 0–4000 psi pressure gauge on the quick-connect coupler located on the hydraulic valve.

Figure 5-11 0–4000 psi pressure gauge



3. Disconnect the packer retract proximity switch. Activate the packer retract until it reaches end of stroke.
4. Check the pressure on the gauge to make sure the pressure builds up in the system.
5. Adjust the body control relief valve as needed by loosening the locknut and by turning the adjustment screw.
6. Set the pressure to 2,500 psi.

Adjusting the Utility Section

To adjust the utility section:

1. Disconnect the closed tailgate solenoid (see H in Figure 5-12).
2. Connect a 0 – 600 psi pressure gauge to the inlet cover (see E in Figure 5-12).
3. Start up the engine and let it idle.
4. Turn the pump on.
5. Toggle and hold the tailgate control switch in the “Closed” position.
6. Adjust the generated pilot pressure to 420 +/- 30 psi.

When facing the valve, the adjustment screw is on the right side of the valve (see A in Figure 5-12).

7. Once the adjustment made, **disconnect the pressure gauge.**
8. Reconnect the tailgate solenoid.
9. Install a 0 -600 psi pressure gauge on the maximum pilot pressure port (see D in Figure 5-12).
10. Toggle and hold the tailgate control switch in the “Closed” position.

11. Using the adjustment screw located on the front of the valve, adjust the maximum pilot pressure to 550 +/- 50 psi (see G in Figure 5-12).

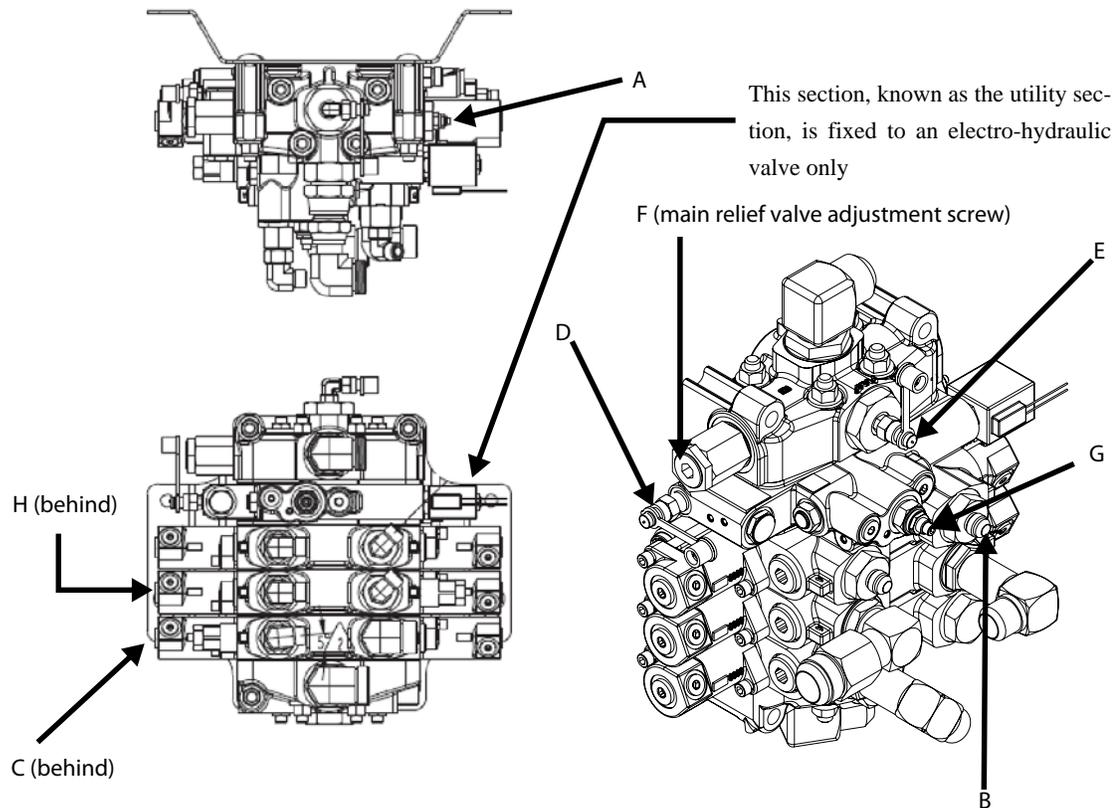
Warning! Replace the 0 - 600 psi pressure gauge with a 0 - 5000 psi pressure gauge for step 12.



NOTE: The generated pilot pressure port and the main relief valve pressure port are the same.

12. To adjust pressure in the main relief valve, install a 0 - 5000 psi pressure gauge on the inlet cover port (see E in Figure 5-12).
13. Activate the packer retract function until the packer reaches the end of its stroke.
14. Adjust the main relief valve pressure to 2,500 psi (See F in Figure 5-12).

Figure 5-12 Valves and ports

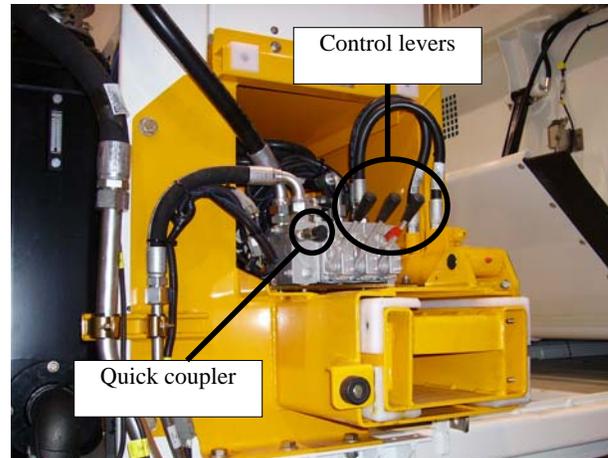


Adjusting Pressure on Arm Control Valve

MINIMAX™ vehicles use an extra valve stack to control the arm. This valve is of the proportional type, meaning that the amount of flow coming out of it will be according to the position of the spool.

Control levers (see Figure 5-13) are delivered with the vehicle to make pressure adjustments and to manually operate the arm if necessary.

Figure 5-13 Control levers and quick coupler



IMPORTANT: Before performing the following procedure, make sure that all function levers and their adjustment screws have been properly identified on the valve.

NOTE: A helper may be needed when adjusting arm pressure. Use all necessary safety precautions around the vehicle at all times.

To adjust the arm valve main relief pressure:

1. Secure the arm working area using safety tape or barricades.

Warning!



Stay out of the path of the arm while manually moving the Helping Hand™. Failure to do so may result in severe injury, or even death.

2. Install the control lever on the arm up/down function of the proportional valve (see Figure 5-4).
3. Move the lever back and forth to remove any residual hydraulic pressure in the system.
4. Connect a 0–4000 psi gauge to the quick coupler located on the left front of the arm control valve (see Figure 5-13).

Warning!

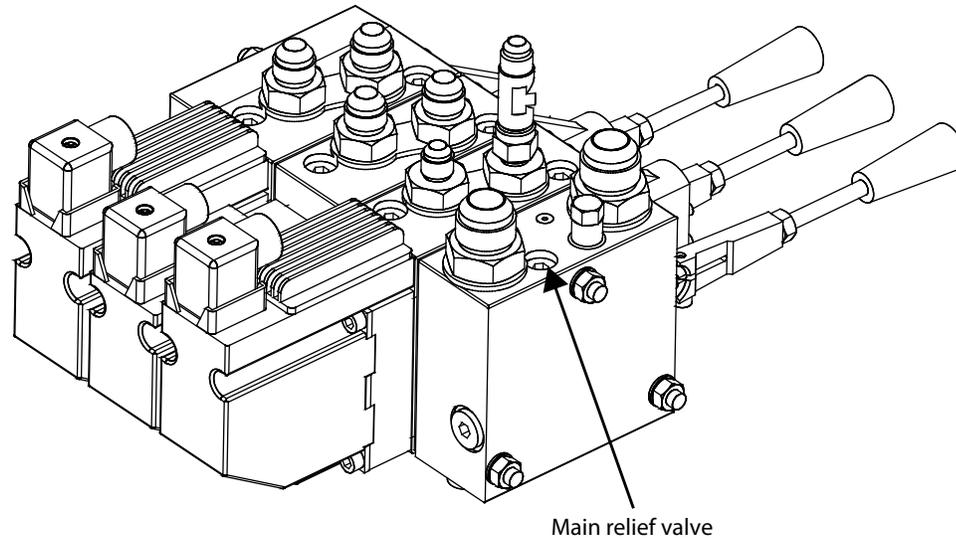


Make sure that the ball valve on the suction line is completely open before starting the engine. Failure to do so may damage the hydraulic system.

5. Start the engine and engage the hydraulic system.
6. Retract and maintain the arm at the end of its stroke using lever.

7. Adjust the main relief valve to 2000 psi using the adjustment screw, turning the hex wrench clockwise to raise pressure, or counterclockwise to lower pressure.

Figure 5-14 Relief adjustment screw



Adjusting Gripper Pressure

Danger! Do not stand directly in the path of the arm while carrying out these adjustments.



The section of the arm control valve that controls the gripper is the first section next to the inlet cover, and it is equipped with a built-in relief valve that allows gripper pressure adjustment (see Figure 5-16).

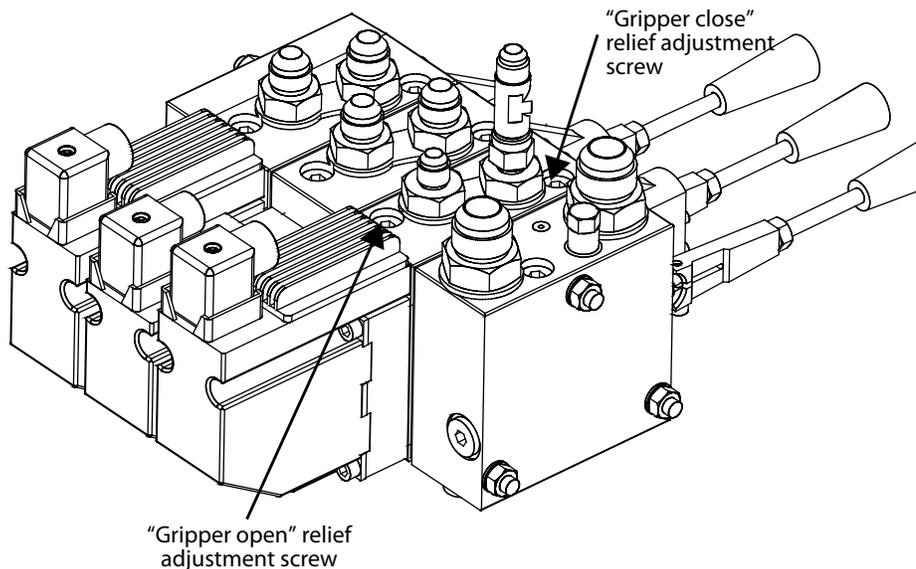
To adjust the gripper pressure on built-in relief valves:

1. Lock out and tag out the vehicle (see *Locking Out and Tagging Out the Vehicle* on page 20).
2. Secure the area around the path of the arm with barrier tape or barricades.
3. Move the manual levers back and forth to release any residual pressure.
4. Make sure that all hoses are tight and not leaking.
5. Connect a pressure gauge (0–4000 psi) to the quick-connect coupler on the arm control valve (see Figure 5-15).

Figure 5-15 Quick-connect coupler**Warning!**

Make sure that the ball valve on the suction line is completely open before starting the engine. Failure to do so may damage the hydraulic system.

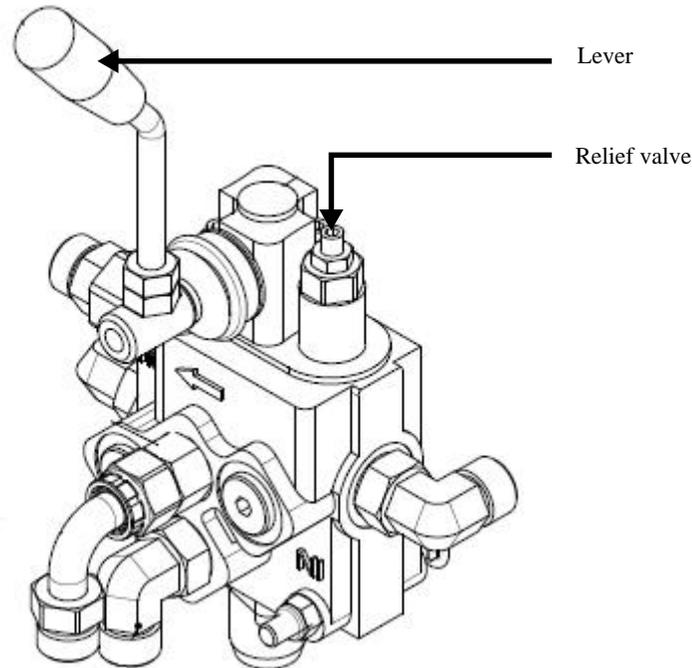
6. Put the transmission in Neutral, start the engine and engage the hydraulic pump.
7. Adjust gripper pressure:
 - 7 a. Close the gripper using the corresponding lever on the valve.
 - 7 b. While maintaining the lever in place, adjust the relief valve of the “gripper close” side of the valve section to 1200 psi (screw or unscrew depending on the gauge readout).
 - 7 c. Open the gripper and maintain the lever in place.
 - 7 d. While maintaining the lever in place, adjust the relief valve of the “gripper open” side of the valve section to 750 psi (screw or unscrew depending on the gauge readout).

Figure 5-16 Gripper relief valve adjustment screws

Adjusting Pressure on Cart Tipper Valve (if installed)

This section describes the procedure for adjusting the cart tipper hydraulic pressure on the tipper control valve (see Figure 5-17).

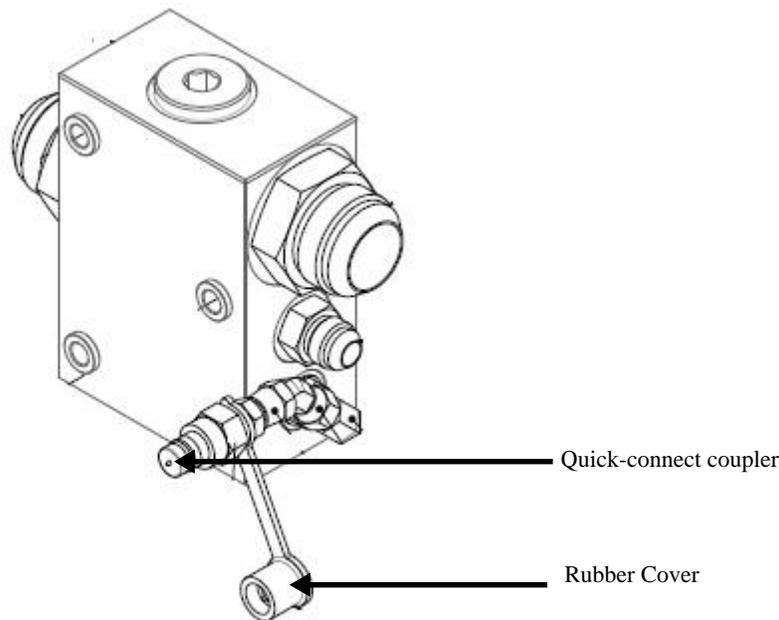
Figure 5-17 Tipper control valve



For this procedure, use a 0 - 4000 psi pressure gauge.

To adjust the cart tipper pressure:

1. Start the engine and engage the hydraulic system.
2. Remove rubber cover from the quick-connect coupler located on the flow divider (see Figure 5-18).
3. Install a 0 - 4000 psi pressure gauge on the quick-connect coupler (see Figure 5-18).
4. Push the tipper lever (see Figure 5-17) and hold it while you read the pressure on the gauge.
5. Check the pressure on the gauge to make sure the pressure builds up in the system.
6. Set the pressure at idle to 2,000 psi by adjusting the relief valve (see Figure 5-17). To do so, loosen the locknut of the relief valve and turn the adjustment screw clockwise or counterclockwise to get the proper pressure.
7. Once the pressure is adjusted, tighten back the locknut.
8. Replace rubber cover on the quick-connect coupler (see Figure 5-18).

