

FORM NO.
13280
August, 1993

WESTERN[®]

SNOWPLOWS

**OWNER'S MANUAL
AND
MECHANICS GUIDE**

CABLE ACTIVATED ISARMATIC[®] MARK IIIa

PREFACE

Welcome to the growing family of WESTERN® snowplow owners. This manual will teach you how to operate and maintain your new WESTERN snowplow and will provide safety information. Please read this manual carefully and follow its recommendations.

When service is needed, your local Western distributor knows your plow best. Return your snowplow to the distributor for maintenance service or any other assistance you may require. We have enclosed in your owner's manual packet a "Report Card" for your use.

Your WESTERN Snowplow ISARMATIC® Mark IIIa Hydraulic Unit has a serial number. Record this serial number and keep it in a safe place so that you can refer to it if needed.

Before using your WESTERN snowplow, make sure your vehicle is equipped with all vehicle manufacturer's and Western recommended options for snowplowing.



SAFETY NOTE: Whenever you see this symbol, it notes a SAFETY WARNING. To avoid serious injury to yourself or others, follow all warnings. Read this manual and plow labels before using snowplow.

Western offers a one-year limited warranty for all snowplows and accessories. See separately printed page for this important information. Western does not warranty non-Western service parts or accessories or any damage caused by the use of these unauthorized items.

The following are registered® or unregistered™ Trade Marks of Douglas Dynamics, Inc.

WESTERN® ISARMATIC® Hydra-Turn®
UniMount® Roll-Action™ PRO-GUARD™

TABLE OF CONTENTS

OWNER'S MANUAL

Make-up of the Snowplow	
Blade	2
A-Frame & Quadrant	6
Lift-Mount	7
Assembly Diagram	8
Hydraulic Power	9
Angling	10
IIIa Control	11
Light Kit	12
Mounting Snowplow to Vehicle	13
Operating Your Plow	14
Controlling The Blade	14
Parking with Plow Attached	15
Transporting Plow	15
Plowing Snow	16
General Instructions	16
Special Snow Conditions	16
Hard-Packed Snow	16
Deep Snow	16
Clearing Driveways	17
Clearing Parking Lots	17
Removing Snowplow & Storage	18

OWNER'S MANUAL (Continued)

Maintenance	19
Pre-Season Check	19
Regular Maintenance	19
Disc Shoe Adjustment	19
Cutting Edge	20
Trip Spring Adjustment	20
PRO-GUARD™ Blade Finish	20
Black Iron Mount Parts - Powder Coated or Painted	20
Hydraulic System	20
Oil Level	20
Annual Fluid Change	20
System Capacity	21
Packing Nut Adjustment	21
Pump Inlet Filter Screen	21
Emergency Parts	21

MECHANICS GUIDE

Theory of Operation	22
Electrical	23
Raising Plow	23
Lowering Plow	23
Right or Left Plow Angling	24
Cushion Valves	24

MECHANICS GUIDE (Continued)

Troubleshooting Guide	25
Safety Rules	26
Before You Begin	26
Personal Safety	26
Ventilation	26
Fire and Explosion	26
Battery Safety	27
Hydraulic Safety	27
General Information	28
A Pump Pressure Test	28
B Relay Test	29
C Cushion Valve Adjustment	30
D 3 Way Valve Lever Travel	30
E 4 Way (Angle) Valve Lever Travel & Adjustment	31
F 3 Way (Raise-Lower) Valve Adjustment	32

PARTS DIAGRAMS

Sub-Compact & Compact Plow Parts Diagram	33
Standard Plow Parts Diagram	34
PRO-PLOW Parts Diagram	35
Heavyweight Plow Parts Diagram	36

MAKE-UP OF THE SNOWPLOW

BLADE

The blade on your new WESTERN® snowplow is constructed of heavy gage steel. To increase rigidity and strength, the blade is reinforced with several vertical ribs. The top edge is rolled for added strength and improved appearance.

The exclusive Roll-Action™ blade is designed to roll snow ahead and to the side instead of just pushing snow. This action means you can move more snow and move it faster using less power, saving fuel and reducing wear and tear on both vehicle and plow.

The blade has a replaceable high-carbon steel cutting edge bolted to the bottom. This cutting edge is reversible to equalize wear and should be replaced when it is worn to the bottom edge of the blade (See Regular Maintenance and Adjustments.)

The blade also features large, adjustable disc-type skid shoes. These rotate 360° for longer wear and better blade flotation over all surfaces. For severe service, heavy duty disc shoes are available from your local Western distributor.

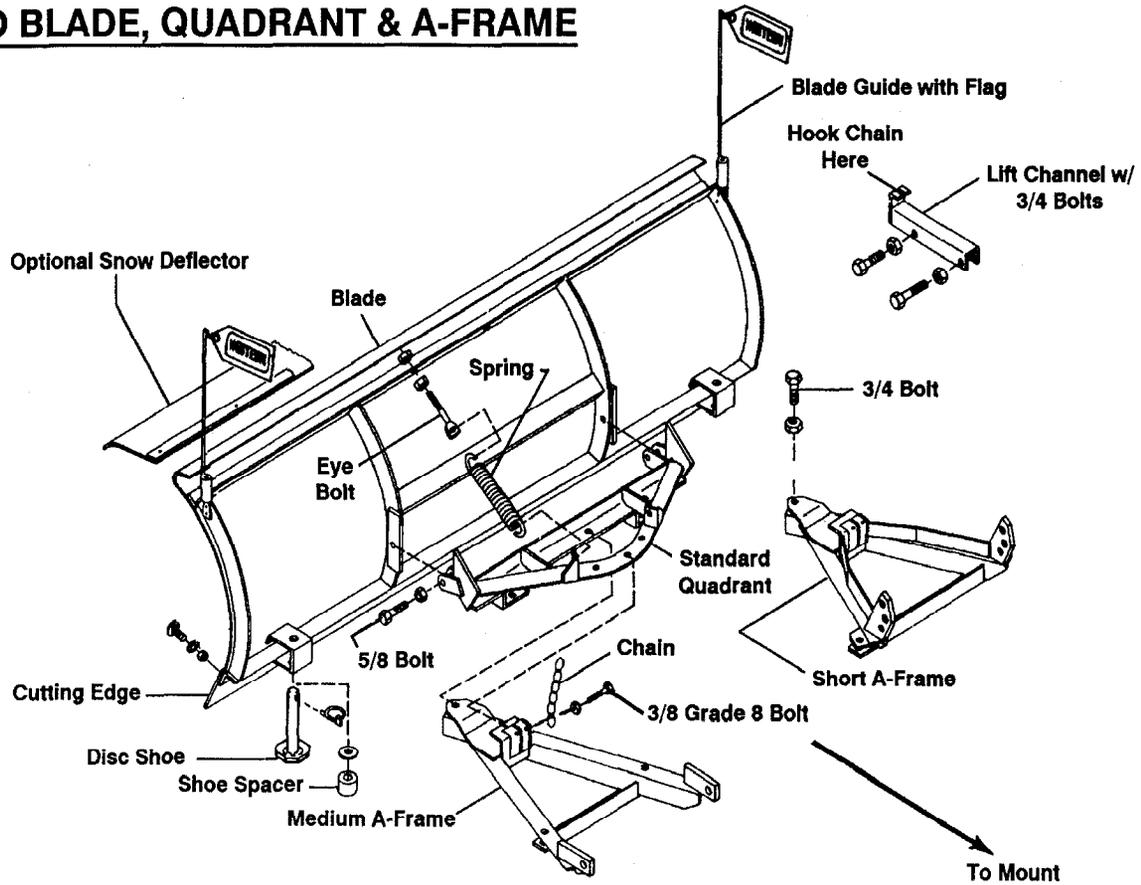
Your new blade is protected with PRO-GUARD™ — a baked-on powder finish that resists cracking, corrosion, scratching and rust. The PRO-GUARD™ coating - many times thicker than paint - will maintain its luster and glossy good looks longer than any other snowplow blade finish in the industry. It can be touched up when necessary.

