

SNO-WAY®

SNOW & ICE CONTROL EQUIPMENT

INSTALLATION & OWNER'S MANUAL

29VHD SERIES 2 SNOW PLOW WITH ENERGY SMART SYSTEM (ESS®) PLOW LIGHT SYSTEM

**WITH SERIAL NUMBERS AFTER:
292VHD200000**

Sno-Way®, Down Pressure®, ESS®, Smart Sight®, and Smart Flash® are registered trademarks of Sno-Way International, Inc.
ProControl™, V-Wing™, E-Z Switch™, Revolution™, MaxAdjust™, SpeedLock™, and QuickJack™ are trademarks of Sno-Way International, Inc..

©2023 Sno-Way® International

97102488A

TABLE OF CONTENTS

	Page
INTRODUCTION	2
SAFETY	3
INSTALLATION INSTRUCTIONS	4
General	4
Electrical Installation	4
Mechanical Installation	4
Blade Level Adjustment	8
Mounting Snow Plow To Vehicle	9
Installing The Cylinder Lock Clamp	11
Removing Snow Plow From Vehicle	11
MAINTENANCE	12
General	12
Periodic Inspection	12
Plow Storage	13
Special Fasteners Torques and Requirements	13
Standard Fasteners	13
Hydraulic Fittings	13
Fluid Requirements	13
Changing Oil and Cleaning Filter Screen	14
Cutting Edge	16
Plow Shoe Adjustment	16
Trip Spring Adjustment	17
Emergency Plow Raise	17
Headlight Aiming Procedure	17
PLOWING OPERATION	19
Operating Class	19
Before The Season Begins	19
Transporting Vehicle With Plow Attached	19
Plowing Like A Pro	20
Using The Down Pressure® (DP) Hydraulic System	20
Plowing Roadways	21
Clearing Parking Lots	21
TROUBLESHOOTING	22
Introduction	22
Troubleshooting Quick Reference - General	22
Troubleshooting Guide	22
THEORY OF OPERATION	27
Hydraulic Power Unit	27
Hydraulic Controls	27
Electro-Hydraulic Controls	27
Raise Mode of Operation	27
Lower Mode of Operation - Down Pressure® Hydraulic (DP) System	28
Wing Angling Mode of Operation - Independent Wing Angling	28
Combination Wing Angling	29
Fuse	29
Power Unit Components	29
HYDRAULIC SCHEMATIC	30
WIRING SCHEMATIC	31
POWER UNIT SOLENOID FUNCTION, WIRING AND LOCATION	32
PLOW LIGHT SCHEMATIC ESS® (Energy Smart System)	33
ENERGY SMART SYSTEM (ESS®) WIRING SCHEMATIC	34
TORQUE SPECIFICATIONS	35

INTRODUCTION

This manual was written for the assembly, installation and maintenance of your new Sno-Way plow. Most importantly, this manual provides an operating plan for safe use. Refer to the Table of Contents for an outline of this manual.


Please keep this manual with your machine at all times as reference material and so it can be passed on to the next owner if the machine is sold.


We require that you read and understand the contents of this manual COMPLETELY, especially the chapter on SAFETY, before attempting any procedure contained in this manual.



The Society of Automotive Engineers has adopted this SAFETY ALERT SYMBOL to pinpoint characteristics that, if NOT carefully followed, can create a safety hazard. When you see this symbol in this manual or on the machine itself, BE ALERT!, your personal safety and the safety of others, is involved.

• Defined below are the SAFETY ALERT messages and how they will appear in this manual.

	WARNING
INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.	

	CAUTION
INDICATES A HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN MINOR OR MODERATE INJURY.	

NOTICE
IS USED TO ADDRESS PRACTICES NOT RELATED TO PHYSICAL INJURY. FAILURE TO FOLLOW COULD LEAD TO PROPERTY DAMAGE.

NOTE: Additional information concerning the equipment or the procedure that may or may not be contained elsewhere in this manual.

BE AWARE! It is illegal to remove, deface or otherwise alter the safety decals mounted on this equipment.

Record the Power Pack Model Number, Power Pack Serial Number, Controller Serial Numbers, Blade Model Number, Blade Serial Number and the Pump Serial Number in the space provided below as a handy record for quick reference. The Power Pack Serial Number is located on the Lower Light Lift Bar (driver's side), the blade serial number is located on one of the middle ribs of the blade. These decals contain information that your Dealer needs to answer questions or to order replacement parts, if needed, for your unit.

NAME DECAL DATA	
POWER PACK MODEL NUMBER _____	
POWER PACK SERIAL NUMBER _____ <small>(Located on Lower Light Lift Bar - Drivers Side)</small>	
BLADE MODEL NUMBER _____	
BLADE SERIAL NUMBER _____ <small>(Located on Blade Frame)</small>	
PUMP SERIAL NUMBER _____	
(FILL IN)	

DEALER	
NAME _____	
ADDRESS _____	
CITY _____ STATE _____ ZIP _____	
PHONE (____) - _____	
(FILL IN)	

ORIGINAL PURCHASER	
NAME _____	
ADDRESS _____	
CITY _____ STATE _____ ZIP _____	
PHONE (____) - _____	
(FILL IN)	

We reserve the right to make changes or improve the design or construction of any part(s) without incurring the obligation to install such parts or make any changes on any unit previously delivered.

Graphics and illustrations may be used which may show equipment and/or options not included in every installation without incurring the obligation to install such parts or make changes on units previously delivered.

Sno-Way Service Parts Manuals are available on-line or at your authorized Sno-Way dealer. Request part number 97102487 for the 29VHD Series 2 Snow Plow. Factory contact information is available at www.snoway.com.

SAFETY

BEFORE ATTEMPTING ANY PROCEDURE IN THIS BOOK, READ AND UNDERSTAND ALL THE SAFETY INFORMATION CONTAINED IN THIS SECTION. IN ADDITION, ENSURE ALL INDIVIDUALS WORKING WITH YOU ARE ALSO FAMILIAR WITH THESE SAFETY PRECAUTIONS.

For your safety Warning and Information Decals have been placed on this product to remind the operator to take safety precautions. It is important that these decals are in place and are legible before operation begins. New decals can be obtained from Sno-Way or your local dealer.

REMEMBER The careful operator is the best operator. Most accidents are caused by human error. Certain precautions must be observed to prevent the possibility of injury to operator or bystanders and/or damage to equipment.

NEVER operate Plow when under the influence of alcohol, drugs or other medications that could hamper your judgement and reactions. An accident may result in serious injury or death to other persons or yourself.

ALWAYS operate vehicle in a well-ventilated area. The carbon monoxide in exhaust gas is highly toxic and can cause serious injury or death.

NEVER allow hands, hair or clothing to get near any moving parts such as fan blades, belts and pulleys. Never wear neckties or loose clothing when working on the vehicle.

NEVER wear wrist watches, rings or other jewelry when working on the vehicle or individual equipment. These things can catch on moving parts or cause an electrical short circuit that could result in serious personal injury.

ALWAYS wear safety goggles when working on the vehicle to protect your eyes from battery acid, gasoline, and dust or dirt from flying off of moving engine parts.

ALWAYS be aware of and avoid contact with hot surfaces such as engine, radiator, and hoses.

ALWAYS wear safety glasses with side shields when striking metal against metal! In addition, it is recommended that a softer (non-chipable) metal material be used to cushion the blow. Failure to heed could result in serious injury to the eye(s) or other parts of the body.

NEVER allow children or unauthorized person to operate this unit.

NEVER exceed 45 m.p.h. when snow plow is attached to vehicle. Braking distances may be increased and handling characteristics may be impaired at speeds above 45 m.p.h.

ALWAYS lock the vehicle when unattended to prevent unauthorized operation of the plow.

ALWAYS check the job site for terrain hazards, obstructions and people.

NEVER exceed 10 m.p.h. when plowing. Excessive speed may cause serious injury and damage of equipment and property if an unseen obstacle is encountered while plowing.

ALWAYS position blade so it does not block path of headlamps beam. Do not change blade positions while traveling. An incorrect plow position blocking headlamp beam may result in an accident.

ALWAYS check surrounding area for hazardous obstacles before operating this unit.

ALWAYS inspect the unit periodically for defects. Parts that are broken, missing or plainly worn must be replaced immediately. The unit, or any part of it should not be altered without prior written approval of the manufacturer.

ALWAYS insert the cylinder lock when plow is not in use. If the cylinder lock is not installed, the plow blade could inadvertently drop and cause serious injury.

ALWAYS shut off the vehicle engine, place the transmission in Neutral or Park, turn the ignition switch to the "OFF" position and firmly apply the parking brake of the vehicle before attaching or detaching the blade from the vehicle or when making adjustments to the blade.

ALWAYS inspect lift system bolts and pins whenever attaching or detaching the plow, and before traveling. Worn or damaged components could result in the plow dropping to the pavement while driving, causing an accident.

ALWAYS keep hands and feet clear of blade and A-Frame when attaching or detaching plow.

NEVER stand between the vehicle and blade or directly in front of blade when it is being raised, lowered or angled. Clearance between vehicle and blade decreases as blade is operated and serious injury or death can result from blade striking a body or dropping on hands or feet.

NEVER work on the vehicle without having a fully serviced fire extinguisher available. A 5 lb or larger CO² or dry chemical unit specified for gasoline, chemical or electrical fires, is recommended.

NEVER smoke while working on the vehicle. Gasoline and battery acid vapors are extremely flammable and explosive.

NEVER use your hands to search for hydraulic fluid leaks; escaping fluid under pressure can be invisible and can penetrate the skin and cause a serious injury! If any fluid is injected into the skin, see a doctor at once! Injected fluid **MUST BE** surgically removed by a doctor familiar with this type of injury or gangrene may result.

REMEMBER it is the owner's responsibility for communicating information on the safe use and proper maintenance of this machine.

INSTALLATION INSTRUCTIONS

General

Install the subframe on the vehicle using the instructions supplied with the subframe package. The pin height should be 8" - 10" off the ground (See Figure 1-1).

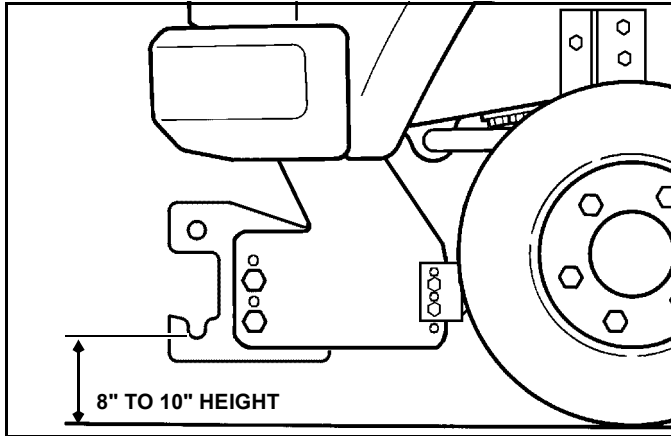


Figure 1-1

Electrical Installation

Install harnesses on the vehicle using the instructions supplied with the control package.

Mechanical Installation

Final Installation

1. Remove the A-frame/tower assembly from the box.
2. Remove power unit from carton. Remove pump cover. Attach lift link to light/lift bar, Install receiver using instructions included with the controls package. Fill reservoir on pump with supplied hydraulic fluid until the oil level reaches the fill line. Do not overfill or oil may leak from the breather.
3. Set a-frame/tower assembly lower hitch pins into slots on truck subframe (See Figure 1-2).

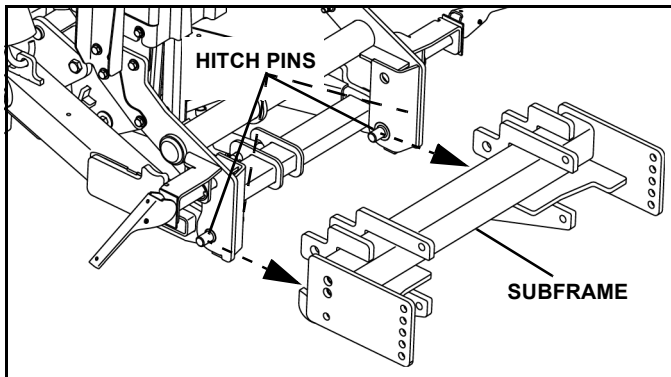


Figure 1-2

4. Plug in power and control harness and rotate light/lift bar into position. Lock in place by rotating cam handles. Adjust A-frame/tower assembly level using plow control.

5. Once A-frame level, turn off controller and disconnect the power. (See "Mounting Snow Plow To Vehicle" on page 9).

6. To aid in the pin installation as the blades are installed, loosen two nuts securing each lower support plate to the DS and PS wings (See Figure 1-3).

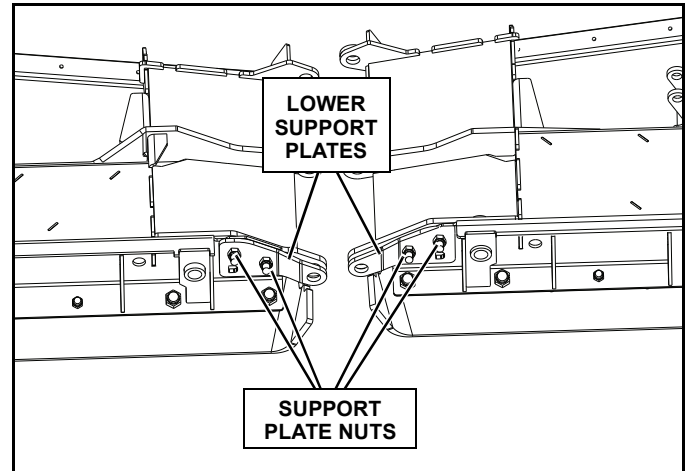


Figure 1-3

7. Position the drivers side (DS) and passenger side (PS) wings in front of the A-frame/tower assembly (See Figure 1-4).

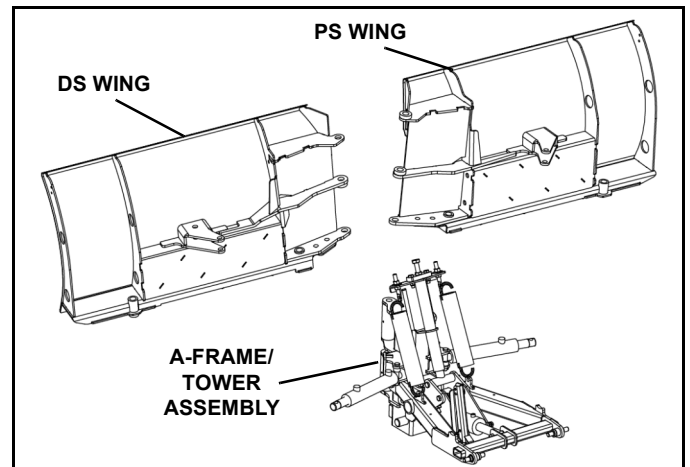


Figure 1-4

8. Coat main wing pivot pin with grease and insert completely through the tower, blade section pin holes, and support plate holes (See Figure 1-5).

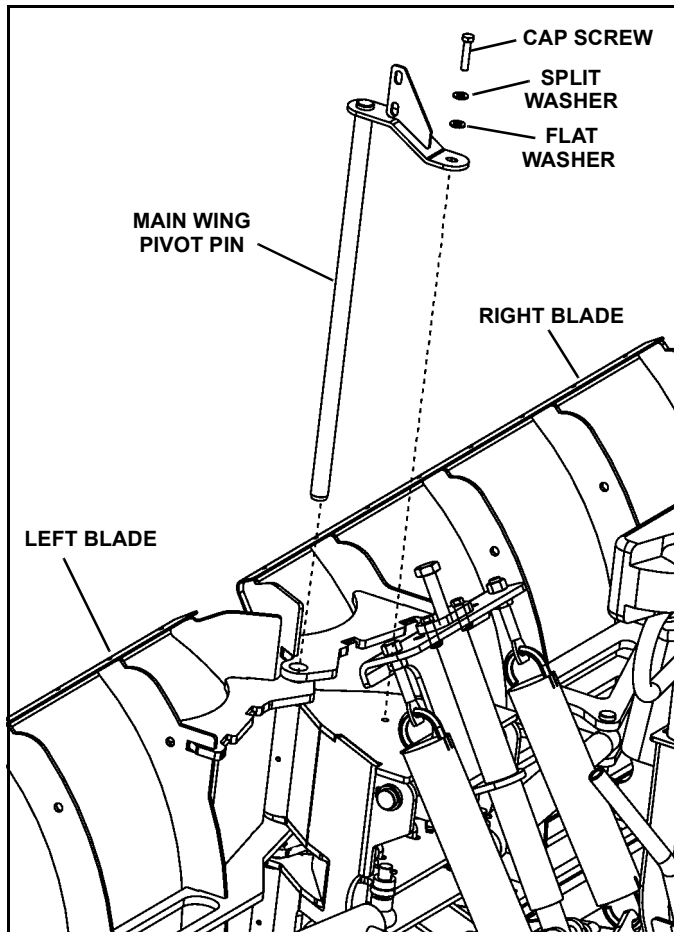


Figure 1-5

9. Secure the main wing pivot pin to the tower assembly with one 5/16-18 x 1" hex head cap screw (p/n 98009149), 5/16" split lock washer (p/n 98009025) and 5/16" flat washer (p/n 98009024).

10. After installation of the pin, tighten nuts on the lower hinge support plates securely if loosened earlier.

11. Install the center shield on the clevis pin retainer bracket, and secure with two 5/16-18 x 1" hex head cap screws (p/n 98009149), four 5/16" flat washers (p/n 98009024) and two 5/16" lock nuts (p/n 98009150) (See Figure 1-6).

