MINIMAX™

MAINTENANCE MANUAL

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MINIMAX™

MAINTENANCE MANUAL

Part # 207968 (rev.02.01.2021)

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January 2021

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It should say: _____

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THANKS FOR YOUR HELP!

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Part # 207968 (rev.02.01.2021)

1

Introduction

About This Manual

This manual contains information regarding the correct maintenance of your MINIMAX™ side loader. Maintenance personnel should read and understand this information before doing repairs and maintenance on the vehicle. For information on how to safely and efficiently operate the MINIMAX™, please refer to the related *Operator's Manual* that is provided with your unit.

Topics Not Included in This Manual

Maintenance of the chassis

This is dealt with 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 *MINIMAX™ Operator's Manual*. (A copy of this manual is provided with the truck.)

Parts and assemblies

For parts and assemblies that make up the MINIMAX™, and for their respective part number for ordering purposes, please refer to the *MINIMAX™ Parts Manual*.

About the Illustrations in this Manual

Because Labrie Enviroquip Group is constantly updating its products, illustrations used in this manual may differ from those of the actual product and accessories, depending on the model or options that come with your vehicle.

Schematics

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

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

As for pneumatic and hydraulic schematics for your MINIMAX™ unit, copies are available from Labrie*Plus* Service Department.

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

Warranty Registration Form

Do not forget to complete the owner registration form and to send it to Labrie Enviroquip Group. Make sure to fill out the in-service date. This date will be used as the start date of the warranty period. If the in-service date is not indicated, the warranty period will start 30 days after the delivery date.

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 the side of the vehicle with no "swing out" movement.

The MINIMAX™ is equipped with an 18-inch packer which pushes refuse that has been dumped in the hopper into the waste body. The packer is also used to unload the body through the tailgate opening. This feature is called the "Auto-Eject Mode".

The standard packer cycle time is 12 seconds at 1200 RPM.

The MINIMAX™ 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).

The MINIMAX™ is primarily designed to be operated by only one worker. 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 Labrie*Plus* (see page 6).

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.

Multiplexed System

All MINIMAX™ vehicles are equipped with an electronic monitoring system called the multiplexed system.

The multiplexed system used by Labrie is a CAN-based system that integrates a monitor, a control panel and three electronic controllers. This whole system has been designed to help you operate your unit in an efficient and easy way.

NOTE: Maintenance personnel as well as in-the-field technicians who encounter any problems with the multiplexed system should refer to the *Multiplex Diagnostic Manual* (part# 153145-01) for troubleshooting information and guidelines.

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.

NOTE: Any time you have a problem with a Labrie unit, you should contact your Labrie authorized dealer first. They should be able to provide you with the proper help that you need, whether it is for parts or technical service.

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

Parts

Labrie refuse vehicle parts are offered exclusively through Labrie*Plus* and Labrie*Plus* authorized dealers. The quality and reliability of Labrie parts are second to none in the industry.

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 side loader. In addition, they 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.

MINIMAX™ Basic Maintenance

MINIMAX™ refuse bodies require routine maintenance to ensure product longevity as well as dependability. Various components have specific needs. A detailed portion of these items is listed below:

1) **Packing System**

One of the most commonly overlooked wear items involves the packing system.

Many parts of the packing system have a life which requires proper maintenance. Improperly maintained packers can result in, but are not limited to: holes worn in the floor liner and/or floor itself, binding of the packing assembly due to uneven wear against the hopper side walls, etc.

2) **Lubrication**

Your MINIMAX™ unit MUST BE COMPLETELY LUBRICATED before its first use.

All moving parts require lubrication for continued operation, longevity and dependability.

Maintenance intervals should be adjusted according to the truck's route or duty cycle. Proper greasing ensures the maximum life from the moving parts as it flushes out water and contaminants from the joint.

When greasing it is important to understand that providing the proper amount of grease is a delicate balance between over greasing, which can result in seal damage as well as wasted lubricant. Only pump enough grease until the air purges from the joint. Commonly, a "popping" sound can be heard as the old grease begins to evacuate the seal. Equally important is to remove the excess grease from the component you are maintaining. Leaving the excess grease will attract dirt and contaminants which could work themselves into the joint causing potential future issues.

3) **Lifting Arm**

Next to the packer, the lifting arm on an Automated Side Loader is the piece of equipment with the most amount of movements throughout the course of a route. Due to this, the arm has the shortest service interval and requires the most attention.

For the HELPING-HAND™ arm lubrication chart, see Figure 4-10. For maintenance of the arm, see *Lifting Arm* on page 191.

4) **Body**

The body contains grease fittings for every operating cylinder as well as all linkages.

Without proper lubrication and maintenance, these parts can become seized, galled, and/or break resulting in equipment damage or injury.

For the MINIMAX™ lubrication chart, see Figure 4-9. For maintenance of the body and its equipment (such as cylinders, packer and tailgate), see *General Maintenance* on page 23.

5) **Hydraulic Fluid and Filter**

Hydraulic fluid is the lifeblood of the MINIMAX™ refuse body. Regular maintenance of the hydraulics will ensure long, trouble-free life.

As directed in all service training, the hydraulic filter needs to be replaced after the initial 50 hours of new truck operation and then again every 6 months, or when the filter restriction gauge is in the yellow. The hydraulic fluid needs to be replaced once a year along with the suction screen being removed, inspected, cleaned and/or replaced.

Visual Inspection

1) **Hardware**

Hardware needs to be verified that it is present and tight. Loose or missing hardware can cause severe equipment damage and/or unsafe operational conditions.

2) **Proximity and Limit Switches**

Proximity and limit switches are used to limit travel of moving parts and/or to ensure conditions are safe for operation.

If these switches are not adjusted properly, damage to the equipment may occur as well as poor or dangerous functionality.

3) **Leaks**

Verify that there are not any leaking hydraulic cylinders, hoses, tubes, valves, or pumps. Leaks in the hydraulic system are an indicator of possibly overheating hydraulics, damage to a seal, over-pressurization, or general wear. To avoid costly and premature replacement of parts, ensure all leaks are addressed properly and timely.

4) **Cracks**

Ensure that there are not any cracks forming along the hopper floor edge, body, tailgate, crusher panel (optional) and arm. This is an indicator that something is worn, not adjusted properly or damaged.

5) **Bushings**/**Bearings**

Check for play in any bushing or bearing. This may require the use of a pry bar or lifting equipment.

Office Addresses and Phone Numbers

In the U.S.

Address:	1198 Shattuck Industrial Blvd. LaFayette, GA 30728
Toll Free:	1-800-231-2771
Telephone:	1-706-591-8764
General Fax:	1-706-639-9275
Oshkosh General Fax:	1-706-591-8766
Parts and warranty:	During business hours, 8:00 AM to 6:00 PM Eastern Standard Time
Technical Support Service:	Available 24 hours

In Canada

Address:	175A Route Marie-Victorin Levis, 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.labriegroup.com
E-mail:	sales@labriegroup.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

Safety is always of prime importance when servicing any type of equipment. All maintenance personnel working on the MINIMAX™ side-loader garbage truck must be aware of the safety practices and features detailed in this chapter.

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 messages in this manual and on the decals affixed to 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 applicable regulations, including all safety requirements and codes set by the Occupational Safety and Health Administration (OSHA) and by the American National Standards Institute (ANSI).
- To ensure that employees are qualified for operating the vehicle and its equipment, and that they all take safety measures before working on or around them.
- To properly maintain all mobile equipment to meet all state/provincial and federal safety standards.
- To supply operators with adequate knowledge and skills so that they can operate the vehicle and its equipment safely
- 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 conducted.
- 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.
- Do not back up the vehicle with the tailgate fully open. Backing up the vehicle when the tailgate is fully open can cause damage to the tailgate cylinders.

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.
- 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 worker.* 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 Labrie*Plus* 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 damage, personal injury or death.

Warning!

Make sure there is enough clearance between a 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 safely. 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 at 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.

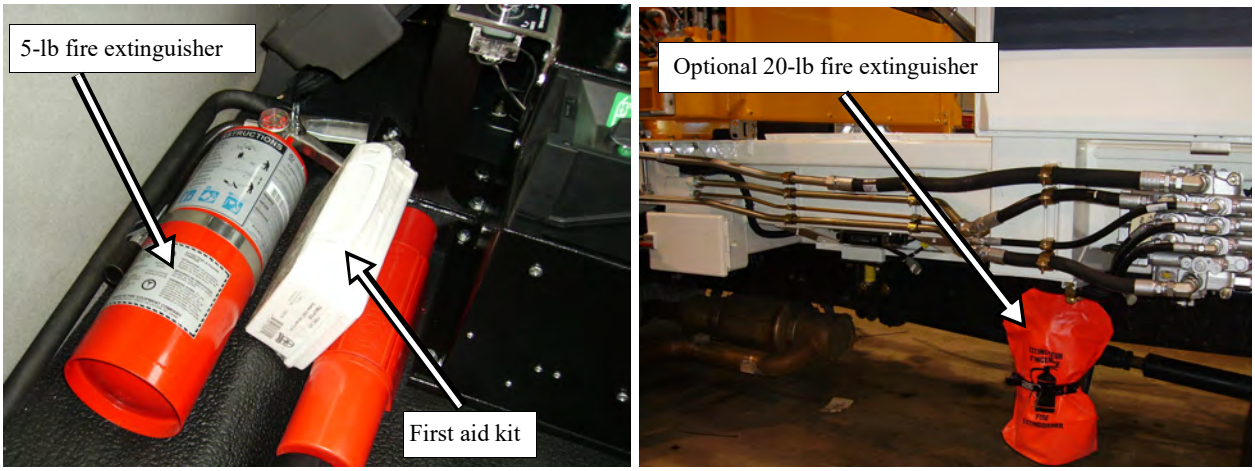
Danger!

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) 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.

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

A brief description of this system and how it works can be found in the *Minimax™ Operator's Manual* under *Global Motion Sensors*.

Back Up Alarm

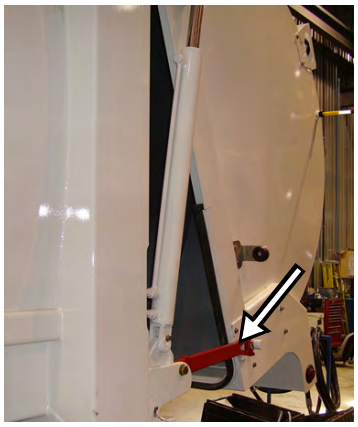
The back up alarm sounds when the truck is in reverse or the tailgate is open.

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 every time the tailgate is opened for such purposes.

IMPORTANT: Make sure that the body is empty before installing the safety prop.

Figure 2-2 Tailgate safety prop



Danger!

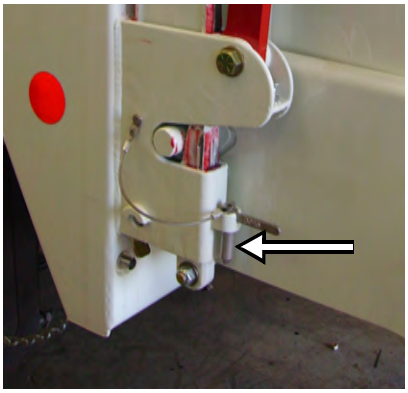
The safety prop shall be set each time the tailgate is opened for inspection and maintenance purposes.

Setting the Tailgate Safety Prop

To set the tailgate safety prop:

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

Figure 2-3 Safety pin



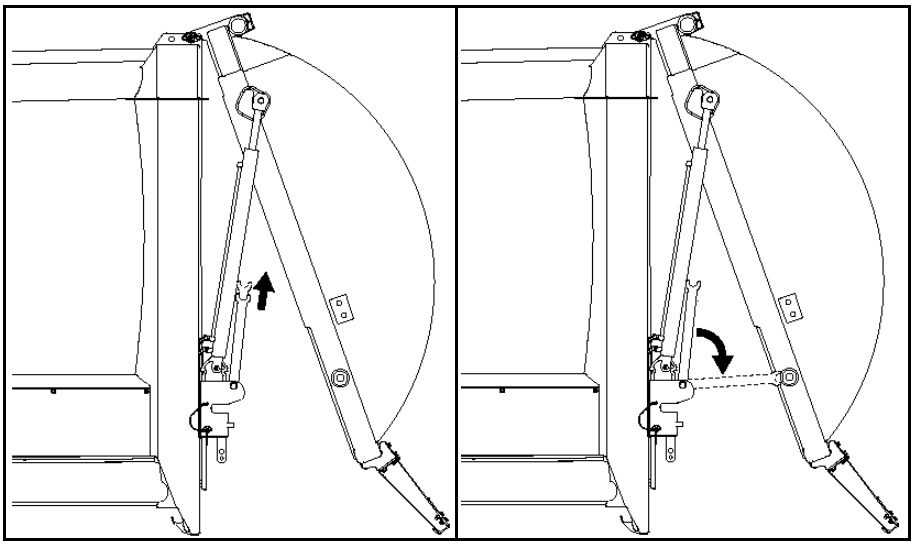
3. Start the engine.
4. Turn ON the pump.

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 control panel (see Figure 3-16), raise the tailgate a few 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)



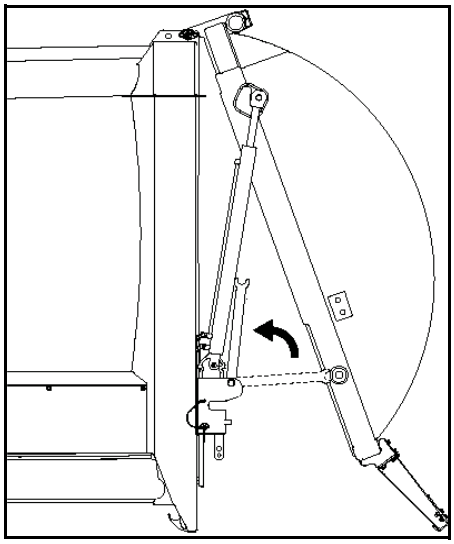
7. Lower the tailgate onto the safety prop using the Tailgate Down switch on the control panel (Figure 3-27).

Putting the Tailgate Safety Prop Back in Place

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

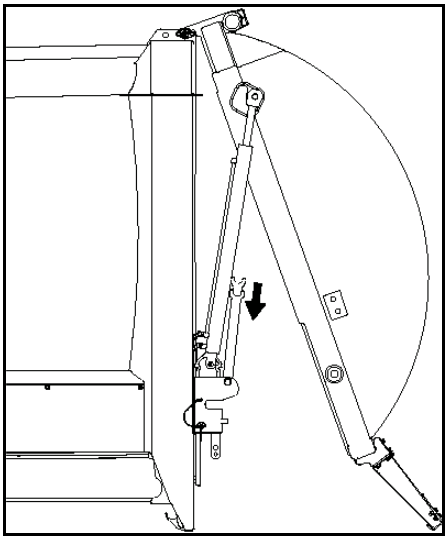
1. Start the engine.
2. Turn On the pump.
3. Raise the tailgate a few feet using the Tailgate Up switch on the control panel (Figure 3-16).
4. Raise the tailgate safety prop.

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 control panel (see Figure 3-27), 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 right rear hopper post (see Figure 2-9), and one underneath the left-hand side mirror (see Figure 2-10).

The operator can switch from one camera to the other using 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 hopper

Figure 2-8 Camera on tailgate

Figure 2-9 Camera on rear hopper post

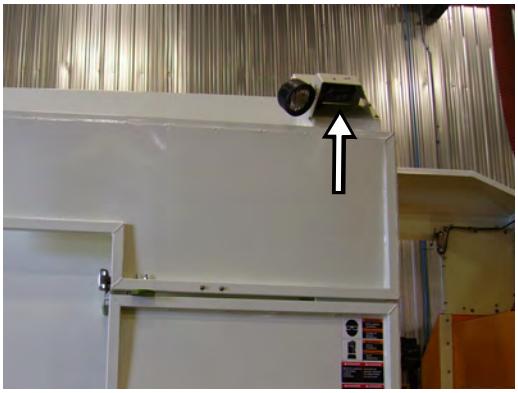


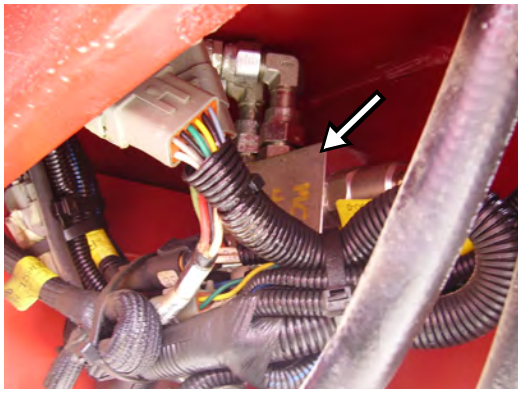
Figure 2-10 Camera underneath mirror

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

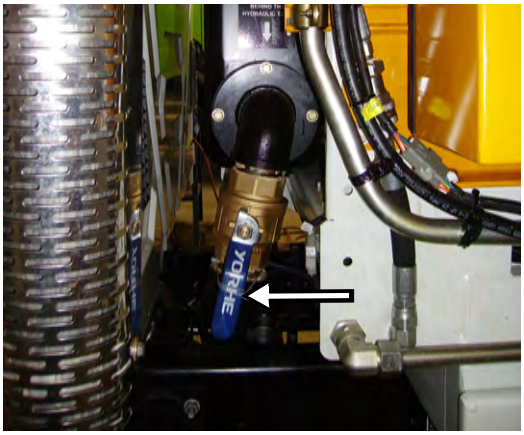


Prior to Start Up

Before starting the vehicle:

1. Make sure no system will engage and/or start to operate as you start the engine.
2. Make sure the shut-off valve on the hydraulic tank is fully open before starting the vehicle. (see Figure 2-13).

Figure 2-13 Suction line shut-off valve



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.

   Once the engine is started, wait for the air pressure to build up to *at least* 70 PSI.

Figure 2-14 Air pressure indicator

IMPORTANT: Do not operate or move the vehicle until the air pressure has reached 70 PSI.

4. Engage the hydraulic system by switching ON the Pump ON/OFF switch on the in-cab control panel (see Figure 2-15).

   The switch will turn from blue to green.

Figure 2-15 Hydraulic pump ON/OFF switch

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 your MINIMAX™ vehicle:

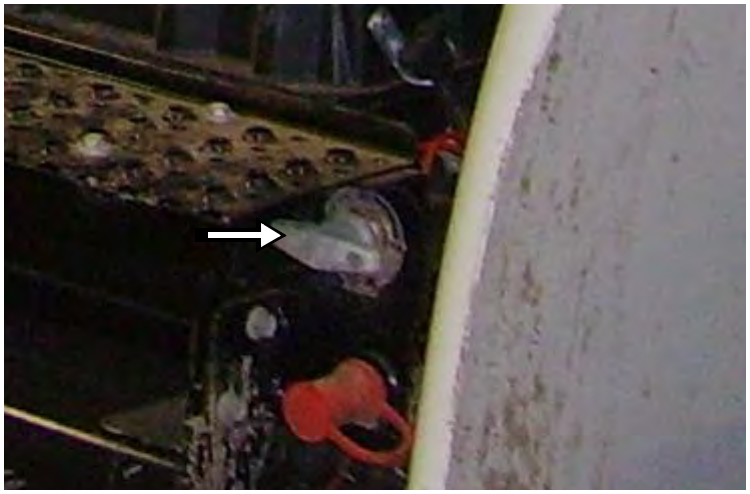
1. Park the vehicle on safe, level ground and apply the parking brake (see Figure 2-16).

Figure 2-16 Parking brake knob

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 (see Figure 2-17).
6. Chock all wheels.

IMPORTANT: The battery set of the MINIMAX™ is equipped with a master switch that must be turned off.

Figure 2-17 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.
10. Verify and inspect any security device and/or mechanism to make sure that there is no bypass and that they are all functional.

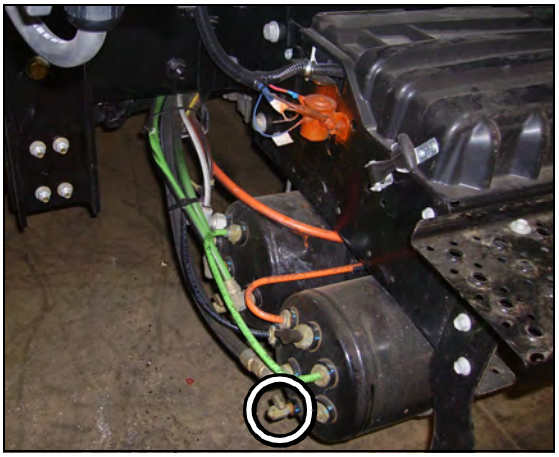
Shutting Down the Vehicle

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 2-18).

Figure 2-18 Drain valve on air tank



3

General Maintenance

Maintaining your vehicle in good working order can help prevent mechanical failures. It can also extend the useful life of your vehicle and at the same time reduce the operating costs associated with maintaining and servicing. Moreover, a well-maintained truck is a guarantee of security, reliability and efficiency.

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

Cleanliness is part of safety.

As such:

- Clean all vehicle lights, warning lights and safety decals so that you and the vehicle's surroundings are safe at all times.
- Clean the contact surface between the body and the chassis. Labrie Enviroquip Group recommends cleaning the chassis after every unloading.
- Remove any stacked garbage from the hopper area after each body unloading.
- Make sure that the side step and/or hopper step (if installed) are clean and free of any slippery material.

Danger!

Always use a stepladder to reach the higher parts of the vehicle. Also, do not climb on to the roof of the truck as it has not been designed to be walked on.

Caution!

Keep the cab floor dry and clean to prevent slipping and falling.

Preventive Maintenance Chart

Component/System	Verification	Daily	Weekly	Monthly	Yearly	Page
Limit/proximity switches	Proper adjustment of all limit/proximity switches is imperative		X			See page 47
	Check and clean area around limit/proximity switches	X				
Lubrication	Lubricate the packer and its accessories. See lubrication chart on side of the vehicle	X				See page 80
Wiring System	Check for damaged harnesses and/or bad connections				X	See page 129
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 air tanks	X				See page 145
Air system	Check for leaks		X			See page 145
	Drain filter	X				
Safety systems	Check for proper operation (tailgate alarm and special devices)		X			See page 13
Lifting arm	Check hydraulic pressure	X				See page 109
	Check all pivots and mechanism	X				See page 191

Component/System	Verification	Daily	Weekly	Monthly	Yearly	Page
Hydraulic system	Check oil level in tank, and refill if necessary	X				See page 105
	Check if the ball valve (or shut-off valve) on suction line is open	X				See page 85
	Check ground for overnight leaks	X				
	Check cylinders, pump, control valve and system for leaks. Repair or replace if required		X			See page 85
	Replace hydraulic filter[a]				Twice a year	See page 120
	Drain, flush, clean and refill strainer				X	See page 117
	Check pressure			X		See page 107
	Replace breather cap on tank				X	
Hopper area	Clean traps on each side	X				See page 23
	Clean dirt around the packer	X				See page 23
Rollers, hydraulic cylinder and cylinder pins, hoses, pipes and connections, wear of floor and hopper sides.	Visually inspect these items	X				See page 26
Body and chassis	Check for corrosion			X		
	Keep the contact surfaces clean between body and chassis	X				
Cart tipper (optional)	Grease and inspect all pivots	X				
	Check pressure			X		

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

Packer

The MINIMAX™ packer (see Figure 3-1) is submitted to intensive use during a work day (500 to 1500 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 3-2).

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 work on the packer. Greasing all moving parts on a daily basis is very important. For more information on the lubrication schedule, see *Lubrication Charts* on page 74.

Also, proper adjustment of the limit and proximity switches is mandatory, especially on vehicles equipped with a multi-cycle feature.

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 3-1 Packer

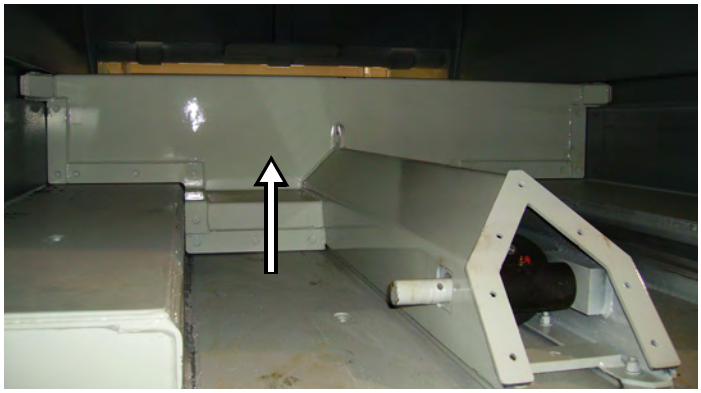
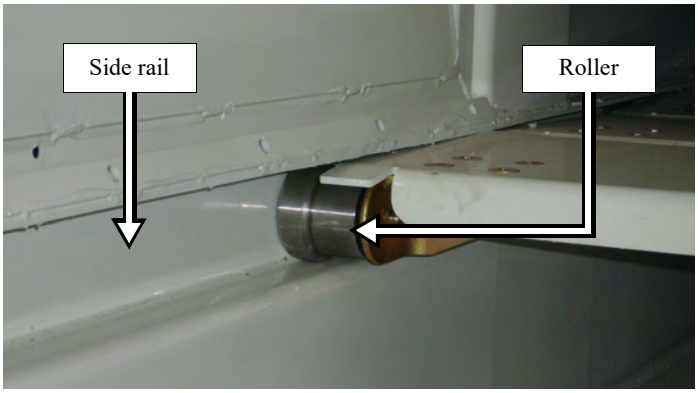


Figure 3-2 Packer components



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 3-15).
4. Fully open the tailgate by pressing the TAILGATE UP switch on the control panel (see Figure 3-16).
5. Fully extend the packer by pressing the green PACK button on the control packer station (see Figure 3-18).

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 3-20).
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.

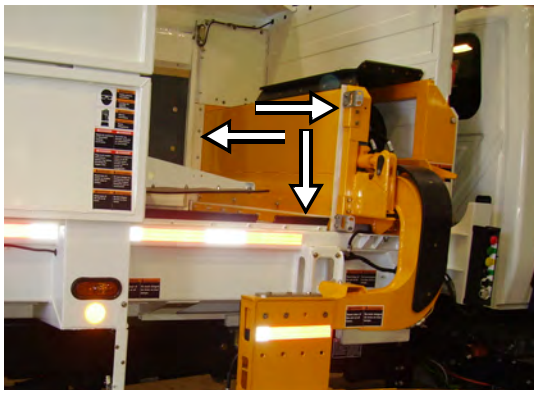
8. Perform the lockout/tagout procedure (see *Locking Out and Tagging Out the Vehicle* on page 20).

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 3-3).

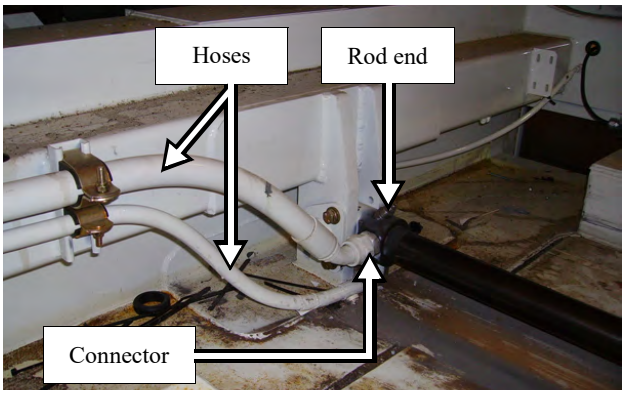
Figure 3-3 Protective wear pads

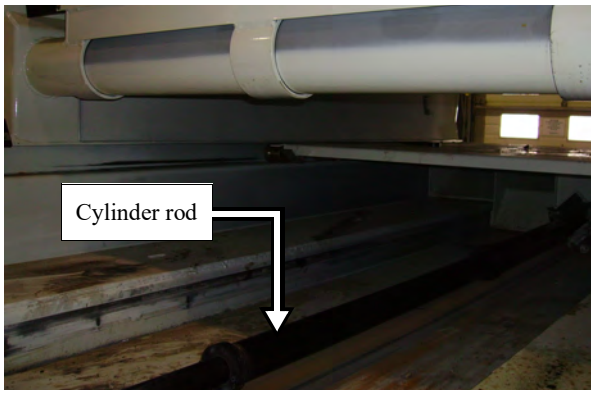


4. Inspect both body side rails and packer rollers for any premature wear (see Figure 3-2).
5. Inspect the hydraulic system, including hoses, pipes, connectors, and cylinder (see Figure 3-4).

   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 3-4 Packer hydraulic components





Replacing the Packer Cylinder

The following procedure details how to replace a faulty packer cylinder.

To remove the packer cylinder:

1. Ensure the parking brake is applied.
2. Start the engine and engage the hydraulic system.
3. Remove the tailgate safety pins (see Figure 3-5) and fully open the tailgate by pressing the TAILGATE UP switch on the control panel (see Figure 3-6).

Figure 3-5 Safety pin

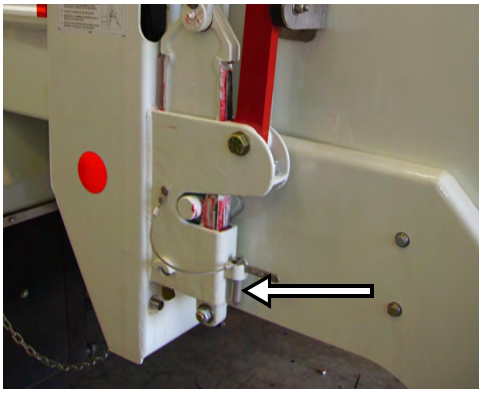
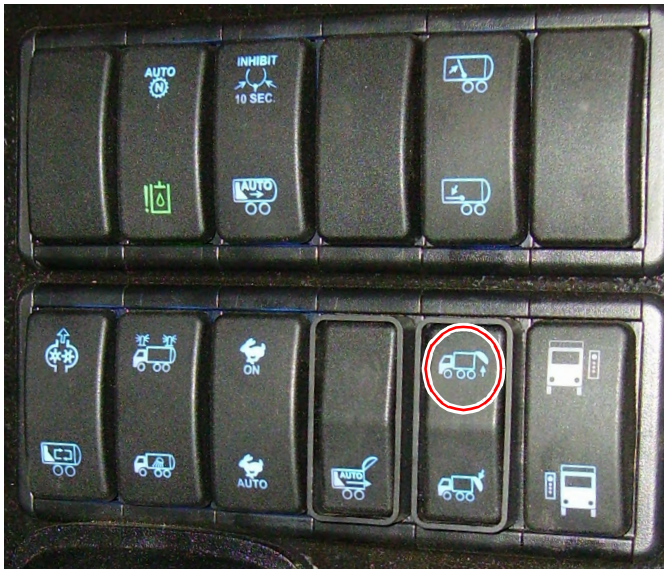


Figure 3-6 Tailgate Up switch



4. Place the tailgate safety prop in service position (see Figure 3-7).

Figure 3-7 Tailgate safety prop in service position

5. 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

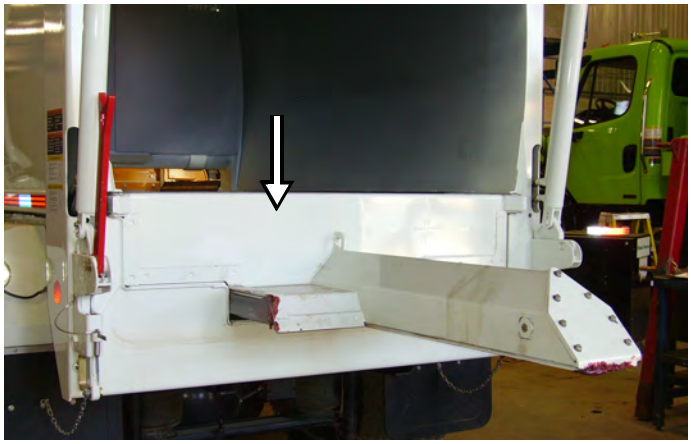
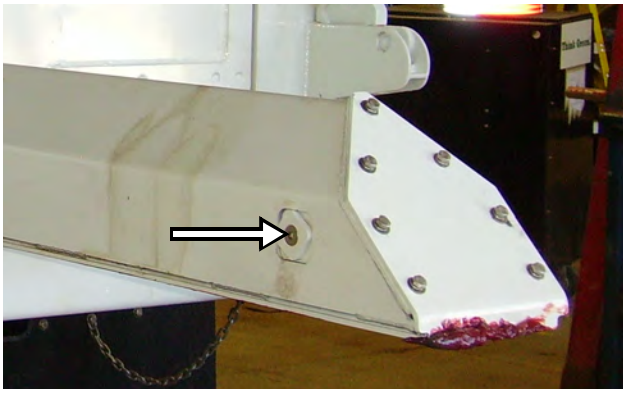


Figure 3-10 Emergency stop button

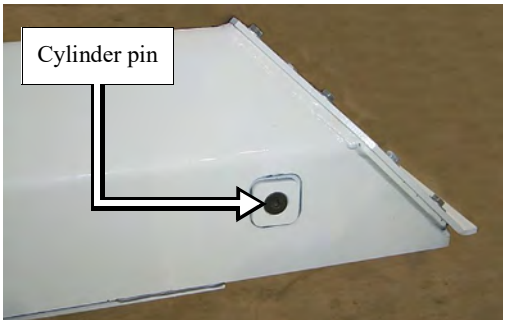
6. Unscrew the bolt (see Figure 3-11) at the left-hand side of the packer tip to remove the cylinder pin.

Figure 3-11 Bolt to unscrew



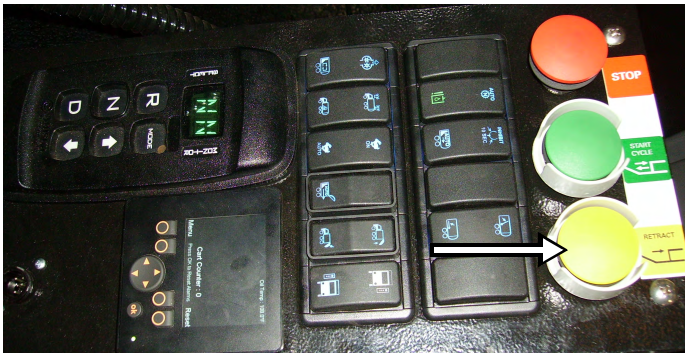
7. Remove the cylinder pin (see Figure 3-12).

Figure 3-12 Removing the packer



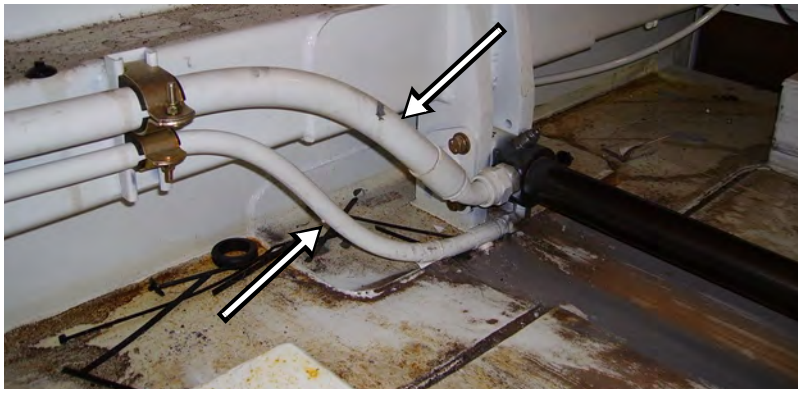
8. On the packer control station, press the yellow PACKER RETRACT button to retract the cylinder (see Figure 3-13).

Figure 3-13 Packer retract button



9. Disengage the pump and turn OFF the engine.
10. Proceed with the lockout/tagout procedure. Refer to “Locking Out and Tagging Out the Vehicle” on page 20.
11. Disconnect both hydraulic hoses from the cylinder fittings.

Figure 3-14 Cylinder hoses



12. Cap each hose and cylinder fitting as soon as they are disconnected.
13. Remove all bolts that hold the cylinder in place.

14. Attach the cylinder to an appropriate lifting device and pull it out of the hopper.

Warning!

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

15. Attach the replacement cylinder to a lifting device and safely transport it to the hopper opening where it can be lowered onto the hopper floor.
16. Install the cylinder base into position and attach the bolts to secure that section of the cylinder.
17. Tighten the bolts.
18. Reconnect both hydraulic hoses to the cylinder fittings (see Figure 3-14).

    Place a container to collect the oil that may come out of the hoses once the caps are removed.
19. Tighten both cylinder hose fittings.
20. Start the engine and turn ON the hydraulic system (PUMP switch set to "ON").

Caution

Make sure the shut-off valve on the suction line is fully open before starting the vehicle.

21. 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.

22. Insert the cylinder into the packer, then the pin through the tip of the packer and into the cylinder to fix them properly.
23. Screw the bolt (Figure 3-11) at the left-hand side of the packer tip to secure the cylinder pin.
24. On the packer control station, press the yellow PACKER RETRACT button to retract the packer to its home position (see Figure 3-13).
25. Test the packer for a full cycle to make sure the cylinder has been properly installed.

    To do this, press the green Pack button on the packer control station (see Figure 3-8).
26. Once the packer is fully retracted, put the tailgate safety prop back to its home position.
27. Close the tailgate completely by pressing and holding the TAILGATE DOWN switch on the control panel (see Figure 3-27).

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 3-15) and fully open the tailgate by pressing the TAILGATE UP switch on the control panel (see Figure 3-16).

Figure 3-15 Safety pin

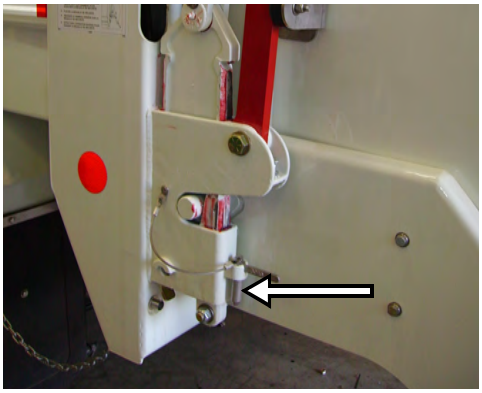
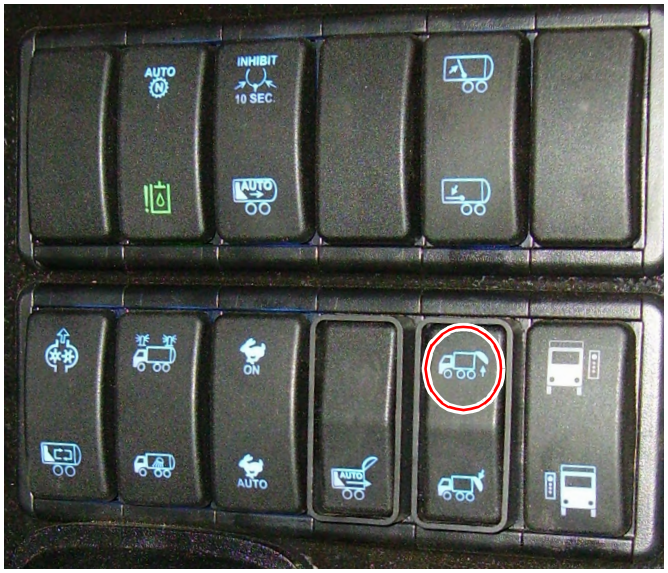


Figure 3-16 Tailgate Up switch



4. Place the tailgate safety prop in service position (see Figure 3-17).

Figure 3-17 Tailgate safety prop in service position

5. On the packer control station, press the green PACK button to fully extend the packer (see Figure 3-18). When the packer has reached its fully extended position (see Figure 3-19), press the red EMERGENCY STOP button to stop the packer (see Figure 3-20).