Blade guides with replaceable flags are furnished with your complete snowplow. These help improve operator visibility and blade control.

BLADE ACCESSORIES - OPTIONAL

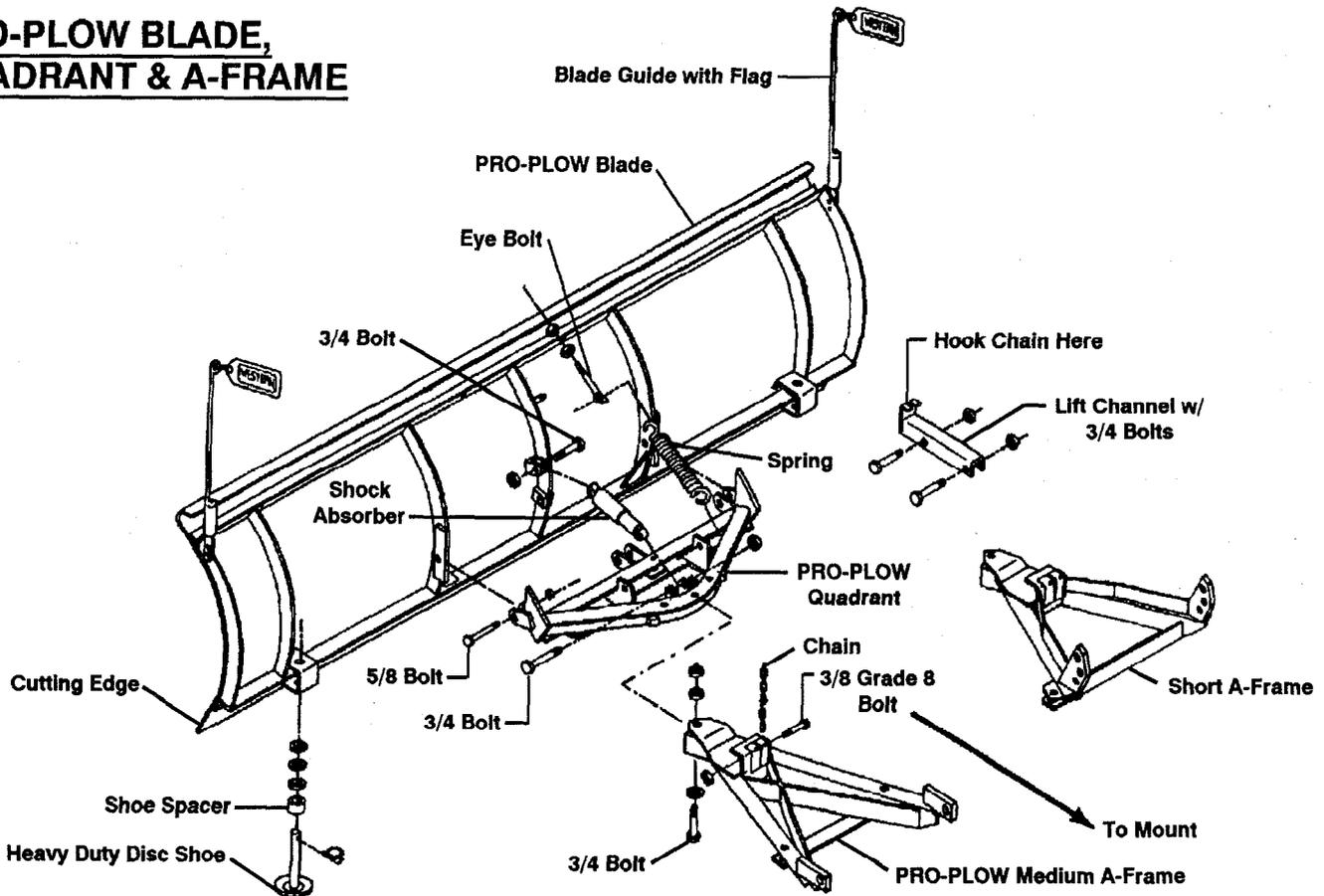
Snow Deflector — Optional snow deflector keeps snow off the windshield and away from the radiator. The deflector improves Roll-Action™ and increases plow efficiency.