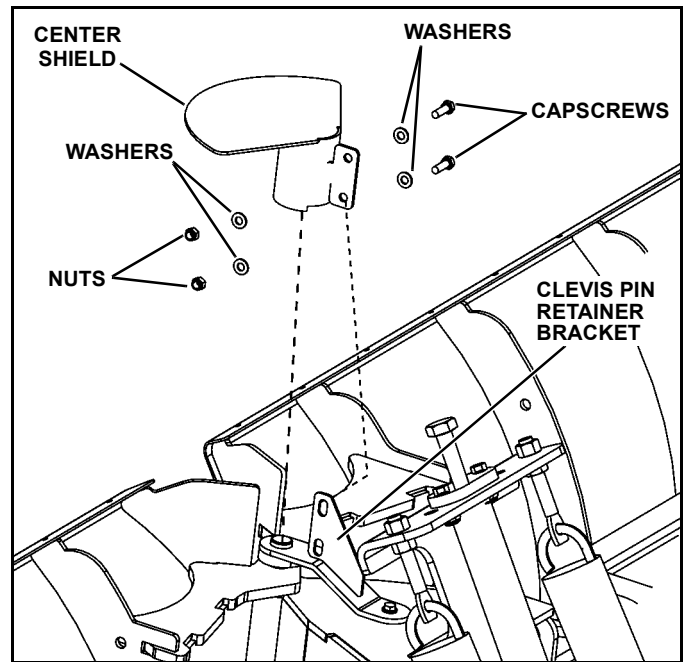


Figure 1-6

12. Attach angle cylinder base to tower with a 3/4" x 4-1/2" capscrew and 3/4" locknut. Attach angle cylinder to blade with a 3/4" x 4" capscrew and 3/4" locknut (See Figure 1-7). Repeat for opposite angle cylinder.

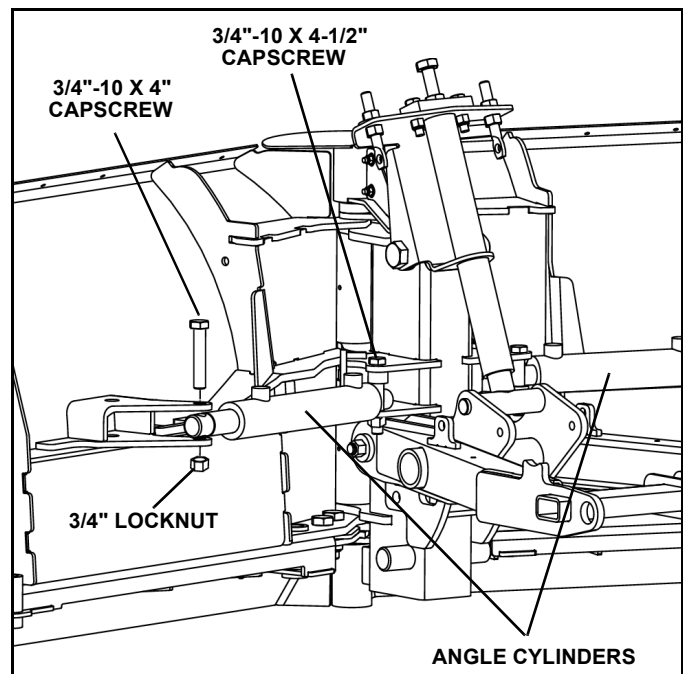


Figure 1-7

13. Attach a plow marker to each wing as shown and secure using 5/16" x 1" cap screws and locknuts (See Figure 1-8).

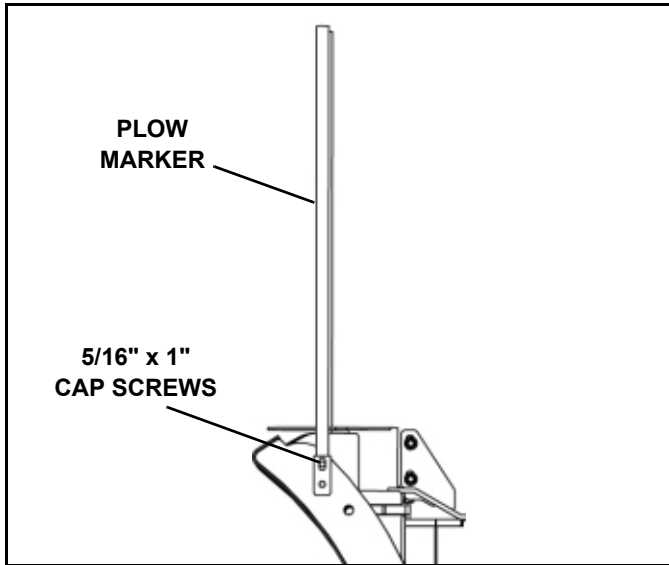


Figure 1-8

14. Loosely connect hydraulic hoses to the wing cylinders (See Figure 1-9 and Figure 1-10).

NOTE: C1 through C6 references are hydraulic ports on the control valve that are marked accordingly. (See Figure 1-9 and Figure 1-10.)

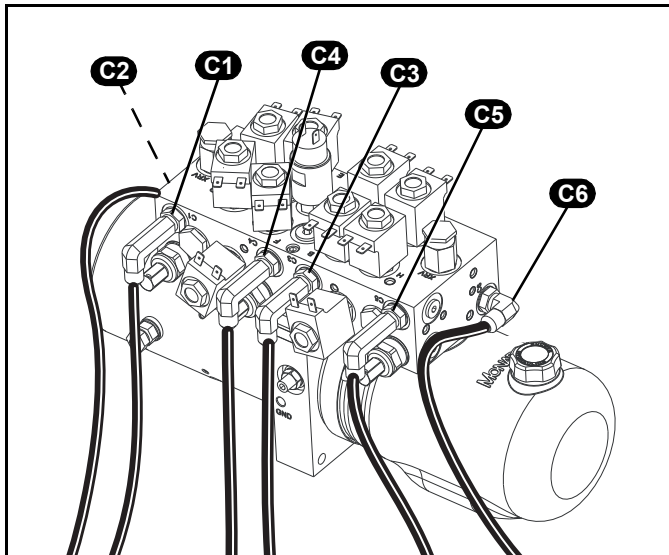


Figure 1-9-View From Rear of Control Valve

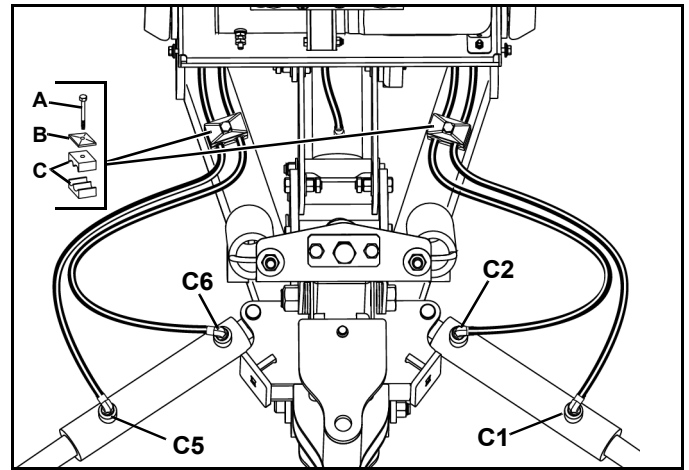


Figure 1-10

15. Loosely position hydraulic hoses in hose clamps (A - 5/16" X 2" self-tapping screw, B - plate, C - clamp blocks) on each side of the A-frame.

16. Adjust each hose length from clamps to hose end fittings to 33 in. and tighten both clamp screws (See Figure 1-11).

NOTE: If installing screw with an impact wrench, ensure that the wrench is adjusted to its lowest torque setting to avoid fastener damage.

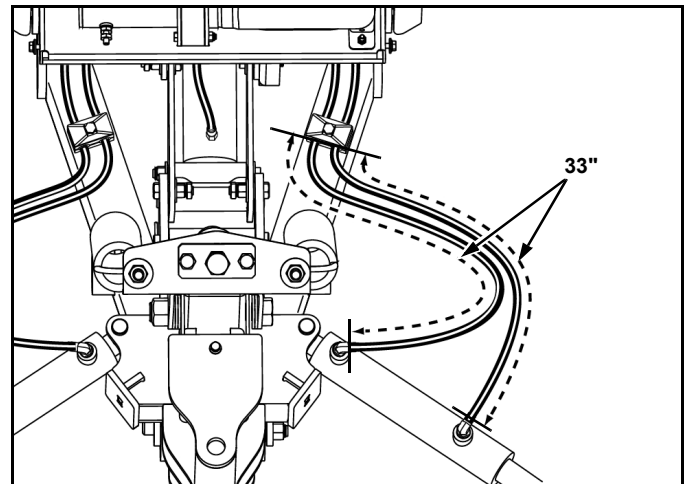


Figure 1-11

17. Tighten all hydraulic hose fittings securely.

18. Install pump cover.

19. Remove left and right light support from power pack carton. Attach passenger side light bar support to lift/light bar with (4) 3/8" x 1" screws, (8) washers and (4) lock nuts from the light bar parts bag part number 96106089. On the drivers side use (3) 3/8 x 1" screw, (6) washers, and (3) lock nuts from the parts bag plus (1) 3/8" x 1-1/2" screw already attached to the plow holding the power cord clamp. Do not tighten at this time (See Figure 1-12).

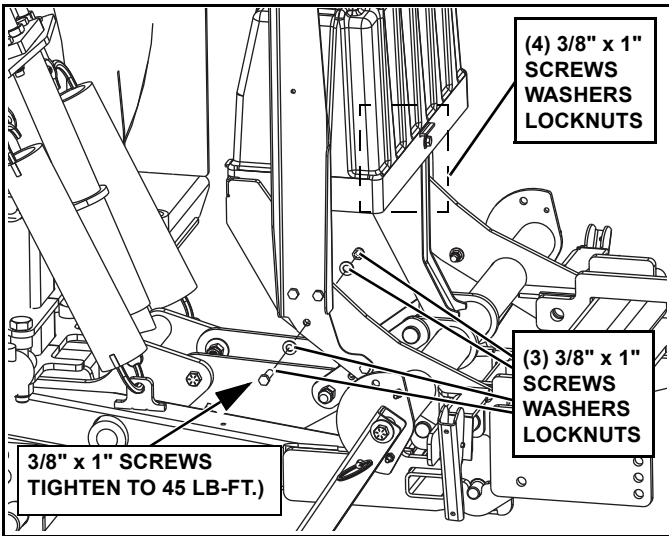


Figure 1-12

20. Secure light bar to supports with (6) 3/8" x 1" screws and lock nuts. Align light bar supports to vertical position and tighten all light bar hardware. Tighten screws to 45 lb-ft. (See Figure 1-12 and Figure 1-13.)

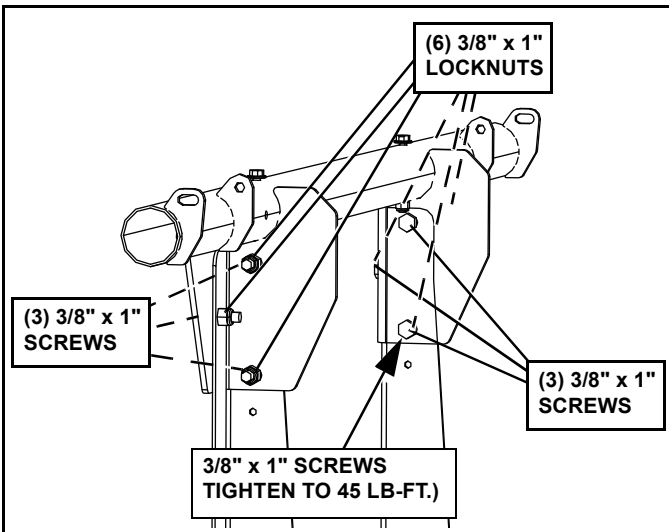


Figure 1-13

21. Place Drivers Side headlamp on top of lightbar with the headlamp tabs inside of the lightbar tabs. Insert (2) 5/16" x 1-1/2" screws, and (4) 5/16" washers. Screws must be inserted from the outside of the plow to the center. Place (2) 5/16" serrated tooth washers between the headlamp and lightbar tabs. Secure with (2) 5/16" lock nuts. Do not tighten (See Figure 1-14).

22. Repeat step 11 with Passengers Side headlamp making sure screws are inserted from the outside of the plow to the center.

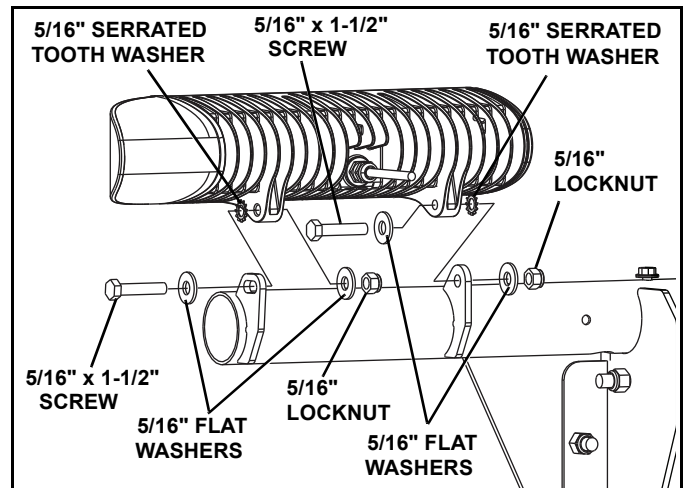


Figure 1-14

23. Apply dielectric grease to all light harness connectors. Connect the plow light harness connectors into the mating connectors on the plow receiver. Reference plow control manual.

24. Check operation of all lamp functions (Low beam headlamp, high beam headlamp, marker lights and directional signals).

25. Aim plow lights with plow in the fully raised position. Lock the lamps in the adjusted position by tightening two 5/16" x 1-1/2" screws (See Figure 1-14)

NOTE: In order to conform to Federal Motor Vehicle Safety Standards follow the Headlamp Aiming Procedure in the maintenance section.

26. Install pump cover by tilting pump cover forward, sliding pump cover over front two tabs, rotate cover back, and pull center rear of cover over rear tab. Replace screw and washer at rear center of pump cover.

27. Place jack stand over drivers side bracket located at the end of the tube on the lower light lift bar. From the jack stand parts bag insert the spacer and secure with a 1/2" washer and 1/2" x 2-1/2" screw (See Figure 1-15).

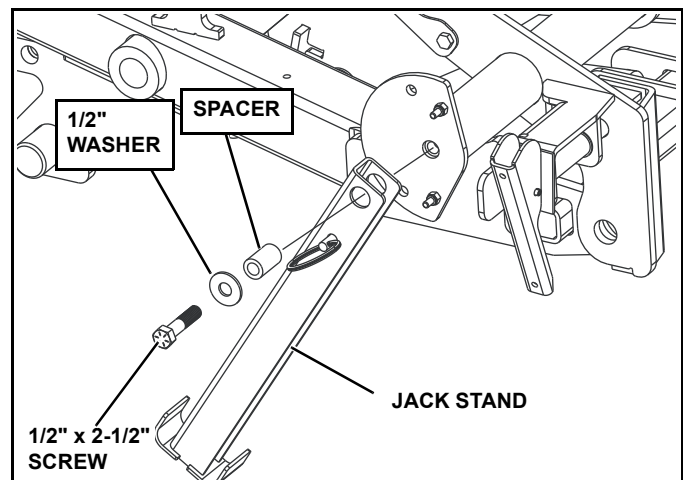


Figure 1-15

28. Repeat previous step to install the passenger side jack stand.

Blade Level Adjustment

The Sno-Way 29VHD has a Max Adjust™ feature that is set when the plow is first installed and when initially run each plowing season. The adjustment mechanism is designed to make the plow wearstrip scrape evenly on flat surfaces without leaving a trail of snow near the center or the edge of the plow. Change in adjustment may be needed due to wear conditions and when the plow is switched between vehicles. Adjustments can be performed with a few turns of a wrench.

Adjustment Procedure

1. Move vehicle to a level flat surface, such as a large parking lot, or a garage floor.

IMPORTANT: If plow leveling procedure is being performed on uneven pavement, the plow will be difficult to level correctly. Also include all ballast weight with the truck while adjusting the plow. Any additional weight added to the truck after the plow is adjusted may require the Max Adjust™ system to be adjusted again.

2. Loosen jam nut on the tilt adjustment cap screw located in the center section of the plow trip mechanism (See Figure 1-16).

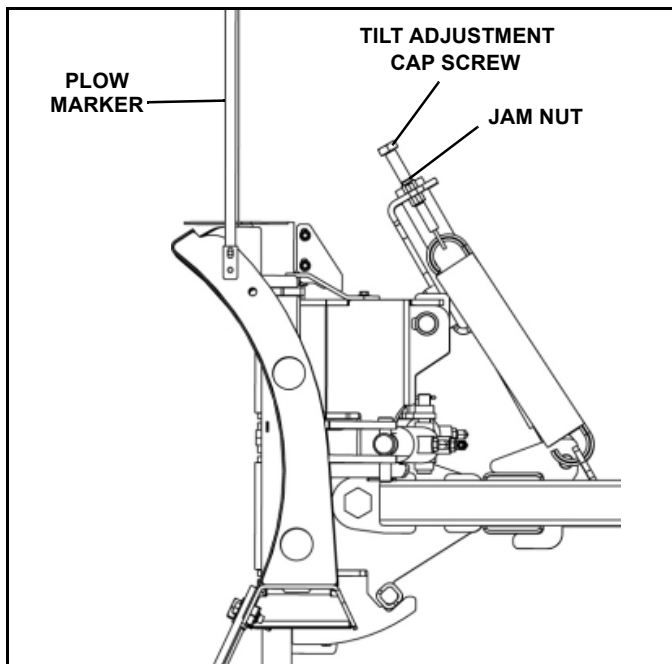


Figure 1-16

3. Swing wings to the straight position and lower plow to the ground.

4. Turn Down Pressure ON.

5. Swing wings forward to the scoop position, with blade on ground

6. If the center wear-strip begins to rise off of the floor, stop moving the wings forward and turn the tilt adjustment cap screw out. This will cause the tower to tilt back and towards the truck.