Figure 5-18 Flow divider

Emptying the Hydraulic Tank

To empty the hydraulic tank:

1. Prepare the vehicle:
 - 1 a. Apply the parking brake
 - 1 b. Start the engine
 - 1 c. Engage the hydraulic pump
 - 1 d. Retract all cylinders (packer, crusher panel, tailgate, etc.)
 - 1 e. Raise the body and install the safety prop
 - 1 f. Disengage the hydraulic pump
 - 1 g. Stop the engine
2. Lock out and tag out the vehicle (see *Locking Out and Tagging Out the Vehicle* on page 20).
3. Close the ball valve on the suction line (see Figure 2-13).
4. Disconnect the suction line from the pump.
5. Place a clean container (minimum capacity: 60 gallons) under the disconnected end of the suction line to empty the hydraulic tank.
6. Open the ball valve to let the oil flow into the container.
7. When the bulk of the oil has been emptied from the tank, remove the drain plug (see Figure 5-19) to allow the rest of the oil drain from the tank.
Place a small container under the plug.
8. Once the tank has been completely emptied, replace the drain plug and reconnect the suction line to the pump.

Figure 5-19 Drain plug


Replacing Hydraulic Oil

Caution!

Highly contaminated hydraulic fluid must be changed promptly to avoid damaging the hydraulic system.



To do so:

1. Empty the hydraulic tank (see *Emptying the Hydraulic Tank* on page 90).
2. With a clean dry cloth attached to a stick, remove all metal particles and debris accumulated at the bottom of the hydraulic tank:
 - 2 a. Remove the access panel (see Figure 5-20).
 - 2 b. Remove the strainer. See *Cleaning the Strainer* on page 92.
 - 2 c. Clean or replace the strainer if necessary.
 - 2 d. Remove the return filter housing (see Figure 5-20).
 - 2 e. Insert your hand inside and clean the interior of the tank with a dry clean cloth.
 - 2 f. Clean the return filter housing with a dry clean cloth.
3. Change the return filter element (see *Replacing Filter Elements* on page 95).
4. Using a filtering screen, refill the tank with high quality oil until it reaches the 3/4 mark on the oil gauge (see *Recommended Lubricants* on page 57 for specifications).

The entire system will require between 50 and 60 gallons of oil.

Caution!

It is not recommended to mix different brands and/or grades of oil in the hydraulic tank.



5. If the suction line has been replaced, fill the line until oil reaches the pump (see *Pump Cavitation* on page 124).

6. Reinstall the access panel, the strainer and the return filter housing.
7. Reinstall the filler cap and fully open the ball valve.

Caution! Failure to open the ball valve may seriously damage the pump and the hydraulic system.



-
8. Start the engine.

Cleaning the Strainer

To clean the strainer:

1. Empty the hydraulic tank (see *Emptying the Hydraulic Tank* on page 90).
2. Remove the hose clamp from the suction hose.
3. Slide the hose over the pipe until it clears the nipple (slide towards the frame of the vehicle).
4. Remove the strainer from the tank port (see Figure 5-20 and Figure 5-21).
5. Clean the strainer using solvent, and check for damage; replace if necessary.
6. Replace the seal if necessary.
7. Reinstall the strainer.
8. Using a filtering screen, refill the tank with high-quality oil until it reaches the 3/4 mark on the oil gauge (see *Recommended Lubricants* on page 57 for specifications).

The entire system will require between 50 and 60 gallons of oil.

Caution! It is not recommended to mix different brands and/or grades of oil in the hydraulic tank.



Figure 5-20 Hydraulic tank

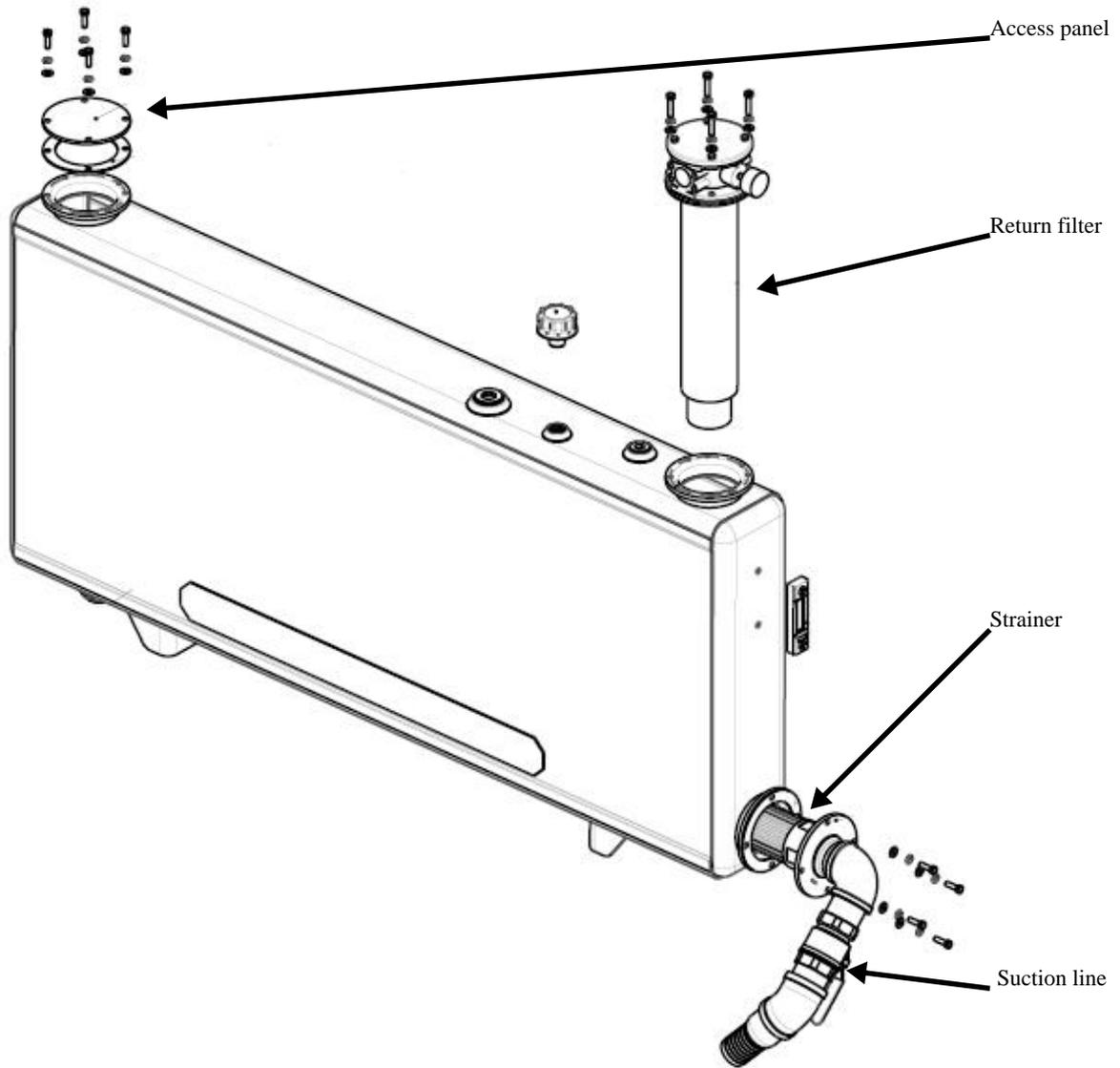
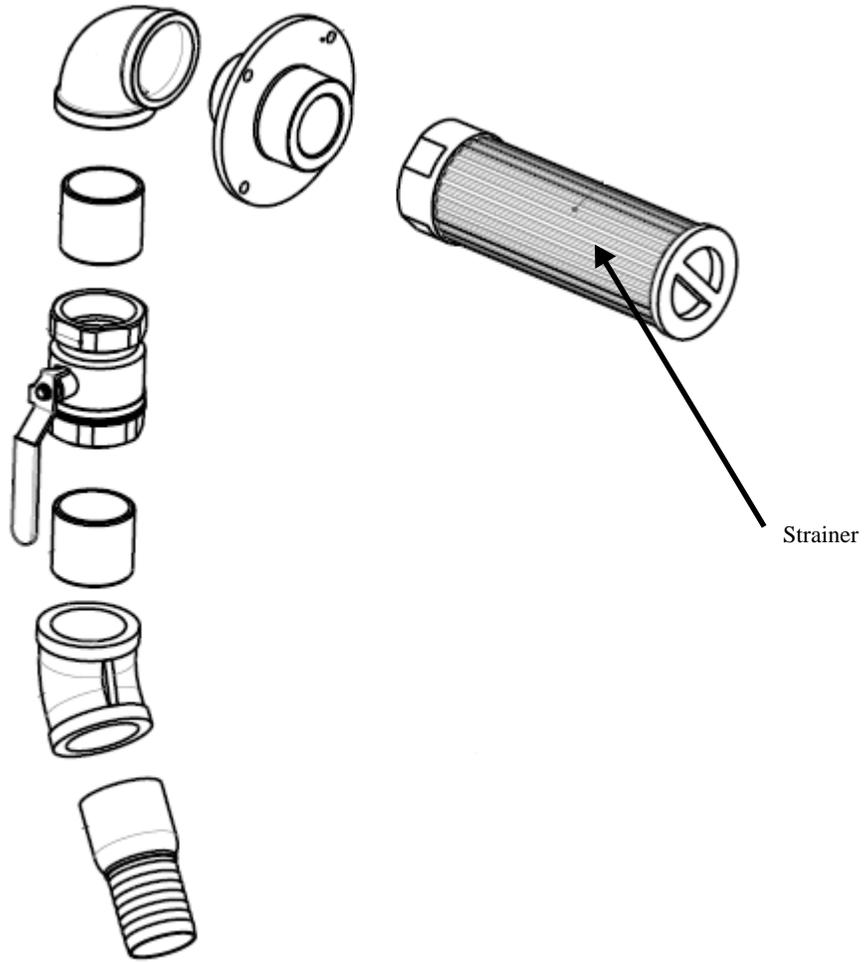


Figure 5-21 Strainer assembly



Replacing Filter Elements

IMPORTANT: To protect new components of the hydraulic system, the return filter element must be changed after the *first 50 hours of operation of the vehicle*. Change the element twice a year afterwards (see *Preventive Maintenance Chart on page 24*).

The filter restriction indicator will indicate, when the engine is running, if the filter needs to be changed. Replace the filter before the indicator reaches the red zone. This will keep the oil clean, extend component life expectancy and reduce failures.

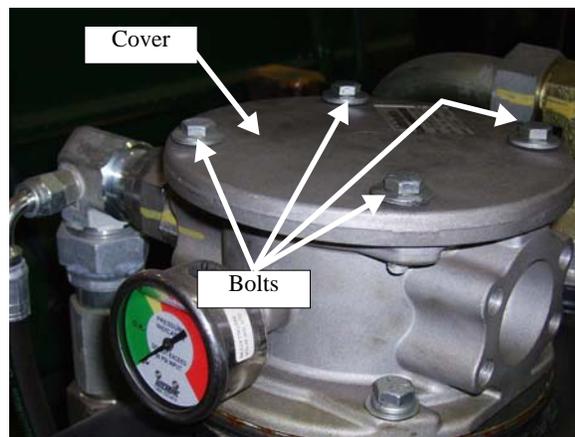
Figure 5-22 Filter restriction indicator (steel tank)



To replace the hydraulic filter:

1. Lock out and tag out the vehicle (see *Locking Out and Tagging Out the Vehicle* on page 20).
2. Remove the filter head cover bolts (four).

Figure 5-23 Filter head cover and retaining bolts (rectangular tank)



3. Replace the filter element with a new one.

Figure 5-24 Filter element



4. Reinstall the filter head cover.

Inspecting Hydraulic Cylinders

Danger!



Always lock out and tag out the vehicle when inspecting or performing maintenance on the vehicle (see *Locking Out and Tagging Out the Vehicle* on page 20).

You must inspect hydraulic cylinders at least once a month.

When you do so:

1. Make sure that the ball valve on the suction line is completely open before starting the engine.

Warning!



Failure to open the ball valve may damage the hydraulic system.

2. Make sure that connections between all hoses and pipes are tight, and that no oil is leaking. Leaking or otherwise faulty cylinders must be repaired or replaced immediately.
3. Make sure that all cylinder caps are firmly set and that there are no leaks.
4. Using a straight edge, make sure that cylinder rods are straight.
5. Lubricate and inspect all cylinder mounting points (pins, retaining bolts, etc.).

Detecting Cylinder Internal Leaks

An internal leak is caused by a damaged seal inside the hydraulic cylinder (see 1 in Figure S-25). Because the cylinder is leaking oil inside (bypassing), a certain amount of pressure is lost, reducing the efficiency of the cylinder and its capacity to push and/or pull.

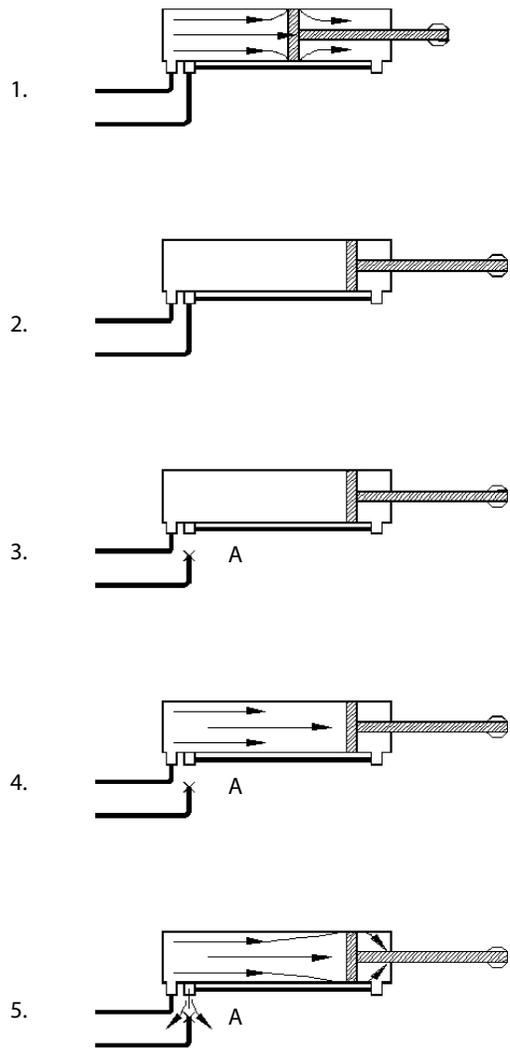
If the packer cylinders are bypassing, the seal inside the cylinder may need to be replaced.