Figure 3-18 Pack button

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

Figure 3-19 Packer in fully extended position

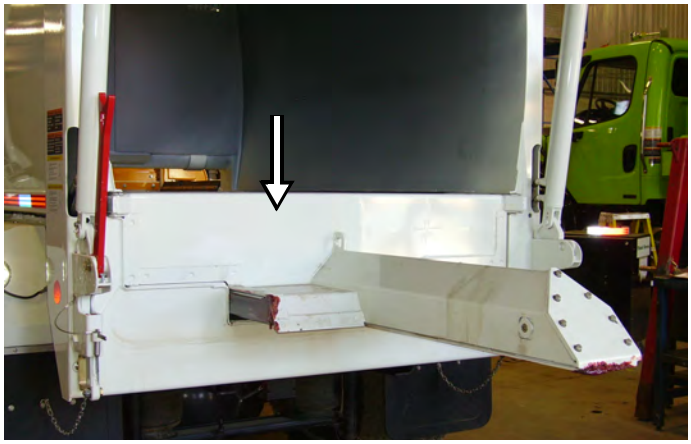
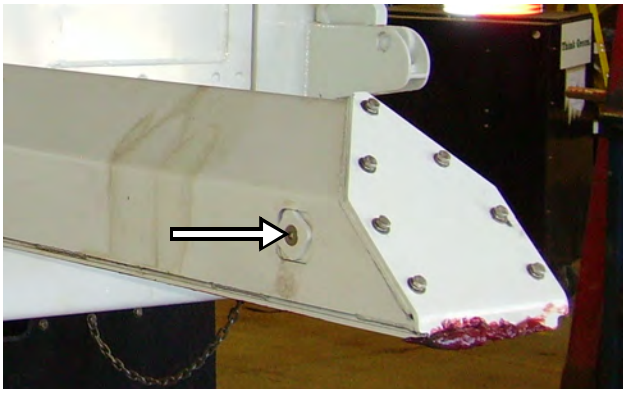


Figure 3-20 Emergency stop button

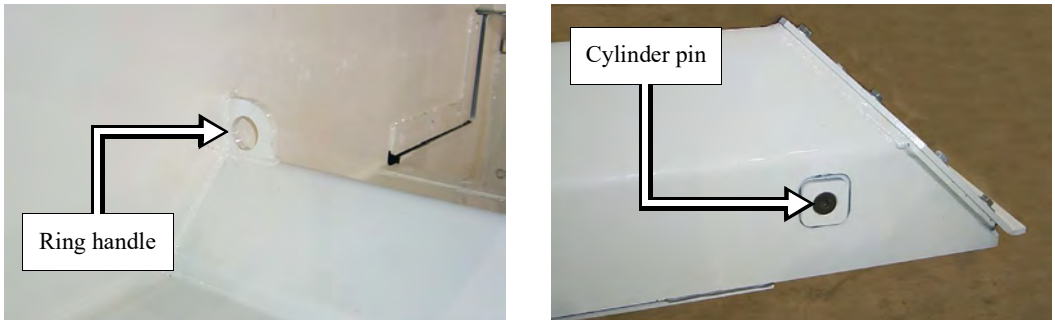
6. Proceed with the lockout/tagout procedure. Refer to “Locking Out and Tagging Out the Vehicle” on page 20.
7. Unscrew the bolt (see Figure 3-21) at the left-hand side of the packer tip to remove the cylinder pin.

Figure 3-21 Bolt to unscrew



8. Remove the cylinder pin (see Figure 3-22).

Figure 3-22 Removing the packer



9. On the packer control station, press the yellow PACKER RETRACT button to retract the cylinder (see Figure 3-23).
10. Install any safe lifting device and hook the packer by the ring handle (see Figure 3-22).
11. Pull the packer out of the side rails and place it in a safe work area.

IMPORTANT: To more easily and safely remove the packer from the body, stitch weld a piece of tube, or C-channel, across the top of the follower panels to the top of the packer before removal.

Figure 3-23 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

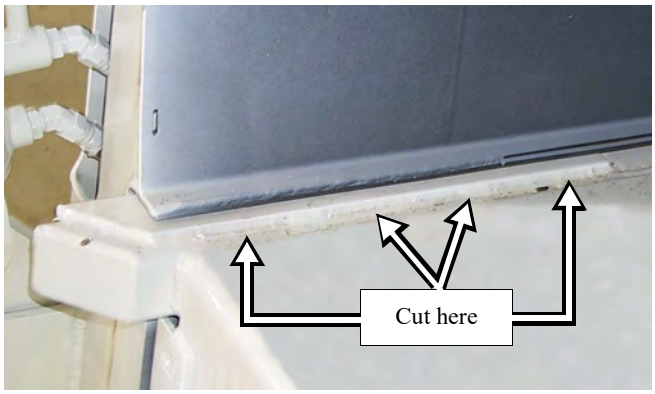
When the packer wear plates are worn out, you must replace them to achieve packer optimal performance.

To replace the wear plates, proceed this way:

1. Remove the packer from the body. See *Removing the Packer* on page 34.

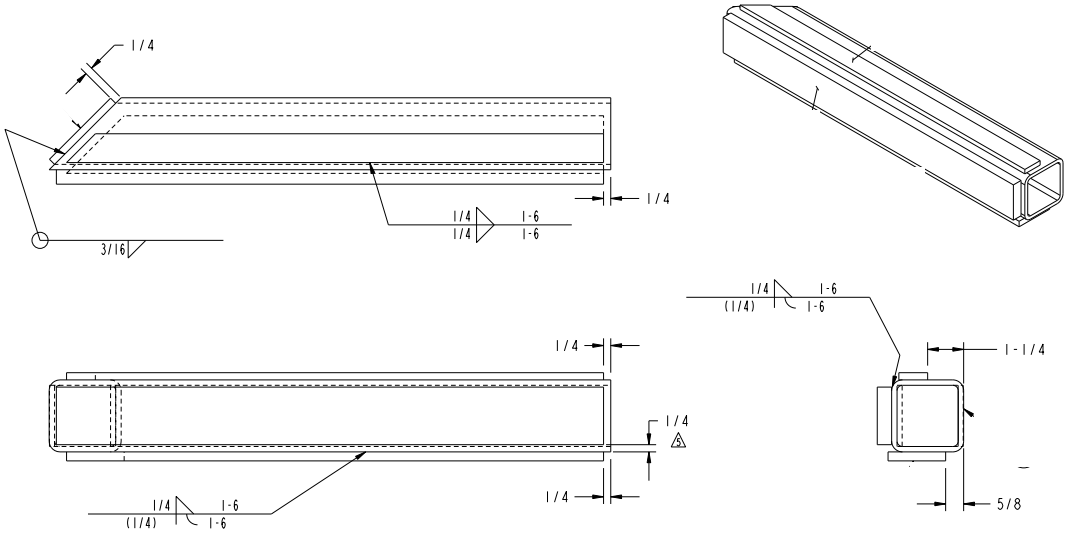
2. Once the packer is placed in a safe work area, cut off the wear plate panel (see Figure 3-24).

Figure 3-24 Cutting the wear plate panel



3. Weld the new wear plate panel to the packer (see Figure 3-25 for welding specifications).

Figure 3-25 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.

IMPORTANT: To more easily and safely reinstall the packer inside the body, stitch weld a piece of tube, or C-channel, across the top of the follower panels to the top of the packer before reinstallation.

2. Proceed with the lockout/tagout 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 3-22).
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. Start the engine and turn ON the hydraulic system (PUMP switch set to "ON").

Caution

Make sure the shut-off valve on the suction line is fully open before starting the vehicle.

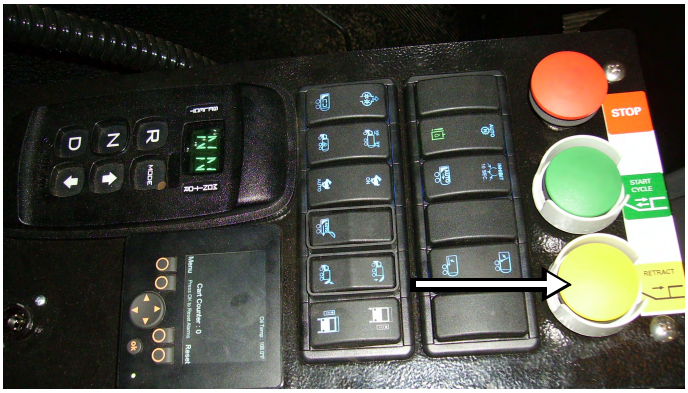
7. On the packer control station, press the green PACK button (see Figure 3-18) to fully extend the packer cylinder.

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.

8. Insert the cylinder into the packer, then the pin through the tip of the packer and into the cylinder to fix them properly.
9. Screw the bolt (Figure 3-21) at the left-hand side of the packer tip to secure the cylinder pin.
10. On the packer control station, press the yellow PACKER RETRACT button to retract the packer to its home position (see Figure 3-26).

Figure 3-26 Packer retract button



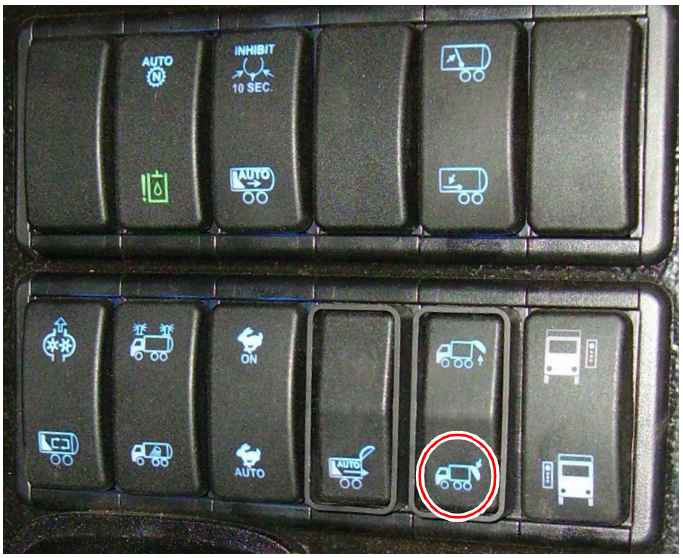
11. Test the packer for a full cycle to make sure it has been properly installed.

    To do this, press the green Pack button on the packer control station (see Figure 3-18).

12. Once the packer is fully retracted, put the tailgate safety prop back to its home position.

13. Close the tailgate completely by pressing and holding the TAILGATE DOWN switch on the control panel (see Figure 3-27).

Figure 3-27 Tailgate Down switch



Packer Roller Assemblies

Packer rollers need to be replaced when damaged or when showing excessive wear or flat spots. The procedure outlined below will show you how to remove the first, second and third sets of rollers and how to replace them.

NOTE: If the packer and the follower panels have been removed from the body for repair or replacement, you can take advantage of it to check all packer rollers and replace those that are damaged or worn out.

Replacing Packer Roller Assemblies

NOTE: This task must be performed by 2 people.

To replace the packer roller assemblies:

1. Ensure the parking brake is applied.
2. Start the engine and engage the hydraulic system.

   Wait for the air pressure to reach 70 psi before engaging the hydraulic system.
3. Remove the tailgate safety pins (see Figure 3-15) and fully open the tailgate by pressing the TAILGATE UP switch on the multiplexed control module (see Figure 3-16).

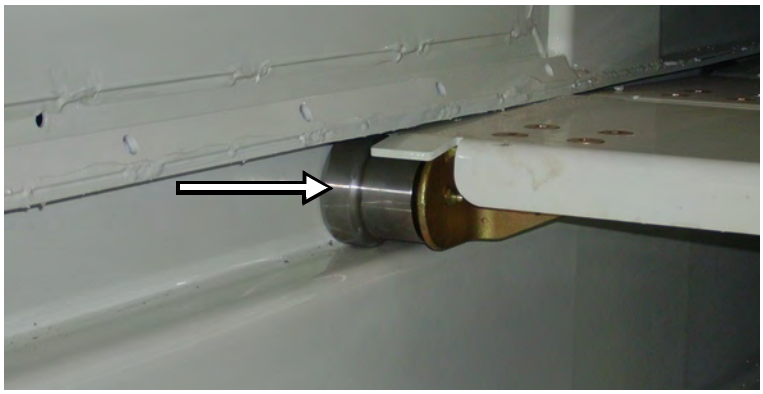
   Keep the TAILGATE UP switch pressed until the tailgate is fully open.
4. On the packer control station, press the green PACK button to fully extend the packer (see Figure 3-18). When the packer has reached its fully extended position (see Figure 3-19), press the red EMERGENCY STOP button to stop the packer (see Figure 3-20).

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

5. Proceed with the tagout/lockout procedure. Refer to “Locking Out and Tagging Out the Vehicle” on page 20.
6. Place the tailgate safety prop in service position (see Figure 3-7).

Figure 3-28 Packer rollers assemblies (3 on each side)

Figure 3-29 Packer roller



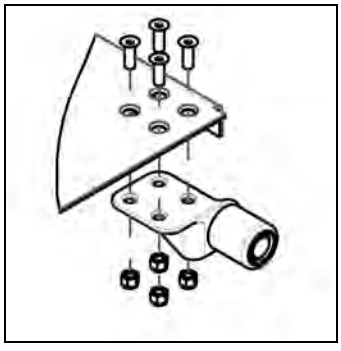
7. Place a 2-by-4 woodblock under the first panel, long enough to hold the panel in place once the roller (see Figure 3-29) is removed.

   You may also use jack stands instead of woodblocks for that purpose.

8. Remove the left-hand side roller assembly of the first panel and replace it:

   8 a. Using a 5/16-inch Allen wrench and a 3/4-inch box, remove all 4 bolts that keep the roller in place (see Figure 3-30).

Figure 3-30 Removing bolts



8 b. Remove the roller assembly and replace it with a new one.

8 c. Put back all 4 bolts in their respective holes before tightening them up.

9. Remove the right-hand side roller of the first panel and replace it by repeating Step 8.

Move the woodblock (or jack stand) to the other side under the panel.

10. Place the 2-by-4 woodblock (or jack stand) under the second panel, long enough to hold the panel in place once the roller is removed.

11. Repeat Steps 8 and 9 to remove both rollers of the second panel.

12. Place the 2-by-4 woodblock (or jack stand) under the third panel, long enough to hold the panel in place once the roller is removed.

13. Repeat Steps 8 and 9 to remove both rollers of the third panel.

14. Once all worn-out rollers have been replaced, exit the body.

15. Start the engine and engage the hydraulic system.

Wait for the air pressure to reach 70 psi before engaging the hydraulic system.

Caution

Make sure the shut-off valve on the suction line is fully open before starting the vehicle.

16. Run a full cycle to check for proper operation.

Replacing Rollers

If the roller itself has to be replaced because of wear, apply the following procedure:

1. Once the roller has been removed from the follower panel (see *Packer Roller Assemblies* on page 41), remove the external snap ring.

Figure 3-31 Removing external snap ring

2. Remove the washer.

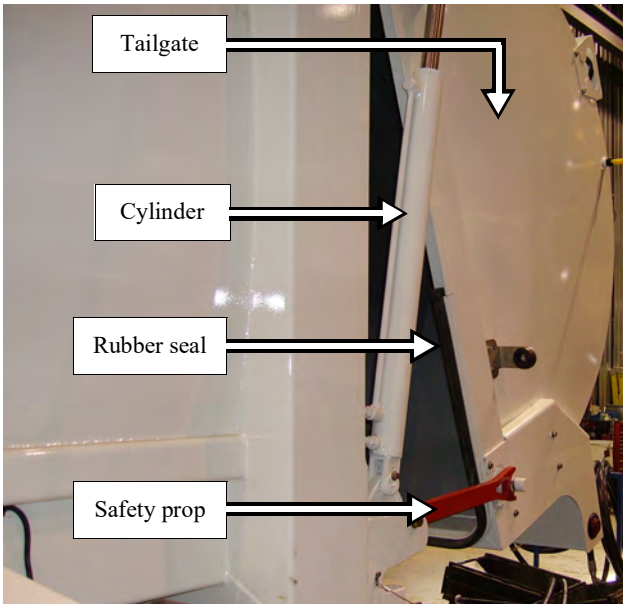
Figure 3-32 Removing washer

3. Slide out the roller.
4. Reverse the previous steps to reinstall the roller.

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 3-33 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 3-18 and 3-19 show where the proximity and limit switches are located on the truck.

Figure 3-34 Switches on the street side

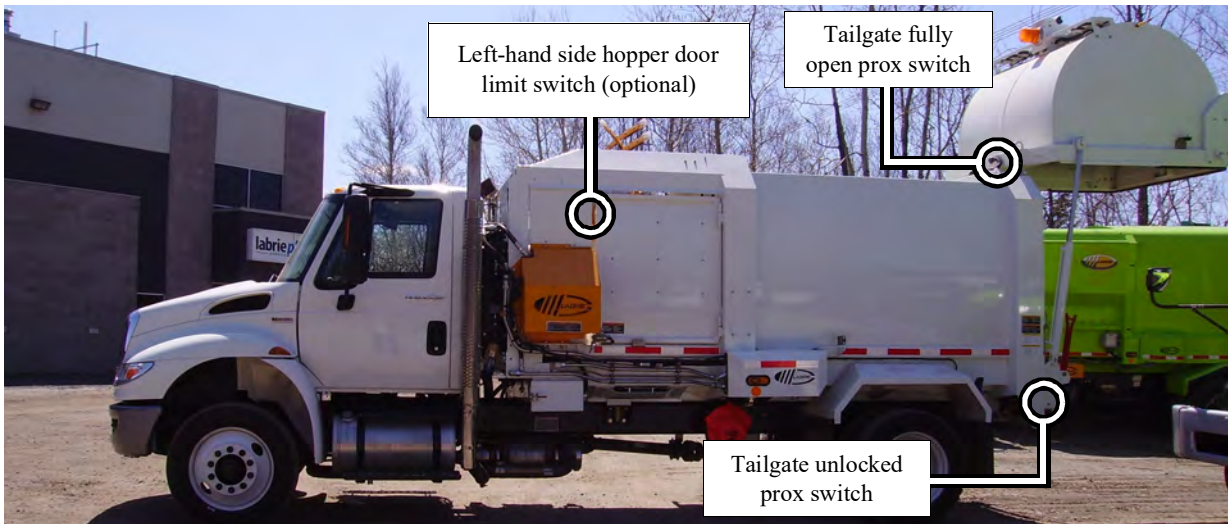
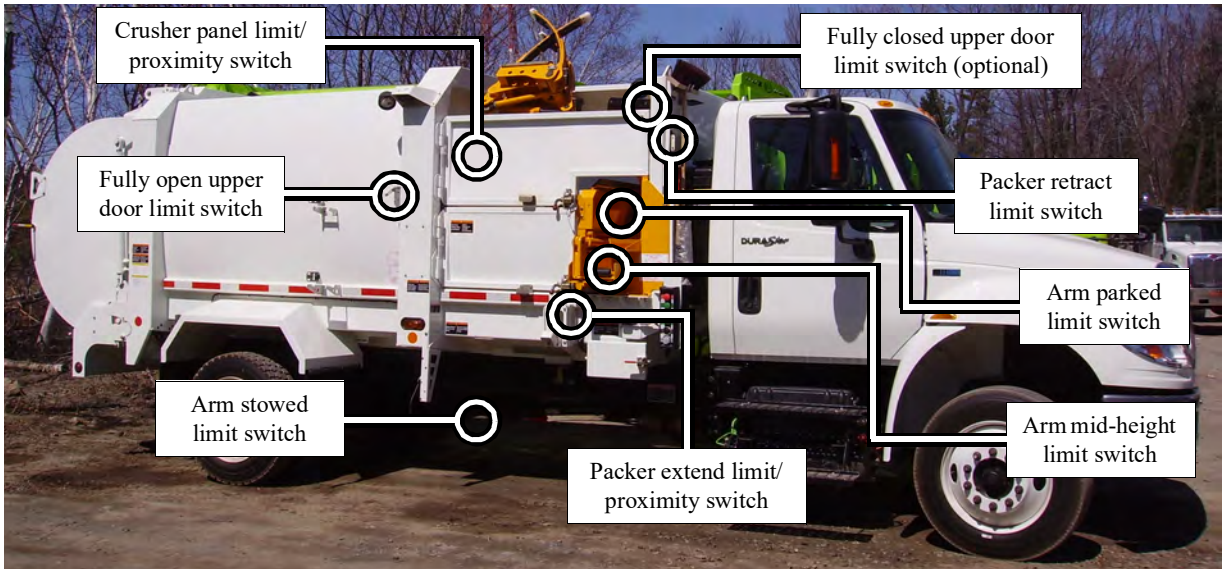
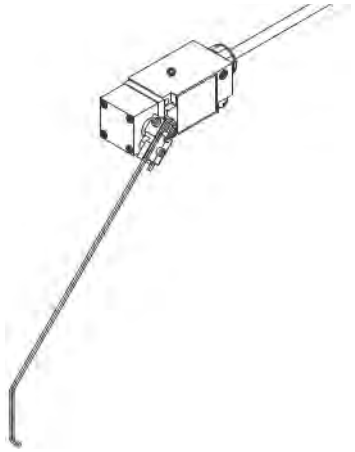


Figure 3-35 Switches on the curb side



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 (*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*).

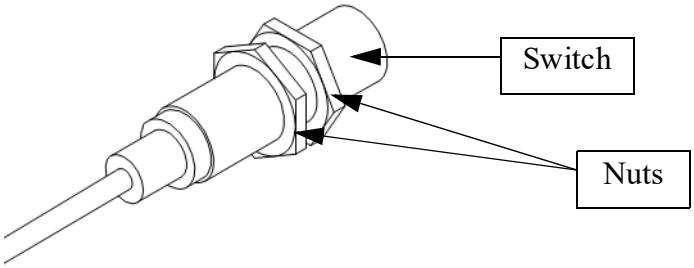


To adjust a limit switch:

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 Proximity Switch

Danger!

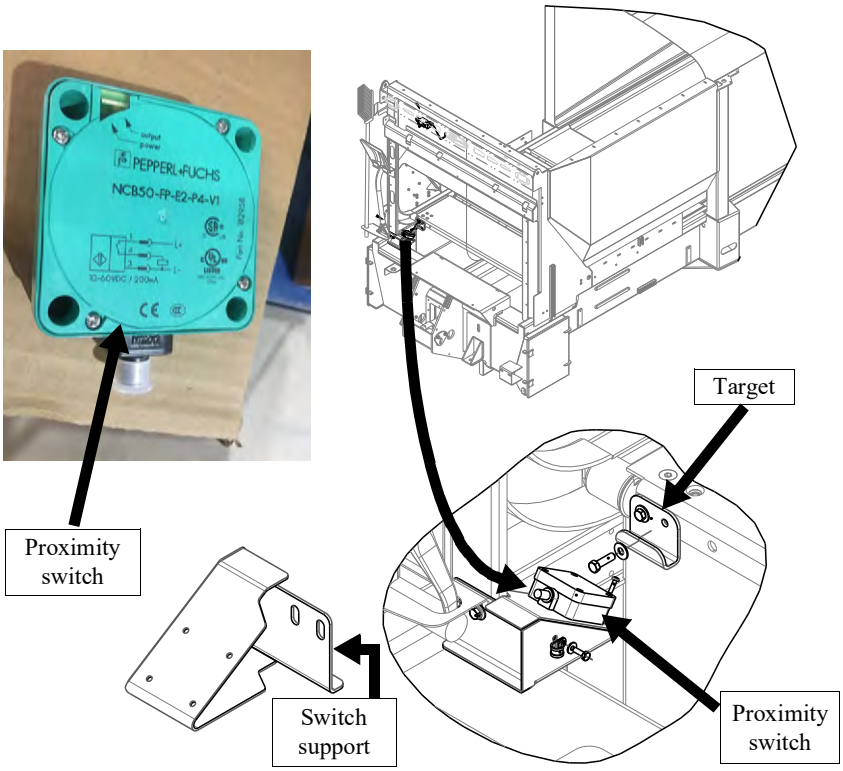
Always lock out and tag out the vehicle when inspecting it or performing maintenance on it (see *Locking Out and Tagging Out the Vehicle* on page 20).

The Packer Extend proximity switch is adjusted at the factory for optimal packer operation. If the area behind the packer is not properly cleaned *daily,* this proximity switch 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 the packer cylinder from completely extending and retracting to the end of its strokes.

The packer range of motion is controlled by a proximity switch and a limit switch. The proximity switch stops the packer during extension (packer extend) and is located near the hopper floor, on the curbside, just under the automated arm housing (see Figure 3-36). The limit switch stops the packer during retraction (packer retract) and is located on the front right-hand side hopper corner, behind the cab (see Figure 3-38).

Figure 3-36 Packer Extend proximity switch



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

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

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 control panel. 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. Disengage the pump and turn OFF the engine.
5. Proceed with the lockout/tagout procedure. Refer to “Locking Out and Tagging Out the Vehicle” on page 20.

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

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

Caution Make sure the shut-off valve on the suction line is fully open before starting the vehicle.

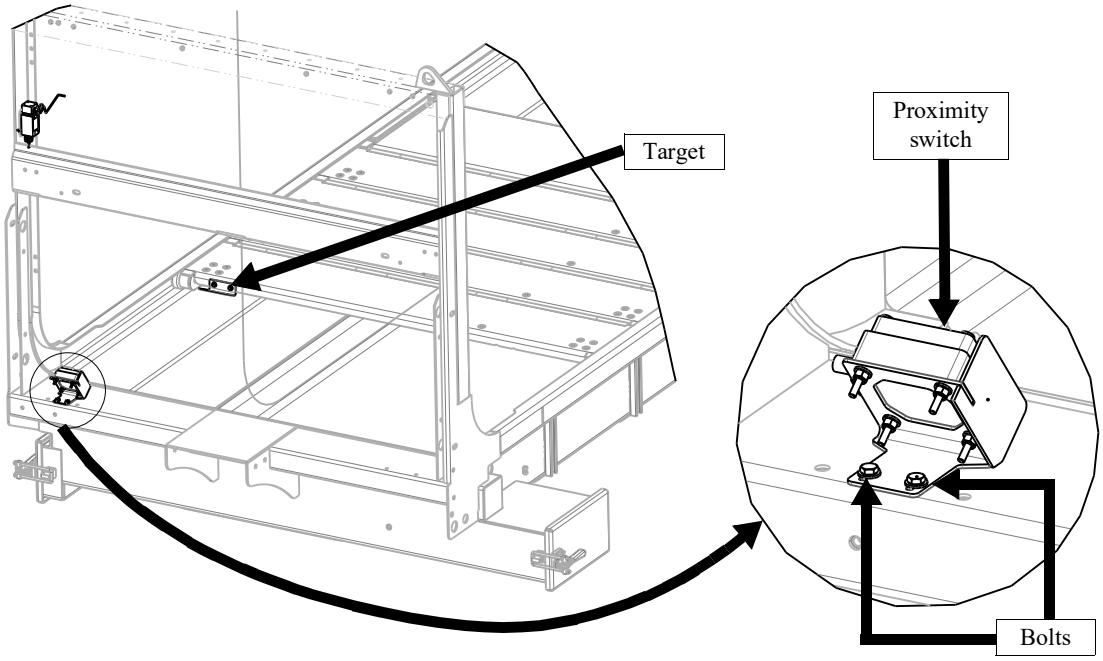
10. Press the yellow PACKER RETRACT button (see Figure 3-23) to retract the packer and bring it back to the position where the target, which is located at the tail of the last follower panel, must make contact with the Packer Extend proximity switch. Use the red EMERGENCY STOP button to stop retraction at such position (see Figure 3-20).
11. Disengage the pump and turn OFF the engine.
12. Proceed with the lockout/tagout procedure. Refer to “Locking Out and Tagging Out the Vehicle” on page 20.

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

13. Adjust the Packer Extend proximity switch. To do so:
    - **13 a.** Remove the two bolts that hold the switch support in place (see Figure 3-37).
    - **13 b.** Adjust the switch support so that there is a gap of approximately 1 inch (25.4 mm) between the plate (target) and the switch.

      Move the support either up or down. The support has two slots for correctly adjusting the position of the proximity switch (see Figure 3-36).
    - **13 c.** Once you have adjusted the position of the switch support, insert the bolts into the appropriate slots.

Figure 3-37 Proximity switch installation diagram



14. Turn ON the engine and engage the hydraulic system (PUMP switch activated).

Caution Make sure the shut-off valve on the suction line is fully open before starting the vehicle.

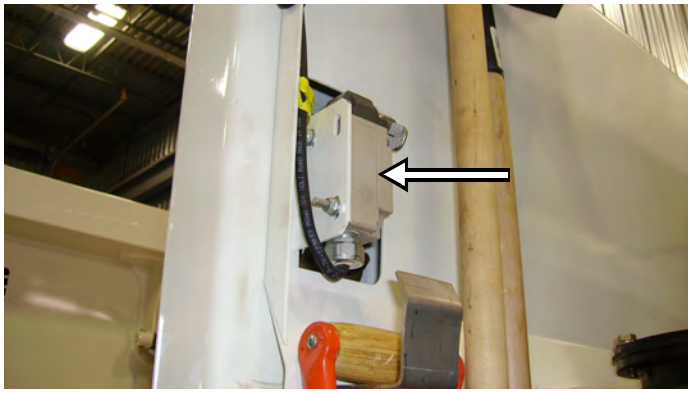
15. Fully retract the packer and press the green PACK button to start a complete cycle and test the efficiency of the proximity switch.

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 3-38) sends a signal to the controller module that the packer has reached its fully retracted position.

Figure 3-38 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 panel and the arm base wiper).

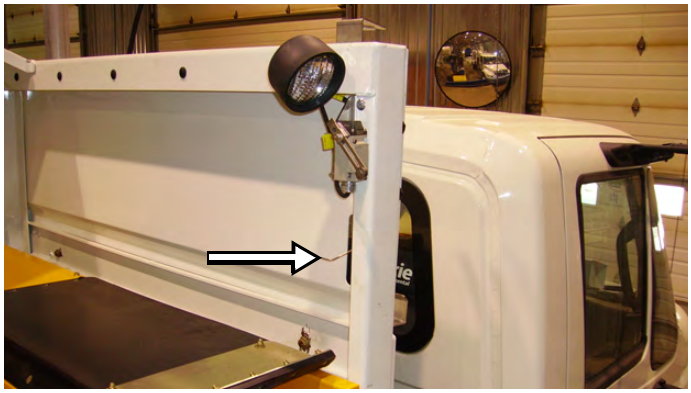
NOTE: When in stowed position the packer panel must always make contact with the wiper.

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

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

7. Locate the Packer Retract limit switch lever (see Figure 3-39).

Figure 3-39 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, retighten the locknut.
10. Turn ON the engine and engage the hydraulic system (PUMP switch activated).

Caution Make sure the shut-off 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 the 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 3-41), 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 3-40). As the proximity switch is no more triggered by the plate, the warning buzzer and the backup alarm stop sounding.

Figure 3-40 Tailgate proximity switch (locked position)

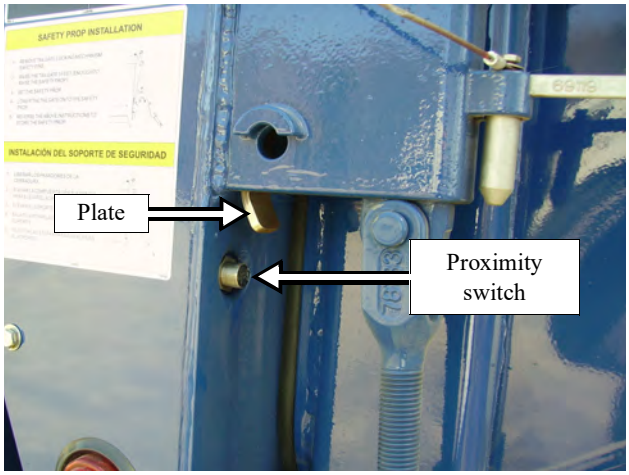
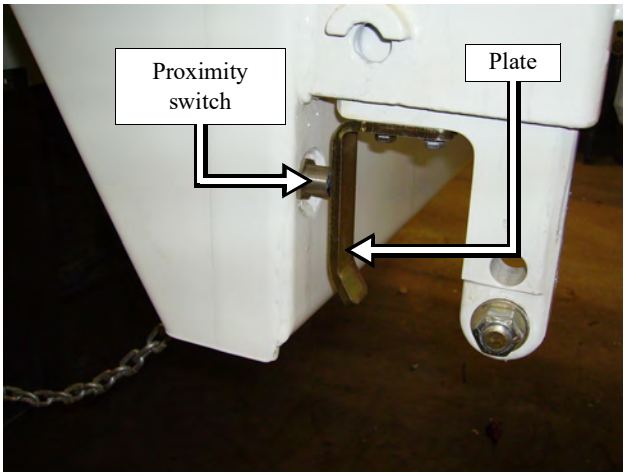


Figure 3-41 Tailgate proximity switch (unlocked position)

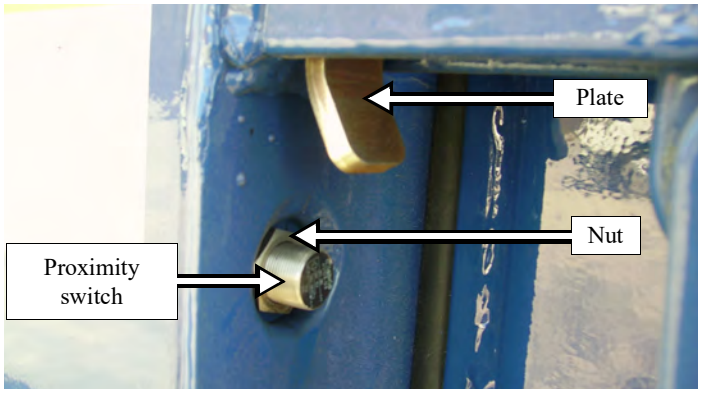


To adjust the tailgate unlocked proximity switch:

1. Start the engine and engage the hydraulic system.
2. Loosen the nuts located on each side of the proximity switch bracket (see Figure 3-42).

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

Figure 3-42 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 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 control panel (see Figure 3-16), 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 the 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 3-43). 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 3-43 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 3-43).

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

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

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

3. Slightly close the tailgate a couple of inches.

   As the target is no more detected by the proximity switch at such position of the tailgate, the switch light should go 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 3-44) prevents the crusher panel from functioning when the left-hand side hopper door is not closed. It also allows the 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: The use of this limit switch is required in some jurisdictions.

Figure 3-44 Left-Hand Side 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 left-hand hopper door by approximately 2 inches (5 cm) and try to operate the crusher panel. No movement of the crusher panel should be occurring. If it still moves, then apply the following adjustment procedure.

Warning

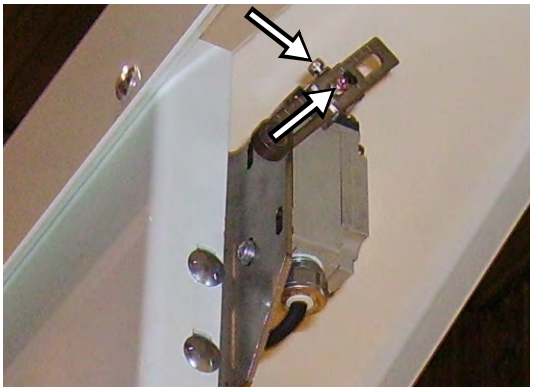
Injury or death may occur if you attempt to enter the body while the packer or the arm is in operation.

To adjust the Left-Hand Side Hopper Door limit switch:

1. Unscrew the lever adjustment screws of the limit switch (see Figure 3-45).
2. Raise or lower the detection lever slightly and tighten up the screws.
3. Test the operation.

   The crusher panel should be operative only when the left-hand hopper door is closed.
4. Repeat the adjustment procedure if need be.

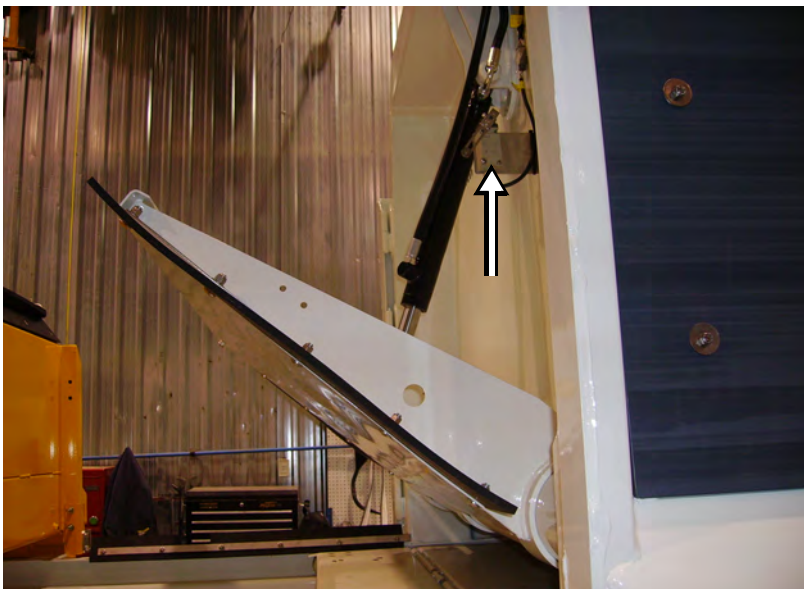
Figure 3-45 Detection lever adjustment screws



Adjusting Crusher Panel Up Limit/Proximity Switch

The Crusher Panel Up limit/proximity 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 enable switch on the arm joystick is activated. This forces the crusher panel to rise to the up position in order to let the arm works.

Figure 3-46 Crusher Panel Up limit switch



This switch is located behind the crusher panel itself.

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

A. To adjust the Crusher Panel Up *limit* switch:

1. Start the engine and engage the hydraulic system (PUMP switch activated).
2. Lower the crusher panel.
3. Disengage the hydraulic pump and turn OFF the engine.
4. Proceed with the lockout/tagout procedure. Refer to "Locking Out and Tagging Out the Vehicle" on page 20.

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

5. Adjust the Crusher Panel Up limit switch so that it is triggered when the crusher panel is in the up position.
   - **5 a.** Unscrew the lever adjustment screws of the limit switch (see Figure 3-45).
   - **5 b.** Raise or lower the detection lever a little bit and tighten up the screws.