7. Continue to move the wings forward (scoop position) until they are free to move forward and backwards to the straight position.

8. If the center wear-strip begins to rise off of the floor when the wings are brought back to the V-Position, turn the tilt adjustment cap screw in, causing the tower to tilt forward.

9. Once proper adjustment has been attained, tighten the jam nut on the tilt adjustment cap screw.

IMPORTANT: Adjusting in Down-Pressure is different than adjusting in Float. If the plow is leveled while in Down-Pressure (which is what is explained in the manual here) the wings will tend to be "off the ground" in scoop, when the Down-Pressure is turned Off. Be aware of which level you are plowing the most in, Down-Pressure-Level, or Float-Level.

NOTE

If you set the Plow-Level when in float, the outer wing edge of the wear strip will wear first when down pressure is turned on.

Mounting Snow Plow To Vehicle

1. To mount plow onto truck, position truck to align light/lift bar frame inside of subframe lugs. Pins should fit inside slots cut into subframe lugs (See Figure 1-17).

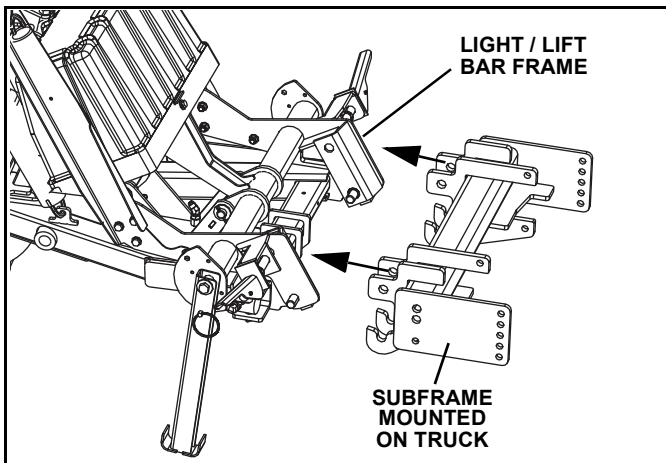


Figure 1-17

NOTE: If pins are too high or low to fit into slots on subframe, adjust the height by plugging in the plow. To lower the pins, turn on down pressure and press down function. To raise the pins, press up function.



WARNING

When using the hand held controller to raise or lower the plow A-frame for mounting the plow to the vehicle, be especially careful of the movement of the light bar. This movement will occur when raising or lowering the A-frame or jack stand.

FAILURE TO FOLLOW CAN RESULT IN DEATH OR SERIOUS INJURY.



WARNING

Pressing the blade angle functions will result in the A-frame swinging if it is not secured to the truck. Do not press the angle function during plow installation.

FAILURE TO FOLLOW CAN RESULT IN DEATH OR SERIOUS INJURY.

2. Plug in power and ESS harness.



WARNING

The power cable in front of the truck is wired directly to the battery. The power cable is always energized, even if the truck is turned off. Always replace the protective cap after disconnecting the plow power cable. Allowing an unprotected plug to contact metal parts of the truck may cause electrical component damage. Never use a metal object to clean the plug contacts.

FAILURE TO FOLLOW CAN RESULT IN DEATH OR SERIOUS INJURY.

3. Rotate light/lift bar into position by turning on down pressure and pressing the lower function (See Figure 1-18).

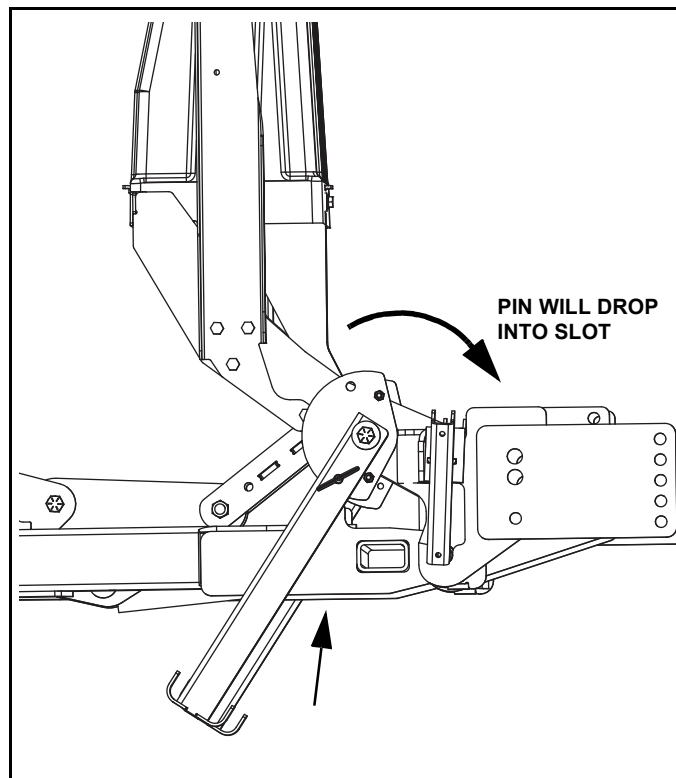



Figure 1-18

4. Rotate pin handles down to lock pins in place. Put plow in float position by turning down pressure off (See Figure 1-19).

 **WARNING**

Make sure that upper hitch pins are engaged before moving truck. Hitch pins not fully engaged could result in the plow separating from the truck.

FAILURE TO FOLLOW CAN RESULT IN DEATH OR SERIOUS INJURY.

NOTE: Upper hitch pins are fully engaged when pin handle is tight against pin bracket and you cannot see the upper hitch pin between the pin bracket and pin handle. If upper hitch pins are not fully engaged:

A. Raise plow an inch off the ground, then lower. Or,
B. Turn Down Pressure ON and then OFF.
Upper hitch pins will snap into place.

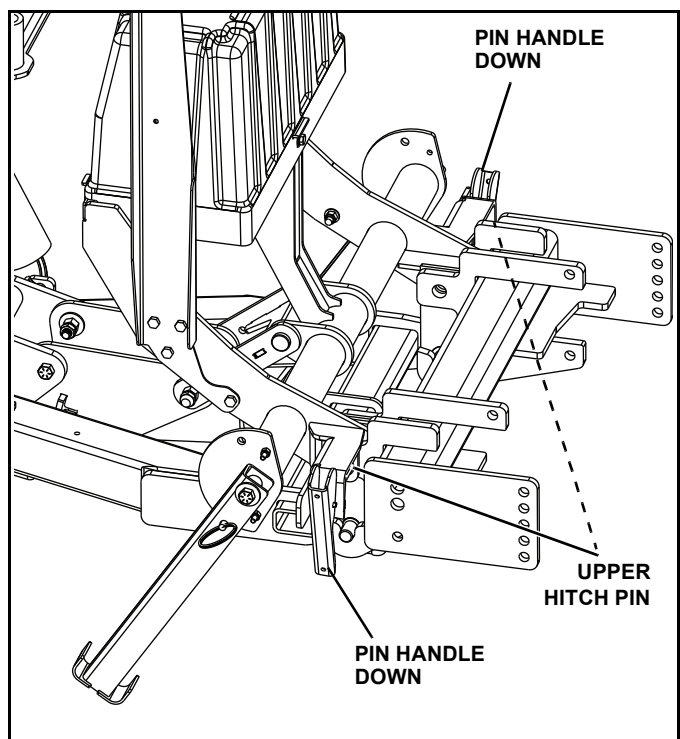


Figure 1-19

5. Pull ring on jack stand to disengage pin. Rotate jack stand towards raised position. Release pin and continue to rotate until jack stand is locked in raised position. Ensure pin is engaged in hole by rotating jack stand back and forth (See Figure 1-20).

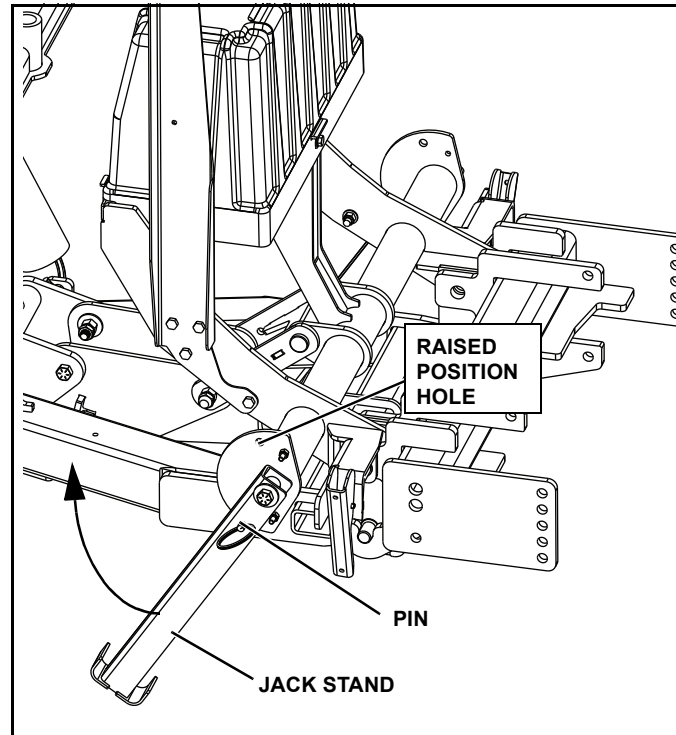



Figure 1-20

6. Repeat step 5 for the passenger side jack stand.

 **WARNING**

Before use, test plow lights. **DO NOT** operate if any plow lights are not functioning properly.

FAILURE TO FOLLOW CAN RESULT IN DEATH OR SERIOUS INJURY.

7. Raise, lower and angle plow to make sure no hoses or wires pinch in the plow mechanism.

Installing The Cylinder Lock Clamp



WARNING

Insert cylinder lock clamp when plow is not engaged in plowing operations. Failure to do so can allow plow to drop to unsafe position. **FAILURE TO FOLLOW CAN RESULT IN DEATH OR SERIOUS INJURY.**

1. Raise the plow to the full UP position.
2. Turn the ignition OFF and apply the parking brake.
3. Turn OFF the hand-held controller.
4. Remove the pin from the cylinder lock clamp.
5. Position the cylinder lock clamp around the exposed (chrome) portion of the lift cylinder with the open side of the cylinder lock up. Install the pin (See Figure 1-21).

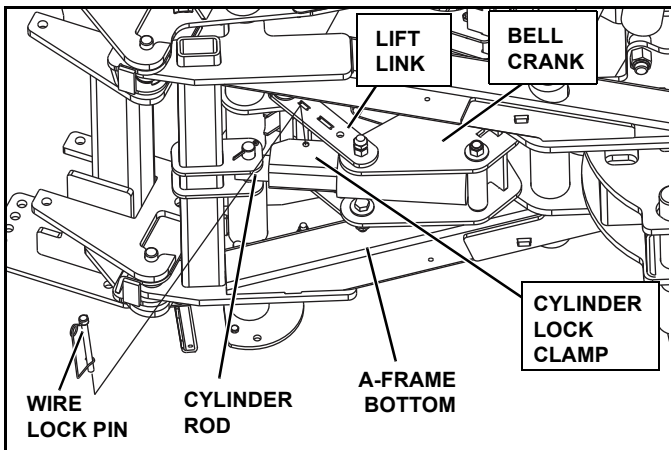


Figure 1-21

6. Lower the plow so that cylinder lock clamp is tight against cylinder.



WARNING

Failure to lower plow onto clamp could block headlights resulting in an accident. **FAILURE TO FOLLOW CAN RESULT IN DEATH OR SERIOUS INJURY.**

Removing Snow Plow From Vehicle

Choose a location for the plow storage, which will allow the plow to be removed from the vehicle and not be moved after removal. Also, choose a location that will not allow the plow stand to sink into the ground. A dry, protected area is recommended.

1. Lower plow to the ground, put vehicle in park, turn off the engine and set the parking brake.

2. Pull ring on jack stand to disengage pin. Rotate jack stand towards lowered position. Release pin and continue to rotate until jack stand is locked in lower position. Ensure pin is engaged in hole by rotating jack stand back and forth (See Figure 1-22).

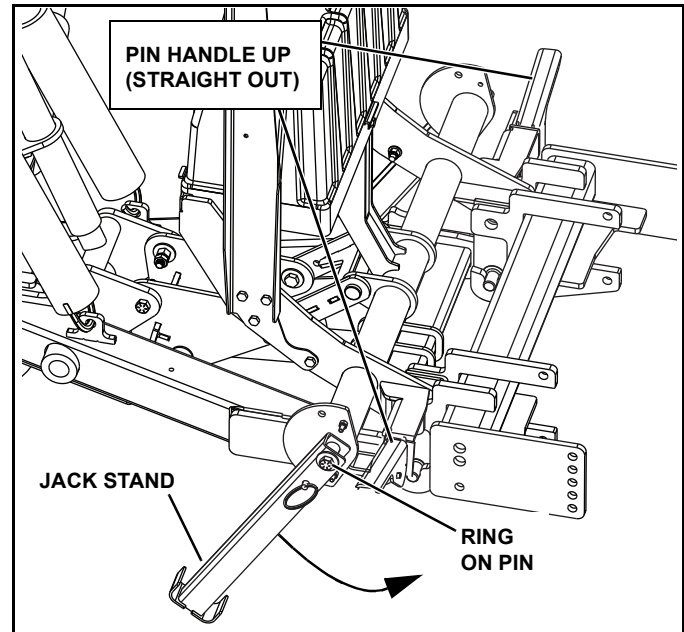


Figure 1-22

3. Repeat the previous step for passenger side jack stand.
4. Turn Down Pressure ON and then OFF.
5. Rotate pin handles up (straight out) to unlock main pins (See Figure 1-22).
6. Rotate jack stand down and raise A-frame by pressing the up function (See Figure 1-23).

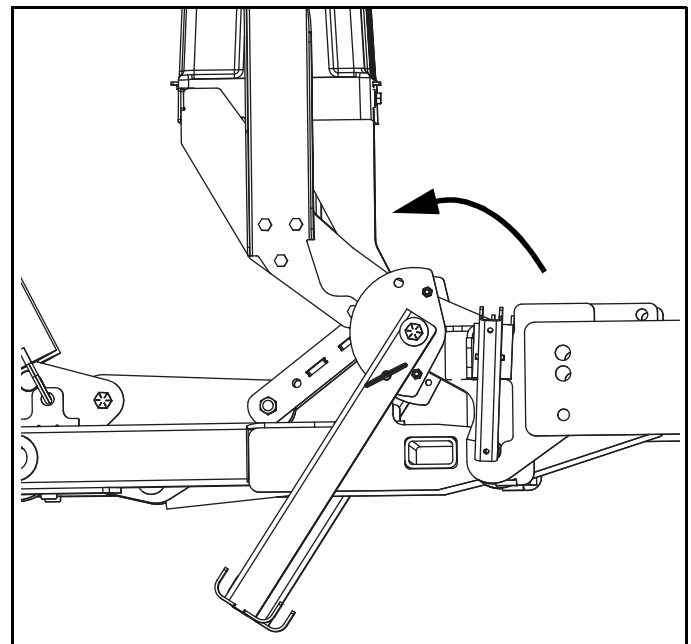


Figure 1-23

7. Disconnect power and ESS harness, replace protective caps and back truck away from plow.

MAINTENANCE

General



WARNING

Before servicing plow, lower plow to ground and disconnect main power harness.

FAILURE TO FOLLOW CAN RESULT IN DEATH OR SERIOUS INJURY.

- Before operating, perform a thorough visual inspection of the equipment. Look for fluid leaks, cracked, bent or broken components, loose nuts, bolts or attachments and proper fluid levels.
- A clean hydraulic system is essential to long pump life and proper performance.
- When adding oil to the reservoir, wipe the area around the filler port clean before removing the breather cap. Use clean oil and a clean funnel, (DO NOT use a cloth or rag to strain the oil).

IMPORTANT: Sno-Way supplies type 5606 Sno-Way Hydraulic Oil with the unit from the factory. If additional oil is added it must be compatible with Sno-Way oil. If another type of oil has been used in the system the same type of oil must be used for topping off system. Improper hydraulic fluid can cause operating problems in cold weather.

- Do **NOT** use synthetic oil.
- Oil must contain an anti-foam additive.
- Ensure all electrical connections are clean and tight.
- To prevent rust from forming, clean and repaint exposed metal surfaces.
- **NEVER** operate the equipment with the protective covers or guards removed.

Periodic Inspection

After approximately every 20 hours of operation perform the following inspections procedures:

1. Inspect the plow assembly including the sub-frame assembly for any damage or excessive wear. Replace parts as necessary.
2. Inspect all fasteners (Plow & Truck Mount) to ensure they are properly tightened. Re-tighten loose fasteners to the proper torque. Loose fasteners on the Bellcrank, Power Unit to the Pump Platform and Truck Mount must have the nylock nuts replaced and tightened while using Sno-Way thread locker 96115529. (Refer to torque specification chart in this manual).