To detect internal leaks in packer cylinders:

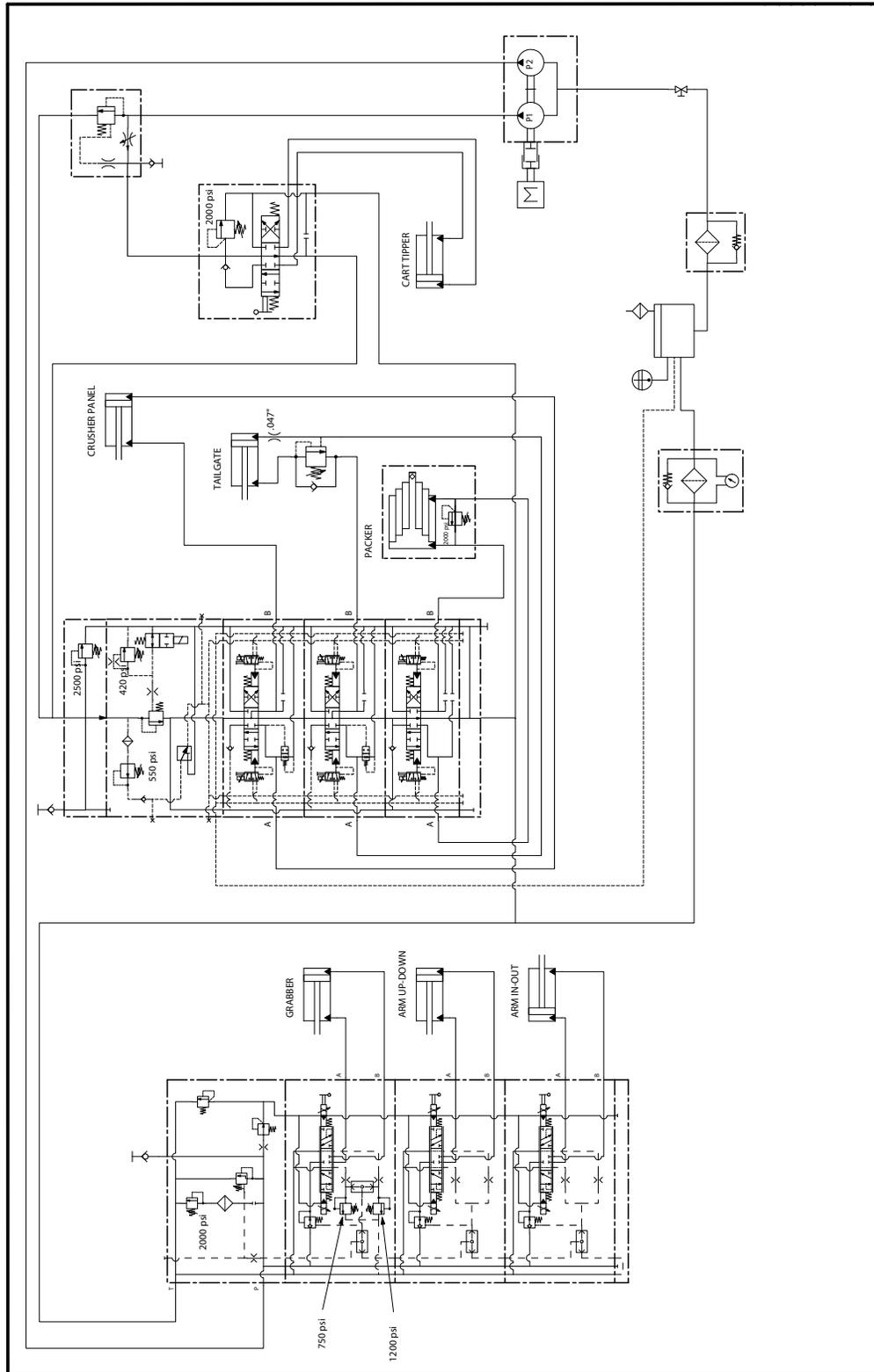
1. Apply all safety measures, and set the parking brake.
2. Pull on the red emergency STOP button.
3. Start the engine and engage the hydraulic pump.
4. Fully extend the packer cylinders and disengage the hydraulic pump.
5. Disconnect the packer extend proximity switch. This prevents the packer from returning to its initial position.
6. Disconnect hose “A” and install a plug at the end of it.
7. Engage the hydraulic pump.
8. Push the green button and see if oil is leaking from port “A”, then push the emergency STOP button.

If oil leaks out of port “A” when pressure is applied, there might be an internal leak; replace or repair the cylinder.

Figure 5-25 Detecting cylinder internal leaks



Main Hydraulic Schematic



6

Electrical System

The electrical system chapter is divided into two sections. The first section describes how the electrical components work and the second section describes how to adjust and repair the electrical components.

How the Electrical System Works

The electrical system includes:

- ◆ Control panel
- ◆ Electronic controller (multiplex system)
- ◆ Limit/proximity switches
- ◆ Harnesses

Electrical Schematics

Electrical schematics are included in the documentation provided with your MINIMAX™ unit. This documentation is found inside the cab.

Electrical schematics show how components are wired to each other. They are useful for troubleshooting and diagnosing electrical circuits.

Each MINIMAX™ unit has its own set of electrical schematics based on the options that are installed.

At the end of this chapter you will find a set of electrical schematics which are given as examples and may differ from the schematics found in the cab of your truck. For specific details pertaining to your truck, always refer to the schematics located in the cab.

Control Panel

The control panel is located in the center of the cab.



The control box is centrally mounted in the cab. It includes push buttons, toggle switches, warning lamps, and a screen. Some units also have auxiliary controls located on the curb side of the truck, under the seat.



The IFM multiplex electronic controller makes the truck more reliable by reducing the number of wires and components. Electrical maintenance is different from relay logic. The use of this electronic controller enables mechanics to perform troubleshooting, which facilitates the debugging process.

Labrie Enviroquip Group offers training on this technology. To know more about electronic controllers and training schedule, please call LabriePlus.



Proximity switches control the packer operation as well as tailgate alarms, and provide the means for safety lockouts.



Limit switches are used where there is "large" movement between components and the limited range of the proximity switch is not permitted.



Harnesses connect all electrical components. They are generic and therefore may contain wires and connectors that are not used. Make sure unused connectors are always protected by a cap in order to avoid electrical failure.

Adjusting and Repairing Electrical Components

The required electrical system adjustments include:

- ◆ Circuit breakers and fuses
- ◆ Packer extend limit switch
- ◆ Packer retract limit/proximity switch
- ◆ Tailgate unlocked proximity switch
- ◆ Tailgate fully open proximity switch
- ◆ Left-hand side hopper door limit switch
- ◆ Crusher panel up limit switch
- ◆ Fully open upper door limit switch
- ◆ Fully closed upper door limit switch
- ◆ Arm stowed limit switch
- ◆ Arm parked limit switch
- ◆ Mid-height limit switch

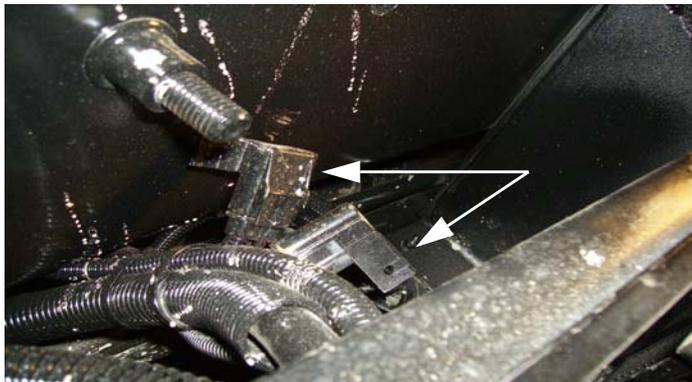
For information on limit and proximity switch adjustment, go to page 36 and the following.

Fuses and Circuit Breakers

Power for the electrical system is protected by two 35-A fuses (power and ground) and up to nine manual reset circuit breakers (depending on the options).

Fuses

The two 35-A fuses, located in the battery box, protect the main battery power supply.



Circuit breakers

There is a button on the circuit breaker of the relay box located inside the cab. Pushing this button resets the breakers.



Important Never hold down the reset button when the reset operation fails. This may result in severe electrical damage. Report this problem to your supervisor and maintenance department.

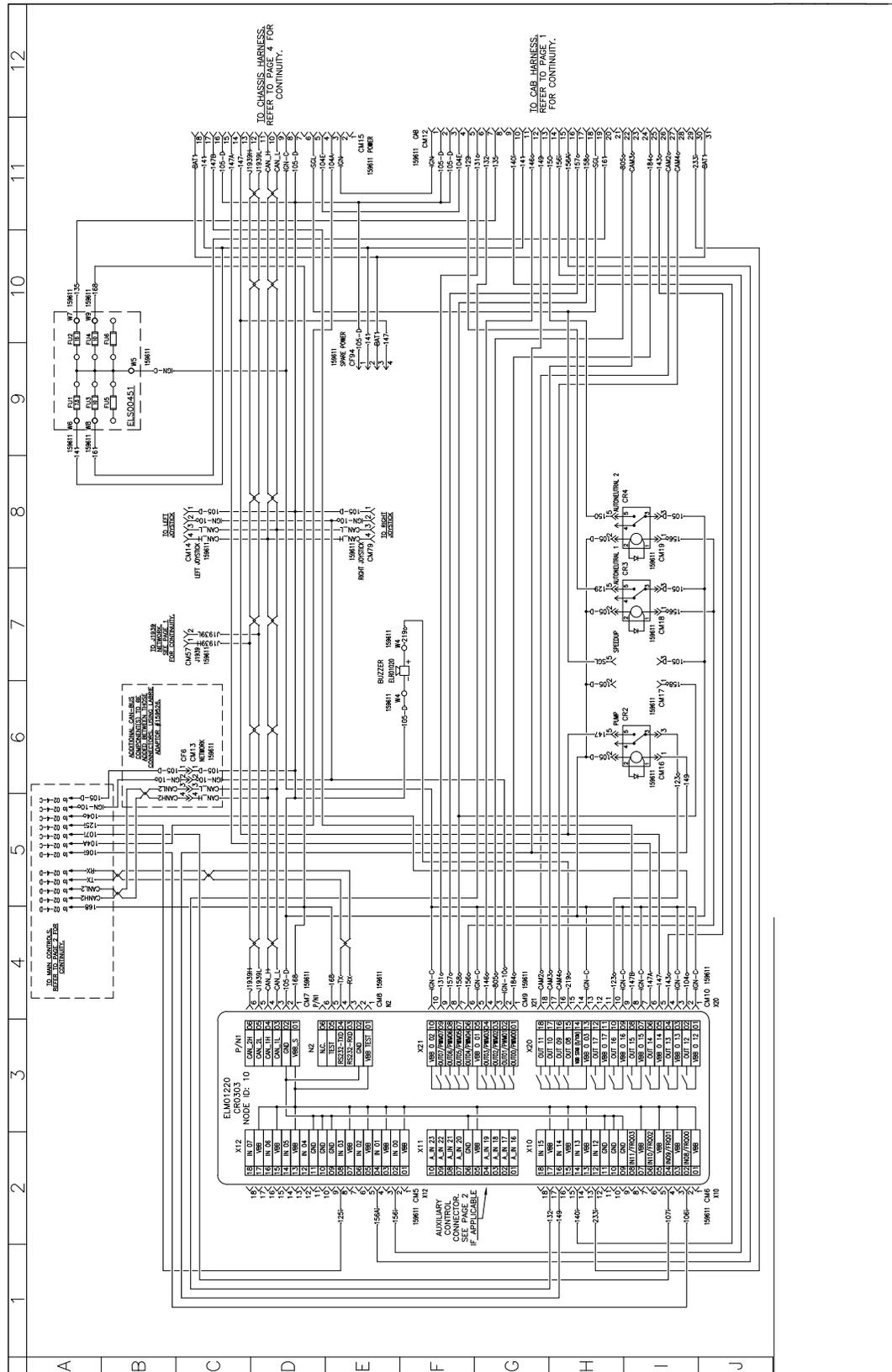


NOTE: Consult the OEM manual for information on equipment not manufactured by Labrie Enviroquip Group.

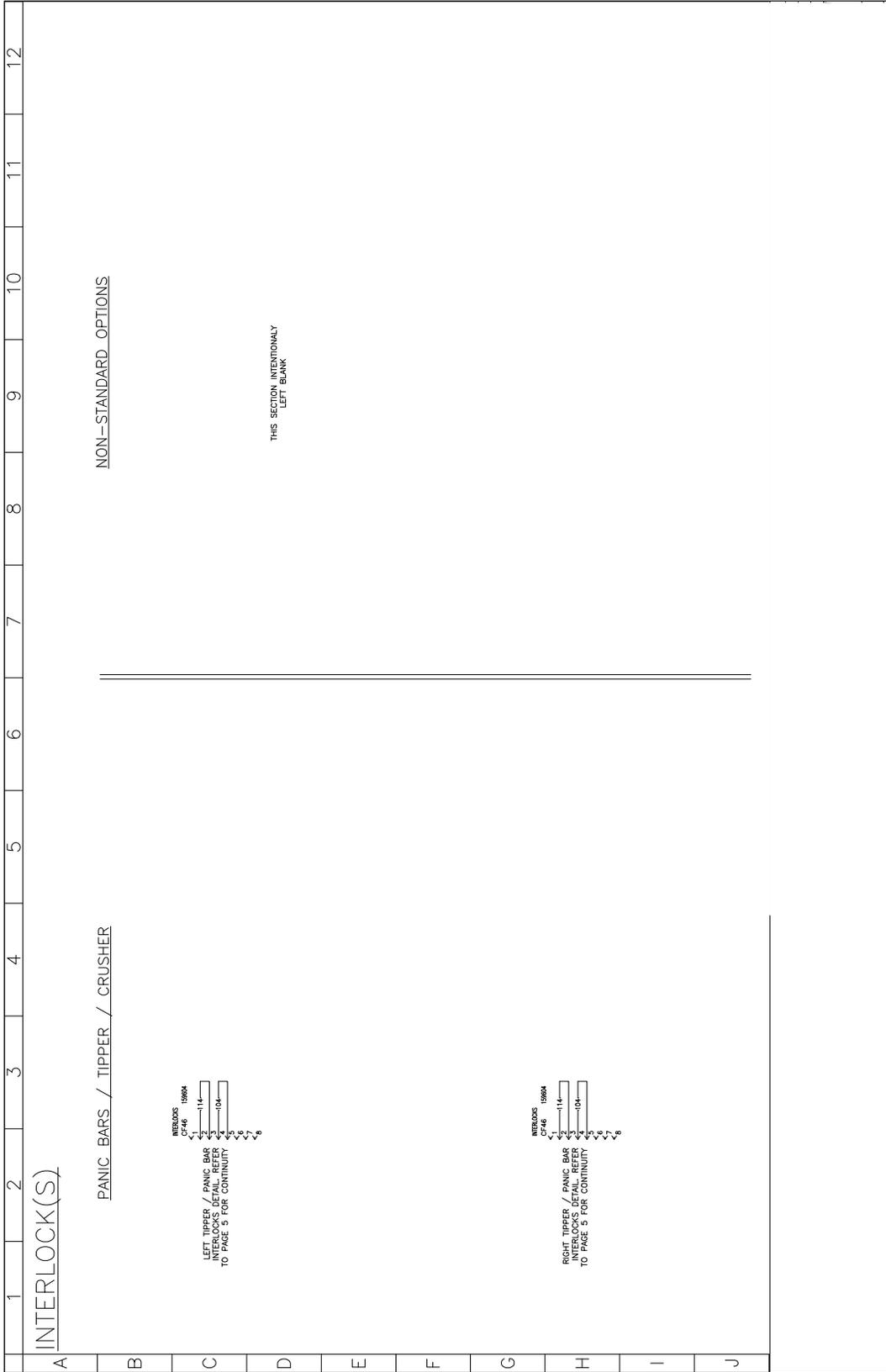
The following table provides a description of the circuit breakers located in the control box inside the truck cab.