STANDARD BLADE, QUADRANT & A-FRAME



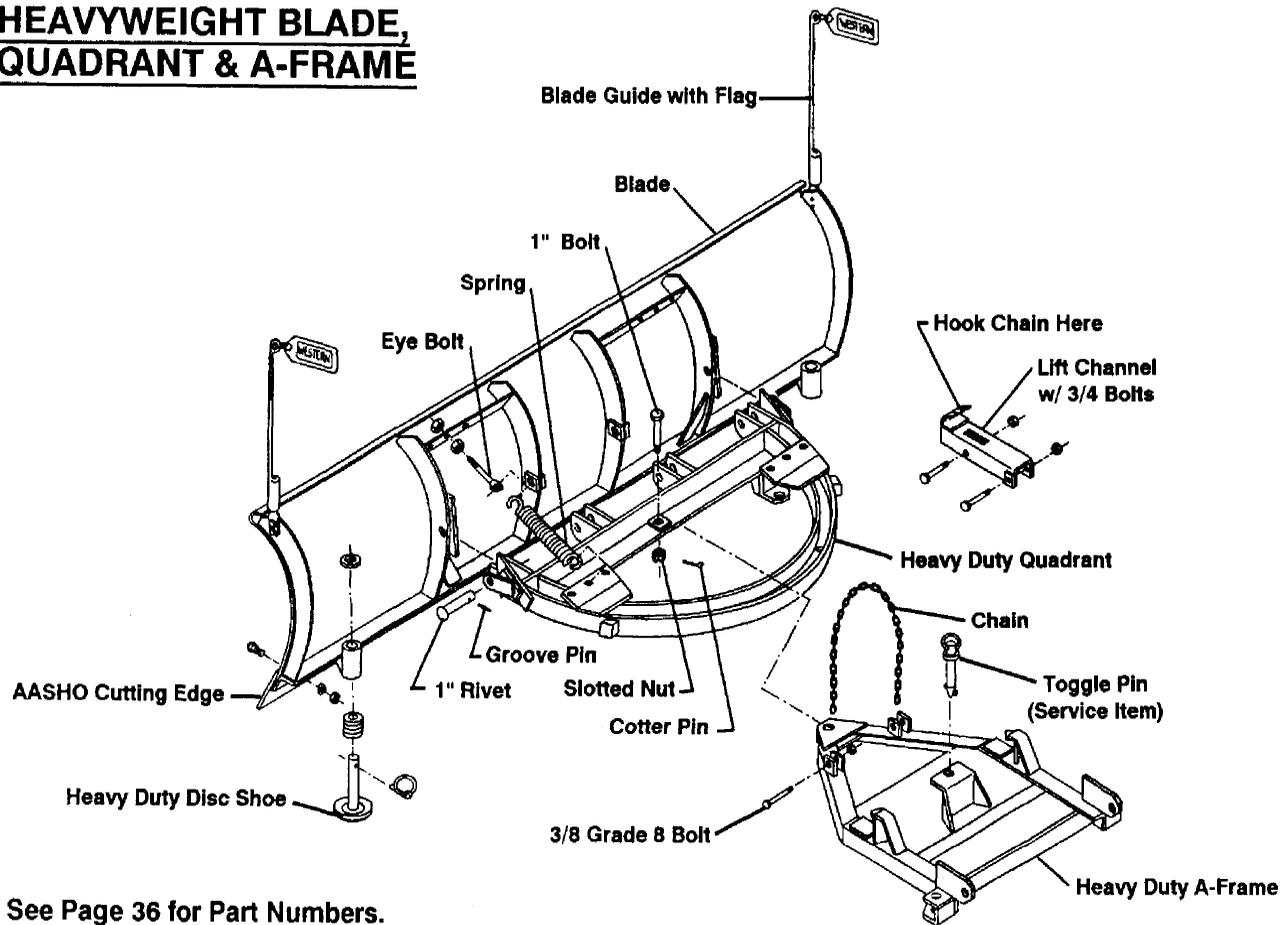
See Page 34 for Part Numbers.

PRO-PLOW BLADE, QUADRANT & A-FRAME



See Page 35 for Part Numbers.

HEAVYWEIGHT BLADE, QUADRANT & A-FRAME

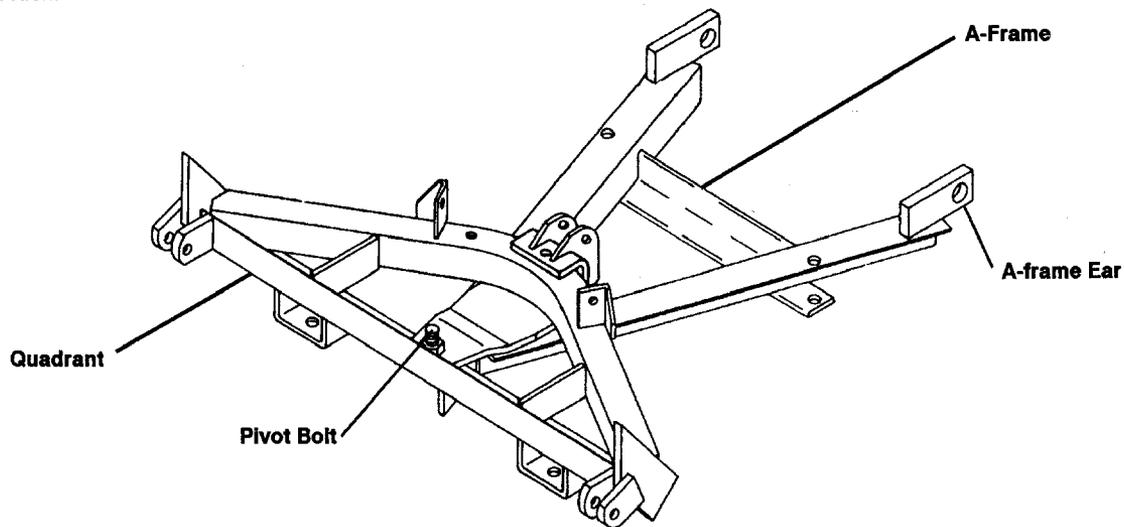


See Page 36 for Part Numbers.

A-FRAME & QUADRANT

The quadrant is attached to the back of the blade with bolts and lock-nuts (pins on heavyweight blades) and heavy-duty trip springs. The trip springs allow the blade to trip forward and ride over obstacles such as low curbs, manhole covers, etc., without damage to the blade or vehicle or injury to driver. The tension of the trip springs is adjustable. (See Regular Maintenance and Adjustments.)

The quadrant is attached to the triangular A-Frame with a pivot bolt, which allows the quadrant and blade to swing right or left. Heavy 1" diameter hitch pins are used to secure the A-Frame ears to the vehicle mount. These hitch pins can't be bent and will not shear in normal operation, assuring a solid connection.