3. Apply oil or grease to the wing pivot pin through two lubrication holes provided in the pin housing (See Figure 2-1).

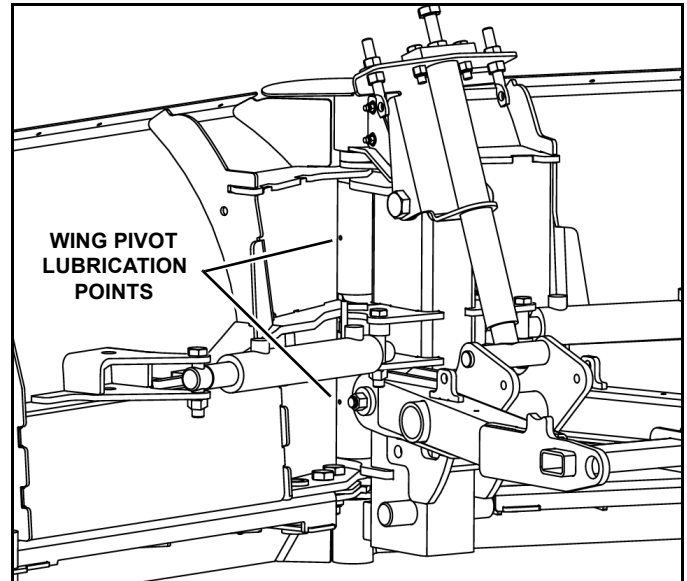


Figure 2-1

4. Apply a small amount of light oil to the wing cylinder pivot pins and to pivot pins between the blade assembly and the intermediate pivot assembly (See Figure 2-2).

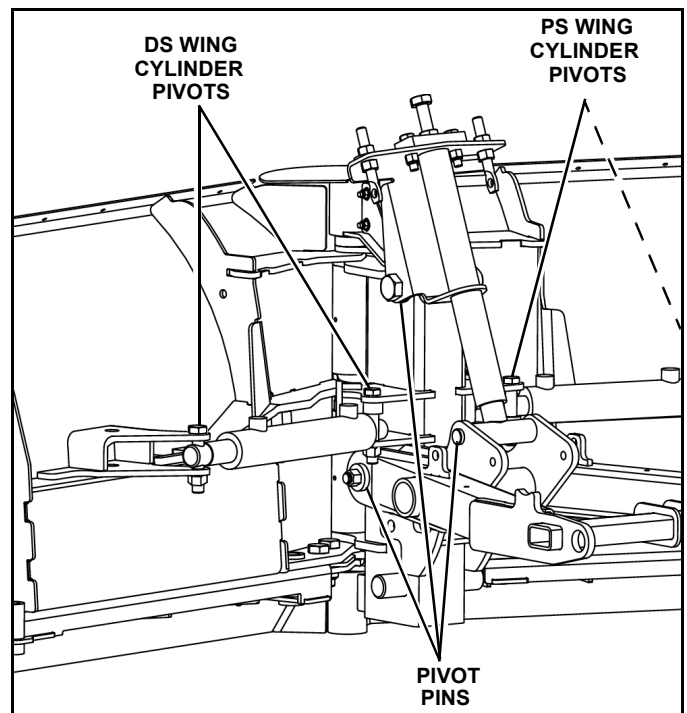


Figure 2-2

5. Apply a small amount of light oil to the lift cylinder assembly pivot pins, to front A-Frame pivot pin and both attach lock pins (See Figure 2-3).

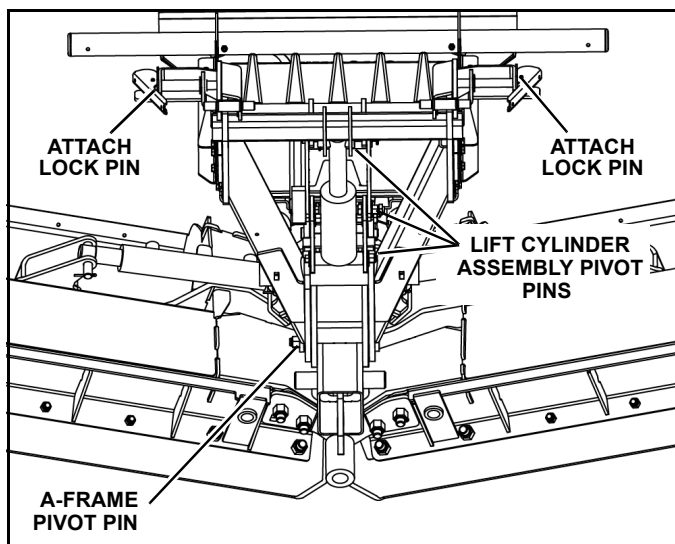


Figure 2-3

Plow Storage

When storing the plow for long periods of time use the following guidelines.

1. If the plow will not be stored on pavement, place a board under the jack stand to prevent it from sinking into the ground.
2. To prevent corrosion, coat the exposed portion of the cylinders with light grease.
3. Grease all pivot points.
4. Fill hydraulic reservoir to the fill line to minimize trapped air.
5. Place dielectric grease on the terminals of all electrical plugs, including those under pump cover. Make sure protective caps are in place or plugs are plugged together.
6. Check and replace any worn or damaged component, such as cutting edges, deflectors, and bushings.
7. Move wings to fully retracted position.
8. For additional protection, use a 99101213 plow parka cover.

Special Fasteners Torques and Requirements

IMPORTANT: Incorrectly securing fasteners may result in incorrect operation, excessive wear, and early failure of plow components. It may also void your warranty.

• **ALWAYS** check to make sure you are using the correct torque specification for the fastener you are using.

• **DO NOT** use any lubricants on the threads of any fastener unless specifically called for in the assembly or maintenance story for that component.

Standard Fasteners

The Torque Specifications Chart on page 35 of this manual should be used as the guide for fastener torque requirements for most standard fasteners used on the plow.

Standard fasteners with special torque requirements will be noted in assembly or service instructions pertaining to the specific piece of equipment.

Hydraulic Fittings

Hydraulic fittings with lock nuts should be assembled with at least three full turns of the fitting in the port and then the lock nut should be tightened to 27 lb-ft.

Hydraulic fittings with 37 degree flare end swivels should be torqued to 18-20 lb-ft.

Fluid Requirements

IMPORTANT: Sno-Way supplies type 5606 Sno-Way Hydraulic Oil with the unit from the factory. If additional oil is added it must be compatible with Sno-Way oil.

It is recommended that the fluid in the hydraulic system be changed once a season.

NOTE: Type 5606 oil is rated to -60 deg. F, when Type 5606 is not available Exxon UNIVIS J13 or equivalent may be used.

Do NOT use synthetic oil.

Oil must contain an anti-foam additive.

NOTICE

- Using the proper oil increases the life expectancy of the most critical part of your plow; the hydraulic power unit.
- Failure to use the proper oil can cause extensive damage to the power unit, seals and hydraulic cylinders.
- Improper oil can cause operating problems and poor performance in cold weather.

FAILURE TO FOLLOW COULD LEAD TO PROPERTY DAMAGE.

Changing Oil and Cleaning Filter Screen

NOTE: Change oil and clean filter screen at the beginning of every season. This will help ensure maximum life and maximum performance from the pump assembly.



WARNING

- Allow the system to cool down before draining oil or handling system components. Burns can result from contact with hot oil.
- Never disconnect any hydraulic line or fitting with the plow in the raised position. Always lower the plow and relieve pressure before removing any lines or caps.

FAILURE TO FOLLOW CAN RESULT IN DEATH OR SERIOUS INJURY.

1. Move plow to a clean, dry area with a solid surface. Lower the plow to the ground, put vehicle in park, turn off the engine and set the park brake. Turn off the plow controller.

2. To prevent inadvertent short circuit or electrical shock, disconnect the power harness and communication harness at the vehicle bumper.



WARNING

Ensure engine is OFF and set parking brake before working on plow. Vehicle movement, equipment failure or inadvertent operation of the control switches during maintenance could result in serious injury

FAILURE TO FOLLOW CAN RESULT IN DEATH OR SERIOUS INJURY.

3. Remove the screw at the lower back center of the pump cover. Pull the back of the pump cover of the rear tab and rotate the cover slightly forward. Push the cover off the two front tabs and remove (See Figure 2-4).

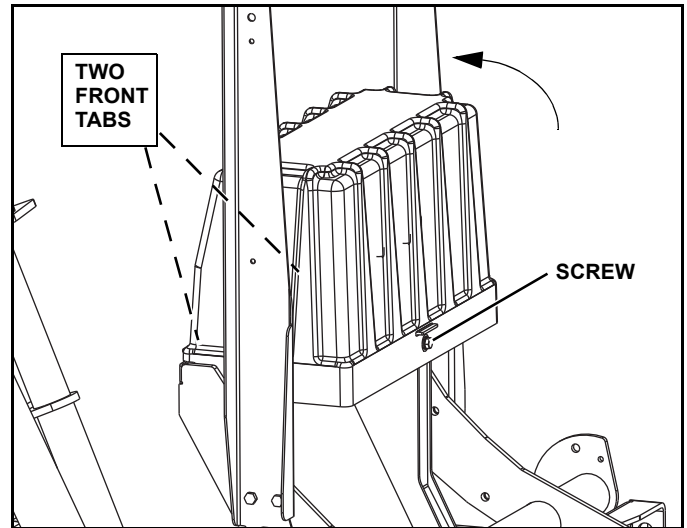


Figure 2-4

4. Unplug plow lamp harness from receiver. Remove 3 forward bolts from both passenger and driver side light bar uprights. Loosen rear bolt on both passenger and driver side light bar. Pivot light bar forward towards blade (See Figure 2-5).

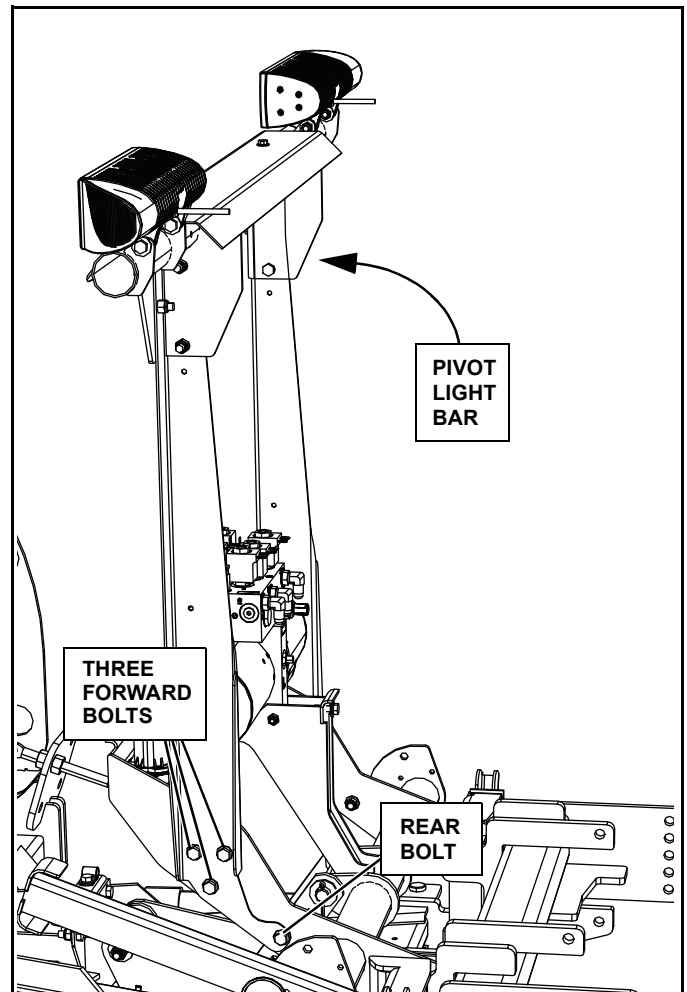


Figure 2-5

5. Remove the filler/breather cap from the reservoir (See Figure 2-6).

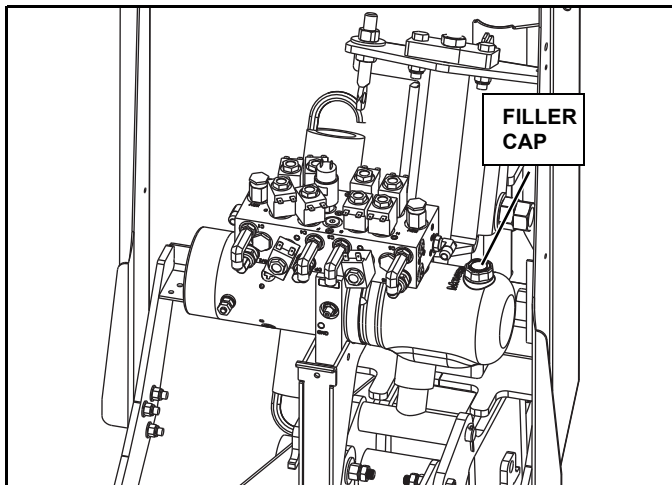


Figure 2-6

6. Using an oil suction gun or similar tool, remove the oil from the oil reservoir.

NOTE: Be careful to avoid contacting and damaging the filter screen while removing the oil.

7. Remove the lift cylinder hoses from the valve block. Remove the swing cylinder and wing cylinder (if equipped) hoses from the fitting in the valve block. Mark hoses before removal to be certain they are reinstalled in the correct location.



WARNING

Make sure wing cylinders are in the retraced position before removing wing cylinder hoses.

FAILURE TO FOLLOW CAN RESULT IN DEATH OR SERIOUS INJURY.

8. Place the hoses in a container to catch oil expelled from cylinders. Cycle the lift cylinder by disconnecting hitch pins and pushing and pulling on light bar. Cycle swing cylinders and wing cylinders (if equipped) by disconnecting from swing frame or wing and pushing and pulling on cylinder rod.

9. Reconnect swing cylinders and wing cylinders, and install hitch pins.

10. Loosen the band clamp, which holds the reservoir to the pump assembly. Pull and twist the reservoir until it separates from the pump assembly. Be careful not to damage the filter screen (See Figure 2-7).

11. Note the position of the reservoir oil pick-up tube and be sure the tube is in the same position when the filter is removed and installed (See Figure 2-7).

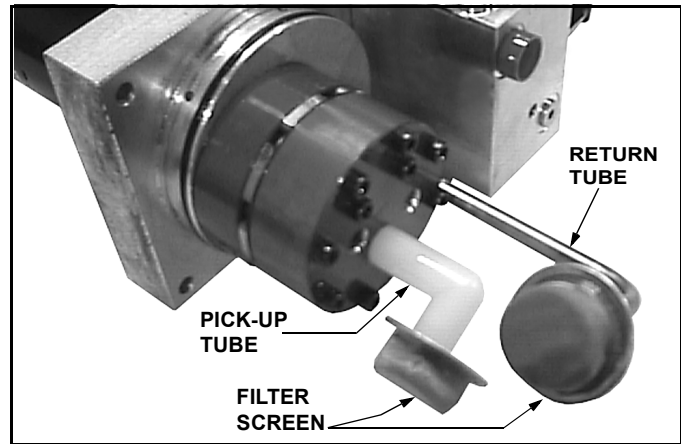


Figure 2-7

12. Pull the filter screens off the return and suction tubes (hold it by the metal cover, not the screen) and clean. Blow dry with low pressure air from the inside (See Figure 2-7).

13. Carefully re-install the filter screens. Use care when handling the screens to avoid damage.

14. Visually check that the pickup tube and filter face down (See Figure 2-7). If not rotate the pickup tube until the tube and filter face down.

15. Clean the inside and outside of the reservoir.

16. Inspect the O-ring seal for damage, replace if needed, lubricate with fresh oil, and reinstall reservoir carefully to avoid damaging the O-Ring.

17. Tighten band clamp that holds reservoir to power unit.

18. Reconnect hydraulic fittings and hoses in their correct position and torque to 20-25 lb-ft. If unit utilizes O-Ring and jam nut type connectors tighten jam nut to 15-20 lb-ft.

NOTICE

Do Not use Teflon tape or pipe dope on hydraulic fittings. These can dislodge and jam valves in the hydraulic system.

FAILURE TO FOLLOW COULD LEAD TO PROPERTY DAMAGE.

19. Rotate light bar back into position. Replace 6 upper 3/8" x 1" screws. Make sure a flat washer is on both sides of screw. Secure with new 3/8" lock nuts and torque to 45 ft lbs. On lower 2 screws replace 3/8" lock nut and torque to 45 ft lbs.

20. Fill the hydraulic reservoir with type 5606 hydraulic fluid until the fluid level registers full on oil level mark on reservoir.

NOTE: Vehicle must be parked on level ground, Plow must be in the lowered position, and Wings must be folded rearward ("V") in order to properly check the oil level. Checking oil level with plow elevated or with wings straight or folded forward will give wrong reading.

21. Refer to controls manual and cycle plow to remove air from hydraulic system. Refill reservoir as needed.
22. Operate system and check for leaks. Repair and replace components as necessary. Install the pump cover.

Cutting Edge

IMPORTANT: The cutting edge MUST be replaced when it is worn to the bottom edge of the plow frame.

1. Raise the plow to full up position.
2. Place a jack stand under both ends of the blade bottom rail.
3. With the Down Pressure[®] Hydraulic System OFF, lower plow until firmly resting on jack stands.
4. With an assistant, remove hardware and worn wearstrip from plow.
5. Insert two carriage bolts, one on each end of the blade, through the cutting edge and blade. Loosely install two lock nuts.
6. Insert the remaining carriage bolts and loosely install lock nuts on each.
7. Beginning on either side, tighten all nuts securely.



WARNING

The bottom of the cutting edge can be very sharp. Whenever handling a cutting edge, work with an assistant and wear suitable protective gloves to avoid serious injury.