6. Turn ON the engine and engage the hydraulic system (PUMP switch activated).

Caution Make sure the shut-off valve on the suction line is fully open before starting the vehicle.

7. Depress and hold the enable switch on the arm joystick until the 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.

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

B. To adjust the Crusher Panel Up *Proximity* switch:

1. Start the engine and engage the hydraulic system (PUMP switch activated).
2. Lower the crusher panel.
3. Disengage the hydraulic pump and turn OFF the engine.
4. Proceed with the lockout/tagout procedure. Refer to "Locking Out and Tagging Out the Vehicle" on page 20.

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

5. Loosen the nuts located on each side of the proximity switch bracket (see Figure 3-47).
6. Adjust the proximity switch so that the switch can be triggered by the target on the crusher panel. There should be a gap of approximately 3/16 of an inch between the target and the switch.
7. Tighten up both nuts.
8. Turn ON the engine and engage the hydraulic system (PUMP switch activated).

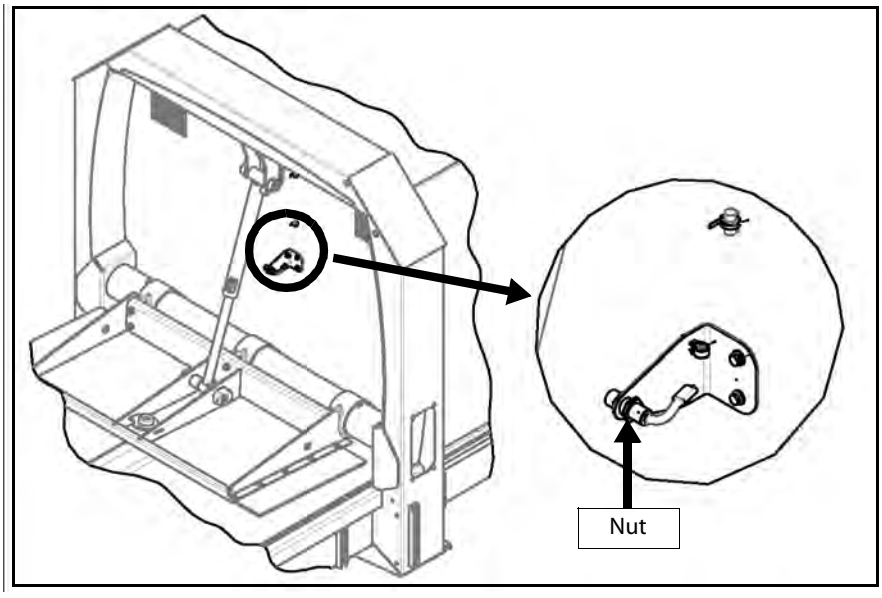
Caution Make sure the shut-off valve on the suction line is fully open before starting the vehicle.

9. Depress and hold the enable switch on the arm joystick until the 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.

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

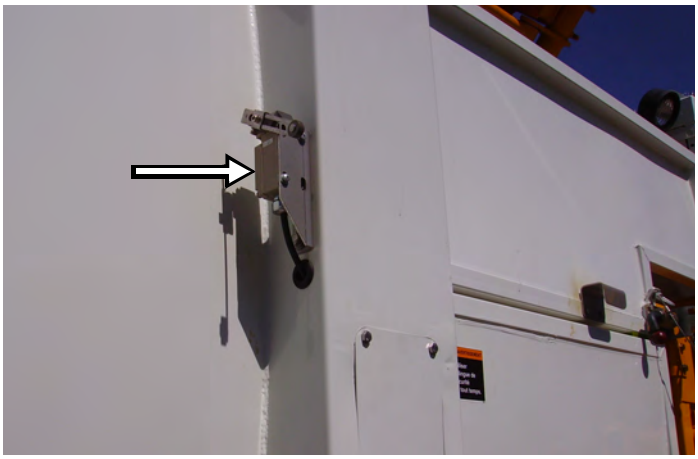
Figure 3-47 Crusher Panel Up proximity switch



Adjusting Fully Open Upper Door Limit Switch

When triggered the Fully Open Upper Door limit switch enables the arm operation (see Figure 3-48). 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 3-48 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 3-45).

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.

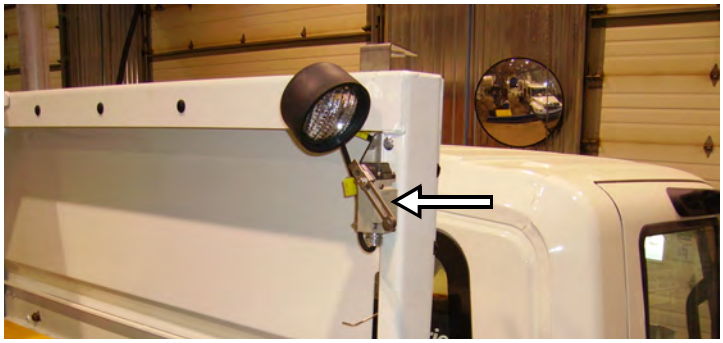
4. Repeat the adjustment procedure if need be.

Adjusting Fully Closed Upper Door Limit Switch (optional)

When triggered the Fully Closed Upper Door limit switch (see Figure 3-49) 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 3-49 Fully Closed Upper Door limit switch



NOTE: The use of this limit switch is required in some jurisdictions.

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 3-45).
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 3-52) when the operator extends the arm or closes the gripper. If this limit switch is misaligned, the warning light 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).

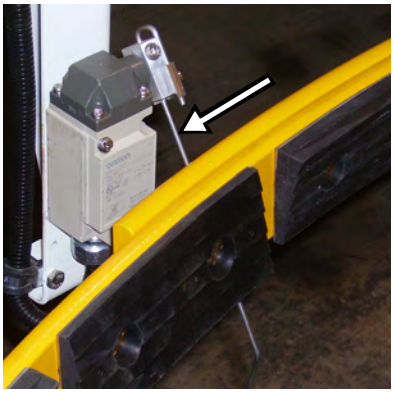
Figure 3-50 Arm Stowed limit switch

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, 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 the limit switch nut.
   - **3 b.** Adjust the rod (see Figure 3-51) so that the gripper finger will trigger the limit switch (click sound) and turn off the warning light.

Figure 3-51 Limit switch rod



3 c. Retighten up the nut.

4. Slightly close the gripper or extend the arm out (about 1 inch).

   The ARM EXTENDED warning light should start flashing.

5. 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 accidents, injuries or property damage.

Caution!

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

Figure 3-52 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 3-53) sends a signal to the controller module that the automated arm is in a 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:

1. Start the engine and engage the hydraulic system (PUMP switch activated).
2. Take down the grabber completely by using the joystick.
3. Fully extend the arm.

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

4. Disengage the PUMP switch and turn OFF the engine.
5. Proceed with the lockout/tagout procedure. Refer to "Locking Out and Tagging Out the Vehicle" on page 20.
6. Open the black plastic spring-equipped retracting cover that is on the top of the arm base (see Figure 3-54).

   Use a stepladder to gain access to that section of the arm.
7. Unscrew the lever screws of the limit switch (see Figure 3-55).
8. Raise or lower the detection lever a little bit and tighten up the screws (see Figure 3-55).

   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 the arm is in operation.

9. Close the black plastic, springed cover.
10. Start the engine and engage the hydraulic pump.

Caution Make sure the shut-off valve on the suction line is fully open before starting the vehicle.

11. Test the operation.
12. Repeat the procedure until the limit switch is properly adjusted.

The ARM EXTENDED warning light should go off when the arm is in a parked travel position (see Figure 3-52).

Figure 3-53 Arm Parked limit switch

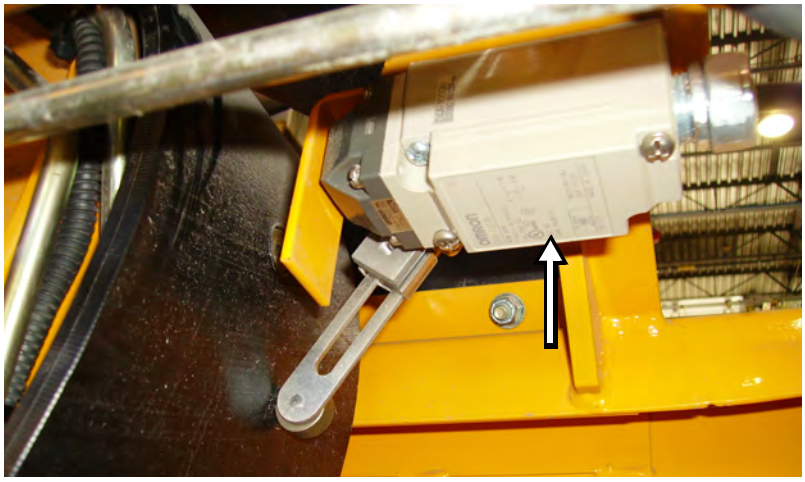


Figure 3-54 Helping-Hand™ arm base

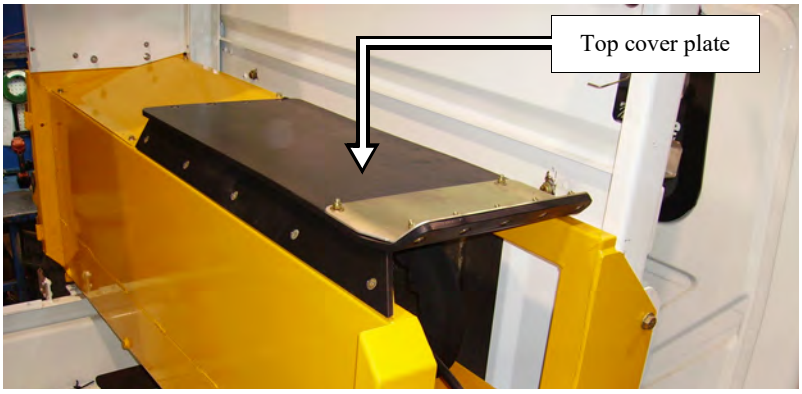
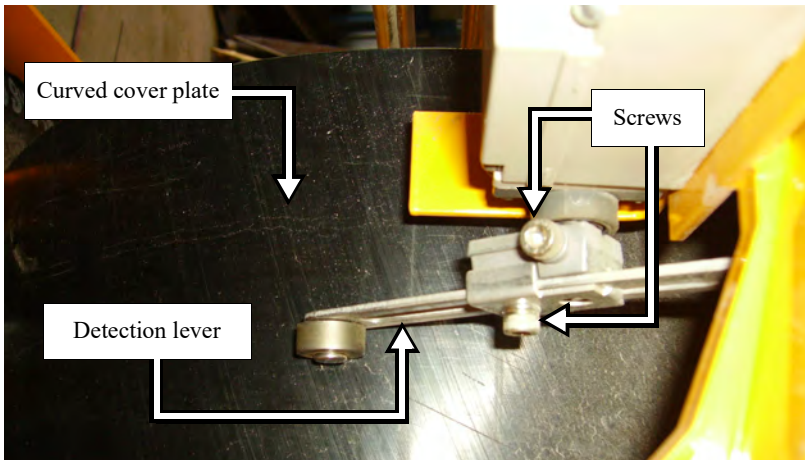


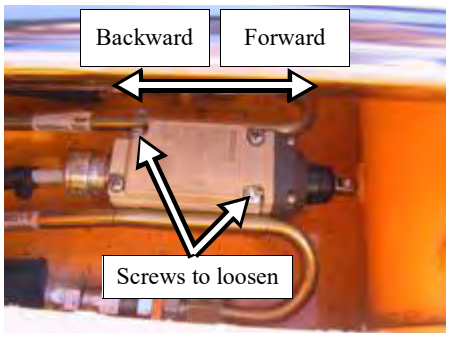
Figure 3-55 Arm Parked limit switch adjustment



Adjusting Mid-Height Limit Switch

The Mid-Height limit switch is located at the base of the Helping-Hand™ arm (Figure 3-56). 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 3-56 Mid-Height limit switch



To adjust the Mid-Height limit switch:

1. Start the engine and engage the hydraulic system (PUMP switch activated).
2. Fully extend the arm.

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

3. If not already done, raise the grabber to 90 degrees.
4. Disengage the pump and turn OFF the engine.
5. Proceed with the lockout/tagout procedure. Refer to “Locking Out and Tagging Out the Vehicle” on page 20.
6. Locate the Mid-Height limit switch at the base of the Helping-Hand™ arm.
7. Loosen the two screws indicated in Figure 3-56.
8. Slide the limit switch forward or backward to achieve proper contact with the target.
9. Retighten up the screws.
10. Start the engine and engage the hydraulic pump.

Caution Make sure the shut-off valve on the suction line is fully open before starting the vehicle.

11. Test the operation.

IMPORTANT: Make sure the contact between the limit switch and the target is made at the right place so that the gripper has the time to close on its way up (gripper auto-closing mode).

12. 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 accidents, injuries or property damage.

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

To help the various systems of your truck run smoothly and extend the life time of the many critical parts that affect performance, there is one thing that you must do and that is:

LUBRICATE, LUBRICATE AND 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 tailgate.

Also, refer to the lubrication chart(s) 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

All Labrie hydraulic systems are filled at the factory with a high-quality anti-wear hydraulic fluid meeting an ISO 32 specification. On vehicles that are used in high ambient temperatures or that sustain high duty cycles, it may be desirable to change the fluid to an ISO 46 specification which has higher viscosity. For vehicles working in colder climates or performing light duty cycles, an ISO 22 might be more appropriate. The International Standards Organization (ISO) assigns specification numbers in order that a consumer receives the same product from different suppliers.

ISO Grade	22	32	46
Viscosity @ 100 F, SUS	115	163	231
Viscosity @ 210 F, SUS	43	47	53
Viscosity Index (Min.)	160	147	153
Pour Point	-65 F	-60 F	-54 F

Other important points to note:

- The oil must contain anti-wear and anti-foam additives, rust and oxidation neutralizers and self-protecting agents.
- The oil must be absolutely clean and free of contaminants.

Any hydraulic oil that possesses such properties may be used on MINIMAX™ units.

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 analyzed 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 to the hydraulic system.

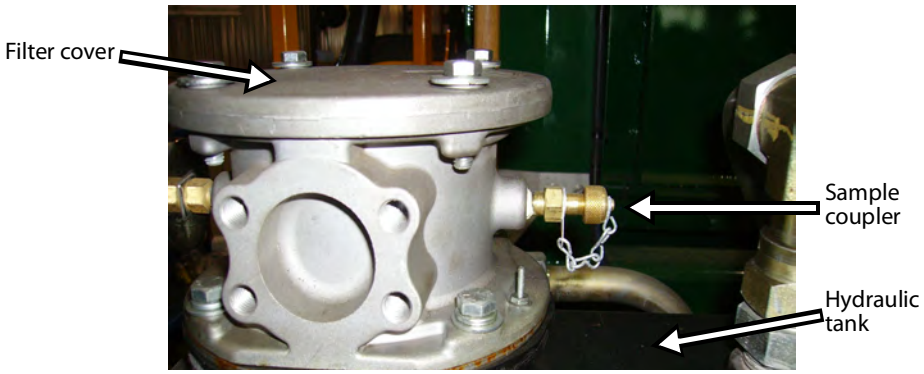
Hydraulic Oil Sample Preparation

Before taking hydraulic oil samples:

1. Apply all safety measures to ensure safety around the vehicle at all times.
2. Locate the oil sample coupler.

   It is located behind the filter cover which is on the top of the hydraulic tank.

Figure 4-1 Oil sample coupler



3. Remove the cap from the sample coupler and clean the coupler with a clean rag.
4. 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). During this operation, the pump must be engaged.

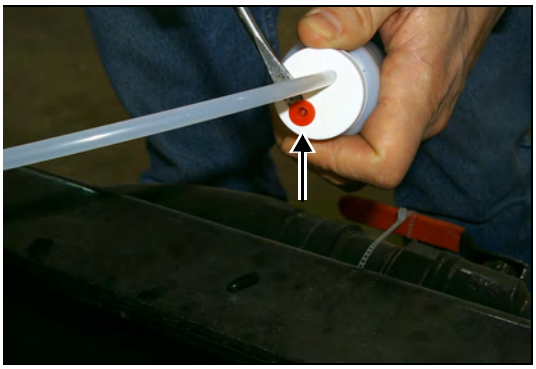
Taking an Oil Sample

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

To do so:

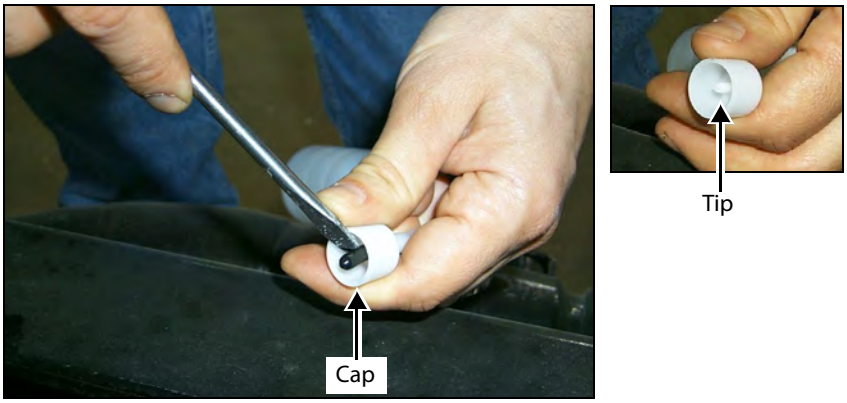
1. Remove the sample kit from its bag and, using a screw driver, remove the vent cap from the bottle cap.

Figure 4-2 Vent cap



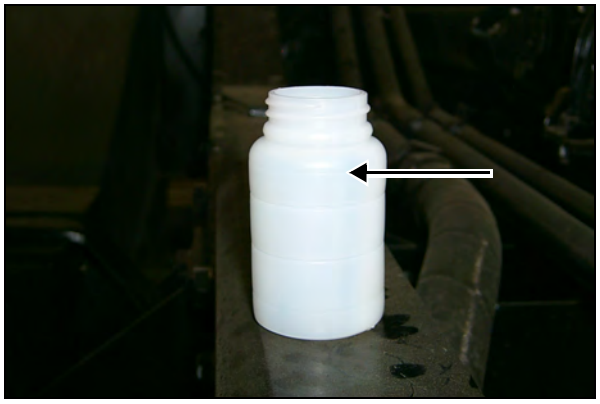
2. Remove the protective cap from the probe.

Figure 4-3 Probe cap and tip



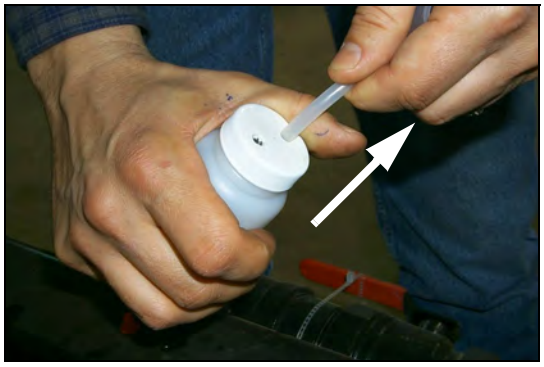
3. Install the probe on the coupler to fill the sample bottle. Use an EMA coupler with M16×2.0 threads.
4. Fill the bottle to the level mark (the pump must be engaged to do this). Remove excess oil through the vent. *DO NOT OPEN THE BOTTLE!*

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



6. Put the seal cover over the bottle cap.

Figure 4-6 Sealing the bottle

Sealed sample

7. Fill the identification form (sticker) and apply it on the sample bottle.

Figure 4-7 Identification form (sticker)

Lubrication Charts

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

Figure 4-8 Lubrication charts on a MINIMAX™ vehicle

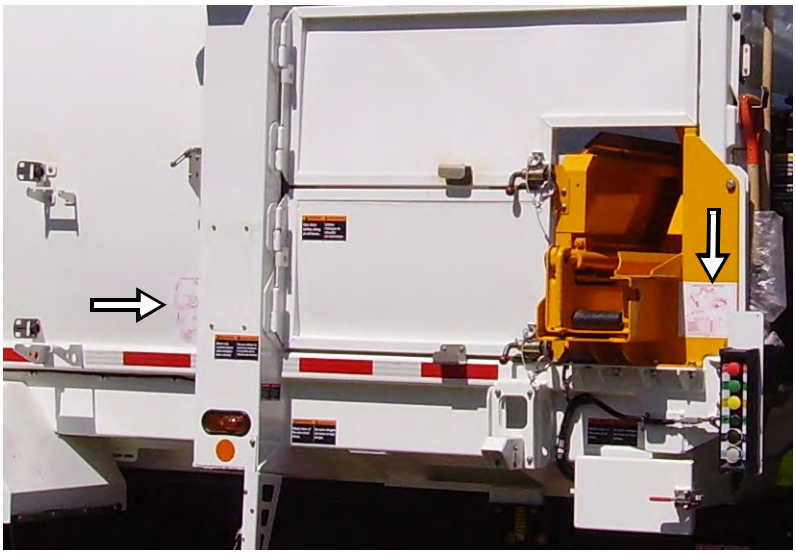
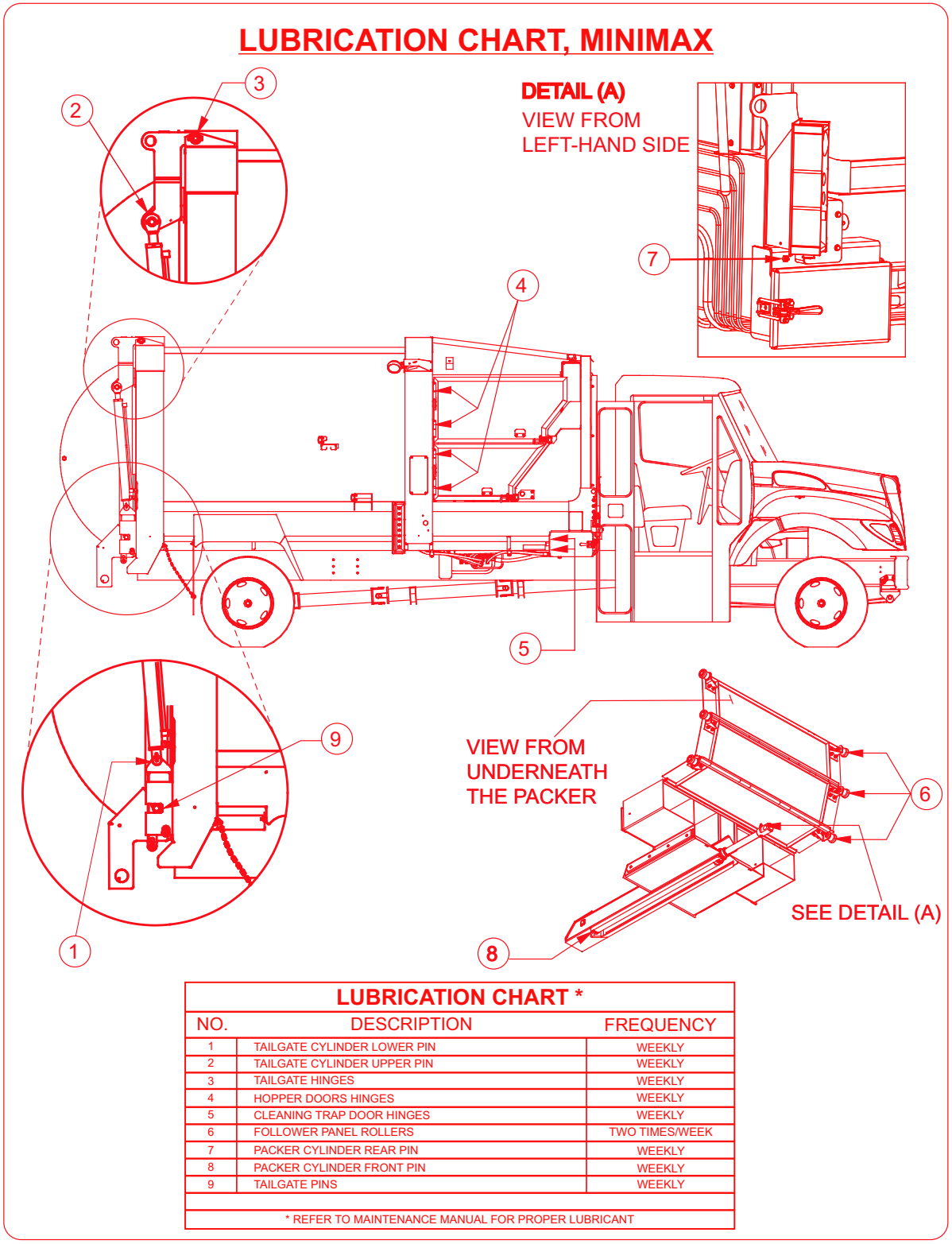
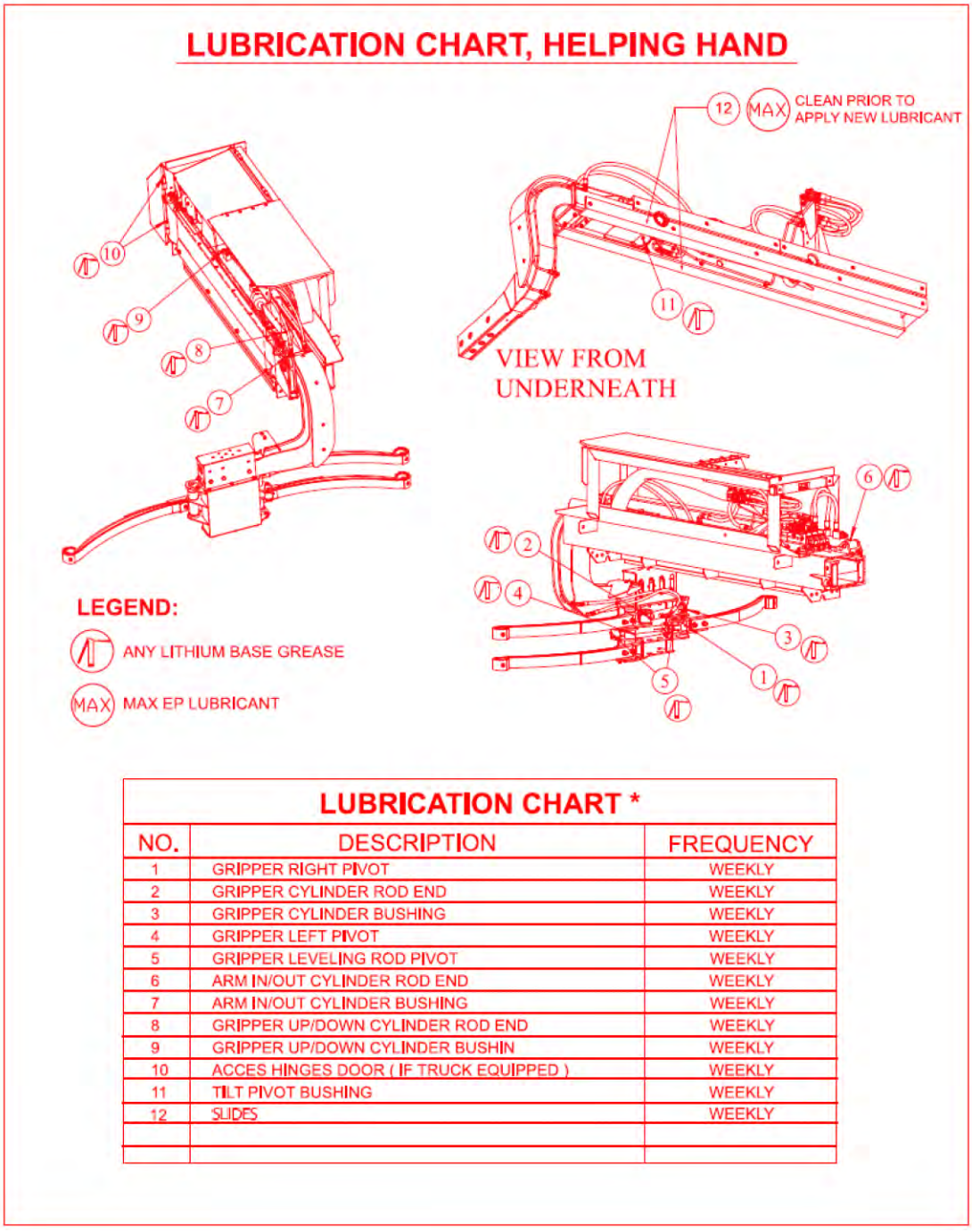


Figure 4-9 Lubrication chart - MINIMAX™



LUBRICATION CHART *		
NO.	DESCRIPTION	FREQUENCY
1	TAILGATE CYLINDER LOWER PIN	WEEKLY
2	TAILGATE CYLINDER UPPER PIN	WEEKLY
3	TAILGATE HINGES	WEEKLY
4	HOPPER DOORS HINGES	WEEKLY
5	CLEANING TRAP DOOR HINGES	WEEKLY
6	FOLLOWER PANEL ROLLERS	TWO TIMES/WEEK
7	PACKER CYLINDER REAR PIN	WEEKLY
8	PACKER CYLINDER FRONT PIN	WEEKLY
9	TAILGATE PINS	WEEKLY
* REFER TO MAINTENANCE MANUAL FOR PROPER LUBRICANT		

Figure 4-10 Lubrication chart - HELPING-HAND™ arm



LUBRICATION CHART *		
NO.	DESCRIPTION	FREQUENCY
1	GRIPPER RIGHT PIVOT	WEEKLY
2	GRIPPER CYLINDER ROD END	WEEKLY
3	GRIPPER CYLINDER BUSHING	WEEKLY
4	GRIPPER LEFT PIVOT	WEEKLY
5	GRIPPER LEVELING ROD PIVOT	WEEKLY
6	ARM IN/OUT CYLINDER ROD END	WEEKLY
7	ARM IN/OUT CYLINDER BUSHING	WEEKLY
8	GRIPPER UP/DOWN CYLINDER ROD END	WEEKLY
9	GRIPPER UP/DOWN CYLINDER BUSHIN	WEEKLY
10	ACCES HINGES DOOR (IF TRUCK EQUIPPED)	WEEKLY
11	TILT PIVOT BUSHING	WEEKLY
12	SLIDES	WEEKLY

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!

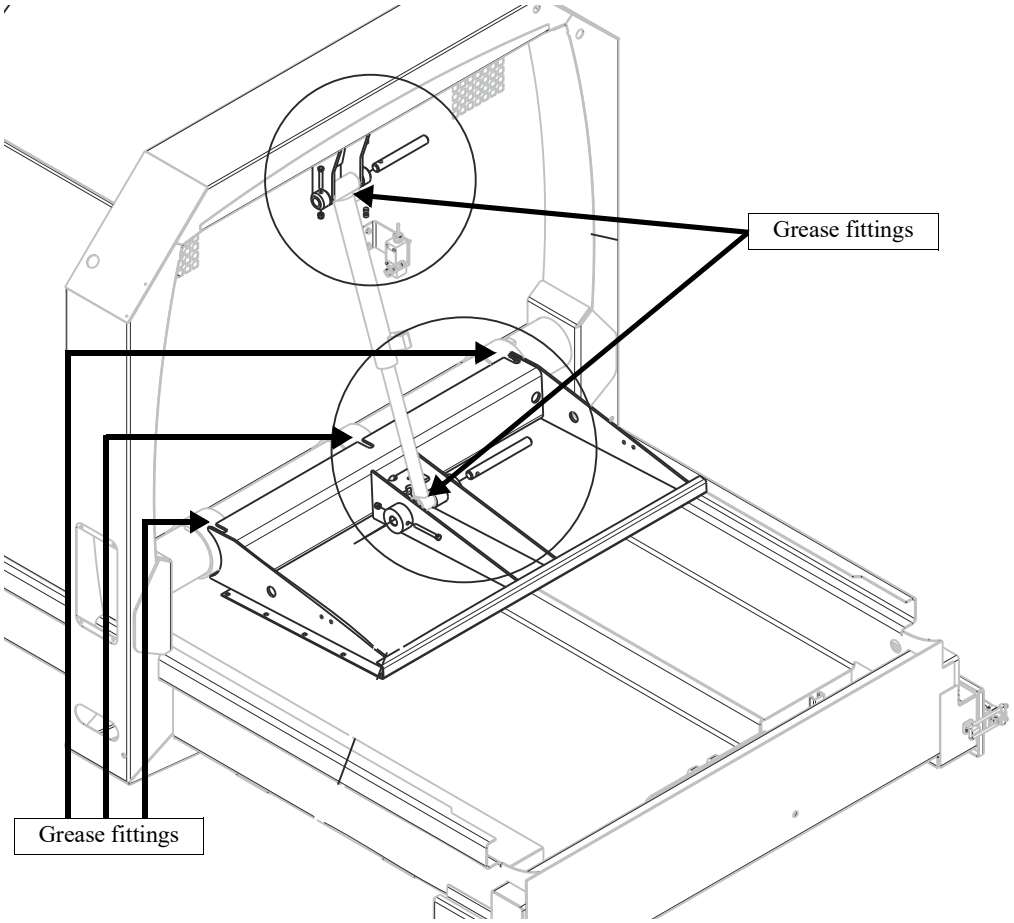
Because of their intensive use, the packer and its accessories must be lubricated every working day.

Greasing the Optional 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 69) as per the lubrication schedule.

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

Also, inspect the welds around the 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; and
- tailgate rubber seal.

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

Figure 4-12 Grease fitting at tailgate hinge

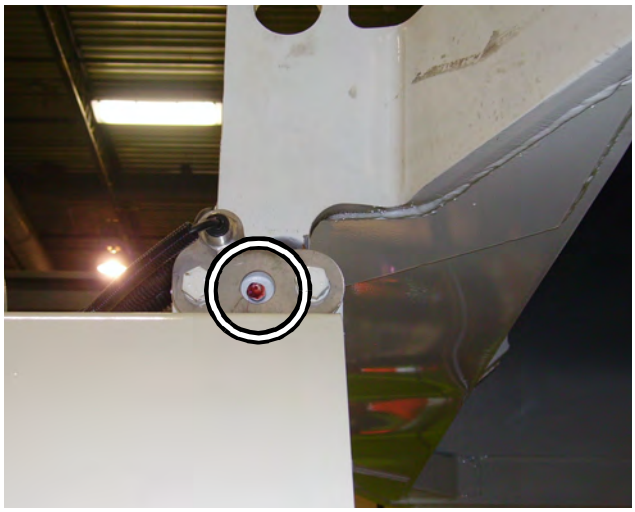


Figure 4-13 Grease fitting on cylinder upper pin

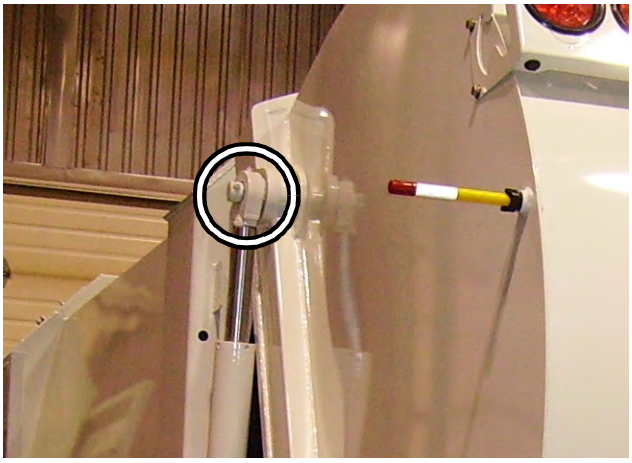
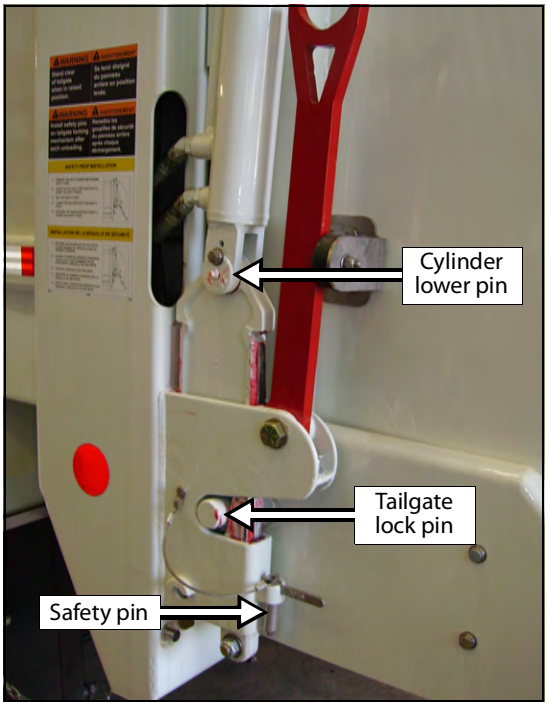


Figure 4-14 Locking mechanism and cylinder lower section



Packer

Packer components that need to be lubricated include the follower panel rollers and the cylinder rear/front pins. Use multipurpose grease (see *Recommended Lubricants* on page 69) 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

A. To lubricate the packer cylinder *front* pin:

1. Start the engine and engage the hydraulic system (PUMP switch activated).
2. Fully open the tailgate and install the tailgate safety prop.
3. Extend the cylinder in EJECT mode to get the front of the cutter blade out of the body.
4. Disengage the pump and turn OFF the engine.
5. Proceed with the lockout/tagout procedure. Refer to "Locking Out and Tagging Out the Vehicle" on page 20.
6. Underneath the front of the cutter blade, locate the grease fitting of the cylinder front pin.
7. Apply lubricant.