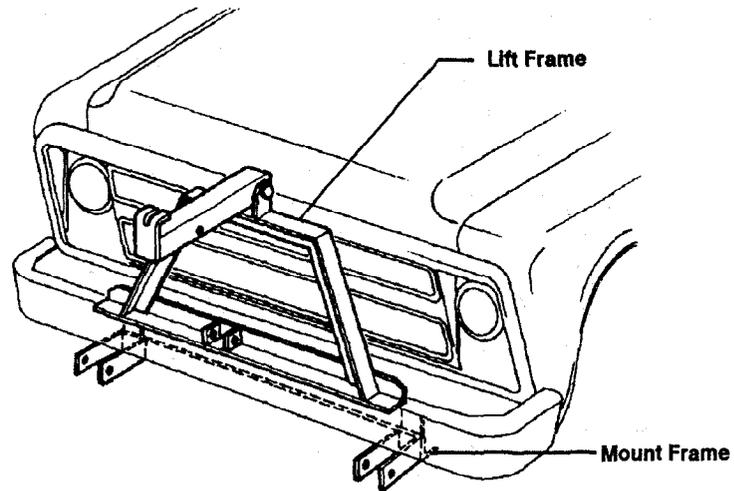


A-FRAME & QUADRANT ASSEMBLY

LIFT-MOUNT

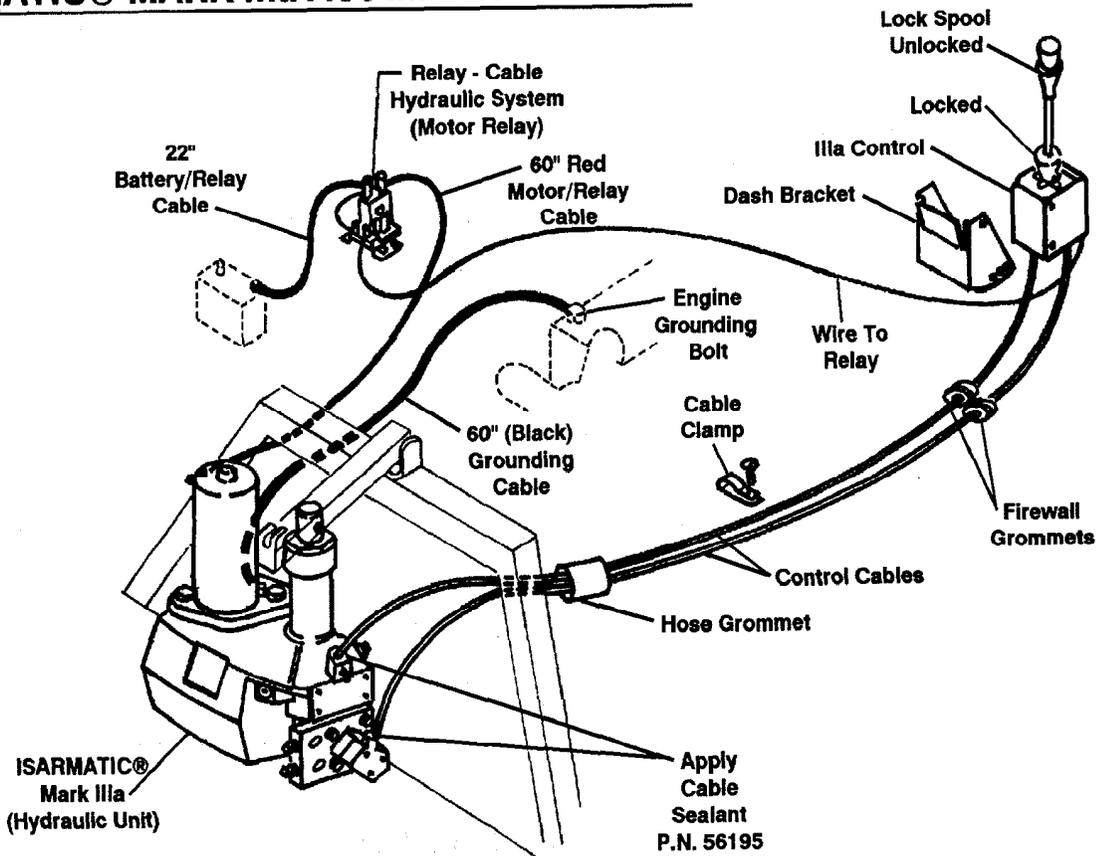
Western has designed custom lift-mount assemblies for most vehicles. Due to differences between vehicle models, lift mount assemblies are generally not interchangeable.

The mount is fastened to the underside of the vehicle frame and provides the primary connecting point between the snowplow and the vehicle. The lift, welded to the mount at the front of the vehicle, provides the supporting framework for the hydraulic unit.



LIFT-MOUNT ASSEMBLY

ISARMATIC® MARK IIIa ASSEMBLY DIAGRAM



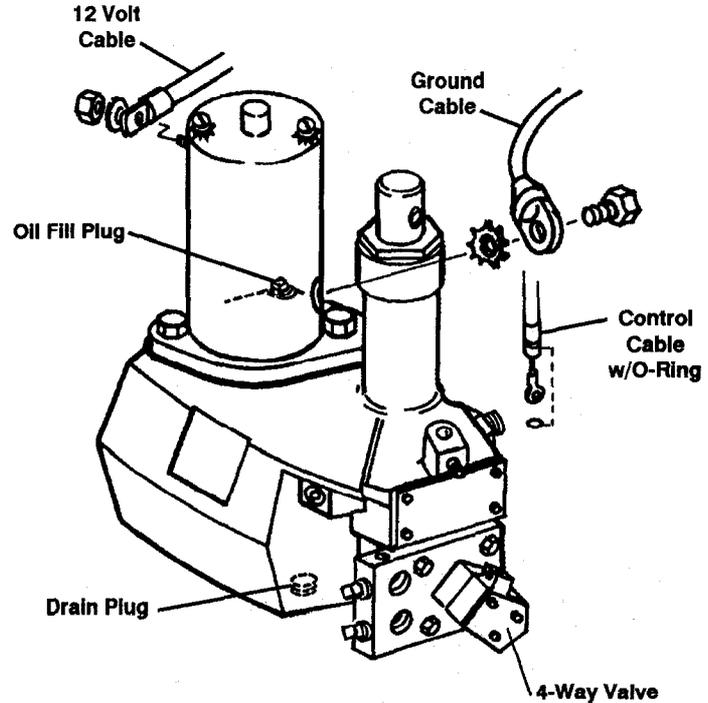
HYDRAULIC POWER

The WESTERN ISARMATIC® Mark IIIa System provides a fast and uniform speed of lifting and angling. The Extra Duty System (1-1/2" Ram) raises the blade in 2 seconds and angles side to side in 4 seconds. The Heavy Duty System (2" Ram) raises the blade in 4 seconds and angles side to side in 8 seconds.