Function	Ampere	Circuit Number
Monitor (W6)	7.5	141
Cab fan (W7)	15	135
Scale Air-Weigh System power & acc. (W8)	10	161
Electronic controller (W9)	10	168

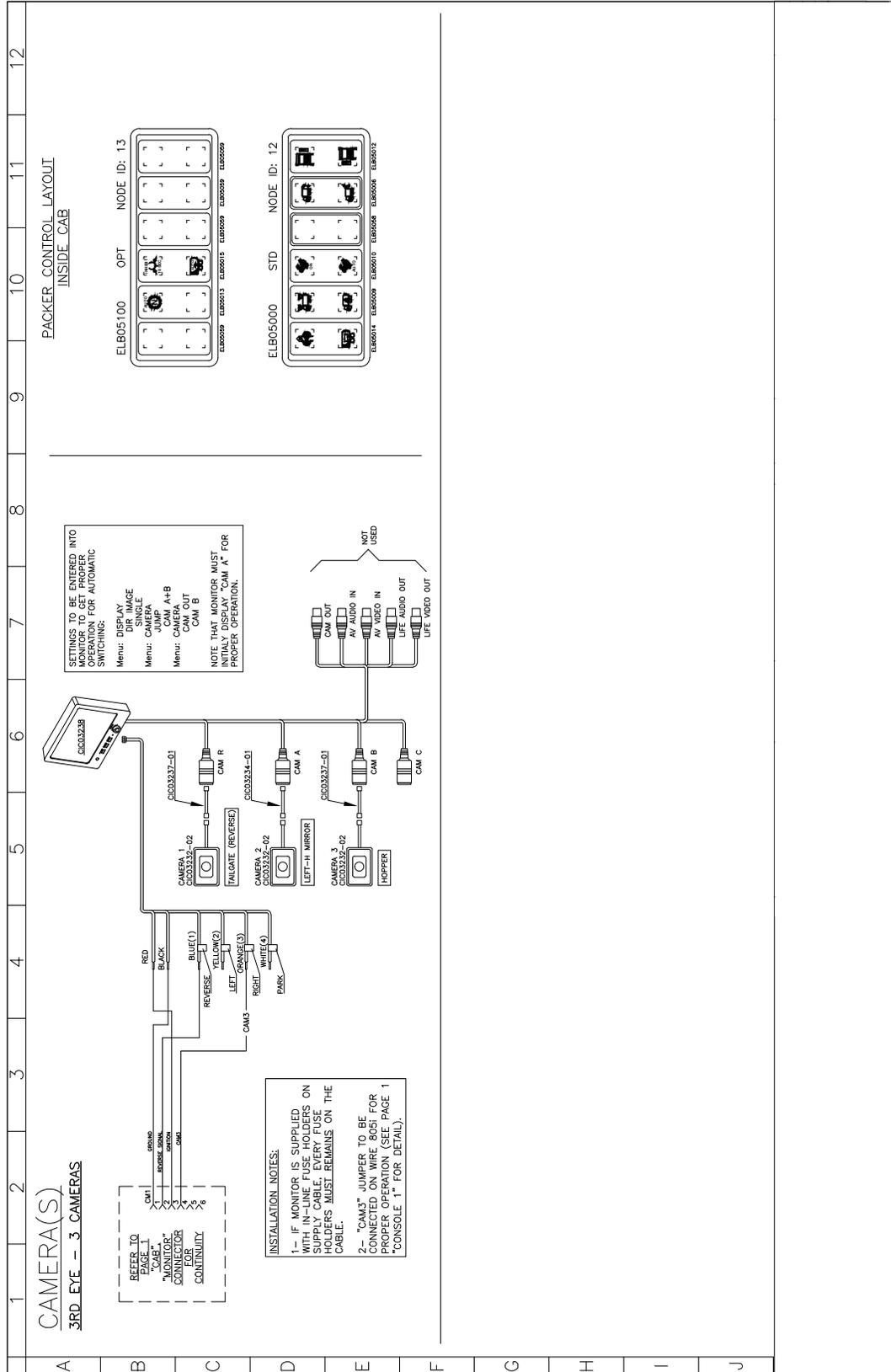
Cab Controller



Panic Bars, Crusher Panel, Tipper Interlocks



Cameras, Switchpack Details & Interlocks



7

Pneumatic System

The pneumatic system is crucial for efficient brake operation.

NOTE: Before searching for parts, identify the type of cab your unit is equipped with (cab over or conventional). The mounting of some components for the body depends on the type of cab configuration.

To avoid problems with the air system of your vehicle (especially in cold weather conditions), Labrie Enviroquip Group strongly recommends draining the MINIMAX™ air tanks at the end of every workday and prior to any maintenance.

Caution



The operator **must** wear safety glasses to protect his eyes against dust and suspended matters. The operator must also stay away from the stream to avoid potential injuries.

To drain the air tanks, apply the following procedure:

1. Locate the drain valves on air tanks (see Figure 7-1).

NOTE: Some trucks are equipped with more than one drain valve.

2. Open the valves by turning them one-quarter turn clockwise.

IMPORTANT: Before opening the valves, be sure to stay away from the stream.

3. Leave the valves open until moisture is removed.
4. When all moisture has been drawn out, close the valves by turning them one-quarter turn counter-clockwise.

Figure 7-1 Drain valves

IMPORTANT: Pay particular attention to the dryer cartridge. On this type of equipment, the compressor works all the time due to the frequent use of the brake system. As a result, a lot of moisture is injected into the air system. For more information, see *Air Dryer* below.

Air Dryer

Some units are equipped with an air dryer and/or alcohol evaporator.

These devices are used to reduce water in the air system, preventing corrosion or freezing of the air components in cold weather.

Maintenance on the air dryer and/or alcohol evaporator is covered by the chassis manufacturer's maintenance manual.

Figure 7-2 Air dryer

8

Troubleshooting

This chapter contains information to help you narrow down and/or solve problems that might occur with your MINIMAX™. Procedures throughout this chapter require that the people performing troubleshooting tasks have basic knowledge in electrical, hydraulic and pneumatic systems.

The employer shall ensure that maintenance personnel is properly trained prior to starting troubleshooting.

Before performing maintenance on a vehicle, make sure that all safety procedures are applied. The lockout/tagout procedure outlined on page 20 is mandatory.

See *Troubleshooting Guide* on page 120 to resolve commonly seen problems, or contact LabriePlus to talk to one of our product specialists.

IMPORTANT: Schematics provided in this manual are for reference only. Vehicle-specific schematics are provided in the vehicle's cab.

Tools

When trying to pinpoint the cause of a problem on a vehicle, you need certain tools to test components of electrical, hydraulic, and pneumatic systems. Below you will find a list of the minimal tool set required to perform troubleshooting procedures throughout this manual. Brand names are only suggested.

Figure 8-1 Digital Multimeter or VOM (Volt-Ohm-Milliammeter)



NOTE: The ammeter must support at least 10 amps.

Figure 8-2 Jumper wire with alligator clips

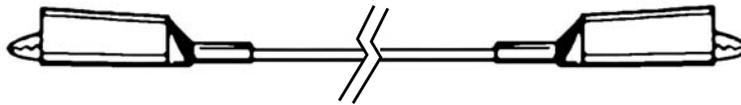


Figure 8-3 Two oil pressure gauges (0–4000 psi)

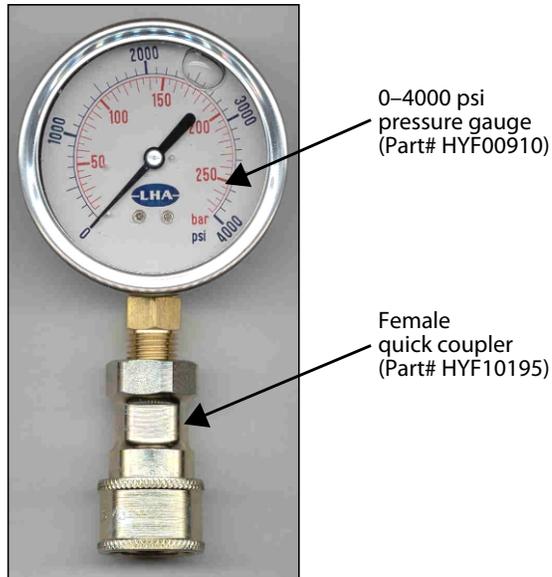


Figure 8-4 Ball-end hex wrench (metric and SAE)



Troubleshooting Guide

This troubleshooting guide will help identify the most commonly seen problems on the MINIMAX™. It will also provide the possible cause of the problem and give solutions to resolve it.

For further information regarding customized options that might not be found in this troubleshooting guide, contact LabriePlus.

Problem	Possible causes	Solution
Insufficient packing ratio	Low oil pressure	See <i>Adjusting Hydraulic Pressure</i> on page 83.
	Packer hydraulic cylinders internally bypassing	See <i>Detecting Cylinder Internal Leaks</i> on page 97.
	Defective pump	Replace the pump.
Overheating hydraulic oil (temperature above 77°C [180°F])	Low oil level in the hydraulic tank	Add oil to the required level. See <i>Inspecting Hydraulic Oil</i> on page 74.
	Hydraulic pressure too low or too high	See <i>Adjusting Hydraulic Pressure</i> on page 83.
	Not the proper grade of oil (that is too thin in hot temperatures or too thick in cold temperatures)	Change for oil indicated in <i>Recommended Lubricants</i> on page 57 (also see <i>Emptying the Hydraulic Tank</i> on page 90).
	Contaminated oil	Clean the strainer and change the return filter element. Fill with clean oil. See <i>Cleaning the Strainer</i> on page 92, <i>Replacing Filter Elements</i> on page 95, and <i>Inspecting Hydraulic Cylinders</i> on page 96.
	Restriction in the hydraulic system	Check all hydraulic components for debris that could cause restriction in the system. Have the pump inspected by a specialist.
Foaming oil	Low oil level	Add oil to the required level. See <i>Inspecting Hydraulic Oil</i> on page 74 (also see <i>Inspecting Hydraulic Cylinders</i> on page 96).
	Air entering the system	Tighten all hose and pipe connections between the pump and the hydraulic tank.

Problem	Possible causes	Solution
	Not the proper grade of oil	Empty oil and refill with anti-foaming oil. See <i>Recommended Lubricants</i> on page 57 and <i>Emptying the Hydraulic Tank</i> on page 90.
Cavitation, excessive noise or vibration of the pump.	Ball valve on suction line not fully open	Fully open the ball valve. See <i>Prior to Start Up</i> on page 19.
	Low oil level	Add oil to the required level. See <i>Inspecting Hydraulic Cylinders</i> on page 96.
	Oil too thick	See <i>Recommended Lubricants</i> on page 57 for proper type of oil to use. See also <i>Emptying the Hydraulic Tank</i> on page 90.
	Air in the system	See <i>Pump Cavitation</i> on page 124. Check all hose and pipe connections and tighten them if necessary.
	Particle contamination or dirty strainer	Clean the strainer and change the return filter. Fill with clean oil. See <i>Cleaning the Strainer</i> on page 92, <i>Replacing Filter Elements</i> on page 95, and <i>Inspecting Hydraulic Cylinders</i> on page 96. Take an oil sample for further analysis (see <i>Testing Hydraulic Oil</i> on page 58).
	Blocked suction hose	Unblock or replace hose.
The pump does not engage	Red emergency STOP button is engaged	Ensure that the red emergency STOP button on packer control station is pulled out.
	Engine speed higher than 900 rpm	Reduce engine speed below 900 rpm. If the speed cannot be reduced under 900 rpm, contact your local chassis dealer.
	Electrical failure	Check fuses inside the control panel and the main fuses inside battery box. See <i>Adjusting and Repairing Electrical Components</i> on page 103.
No hydraulic pressure	Pump not engaged	Turn on the pump switch.

Problem	Possible causes	Solution
	Hydraulic pressure not properly adjusted	Properly adjust pressure. See <i>Adjusting Hydraulic Pressure</i> on page 83.
	Faulty hydraulic line	Perform a circuit analysis using the main hydraulic schematics (see <i>Main Hydraulic Schematic</i> on page 99).
	Stuck hydraulic spool inside valve	Make sure that no spool inside the body control valve is stuck in a position that could redirect the hydraulic flow to the tank.
Pump is leaking oil	Loose connections	Tighten all connections to the pump.
	Pump is damaged	Have the pump repaired by an authorized service center.
Packer moves irregularly or sideways	Worn out packer wear plates	Replace wear plates as indicated in <i>Replacing Packer Wear Plates</i> on page 31.
Tailgate is unlocking or lowering by itself	Dirty or defective velocity fuse	Clean or replace the velocity fuse. See <i>Tailgate Locking Mechanism</i> on page 125.
	Inverted hydraulic hoses on main hydraulic valve	Test the power bleed on the tailgate section of the valve. See <i>Tailgate Locking Mechanism</i> on page 125.
Packer does not complete a full cycle	Body is full	Empty the body as explained in the MINIMAX™ Operator's manual.
	Garbage behind the packer	Clean behind the packer. Refer to the Daily Hopper Cleaning section of the MINIMAX™ Operator's manual.
	Misaligned packer proximity/limit switches, or presence of debris	Clean the area around proximity/limit switches, or readjust switches (see <i>Proximity and Limit Switches</i> on page 36).
Packer does not start at all when pressing the green button	PTO switch is off	Make sure the PTO switch is turned on.
	Red emergency STOP button is engaged	Make sure all red emergency STOP buttons are pulled out.

Problem	Possible causes	Solution
	Hydraulic pressure not properly adjusted	See <i>Adjusting Hydraulic Pressure</i> on page 83.
	LHS hopper door open	Close LHS hopper door.
Packer moves forward but stops at the end of stroke	Packer wear plates are worn out	Replace wear plates. See <i>Replacing Packer Wear Plates</i> on page 31
	Packer extend limit switch is misaligned	Adjust switch. See <i>Adjusting Packer Extend Limit/Proximity Switch</i> on page 38
Packer does not perform enough cycles	Multi-cycle module programming	Reprogram the module for higher number of cycles (see <i>Multicycle</i> on page 138).
Backup alarm and warning buzzer inside the cab sound all the time	Misaligned tailgate proximity switch	Adjust tailgate proximity switch (see <i>Adjusting Tailgate Unlocked Proximity Switch</i> on page 44).
	Faulty proximity switch	Check the proximity switch with a multimeter or VOM for proper operation (ON/OFF or click). Replace if necessary.
	Faulty harness	Check for continuity on the electrical harness that is connected to the proximity switch. Change the electrical harness if necessary.
Arm is too fast/too slow	Flow limiter adjustment on arm control valve	Recalibrate cylinder speed (see <i>Adjusting Arm Speed</i> on page 164).
Flashing lights on dashboard always blinking	Misaligned arm stowed limit switch	Align switch lever with gripper finger (see <i>Adjusting Arm Stowed Limit Switch</i> on page 50).
	Cut off or defective power cables	Perform a continuity test on the cable. Replace faulty cables if necessary.
	Faulty limit switch	Replace faulty limit switch.
Arm does not respond to joystick (assuming that PTO switch is engaged)	Cut off or defective power cables	Follow wires on the electrical schematic for 12-volt supply (move joystick to get signal).
	Faulty joystick	Contact LabriePlus.

Pump

The pump is operated by a control rocker switch located on the control panel. When the pump is engaged, the switch turns to green.

Three conditions must be met for the pump to engage and for the rocker switch to turn green:

- ◆ Engine speed must be lower than 900 rpm
- ◆ Emergency STOP button (red) pulled out

Engine speed is verified by the transmission ECU.

If the pump does not engage when the pump rocker switch is turned on, it may be related to a voltage supply problem in the pump circuitry.

There is a pump test that can help resolve pump-related problems. For more information on that or for advanced troubleshooting, please call *LabriePlus*.

Prior to conducting a pump test, ensure that all these conditions are met:

- ◆ Parking brake is applied
- ◆ Engine is running (at idle speed)
- ◆ Transmission is in “Neutral”
- ◆ Emergency STOP button(s) is pulled out
- ◆ Pump (PTO) switch is ON

NOTE: Neither the engine throttle nor the transmission not being in Neutral will affect pump operation once the pump is engaged.

Pump Cavitation

Cavitation is defined as the formation of air pockets in a moving fluid. Air in the hydraulic oil causes excessive wear and noise. Make sure to prime the pump properly after replacement or after flushing the hydraulic system (refer to “Priming a New Pump” on page 80). When the pump is properly primed, cavitation disappears after a short period of time because air is returning to the hydraulic tank.

If the pump is still generating unusual noise after performing the pump priming procedure, then you will have to bleed the hydraulic system.