Figure 4-15 Cutter blade

B. To lubricate the packer cylinder *rear* pin:

1. Turn OFF the engine and disengage the hydraulic pump.
2. Proceed with the lockout/tagout procedure. Refer to "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

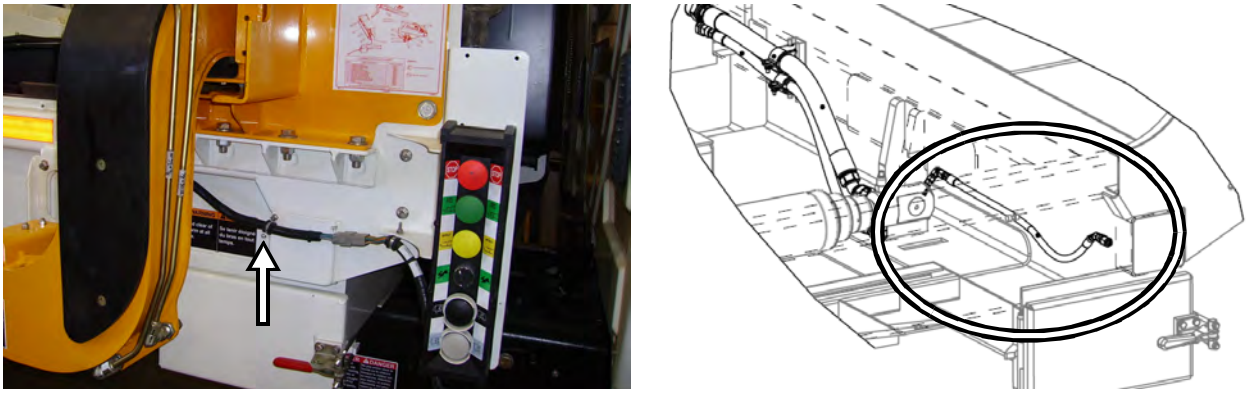
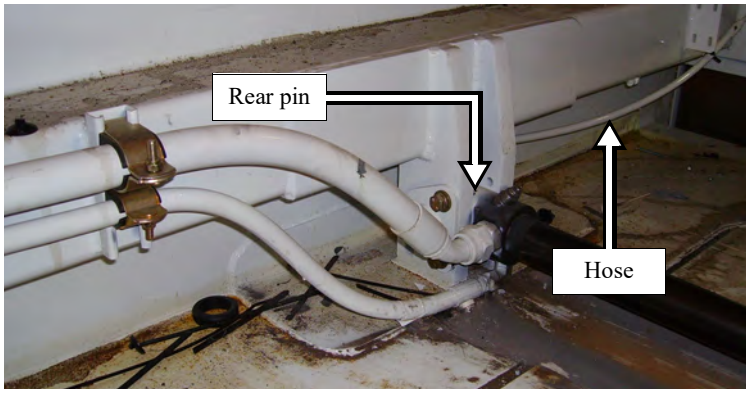


Figure 4-17 Cylinder rear pin and remote grease fitting hose



Follower Panel Rollers

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

1. Start the engine and engage the hydraulic system (PUMP switch activated).
2. Fully retract the packer.
3. Turn OFF the engine and disengage the hydraulic pump.
4. Proceed with the lockout/tagout procedure. Refer to "Locking Out and Tagging Out the Vehicle" on page 20.
5. On the front hopper wall behind the cab, locate both access cover plates (see Figure 4-19).
6. Remove the cover plates.
7. Proceed with the lubrication of all 6 follower panel rollers.
8. Once the lubrication process completed, put back both access cover plates.

Figure 4-18 Follower panel rollers

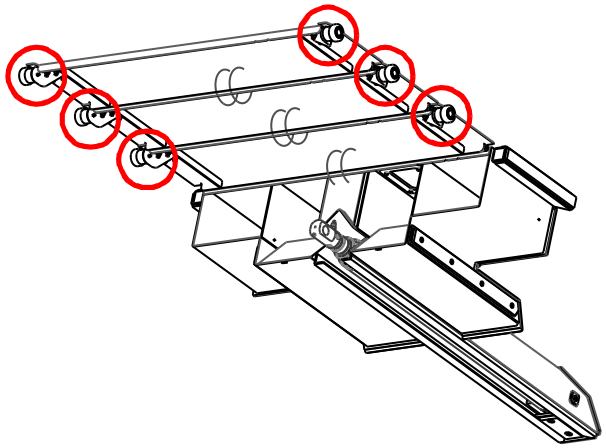
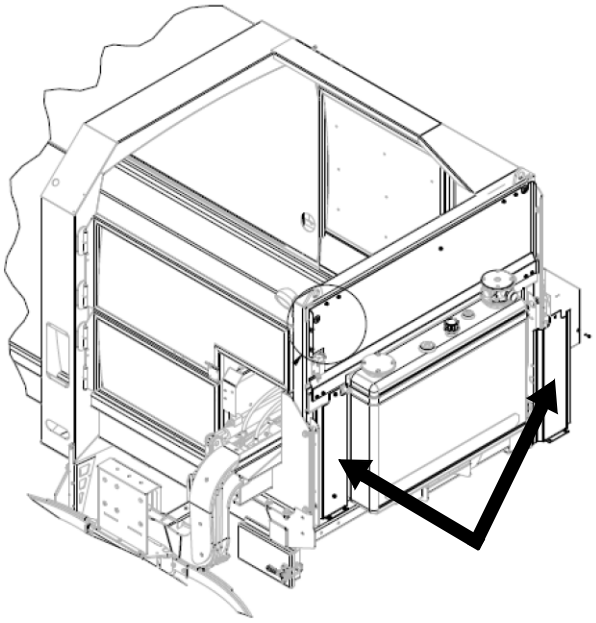


Figure 4-19 Access cover plates



NOTE: Rollers need lubrication, roller tracks do not. Grease on the tracks will cause the rollers to slide. Keep the tracks clean and dry.

Hopper Door Hinges

To protect and reduce wear on hopper door hinges, lubricate them regularly with multipurpose grease (see *Recommended Lubricants* on page 69).

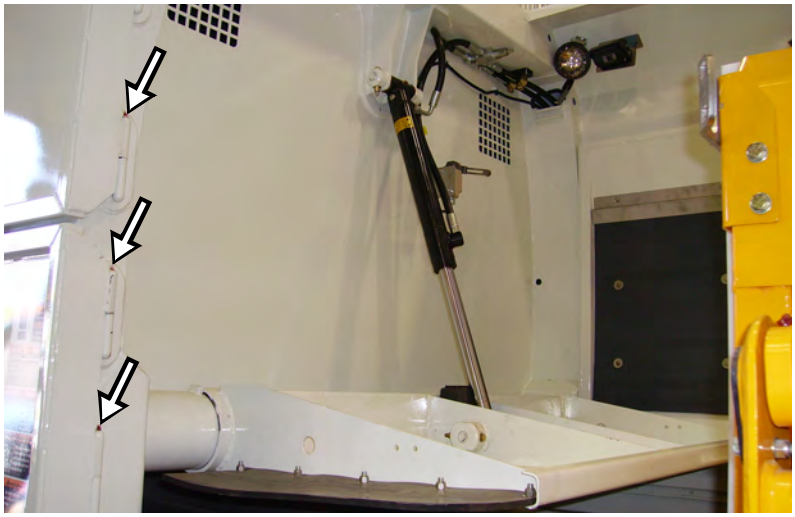
To lubricate the hopper door hinges:

1. Turn OFF the engine and disengage the hydraulic pump.

2. Proceed with the lockout/tagout procedure. Refer to “Locking Out and Tagging Out the Vehicle” on page 20.
3. Fully open all hopper doors.
4. Locate the grease fitting on the top of each door hinge.
5. Apply lubricant with a grease gun.

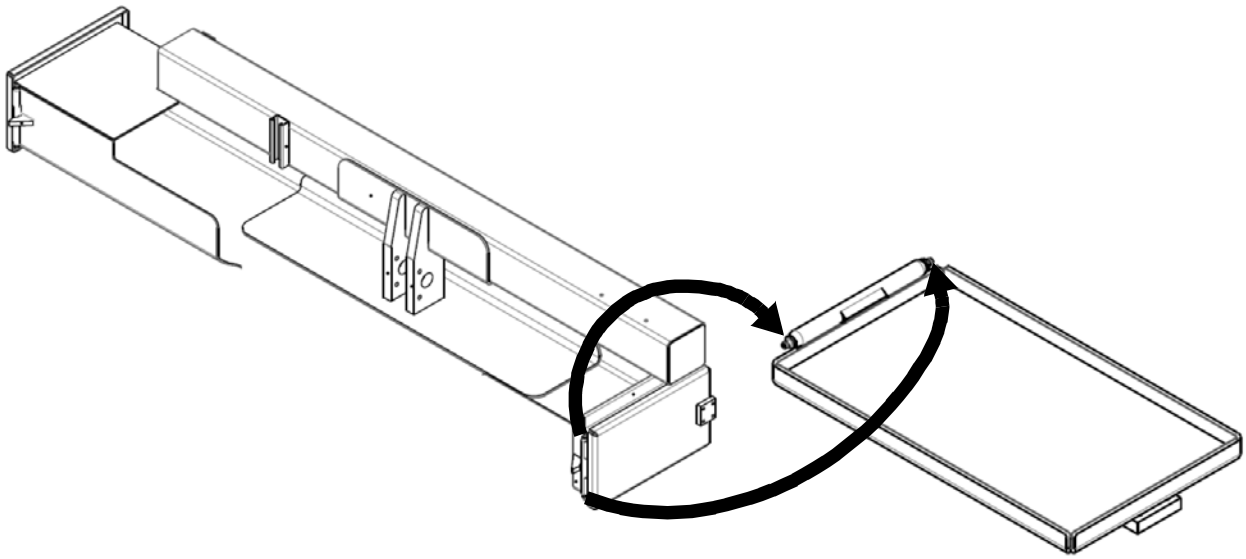
   There are 2 hinges on each hopper door for a total of 6.

Figure 4-20 Grease fittings on top of door hinges



Sump Box

Figure 4-21 Sump box lubrication points



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 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 lease once a month, and adjust pressure if necessary (see *Steel hydraulic tank* on page 106).

- 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 the yellow (see Figure 5-1), whichever comes first (see *Replacing Filter Elements* on page 120).
- 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 the yellow (see Figure 5-1), whichever comes first (see *Cleaning the Strainer* on page 117).
- Hydraulic oil must be replaced at least once a year, or when contaminated (see *Emptying the Hydraulic Tank* on page 115).

NOTE: The ball valve (or shut-off valve) on the hydraulic tank (see Figure 2-13) 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 the yellow (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.

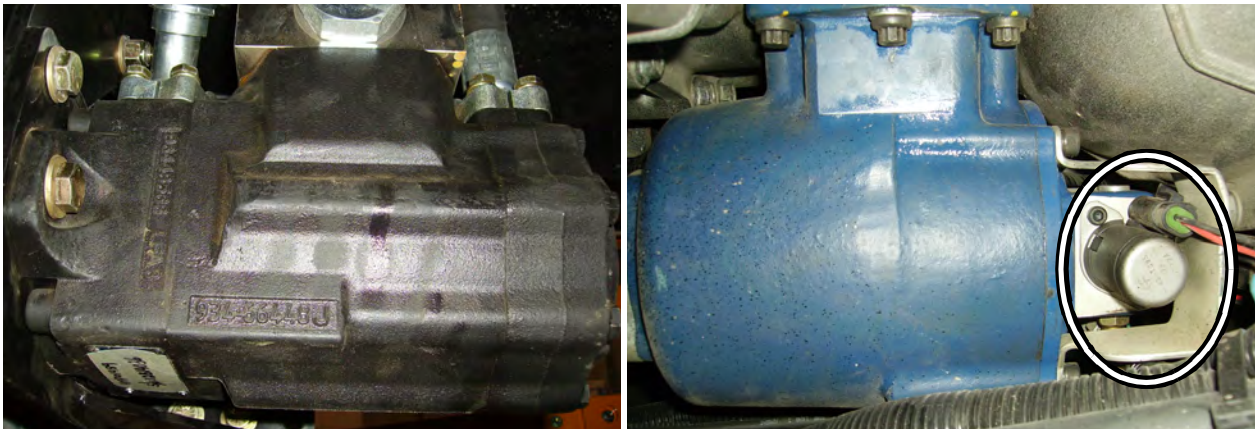
It is recommended to have the hydraulic fluid tested and analyzed by a lab to prevent hydraulic system or pump breakdown. This will also optimize the frequency of hydraulic fluid changes.

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)



MINIMAX™ vehicles may be equipped with a mechanical/electric dump valve. On units not equipped with a dump valve, the hydraulic flow is instead controlled by modulated electrical signals produced by the multiplexed 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 the vehicle and the 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 the engine speed exceeds 900 RPM, the vane pump will not engage. After the pump is engaged, it will stay as is at any engine speed under 2300 RPM (for more information, see *Allison Transmission Parameters* on page 187).

The first section of the vane pump, known as the *body* vane pump, powers all body functions (tailgate, crusher panel [if equipped], packer, side bucket [if equipped] and cart tipper [if equipped]) 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 89). 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 system, this control valve powers all body functions (tailgate, packer and optional crusher panel, side bucket and cart tipper).

Figure 5-3 3- section 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 124. To learn how to adjust hydraulic pressure, see *Hydraulic Pressures* on page 107.

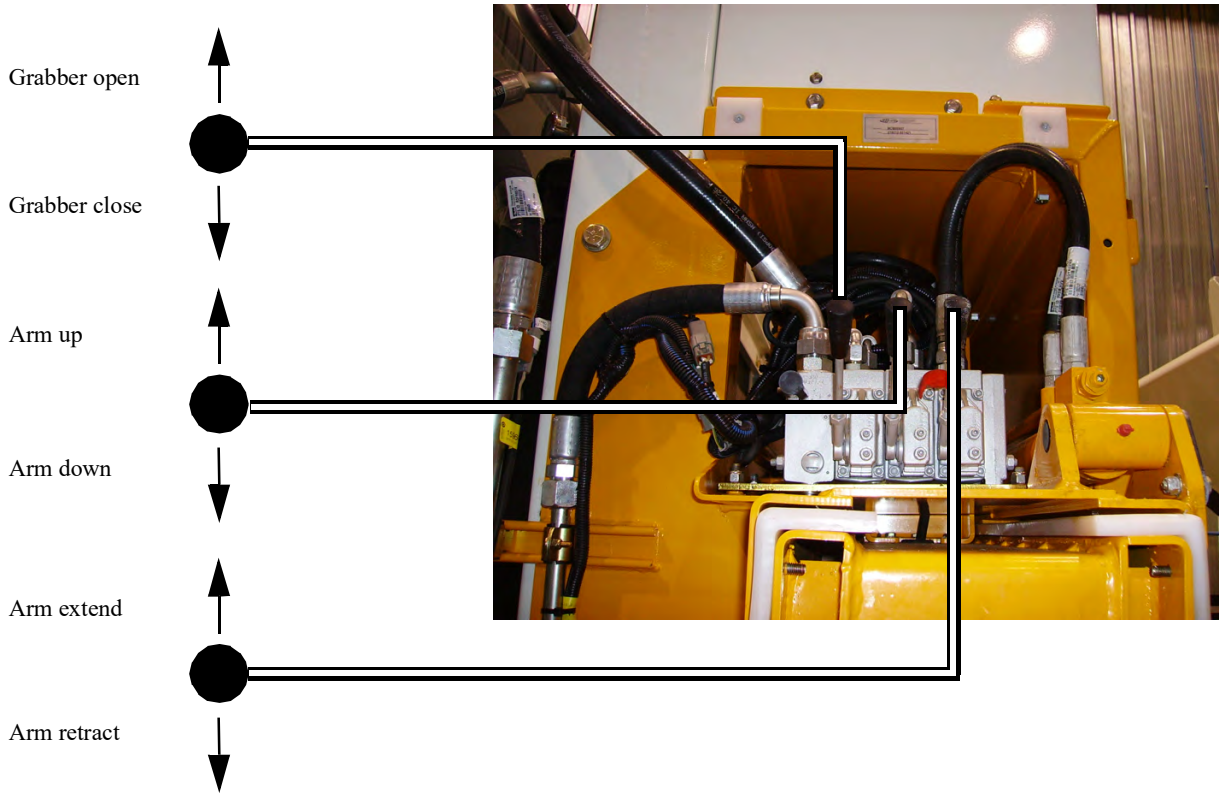
Arm Control Valve

MINIMAX™ vehicles are also equipped with an arm control valve (see Figure 5-4). As part of the *arm* vane pump system, 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[1]. 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

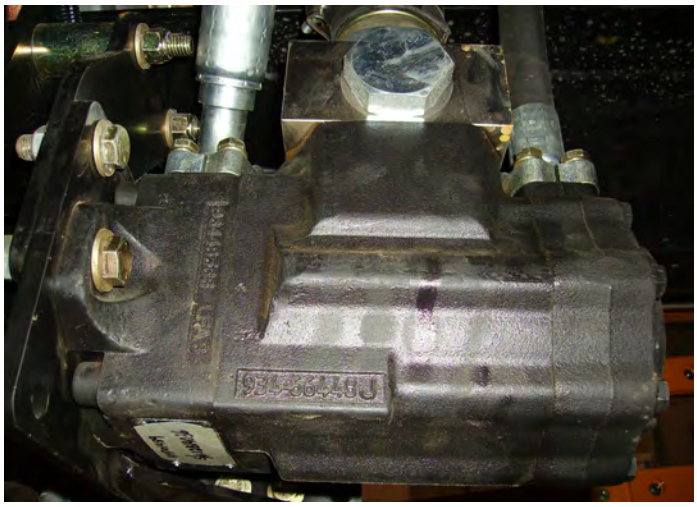
1. **Except for the gripper section of the valve which does not modulate the hydraulic flow into the gripper cylinder.**

- **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.
2. Check the pump turns freely without excessive noise or vibrations.
3. Turn OFF the pump and stop the engine.
4. Lock out and tag out the vehicle (see *Locking Out and Tagging Out the Vehicle* on page 20).
5. Check for oil leaks under the pump and at connection points.
6. If electrical problems occurred with the pump, see *Pump* on page 153.

Caution!

If the unit has to be driven away for repairs on the hydraulic system, remove the drive shaft between the engine and the pump before restarting the engine.
Not required on a unit equipped with a hot-shift PTO.

Pump Replacement

Occasionally, circumstances such as a broken pump drive shaft, a leaking or noisy pump or a lack of hydraulic pressure or oil flow may necessitate the replacement of the pump.

Before proceeding with the replacement of the pump, determine the type of pump setup that is used on your MINIMAX™ unit. There are 3 types of pump setups: front-mounted, PTO-driven mounted (pump connected to PTO via a drive shaft) and direct mount PTO. Basically, each setup calls for the same replacement method but with some differences due to the position of the pump.

A. **To replace a front-mounted hydraulic pump**, perform the following procedure:

1. Disengage the pump and turn OFF the engine.
2. 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).
3. Close the shut-off valve (see Figure 2-13).
4. Loosen the breather cap on the hydraulic tank to depressurize the tank.

   If tank is of the pressurized type.
5. Remove the pump guard.

Figure 5-6 Pump guard

6. Disconnect the electric coil on the dump valve (if equipped).
7. Place a pan under the pump to catch dripping oil and unscrew all hydraulic hoses (4) that are attached to the pump.

Caution!

Before disconnecting the hydraulic hoses from the pump, place a pan under the pump to catch oil that may drip down from the disconnected lines.

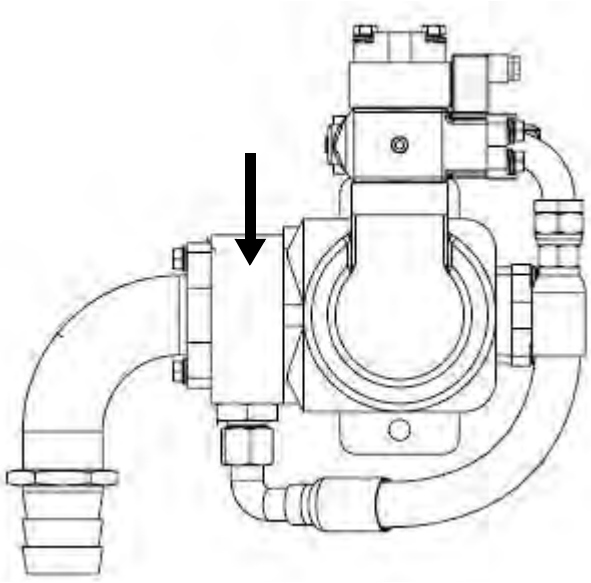
8. Remove the dump valve (if equipped).

NOTE: The dump valve is usually, but not necessarily, located atop the pump.

NOTE: Always reinstall the dump valve and its components (shims, block assembly) as they were before uninstallation. Make sure you do not invert them.

9. Remove the suction block (see Figure 5-7) and save it for the new pump.

Figure 5-7 Suction block



10. Disconnect the drive shaft by removing the 4 bolts that secure the shaft to the engine.

    Some mechanics may rather want to disconnect the drive shaft from the pump.

    The choice is up to the mechanics and is based on the type of chassis the vehicle is built on.

11. Attach the pump to a lifting device and remove both 5/8" bolts that hold the pump to the pump support.

12. Remove the pump.

    If need be, disconnect the drive shaft from the pump and save it for the replacement pump.

13. Install the new pump.

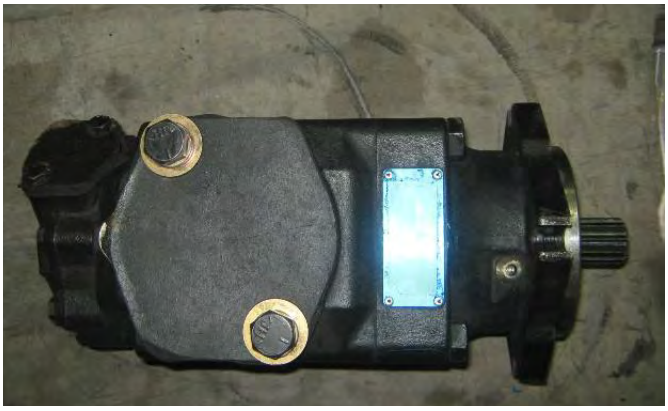
    Before attempting to install the new pump, it is very important to check the port configuration on that pump; the ports on the replacement pump must be positioned the same way as on the old pump. If they are not, proceed with the indexing of the new pump.

    The replacement pump must be oriented in such a way to facilitate reconnection to the hydraulic system and attachment to the chassis frame.

NOTE: Both sections of the pump are indexable: the body section and the arm section.

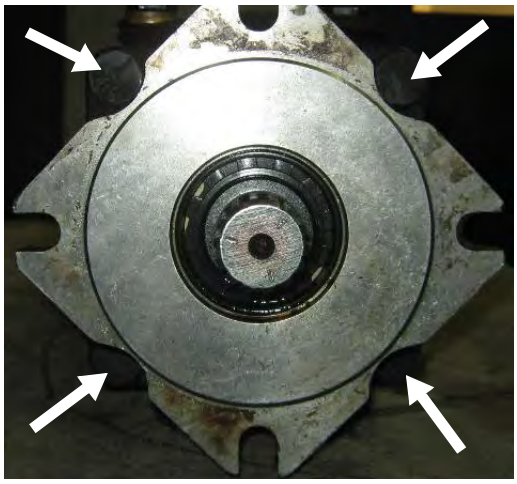
To index the new pump, proceed this way:

13 a. Put the pump on a flat surface or in a vise.

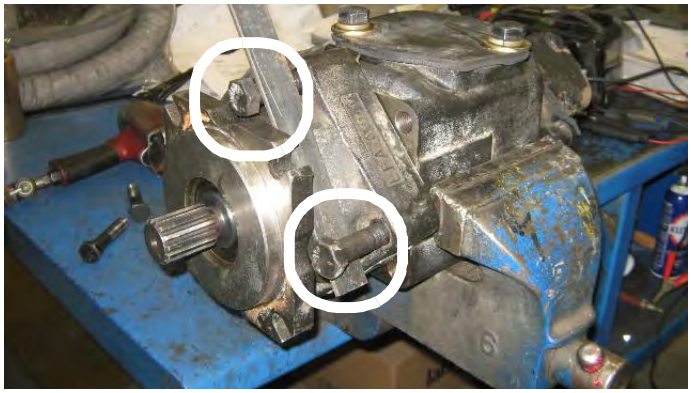


BODY SECTION

13 b. Remove all 4 retaining bolts that hold the mounting cap in place.



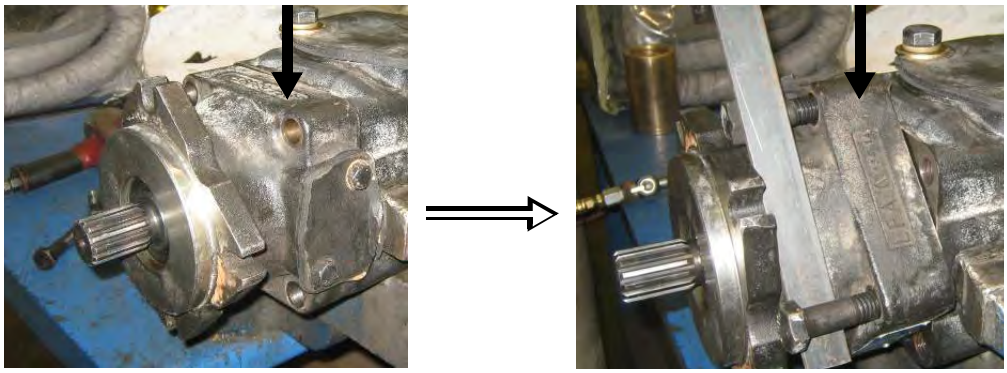
NOTE: **You may leave two retaining bolts partially unscrewed to facilitate rotation with a metallic bar.**



13 c. Rotate the mounting cap accordingly.

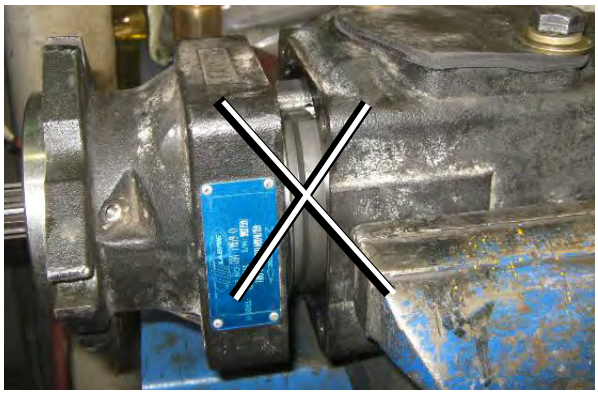
Rotation can be done by turning the mounting cap clockwise or counter-clockwise with your hands or by using a metallic bar as illustrated in the above picture.

NOTE: Make sure pump does not come apart.



NOTE: The cartridge will rotate with the housing.

IMPORTANT: Do not pull on the mounting cap because inside components may move and damage the pump.

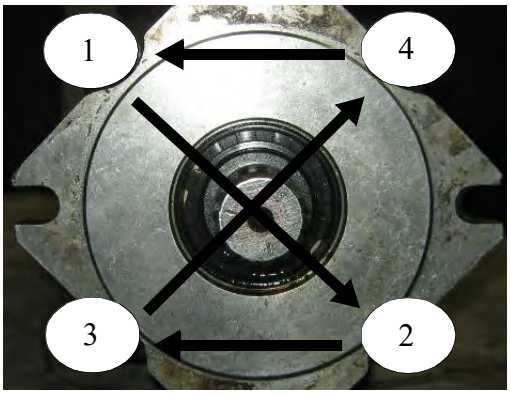


13 d. Put all 4 bolts back in place.

13 e. Check if the shaft rotates freely.

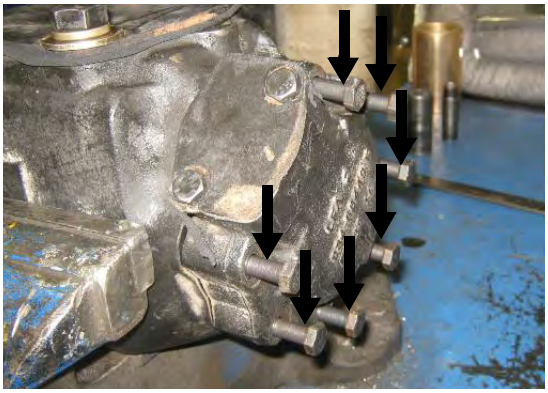
13 f. Tighten up all bolts to the torque of 138-140 ft-lb.

When tightening bolts, be sure to respect the following number sequence to avoid damaging the seals:



ARM SECTION

13 g. Remove all 7 retaining bolts that hold the front cap in place.

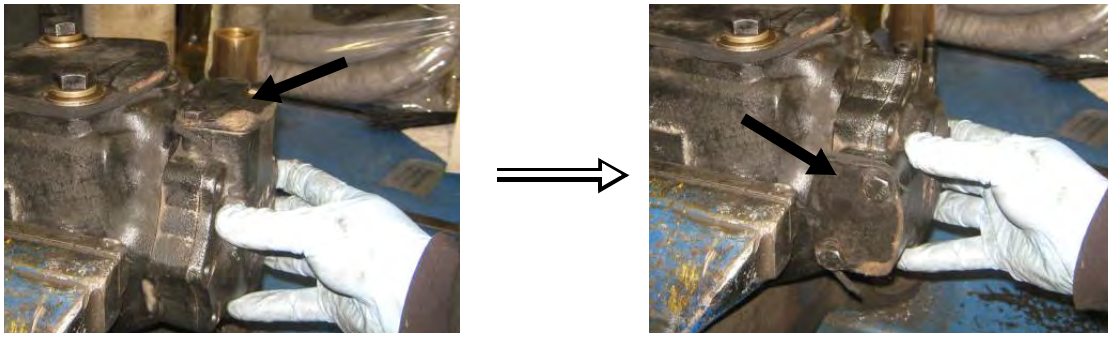


NOTE: You may leave two retaining bolts partially unscrewed to facilitate rotation with a metallic bar.

13 h. Rotate the front cap accordingly.

Rotation can be done by turning the front cap clockwise or counter-clockwise with your hands or by using a metallic bar.

NOTE: Make sure pump does not come apart.



IMPORTANT: Be sure not to pull on the front cap. Otherwise, the dowel pin may leave its position in the housing causing damage to the pump.

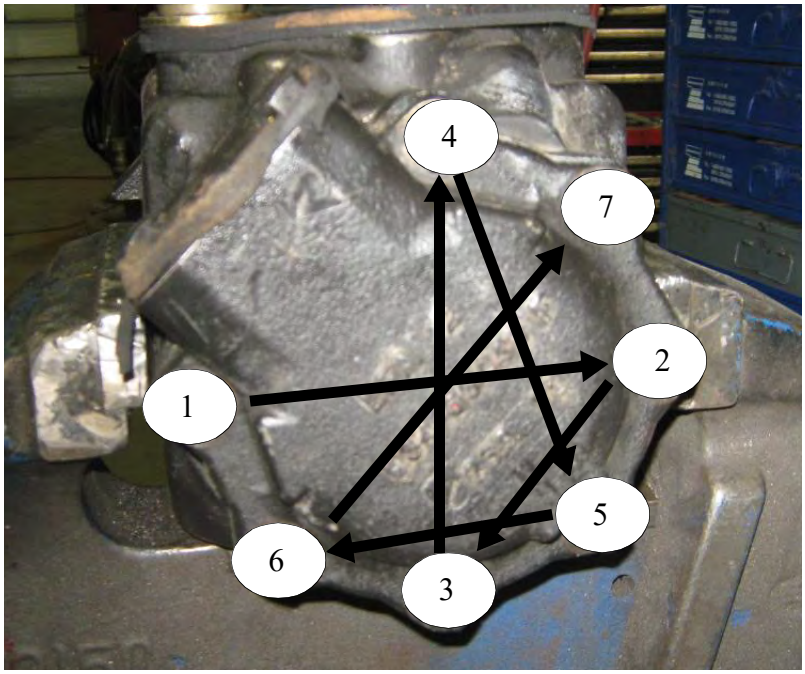
NOTE: The cartridge will rotate with the housing.

13 i. Put all 7 bolts back in place.

13 j. Check if the shaft rotates freely.

13 k. Tighten up all bolts to the torque of 50 ft-lb.

When tightening bolts, be sure to respect the following number sequence to avoid damaging the seals:



14. Reinstall the drive shaft if it has been removed from the engine.

Before proceeding with the installation of the drive shaft apply the following procedure:

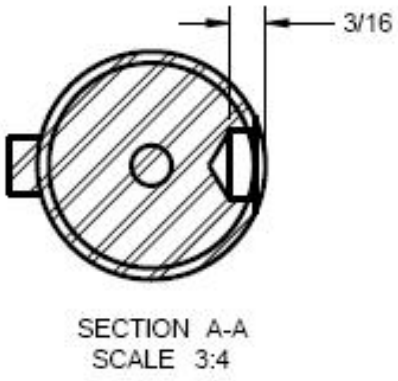
14 a. On the drive shaft mark the location where a hole must be drilled.

Use the yoke as a jig to determine where exactly the hole must be drilled then remove it.

NOTE: The yoke must be fully engaged on the shaft before determining the exact location where the hole must be drilled.

14 b. Drill a hole with a 5/16" diameter on the drive shaft.

Figure 5-8 Depth of hole to be drilled



14 c. Reinstall the drive shaft.

14 d. Place the yoke on the shaft as illustrated on page 103.

The yoke must be fully engaged on the shaft with both holes aligned (one hole over the other).

14 e. Apply Loctite 243 (medium strength) to bolt threads and insert the bolt firmly into the holes to properly secure the yoke to the shaft.

14 f. Install a steel wire on the yoke bolt (the wire must be fixed tight around the bolt) [see Figure 5-13].

15. Using a lifting device, install the new pump on the pump support.

16. Put both 5/8" bolts back in to secure the pump to the plate.

17. Go through Steps 9 to 5 inclusively to reinstall the various components of the pump assembly.

18. Retighten the breather cap (if applicable).

19. Prime the new pump (see *Priming a New Pump* on page 104).

20. Put the front pump guard back on (see Figure 5-6).

Caution! Check the level of hydraulic oil in the tank. Add oil if needed.

NOTE: Labrie Enviroquip Group strongly recommends you change the filter element and the hydraulic oil as well as clean the hydraulic tank after the installation of a new pump (see *Replacing Filter Elements* on page 120 and *Replacing Hydraulic Oil* on page 116).

B. **To replace a PTO-driven hydraulic pump**, perform the following procedure:

1. Disengage the pump and turn OFF the engine.

2. 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).

3. Close the shut-off valve (see Figure 2-13).

4. Loosen the breather cap on the hydraulic tank to depressurize the tank.

   If tank is of the pressurized type.

5. Disconnect the electric coil on the dump valve (if equipped).
6. Place a pan under the pump to catch dripping oil and unscrew all hydraulic hoses (4) that are attached to the pump.

Caution!

Before disconnecting the hydraulic hoses from the pump, place a pan under the pump to catch oil that may drip down from the disconnected lines.

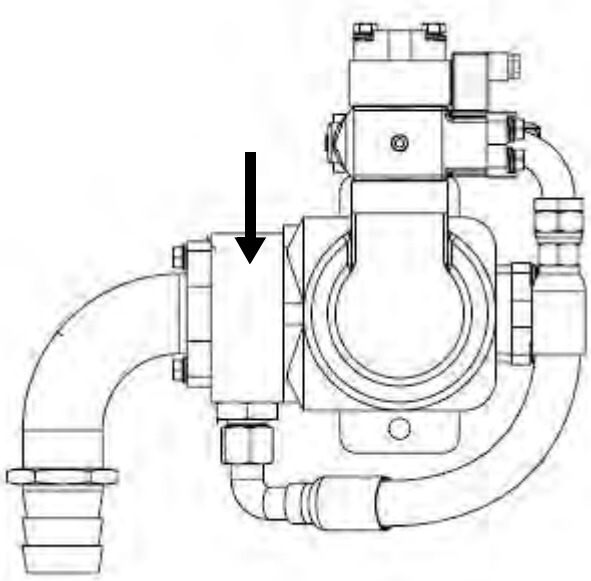
7. Remove the dump valve (if equipped).

NOTE: The dump valve is usually, but not necessarily, located atop the pump.

NOTE: Always reinstall the dump valve and its components (shims, block assembly) as they were before uninstallation. Make sure you do not invert them.

8. Remove the suction block (see Figure 5-9) and save it for the new pump.

Figure 5-9 Suction block



9. Disconnect the drive shaft by removing the 4 bolts that secure the shaft to the PTO.

   Some mechanics may rather want to disconnect the drive shaft from the pump.

   The choice is up to the mechanics and is based on the type of chassis the vehicle is built on.

10. Attach the pump to a lifting device and remove both 5/8" bolts that hold the pump to the pump support.
11. Remove the pump.

If need be, disconnect the drive shaft from the pump and save it for the replacement pump.

12. Install the new pump.

Before attempting to install the new pump, it is very important to check the port configuration on that pump; the ports on the replacement pump must be positioned the same way as on the old pump. If they are not, proceed with the indexing of the new pump.

The replacement pump must be oriented in such a way to facilitate reconnection to the hydraulic system and attachment to the chassis frame.

Go to **page 92** to know how to index the new pump; procedure begins with Step 13 a.

13. Reinstall the drive shaft if it has been removed from the engine.

Before proceeding with the installation of the drive shaft apply the following procedure:

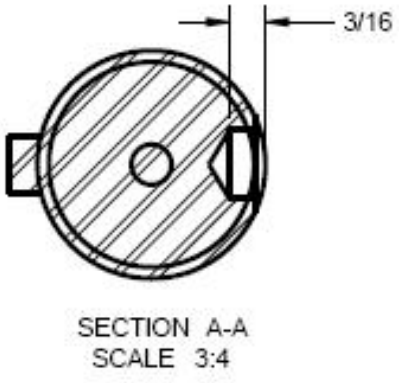
13 a. On the drive shaft mark the location where a hole must be drilled.

Use the yoke as a jig to determine where exactly the hole must be drilled then remove it.

NOTE: The yoke must be fully engaged on the shaft before determining the exact location where the hole must be drilled.

13 b. Drill a hole with a 5/16" diameter on the drive shaft.

Figure 5-10 Depth of hole to be drilled



13 c. Reinstall the drive shaft.

13 d. Place the yoke on the shaft as illustrated on page 103.

The yoke must be fully engaged on the shaft with both holes aligned (one hole over the other).

13 e. Apply Loctite 243 (medium strength) to bolt threads and insert the bolt firmly into the holes to properly secure the yoke to the shaft.

13 f. Install a steel wire on the yoke bolt (the wire must be fixed tight around the bolt) [see Figure 5-13].

14. Using a suitable lifting device, install the new pump on the pump support.

15. Put both 5/8" bolts back in to secure the pump to the plate.

16. Go through Steps 8 to 5 inclusively to reinstall the various components of the pump assembly.

17. Retighten the breather cap (if applicable).

18. Prime the new pump (see *Priming a New Pump* on page 104).

Caution! Check the level of hydraulic oil in the tank. Add oil if needed.

NOTE: Labrie Enviroquip Group strongly recommends you change the filter element and the hydraulic oil as well as clean the hydraulic tank after the installation of a new pump (see *Replacing Filter Elements* on page 120 and *Replacing Hydraulic Oil* on page 116).

C. **To replace a direct mount PTO**, apply the following procedure:

1. Disengage the pump and turn OFF the engine.
2. 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).
3. Close the shut-off valve (see Figure 2-13).
4. Loosen the breather cap on the hydraulic tank to depressurize the tank.

   If tank is of the pressurized type.
5. Disconnect the electric coil on the dump valve (if equipped).
6. Place a pan under the pump to catch dripping oil and unscrew all hydraulic hoses (4) that are attached to the pump.

Caution! Before disconnecting the hydraulic hoses from the pump, place a pan under the pump to catch oil that may drip down from the disconnected lines.