FAILURE TO FOLLOW CAN RESULT IN DEATH OR SERIOUS INJURY.

Plow Shoe Adjustment

This plow is equipped with the ability to utilize four (4) plow shoes. Two plow shoes are located at the outboard end of each wing, and two plow shoes are located on the inboard section of each wing, close to the center tower.



WARNING

Keep hands and feet clear of wings and center section when setting blocking and lowering plow. Moving or falling assemblies could result in serious injury.

FAILURE TO FOLLOW CAN RESULT IN DEATH OR SERIOUS INJURY.

Adjust the plow shoes as follows:

1. Raise plow to full up position.
2. Support blade with a jack.
3. Turn vehicle ignition switch and plow control OFF and apply emergency brake.
4. Adjust shoe assemblies by removing shoe mounting lynch pin and adding or subtracting washers on the top or bottom of the shoe-mounting bracket (See Figure 2-8).

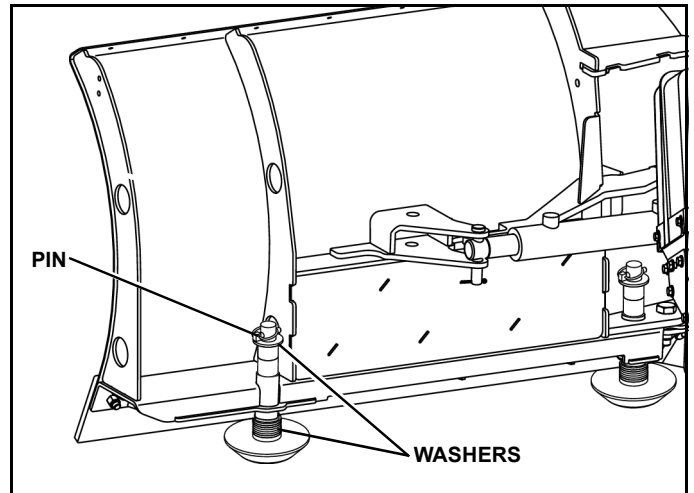


Figure 2-8

5. After the disk shoe position is properly adjusted place washer on the shoe stem - above the disk shoe mounting bracket and below the retaining lynch pin - to remove all up and down movement of the disk shoe in the bracket. Failure to do so will result in excessive wear of the holes in mounting bracket or bending of the disk shoe stem.

IMPORTANT: Snap lynch pin ring over so that it contacts the pin. If ring does not contact lynch pin, rotate the pin and reverse the direction of the ring. If the ring does not contact the pin it is not locked and could fall out.

Trip Spring Adjustment

1. Level the tower and wings. (See "General" on page 12.)
2. Check gap on springs with a feeler gauge. The gap between the coils should be no greater than 0.015 to 0.020 inches (See Figure 2-9).

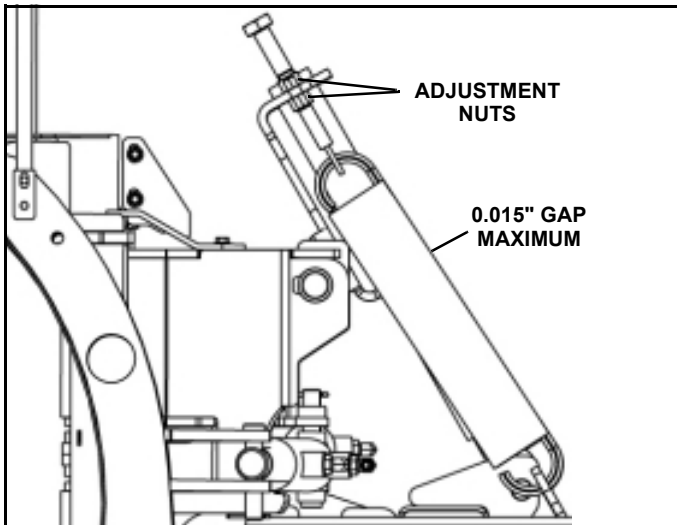


Figure 2-9

If the gap needs adjustment:

- 4a. Loosen the bottom nut on the spring eye bolt(s).
- 4b. Tighten or loosen the top nut until the correct tension is reached, by measuring with a feeler gauge.
- 4c. Tighten the bottom nut(s) on all spring eye bolts.

Emergency Plow Raise

If your snowplow becomes inoperable for any reason, follow the instructions below to raise the plow for transport to your nearest Sno-Way Dealer.

1. Move truck to level hard ground.
2. Place a jack under the tower as close to the A-frame as possible.
3. Raise jack until the A-frame is at approximately 30 degrees with the ground.
4. Make sure the plow and jack are stable. Place a jack stand or wood blocking under the A-frame to prevent the plow from suddenly dropping.



WARNING

Failure to place a jack stand under the plow could result in the plow rapidly falling.

FAILURE TO FOLLOW CAN RESULT IN DEATH OR SERIOUS INJURY.

5. Install cylinder lock clamp. (See "Installing The Cylinder Lock Clamp" on page 11.)
6. Remove jack and jack stand.
7. Drive to your nearest Sno-Way dealer for service.

Headlight Aiming Procedure

Requirements:

An unobstructed wall that is preferably painted white with minimum dimensions 10 feet (3 m) wide by 5 feet (1.5 m) high. The vehicle that is having the lamps installed will need to be parked such that the distance from the front of the snow plow lamps to the wall is 25 feet (7.6 m). The ground of the wall and driveway in which the vehicle is parked must be flat and even.

Preparation for Headlamp Aim:

The vehicle must be positioned 25 feet (7.6 m) away from the aiming wall. The center of the vehicle must be aligned with the center of the wall. This can be facilitated by using black tape to mark the wall. The wall will require a vertical line that represents the center line of the vehicle and the wall (Line 1), and a horizontal line that represents the center line height of the snow plow lamps (Line 2), (reference item 9 below). The wall will also require two vertical lines bisecting the horizontal line that provides the distance between the snow plow headlamps (Lines 3 left and 4 right). Locate the high beam light on each snow plow lamp and project the location onto the front lens with the aid of a small 1/2" piece of black tape. Then, using a tape measure, accurately measure the distance between the black tape left and right light centers. Once the distance has been determined, divide the distance by two. This is the distance between Line #1 to Line #3 and Line #1 to Line #4. (See Figure 2-10). Finally, the wall will require a horizontal line that represents the nominal vertical aim position down (Line 5), (reference item 10 below) (See Figure 2-10).

1. Remove ice or mud from under fenders.
2. Set tire inflation pressures to the values specified on the tire sidewall or information label.
3. Check truck springs for sag or broken suspension system.

4. See that there is no load on the vehicle other than the driver, the snow plow frame, and the snow plow. The snow plow should be in the raised position.

5. Check functioning of any automatic vehicle leveling systems and specific manufacturer's instructions pertaining to vehicle preparation for headlamp aiming.

6. Clean the snow plow lamp lens.

7. Check for LED burnout and proper beam switching.

8. Stabilize suspension by rocking vehicle sideways.

9. Measure the vertical height of the center of the snow plow lamp from ground. This dimension will be required for comparison to Table #1 below.

10. Reference Table #1 and determine the nominal vertical aim down below the horizontal center line of the snow plow headlamps. Using black tap, draw this horizontal line (Line 5) (See Figure 2-10).

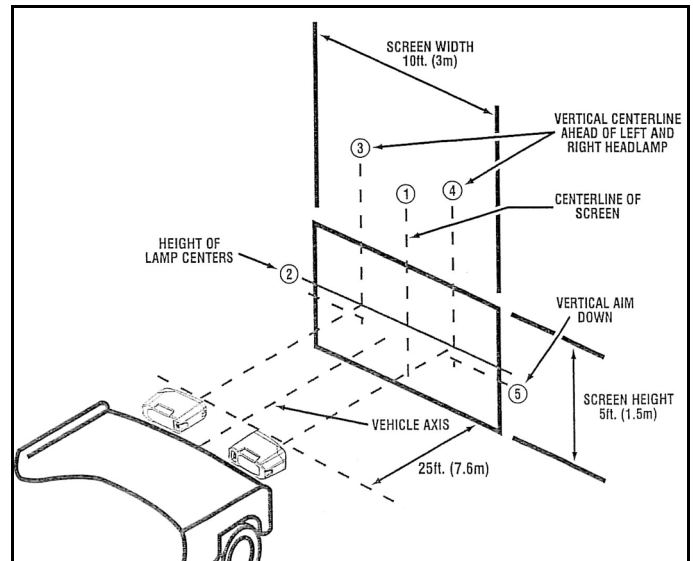


Figure 2-10 Alignment of Headlamp Aiming Screen

Table 1: Vertical Beam Aim Guidelines (Line 5)

Headlamp (Centerline) Mounting Height	Nominal Vertical Aim Down
22 to 36 in (56 to 90 cm)	0 Vertical
36 to 48 in (90 to 120 cm)	2 in (5 cm) Down
48 to 54 in (120 to 140 cm)	4 in (6.4 cm) Down

Visual Headlamp Aiming Procedure:

1. Activate the snow plow lamp HIGH beams so that they illuminate toward the wall (See Figure 2-11).
2. Focus the left snow plow lamp hot spot beam directly at the cross hair target that is developed by Line 5 and Line 3.
3. There are two bolts that provide vertical aiming of the headlamp. Adjust the lamps accordingly and tighten the bolts.

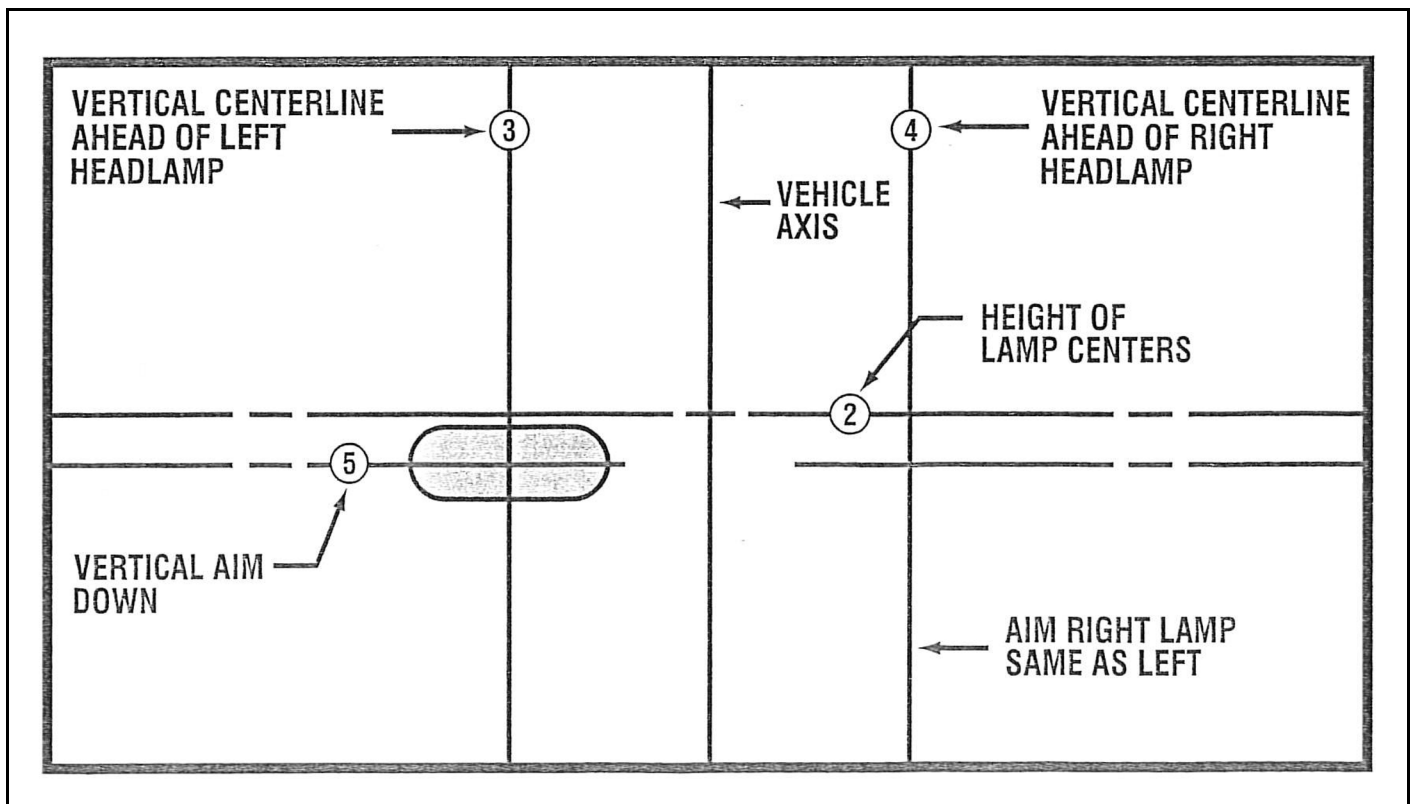


Figure 2-11 High-Intensity Zone (Shaded Area of a Properly Aimed Upper Beam on the Aiming Screen 25 ft (7.6 m) in Front of Vehicle

PLOWING OPERATION

Operating Class

The Sno-Way 29VHD Series plow is specifically designed for heavy commercial applications on 3/4 ton, 1 ton, and other vehicles with a GVWR up to 20,000 lbs.

NOTE: The loaded vehicle, including any ballast weight and optional equipment, must not exceed the Gross Vehicle Weight (GVW) or front or rear Gross Axle Weight (GAW) ratings specified on the Safety Compliance Certification Label located on the driver's side door opening. For additional information, refer to your dealer and the Sno-Way Application Guide for proper vehicle applications.

Before the Season Begins

1. Inspect plow vehicles electrical system for proper operation.
2. Inspect plow assembly including sub frame for any damage or excessive wear. Replace parts as necessary
3. Inspect all fasteners to insure they are properly tightened. Re-tighten loose fasteners to the proper torque (Refer to torque specification chart in this manual).
4. Apply a small amount of light oil to: Quick-tatch pin and handle assemblies, pivot pins between the blade and swing frame, and pivot pins at lift and swing cylinders. Also lubricate jack stand pins (See Figure 1-20).
5. Clean and repaint any exposed metal parts with corrosion resistant enamel.
6. Check the oil level and repair any oil leaks. (See "MAINTENANCE" on page 12.)
7. Inspect electrical connectors. Make sure the contacts are clean, and apply a small amount of dielectric grease.
8. If ballast is required, position and secure ballast behind rear wheels, for optimum performance.

Transporting Vehicle With Plow Attached

1. Always install the cylinder lock clamp when the plow is raised and the operator is not engaged in plowing operations. See Installing The Cylinder Lock Clamp section.

NOTICE

Remove the plow when driving extended distances at temperatures above 40 deg. F, the plow blocks enough airflow to cause it to overheat at temperatures above 40 deg. F.

FAILURE TO FOLLOW COULD LEAD TO PROPERTY DAMAGE.

2. Position the blade out of the beam path of the headlights before driving.



WARNING

The 29VHD Series will partially block the plow lights when fully raised, especially if a deflector is present. Always lower the plow so the lights are able to go past the blade in the raised position for transportation. Blocked plow lights could result in an accident.

FAILURE TO FOLLOW CAN RESULT IN DEATH OR SERIOUS INJURY.

3. DO Not exceed 45 m.p.h. when driving with the snow plow attached. Braking distance is increased and handling is impaired dramatically at speeds above 45 m.p.h.
4. Reduce speed when crossing railroad tracks or when road conditions deteriorate.
5. Never change blade angle or height while driving.
6. Inspect plow and plow attaching hardware for wear or damage before transporting or plowing.

Plowing Like A Pro



WARNING

Wear your seat belt! Contact with a hidden obstruction can cause serious personal injury from bodily contact within the vehicle cab or whiplash from sudden stops.

FAILURE TO FOLLOW CAN RESULT IN DEATH OR SERIOUS INJURY.



WARNING

• Never exceed 10 m.p.h. when plowing! Serious personal injury can result, as well as damage to equipment and property, if an unseen obstruction is encountered while plowing.

• Never plow with your head protruding from the vehicle side window. Serious head or neck injuries can result from sudden stops or coming into contact with tree branches, signs or other stationary objects.

FAILURE TO FOLLOW CAN RESULT IN DEATH OR SERIOUS INJURY.

NOTE: The vehicle air bag is factory set to deploy at a pre-determined level of impact. The air bag will deploy with the plow attached if an obstruction is hit with enough force to reach this level. Always plow within the recommended plowing speeds and know the area you are plowing to avoid any obstructions.

For instructions on using the plow controller to manipulate the plow see the manual included with your plow control package.

1. Become familiar with the area to be plowed and mark potential hazards before the snow falls. Many immovable objects cannot be seen when covered with snow. Developing a plan early can save valuable time and equipment damage. Allow sufficient room to pile snow, out of the traffic area, with enough space for snow when the next storm comes.

2. Plow with the storm. The “Pros” are out early removing only several inches of snow at a time. Allowing snow to accumulate to unmanageable levels can cause difficult removal problems and can be costly in terms of “wear and tear” on equipment. The plow is not a “Ram or Bulldozer”, if used properly, it will give you many years of safe and reliable service.

3. Research municipal ordinances for restrictions on the disposal of snow. Many municipalities do not allow snow to be placed in roads or throughways.

4. Research state department of transportation rules on maximum width restrictions for snow plows. Certain blades may require permits.

5. The 29VHD product is a heavy duty plow that is built for moving extreme amounts of snow. You may experience occasions (especially in the scoop position) when the plow will not lift because the amount of snow in front of the blade. Excessive stacking with large amounts of snow load (especially wet heavy snow) will heat up the hydraulic oil causing the plow to lift slower.