To do so:

1. Apply all safety measures to ensure safety around the vehicle at all times.
2. Connect a 0–4000 psi gauge to the main valve to ensure that no pressure has built up in the system.
3. Apply the parking brake and start the engine.
4. Engage the hydraulic pump (PTO switch “ON”).
5. Place a pan or a bucket under the plug located on the output section of the main control valve and slowly loosen the plug.

A mixture of oil and air will come out. Keep bleeding the oil until the pump noise stops.

Figure 8-5 Plug to loosen



IMPORTANT: Do not activate any hydraulic function during system bleeding.

6. When the noise stops, tighten the pipe/hose fitting.
7. Cycle the packer to ensure there are no leaks and the pump is running smoothly.
8. Disconnect the gauge.

Tailgate Locking Mechanism

NOTE: Refer to the main hydraulic schematic.

The tailgate locking mechanism is equipped with hydraulic safety devices that prevent accidental unlocking of the tailgate during operation. One of these devices is the velocity fuse (see Figure 8-7) with the *power bleed* feature; the other is the holding valve (see Figure 8-6).

The spool inside the tailgate section of the valve is designed in such a way as to allow pressure to pass through it every time pressure is building up in the hydraulic system (that is when the packer is working). The pressure “burst” goes to the holding valve into port D1 and then out to the cylinder through port U1 (see Figure 8-6). This will keep the tailgate cylinders pressurized and the tailgate closed when packing refuse.

The velocity fuse, located on the right-hand side of the valve, will make sure to drain any slow moving oil coming from the piston side of the tailgate cylinders. Since the rod side is being pressurized with the “power bleed” system, the other side has to drain to avoid any pressure build-up. The velocity fuse makes the piston side open to tank when the oil is moving under 3 gallons per minute, and will shut close when a flow signal is sent.

Figure 8-6 Tailgate locking mechanism

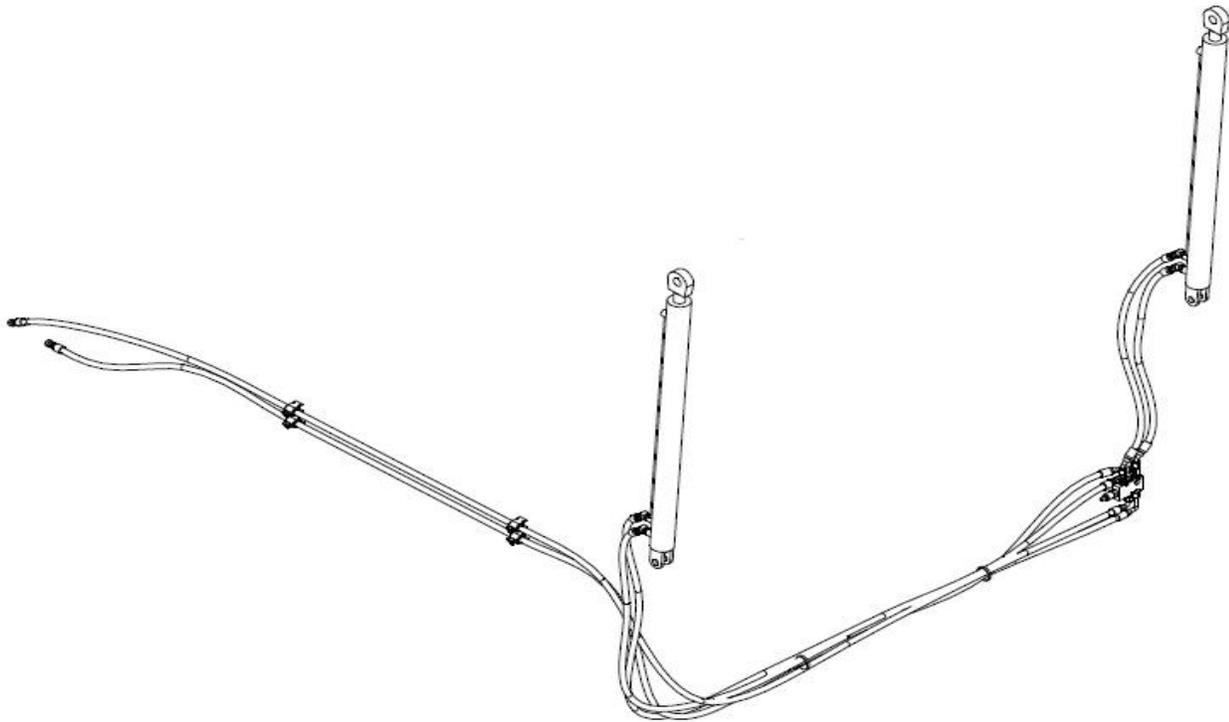
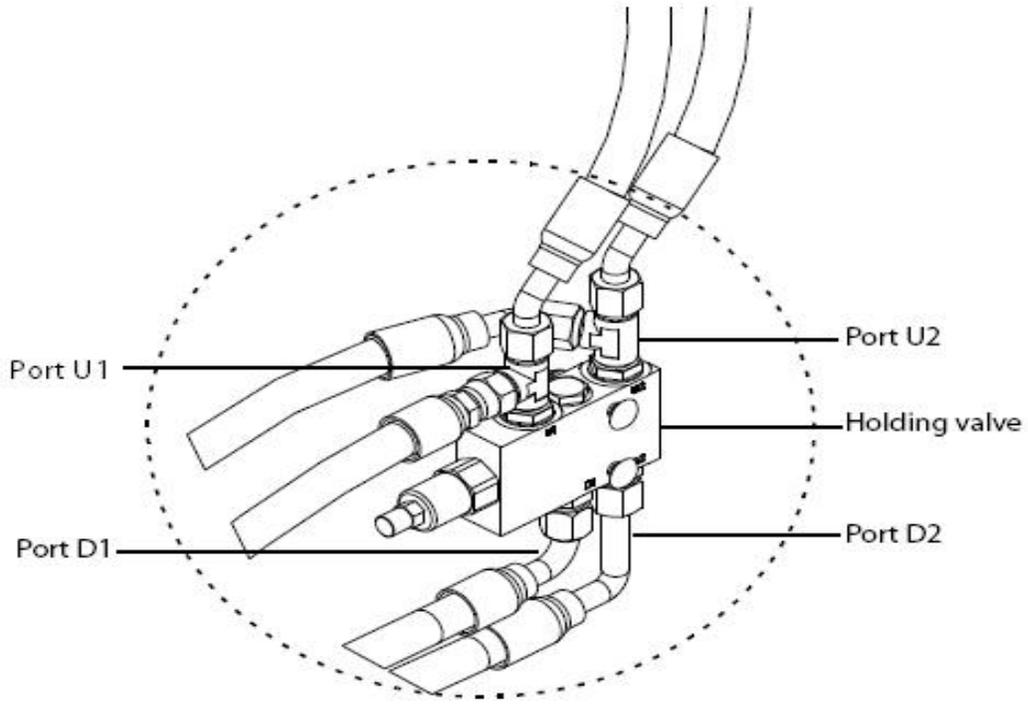


Figure 8-7 Velocity fuse



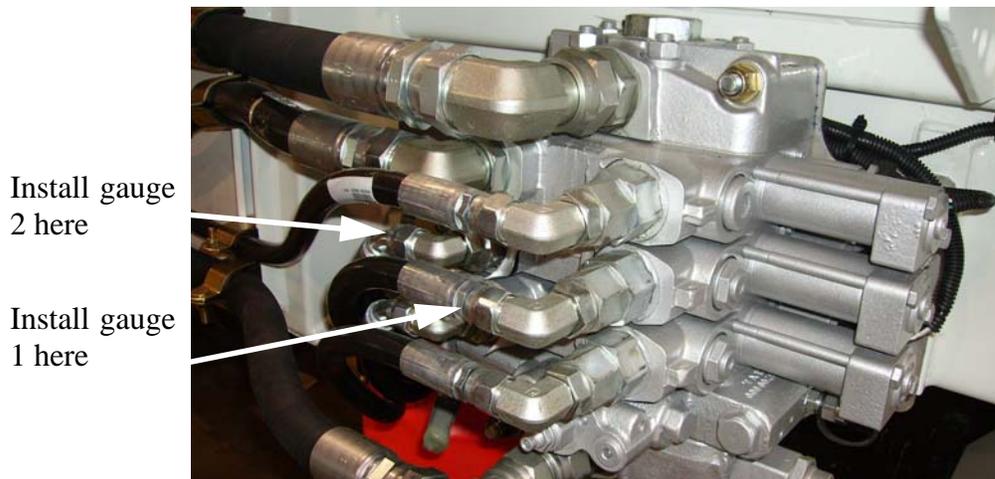
Tailgate Unlocking Spontaneously

If the tailgate seems to unlock by itself when using the packer, the “power bleed” inside the valve might not be working on the right side of the hydraulic cylinder.

To fix this problem:

1. Apply all safety measures to ensure safety around the vehicle at all times.
2. Ensure that the parking brake is applied.
3. Pull out the red emergency STOP button.
4. Disengage the hydraulic pump and turn off the engine.
5. Install a pressure gauge on each port of the tailgate section of the valve.
A T-connector is needed to connect the gauge to the port.

Figure 8-8 Gauges 1 and 2



6. Start the engine and engage the hydraulic pump.
7. Disconnect the packer retract limit switch.
8. Push the yellow button to move the packer and pressurize the system.

Gauge 1 (on the velocity fuse side) should always indicate 0 psi and gauge 2 should indicate a sudden burst of pressure (from 0 psi to 3000 psi) each time the packer reaches the end of a stroke. If gauge 1 indicates pressure, this may be caused by a faulty holding valve or velocity fuse or by some hydraulic hoses not properly connected. Refer to “Main Hydraulic Schematic” on page 99 for proper connection.

Tailgate Lowering Spontaneously

If the tailgate seems to lower by itself, a faulty velocity fuse might be involved.

To fix the problem:

1. Apply all safety measures to ensure safety around the vehicle at all times.
2. Ensure that the parking brake is applied.
3. Pull out the red emergency STOP button.
4. Disengage the hydraulic pump and turn off the engine.
5. Remove the velocity fuse.
6. Make sure that the velocity fuse is clean and that its plunger is moving freely. Replace if necessary.

9

Multiplexing

As Labrie Enviroquip Group vehicles become more and more efficient, they require more automation features and thus some programming. Currently, MINIMAX™ vehicles require programming of:

- ♦ Labrie's CAN bus-based multiplexed system
- ♦ the Allison transmission parameters, and
- ♦ the Cummins engine parameters

The following pages provide the necessary information for these tasks.

Labrie's Multiplexed System

Labrie has equipped your MINIMAX™ unit with a CAN bus-based multiplexed system, which integrates a display monitor, a rocker switch panel, a joystick, and three IFM electronic controllers. This whole system has been designed to help you operate your unit in an efficient and easy way. Labrie's multiplexed system is reliable and safe and it requires less wiring harnesses to operate. It can also monitor various function status of the body and display warning and caution messages.

Through its display monitor (see Figure 9-1), Labrie's multiplexed system informs you of the various functions being carried out or of any malfunctions. Various caution and warning messages can be displayed on the monitor, depending of the seriousness of the situation. Messages in yellow blocks indicate that caution should be used; messages in red blocks indicate a warning situation that must be dealt quickly.

Figure 9-1 Display monitor



Each time the operator turns the ignition key on, a complete bit test of the multiplexed system is conducted. This test takes about 10 seconds to complete.

NOTE: A flashing green light on the monitor indicates that the display power is on. This light should be blinking steadily at 2 Hz during normal operation. If it blinks at a faster rate, it is a sign of a problem with the monitor. A flashing red light on the monitor is also a sign of a problem. Call *LabriePlus* for support.

The logo of Labrie Enviroquip Group appears momentarily on the display monitor at the start of the system (see Figure 9-2).

Figure 9-2 Labrie logo on the display monitor



NOTE: If the Welcome Screen with the Labrie logo stays continually displayed, there may be a communication problem between the monitor and the master control module. Refer this problem to the maintenance personnel.

NOTE: The display monitor works even if the engine is not started. It only needs electricity to function. However, if you start the engine, the monitor will reboot to reflect the changes caused by the starting of the truck.

Cart Counter (optional)

The next page that comes up after the Welcome Screen is the Cart Counter Page (see Figure 9-3). On this page you will see the number of carts that have been emptied so far. If your vehicle is equipped with two arms, the number of carts emptied is shown for each of these arms (right and left counters).

Figure 9-3 Cart counter



Press the far right button to reset the counter display to zero.

Warning and Caution Messages

On the display monitor, messages in yellow blocks indicate that caution should be used and messages in red blocks indicate a warning situation that must be dealt quickly.

Figure 9-4 Warning and caution messages on monitor



See Table 1 for a list of warning and caution messages. Please note that this list is not exhaustive.

Table 1 Warning messages

Warning and Caution Messages	Solution
Arm Up:Chute Bad Position	Set Chute to Correct Position
Arm Up:Crusher Not Raised	Raise Crusher Panel
Arm:Auxiliary Deadman ON	Release Auxiliary Deadman
Arm:Body Raised	Lower Body

Table 1 Warning messages (cont'd)

Warning and Caution Messages	Solution
Arm:Hopper Door Not Close	Close Hopper Door
Arm:Pump Not Started	Engage Pump
Arm:Tailgate Unlocked	Lock Tailgate
AutoDump:Cab EStop	Pull Out Cab EStop Button
AutoDump:Pump Not Started	Engage Pump
Body:Pump Not Started	Engage Pump
Buzzer:Arm Not Stow	Retract Arm to Stowed Position
Buzzer:Body Raised	Lower Body
Buzzer:TailGate Unlocked	Lock Tailgate
Chute:Arm Too High	Lower Arm
Chute:Crusher Not Up	Raise Crusher Panel
Chute:Pump Not Started	Engage Pump
Crusher:Arm Too High	Lower Arm
Crusher:Chute Bad Position	Set Chute to Correct Position
Crusher:Hopper Door Not Closed	Close Hopper Door
Crusher:Packer Not Retracted	Retract Packer
Crusher:Pump Not Started	Engage Pump
ESTOP:Aux Cab EStop	Pull Out Aux Cab EStop Button
ESTOP:Cab EStop	Pull Out Cab EStop Button
FullEject:Cab EStop	Pull Out Cab EStop Button
FullEject:Pump Not Started	Engage Pump
Gripper Open:Arm Too High	Lower Arm
High Hydraulic Oil Temp.	Turn Off Engine and Refer to your Maintenance Personnel
Low Hydraulic Oil	Add Hydraulic Oil
Miss 1 Scan with Master	Refer to Maintenance Personnel or <i>LabriePlus</i>

Table 1 Warning messages (cont'd)

Warning and Caution Messages	Solution
Packer Extend:Air Weigh Signal	Unload Body
Packer:Already Extended	Refer to Maintenance Personnel or LabriePlus
Packer:Already Retracted	Refer to Maintenance Personnel or LabriePlus
Packer:Pump Not Started	Engage Pump
Packer:Tailgate Not Open	Open Tailgate
Pump Not Started:Aux Cab Estop	Pull Out Aux Cab EStop Button
Pump Not Started:Cab EStop	Pull Out Cab EStop Button
Pump Not Started:Hopper Door Not Closed	Close Hopper Door
Pump Not Started:Main Air Pressure	Let the Air Build Up to Required Pressure
Pump Not Started:RPM to High	Lower Engine Speed Below 900 RPM
Pump:Aux. AutoDump Switch ON	Release Aux. AutoDump Switch prior to Engaging Pump
Pump:Aux. ChuteToLeft Switch ON	Release Aux. ChuteToLeft Switch prior to Engaging Pump
Pump:Aux. ChuteToRight Switch ON	Release Aux. ChuteToRight Switch prior to Engaging Pump
Pump:Aux. CloseGripper Switch ON	Release Aux. CloseGripper Switch prior to Engaging Pump
Pump:Aux. Deadman Switch ON	Release Aux. Deadman Switch prior to Engaging Pump
Pump:Aux. OpenGripper Switch ON	Release Aux. OpenGripper Switch prior to Engaging Pump
Pump:BodyLower Switch ON	Release BodyLower Switch prior to Engaging Pump
Pump:BodyRaise Switch ON	Release BodyRaiseSwitch prior to Engaging Pump