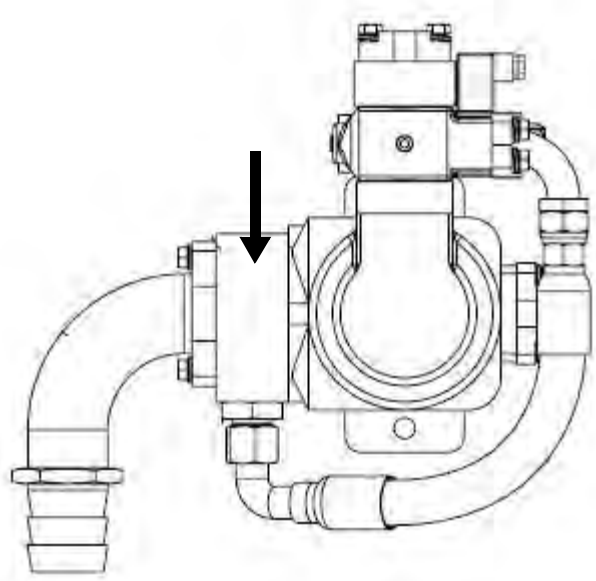
7. Remove the dump valve (if equipped).

NOTE: The dump valve is usually, but not necessarily, located atop the pump.

NOTE: Always reinstall the dump valve and its components (shims, block assembly) as they were before uninstallation. Make sure you do not invert them.

8. Remove the suction block (see Figure 5-11) and save it for the new pump.

Figure 5-11 Suction block



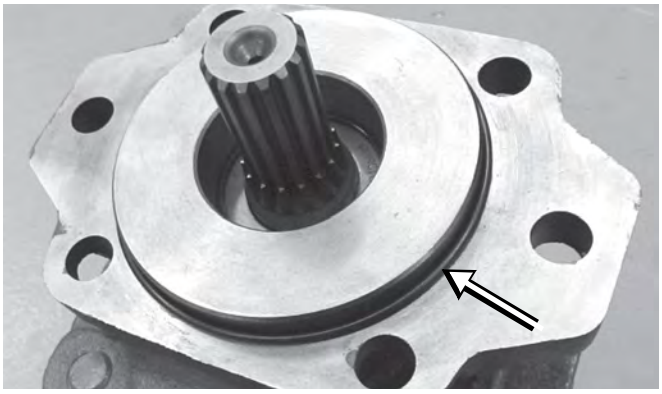
9. Attach the pump to a suitable lifting device and remove all 5/8" bolts that hold the pump to the PTO extension shaft.
10. Remove the pump.
11. Install the new pump using a suitable lifting device.

    Before attempting to install the new pump, it is very important to check the port configuration on that pump; the ports on the replacement pump must be positioned the same way as on the old pump. If they are not, proceed with the indexing of the new pump.

    The replacement pump must be oriented in such a way to facilitate reconnection to the hydraulic system and attachment to the chassis frame.

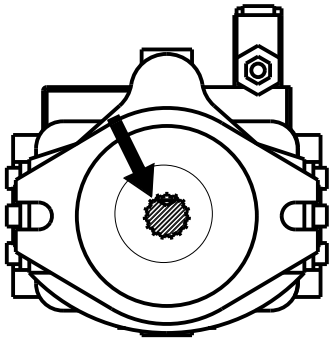
    Go to **page 92** to know how to index the new pump; procedure begins with Step 13 a.

NOTE: If the old pump had an o-ring on the front cap, the replacement pump must have a new o-ring installed. Make sure this is done before installing the pump.



12. Connect the pump to the PTO extension shaft. Align the splines on the PTO to those on the pump for ease of connection.

Figure 5-12 Splines on pump



13. Put all 5/8" bolts back in to secure the pump to the shaft.
14. Go through Steps 8 to 5 inclusively to reinstall the various components of the pump assembly.
15. Retighten the breather cap (if applicable).
16. Prime the new pump (see *Priming a New Pump* on page 104).

Caution!

Check the level of hydraulic oil in the tank. Add oil if needed.
Also check transmission oil level.

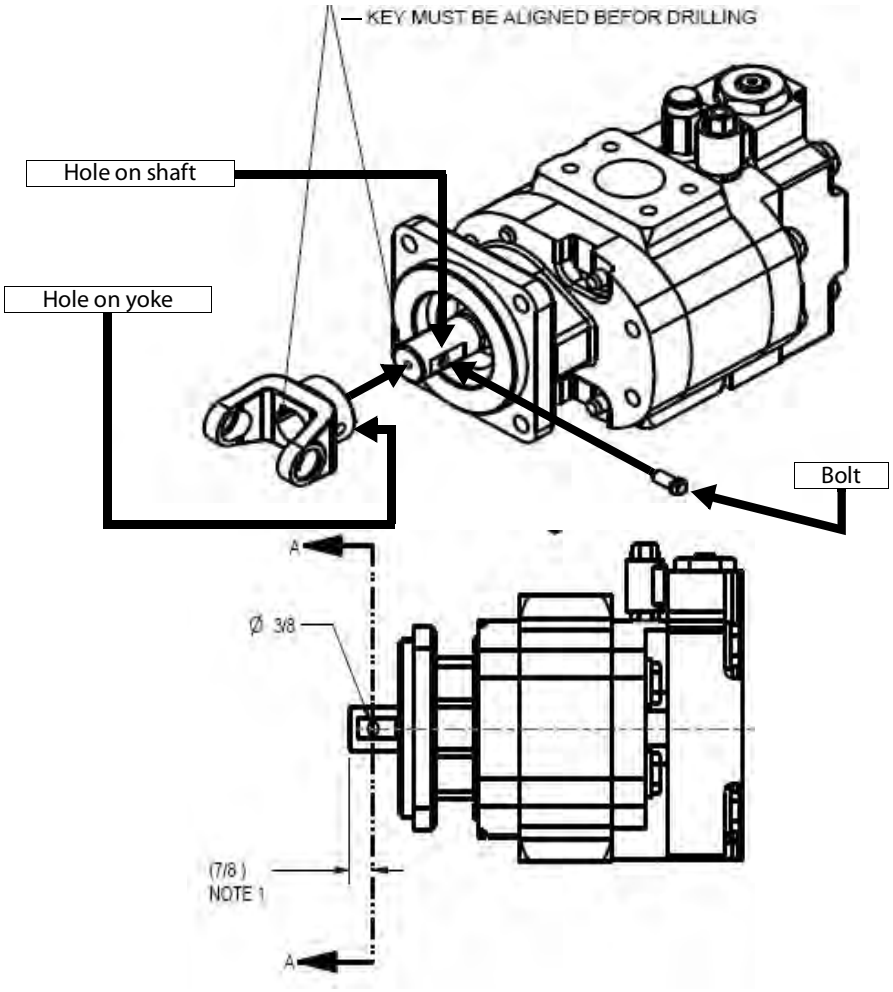
NOTE: Labrie Enviroquip Group strongly recommends you change the filter element and the hydraulic oil as well as clean the hydraulic tank before starting a new pump (see *Replacing Filter Elements* on page 120 and *Replacing Hydraulic Oil* on page 116).

Installing a Yoke-Locking Bolt

NOTE: It is important to perform this procedure after a pump replacement or a pump drive shaft replacement.

To install a yoke-locking bolt, do the following:

1. Locate the hole on the yoke and the hole on the drive shaft (see illustration below).

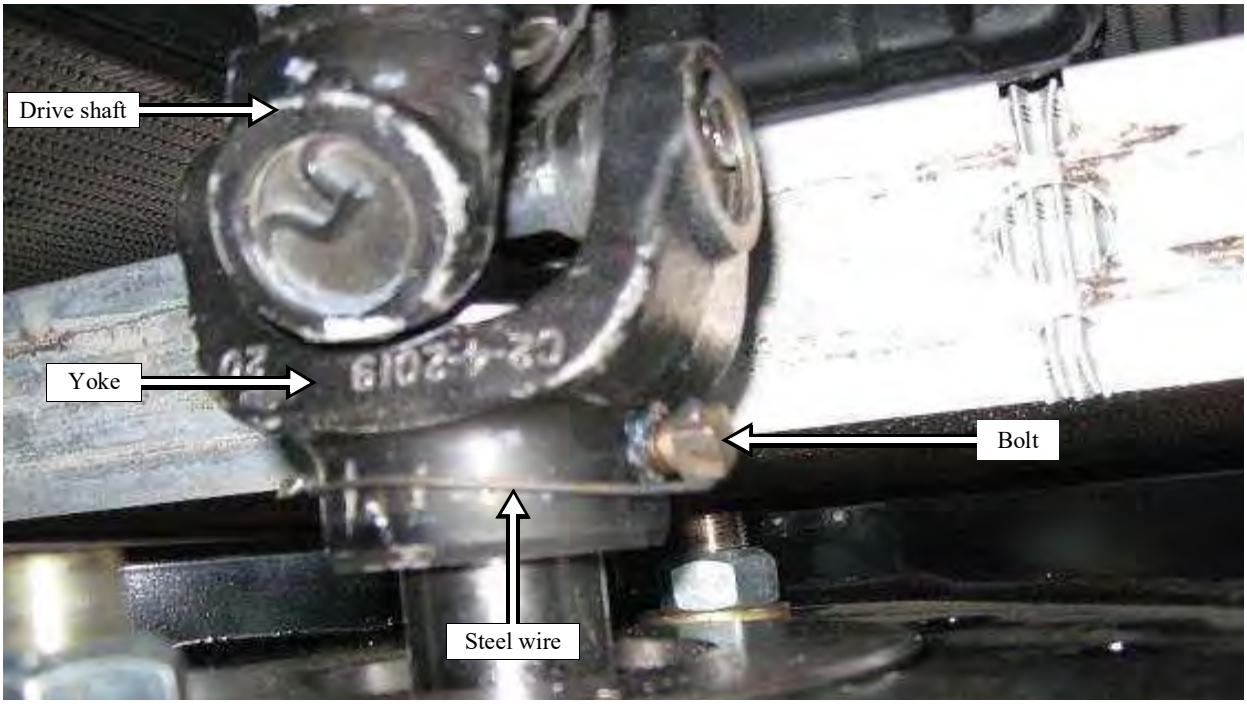


2. Place the yoke on the shaft as illustrated above.

   The yoke must be fully engaged on the shaft with both holes aligned (one hole over the other).

3. Apply Loctite 243 (medium strength) to bolt threads and insert the bolt firmly into the holes to properly secure the yoke to the shaft.
4. Install a steel wire on the yoke bolt (the wire must be fixed tight around the bolt) [see Figure 5-13].

Figure 5-13 Steel wire on yoke



NOTE: 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 shut-off valve closed (see Figure 2-13), 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 shut-off 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.

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 117 and *Replacing Filter Elements* on page 120).

Figure 5-14 Filter housing element

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

3. Make sure that the filler cap (see Figure 5-15) is not obstructed and works properly.
4. Make sure that the hydraulic oil is clean (not colored) and at least ¾ full on the oil level gauge (with all cylinders retracted) [see Figure 5-16].

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

Figure 5-15 Filler/breather cap

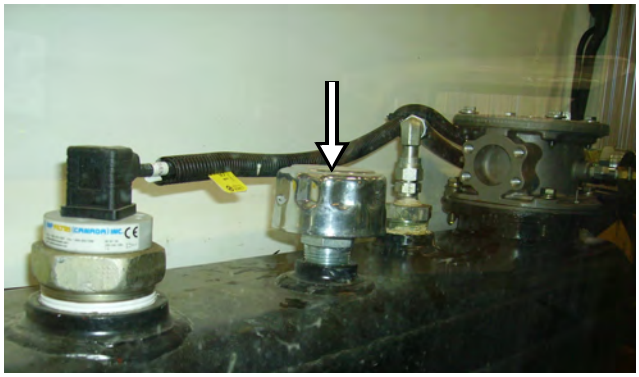


Figure 5-16 Oil temp/level gauge

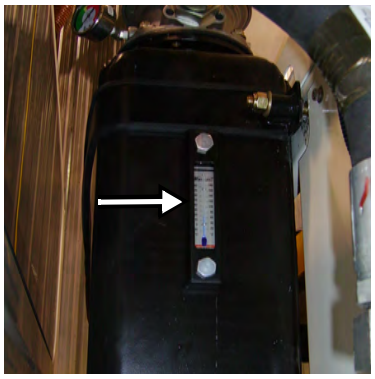
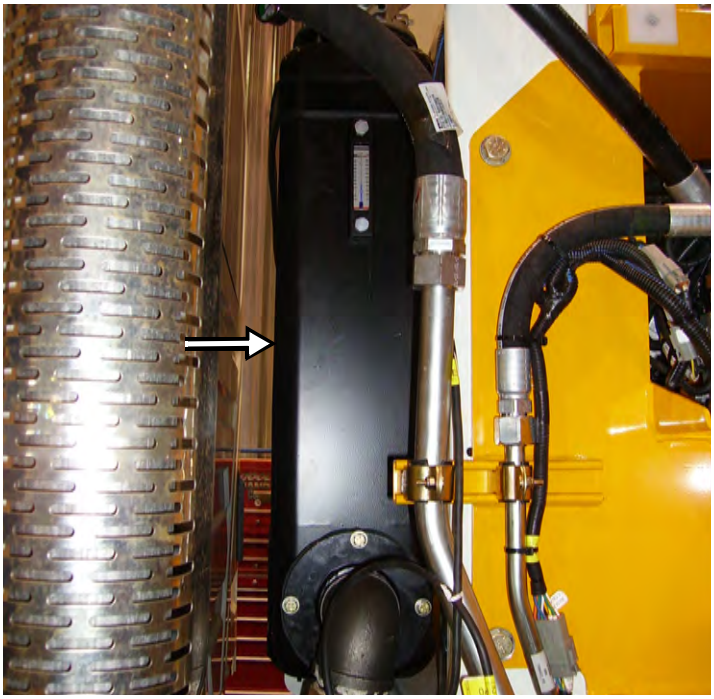


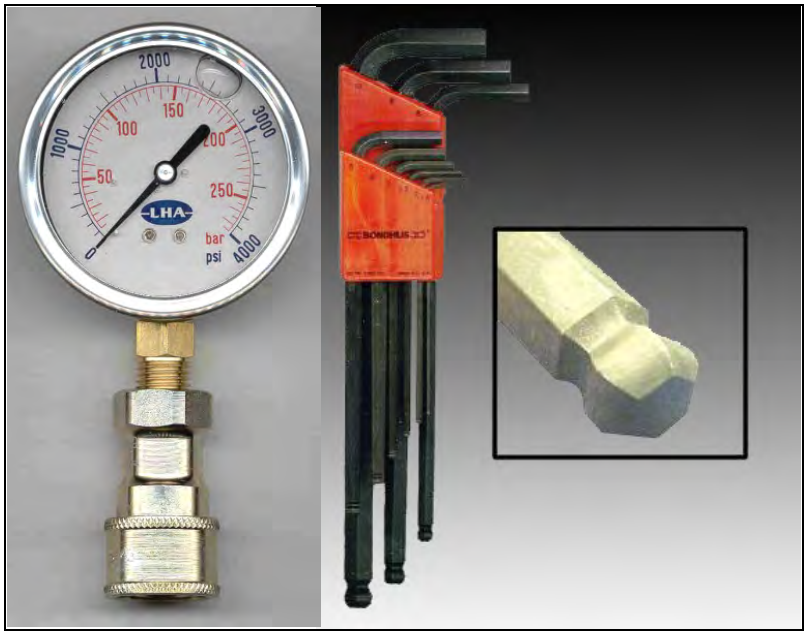
Figure 5-17 Steel hydraulic tank



Hydraulic Pressures

Pressure gauges of various pressure ranges, such as 0–1000 PSI, 0–4000 PSI and 0–5000 PSI, as well as a set of ball-end hex keys are required for adjusting the different working pressures of the truck's hydraulic system (see Figure 5-18).

Figure 5-18 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 those hydraulic pressures for a number of reasons. For more information, see *Troubleshooting Guide* on page 149 or *Preventive Maintenance Chart* on page 24.

Adjusting the Utility Section (Electric-Hydraulic Valve)

To adjust the utility section:

1. Disconnect the closed tailgate solenoid (see H in Figure 5-19).
2. Connect a 0–1000 PSI pressure gauge to the quick-connect coupler on the inlet cover (see E in Figure 5-19).
3. Start up the engine and let it idle.
4. Turn ON the pump.
5. Press the TAILGATE DOWN switch on the control panel.
6. Adjust the generated pilot pressure to 420 ± 20 PSI.

   When facing the valve, the adjustment screw is on the right side of the valve (see A in Figure 5-19).
7. Once the adjustment is made, **disconnect the pressure gauge**.
8. Reconnect the tailgate solenoid.

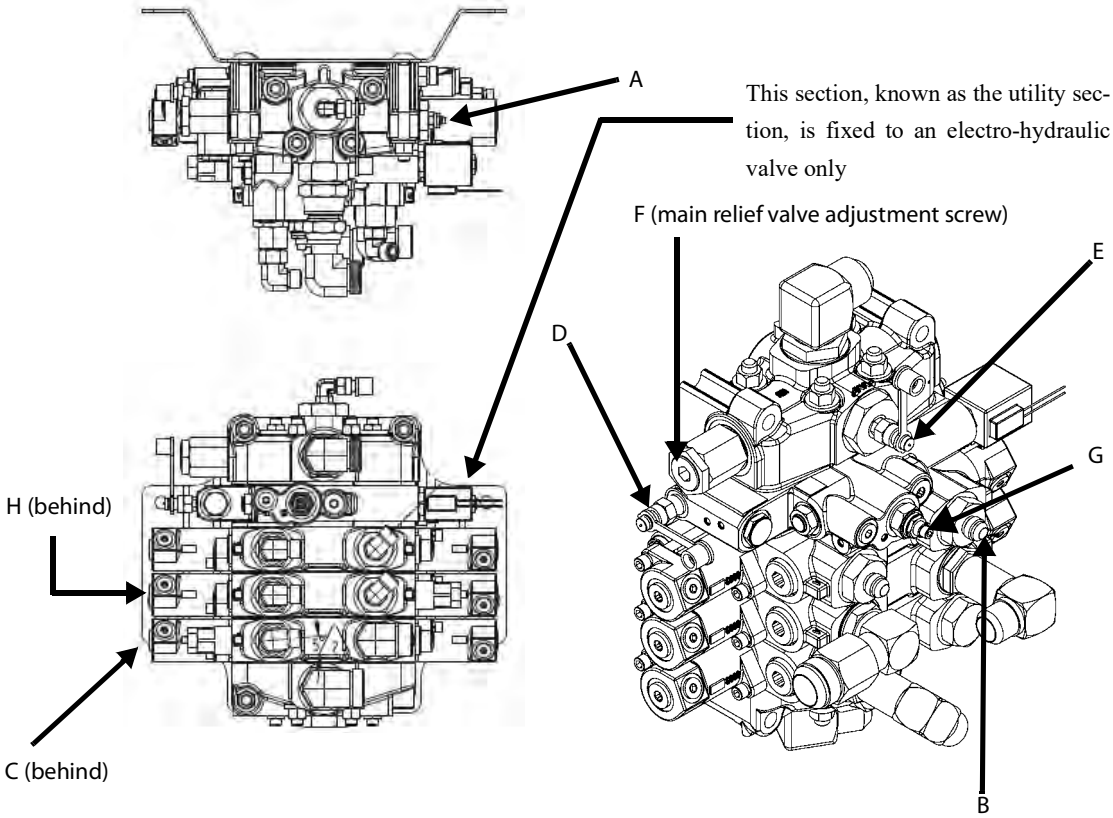
9. Install the 0-1000 PSI pressure gauge on the maximum pilot pressure port (see D in Figure 5-19).
10. Press the TAILGATE DOWN switch on the control panel.
11. Using the adjustment screw on the front of the valve, adjust the pressure reducing valve to 550 ± 20 PSI (see G in Figure 5-19).

Warning! Replace the 0-1000 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 the pressure in the main relief valve, install a 0-5000 PSI pressure gauge to the quick-connect coupler on the inlet cover (see E in Figure 5-19).
13. Activate and maintain the tailgate close function.
14. While maintaining the tailgate close function adjust the main relief valve pressure to 2500 PSI (See F in Figure 5-19).

Figure 5-19 Valves and ports

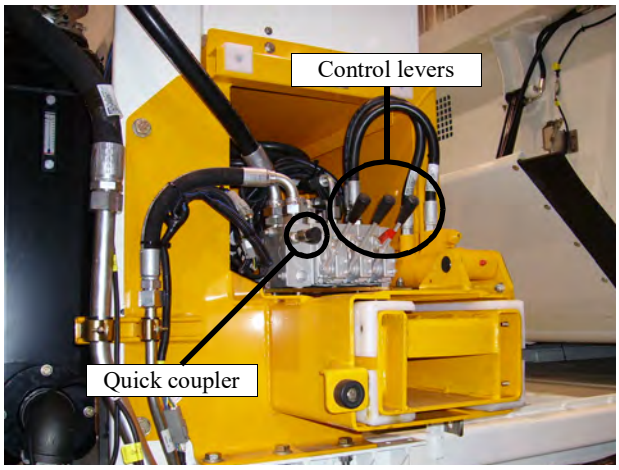


Adjusting Pressure on the Proportional Valve

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[1].

Control levers (see Figure 5-20) are delivered with the vehicle to make pressure adjustments and to manually operate the arm if necessary.

Figure 5-20 Control levers and quick coupler



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

Refer to Table 1 to correctly adjust the pressure for each function of the lifting arm.

IMPORTANT: Before performing the following procedure, make sure that all function levers and their adjustment screws have been properly identified on the valve (see Figure 5-4).

Table 1 Hydraulic pressure table

Function	Pressure setting
Danfoss PVG-32 main relief valve	2000 ± 50 PSI
Gripper close	1200 ± 50 PSI
Gripper open	1200 ± 50 PSI
Gripper cylinder holding valve (to keep it open), if equipped	650 ± 50 PSI
Arm up	System pressure
Arm down	System pressure

1. Except for the gripper section of the valve which does not modulate the hydraulic flow into the gripper cylinder.

Table 1 Hydraulic pressure table (cont'd)

Function	Pressure setting
Arm down holding valve (to keep arm up)	800 ± 50 PSI
Arm extend	System pressure
Arm retract	System pressure

To adjust the proportional 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 a control lever on the arm in/out section 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 on the proportional valve (see Figure 5-20).

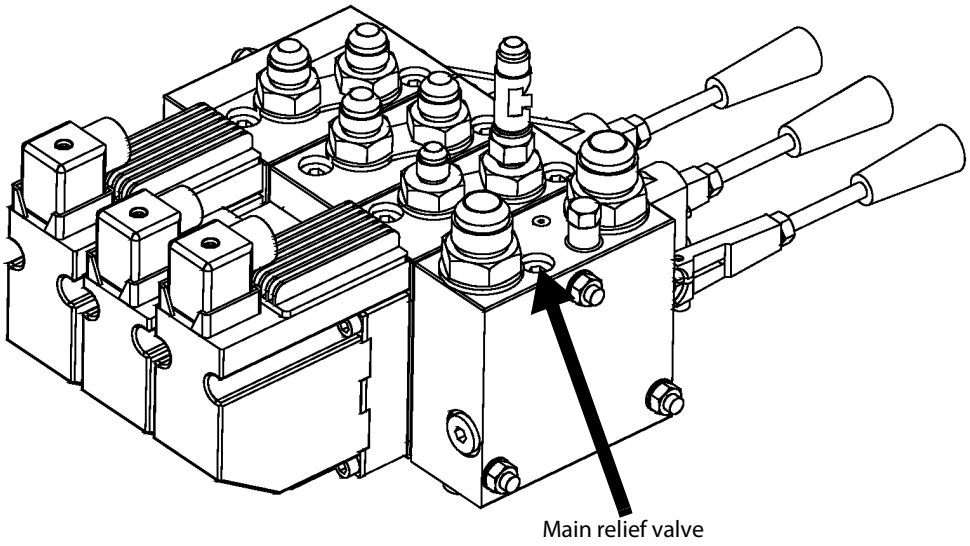
Warning!

Make sure that the shut-off 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. Fully retract the arm using the lever.
7. While maintaining the arm in function active, adjust the main relief valve to 2000 PSI (± 50 PSI) using the adjustment screw.

   Turn the hex wrench clockwise to raise pressure or counterclockwise to lower pressure.

Figure 5-21 Relief adjustment screw



Adjusting Gripper Pressures

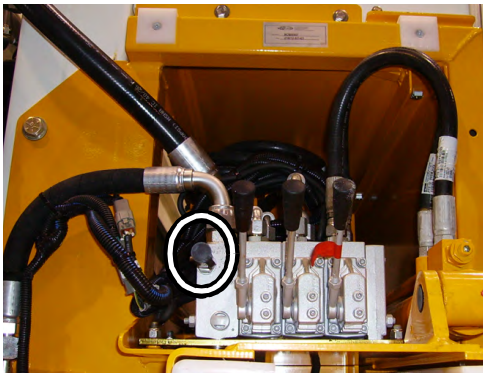
Danger! Do not stand directly in the path of the arm while carrying out these adjustments.

The section of the proportional 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 for gripper pressure adjustment (see Figure 5-23).

To adjust the gripper pressures:

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 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 proportional valve (see Figure 5-22).

Figure 5-22 Quick-connect coupler



Warning!

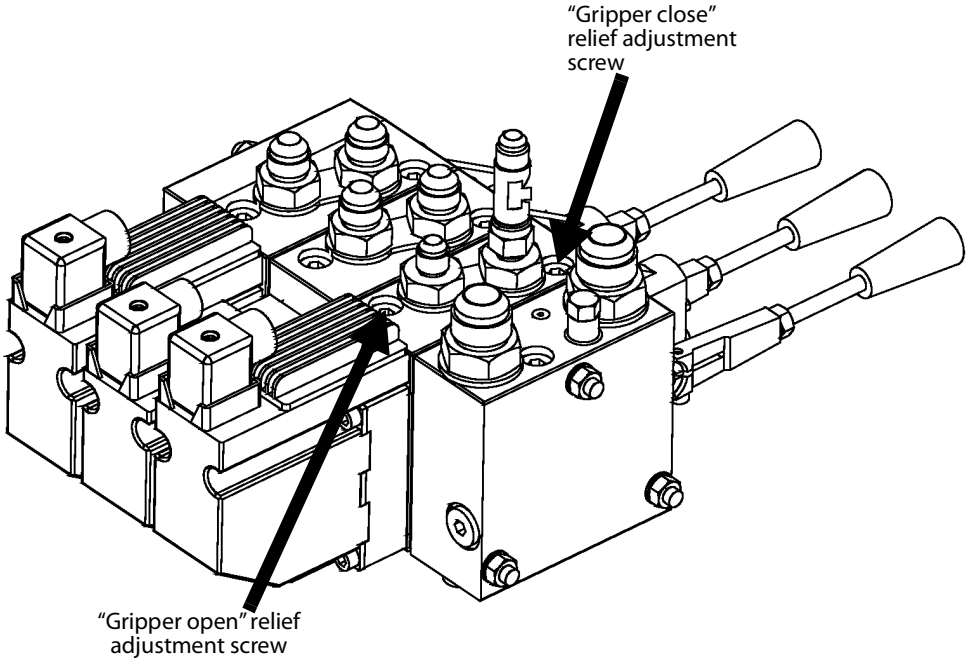
Make sure that the shut-off valve on the suction line is completely open before starting the engine. Failure to do so may damage the hydraulic system.

6. Put the transmission in Neutral, start the engine and engage the hydraulic pump.
7. Proceed with the pressure adjustment:
   - **7 a.** Install a lever on the gripper section of the valve (see Figure 5-4).
   - **7 b.** Close the gripper using the gripper lever.
   - **7 c.** While maintaining the gripper close function active, adjust the relief valve of the "gripper close" side of the valve section to 1200 PSI (± 50 PSI) [see Figure 5-23].

     Screw or unscrew depending on the gauge readout.
   - **7 d.** Open the gripper using the gripper lever.
   - **7 e.** While maintaining the gripper open function active, adjust the relief valve of the "gripper open" side of the valve section to 1200 PSI (± 50 PSI) [see Figure 5-23].

     Screw or unscrew depending on the gauge readout.

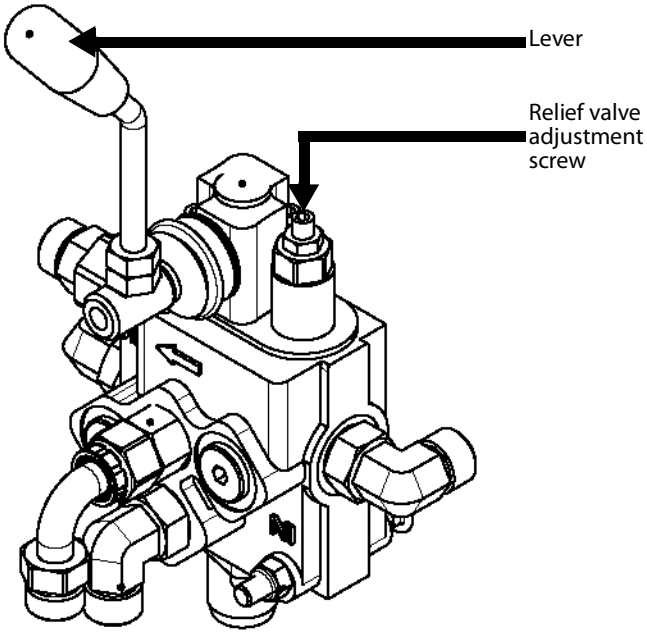
Figure 5-23 Gripper relief adjustment screws



Adjusting Pressures on Cart Tipper Valve (if installed)

This section describes the procedure for adjusting the cart tipper hydraulic pressures on the tipper control valve (see Figure 5-24).

Figure 5-24 Tipper control valve



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

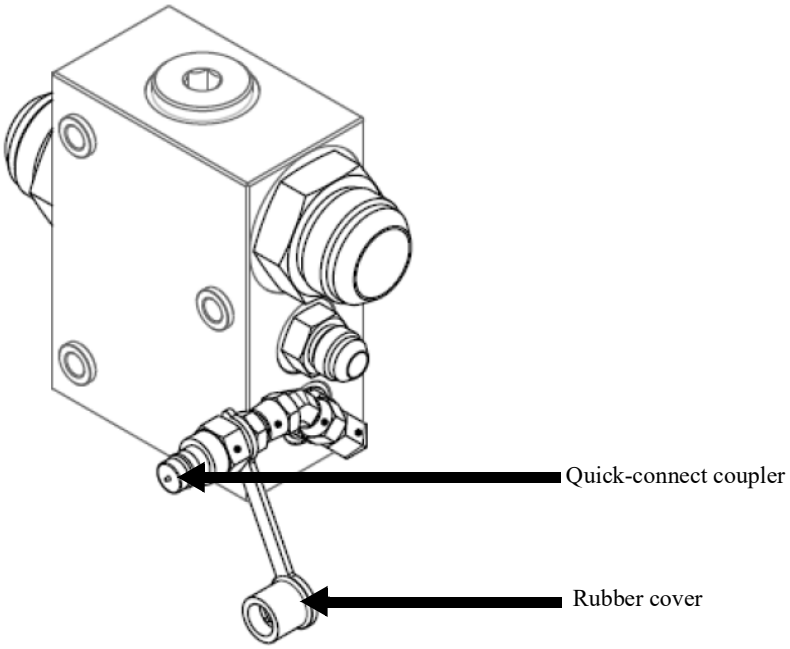
To adjust the cart tipper pressures:

1. Start the engine and engage the hydraulic system.
2. Remove the rubber cover from the quick-connect coupler on the flow divider (see Figure 5-25).
3. Install a 0-4000 PSI pressure gauge on the quick-connect coupler (see Figure 5-25).
4. Push the tipper lever completely (see Figure 5-24) and hold it while you read the pressure on the gauge.

   Check the gauge to make sure the pressure builds up in the system.
5. Set the pressure at idle to 2000 PSI (± 50 PSI) by adjusting the relief valve adjustment screw (see Figure 5-24).

   To do so, loosen the locknut on the relief valve and turn the adjustment screw clockwise or counterclockwise to get the proper pressure.
6. Once the pressure is adjusted, retighten the locknut.
7. Put back the rubber cover on the quick-connect coupler (see Figure 5-25).

Figure 5-25 Flow divider



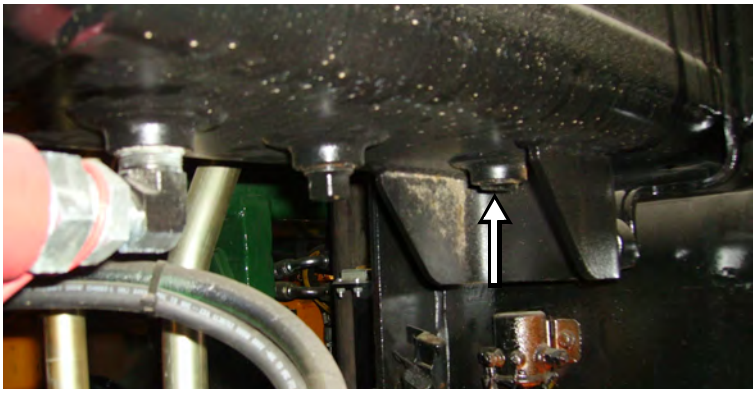
Emptying the Hydraulic Tank

To empty the hydraulic tank:

1. Prepare the vehicle accordingly:
   - **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.** Disengage the hydraulic pump
   - **1 f.** 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 shut-off 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 shut-off 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 5-26) 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 5-26 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 115).
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 5-27).
   - **2 b.** Remove the strainer. See *Cleaning the Strainer* on page 117.
   - **2 c.** Clean or replace the strainer if necessary.
   - **2 d.** Remove the return filter housing (see Figure 5-27).
   - **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 120).
4. Reinstall the access panel, the strainer and the return filter housing.
5. Using a filtering screen, refill the tank with high quality oil until it reaches the ¾ mark on the oil gauge (see *Recommended Lubricants* on page 69 for specifications).

NOTE: Oil must be clean and free of any contaminants (dirt, metal particles, sand, etc.).

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.

6. Reinstall the filler cap and fully open the shut-off valve (see Figure 2-13).

Caution! Failure to open the shut-off valve may seriously damage the pump and the hydraulic system.

7. Prime the pump (see *Priming a New Pump* on page 104).
8. Start the engine without pushing on the gas pedal.

   The engine **MUST** run at idle speed for at least 5 minutes to make sure there is no more air in the system. You can slowly raise the engine RPM only after the engine has run 5 minutes. When you raise the RPM, always make sure the pump does not make excessive noise.

Cleaning the Strainer

To clean the strainer:

1. Empty the hydraulic tank (see *Emptying the Hydraulic Tank* on page 115).
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 5-27 and Figure 5-28).
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 ¾ mark on the oil gauge (see *Recommended Lubricants* on page 69 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 5-27 Hydraulic tank

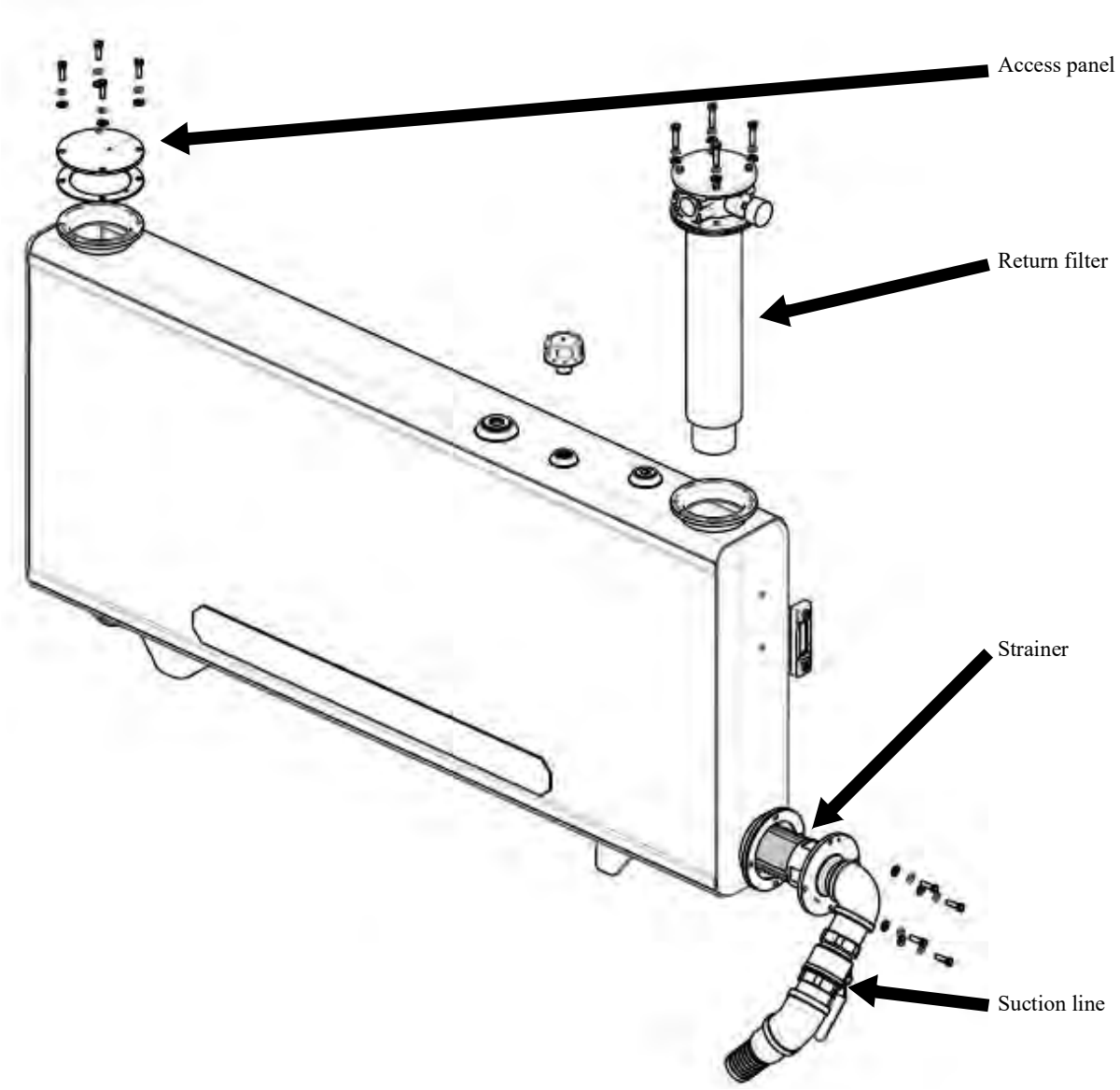
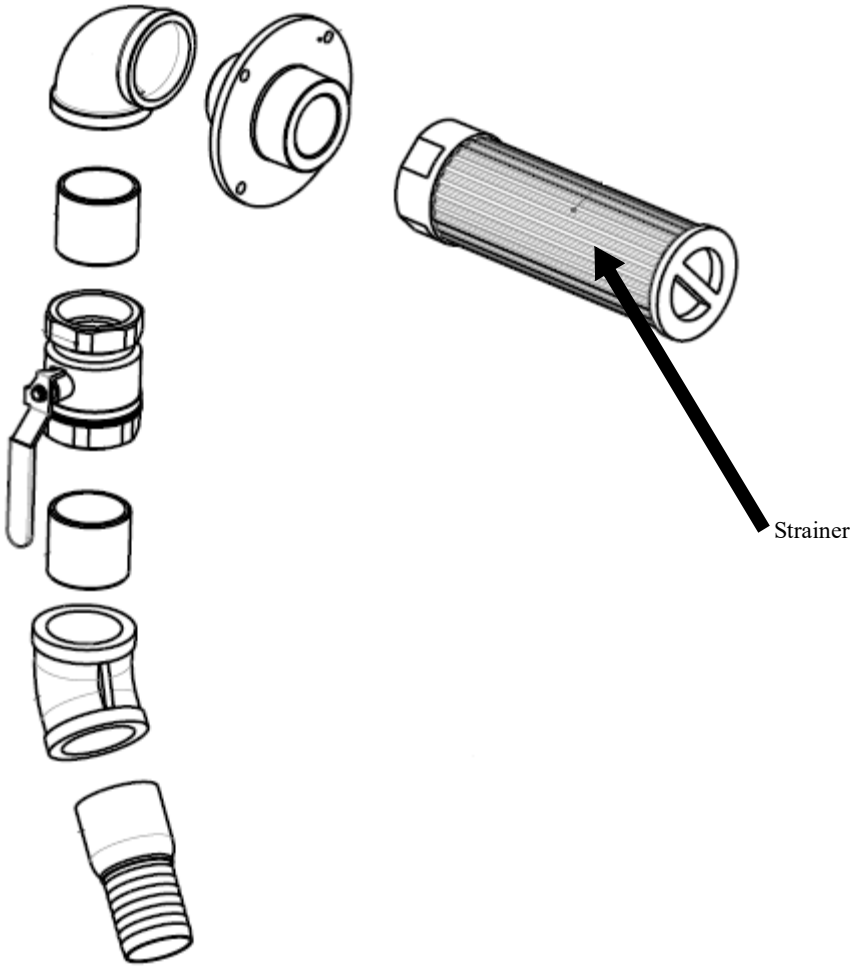


Figure 5-28 Strainer assembly



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).