The ISARMATIC® Mark IIIa reservoir should be filled with automatic transmission (ATF) fluid (Mobil One or Texaco 1537 Aircraft Hydraulic Oil may be used for low temperature operation). Push lift channel all the way down. Remove fill plug (behind motor). Fill reservoir only through the fill opening (it is designed to prevent over-filling). Reservoir is full when the oil level reaches hole threads. Replace fill plug.

SYSTEM CAPACITY

All ISARMATIC® Mark IIIa Unit Reservoirs — 1-1/2 quarts.
ISARMATIC® Mark IIIa Extra Duty (1-1/2" Ram) with 10" Hydra-Turn® Rams — 2-1/8 quarts.
ISARMATIC® Mark IIIa Heavy Duty (2" Ram) with 16" Hydra-Turn® Rams — 2-3/4 quarts.



**ISARMATIC® MARK IIIa
(Hydraulic Unit)**

HYDRA-TURN® ANGLING

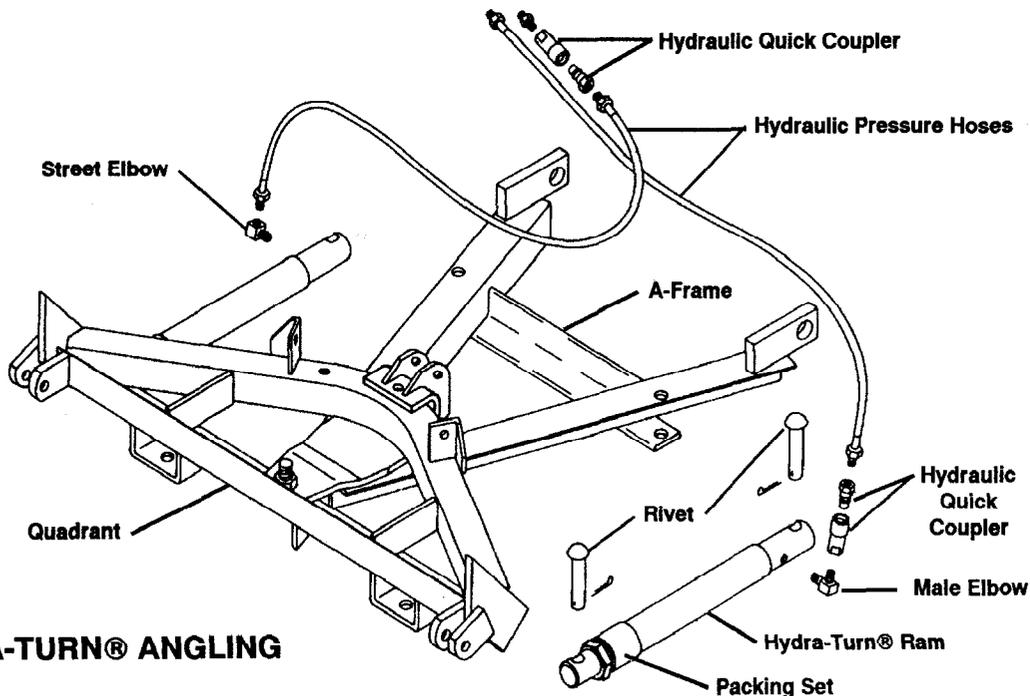
Hydra-Turn® power angling gives you full control of the plow from within the cab of the vehicle — you'll never have to get out in the snow to change the angle of the blade. Two single acting hydraulic rams hold the blade at the desired angle. The rams are operated by the Illa control.

The ISARMATIC® Mark Illa 4-way valve manifold has two cushion valves built in to prevent damage to the blade or vehicle if obstacles are hit. When the force against the blade causes pressure in an extended ram to exceed set limits, the cushion valve opens allowing oil to escape and the ram plunger retracts.

NOTE: In the event of Hydra-Turn® angling failure, place a 5/8" bolt thru the holes in the A-Frame & quadrant. This will hold the blade in position until the problem is corrected. For heavyweight Hydra-Turn® failure, use Part Number 93015 Toggle Pin.



WARNING: Keep well clear of the blade when it is being raised, lowered, or angled. Do not stand between the vehicle and blade or directly in front of blade. If the blade hits you or drops on you, you could be seriously injured.



HYDRA-TURN® ANGLING

IIIA CONTROL

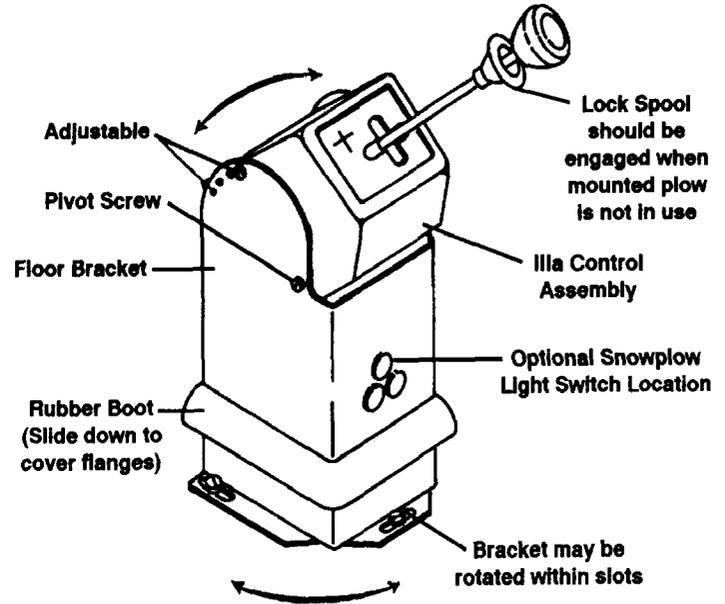
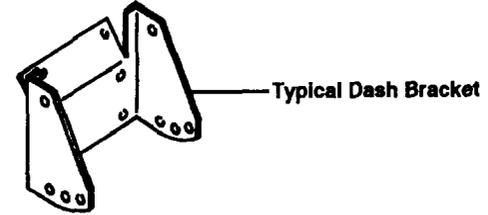
The IIIa control assembly controls raising, lowering and angling the blade left or right. The sliding lock spool allows the control to be secured in the neutral position to prevent blade movement. The blade can be moved without the vehicle ignition switch being in the "on" position.