Table 1 Warning messages (cont'd)

Warning and Caution Messages	Solution
Pump:CrusherDown Switch ON	Release CrusherDown Switch prior to Engaging Pump
Pump:CrusherUp Switch ON	Release CrusherUp Switch prior to Engaging Pump
Pump:Hopper Door Not Close	Close Open Door
Pump:J1 AutoDump Switch ON	Release J1 AutoDump Switch prior to Engaging Pump
Pump:J1 ChuteToLeft Switch ON	Release J1 ChuteToLeft Switch prior to Engaging Pump
Pump:J1 ChuteToRight Switch ON	Release J1 ChuteToRight Switch prior to Engaging Pump
Pump:J1 CloseGripper Switch ON	Release J1 CloseGripper Switch prior to Engaging Pump
Pump:J1 Deadman Switch ON	Release J1 Deadman Switch prior to Engaging Pump
Pump:J1 OpenGripper Switch ON	Release J1 OpenGripper Switch prior to Engaging Pump
Pump:J2 AutoDump Switch ON	Release J2 AutoDump Switch prior to Engaging Pump
Pump:J2 ChuteToLeft Switch ON	Release J2 ChuteToLeft Switch prior to Engaging Pump
Pump:J2 ChuteToRight Switch ON	Release J2 ChuteToRight Switch prior to Engaging Pump
Pump:J2 CloseGripper Switch ON	Release J2 CloseGripper Switch prior to Engaging Pump
Pump:J2 Deadman Switch ON	Release J2 Deadman Switch prior to Engaging Pump
Pump:J2 OpenGripper Switch ON	Release J2 OpenGripper Switch prior to Engaging Pump
Pump:Packer Extend Switch ON	Release Packer Extend Switch prior to Engaging Pump
Pump:Packer Retract Switch ON	Release Packer Retract Switch prior to Engaging Pump

Table 1 Warning messages (cont'd)

Warning and Caution Messages	Solution
Pump:PTO or Trans. Not OK	Refer to Maintenance Personnel or LabriePlus
Pump:RPM Too High	Lower Engine Speed Below 900 RPM
Pump:TailgateDown Switch ON	Release TailgateDown Switch prior to Engaging Pump
Pump:TailgateUp Switch ON	Release TailgateUp Switch prior to Engaging Pump
Raise Body:Arm Not Stow	Retract Arm to Stowed Position
Raise Body:Truck Moving	Bring Truck to a Standstill
Service Oil Filter #1	Replace Oil Filter #1
Service Oil Filter #2	Replace Oil Filter #2
TailGate Up:Truck Moving	Bring Truck to a Standstill
TailGate:Packer Not Retracted	Retract Packer
TailGate:Pump Not Started	Engage Pump
Wrong Driver Position	Change Driver Position Switch to Correct Position

Table 2 Error messages

Error Messages	Solution
Button Pack 12 is disconnected	Refer to Maintenance Personnel or LabriePlus
Button Pack 13 is disconnected	Refer to Maintenance Personnel or LabriePlus
Button Pack 14 is disconnected	Refer to Maintenance Personnel or LabriePlus
Button Pack 15 is disconnected	Refer to Maintenance Personnel or LabriePlus
CAN Error Level 1	Refer to LabriePlus
CAN Error Level 2	Refer to LabriePlus

Table 2 Error messages (cont'd)

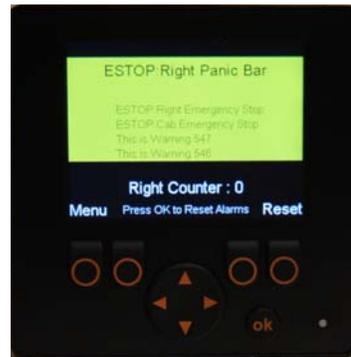
Error Messages	Solution
CAN Error Level 3	Refer to <i>LabriePlus</i>
Comm. Lost with Master	Refer to Maintenance Personnel or <i>LabriePlus</i>
Module 11 is disconnected	Refer to Maintenance Personnel or <i>LabriePlus</i>
Module 11 not Connected	Refer to Maintenance Personnel or <i>LabriePlus</i>
Module 20 is disconnected	Refer to Maintenance Personnel or <i>LabriePlus</i>
Module 20 not Connected	Refer to Maintenance Personnel or <i>LabriePlus</i>
Module 30 is disconnected	Refer to Maintenance Personnel or <i>LabriePlus</i>
Module 30 not Connected	Refer to Maintenance Personnel or <i>LabriePlus</i>
Module 50 is disconnected	Refer to Maintenance Personnel or <i>LabriePlus</i>
Module 50 not Connected	Refer to Maintenance Personnel or <i>LabriePlus</i>
Module 60 is disconnected	Refer to Maintenance Personnel or <i>LabriePlus</i>
Module 60 not Connected	Refer to Maintenance Personnel or <i>LabriePlus</i>

Should the system issue a warning or a caution message, it will appear on the same page as the cart counter.

For example, if the following caution message “Pump Not Started: Main Air Pressure” is issued by the system, it will appear on the Cart Counter page of the display monitor. An action that could be taken by the operator, when faced with such a situation, would be to wait until the required main air pressure level is reached.

For a specific problem or condition that requires special attention, the multiplexed system can alert the operator to a possible cause, which appears in bold and in large print on the monitor screen (active cause). The operator should check if the problem stems from the highlighted or active cause. One possible cause is highlighted at a time. What is shown in light and small print in the lower part of the screen are causes that have already been dealt with (see Figure 9-5).

Figure 9-5 Example of a possible cause



NOTE: If the system detects a problem, a beep will sound and a message will appear on the display monitor.

Hydraulic Oil Temperature Indicator (optional)

This optional indicator, when provided, shows you the current hydraulic oil temperature. This indicator is found on the upper right-hand side corner of the screen.

Time and Date Indicator

A time and date indicator may be found on the upper left-hand side corner of the screen. The availability of this indicator is based on the chassis on which the body is mounted. If the chassis provides real-time clock information through J1939 bus, time and date will appear on the screen. To set the Time and Date indicator, go to the main menu and choose Time Adjust.

Main Menu

To access the main menu, press the far left button when the Cart Counter page is displayed.

When the Main Menu is displayed, you can have access to the following sections:

- ◆ Multicycle
- ◆ I/O Status
- ◆ Program Version
- ◆ Optional Item
- ◆ Time Adjust (available according to chassis)

Displayed in the lower center of the screen is an indicator that monitors traffic on the network. This indicator is called Network Load, and it shows values that reflect such traffic.

NOTE: The higher the network load value is, the heavier the traffic is on the network. Also, the lower the network load value is, the less the traffic is on the network.

To exit this page and return to the Cart Counter page, press “Esc”. To choose a section from the main menu, highlight the desired section using the up/down arrows and press the “OK” button.

Multicycle

On the multiplexed system display monitor (see Figure 9-1), select MAIN MENU by pressing the corresponding button at the bottom left corner of the display monitor. From the displayed menu, choose the option SELECT THE NUMBER OF CYCLES. If need be, use the arrow to choose that option and press OK. The multi-cycle settings can be changed from two to eight cycles. Choose the desired number of cycles and press OK. It could not be easier!

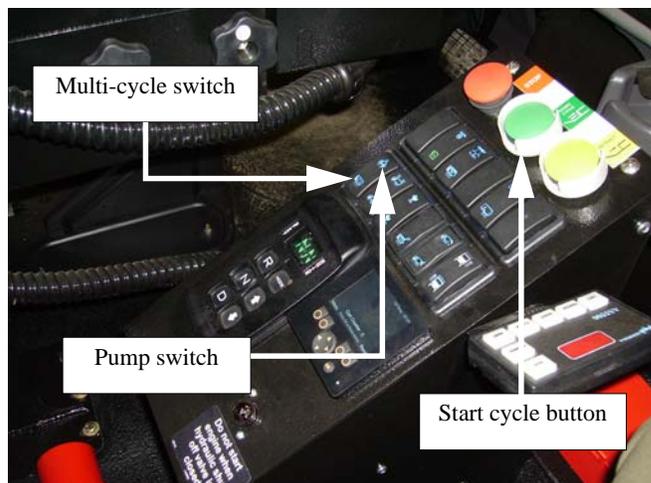
Figure 9-6 Display monitor



NOTE: The packer multi-cycle function has been preset at the factory to carry out three cycles.

When the MULTI-CYCLE switch on the multiplexed switch panel is on and the packer is activated, the packer will move according to the default number of cycles (that is 3) or to the number of cycles you chose (up to 8 cycles).

Figure 9-7 Multiplexed switch panel



To test the new multi-cycle settings:

1. On the multiplexed switch panel press the MULTI-CYCLE switch and the green START CYCLE button (see Figure 9-7).

Caution Make sure the ball valve on the suction line is fully open before starting the vehicle.



2. Once the packer has completed its cycles and come to a stop, switch off the hydraulic pump and turn off the engine (see Figure 9-7).

The number of cycles needs to be adjusted depending on the type of collection route used by the vehicle. For example, in a residential area, if the houses are numerous and close one to another, it may be required to increase the number of cycles. This will allow the hopper to be clear for the next house pickup.

Each time the packer completes a full cycle, the limit switch located on the right-hand side hopper front wall, just behind the cab (see Figure 9-8), sends a signal to the IFM electronic controller. The controller then counts the amount of cycles that the packer does. The IFM controller will stop the packer after the preset amount of cycles has been reached.

Danger! Never enter the hopper while the packer is moving.



Figure 9-8 Fully retract limit switch



I/O Status

In this section, you will find helpful information to troubleshoot body-related problems that you may face during your day-to-day tasks. These problems can be of any nature, from hydraulic to mechanical, electrical or pneumatic.

Select the control module corresponding to the part of the truck that needs to be checked.

For example, if you want to check all functions that are found in the cab, choose module #10. For all functions that pertain to the chassis, choose module #20, etc.

To choose a particular module, use the up/down arrows to select it and press “OK”.

NOTE: Pressing “OK” can be done two ways: either press the far right button or the “OK” button.

Press “Esc” to return to the preceding page.

Figure 9-9 Module I/O Status page



Input Status

The Input Status page is accessible from the Module I/O Status page. After selecting the desired module and pressing “OK”, the Input Status page of the selected module is displayed (see Figure 9-10).

Figure 9-10 Input Status page



The Input Status page contains a set of rectangles. Each of these rectangles represents input elements, which in turn correspond to a particular function of the truck. For example, if you select rectangle I00, a short description appears in the lower part of the screen, which indicates that this rectangle relates to the input element coming from the service brake pressure switch.

NOTE: Each rectangle is numbered and relates to a specified function of the truck. However, for a given number, the related function may vary from truck to truck.

Table 3 Colored rectangles

Rectangles (inputs)	Function Status
Blue	Inactive
Green	Active

Press “Esc” to return to the preceding page.

Press the “Output” button to display the Output Status page.

Output Status

The Output Status page is accessible from the Input Status page (see Figure 9-11).

Figure 9-11 Output Status page



The rectangles found in this page are used to check the status of different outputs.

NOTE: Each rectangle is numbered and relates to a specified function of the truck. However, for a given number, the related function may vary from truck to truck.

Table 4 Colored rectangles

Rectangles (outputs)	Function Status
Blue	Inactive
Green	Active
Red	Closed short-circuit
Yellow	Open circuit

Press “Esc” to return to the preceding page.

Press the “Force” button to display the Force page.

Force

The Force page is accessible from the Output Status page. Just press the corresponding button to access the Force page.

But before the Force page is displayed, a warning message appears on the screen (see Figure 9-12).

Figure 9-12 Warning message



This message stays there for 15 seconds. Then an “OK” prompt appears on the lower right-end corner of the screen.

Figure 9-13 Warning message w/ "OK" prompt



Press "OK" to go to the Force page or "Esc" to return to the preceding page.
After pressing "OK", the Force page appears on the screen.

Figure 9-14 Force page (input)



As no input function can be forced to be active or inactive, the operator must press the "Output" button to go to the following page (see Figure 9-15).

Figure 9-15 Force page (output)



The Force page allows the operator to force a function to be overridden, that is, to make an inactive function active and an active function inactive.

This page contains a set of rectangles. Each of these rectangles is numbered and corresponds to a specific function of the truck.

Colors are used to indicate whether the corresponding function is active or not:

- ◆ a blue rectangle means the corresponding function is inactive
- ◆ a green rectangle means the corresponding function is active

Also:

- ◆ a red rectangle means there is a closed short-circuit
- ◆ a yellow rectangle means there is an open circuit

A white-bordered rectangle means that this rectangle is selected. Use the directional arrows to select a specific rectangle or function. When a rectangle is selected, a short description of the corresponding function appears in the lower part of the screen.

After selecting a rectangle:

- ◆ press “ON” to activate the corresponding function (rectangle turns blue to green)
- ◆ press “OFF” to deactivate the corresponding function (rectangle turns green to blue)
- ◆ press “RESET” to have the software control the status of the corresponding function

NOTE: To go from a module to another (e.g. from module 10 to 20), the operator has to go back to the Module I/O Status page (see Figure 9-9) and select module 20.

Press “Esc” to return to the preceding page.

Joystick

The joystick page is accessible from the Module I/O Status page (see Figure 9-9). From that page select “Joystick” using up/down arrows and press “OK”. The Joystick page opens (see Figure 9-16).

Figure 9-16 Joystick page



The Joystick page allows the operator to check if all functions of the joystick are working correctly. If one joystick is installed on your vehicle, it will be represented on the display monitor by joystick 127. However, if two joysticks are installed on your vehicle, any of the two joystick numbers (127 and 72) can represent either joystick on the screen.

If you press a joystick button, the corresponding button on the display monitor will turn to green. If nothing happens, there might be a communication problem between the joystick and the master control module. Refer to maintenance personnel or LabriePlus.

Also, if you move the joystick backwards, forwards or sideways, you should see the values under the illustration changing. If no change occurs when moving the joystick, a communication problem between the joystick and the master control module may be the cause. Refer to maintenance personnel or LabriePlus.

Press “Esc” to return to the preceding page.

J1939

The J1939 page is useful when you need some specific information (e.g. current gear, road speed, brake).

Figure 9-17 J1939 page



Your vehicle is equipped with 2 different CAN-based communication buses:

- ◆ the **J1939 bus**, which is used for the chassis equipment; and
- ◆ the **CANopen bus**, which is used for the body.

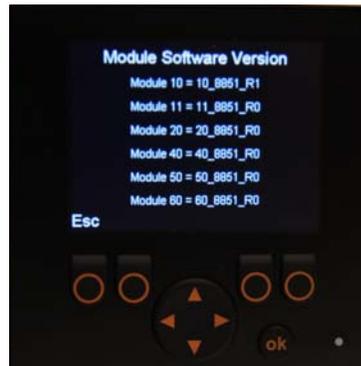
These 2 communication buses are completely independent of one another, except for some specific data that are transferred from the chassis J1939 bus to Labrie’s multiplexed system in order to be used by this system. These specific data are the following:

- ◆ selected gear
- ◆ current gear
- ◆ road speed
- ◆ engine RPM
- ◆ brake
- ◆ parking brake

Press “Esc” to return to the preceding page.

Module Software Version

In this section, you will find the software version currently used by each of the modules installed on the truck and by the master control module.

Figure 9-18 Program Version page

Press “Esc” to return to the preceding page.

Optional Item

This section contains an optional hour meter that tracks pump usage for maintenance purposes.

Press “Esc” to return to the preceding page.

Time Adjust

This section allows you to set the Time and Date indicator.