The power unit could become overheated and rendered inoperable unless the power unit is allowed to cool to ambient temperature.

To avoid overheating:

- Lift the blade only as high as necessary
- Program macro functions so that the pump is not running when the plow has already stopped moving.
- Avoid performing excessive functions such as holding the button down so that the pump continues to run even though the plow has stopped moving.
- Use the snow pile to assist in lifting the plow blade (Let the stack do the lifting work).
- Structure/Plan snow plowing (coordinate accounts if possible so excessive stacking with large amounts of snow are divided out).

Using The Down Pressure[®] (DP) Hydraulic System

The Down Pressure[®] (DP) system was designed for removing hard packed snow from hard surfaces that have had traffic on them prior to being plowed.

The system should be turned OFF when plowing surfaces such as gravel, dirt, sand, etc., to prevent cutting into the surface being plowed.

Activating the system applies hydraulic pressure to the down side of the hydraulic lift cylinder. This down pressure will force the blade through the hard-packed snow and down to the pavement. If down pressure decreases, (results if a valley or low spot is encountered by the blade), more down pressure is applied to lower side of the lift cylinder and the blade will follow the contour of the valley. When a hill or a high spot is encountered by the blade, the down pressure will be relieved on the down side of the lift cylinder, this will allow the blade to follow the contour of the hill without lifting the front of the vehicle off the ground.

Plowing Roadways

A roadway covered with unpacked snow that is not over 4-6" deep can be plowed by angling the plow wings to move the snow all to one side.

If the roadway is covered with deep and/or hard packed snow, position the plow wings in a "V"-position to move snow equally to each side to open the first path through the roadway. The roadway can then be widened by making successive passes on each side of the first path, with the wings angled to move snow to one side.

Clearing Parking Lots

1. Plow a single path, with the plow in a "V" position, through the lot at right angle to the side of the lot where you want to "stack" the snow.

2. With the plow angled to one side, widen the path until the snow piled to the side of the path is large enough for a full "scoop" to be moved to the edge of the lot for stacking.

3. With the blade in "scoop" position, push the snow plowed to the edge of the path to the edge of the lot and "stack" it in a pile.

4. If the snow plowed to the edge of the path is too large to push the entire pile to the edge of the lot, fill the blade, in "scoop" position, and then push the pile over into the cleared path and then to the edge of the lot. Then return, and with the blade in "scoop" position, push the remaining row of plowed snow to the edge of the lot.

5. When "stacking" snow, pushing the plow filled with snow into the existing pile will usually cause the plow to raise somewhat as it goes into the pile allowing the "stack" to be built higher.



CAUTION

Excessive stacking of snow causes undue stress to the snowplow and vehicle. Repeated loading of this nature may result in the failure of plow components designed to protect the snowplow and vehicle from major damage.


FAILURE TO FOLLOW COULD RESULT IN MINOR OR MODERATE INJURY.

6. If the snow in the lot is deep and/or hard packed, plow all the paths through the lot with the blades in the "V" position. This will put less sideload on the vehicle and will make plowing the paths easier.

TROUBLESHOOTING

Introduction

Whenever service is necessary, your local dealer knows your plow best and is interested in your complete satisfaction. Return your snow plow to your local dealer for maintenance service or any other assistance you may require. If you are unable to do so, this Trouble Shooting Guide should help you determine the problem. However, before attempting the servicing of your plow, you should possess good mechanical abilities and a total understanding of the mechanism.

	<h2>WARNING</h2>
<p>First read all warning instruction, the safety messages, and directions before attempting any adjustments or repairs to your unit!</p> <p>FAILURE TO FOLLOW CAN RESULT IN DEATH OR SERIOUS INJURY.</p>	

PLEASE: Before calling parts and service personnel be certain that:

1. You have read this guide carefully and are certain that all of the suggestions pertaining to your problem have been attempted.

2. You have the following information available.

- A. Date Snow Plow was originally installed.
- B. Power Pack Serial Number

This information should be recorded on page 2 of this Owners Manual.

Troubleshooting Quick Reference - General

1. Check vehicle electrical system for proper operation.
2. Check all wiring to be sure that battery terminals are clean and connections to battery, circuit breaker, solenoid, switches and all connectors on plow harness are clean and tight.
3. Check oil level in hydraulic system reservoir.
4. Check for external leakage at cylinders, hoses and power unit.
5. Check the voltage at the coils which operate the solenoid valves to be sure that the voltage at the coils is a minimum of 10.5 volts DC.

TROUBLESHOOTING GUIDE

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Motor will not run	Fuse Blown	Check the circuit breaker / 250A fuse at your battery as well as the 20A fuse on the pump harness. If either fuse has blown check over all electrical wiring to determine why the fuse blew and replace fuse.
	Motor solenoid failed	Replace Motor solenoid.
	Motor seized	Remove and replace motor, torque motor bolts between 50 to 60 inch pounds.
	Motor brushes worn	Remove and replace motor, torque motor bolts between 50 to 60 inch pounds.
	Seal between motor and pump damaged allowing oil to enter motor housing	Remove the motor. Drain oil from the reservoir. Loosen the clamp and remove the reservoir. Remove the 4 Allen screws and remove the pump from the base block. Remove pump seal and replace. If the motor can be salvaged, clean out motor and reassemble. If the motor can not be salvaged replace motor.
Motor continues to run and will not shut off	Wires shorted out at solenoid	Check wires and recrimp.
	Solenoid shorted internally	Replace solenoid.
	Receiver shorted internally	Test the brown wire on the small post of the solenoid so see If the wire has a continuous ground without function. Replace receiver.

TROUBLESHOOTING GUIDE

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Blade will not lift (motor Runs)	Hydraulic fluid level low	Fill hydraulic fluid up to the fill line on the reservoir using Sno-Way hydraulic fluid.
	Improper main system pressure relief valve setting	Using a 3000 psi gauge plumbed into the gauge port (GP), run plow over relief. Adjust main pressure relief screw to the proper main system pressure for the series of plow. This can be found in the back of your owners manual or online at SNOWAY.com.
	Breather cap plugged	Remove and replace breather cap.
	Lower valve (B) stuck in the "lower" position	Check valve to make sure there is not magnetism on the "B" coil. Remove the "B" valve and swap it with the "F" valve. If the blade lifts your valve was stuck open. Replace the valve
	Raise cylinder binding	Check all linkages in the bell crank area. Replace and damaged components.
	Pick up tube filter plugged	Remove hydraulic fluid from the tank. Remove the tank and observe the pick up tube screen. Clean or replace if necessary.
	Worn/failed pump	Using a 3000 psi gauge plumbed into the gauge port (GP), run plow over relief. Adjust main pressure relief screw. If the pressure will not raise and the angle functions work remove hydraulic fluid and tank. Replace pump.
	Pick up tube is not submerged in fluid	Remove hydraulic fluid and tank. Turn pick up tube so it is angled down to the bottom of the tank.
	Down pressure valve (E) stuck open	Check valve to make sure there is not magnetism on the "E" coil. Remove the "E" valve and swap it with the "F" valve. If the blade lifts your valve was stuck open. Replace the valve.
	Raise Valve (C) not functioning	Check "C" coil for magnetism. Remove the "C" valve and inspect. Make sure the lower part of the valve moves free and there is no debris causing the valve to stick. If stuck and cant be freed up replace valve.
Blade lifts slowly	Hydraulic fluid level low	Fill hydraulic fluid up to the fill line on the reservoir using Sno-Way hydraulic fluid.
	Breather cap plugged	Remove and replace breather cap.
	Improper main system pressure relief valve setting	Using a 3000 psi gauge plumbed into the gauge port (GP), run plow over relief. Adjust main pressure relief screw to the proper main system pressure for the series of plow. This can be found in the back of your owners manual or online at SNOWAY.com.
	Pick up tube filter plugged	Remove hydraulic fluid from the tank. Remove the tank and observe the pick up tube screen. Clean or replace if necessary.
	Improper oil viscosity for outside air temperature/ Ice in hydraulic tank	Change oil with Sno-Way hydraulic fluid.
	Weak system pump	Using a 3000 psi gauge plumbed into the gauge port (GP), run plow over relief. Adjust main pressure relief screw. If the pressure will not raise and the angle functions work remove hydraulic fluid and tank. Replace pump.
	Low battery voltage	Check voltage at both the battery and at the solenoid during function. The battery may show 12V when the plow is not under load.

TROUBLESHOOTING GUIDE

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Plow lifts but does not hold - New plow first action	Dirt in check valve	Cycle raise and lower system to flush debris.
	Dirt in lower valve (B)	Cycle raise and lower system to unstick valve.
Plow lifts but does not hold - second action	Dirt or Debris in check valve	Cycle raise and lower system to unstick valve. If this does not work, replace valve.
	Lower valve (B) stuck	Check valve to make sure there is not magnetism on the "B" coil. Remove the "B" valve and swap it with the "F" valve. If the blade lifts your valve was stuck open. Replace the valve.
	Seals, O-ring(s) on lower valve (B) damaged	Remove the lower valve (B) and inspect the O-rings to see if they are damaged. If damaged replace the O-ring if there is one available. If not replace the valve.
	Ground available at lower coil (B) without activation	Test the control receiver to see if there is a ground signal sent to the lower coil (B) without activation. This can be done using a Sno-Way control test (99101028). If you do not have a test box remove the two wires off of the (B) coil and check to see if the blue with the white trace wire has a ground signal coming from it. The control will need to be turned on. Tap the raise function to make sure the control is not in the float or down pressure mode as this would send the ground signal to the wire. If the ground is present the receiver (black/yellow box on snow plow) will need to be replaced. You should also check the OHM reading on the (B) coil as well as the other coils on the valve block. If the OHM reading on the (B) coil does not read the same as the other coils replace the coil as well.
	Piston seals leaking on raise cylinder	Raise the plow up in the air and support the blade with a hydraulic floor jack. Remove the hose off of the rod side of the lift cylinder. Slowly lower the floor jack and watch to see what direction the fluid flows from the lift cylinder. If the fluid sucks into the lift cylinder the seals are good. If the fluid flows out of the lift cylinder fluid is leaking past the seals and the cylinder needs to be replaced.
Unit will not lower (Down pressure off)	Plugged breather cap	Remove and replace breather cap.
	Low or no current available at lower coil (B)	Check wiring harness to make sure the connection had not been severed. If a ground is present when operated from the blue with the white trace wire the coil may be weak. Swap coil with another coil on the valve block. If the problem moves to a different function replace coil.
	Lower valve (B) sticking or stuck	Swap out the (B) valve with the (E) valve. If the plow lowers the valve is sticking and should be cleaned or replaced.
	Lower coil (B) inoperative	Check to see if the blue with the white trace wire has a ground signal. If it does and the coil is not magnetized, the coil needs to be replaced.
	Raise cylinder damaged allowing movement in one direction only	Visually inspect lift cylinder. If it is damaged replace lift cylinder.

TROUBLESHOOTING GUIDE

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Driver side blade wing moves in one direction only	Low or no current available at extend coils (A, D, K)	Check wiring harness to make sure the connection had not been severed. If a ground is present when operated at all wires. Swap the coil with another coil on the valve block not (A, D, K). If the problem moves to a different function, replace coil.
	Low or no current available at retract coil (D)	Check wiring harness to make sure the connection had not been severed. If a ground is present when operated at all wires. Swap the coil with another coil on the valve block not (A, D, K). If the problem moves to a different function, replace coil.
	Valve (L) sticking or stuck	Swap out the (L) valve with the (K) valve. If the wing problem moves the (L) valve is sticking and should be cleaned or replaced.
	Valve (D) sticking or stuck	Remove the (D) valve and swap it out with the (A) valve. If the wing now extends and retracts the valve needs to be cleaned or replaced.
	Extend and retract hoses are routed incorrectly/ reversed	Due to the regen circuit the hoses being switched will allow the wing to extend in both the extend and the retract function. The hoses must be routed correctly to ensure proper function. See owners manual for proper port routing.
	Pilot check valve has debris or damaged piston, wing will not retract	Remove pilot check valve and inspect both cartridges and piston. If the valve has external springs make sure they both are not damaged and installed properly. Clean valves and reinstall.
Passenger side blade wing moves in one direction only	Low or no current available at extend coils (G, H, L)	Check wiring harness to make sure the connection had not been severed. If a ground is present when operated at all wires. Swap the coil with another coil on the valve block not (G, H, L). If the problem moves to a different function, replace coil.
	Low or no current available at retract coil (H),	Check wiring harness to make sure the connection had not been severed. If a ground is present when operated at all wires. Swap the coil with another coil on the valve block not (G, H, L). If the problem moves to a different function, replace coil.
	Valve (H) sticking or stuck	Remove (H) valve and swap out with the (G) valve. If the wing now extends and retracts, the valve needs to be cleaned or replaced.
	Extend and retract hoses are routed incorrectly/ reversed	Due to the regen circuit the hoses being switched will allow the wing to extend in both the extend and the retract function. The hoses must be routed correctly to ensure proper function. See owners manual for proper port routing.
Blade wing(s) will not move	Hydraulic fluid level low	Fill hydraulic fluid up to the fill line on the reservoir using Sno-Way hydraulic fluid.
	Pickup tube not submerged in hydraulic fluid	Fluid level is low. Fill with Sno-Way hydraulic fluid up to fill line on reservoir.
	Crossover relief valve pressure setting too low	The wing will not hold pressure when plowing. Replace relief valve
	Wing cylinders bound or frozen	Push plow wings against a curb to try and free up the cylinders. If they do not move replace cylinders.

TROUBLESHOOTING GUIDE

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Blade wing(s) will not hold	Wing relief valve pressure setting too low	Swap out wing relief valves on valve block. If the problem moves to the other wing, remove and replace relief valve.
	Cross over relief valve pressure setting too low, sticking or stuck	Swap wing cross over relief valves on valve block. If the problem moves to the other wing, remove and replace cross over relief valve.
Driver side wing will not hold pressure	"Cross over relief valve pressure setting too low, sticking or stuck	Replace crossover relief valve.
	Wing relief valve pressure setting too low	The wing will not hold pressure when plowing. Replace relief valve.
	Pilot operated check valve sticking or stuck closed	Remove pilot check valve and inspect both cartridges and piston. If the valve has external springs make sure they both are not damaged and installed properly. Clean valves and reinstall.

THEORY OF OPERATION

Hydraulic Power Unit

The hydraulic power unit consists of:

- 12VDC Motor
- Hydraulic pump rated at 1.54 GPM @ 1500 PSI
- 1.35 quart capacity reservoir
- Fine mesh intake filter
- Filter screens on all outlet ports

The fluid supply line for the pump is submerged in the hydraulic fluid reservoir and is equipped with a fine mesh intake filter screen.

The 12VDC motor is protected electrically by a 250 Amp fuse located between the battery and the motor solenoid.

The hydraulic pump is protected by a system relief valve.

This unit is equipped with a Down Pressure function which allows the operator to selectively switch the system to provide additional hydraulic force to the cutting edge of the plow.

IMPORTANT: The electric coils, which operate the solenoid valves, require a minimum of 10.5 volts DC for proper operation. Lower voltage will cause erratic operation, or failure to operate.

Hydraulic Controls

The hydraulic controls consist of:

- System pressure relief valve.
- Two crossover relief valves.
- Two wing relief valves.
- Four three-way two position hydraulic valves and four pilot operated check valves for wing angling functions.
- Two double acting hydraulic cylinders for wing angling functions.
- One three-way two position, three two-way two position valves and two check valves for raise, lower and down pressure functions.
- One down pressure relief valve.

Electro-Hydraulic Controls

All hydraulic functions are controlled by the 12VDC electrical system which actuates coils on the hydraulic valves and the solenoid for the electric motor of the power unit. 12VDC power is fed from the battery post of the motor start solenoid to a control circuit board on the plow and from the circuit board to each coil.

Each valve is actuated by completing a circuit to ground through the coil, and through the circuit board by means of a wire transmitted signal to the circuit board from the hand-held controller in the vehicle.

NOTE: This is a ground switching system and has power on the coils as soon as power is connected to the plow. The receiver module energizes the coils by providing a ground path to them.

Raise Mode of Operation

Actuating the 'Raise' switch on the hand-held controller sends a signal to the control circuit board on the plow which then actuates the motor solenoid and the coils for the 'C' valve and 'F' valve.

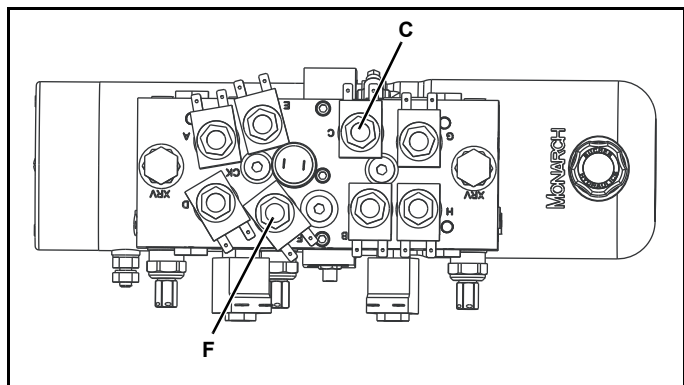


Figure 1-1

Actuating the start solenoid sends current to the power unit motor to cause the power unit to pump hydraulic fluid. Hydraulic fluid, under pressure, is directed through the 'C' valve to the lift cylinder causing it to extend and raise the plow. The 'F' valve is also actuated to allow fluid in the rod end of the double acting raise cylinder to return to the reservoir.

When the 'Raise' switch on the hand-held controller is released the start solenoid circuit is broken and the motor stops, the circuit to the coil for the 'C' valve and the 'F' valve is broken and these valves go to their normally closed positions.