WARNING: The blade can be raised, lowered or angled anytime the control lever is moved. Always keep the lock spool pushed into the center of the cross slots when the plow is not in use. Accidental movement of the plow could result in serious injury.

WESTERN® control cables are built for the most brutal winters. They're designed with stainless steel wire, conduit lined with high density polyethylene and permanently lubricated for low temperature operation.

During the off season, the IIIa control lever can be removed by unscrewing the lever from the control. Store lever in glove box of vehicle.



LIGHT KIT

The headlamp kit includes a set of rectangular dual-beam halogen headlamps plus combination park and turn signals.

A patented pre-wired harness with plug-in module requires no headlamp wire splicing. Lights conform to federal safety standards.

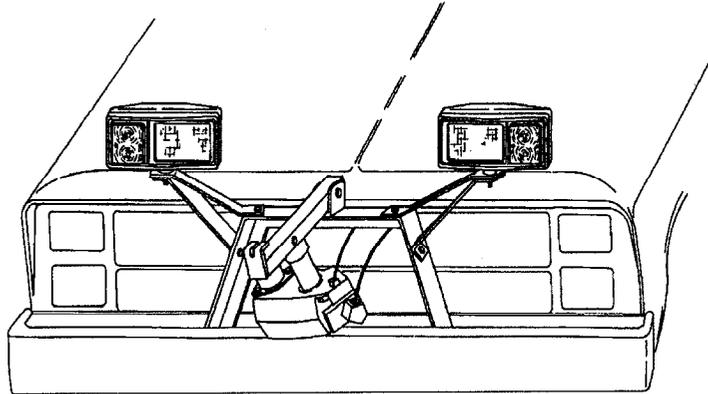
Use plow headlamps **ONLY** when plow is attached. Use vehicle headlamps when plow is **NOT** attached.



WARNING: Before traveling, position blade so it does not block headlamp beam. Do not change blade position while traveling.

Replacement 2E1 Seal Beam headlamps (P.N. 49297) are available through your local Western distributor.

CAUTION: Lights may be damaged by brush-type automatic car washes.



LOW PROFILE LIGHT KIT

MOUNTING SNOWPLOW TO VEHICLE

Note: Lift-mount assembly must already be installed.

WESTERN® snowplows are easy to mount and remove from your vehicle. The blade, quadrant and A-frame are usually removed and stored as a complete assembly.

1. Position your vehicle close behind plow so that the A-frame ears are approximately in line with coupling lugs on mount.
2. Hook chain to lift channel.



WARNING: Inspect plow components and bolts for wear or damage whenever mounting or removing the plow. Worn or damaged components could permit plow to drop unexpectedly.

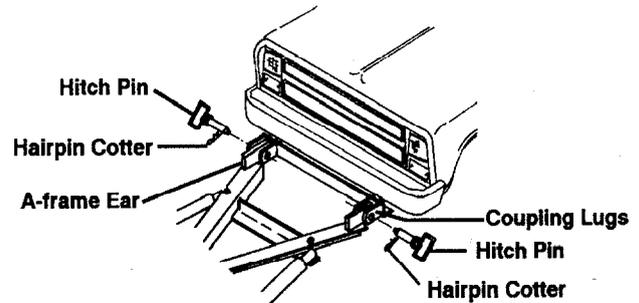
3. Pull the lock spool up out of the cross slots in the Illa control.
4. Move Illa control lever to raise and raise lift channel until A-frame ear holes align with coupling lug holes on mount.



WARNING: Never put a finger in A-frame ear or mount coupling lug holes to check alignment. If the plow moved, your finger could be crushed.

5. Insert hitch pins and hairpin cotters as shown.
6. Connect hoses between hydraulic unit and Hydra-Turn® rams on each side of A-frame.

NOTE: Temperature changes may cause a pressure build-up within the Hydra-Turn® rams that prevents recoupling of the hoses. If this occurs, place a clean rag over the male coupler and lightly tap the ball on a block of wood to release the pressure.



7. Move Illa control lever to lower position. Leave lever in detent position (float position).
8. Push lift channel all the way down. Pull the chain tight and hook it to the lift channel. After chain is hooked, it will have the correct amount of slack for plow to "float" (move up and down to follow the contour of the surface being plowed).
9. Move the control lever to raise, lower and angle plow in both directions to make sure all systems are in working order.
10. Move plow light switch from vehicle lights to plow lights.



WARNING: Keep well clear of the blade when it is being raised, lowered, or angled. Do not stand between the vehicle and blade or directly in front of blade. If the blade hits you or drops on you, you could be seriously injured.

OPERATING YOUR PLOW

CONTROLLING THE BLADE

The IIIa control operation is as follows:

Pull the lock spool up out of the center of the cross slots.

RAISE: Move IIIa control lever UP (forward) to raise blade until blade has reached desired height.

LOWER (Float): Move IIIa control lever DOWN (back) to lower (float) blade.

ANGLE LEFT: Move IIIa control lever to the LEFT to angle blade to the left until blade has reached desired angle.

ANGLE RIGHT: Move IIIa control lever to the RIGHT to angle blade to the right until blade has reached desired angle.

LOCK BLADE IN POSITION: Push lock spool down into center of cross slots.

The lever should be moved all the way into the desired position smoothly and without hesitation. Always return the lever to the neutral position except when float is desired.

The "lower" position has a detent to allow the plow to float (move up and down) on the surface being plowed.

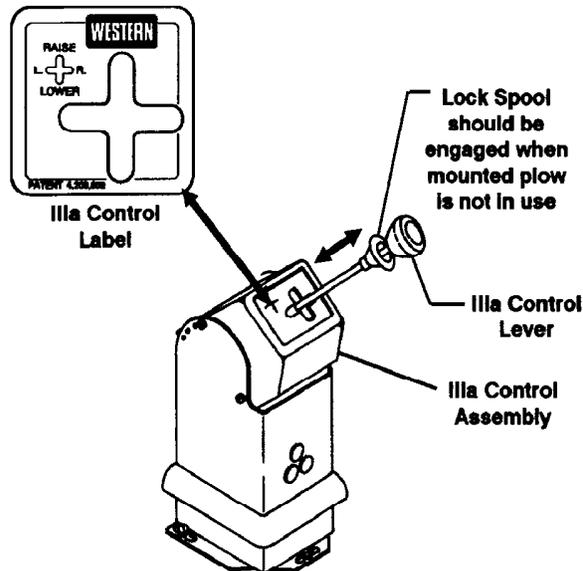
Caution: DO NOT hold IIIa control lever in "raise", "angle left" or "angle right" position longer than 5 seconds beyond hydraulic function demand. To do so increases battery drain and could result in motor burn-out.