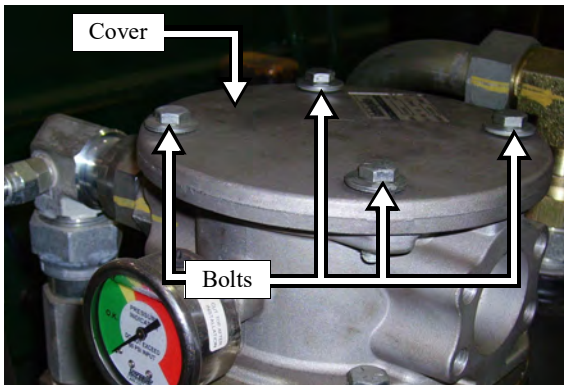
The filter restriction indicator (Figure 5-29) will indicate, when the engine is running, if the filter needs to be changed. Replace the filter before the indicator reaches the red zone. This will keep the oil clean, extend component life expectancy and reduce failures.

Figure 5-29 Filter restriction indicator (steel tank)

To replace the hydraulic filter:

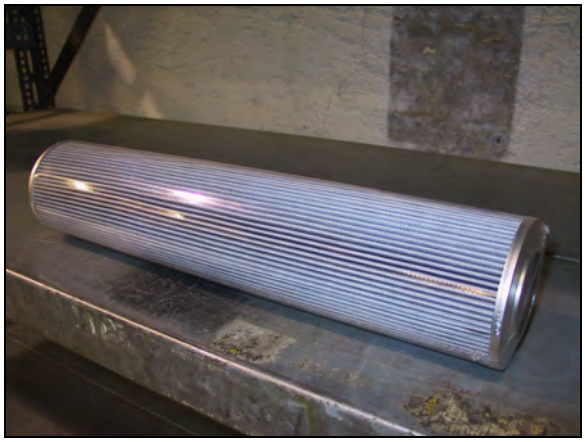
1. Lock out and tag out the vehicle (see *Locking Out and Tagging Out the Vehicle* on page 20).
2. Remove all 4 filter head cover bolts (see Figure 5-30).

Figure 5-30 Filter head cover and retaining bolts (rectangular tank)



3. Replace the filter element with a new one (see Figure 5-31).

Figure 5-31 Filter element



4. Reinstall the filter head cover.

Hydraulic Cylinders

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 all hydraulic cylinders at least once a month.

When you do so:

1. Make sure that the shut-off valve on the suction line (Figure 2-13) is completely open before starting the engine.

Warning!

Failure to open the shut-off 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 5-32). 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 cylinder is bypassing, the seal inside the cylinder may need to be replaced. If an internal leak is suspected, apply the following procedure.

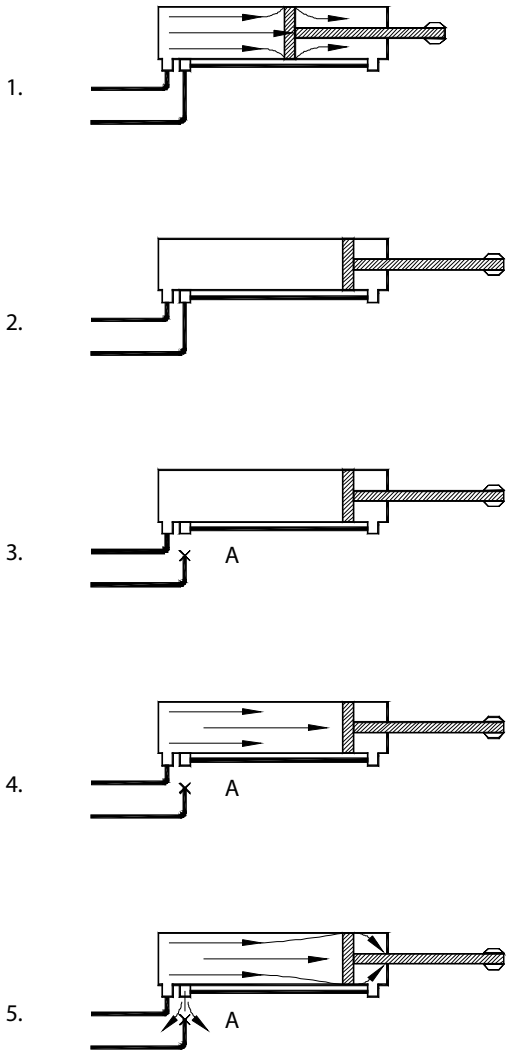
To detect internal leaks inside a packer cylinder:

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 open the tailgate.
5. Fully extend the packer cylinder and disengage the hydraulic pump.
6. Disconnect hose "A" and install a plug at the end of the hose.
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.

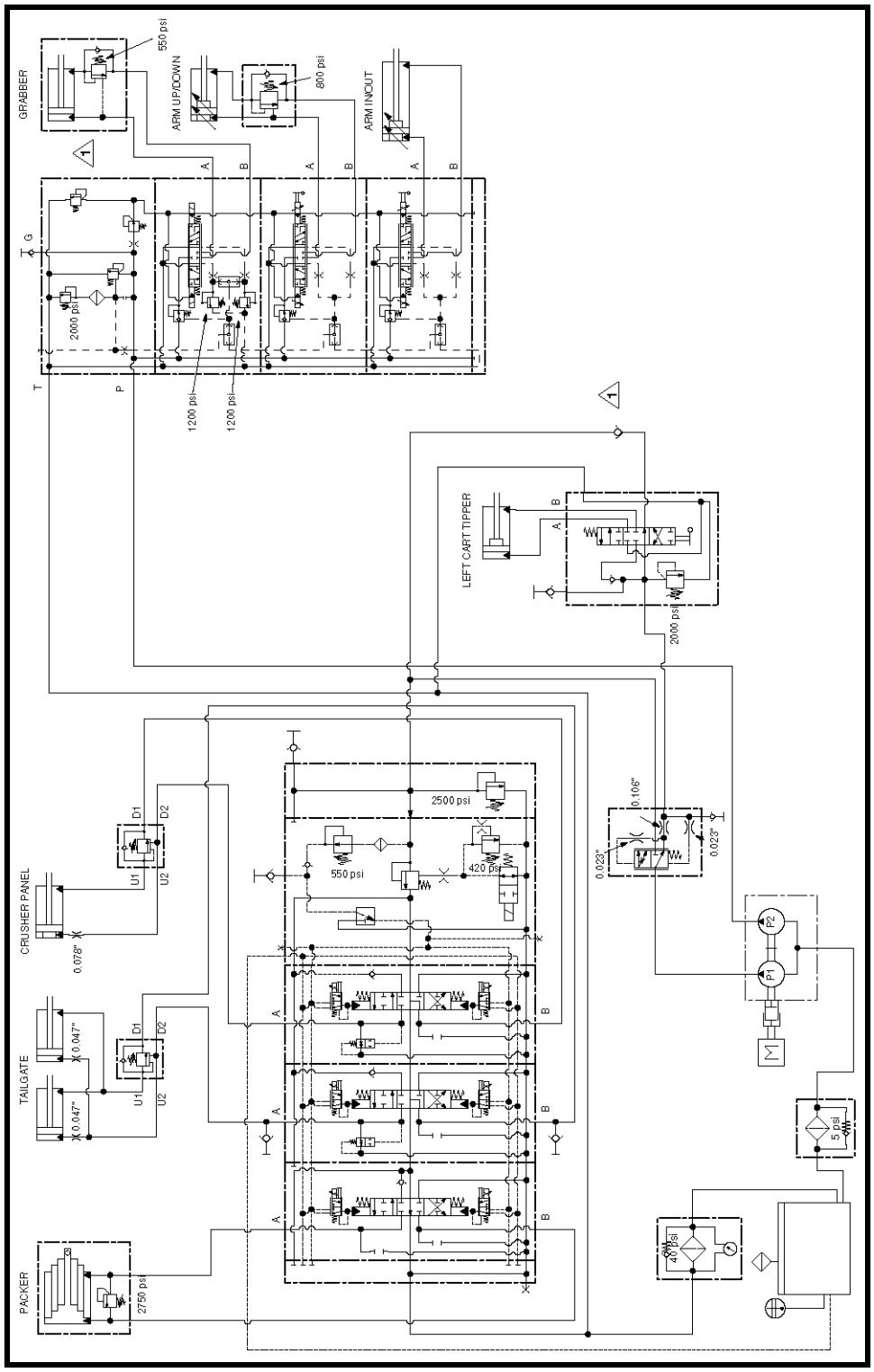
   If oil leaks out of port "A" when pressure is applied, there might be an internal leak; replace or repair the cylinder.

NOTE: It may be necessary to perform this procedure with the packer in retract position.

Figure 5-32 Detecting cylinder internal leaks



Main Hydraulic Schematic



6

Electrical System

This 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 some electrical components.

Electrical Schematics

Electrical schematics are provided as part of the MINIMAX™ documentation package, located inside the cab.

The electrical schematics show how components are wired to each other. These schematics are useful when diagnosing electrical circuits and should be kept for future reference.

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 inside the cab.

How the Electrical System Works

The electrical system includes the following components:

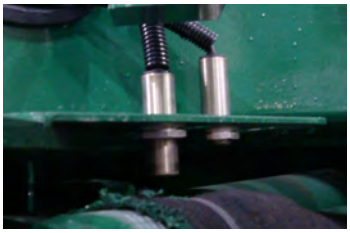
- Control panel
- Electronic controllers
- Harnesses
- Valve controls
- Limit/proximity switches
- Sensors (ex. temperature, pressure sensors)

The control panel is centrally mounted in the cab. It has push-buttons, toggle switches and warning lamps. The multiplexed monitor may be placed directly on the panel (as illustrated) or fixed next to it.

Some units also have auxiliary controls located on the curbside or streetside of the truck.

The 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 learn more about multiplex electronic controllers and training schedule, please call Labrie*Plus*.



Proximity switches control packer, crusher panel and tailgate operations, and provide the means for safety lockouts.

Limit switches control packer, crusher panel and arm operations, and provide the means for safety lockouts (on hopper doors).

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 caps in order to avoid electrical failure.

Adjusting and Repairing Electrical Components

The required electrical system adjustments include:

- Fuses and circuit breakers
- Limit and proximity switches

Fuses and Circuit Breakers

Power for the electrical system on board the MINIMAX™ is protected by a set of fuses and circuit breakers.

Fuses

Two fuses (30A and 40A), which are located inside the ignition relay box (see Figure 6-3), are used to protect the Labrie electrical system.

The 40A circuit is subdivided into 2 secondary circuits (10A and 30A) which are protected by in-line fuses.

Figure 6-1 Circuit schematic - Ignition relay box

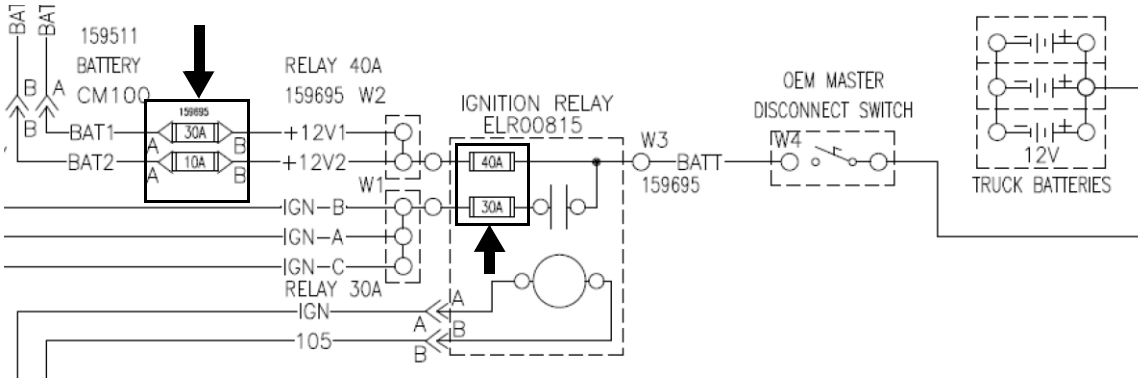


Figure 6-2 Ignition relay box (with/without cover)

NOTE: When a fuse blows, always replace it with a fuse of the same kind and same amperage. Fuses 30A and 40A are protected by a plastic cover (see Figure 6-3). Just remove that plastic cover to gain access to these fuses. For fuses 10A and 30A found just outside the relay box (see Figure 6-4), they are also protected by a plastic cover that needs to be removed to gain access to the fuse. Always check amperage before attempting to replace a dead fuse.

Figure 6-3 Fuses inside relay box

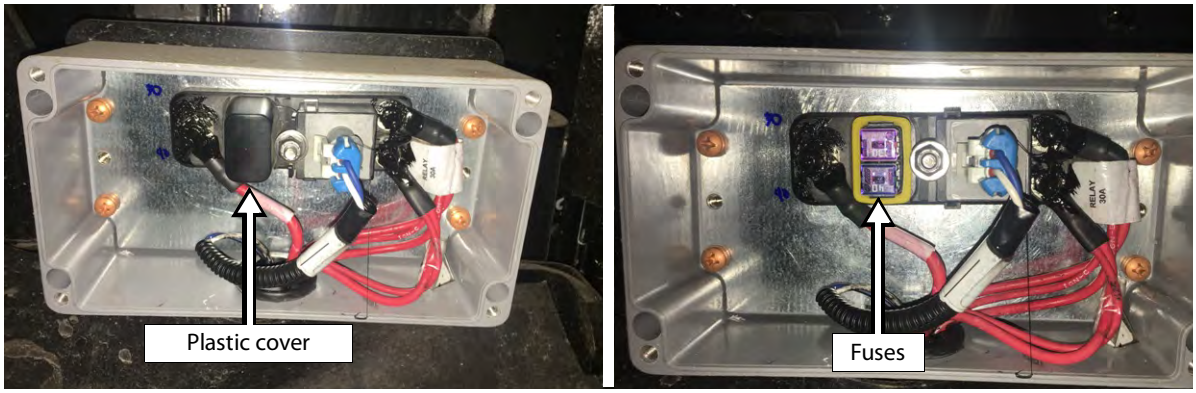


Figure 6-4 Fuses outside relay box

Circuit breakers

The MINIMAX™ may have up to 6 manual reset circuit breakers, depending on the options installed. These breakers are located within the in-cab control box.

Mounted on each circuit breaker is a button which, once pushed, resets the breaker (see Figure 6-5).

Figure 6-5 Circuit breaker

Caution!

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 (W2)	10	141
Cab fan (W3)	15	135
Scale Air-Weigh System power & acc. (W4)	10	161
Electronic controller (W5)	10	168

Limit and Proximity Switches

Limit and proximity switches act as remote electrical ON/OFF switches.

The following is a list of limit and proximity switches that are installed on a MINIMAX™ unit. Some of them are optional.

- Packer extend limit/proximity switch
- Packer retract limit switch
- Tailgate unlocked proximity switch
- Tailgate fully open proximity switch
- Left-hand side hopper door limit switch (optional)
- Crusher panel up limit/proximity switch (optional)
- Fully open upper door limit switch
- Fully closed upper door limit switch (optional)
- Arm stowed limit switch
- Arm parked limit switch
- Mid-height limit switch

For information on limit and proximity switch adjustment, go to page 46 and the following.

To know exactly where these switches are located on the truck, see Figure 3-34 and Figure 3-35.

Warning! Limit and proximity switches must operate properly. Improperly adjusted limit/proximity switches may cause serious damage or even death.

Multiplex System-Related Interventions

The following interventions will enhance the effectiveness and efficiency of the multiplex control system.

IFM Program Update Process

Occasionally, the Labrie IFM multiplex control system program may require modification or updating. If a revision to the control system program is required, the following list of action items must be addressed prior to making a program change:

- Verify the program number and revision currently installed.
  - Place the vehicle ignition key in the on/run position. When the IFM display shows its home screen, press the button below “Menu" on the IFM display. The system “MAIN MENU” screen will appear.
  - Using the up/down arrow on the IFM display module, highlight “Program Version”, and press the button below “OK”.
  - The current program and revision is listed next to “Module 10 =”. The program number should match the new program to be installed, the revision number will be different (example: if the program number currently installed is “10_10922”_R3”, the new, updated program number to be downloaded would have a higher revision; i.e. “10_10922_R4”).
  - Press the button below “Esc” to return to the “MAIN MENU” screen.
- Verify the current baud rate setting.

NOTE: This setting must match the chassis baud rate. Otherwise, the J1939 CAN data bus communication can be corrupted.

  - In the “MAIN MENU” screen, using the up/down arrow button on the IFM display module, highlight “Settings”, and press the button below “OK”. The “Settings” screen will appear.
  - Using the up/down button, highlight “J1939 Baud rate”, and press the button below “OK”. The “J1939 Baud rate” screen will appear. Note the current “Baud rate”; either 250 or 500.
- Upload the program that is currently installed prior to re-programming. To do so, use the Service Kit 01208.

Figure 6-6 Service kit 01208

Labrie does not archive previous revisions of programs; this will ensure if there is any issue with the new program the original may be installed back into the module. Failing to upload the original program will result in it being lost when the revised program is installed.

- Connect a PC with the CoDeSys program installed, to the Labrie control console.
- Turn the vehicle ignition to the on/run position
- Open the IFM Download program on the PC.
- Select the Identity tab to ensure that the PC is communicating with the Labrie IFM system.
- Select the Upload tab. A prompt will appear to name the program; typically, the original program and revision number is used.
- Save the program on the PC (This will take several minutes).
- Once the IFM program uploads an "UPLOAD COMPLETE" message will appear; select "OK".

After completing these steps, the new program may be downloaded. After download is complete, check to ensure that the baud rate setting matches the original setting noted earlier to avoid chassis/Labrie system communication issues.

Once the updated program is loaded and verified to be working correctly the original uploaded file should be deleted from the PC to avoid future confusion.

Checking Control Module (Node) Supply Voltage

A benefit to the IFM multiplex control systems used on MINIMAX™ products is the ability to verify inputs and outputs through the display screen quickly, without the need to connect a diagnostic reader or laptop PC. However, prior to checking the status of these outputs, the supply power voltage for each control module (Node) must be checked to ensure that it is at least 12 volts.

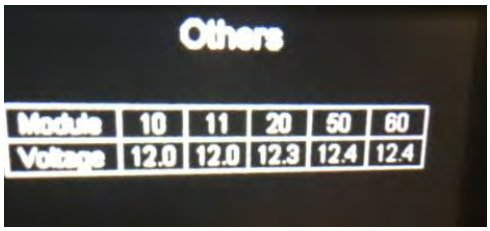
Effective on production models manufactured in early 2017, the diagnostic features of the IFM multiplex control system have been further enhanced; supply voltages for the control modules (Nodes) may now be checked through the on-board display, as follows:

1) Turn the ignition switch to the "run" position, activating the IFM display.

2) On the IFM display, select "Menu", then select "I/O Status".

3) Using the up/down arrows on the directional pad, scroll down and select "Others".

4) The real-time supply voltages of the control modules (Nodes) will be displayed:

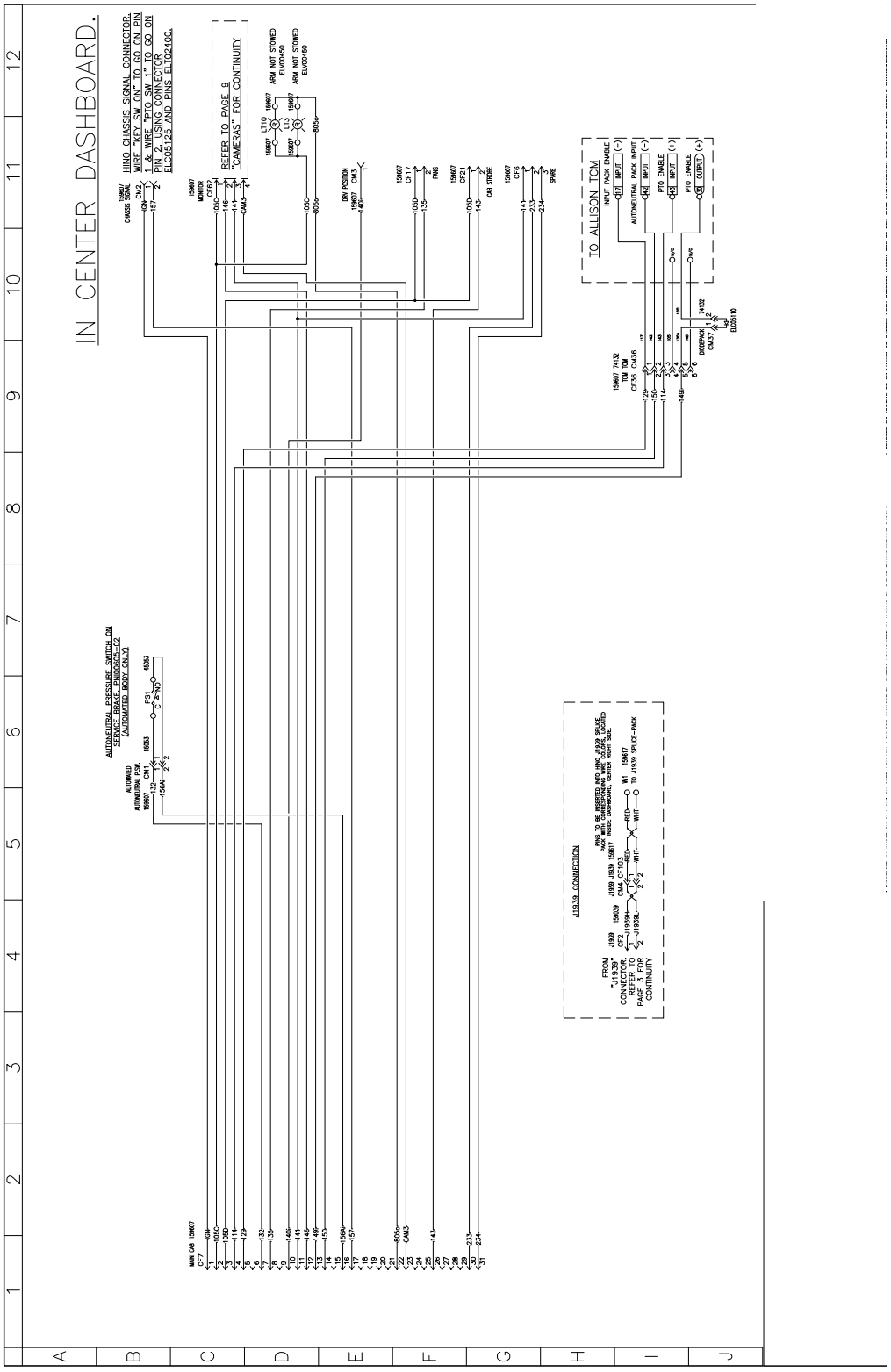


If voltage(s) are below 12 volts, check the supply power to the module; if all voltages are below 12 volts, check the chassis battery voltage.

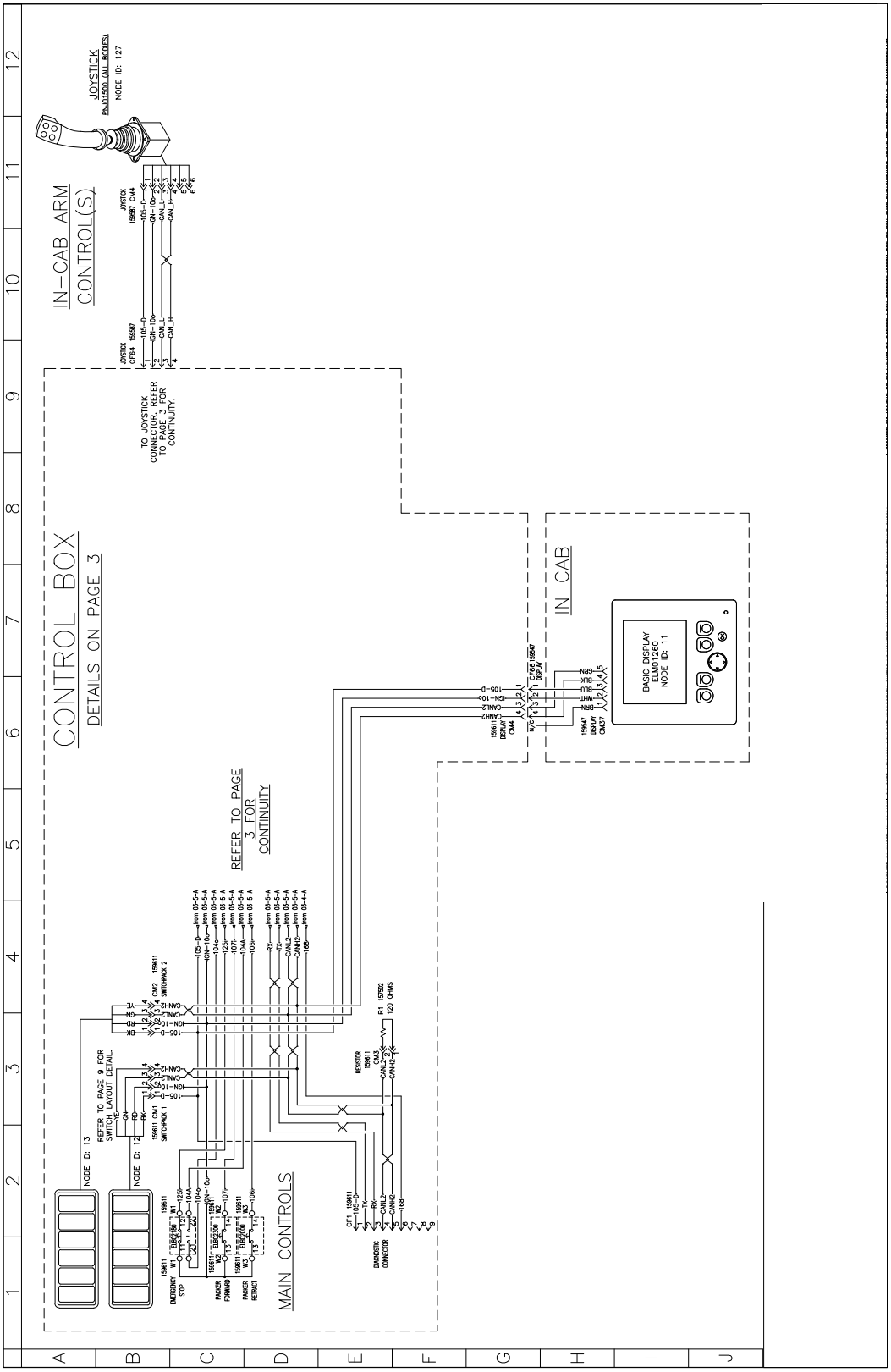
This helps diagnose error messages such as a module disconnected or functions of a module not receiving their outputs. Once the supply voltages have been verified, further troubleshooting of various outputs may then be investigated.

Electrical Schematics

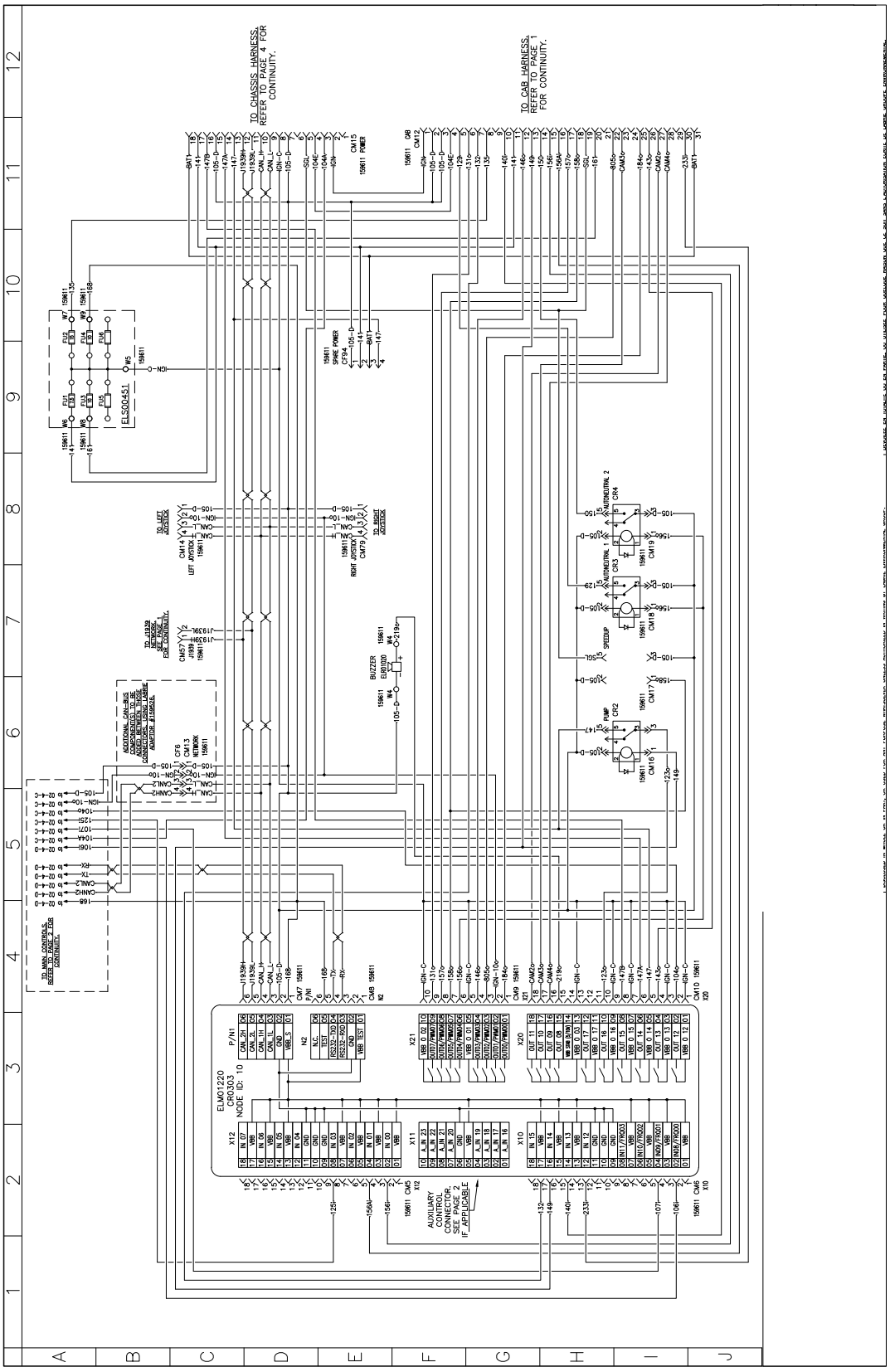
Cab Adaptation



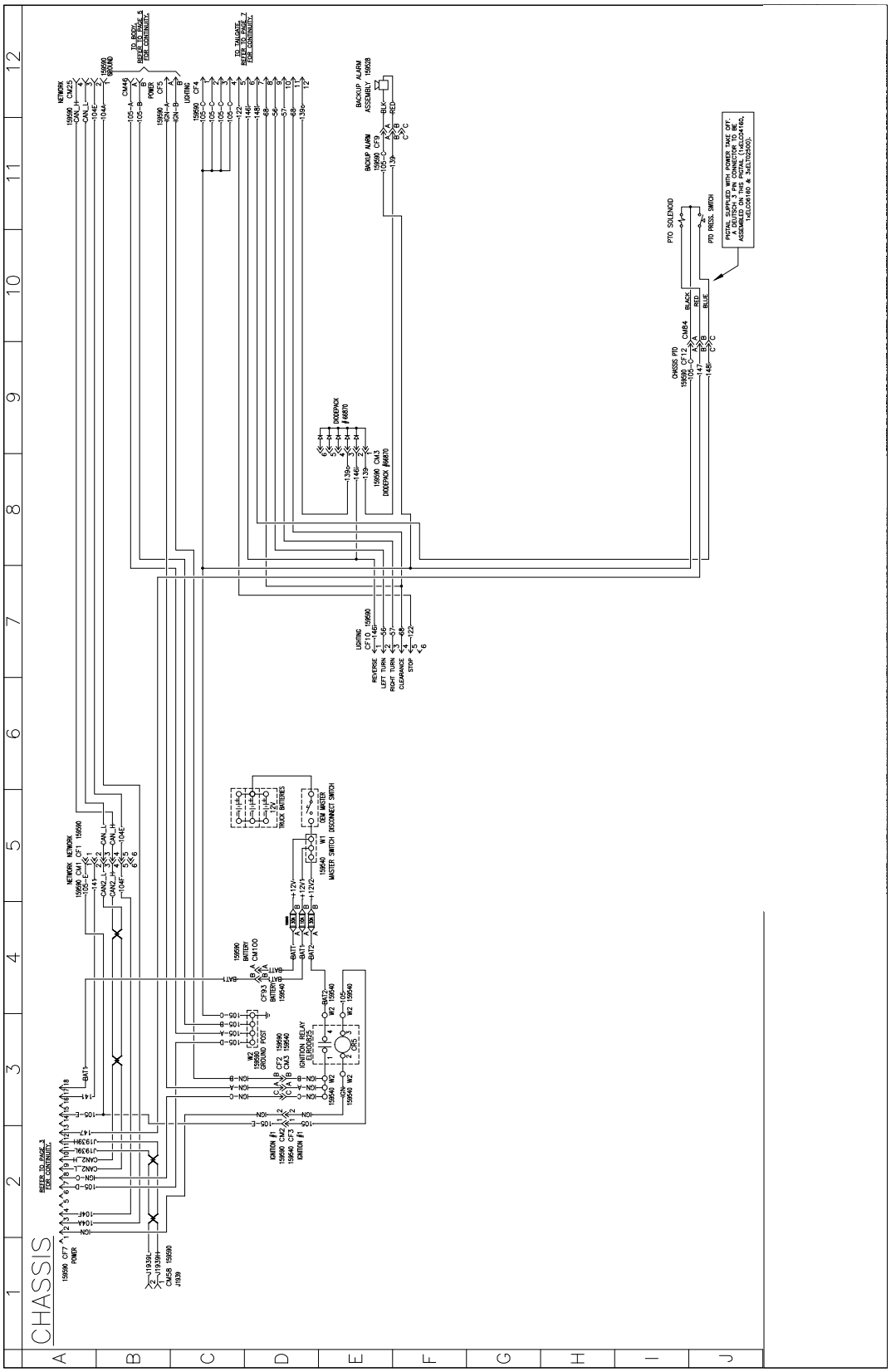
Cab Console & Controls



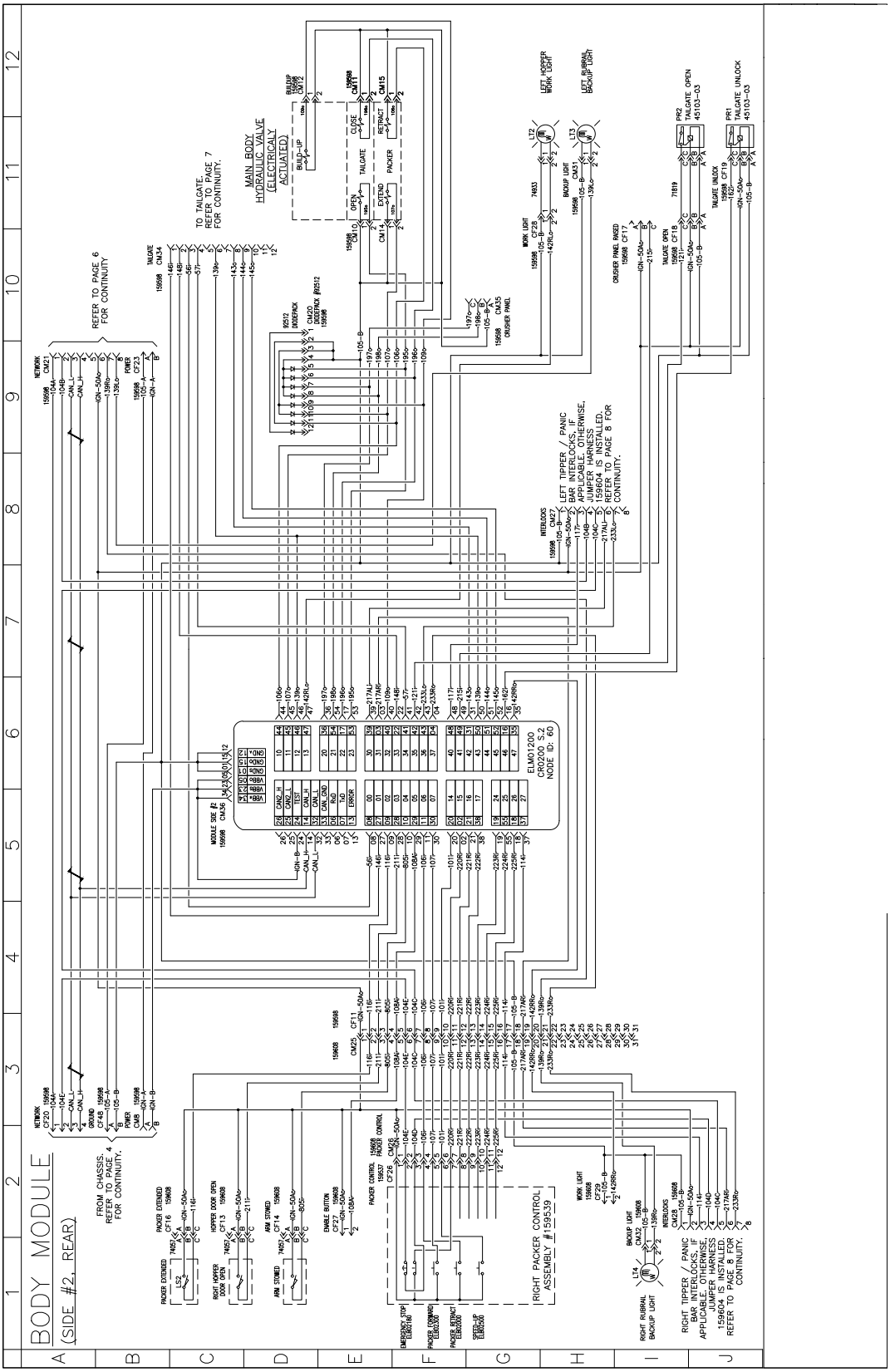
Cab Controller



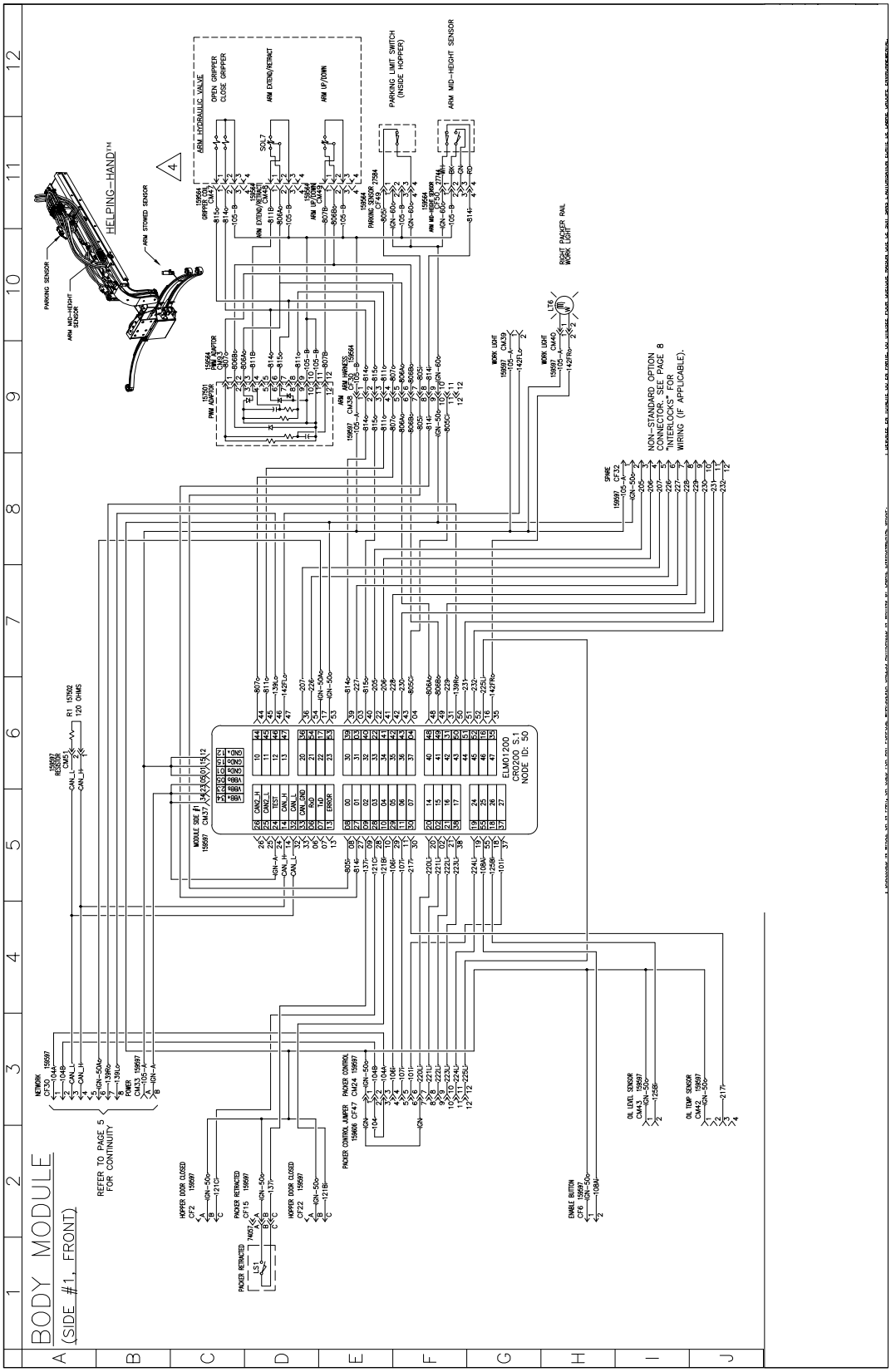
Chassis


CHASSIS
PTO SOLENOID
PTO PRESS. SWITCH
BACKUP ALARM ASSEMBLY 159028
DIODEPACK #66870
MASTER SWITCH DISCONNECT SWITCH
IGNITION RELAY
TRUCK BATTERIES
GROUND POST