Press “Esc” to return to the preceding page.

Operational diagram of the Multiplexed System

Labrie Enviroquip Group has elaborated a document that illustrates the way the multiplexed system works. Particularly, it visually shows how this system reacts to different situations and how it manages the various lockouts that are on the MINIMAX™. It also makes reading and understanding related ladder logic diagrams much easier. The following are the first two pages of this document. If you are interested in receiving the entire document, call LabriePlus (see *To Contact Labrie Plus* on page 2).



Electrical System - Diagram of operation - Automizer

Purpose: This document is intended to provide a visual way to quickly understand the electrical operation of the truck, and more specifically, the different interlocks and operation conditions. It should help answering questions such as :

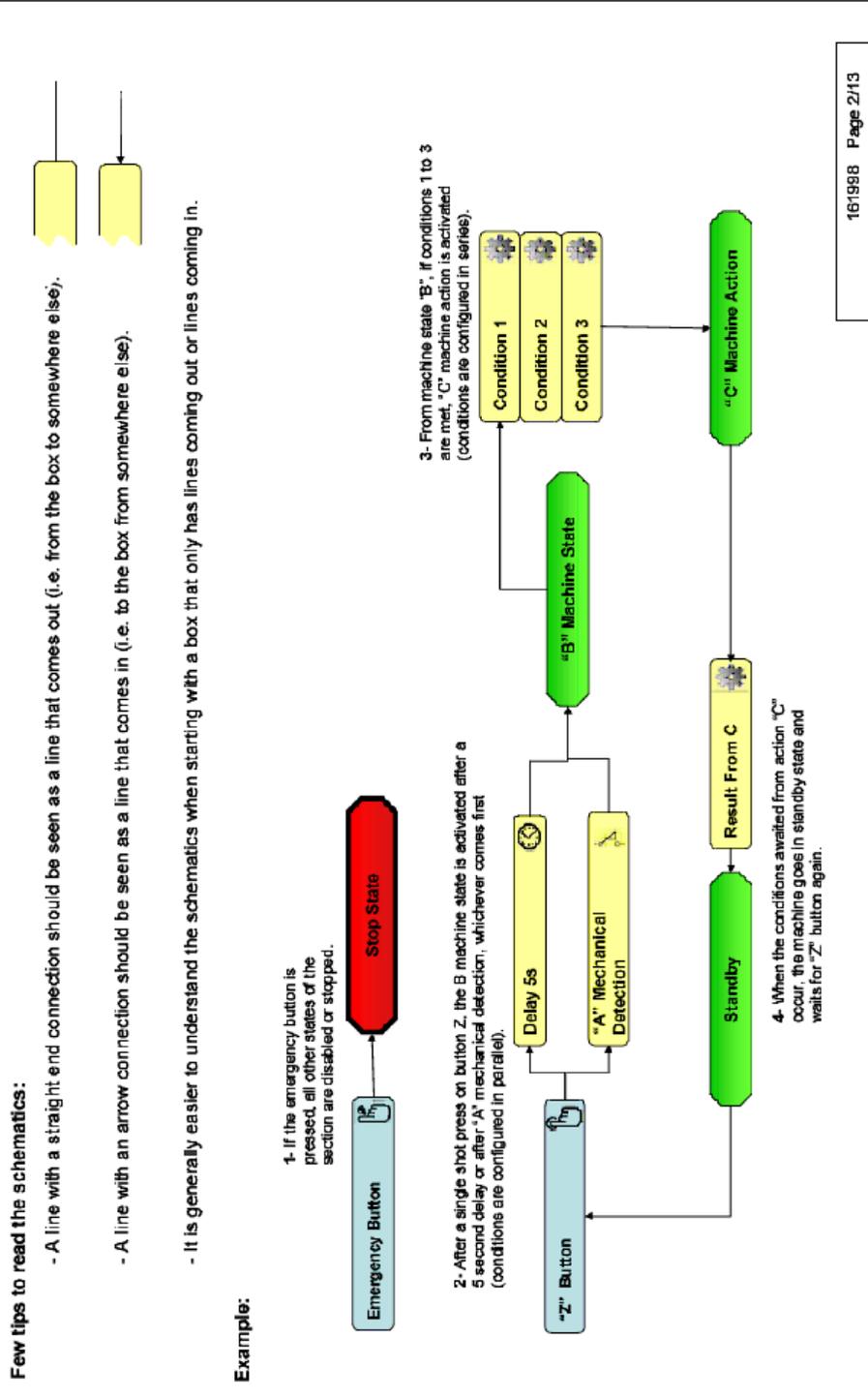
- Which conditions can disable or enable a certain functionality?
- How does the system react when the operator pushes a specific button?
- How does the system react when a certain interlock occurs?

If more details are needed, please refer to the electrical wiring schematic and/or the ladder diagram.

Legend:

	Normal machine state OR machine action
	Priority State <small>Otherwise specified, when a priority machine state is enabled, all other machine states or machine actions are disabled. Typically corresponds to a stop or an emergency mode.</small>
	Machine Condition (counters, virtual variables, RPM, etc.)
	Truck options
	Position detection (limit switch, proximity sensor)
	Delay
	Momentarily Button <small>Single shot action on a button</small>
	Continuous Button <small>Continuous action on a button</small>
	Toggle Button <small>Pressed once: turns ON, pressed again: turns OFF (otherwise specified, it is OFF on electrical power up)</small>
	Selector <small>Physically keeps the selected position</small>

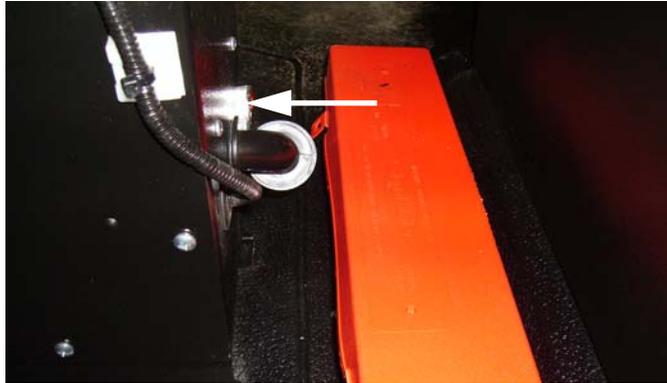
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Warning Buzzer

On the rear side of the control panel there is a warning buzzer (see Figure 9-19). This buzzer sounds and a red light flashes to warn the operator of any situation that might be hazardous. When this happens, the operator can look at the display monitor for more information on the situation. A caution or warning message will be displayed. The buzzer also sounds when the truck is in reverse or when the tailgate is being raised.

Figure 9-19 Buzzer with red light



Plugging a Computer

The rocker switch panel has a computer plug on it that can be used to connect a computer for reprogramming purposes (see Figure 9-20). In order to connect a computer to this plug, special hardware and software are required (included in a service kit). For more information on this, contact the Labrie*Plus* Service Department. In advanced troubleshooting process, a modem may be connected to this plug to help Labrie's technicians to pinpoint the cause of problems with body functions.

Figure 9-20 Computer plug



Replacing the CAN Bus-Based Multiplexed System Joystick

Should the CAN bus-based multiplexed system joystick need to be replaced for any reason, it will have to be replaced with a new joystick with the same part number in order to insure continued proper operation of the multiplexed system. Do not use other kind of joysticks even if they bear similarities to the CAN bus-based joystick. For more information on CAN bus-based joystick replacement, contact LabriePlus.

Figure 9-21 CAN bus-based multiplexed system joystick



NOTE: The PTO can only be turned on when the engine speed is lower than 900 rpm and the air pressure higher than 90 psi. It is recommended to raise the engine speed only after the hydraulic system is engaged.

Labrie's multiplexed system monitors all safety and operating functions to insure they work at their best. This system transfers data to and from Allison transmission ECU and Cummins engine ECM. In order for this to be possible, proper parameters must be put into these ECU and ECM. In the next section you will find tables that contain such parameters.

Allison Transmission Parameters

In Allison transmissions used on automated vehicles, the electronic control unit (ECU) manages several functions:

- ◆ It prevents the pump from overspeeding (2,000 rpm, maximum).
- ◆ It prevents the pump from engaging if the engine speed is higher than 900 rpm.
- ◆ It shuts off the arm joystick if the vehicle is moving faster than 2 mph (3.2 km/h).
- ◆ It also controls the auto-neutral system (if present).

The ECU is programmed using the Allison Doc software installed on a laptop computer. Allison Doc is also necessary to verify if signals are properly reaching the ECU, and to verify the fault code.

Figure 9-22 Allison Doc software



If your vehicle ECU needs repair or replacement, or if it needs specific programming parameters, see *Programmed Parameters* below.

Programmed Parameters

Programming in the transmission ECU module affects engine speed, PTO engagement and operation, as well as the (optional) auto-neutral system. If the ECU module is replaced, it must be reprogrammed to reset the vehicle operating parameters. Refer to Table 5 to reprogram the transmission ECU.

On chassis supplied by Labrie, the programming package for Allison transmissions is package n° 142. Some customer chassis may have different programming packages. Refer to your local Allison dealer for original programming packages. For further information regarding ECU programming, contact *LabriePlus*.

This page and the next page show how Allison electronic transmission ECUs are programmed for Labrie vehicles.

NOTE: The parameters shown in the following tables are typical values and are given for guidance only. Some vehicles may need different parameters based on the options installed. Please call *LabriePlus* for the values that are specific to your vehicle.

Table 5 Allison transmission programmed parameters

Parameters	r.p.m.
Maximum engine speed for PTO engagement	900
Maximum engine speed for PTO operation	2,000
Maximum output speed for PTO engagement	5,000
Maximum output speed for PTO operation	930 ^a (15 mph)

Table 5 Allison transmission programmed parameters (cont'd)

Parameters	r.p.m.
Maximum output speed for auto-neutral (if present)	500 (7 mph)
Output speed indicator A to turn on	160 (2 mph)
Output speed indicator A to turn off	110 (1.2 mph)

a. The value is adjusted so it corresponds with the vehicle speed in mph. It may vary according to the differential gear ratio and tire size.

Table 6 Allison wires to be enabled

Wires	Wire # (WTEC IV)
Pack enable	117
Input PTO enable	143
Output PTO enable	130
Output neutral indicator – PTO	145
Auto-neutral pack enable (if present)	142
Output speed indicator A	105

To tap into the TCM, Labrie uses the following wires on the Allison connector:

Table 7 Input

Wire #	Description	State
117	Pump pack enable	Active when the brakes are used, and when the PTO and auto-neutral switches are on (ground signal).
143	PTO enable	Active when the PTO switch is on (+12-V signal).
142	Auto-neutral pack input	Active when the brakes are used, and when the PTO and auto-neutral switches are on (ground signal).

Table 8 Output

Wire #	Description	State
130	PTO enable output	Active when the PTO switch is on and when all engine and vehicle speed criteria are respected (+12-V signal). See <i>Programmed Parameters</i> on page 151.
145	Neutral signal output	Active when the transmission is in neutral. This signal (ground signal) is used to allow the fast idle engagement. For more details, refer to the electrical schematic provided with the vehicle.
105	Output speed indicator A	Activates when the vehicle reaches about 3 mph; deactivates when the vehicle slows to about under 2 mph.

Engine Programming Parameters

Engine programming parameters are specific to each vehicle model. To know which parameters apply to your vehicle, call *LabriePlus*.

10

Lifting Arm

To keep the arm in good working order and to reduce the amount of down time and risk of accidents, a preventive maintenance program must be implemented and followed thoroughly.

Maintenance personnel must be familiar with operation of the arm, the safety around it and the maintenance procedures described in this chapter.

Daily Inspection

Danger!



Always lock out and tag out the vehicle when inspecting or performing maintenance on it (see *Locking Out and Tagging Out the Vehicle* on page 20).

On a daily basis, perform a visual inspection of the arm, looking for leaks, cracks or premature wear of the moving parts. For detailed information on greasing points, see *Lubrication* on page 57.

To perform the daily inspection:

1. Start the engine and engage the hydraulic pump (PTO ON).
 2. Fully extend the arm.
-

Danger!



Do not stand directly in the path of the arm while performing the inspection.

3. Turn off the hydraulic pump and the engine.
4. Perform a visual inspection of the following items:

Figure 10-1 Mounting bolts

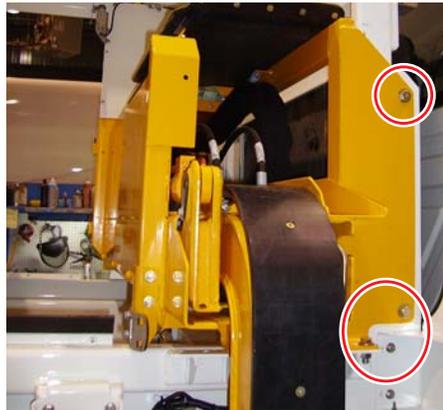


Figure 10-2 Helping Hand™ gripper

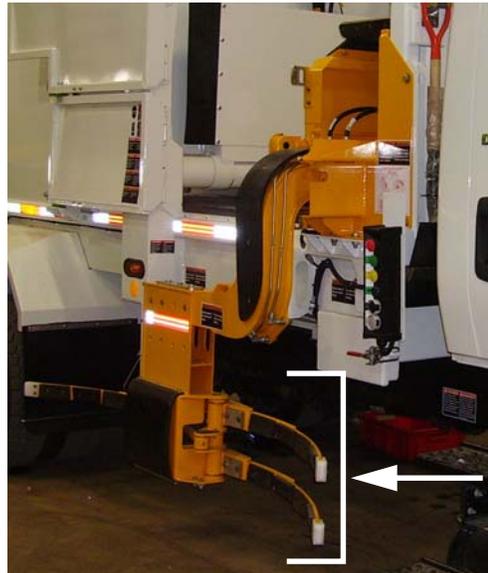
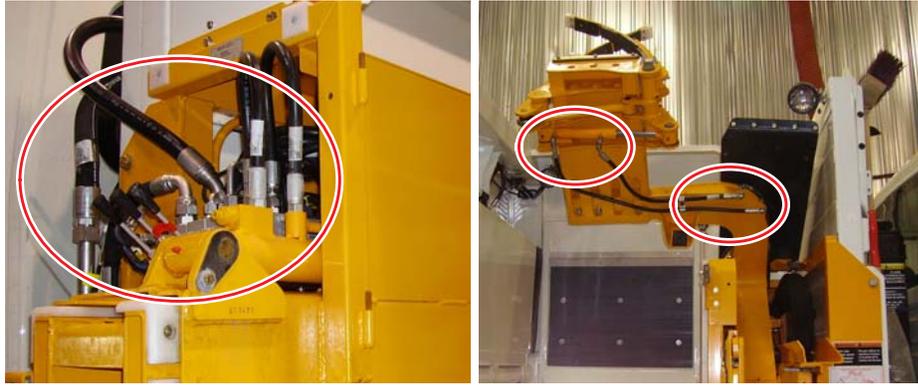


Figure 10-3 Hoses



Figure 10-4 Connections

5. Check for loose nuts and bolts.

Figure 10-5 Bolts

6. Check arm stowed limit switch.
For more information, see *Adjusting Arm Stowed Limit Switch* on page 50.
7. Lubricate moving parts as per the arm lubrication chart on page 64.
8. Lock out and tag out the vehicle (see *Locking Out and Tagging Out the Vehicle* on page 20).

Gripper Auto-Closing System

Lifting arms are equipped with a system that automatically closes the gripper if the operator forgot to close it. It does so at a preset height, preventing collision between the gripper and the hopper wall or the vehicle.

Also, if the vehicle is parked for a long period of time with the gripper inside the hopper, the gripper cylinder may leak pressure, causing the gripper to open by itself. As soon as the hydraulic system is brought online (pump switch on), the system closes the gripper automatically before the operator can move the arm.

For this to work, the system acts as though the operator would push the CLOSE GRIPPER button on the joystick.