The IIIa control is equipped with a manual lock to prevent accidental lowering or movement of the blade. Push the lock spool down into the center of the cross slots to prevent the plow from being moved. Pull the lock spool up out of the cross slots to operate the plow. Lock spool should be engaged whenever plow is not in use.



WARNING: The blade can be raised, lowered, or angled anytime the control lever is moved. Always keep the lock spool pushed into the center of the cross slots when the plow is not in use. Accidental movement of the plow could result in serious injury.

During the off season, the IIIa control lever can be removed by unscrewing the lever from the control. Store lever in glove box of vehicle.



PARKING WITH PLOW ATTACHED

Whenever you park your vehicle, lower blade to the ground.



WARNING: Always lower blade fully when vehicle is parked. Temperature changes could change hydraulic pressure, causing the blade to drop unexpectedly or damaging hydraulic components. Failure to do this can result in serious injury.

TRANSPORTING PLOW

NOTE: These instructions are for driving short distances to and from plowing jobs. For long trips, remove plow from front of vehicle.

1. Raise blade.

2. Adjust blade height for maximum plow light illumination.



WARNING: Your vehicle must be equipped with plow headlights and directional lights. Be sure the plow lights are operating properly before traveling.

3. Adjust blade to straight position.



WARNING: Make sure blade does not block headlight beams.

4. Move lock spool down into the center of the cross slot to lock blade in place.



WARNING: Never exceed posted road speeds. Under bad weather conditions or when driving on uneven surfaces such as railroad tracks or bumpy roads reduce speed.

5. Monitor vehicle operating temperature. Overheating is unlikely under normal driving conditions, but occasionally the plow may be positioned where it deflects air away from the radiator. If this occurs, stop the vehicle and raise, lower or angle the plow slightly to correct overheating.

NOTE: Only the driver should be in the vehicle when the plow is attached during transport of vehicles with less than a 3/4 ton rating.

PLOWING SNOW

GENERAL INSTRUCTIONS

1. Before plowing, make sure you know of any obstructions hidden beneath the snow, such as bumper stops in parking lots, curbs, sidewalk edges, shrubs, fences, or pipes sticking up from the ground.

CAUTION: To prevent damage to plow or vehicle, flag any obstructions that are hard to locate.

2. Only the driver should be in the vehicle when plow is attached for plowing.



WARNING: Always wear seat belt when plowing snow. A hidden obstruction could cause the vehicle to stop suddenly, throwing you forward and injuring you.

3. Plow during the storm rather than letting snow accumulate.



WARNING: Never plow with head out of the vehicle window. Sudden stops or protruding objects could cause severe neck or head injuries.

4. When you are stacking snow, begin raising the blade as you come close to the stack. This will let the blade with its load ride up onto the stack.

CAUTION: Never pile snow with the blade angled more than halfway or the bumper could be damaged.

SPECIAL SNOW CONDITIONS

– Hard-packed Snow

1. Raise the disc shoes so that the cutting edge comes into direct contact with the pavement. (See Regular Maintenance and Adjustments.)
2. Use lowest gear to place maximum power behind cutting edge.
3. An angled blade is more effective to remove hard-packed snow.

– Deep Snow

1. Shear off top layers by plowing with the blade raised 3 to 4 inches for the initial pass.
2. Bite into the edges using only partial blade width until job is cut down to size for full blade plowing.

Rule of thumb:

6" snow may be plowed with entire blade width,
9" with 3/4 blade,
12" with 1/2 blade.

Experience and "feel" are the best guides.

3. When plowing deep snow, be sure to keep vehicle moving.
4. Secure ballast behind wheels for better traction.

Recommended ballast for:

full-size pick-ups, 500-700 lbs.
compact pick-ups, 300 lbs.

5. For increased traction use tire chains.

CLEARING DRIVEWAYS

1. Head into drive with angled blade and plow snow away from buildings. Widen drive by rolling snow away from building.
2. If building is at end of driveway, plow up to within a vehicle length of building. Then push as much snow as possible off driveway.
3. With raised straight blade, drive through remaining snow to building. Drop blade and "back-drag" snow away from building at least one vehicle length. Repeat if necessary.
4. Back vehicle to building door and plow forward toward street, removing remaining snow from driveway. Check municipal ordinances for disposal of snow.

CLEARING PARKING LOTS

1. Clear areas in front of buildings first. With raised blade, drive up to building. Drop blade and "back-drag" snow away from buildings. When snow is clear of buildings, turn vehicle around and push snow away from buildings towards outer edges of lot.
2. Plow a single path down center in long direction.
3. Angle plow toward the long sides, and plow successive strips lengthwise until area is cleared and snow is "stacked" around outer edges.
4. If snow is too deep to clear in above manner, clear main traffic lanes as much as possible.

REMOVING SNOWPLOW & STORAGE

1. Lower the plow to the ground (keep tension on chain). Move Illa control lever to neutral.



WARNING: Keep hands and feet clear of blade and A-frame when removing or mounting plow. Moving or falling assemblies can pinch or crush.

2. Disconnect hose couplers between hydraulic unit and Hydra-Turn® rams.
 - A. Connect curb-side ram hose into the quick coupler on the driver-side ram.
 - B. Loop hydraulic unit hose around the lift assembly and couple hose into manifold quick coupler.

This will protect the quick coupler ends and keep foreign matter out of the quick couplers while the snowplow is off the vehicle.
3. Pull hairpin cotters from hitch pins at rear of A-frame and remove hitch pins. After disassembly, replace hitch pins and hairpin cotters in A-frame ears for ready access when reinstalling plow.
4. Move the Illa control lever to lower (float) position.
5. Push the lift channel all the way down. Leave lift channel in down position to protect lift ram from rusting and pitting.

6. Unhook chain.



WARNING: Inspect plow components and bolts for wear or damage whenever mounting or removing the plow. Worn or damaged components could permit plow to drop unexpectedly.

7. Move Illa control lever to neutral. Slide lock spool down into center of cross slots.
8. Move plow light switch from plow lights to vehicle lights.

NOTE: For long-term storage, grease exposed chrome surfaces of the Hydra-Turn® rams to prevent rust.

CAUTION: To prevent the shock absorber on the PRO-PLOW A-frame from collecting water, store plow with A-frame horizontal.

During the off season, the Illa control lever can be removed by unscrewing the lever from the control. Store lever in glove box of vehicle.