Lower Mode of Operation - Gravity Down and Float

Actuating the 'Lower' switch on the hand-held controller sends a signal to the control circuit board on the plow which then actuates the coil for the 'B' valve and the 'F' valve allowing hydraulic fluid to flow from the lift cylinder to the reservoir.

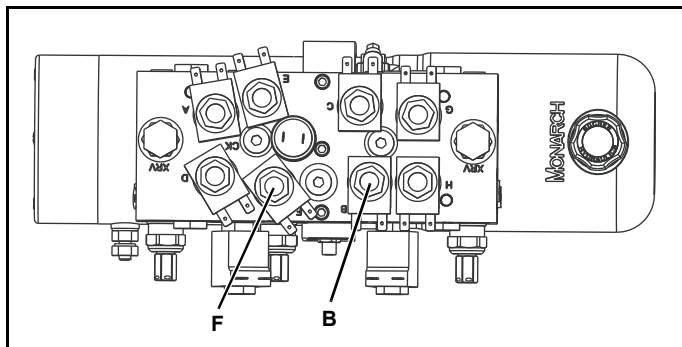


Figure 1-2

Once the 'Lower' switch has been actuated, the system will stay in this mode until the raise function is actuated, allowing hydraulic fluid to flow between the reservoir and the lift cylinder and let the lift cylinder extend and retract as necessary to follow ground contours while plowing.

Lower Mode of Operation - Down Pressure® Hydraulic (DP) System

This system operates only when the 'DP' switch and the 'Lower' switch on the hand-held controller is actuated. Actuating the 'DP' switch (a red LED will be lit) actuates the pressure switch, the 'B' valve coil, the 'E' valve coil and, through the pressure switch, the start solenoid as required.

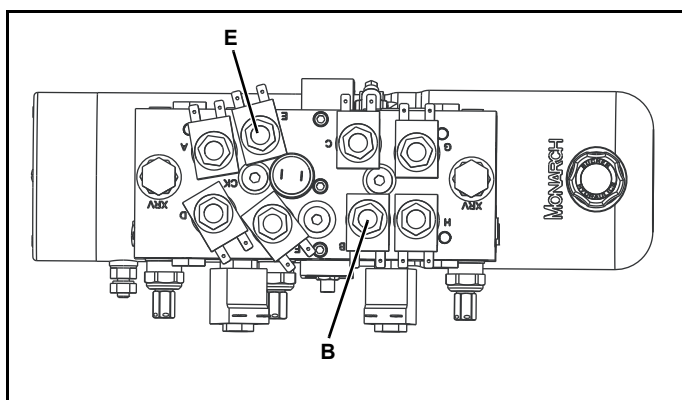


Figure 1-3

When the 'E' valve is actuated and the hydraulic pump operates, hydraulic fluid is directed to the rod end of the lift cylinder compressing the cylinder and forcing the plow down. The pressure switch in this system senses the pressure of the fluid in the lift cylinder and closes when the pressure becomes low, allowing the motor and the pump to pump fluid into the rod end of the cylinder.

When the pressure reaches the proper level, the switch opens, shutting off the motor and pump. The system is protected by a relief valve which relieves excess pressure if the plow is forced up, such as by a bump or obstacle in the roadway.

Once any obstacle is cleared, the plow can return to a lower position lowering the pressure in the system. If the pressure is lowered sufficiently, the pressure switch will then sense the lowered pressure and cause the pump to pump fluid into the system and return it to the proper pressure.

The down pressure system is overridden any time the plow control is placed in the 'Raise' mode, but will resume when placed back into the 'Lower' position.

Also, note that the 'E' valve is deactivated anytime an angle function is activated, but returns to its previous condition as soon as the angle function is completed.

Wing Angling Mode of Operation - Independent Wing Angling

Each wing can be angled forward or rearward independently by operating the forward or rearward switch for either the right or left wing. Operating the left (DS) extend switch on the controller will energize the motor solenoid and the 'A' coil, which will allow hydraulic oil under pressure to be directed to the base end of the left wing cylinder. When "A" is energized, correspondingly "K" and "D" are energized as well. "K" bleeds some of the fluid from the rod end of the cylinder to the base end, helping supplement and speed up the cylinder extend function. "D" pressurizes the rod end causing a differential in pressure between the rod and base end.

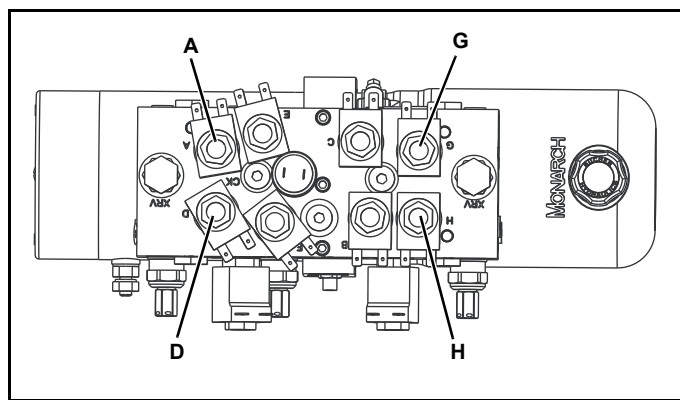


Figure 1-4

Operating the left (DS) retract switch on the controller will energize the motor solenoid and the 'D' coil, which will allow hydraulic fluid under pressure to be directed to the rod end of the right wing cylinder.

Operating the right (PS) wing extend switch will perform the same function as the left except that the 'G' coil will be energized instead of the 'A' coil and the "L" coil will bleed oil from the base end to the rod end of the cylinder. The "H" coil pressurizes the rod end causing a differential in pressure between the rod and base end.

Operating the right (PS) retract switch will perform the same function as the left retract except that the 'H' coil will be energized instead of the 'D' coil.

Combination Wing Angling

Both wings can be moved together using the control switches on the controller. Operating the forward combination switch on the controller will extend both wings in the 'scoop' position. Operating this combination will energize the motor solenoid and both the 'A' and 'G' coils. "A", "D", "K", "L", "G" and "L" WILL ALL OPEN. The "K" and "L" valves are the part of the regen circuit, which helps speed up the cylinders when in extend mode.

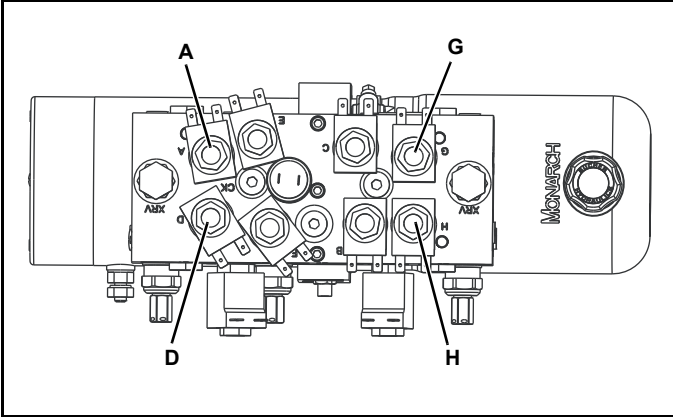


Figure 1-5

Operating the rearward combination switch on the controller will retract both wings into the 'V' position. Operating this combination switch will energize the motor solenoid and both the 'D' and 'H' coils.

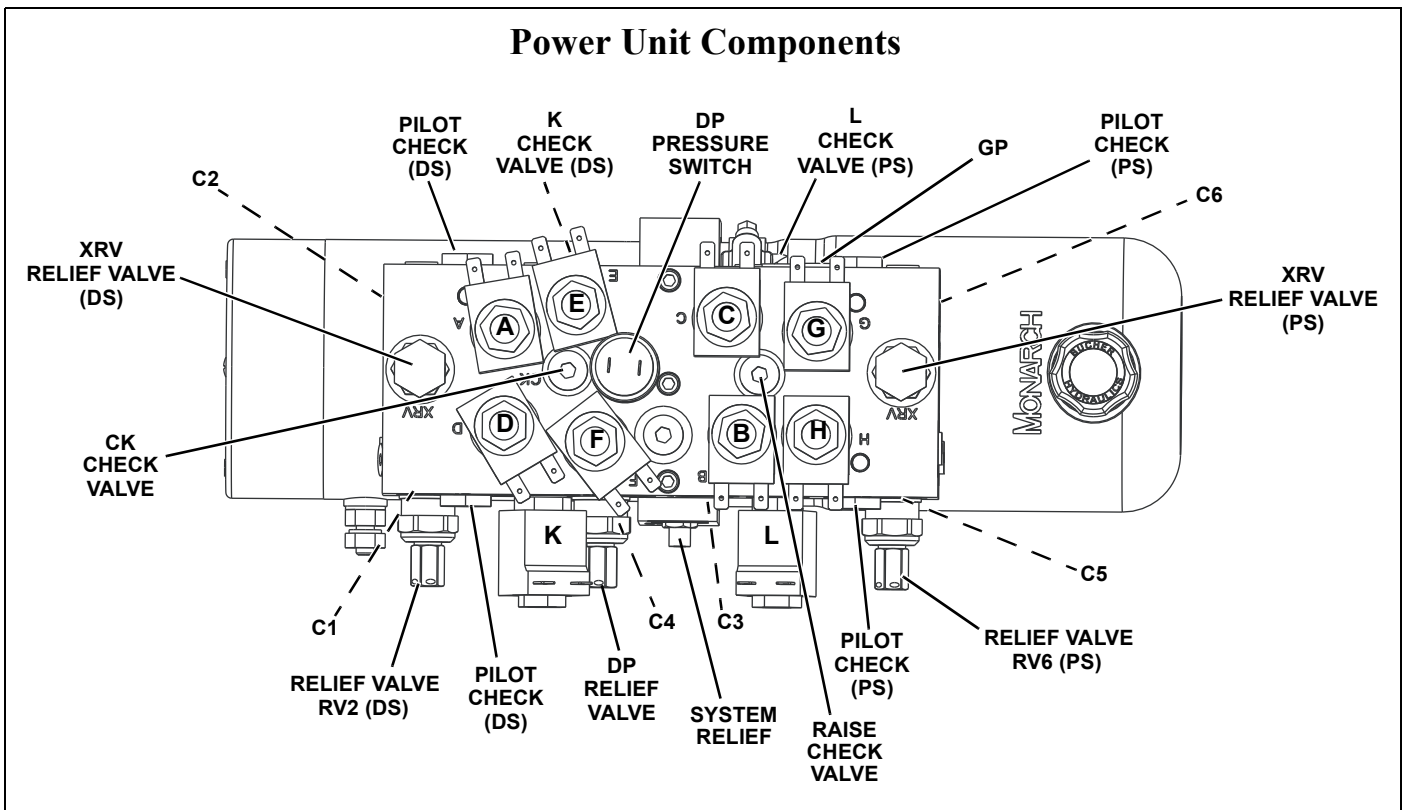
Operating the right side combination switch on the controller will extend the left wing and retract the right wing to plow all snow to the right. Operating this combination switch will energize the motor solenoid and both the 'A' and 'H' coils. Correspondingly, the "D" and "K" coils will open to bleed oil from the base end of the right side base end to the right side rod end and cause a pressure difference between the rod and base end.

Operating the left side combination switch on the controller will extend the right wing and retract the left wing to plow all snow to the left. Operating this combination switch will energize the motor solenoid and both the 'D' and 'G' coils. Correspondingly, the "H" and "L" coils will open to bleed oil from the base end of the left side base end to the left side rod end, and cause a pressure difference between the rod and base end.

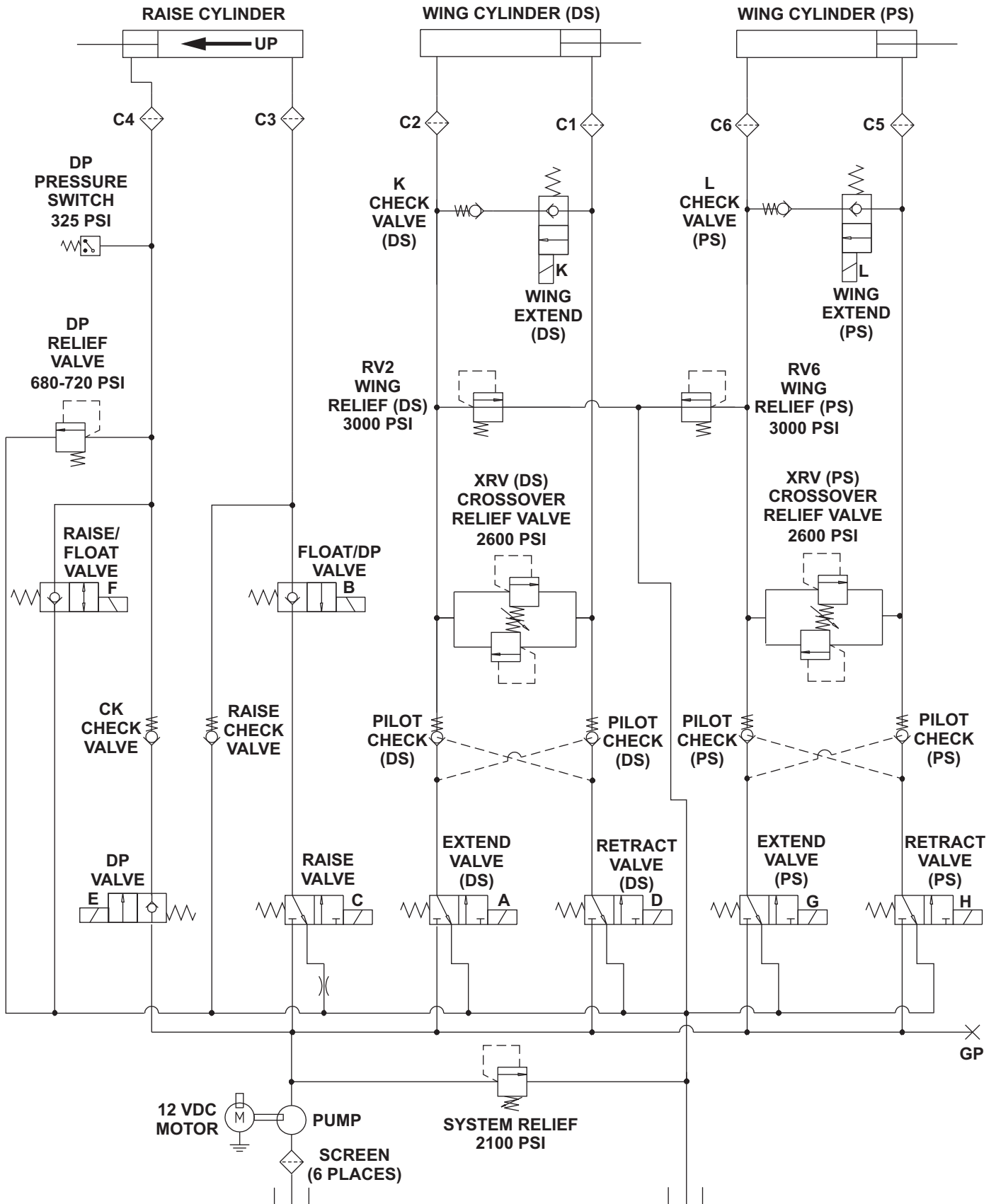
Each wing angling circuit is protected by a crossover relief valve set to relieve pressure on the wing angling circuit. Each wing also has a relief valve that protects the wing when back-dragging.

Fuse

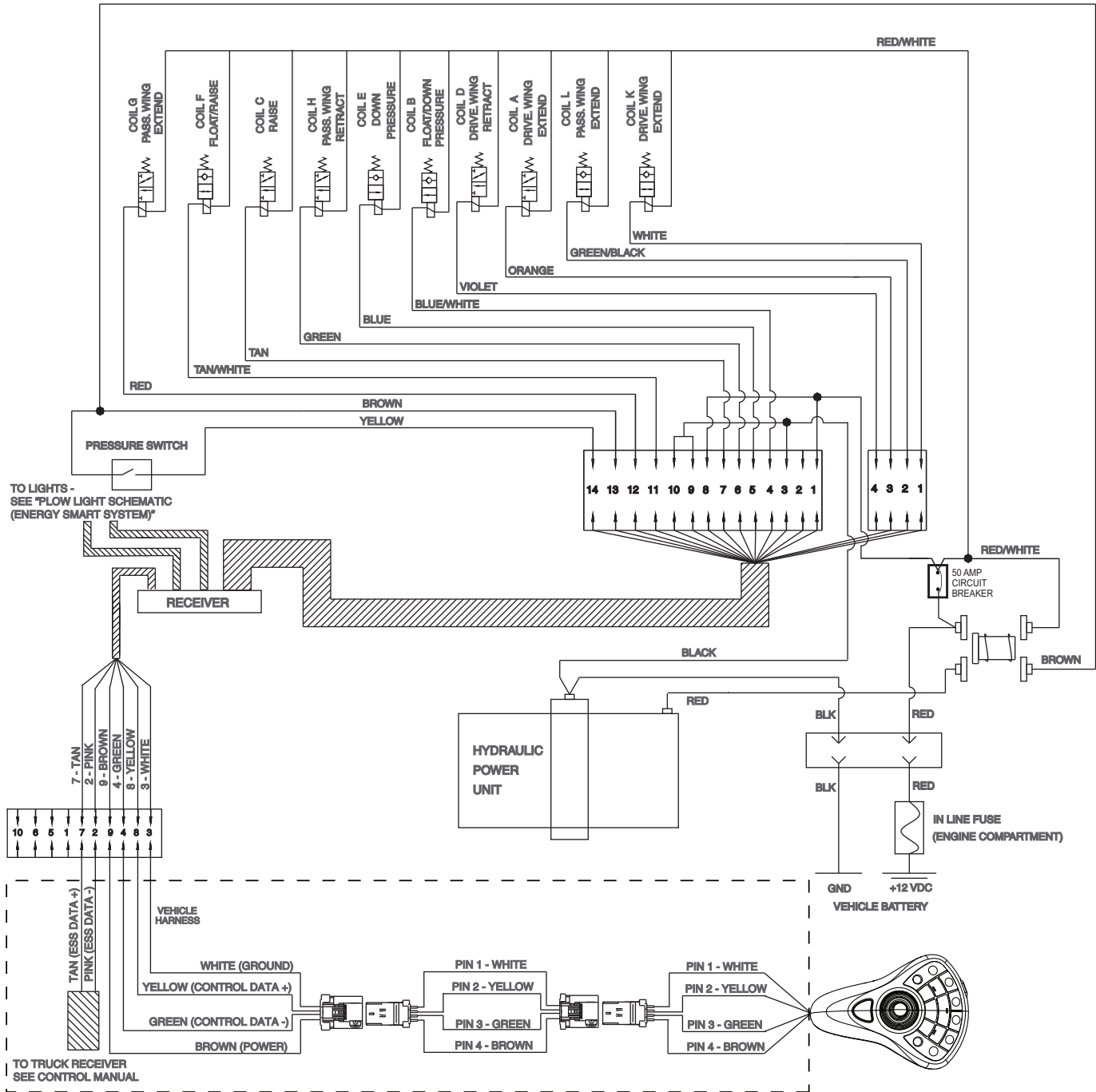
A 250 Amp fuse is located near the battery in the primary 12V DC positive power circuit and is in place to protect the electrical system against direct shorts. A high current draw condition will cause the fuse to open and interrupt power to the plow. Once the cause of the high current situation is identified and corrected replace the fuse.