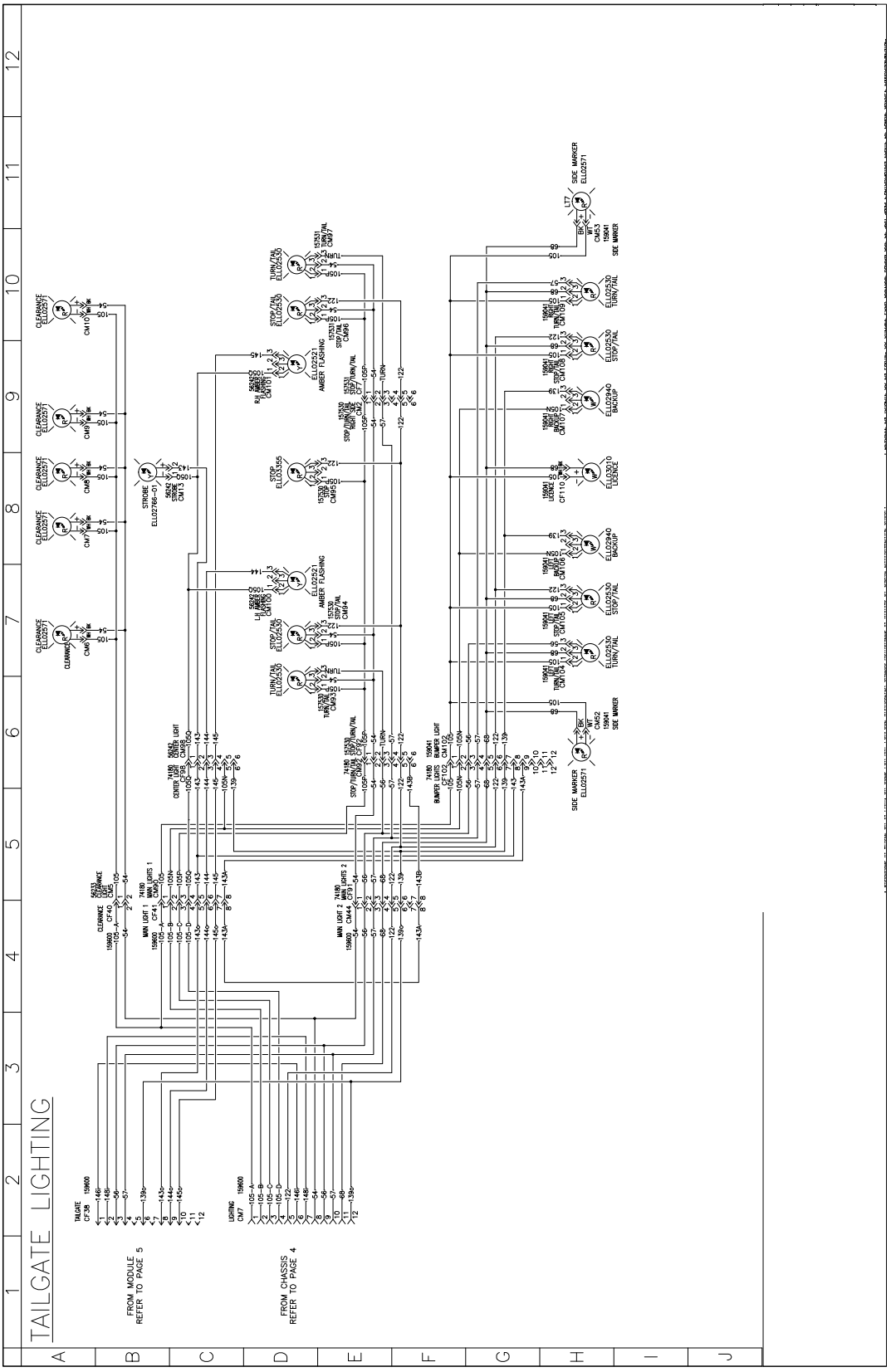
Body Module (rear side)



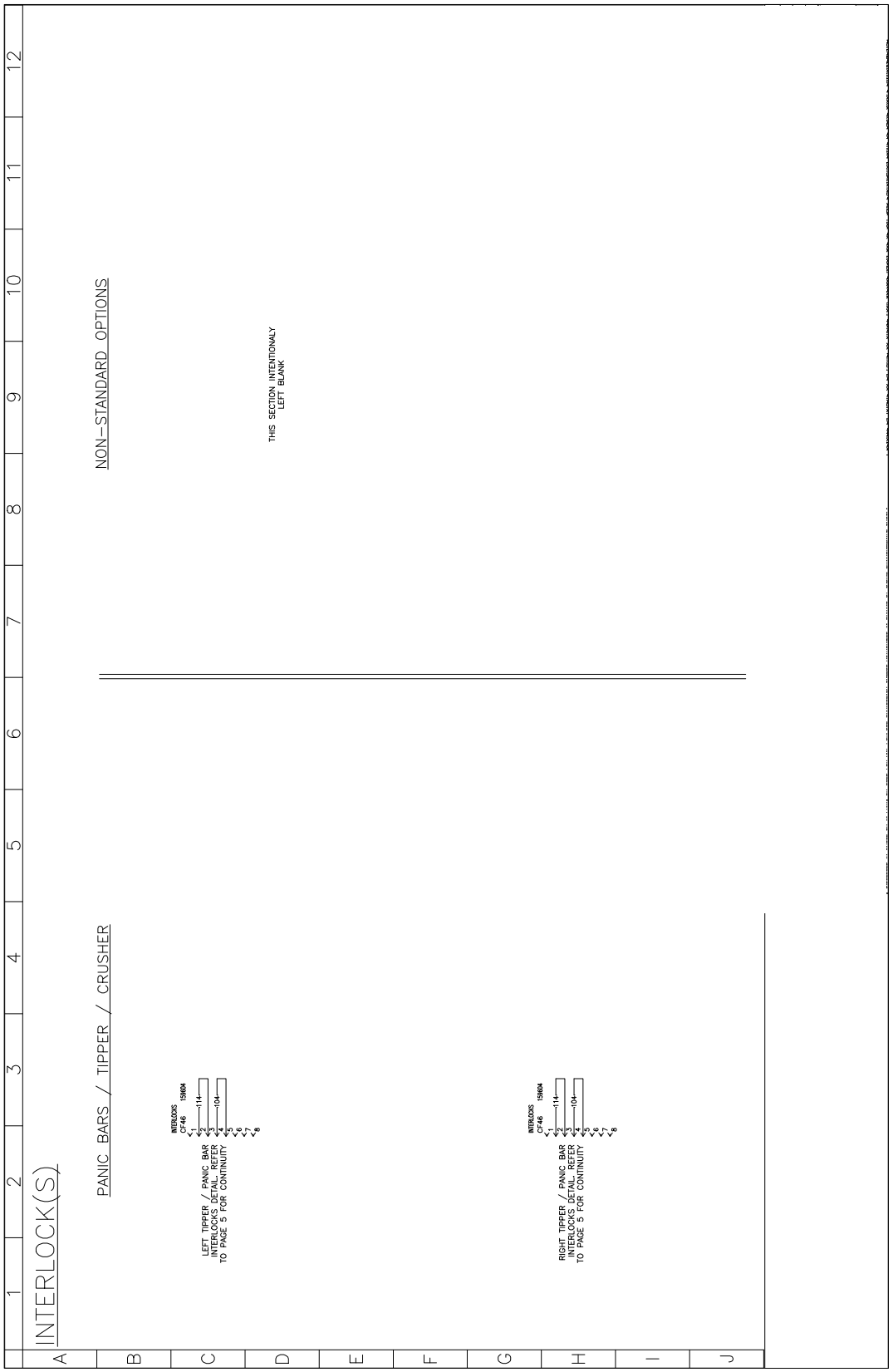
Body Module (front side)



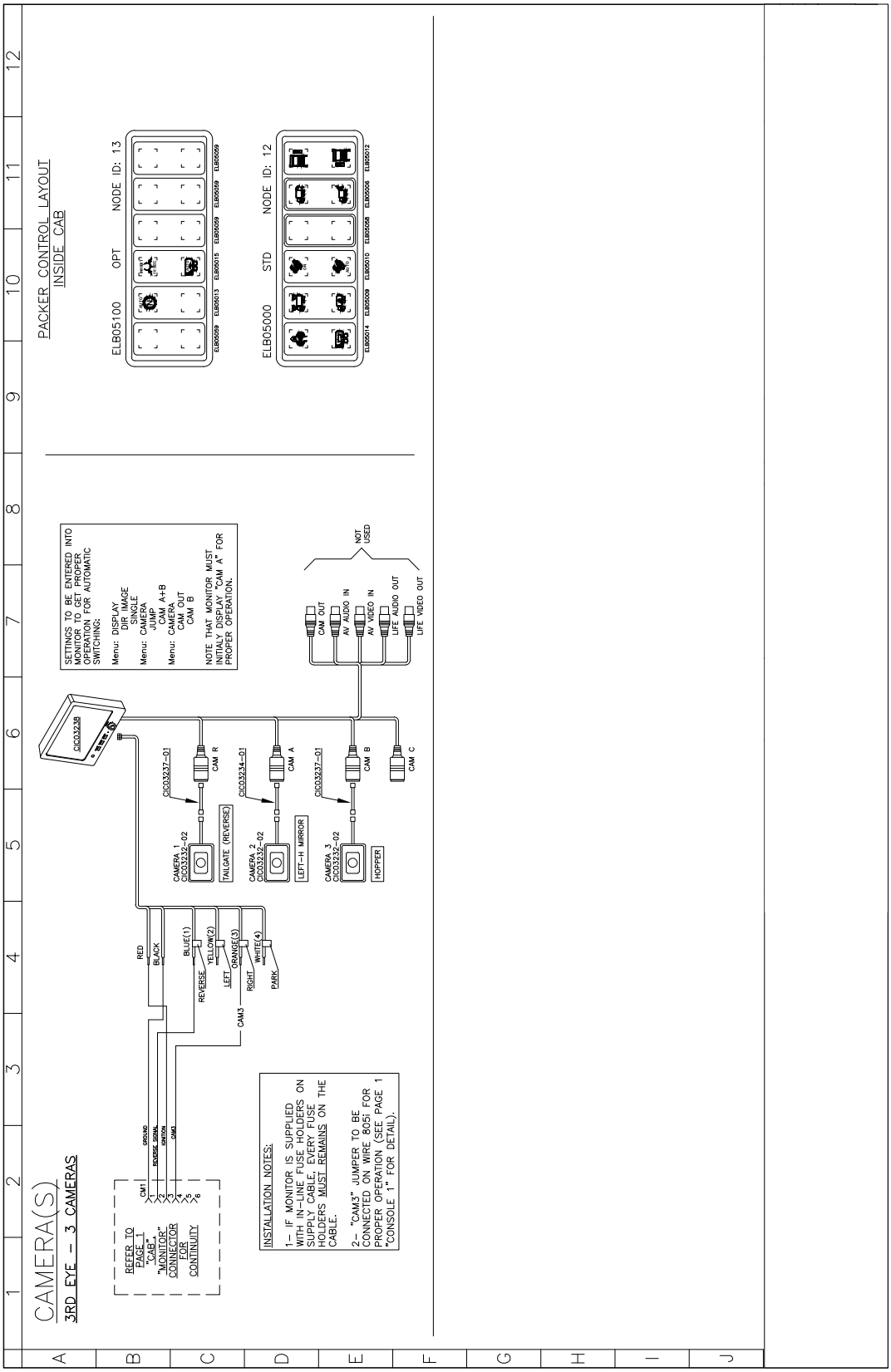
Tailgate Lighting



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 the 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 149 to resolve commonly seen problems, or contact Labrie*Plus* to talk to one of our product specialists.

NOTE: Any time you have a problem with a Labrie unit, you should contact your Labrie authorized dealer first. They should be able to provide you with the proper help that you need, whether it is for parts or technical service.

IMPORTANT: Schematics provided in this manual are for reference only. Vehicle-specific schematics are found 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 and hydraulic 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

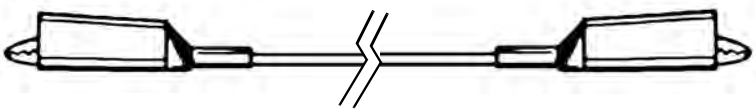
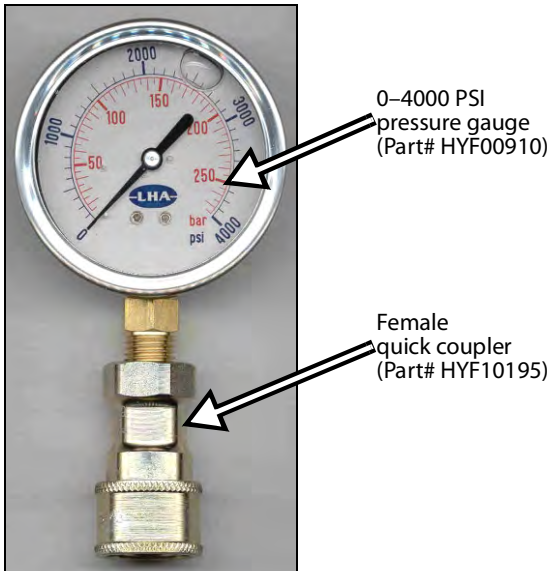


Figure 8-3 Two 0–4000 PSI oil pressure gauges (left), ball-end hex wrench (metric and SAE) [right]



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 Labrie*Plus*.

Problem	Possible causes	Solution
Insufficient packing ratio	Low oil pressure	See *Hydraulic Pressures* on page 107.
	Packer hydraulic cylinder internally bypassing	See *Detecting Cylinder Internal Leaks* on page 122.
	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 *Inspecting Hydraulic Oil* on page 86.
	Hydraulic pressure too low or too high	See *Hydraulic Pressures* on page 107.
	Not the proper grade of oil (that is too thin in hot temperatures or too thick in cold temperatures)	Change for oil indicated in *Recommended Lubricants* on page 69 (also see *Emptying the Hydraulic Tank* on page 115).
	Contaminated oil	Clean the strainer and change the return filter element. Fill with clean oil. See *Cleaning the Strainer* on page 117, *Replacing Filter Elements* on page 120, and *Inspecting Hydraulic Cylinders* on page 121.
	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 *Inspecting Hydraulic Oil* on page 86 (also see *Inspecting Hydraulic Cylinders* on page 121).
	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 *Recommended Lubricants* on page 69 and *Emptying the Hydraulic Tank* on page 115.
Cavitation, excessive noise or vibration of the pump.	Shut-off valve on suction line not fully open	Fully open the shut-off valve. See *Prior to Start Up* on page 18.
	Low oil level	Add oil to the required level. See *Inspecting Hydraulic Cylinders* on page 121.
	Oil too thick	See *Recommended Lubricants* on page 69 for proper type of oil to use. See also *Emptying the Hydraulic Tank* on page 115.
	Air in the system	See *Pump Cavitation* on page 153. 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 *Cleaning the Strainer* on page 117, *Replacing Filter Elements* on page 120, and *Inspecting Hydraulic Cylinders* on page 121. Take an oil sample for further analysis (see *Testing Hydraulic Oil* on page 71).
	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 *Adjusting and Repairing Electrical Components* on page 129.
No hydraulic pressure	Pump not engaged	Turn ON the PUMP switch.
	Hydraulic pressure not properly adjusted	Properly adjust pressure. See *Hydraulic Pressures* on page 107.

Problem	Possible causes	Solution
	Faulty hydraulic line	Perform a circuit analysis using the main hydraulic schematics (see *Main Hydraulic Schematic* on page 124).
	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 *Replacing Packer Wear Plates* on page 37.
Tailgate is unlocking or lowering by itself	Dirty or defective velocity fuse	Clean or replace the velocity fuse. See *Tailgate-Locking Mechanism* on page 154.
	Inverted hydraulic hoses on main hydraulic valve	Test the power bleed on the tailgate section of the valve. See *Tailgate-Locking Mechanism* on page 154.
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 *Proximity and Limit Switches* on page 46).
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.
	Hydraulic pressure not properly adjusted	See *Hydraulic Pressures* on page 107.

Problem	Possible causes	Solution
Packer moves forward but stops at the end of stroke	Packer wear plates are worn out	Replace wear plates. See *Replacing Packer Wear Plates* on page 37
	Packer extend limit/proximity switch is misaligned	Adjust switch. See *Adjusting Packer Extend Proximity Switch* on page 48
Packer does not perform enough cycles	Multicycle module programming	Reprogram the module for higher number of cycles (see *Multicycle* on page 175).
Backup alarm and warning buzzer inside the cab sound all the time	Misaligned tailgate proximity switch	Adjust tailgate proximity switch (see *Adjusting Tailgate Unlocked Proximity Switch* on page 53).
	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 *Adjusting Arm Speed* on page 200).
Flashing lights on dashboard always blinking	Misaligned arm stowed limit switch	Align switch lever with gripper finger (see *Adjusting Arm Stowed Limit Switch* on page 62).
	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 Labrie*Plus*.

Pump

The hydraulic pump is operated by pressing the PUMP switch on the control panel. When it is engaged, the switch turns green.

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

- Air pressure must be at approximately 70 PSI
- Engine speed must be lower than 900 RPM
- Emergency STOP button (red) must be pulled out

Air pressure condition is verified by a pressure switch, and engine speed, by the transmission control module (TCM).

If the pump does not engage when the PUMP switch is turned on, it may be related to a voltage supply problem in the pump circuitry. Contact your LabriePlus service technician for instructions on how to solve this problem.

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 104). When the pump is properly primed, cavitation disappears after a short period of time because air is returning to the hydraulic tank.

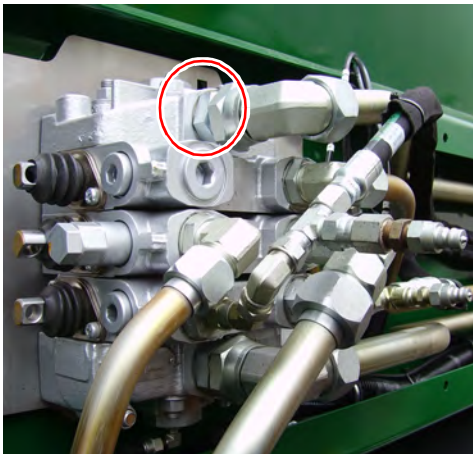
If the pump is still generating unusual noise after performing the pump priming procedure, then you will have to bleed the hydraulic system.

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 (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 8-4 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 "Main Hydraulic Schematic" on page 124.

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 8-6) with the *power bleed* feature, the other is the holding valve (see Figure 8-5).

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 8-5). 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 8-5 Tailgate holding valve

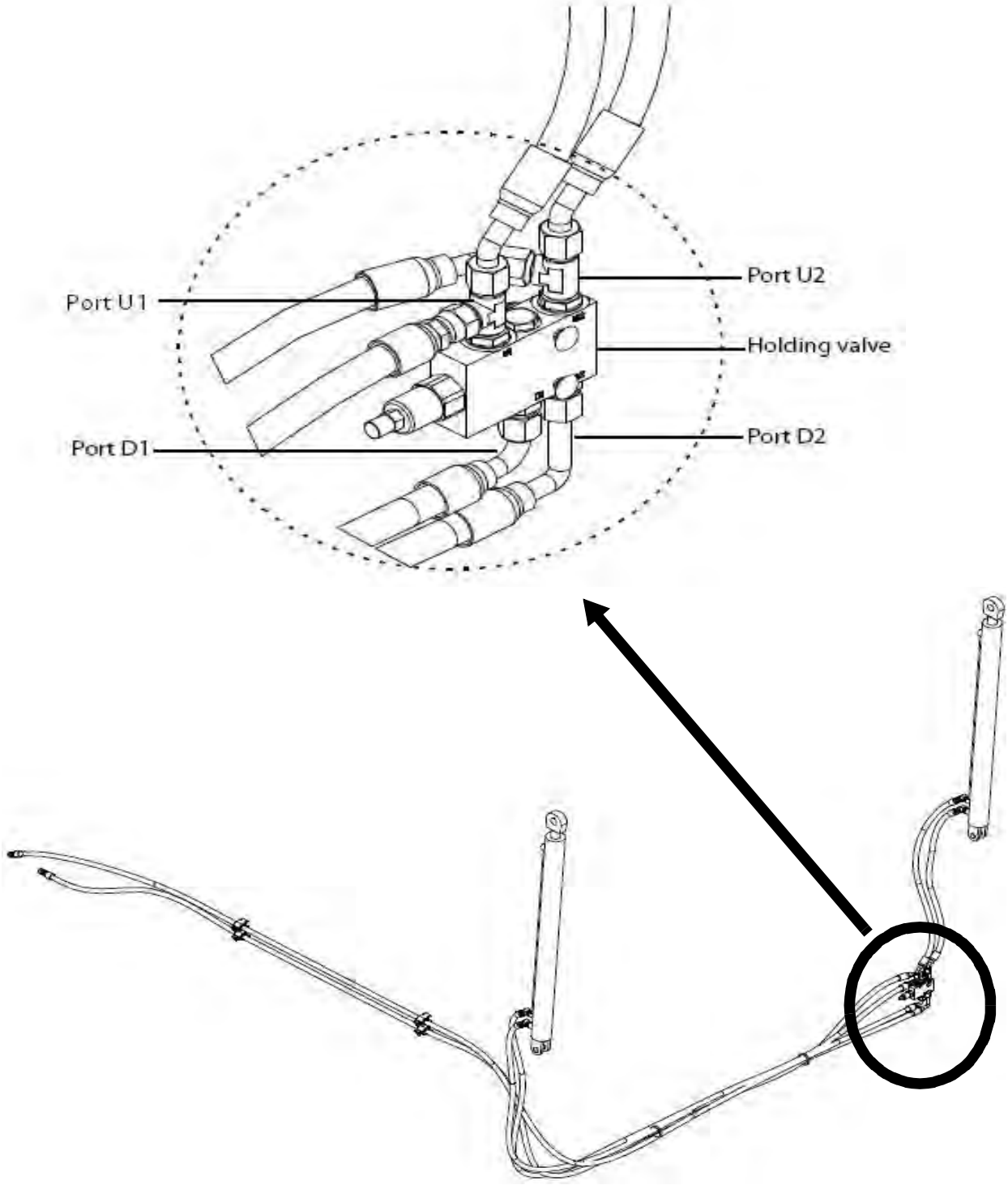
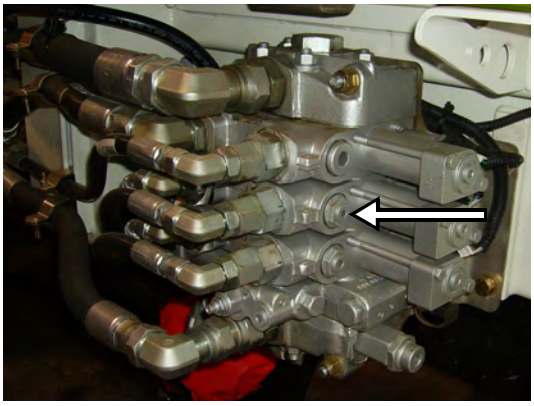


Figure 8-6 Velocity fuse



Tailgate Unlocking Spontaneously

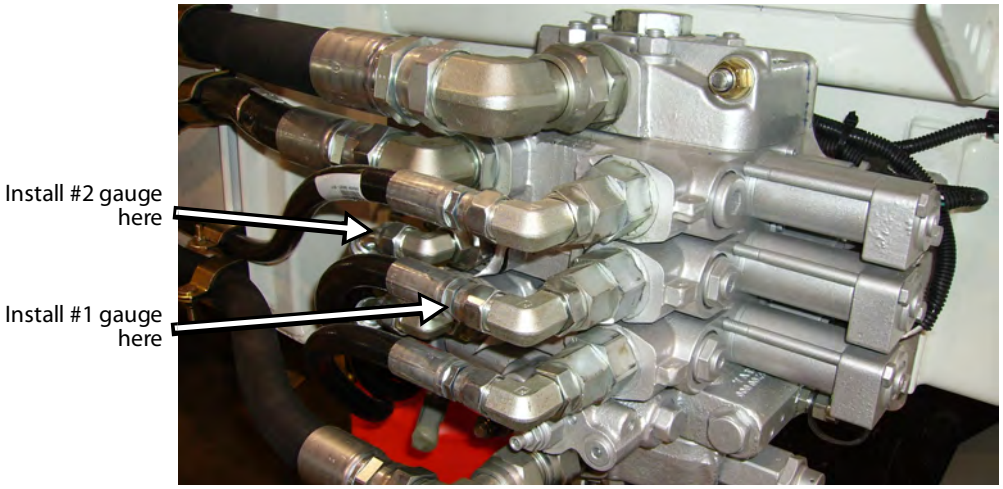
If the tailgate seems to unlock by itself when using the packer, the "power bleed" inside the valve might not be working on the right side of the hydraulic cylinder.

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. Disengage the hydraulic pump and turn OFF the engine.
4. Install a pressure gauge on each port of the valve tailgate section (see Figure 8-7).

   A T-connector is needed to connect each gauge to one of the ports.

Figure 8-7 Gauges #1 and #2



5. Disconnect the packer retract limit switch (see Figure 3-38).
6. Start the engine and engage the hydraulic pump.
7. Push the yellow button on the packer control station 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 124 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. Ensure that the tailgate is closed.
4. Disengage the hydraulic pump and turn OFF the engine.
5. Remove the velocity fuse.

   Tailgate must be closed before removing the velocity fuse.
6. Make sure that the velocity fuse is clean and that its plunger is moving freely. Replace if necessary.

"PUMP: Trans Not OK"

Since the release of the Labrie multiplex diagnostic manual for the MINIMAX™ (part #153145), a more effective method for troubleshooting the failure mode identifier "**Pump: Trans not ok**" has been identified.

The method outlined below can be used in conjunction with the Labrie multiplex diagnostic manual. Only basic tools are needed for this troubleshooting: a quality multimeter (preferably used with back probe leads), assorted screwdrivers, and a set of cutting pliers (for removing zip ties).

NOTE: Accurate diagnostic information will require use of the body serial number specific electrical schematics. This ensures correct connection information as connector/wire numbers are dependent on chassis manufacturer as well as whether a Labrie cab conversion has been performed.

IMPORTANT: Be sure to follow all appropriate lockout/tagout procedures (see *Locking Out and Tagging Out the Vehicle* on page 20) as well as your standard shop/facility procedures before attempting this procedure.

*"**Pump: trans not ok**"* indicates a breakdown in one of the two portions of the pump circuit.

Wire 104o originates at Node 10. When the pump switch is depressed, voltage is sent through wire 104o. Wire 104o is used to sense all safety features are met and terminates as an input into the Transmission Control Module as "Pump Request Chassis".

The 104 circuit acts as a request circuit to ask the chassis for a return signal after stating the body is ready to allow pump engagement.

When the transmission parameters are met, a return signal via wire 149i sends voltage to two specific locations. The ***first*** 149i runs to is Node 10 as input "Pump Running Chassis" and the ***second*** location is spade location 1 of the pump relay.

A breakdown in either of these circuits will cause this error code to manifest.

It is important to note, specifically with wire 149i, the system may believe the pump is engaged but due to a broken splice or other fault, the relay may not latch. This situation would prevent voltage from passing through the relay to the dump valves/PTO, thus preventing hydraulic function even though Node 10 is seeing power on wire 149i. This scenario would NOT result in a "**PUMP: TRANS NOT OK**" code.

Step #1) With the engine running, attempt to engage the pump and verify the complaint. **If the display screen** shows "PUMP: TRANS NOT OK", continue to step #2.

Step #2) Cycle the key "OFF" and to the "ON" position only. Starting the engine is not necessary.

Utilizing the Labrie multiplex display, perform the following steps:

1. Depress “Menu” then select “I/O Status”.

2. Next, select Module: “10_Cabine”.

3. Once in the Module 10 screen, depress the “Output” button.

4. After entering the output screen, select the "Force" button.

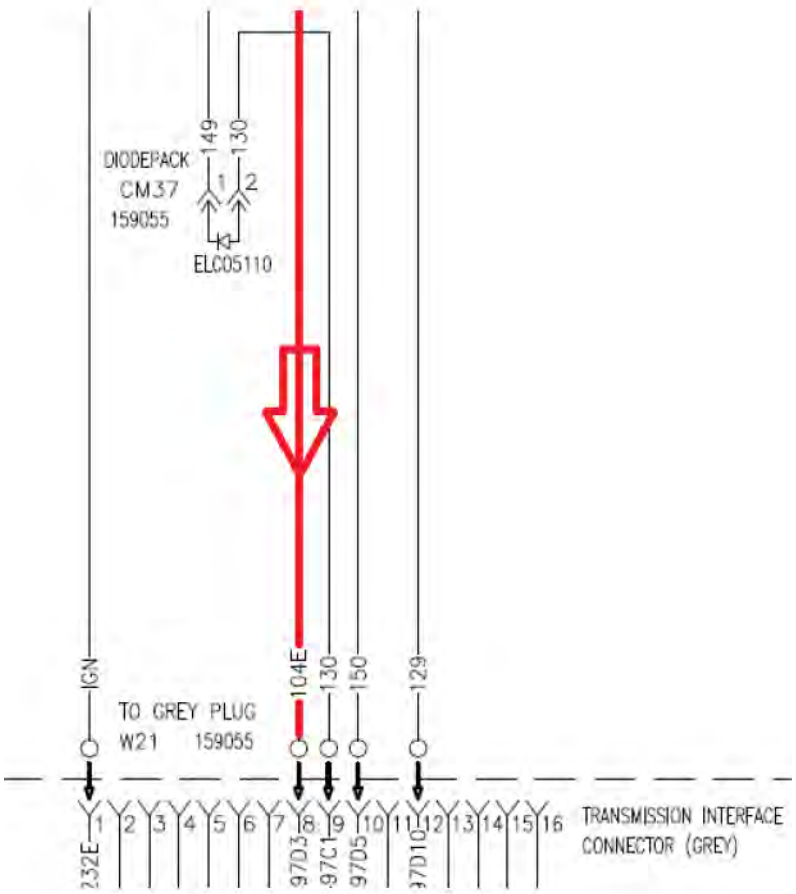
5. After selecting "Force" a countdown will begin. At the end of the countdown, press the "OK" button to enter force mode.

Note the addition of "Force Active" in the center of the screen. This is to alert the technician that force mode has been entered successfully. Also note the buttons on the far right have become an "ON" and "OFF" toggle.

Step #3)

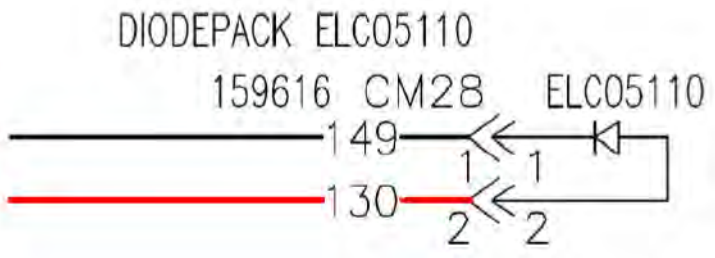
A) Locate output "OUT 12" and force it "ON". With this output forced move to the appropriate Labrie/chassis interface connector (see body serial number specific drawings for exact connector number). Measure voltage on the pump trans request wire (104E). **If voltage is present** proceed to step #4.

B) **If no voltage is present**, verify that voltage is leaving Node 10, wire 104o, pin 02, connector X20. **If voltage is not** leaving the module then the node 10 is defective/damaged; replace it. **If voltage is** leaving the module; there is one of two issues. Either a break in the wiring caused by an Emergency stop switch/panic bar or an outside fault (such as an abraded/cut wire, corrosion/water in a connector, etc.) is present. Repair the 104 wire before proceeding to step #4.

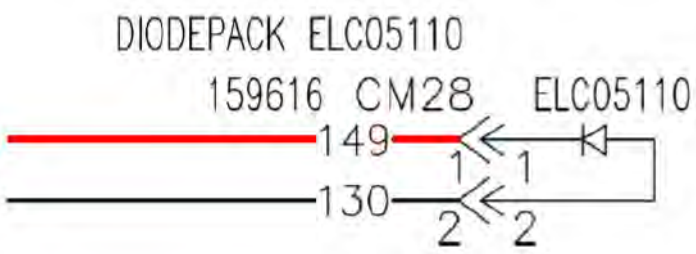


Step #4) Locate wire 130 on the same chassis interface connector and check for voltage. **If no voltage** is present, the transmissions parameters for pump engagement are not met (service transmission and/or TCM). **If voltage** is present on wire 130 then locate the diode pack; this is located between wires 130 and 149. Remove the diode pack and proceed to step #5.

Step #5) Perform a check of the diode pack using a digital multi-meter. With the multi-meter set to the diode check function, place the red lead on pin 2 and the black lead on pin 1. There should be continuity through the diode.



Next, place the red lead on pin 1 and the black lead on pin 2. There should not be continuity through the diode.



- **If the diode passed** the above test proceed to step #6.
- **If the diode did not pass** the above test replace the diode and then proceed to step #6.

NOTE: Connector CM28 & wire 149 on the illustrations are for reference only; the specific connector & wire numbers may vary. To find the diode on the wiring schematic, locate wire #130 and trace it to the diode pack, typically on page 1.

Step #6) Reconnect the diode onto wires 130 and 149. Check for voltage on wire 149.

- **If voltage is not present,** then the diode continuity check was performed incorrectly. Replace the diode.
- **If voltage is present** on wire 149 then proceed to step #7.

Step #7) Locate wire 149 at Node 10, connector X10, pin 16 AND spade location 1 of the pump relay. Check for voltage.

- **If voltage is present,** then the node 10 is defective/damaged, replace it.
- **If no voltage is present,** then the 149 wire is broken between the diode location and Node 10. Locate the break and repair.