The “auto-closing system” is activated by a limit switch, which is located at the base of the Helping Hand™ arm. When the gripper reaches a certain height, a signal is sent to the on/off valve coil to close the gripper.

Figure 10-6 Auto-closing limit switch



Figure 10-7 Gripper closed (left) and open (right)



Inspecting the Auto-Closing System

Danger!



Always lock out and tag out the vehicle when inspecting or performing maintenance on it (see *Locking Out and Tagging Out the Vehicle* on page 20).

To inspect the system:

1. Make sure that the vehicle is parked on safe and level ground.
2. Secure the area around the path of the arm with barrier tape or barricades.
3. Start the engine and engage the hydraulic pump.
4. Lower and fully open the gripper.

Danger!



Do not stand directly in the path of the arm while carrying out these adjustments.

5. Close the gripper a few inches (to release the limit switch) and lift the gripper to see if it closes automatically.

Auto-Packing

The auto-packing control switch (see Figure 3.11 in the Operator Manual) enables the packer to automatically start cycling about four seconds after the gripper is closed. This gives the arm enough time to reach the hopper and dump the cart before the packer starts to pack.

When the auto-packing feature is used simultaneously with the multi-cycle system, the packer will perform the preset number of cycles (default setting is 3) and then will stop until the operator closes the gripper again. When he does, the multi-cycle function is reset and another set of cycles begins.

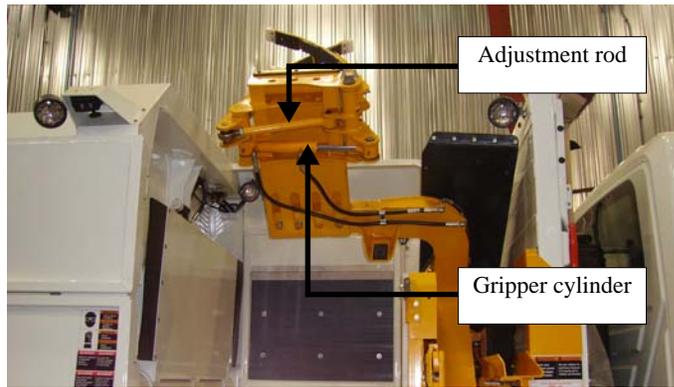
If the gripper closes in the middle of a packer cycle, the packer will interrupt its current cycle, return to its fully retracted position, and restart the next cycle. When a cycle is interrupted and the packer has returned to its home position, there is no delay before the packer restarts the next cycle. The four-second reset will apply only when the packer has completed all its cycles (two to eight) and when it has returned to its fully retracted position.

Interrupting a cycle prevents carts from emptying directly over the packer. Piled material over the packer could reduce its efficiency.

A blue lighted switch means that the corresponding feature is disabled.

A green lighted switch means that the corresponding feature is enabled.

NOTE: The gripper does not need any adjustment. An adjustment rod installed on the back side of the gripper allows both gripper blades to move symmetrically (see Figure 10-8).

Figure 10-8 Gripper cylinder and adjustment rod

Adjusting Adjustment Rod

Both blades of the gripper should move symmetrically in order for the gripper to close equally. A system of cylinder and adjustment rod (see Figure 10-8) allows for the proper operation of the gripper. The cylinder is used to control one side of the gripper while the adjustment rod is used to control the other side. Since the cylinder and the adjustment rod have the same length, both sides of the gripper should move symmetrically. While the gripper cylinder does not need to be adjusted, the adjustment rod may need some adjustment.

NOTE: The adjustment rod has been pre-adjusted at the factory.

To adjust the adjustment rod:

1. Apply all safety measures to ensure safety around the vehicle at all times and make sure to have enough room to fully operate the arm and gripper.
2. Make sure that the parking brake is applied.
3. Slide out the arm about half way (gripper in the lower position and blades fully open).
4. Remove the pin from the left-hand side end of the adjustment rod (see Figure 10-9).
5. Move the adjustment rod towards you.
6. Loosen the locknut.
7. Turn the swivel eye clockwise or counterclockwise to adjust rod length.
8. When the correct length is achieved, tighten the locknut.
9. Replace the adjustment rod into position.
10. Put back the pin.
11. Test the operation.

Repeat the procedure if required.

Figure 10-9 Adjusting adjustment rod



Bleeding Air Out of the Lifting Arm Hydraulic Circuit

After opening the Helping Hand™ hydraulic circuit to replace (for example) a hydraulic cylinder or a valve, air might enter into the hoses located between the arm control valve and the arm cylinder. As the air cannot be completely removed by the normal use of the arm, the system must be bled.

The Helping Hand™ is composed of three hydraulic subcircuits, two of which must be bled individually depending on the modifications done. Those subcircuits are the following:

Gripper hydraulic circuit

This subcircuit, which includes one cylinder (bore 1 1/2 in., stroke between 5 and 7 in.) and a valve, controls the open/close motion of the gripper in order to grip containers.

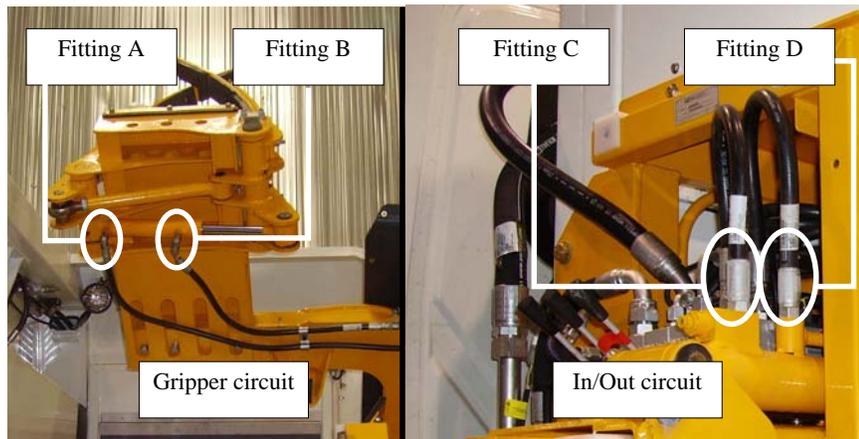
In/Out hydraulic circuit

This subcircuit, which includes one cylinder (bore 1 1/2 in., stroke 54 in.) and a valve, controls the extend/retract motion of the arm in order to reach containers and come back close to the truck for travelling.

NOTE: The Up/Down hydraulic circuit needs not to be bled because air that may be inside the circuit can easily be removed by the normal use of the arm.

To bleed the gripper circuit:

1. Apply all safety measures to ensure safety around the vehicle at all times and make sure to have enough room to fully operate the arm and gripper.
2. Make sure that the parking brake is applied.
3. Slide out the arm about half way (gripper in the lower position and blades fully open).

Figure 10-10 Fittings to loosen

4. Using the lever on the arm control valve, fully extend the gripper cylinder in order to close the blades.
5. Loosen (*do not disconnect*) the piston side cylinder fitting and let the air out of the circuit (see Figure 10-10, Fitting A).
6. As soon as a constant and uniform oil flow (without the appearance of air bubbles) is leaking out, tighten the fitting. Keep the hydraulic function engaged until the fitting is tightened.
7. Loosen (*do not disconnect*) the rod side cylinder fitting and let the air out of the circuit.
8. Fully retract the gripper cylinder in order to open the blades (see Figure 10-10, Fitting B).
9. Repeat step number 6.

To bleed the In/Out circuit:

1. Repeat steps 1 through 3 of the gripper circuit bleeding procedure on page 161.
2. Using the lever on the arm control valve, fully extend the rail cylinder of the arm.
3. Loosen (*do not disconnect*) the piston side cylinder fitting and let the air out of the circuit (see Figure 10-10, Fitting C).
4. As soon as a constant and uniform oil flow (without the appearance of air bubbles) is leaking out, tighten the fitting. Keep the hydraulic function engaged until the fitting is tightened.
5. Loosen (*do not disconnect*) the rod side cylinder fitting and let the air out of the circuit (see Figure 10-10, Fitting D).
6. Fully retract the rail cylinder of the arm.
7. Repeat step number 4.

Cylinder Cushion Adjustment

The In/Out and Up/Down cylinders are cushioned at the end of their strokes to give a smoother movement. The cushioning speed is adjustable directly on the cylinders using two cushion screws. If the grabber or the arm hits hard at the end of its strokes, apply the following procedure.

To adjust the end cushioning of the In/Out cylinder:

1. Secure the arm working area using barrier tape or barricades.
2. Put the transmission in neutral.
3. Start the engine and engage the hydraulic pump.

4. Fully extend and retract the Helping Hand™ to check if more cushioning is needed.

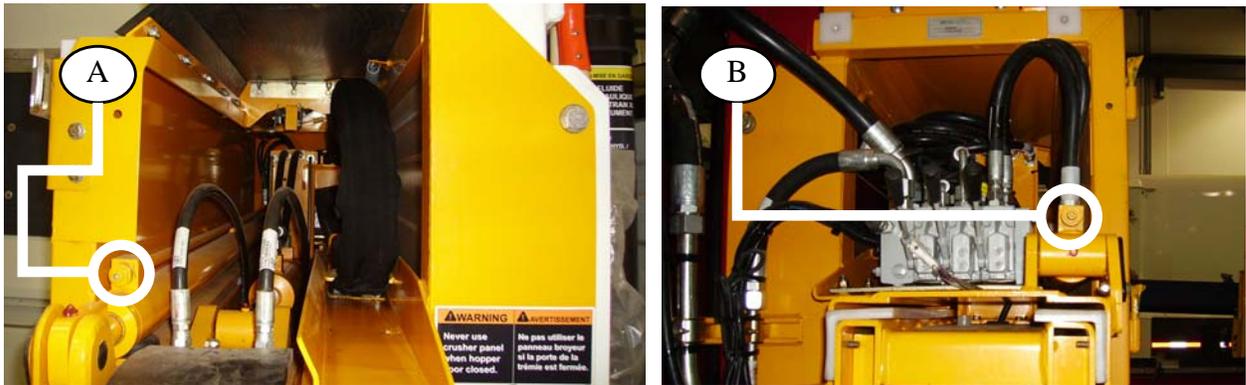
The arm should not hit hard at the end of its strokes. End of stroke cushioning should provide smooth operation of the arm.

5. If cushion adjustment is necessary, stop the hydraulic pump and turn off the engine.

6. Tighten the corresponding adjustment screw to achieve a smoother movement at the end of the stroke or loosen the screw if the movement is too slow (no shock should occur).

Use the adjustment screw on the curb side for the end-of-stroke extension motion (See A in Figure 10-11); use the adjustment screw on the street side for the end-of-stroke retraction motion (See B in Figure 10-11).

Figure 10-11 Cushion adjustment screws - In/Out cylinder (curb side: A; street side: B)



To adjust the end cushioning of the Up/Down cylinder:

1. Secure the arm working area using barrier tape or barricades.
2. Put the transmission in neutral.
3. Start the engine and engage the hydraulic pump.

4. Fully raise and lower the Helping Hand™ to check if more cushioning is needed.

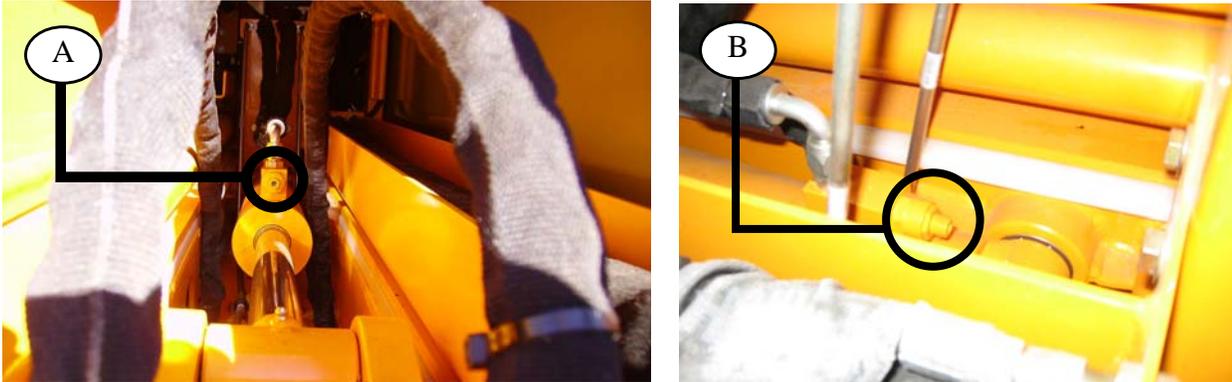
The arm should not hit hard at the end of its strokes. End of stroke cushioning should provide smooth operation of the arm.

5. If cushion adjustment is necessary, stop the hydraulic pump and turn off the engine.

6. Tighten the corresponding adjustment screw to achieve a smoother movement at the end of the stroke or loosen the screw if the movement is too slow (no shock should occur).

Use the adjustment screw on the curb side for the end-of-stroke lowering motion (See A in Figure 10-12); use the adjustment screw on the street side for the end-of-stroke raising motion (See B in Figure 10-12).

Figure 10-12 Cushion adjustment screws - Up/Down cylinder (curb side: A; street side: B)

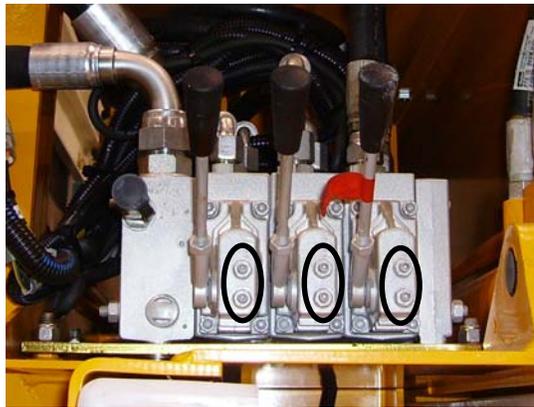


Adjusting Arm Speed

NOTE: No arm speed adjustment is required unless replacing the valve or one of its sections.

Arm speed is controlled by the amount of hydraulic fluid (flow) that is being sent to the arm cylinder. The arm control valve spools can limit the flow of hydraulic oil, depending on the section of the valve¹. Flow is limited by two movement restrictors located on each section.

Figure 10-13 Movement restrictors



The arm movements, extension/retraction and tilt, are preset in factory to the maximum speed. The gripper speed (opening and closing) has also been set in factory to its optimal value in order to allow smoother grabbing of the cart.

1. Limiting spool strokes limits the quantity of oil (flow) going through them. Controlling the flow of oil means controlling arm speed.

Danger! Do not stand in the path of the arm while carrying out these adjustments.



To adjust arm speed:

1. Lock out and tag out the vehicle (see *Locking Out and Tagging Out the Vehicle* on page 20).
2. Secure the area around the path of the arm with barrier tape or barricades.
3. Put the transmission in Neutral.
4. Start the engine and engage the hydraulic system.
5. Clearly identify the stopper screw on the valve that corresponds to the proper function (arm extension/retraction, gripper open/close).
6. Move the lever to evaluate arm speed, then release the lever.

Make sure the Speed-Up feature is activated. Engine speed should be at 1200 rpm.

Caution! When adjusting tilt movement speed, make sure the auto-closing feature allows the gripper to close sufficiently to avoid gripper fingers hitting the hopper walls.



7. Loosen the locknut.
8. Turn the restrictor adjustment screw only one eighth (1/8th) of a turn at a time to see a significant change in the arm speed.
9. Move the lever again to evaluate arm speed. Repeat until cycle times are properly set (see table below).
10. Tighten back the locknut.

Table 1 Arm Operating Pressure and Cycle Times (engine speed at 1200 rpm)

Arm function	Pressure setting (psi)	Cycle time (sec.)
Arm extend/retract	2000	10.5
Arm up	2000	6
Arm down	2000	6
Gripper close	1200	2
Gripper open	750	less than 2

labrie *plus*

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