HYDRAULIC SCHEMATIC



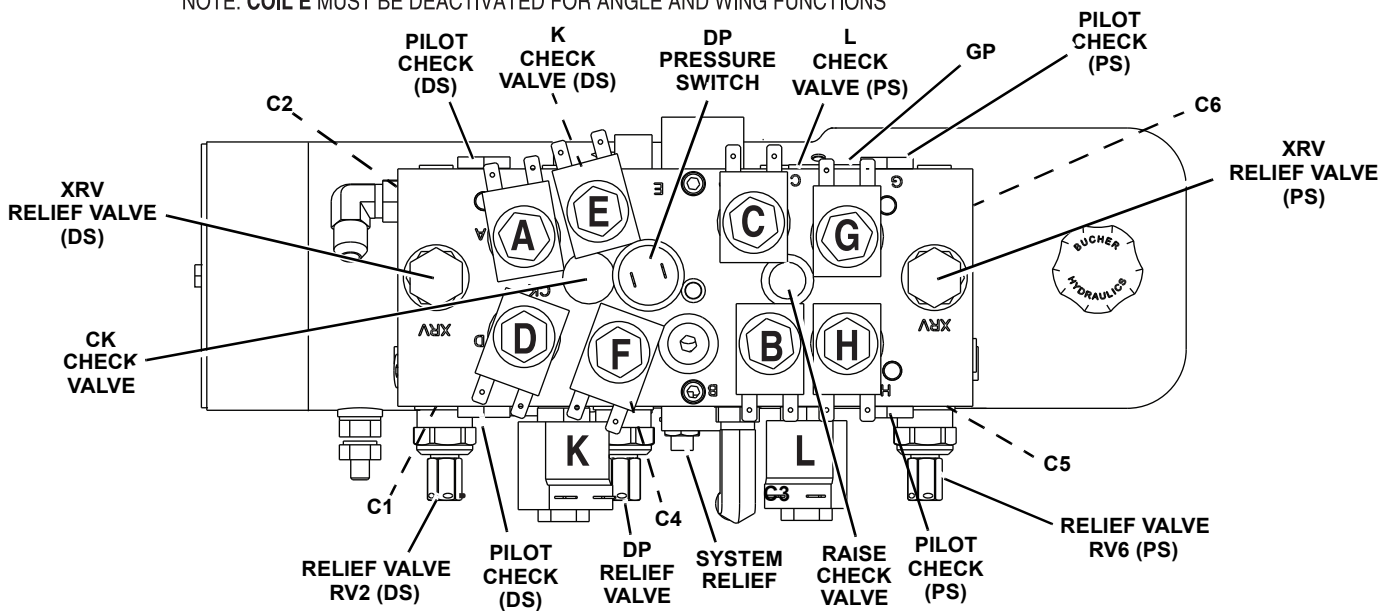
NOTE: DS - Driver (Left Side); PS - Passenger (Right Side)



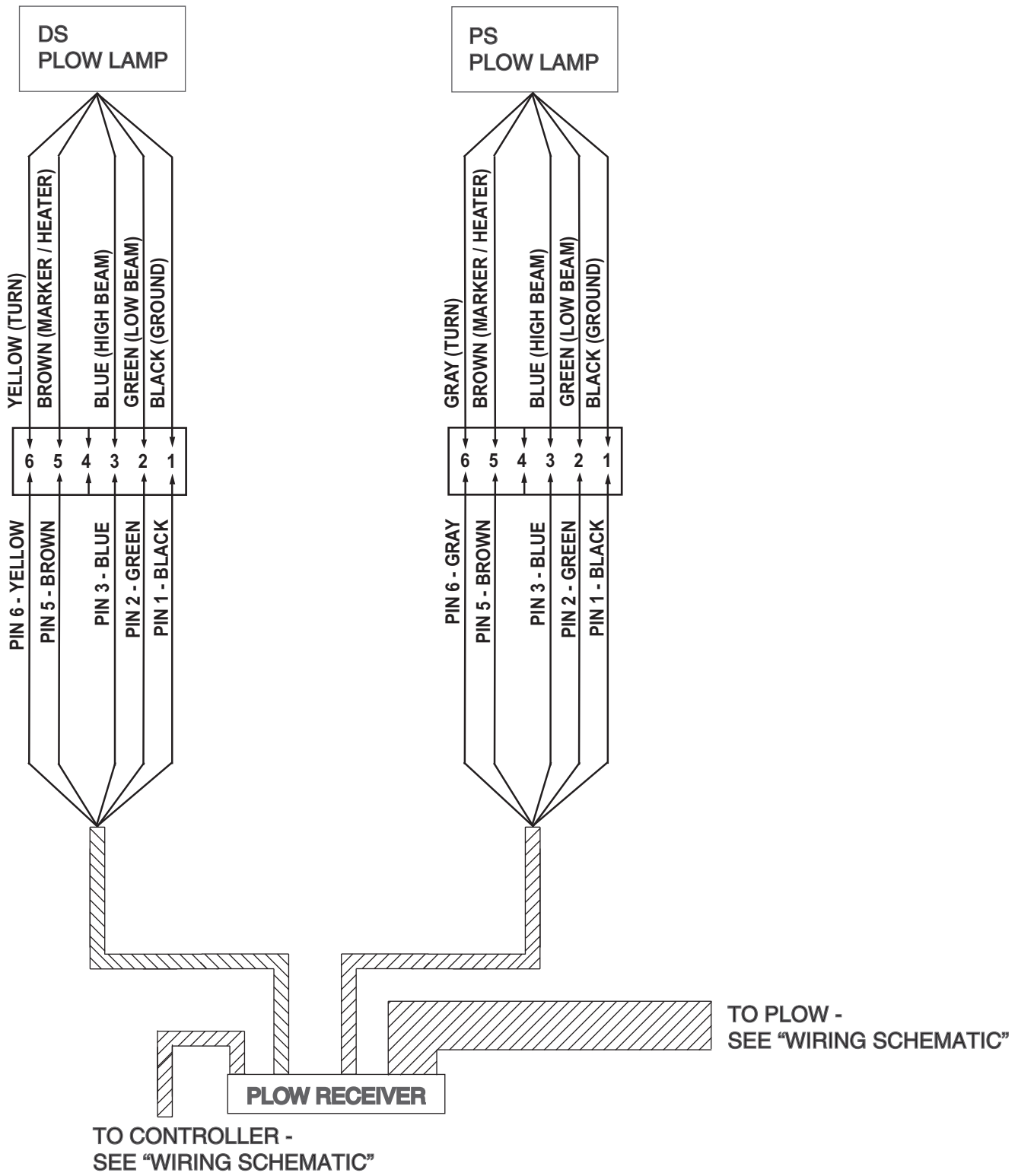
POWER UNIT
SOLENOID FUNCTION,
WIRING AND LOCATION

PLOW FUNCTION	MOTOR SOLENOID	A	B	C	D	E	F	G	H	K	L	PRESSURE SWITCH
WIRE COLOR	BROWN	ORANGE	BLUE/WHITE	TAN	VIOLET	BLUE	TAN/WHITE	RED	GREEN	WHITE	GREEN/BLACK	YELLOW AND BROWN
RAISE	X			X			X					
DOWN (FLOAT)			X				X					
DOWN PRESSURE™			X			X						X
PASS. SIDE WING EXTEND	X							X	X		X	
PASS. SIDE WING RETRACT	X								X			
DRIVE. SIDE WING EXTEND	X	X			X					X		
DRIVE. SIDE WING RETRACT	X				X							
VEE POSITION	X				X				X			
SCOOP POSITION	X	X			X			X	X	X	X	
ANGLE RIGHT	X	X			X				X	X		
ANGLE LEFT	X				X			X	X		X	

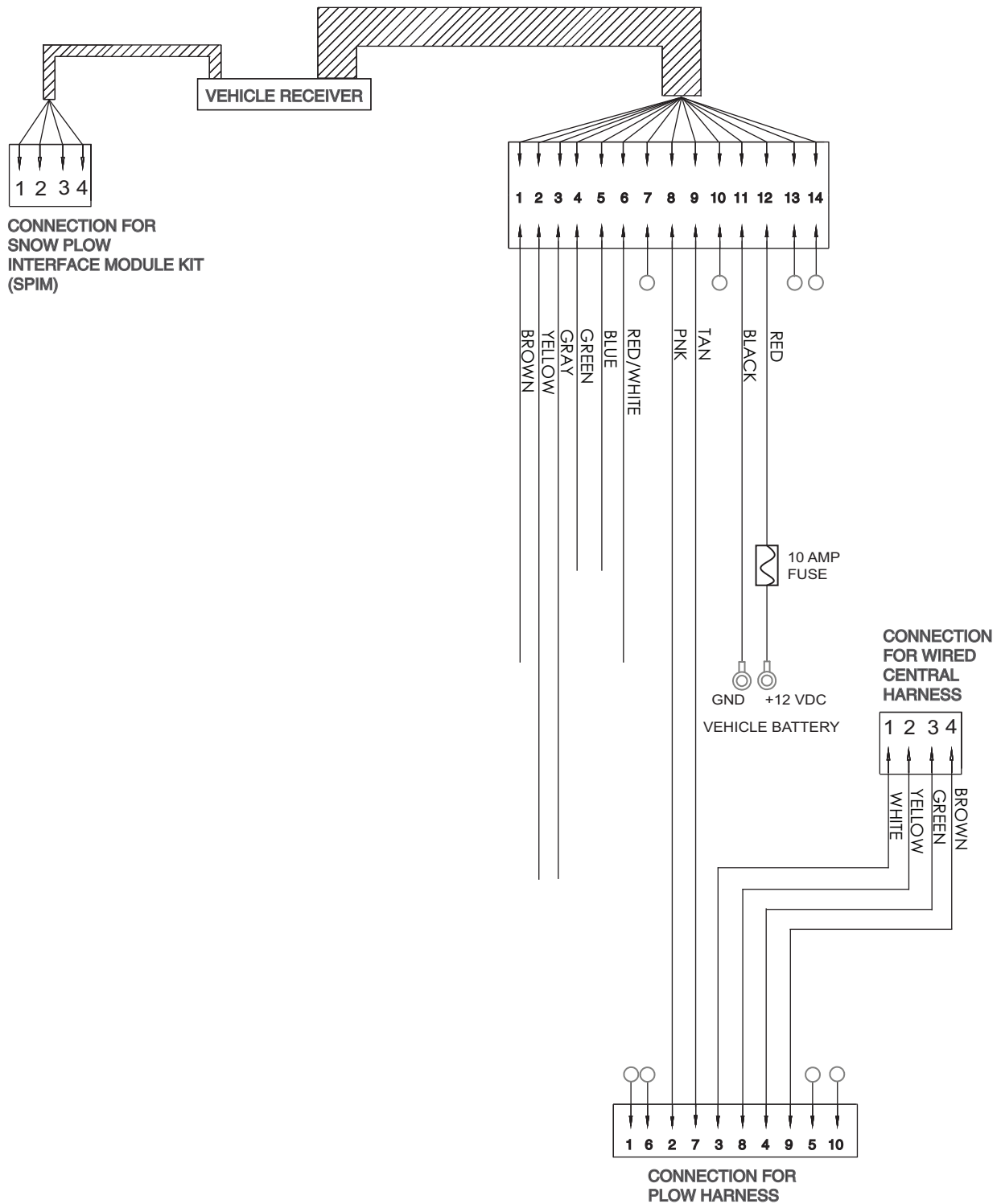
NOTE: COIL E MUST BE DEACTIVATED FOR ANGLE AND WING FUNCTIONS











PLOW LIGHT SCHEMATIC (Energy Smart System (ESS®))



ENERGY SMART SYSTEM (ESS®) WIRING SCHEMATIC



TORQUE SPECIFICATIONS

SAE Grade and Head Markings	1 or 2 No Marks 	5 5.1 5.2 	8 8.2 
SAE Grade and Nut Markings	2 No Marks 	5  	8  

	Grade 1		Grade 2		Grade 5, 5.1 or 5.2		Grade 8 or 8.2	
	Lubricated ^a	Dry ^b	Lubricated ^a	Dry ^b	Lubricated ^a	Dry ^b	Lubricated ^a	Dry ^b
SIZE	lb-ft	lb-ft	lb-ft	lb-ft	lb-ft	lb-ft	lb-ft	lb-ft
8-32			14*	19*	22*	30*	31*	42*
10-24			21*	27*	32*	43*	45*	60*
1/4	2.8	3.5	4.5	5.5	7	9	10	12.5
5/16	5.5	7	9	11	15	18	21	26
3/8	10	13	16	20	26	33	36	46
7/16	16	20	26	32	41	52	58	75
1/2	25	31	39	50	63	80	90	115
9/16	36	45	56	70	90	115	130	160
5/8	50	62	78	100	125	160	160	225
3/4	87	110	140	175	225	280	310	400
7/8	140	175	140	175	360	450	500	650
1	210	270	210	270	540	675	750	975
METRIC COARSE THREAD Grade 8.8			Grade 8.8		Grade 10.9		Grade 12.9	
			Dry	Lubed	Dry	Lubed	Dry	Lubed
M6-1			8	6	11	8	13.5	10
M8-1.25			19	14	27	20	32.5	24
M10-1.5			37.5	28	53	39	64	47
M12-1.75			65	48	91.5	67.5	111.5	82
M14-2			103.5	76.5	145.5	108	176.5	131
M16-2			158.5	117.5	223.5	165.5	271	200

DO NOT use these values if a different torque value or tightening procedure is given for a specific application.

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

^a "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings.

^b "Dry" means plain or zinc plated without any lubrication

* Values with asterisk are in lb-in.

NOTES

NOTES

SNO-WAY[®] INTERNATIONAL, INC.



Hartford, WI 53027 USA
Website: www.snoway.com
©2023 Sno-Way[®] International

DEALER PRE DELIVERY CHECKLIST

The following inspections **MUST** be accomplished prior to delivering the snowplow to the customer. Place an X in the box after accomplishing each item on the checklist.

CHECK THAT

- Parts have not been damaged in shipment. Repair or replace items that are loose, dented or missing.
- All covers, guards and decals are in place and attached securely.
- All pivot pins and cotters are installed and secure.
- Trip springs are adjusted.
- Shoe assemblies are installed and adjusted.
- Snow plow headlamps are adjusted properly.
- Snow plow headlamps are functional.
 - High Beam Low Beam Park Lamps
 - Left Turn Right Turn Headlamp Beam Aimed Correctly
- Cylinder lock clamp is installed.

Start the vehicle engine and place an X in the box after accomplishing each item on the checklist.

CHECK THAT

- ALL** blade functions work properly.
- Cylinders, hoses and fittings **DO NOT** leak.
- Listen for abnormal noises or vibrations; Repair or replace as necessary.
- The Power Unit is properly filled.

DELIVERY CHECKLIST

The following checklist is to be accomplished with the customer present, Place an X in the box after accomplishing each item on the checklist.

- After giving the Customer his Owner's Manual, instruct him to read it **PRIOR** to operating the Snow Plow. If he has any questions or does not understand part(s) of the Manual, ask him to contact the Dealer for answers or explanations **BEFORE** operating the unit.
- Record the Serial Numbers, Date of Purchase, Purchaser's Name and Address, and the Dealers Name, Address and Phone Number in the space provided on Page 1 of the Owner's Manual.
- Explain mounting and removal procedures.
- Demonstrate power plow controller operation.
- Demonstrate cylinder lock clamp installation.
- Demonstrate Down Pressure hydraulic system function and operation. (If unit is so equipped)
- Fill out Warranty Registration Card and mail COPY 1 to the factory to validate Warranty. NO Warranty claims can be honored if the Warranty Card is not on file at the factory.**

SNO-WAY® INTERNATIONAL, INC.



Hartford, WI 53027 USA
Website: www.snoway.com
©2023 Sno-Way® International