NOTE: Connector/wire numbers may vary from truck to truck. If in doubt, call your Field Service Representative for advice before proceeding.

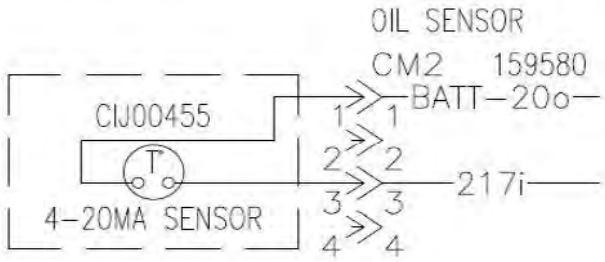
Troubleshooting Harnesses

To simplify electrical troubleshooting on any MINIMAX™ side loader, a kit of different harnesses is available for use. These harnesses enable digital multimeter readings of both voltage and resistance without poking or damaging wires. Simply connect the compatible harness between two (2) existing connectors and use the additional connector as test points (see pictures below).

NOTE: Two (2) harnesses in this kit have a reference chart to work with:
1. harness #151202, which is used to measure the temperature sensor, and
2. harness #151199, which is used to measure the pressure sensor

CIJ00455 TEMPERATURE SENSOR

°F	°C	mA
-13	-25	4
1,0625	-17,1875	5
15,125	-9,375	6
29,1875	-1,5625	7
43,25	6,25	8
57,3125	14,0625	9
71,375	21,875	10
85,4375	29,6875	11
99,5	37,5	12
113,5625	45,3125	13
127,625	53,125	14
141,6875	60,9375	15
155,75	68,75	16
169,8125	76,5625	17
183,875	84,375	18
197,9375	92,1875	19
212	100	20

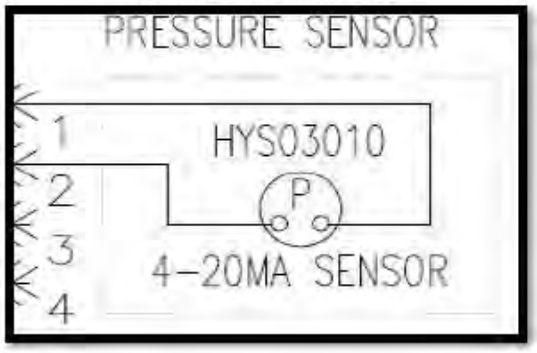


HARNESS TOOL
#151202

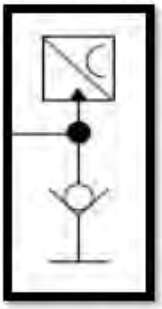
HARNESS TOOL #151199

HYS03010	
PSI VS mA @ 12v	
PSI	mA
0	4
100	4,4
200	4,8
300	5,2
400	5,6
500	6
600	6,4
700	6,8
800	7,2
900	7,6
1000	8
1100	8,4
1200	8,8
1300	9,2
1400	9,6
1500	10
1600	10,4
1700	10,8
1800	11,2
1900	11,6
2000	12
2100	12,4
2200	12,8
2300	13,2
2400	13,6
2500	14
2600	14,4
2700	14,8
2800	15,2
2900	15,6
3000	16
3100	16,4
3200	16,8
3300	17,2
3400	17,6
3500	18
3600	18,4
3700	18,8
3800	19,2
3900	19,6
4000	20

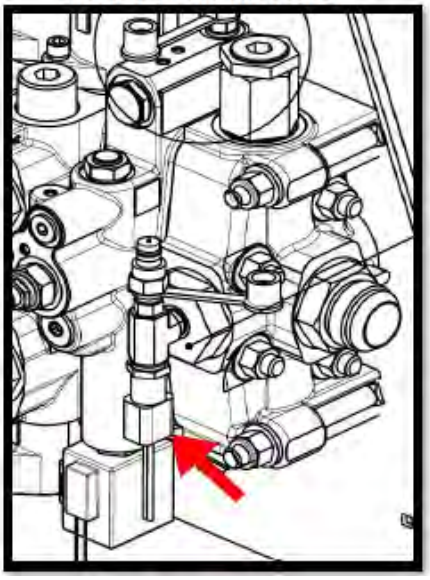
Electrical schematic view



Hydraulic schematic view



Located on the inlet cover



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 following pages provide the necessary information for this task.

Labrie's Multiplexed System

Labrie has equipped your MINIMAX™ unit with a CAN bus-based multiplexed system, which integrates a monitor, a control panel, a joystick, and a set of 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 monitor (see Figure 9-1), Labrie's Multiplexed System informs you of any malfunctions that may occur during the operation of the truck. Various caution and warning messages can be displayed on the monitor, depending on the seriousness of the situation. Yellow-highlighted messages indicate that caution should be used while red-highlighted messages indicate a warning situation that must be dealt with quickly.

Figure 9-1 Monitor

Each time the operator turns the ignition key on, a complete bit test of the multiplexed system is conducted. This test takes about 5 seconds to complete.

NOTE: A flashing green light on the monitor indicates that the 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 Labrie*Plus* for support.

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

Figure 9-2 Labrie logo on the monitor screen

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

NOTE: The monitor screen works even if the engine is not started. All it needs is electrical power. However, if you start the engine, the monitor will reboot to reflect the changes caused by the starting of the truck.

Main Page

The next page that comes up after the Welcome Screen is the Main Page (see Figure 9-3). Here you will find a link that will give you access to the Main Menu (see *Main Menu* on page 175). Any warning or error messages that may occur while the truck is being operated are also displayed on this page. The following optional indicators, when provided, are also found on the Main Page : Cart Counter, Time and Date Indicator and Hydraulic Oil Temperature Indicator.

Cart Counter (optional)
This indicator tells you how many carts have been emptied so far.

Figure 9-3 Main Page

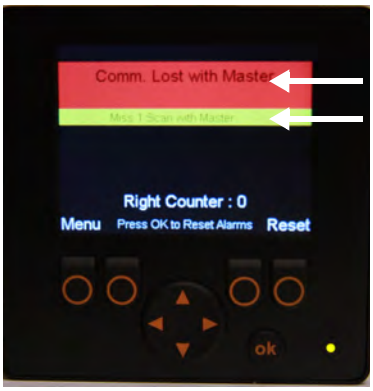
Press the far right button to reset the counter display to zero.

Time and Date Indicator (optional)
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.

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.

Warning and Caution Messages
On the monitor screen, yellow-highlighted messages indicate that caution should be used and red-highlighted messages indicate a warning situation that must be dealt with 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 (cont'd)

Warning and Caution Messages	Solution
Arm Up:Crusher Not Raised	Raise Crusher Panel
Arm:Auxiliary Deadman ON	Release Auxiliary Deadman
Arm:External Control Selected	Deactivate External Control
Arm:Hopper Door Not Close	Close Hopper Door
Arm:Pump Not Started	Engage Pump
Arm:Tailgate Unlocked	Lock Tailgate
Buzzer:Arm Not Stow	Retract Arm to Stowed Position
Buzzer: Unlocked	Lock Tailgate
Crusher:Arm Too High	Lower Arm
Crusher:External Control	Deactivate External Control
Crusher:Hopper Door Not Closed	Close Hopper Door
Crusher:Packer Not Retracted	Retract Packer
Crusher:Pump Not Started	Engage Pump
ESTOP: Right Emergency Stop	Pull Out Right EStop Button
ESTOP:Aux Cab EStop	Pull Out Aux Cab EStop Button
ESTOP:Cab Emergency Stop	Pull Out Cab EStop Button
ESTOP:Left Emergency Stop	Pull Out Left EStop Button
ESTOP:Left Panic Bar	Release Left Panic Bar
ESTOP:Right Panic Bar	Release Right Panic Bar
FullEject:Cab EStop	Pull Out Cab EStop Button
FullEject:Ext. Control Selected	Deactivate Ext. Control
FullEject:Packer Not Retracted	Retract Packer
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

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 Labrie*Plus*
Packer:Already Retracted	Refer to Maintenance Personnel or Labrie*Plus*
Packer:External Control	Deactivate External Control
Packer:Pump Not Started	Engage Pump
Packer:Tailgate Not Fully Open	Open Tailgate Completely
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:Left Estop	Pull Out Left EStop Button
Pump Not Started:Left Panic Bar	Release Left Panic Bar
Pump Not Started:Right Estop	Pull Out Right EStop Button
Pump Not Started:Right Panic Bar	Release Right Panic Bar
Pump Not Started:RPM Too High	Lower Engine Speed Below 900 RPM
Pump:Aux. AutoDump Switch ON	Release Aux. AutoDump 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:CrusherDown Switch ON	Release CrusherDown Switch prior to Engaging Pump
Pump:CrusherUp Switch ON	Release CrusherUp Switch prior to Engaging Pump
Pump:J1 AutoDump Switch ON	Release J1 AutoDump Switch prior to Engaging Pump
Pump:J1 CloseGripper Switch ON	Release J1 CloseGripper Switch prior to Engaging Pump

Table 1 Warning messages (cont'd)

Warning and Caution Messages	Solution
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 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:Left EStop	Pull Out Left EStop Button
Pump:Left Panic Bar	Release Left Panic Bar
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
Pump:PTO Not OK	Refer to Maintenance Personnel or Labrie*Plus*
Pump:Right EStop	Pull Out Right EStop Button
Pump:Right Panic Bar	Release Right Panic Bar prior to Engaging Pump
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
Pump:Trans. Not OK	Refer to Maintenance Personnel or Labrie*Plus*
Tailgate Up:Truck Moving	Bring Truck to a Standstill
Tailgate:External Control Selected	Deactivate External Control

Table 1 Warning messages (cont'd)

Warning and Caution Messages	Solution
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 (cont'd)

Error Messages	Solution
Button Pack 12 is disconnected	Refer to Maintenance Personnel or Labrie*Plus*
Button Pack 13 is disconnected	Refer to Maintenance Personnel or Labrie*Plus*
Button Pack 14 is disconnected	Refer to Maintenance Personnel or Labrie*Plus*
Button Pack 15 is disconnected	Refer to Maintenance Personnel or Labrie*Plus*
CAN Error Level 1	Refer to Labrie*Plus*
CAN Error Level 2	Refer to Labrie*Plus*
CAN Error Level 3	Refer to Labrie*Plus*
Comm. Lost with Master	Refer to Maintenance Personnel or Labrie*Plus*
Module 11 is disconnected	Refer to Maintenance Personnel or Labrie*Plus*
Module 11 not Connected	Refer to Maintenance Personnel or Labrie*Plus*
Module 50 is disconnected	Refer to Maintenance Personnel or Labrie*Plus*

Table 2 Error messages (cont'd)

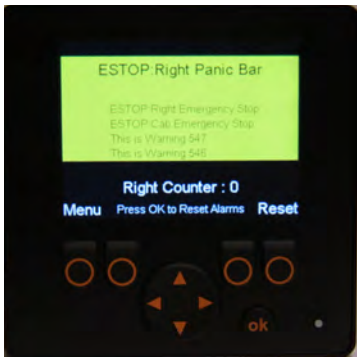
Error Messages	Solution
Module 50 not Connected	Refer to Maintenance Personnel or Labrie*Plus*
Module 60 is disconnected	Refer to Maintenance Personnel or Labrie*Plus*
Module 60 not Connected	Refer to Maintenance Personnel or Labrie*Plus*

Should the system issue a warning or caution message, it will appear on the Main Page.

For example, if the following caution message "Pump Not Started: Main Air Pressure" is issued by the system, it will appear on the Main Page of the 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 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 (non active causes) [see Figure 9-5].

Figure 9-5 Example of possible cause



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

NOTE: To go back to the Main Page or Main Menu, press "Esc" as needed until the desired page is displayed.

Main Menu

To access the Main Menu, press the far left button when the Main Page is displayed.

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

- Multicycle
- I/O Status
- Password (optional)
- Program Version
- Pump Usage (optional)
- 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.

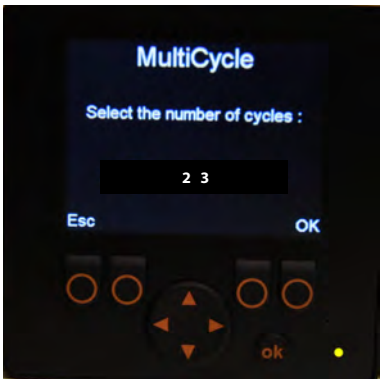
NOTE: The higher the network load value is, the heavier the traffic is on the network.

To exit this page and return to the Main 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

The monitor used in Labrie's Multiplexed System is user-friendly. Say you want to change the multicycle settings of the packer. All you have to do is select MAIN MENU by pressing the corresponding button at the bottom left corner of the 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 multicycle settings can be changed from two to three cycles. Choose the desired number of cycles and press "OK".

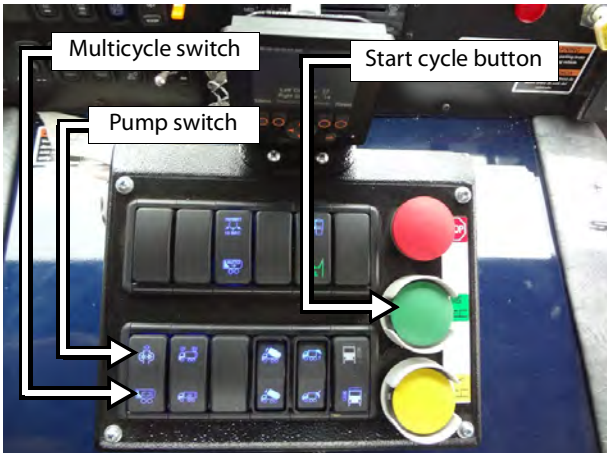
Figure 9-6 Multicycle page



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

When the MULTICYCLE switch on the control 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.

Figure 9-7 Control panel



To test the new settings of the packer:

1. On the control panel press the MULTICYCLE switch and the green START CYCLE button.
2. Once the packer has completed its cycles and come to a stop, switch off the hydraulic pump and turn OFF the engine.

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 to one another, it may be required to select the higher 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 proximity/limit switch located on the right-hand side, behind the packer, sends a signal to the electronic controller. The controller then counts the amount of cycles that the packer does, and will stop the packer after the preset amount of cycles has been reached.

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 right hopper, choose module #50 or #60, 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 9-8 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 9-9).

Figure 9-9 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 specific 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 (see Figure 9-10) is accessible from the Input Status page.

Figure 9-10 Output Status page

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

NOTE: Each rectangle is numbered and relates to a specific 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.

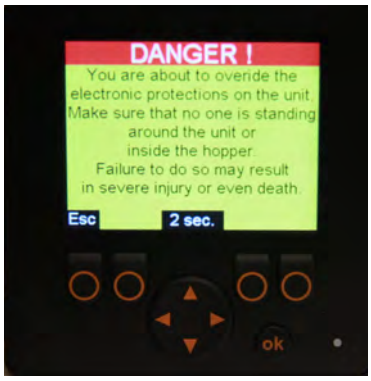
NOTE: To go back to the Main Page or Main Menu, press “Esc” as needed until the desired page is displayed.

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 monitor screen (see Figure 9-11).

Figure 9-11 Warning message



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

Figure 9-12 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 9-13 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 9-14).

Figure 9-14 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 at the bottom of the screen.

After selecting a rectangle:

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

NOTE: To cancel changes made in this page and restore the default values, all you have to do is cut power to the multiplexed system by turning the ignition key off.

NOTE: To go from a module to another (e.g. from module 10 to 50), the operator has to go back to the Module I/O Status page (see Figure 9-8) and select module 50.

Press “Esc” to return to the preceding page.

Joystick

The Joystick page is accessible from the Module I/O Status page (see Figure 9-8). From that page select "Joystick" using up/down arrows and press "OK". The Joystick page opens (see Figure 9-15).

Figure 9-15 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 monitor screen 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 monitor will turn green. If nothing happens, there may be a communication problem between the joystick and the master control module. Refer to the maintenance personnel or Labrie*Plus*.

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 the maintenance personnel or Labrie*Plus*.

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 status).

Figure 9-16 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, where they are used. 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.

Managing Passwords (optional)

With this optional feature, data protection passwords can be added to the IFM Multiplexed System display. This feature can also be used to change or remove already saved passwords.

Data that can be protected by passwords relate to the following features: Output Force, Multicycle and J1939 baudrate.

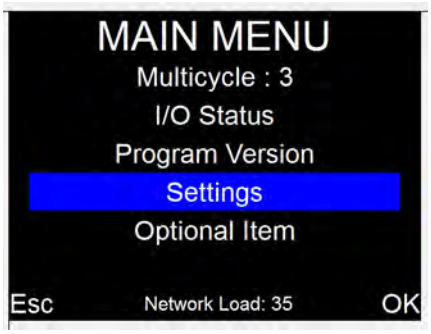
NOTE: Only adjustable data in Output Force, Multicycle and J1939 Baudrate can be protected by passwords.

The **Password Menu** is available through the **Settings Menu**. An associated menu, **Locked Features**, is also available, allowing you to choose among the features that can be "locked".

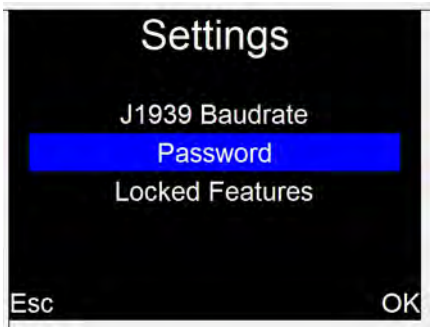
After creating a new password, write it down in a safe place for reference. You will be required to provide it to gain access to a locked adjustable feature when logging on anew (after the sign out and back on).

To create, change or remove a password, do the following:

1. Go to the Main Menu.
2. Select "Settings".



3. Select "Password".



4. If no password has been created, enter a password using the arrow keys.
   Press “Esc” to quit or OK to set password.

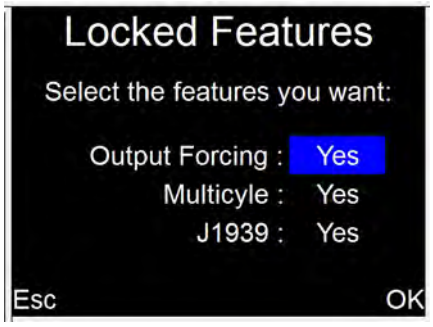
5. If a password already exists, enter it using the arrow keys.
   Press “Esc” to quit or OK to erase the password.

6. Enter a new password using the arrow keys.
   Press “Esc” to quit or OK to create a new password.

NOTE: Entering a new password with only zeros as the number, such as "000000", will result in deactivating the password function.

7. Go back to the Settings Menu by pressing "Esc".
8. In the Settings Menu, select Locked Features.

9. Select the feature(s) that you want to lock using the password created or saved.



NOTE: If you have forgotten your password, please contact the Labrie*Plus* Service Department.

Module Software Version

On the Module Software Version page, you will find the software version currently used by each of the modules installed on the truck and by the master control module.

Figure 9-17 Software Version page

With the information on this page it is possible for the operator or maintenance personnel to determine the electrical schematic number pertaining to a specific vehicle. Looking at Figure 9-17 above you will notice the following digit string 8-8-5-1 between, for example, 10 and R1. As all Labrie electrical schematics begin with ZS00, you simply add those digits to that base number to get the corresponding electrical schematic number. So, in this case, the electrical schematic number is ZS008851.

Press "Esc" to return to the preceding page.

Pump Usage
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.

NOTE: To go back to the Main Page or Main Menu, press "Esc" as needed until the desired page is displayed.

Warning Buzzer

Among the many buttons on the control panel you will find a warning buzzer (see Figure 9-18). This buzzer sounds and a red light in its center flashes to warn the operator of any situation that might be hazardous. When this happens, the operator can look at the monitor screen 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 9-18 Buzzer with red light

Plugging a Computer

The in-cab control panel of the MINIMAX™ has a computer plug that can be used to connect a laptop computer for reprogramming purposes (see Figure 9-19). Connecting a laptop to this plug requires special hardware and software (included in the 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 detect and pinpoint the cause of body-related problems.

Figure 9-19 Computer plug

Replacing the CAN Bus-Based Multiplex Joystick

Should the CAN bus-based multiplex joystick need to be replaced for any reason, it will have to be replaced with a new joystick of the same kind and same part number in order to insure continued proper operation of the multiplex 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 Labrie*Plus*.

Figure 9-20 CAN bus-based multiplex 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 multiplex system monitors all safety and operating functions to insure they work at their best. This system transfers data to and from the Allison TCM and the Cummins engine ECU. In order for this to be possible, proper parameters must be put into the TCM and the ECU. In the next section you will find tables that contain such parameters.

Allison Transmission Parameters

In Allison transmissions used on automated vehicles, the Transmission Control Module (TCM) manages several functions:

- It prevents the pump from engaging if the engine speed is higher than 900 RPM.
- It also controls the auto-neutral system (if so equipped).

The TCM 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 TCM and to verify the fault code, if any.

Figure 9-21 Allison Doc software

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

Programmed Parameters

NOTE: The following tables show parameters that are not necessarily specific to your vehicle. These are general parameters. To obtain the parameters that are closely related to your vehicle, contact Labrie*Plus* and ask for the electrical schematic pertaining to your truck model with all the options installed.

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

On chassis supplied by Labrie, the programming package for Allison transmissions is package no 142. Some customer chassis may have different programming packages. Refer to your local Allison dealer for original programming packages. For further information regarding TCM programming, contact Labrie*Plus*.

The next page shows how Allison TCMs 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 Labrie*Plus* for the values that are specific to your vehicle.

Table 5 Allison transmission programmed parameters

Parameters	RPM
Maximum engine speed for PTO engagement	900
Maximum engine speed for PTO operation	2000
Maximum output speed for PTO engagement	5000
Maximum output speed for PTO operation	930[a] (15 mph)
Maximum output speed for auto-neutral (if present)	500 (7 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.

NOTE: Engine speed (RPM) or road speed (MPH) limiters are options.

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

Table 6 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 7 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 *Programmed Parameters* on page 188.
145	Neutral signal output	Active when the transmission is in neutral. This signal (ground signal) is used to allow fast idle engagement. For more details, refer to the electrical schematic provided with the vehicle.

Cummins Engine Parameters

The following table contains the engine programming parameters specific to MINIMAX™ units. Enter those parameters into Cummins engine ECUs. For more information, call Labrie*Plus*.

Table 8 Cummins engine parameters

Menu: Features & Parameters	Parameter Name	Value
Adjustable low idle speed	Low idle speed adjustment switch --- Low idle speed	Disable --- 700 RPM
Switched maximum engine operating speed	Switched maximum engine operating speed --- Maximum operating speed switch setup --- Maximum switched engine speed	Enable --- Active closed --- 900 RPM

NOTE: The values contained in the table above are given as an indication and may vary according to truck specifications. If in doubt, call Labrie*Plus* Support Service.

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 the 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 69.

To perform the daily inspection:

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

Danger!

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

NOTE: If the vehicle is equipped with an auxiliary arm control panel under the right-hand side seat just next to the cab door, you will have to push the enable switch first in order to enable this auxiliary control panel.

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

Figure 10-1 Mounting bolts

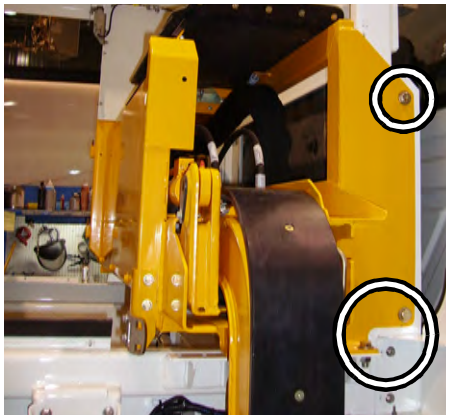


Figure 10-2 Helping Hand™ gripper

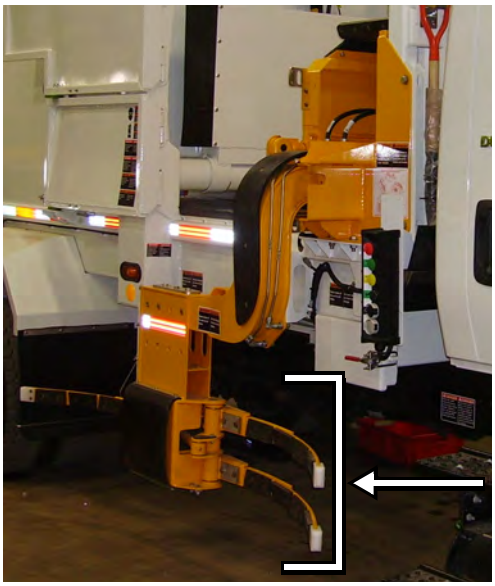


Figure 10-3 Hoses

Figure 10-4 Connections

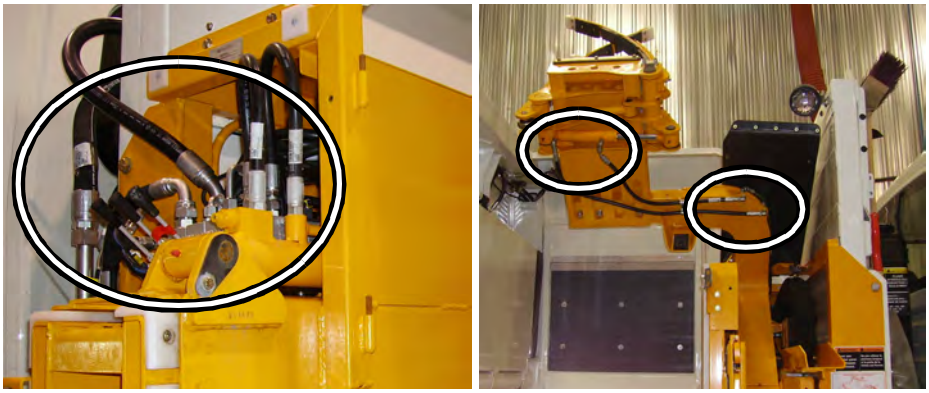
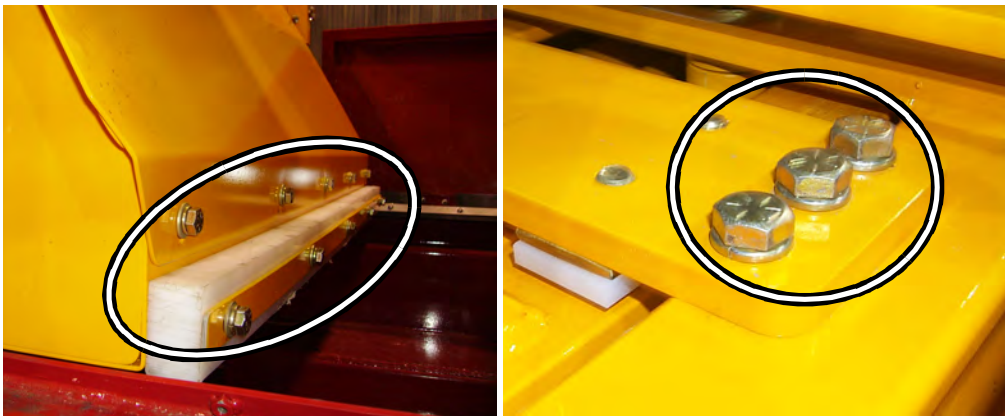


Figure 10-5 Wear pads

5. Check for loose nuts and bolts.

Figure 10-6 Bolts



6. Check the arm stowed limit switch.
   For more information, see *Adjusting Arm Stowed Limit Switch* on page 62.
7. Lubricate the arm moving parts as per the Arm Lubrication Chart on page 76.
8. Lock out and tag out the vehicle (see *Locking Out and Tagging Out the Vehicle* on page 20).

Gripper Auto-Closing System

The HELPING-HAND™ lifting arm is equipped with a system that automatically closes the gripper in the event the operator forgets to close it. It does so at a preset height, preventing a collision between the gripper and the hopper walls.

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. But as soon as the hydraulic system is brought online (PUMP switch "ON"), the auto-closing system closes the gripper automatically before the operator can move the arm. In this, the system acts as though the operator had pushed the CLOSE GRIPPER button on the joystick.

The Gripper Auto-Closing System is activated by a limit switch 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 10-7 Gripper Auto-Closing limit switch

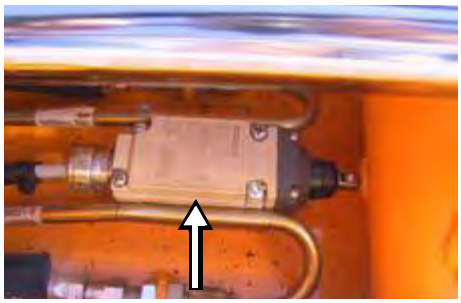


Figure 10-8 Gripper closed (left) and open (right)

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 Auto-Closing System:

1. Make sure that the vehicle is parked on safe, 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 operations.

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

Auto-Packing

The Auto-Packing switch (see Figure 10-9) enables the packer to automatically start cycling about 2 seconds after the gripper reached the mid-height position on its way up. If the packer is performing a cycle while the lifting arm carries a rolling cart towards the hopper, the packer will immediately stop and return to its home position, no matter where it was in the hopper. This is to prevent refuse from falling directly on the packer. However, there is one exception to this: if, after 3 consecutive packing cycles, the Packer Fully Extend limit/proximity switch has not been activated, the packer will not return to its home position.

Figure 10-9 Auto-Packing switch

When the Auto-Packing feature is used simultaneously with the Multi-Cycle feature, the packer will then perform a preset number of cycles unless a new rolling cart is carried towards the hopper by the automated arm. In such a case, the Multi-Cycle feature will then be reset to zero.

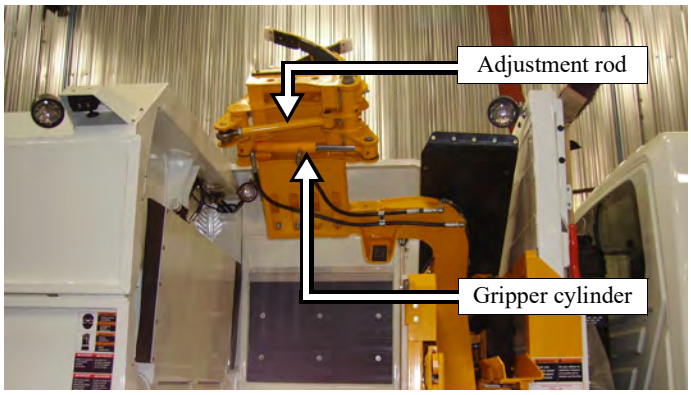
When a packing cycle has been interrupted and the packer has returned to its home position, a new cycle will begin 2 seconds after the gripper reached the mid-height position on its way up.

Interrupting a packing cycle prevents cart contents from falling directly over the packer. Piled material over the packer could reduce its efficiency.

- A blue-lighted Auto-Packing switch means this feature is disabled.
- A green-lighted Auto-Packing switch means this 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 10-10).

Figure 10-10 Gripper cylinder and adjustment rod



Adjusting Gripper Adjustment Rod

Both sides of the gripper should move symmetrically in order for the gripper to close equally. A system of cylinder and adjustment rod (see Figure 10-10) 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. The gripper cylinder does not need to be adjusted, unlike the adjustment rod, which 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 the 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 10-11).
5. Move the adjustment rod towards you.

6. Loose the locknut.
7. Turn the swivel eye clockwise or counterclockwise to adjust the 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.
12. Repeat the procedure if required.

Figure 10-11 Adjusting gripper adjustment rod

Bleeding Air Out of the Lifting Arm Hydraulic Circuit

After opening the HELPING-HAND™ hydraulic circuit to replace (for example) a 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.

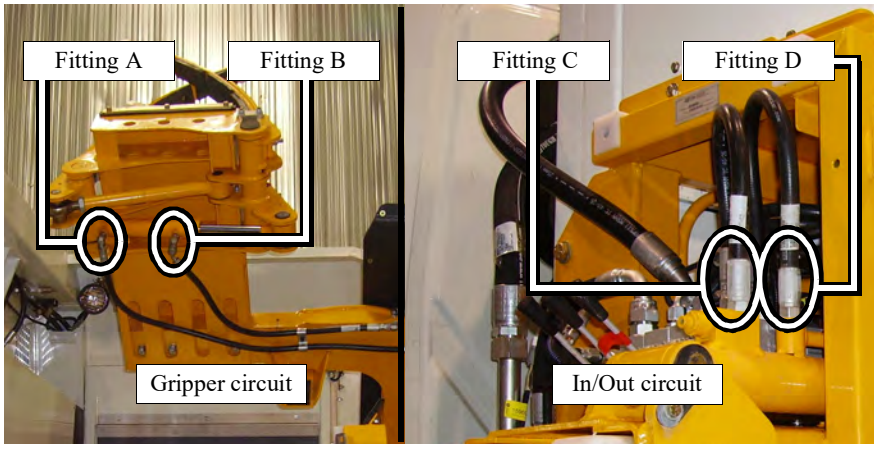
NOTE: The Up/Down hydraulic circuit needs not to be bled because air that may be inside the circuit can easily be removed by the normal use of the arm.

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 the 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 10-12 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 10-12, 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 (see Figure 10-12, Fitting B).
8. Fully retract the gripper cylinder in order to open the blades.
9. Repeat step #6.

To bleed the In/Out circuit:

1. Repeat steps 1 through 3 of the gripper circuit bleeding procedure on page 197.
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 10-12, 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 10-12, 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 adjustment screws. If the grabber or the arm hits hard at the end of its strokes, apply the following procedure.

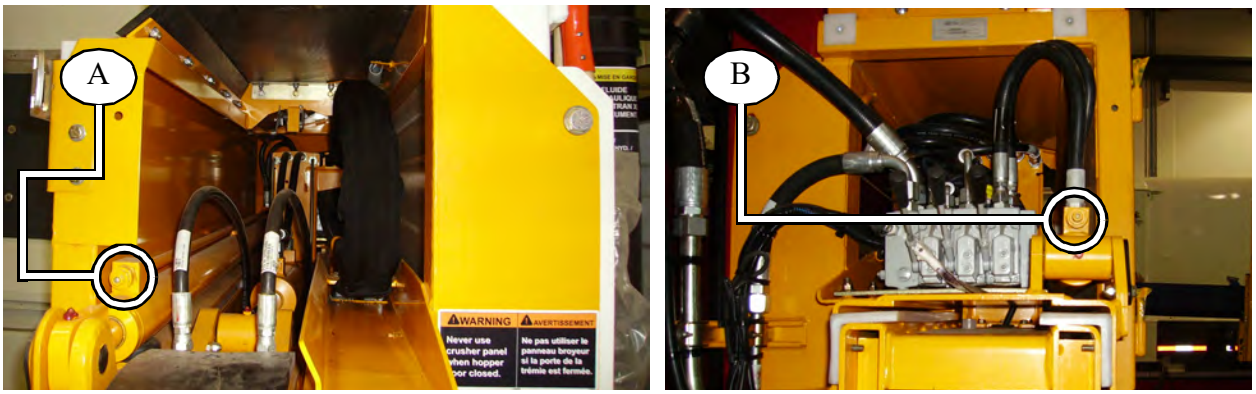
To adjust the end cushioning of the In/Out cylinder:

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™ arm 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 a 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 10-13); use the adjustment screw on the street side for the end-of-stroke retraction motion (See B in Figure 10-13).

Figure 10-13 Cushion adjustment screws - In/Out cylinder (curb side: A; street side: B)



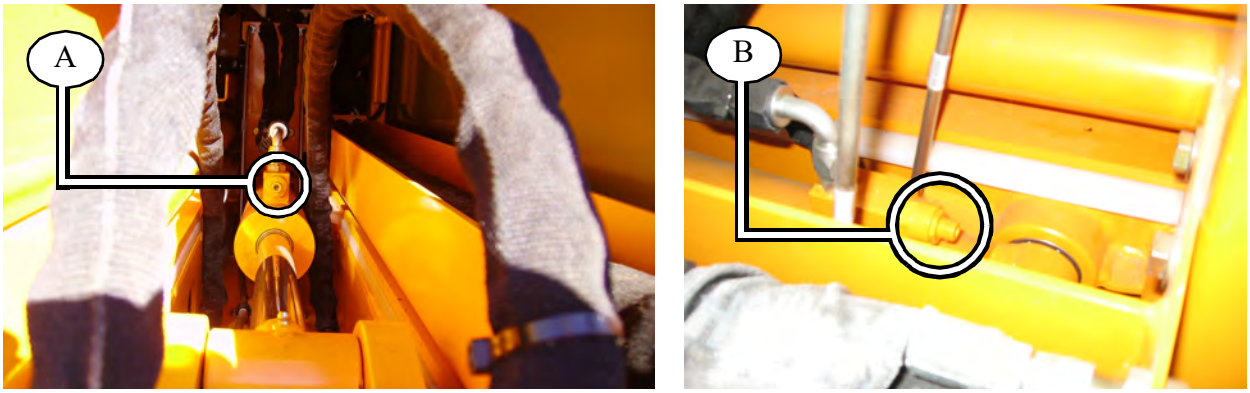
To adjust the end cushioning of the Up/Down cylinder:

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 a 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 10-14); use the adjustment screw on the street side for the end-of-stroke raising motion (See B in Figure 10-14).

Figure 10-14 Cushion adjustment screws - Up/Down cylinder (curb side: A; street side: B)

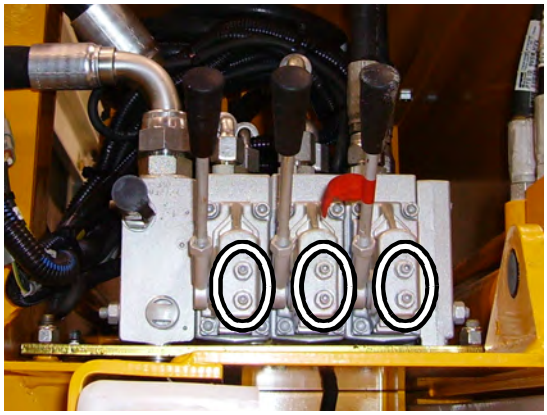


Adjusting Arm Speed

NOTE: No arm speed adjustment is required unless when 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 valve[1]. Flow is limited by two movement restrictors located on each section.

Figure 10-15 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 the arm speed:

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

   Make sure the Speed-Up feature is activated. The engine speed should be at 1200 RPM (except for units that work at idle).

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

6. Loosen the locknut.
7. 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.
8. Move the lever again to evaluate the arm speed. Repeat until the cycle times are properly set (see table below).
9. Retighten 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	System pressure	5.0 (min.) - 5.5 (max.)
Arm retract	System pressure	3.0 (min.) - 3.5 (max.)
Arm up	System pressure	3.0 (min.) - 3.5 (max.)
Arm down	System pressure	3.0 (min.) - 3.5 (max.)
Gripper close	1200 ± 50	1.0 (min.) - 1.5 (max.)
Gripper open	1200 ± 50	1.3 (min.) - 1.8 (max.)

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