MAINTENANCE

PRE-SEASON CHECK

Before the snow flies, check your equipment and make sure it's ready for action. Here's a checklist for making sure your equipment is set for the snowplowing season –

1. Inspect hydraulic system for leaks and cracked or damaged hoses. Check oil level (push lift channel all the way down).
2. Inspect all parts of plow and mount system. Replace worn or defective parts.
3. Clean all electrical connections, including grounds.
4. Inspect and test your battery and recharge or replace if necessary. Suggested MINIMUM vehicle electrical system: 70 amp hr./550 CCA battery, 55 amp alternator.
5. Check mounting of snowplow to vehicle and tighten any loose fasteners.
6. Repaint mountings with rust resistant, high grade enamel. Touch-up blade with WESTERN® red paint available in aerosol or quart can.
7. Check windshield wipers, heater, and vehicle and plow lights for proper operation. Check that plow headlights are properly aimed. Plow headlights should be aimed with plow attached and in raised position.
8. Secure ballast behind rear wheels. Suggested ballast for:
full size pick-ups is 500-700 lbs.,
compact pick-ups is 300 lbs.

REGULAR MAINTENANCE AND ADJUSTMENTS



WARNING: To prevent injuries, always lower snowplow to the ground when parked. Always remove snowplow before servicing vehicle when automotive lifts or hoists are used. Failure to do this can result in serious injury.

Your WESTERN® snowplow is designed for rugged, dependable service. But like the vehicle on which it is mounted, it needs a certain amount of regular care and maintenance. Check the following before and frequently during the plowing season:

- Make sure all fasteners, mounting bolts, hydraulic and electrical connections are tight.
- Check all plugs and seals for oil leaks. Repair as necessary.
- **Disc Shoe Adjustment**

Recommended shoe adjustments:

1. For gravel surfaces – bottom surface of shoe should be 1/2" below cutting edge.
2. For hard surfaces (concrete or asphalt) – bottom surface of shoe should be even with cutting edge.

ADJUSTMENT PROCEDURE

1. Raise blade and place on blocking.
2. Remove linch pin and slide shoe down out of bracket.
3. Remove one or more washers from shoe stem and reinstall shoe into bracket.
4. Place removed washers onto shoe stem above bracket.
5. Install linch pin. NOTE: Do not discard any washers.

MAINTENANCE (Continued)

REGULAR MAINTENANCE AND ADJUSTMENTS (Condt.)

– Cutting Edge

To equalize wear, cutting edge can be reversed. Replace cutting edge when worn to the bottom of blade sheet.

1. Raise blade and place blocking under A-frame.
2. Remove cutting edge, and turn end for end.
3. Reinstall.

– Trip Spring Adjustment

To adjust trip spring tension, adjust the eyebolts located at the top of the blade.

1. Loosen locknut (nut closest to spring).
2. Tighten adjusting nut (nut closest to plow) until coils begin to separate. When tension is properly adjusted, a sheet of paper should pass between the second and third coils.
3. Tighten locknut.

– PRO-GUARD™ Blade Finish

If the PRO-GUARD™ powder coated finish is nicked or scratched, repair the blade surface with WESTERN® red paint in aerosol or quart can.

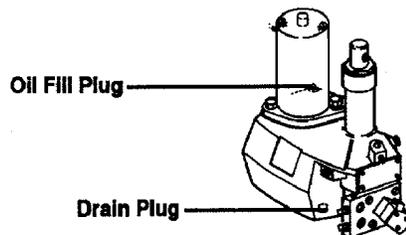
– Black Iron Mount Parts – Powder Coated or Painted

Parts should be cleaned and repainted as required.

HYDRAULIC SYSTEM

– Oil Level

Push lift channel all the way down. Remove fill plug (behind motor). Fill reservoir only through fill opening (it is designed to prevent overfilling). Reservoir is full when the oil level reaches hole threads. Replace fill plug.



– Annual Fluid Change

IMPORTANT: Change fluid at the beginning of each plowing season.

1. Remove drain plug located in the bottom of the right front corner of the reservoir (see diagram).
2. Completely drain the hydraulic reservoir.
3. Refill through fill hole with new automatic transmission fluid (ATF). (Mobil One or Texaco 1537 Aircraft Hydraulic Oil may be used for low-temperature operation. DO NOT mix different types of oils.)

— **System Capacity**

- All ISARMATIC® Mark IIIa Unit Reservoirs — 1-1/2 quarts.
- ISARMATIC® Mark IIIa Extra Duty (1-1/2" Ram) with 10" Hydra-Turn® Rams — 2-1/8 quarts.
- ISARMATIC® Mark IIIa Heavy Duty (2" Ram) with 16" Hydra-Turn® Rams — 2-3/4 quarts.

— **Packing Nut Adjustment**

Periodically check lift ram and Hydra-Turn® ram packing nuts for tightness. If packing nuts are loose or leakage appears while lifting or angling plow, tighten not more than 1/4 turn after you feel packing nut contact the packing.

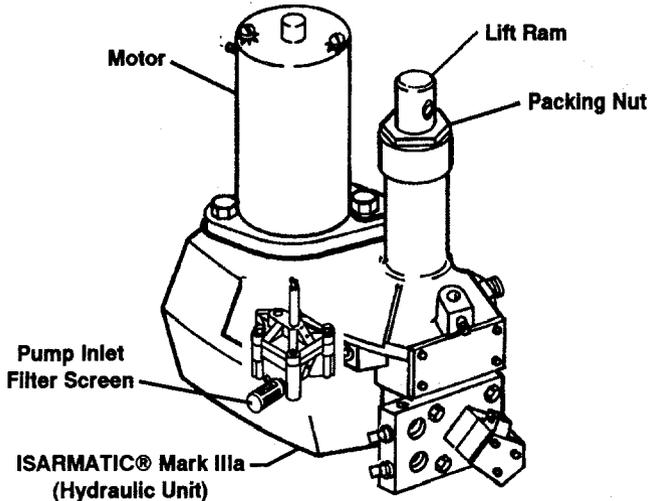
CAUTION: Fill reservoir through fill hole ONLY. Never fill through motor/pump opening. Overfilling can damage the unit.

CAUTION: Do not overtighten packing nut.

Packings not used for a period of time may show signs of oil weep. This will usually stop after use.

— **Pump Inlet Filter Screen**

Clean the pump inlet filter screen whenever the pump is removed. If the screen is damaged, replace it. Torque die-cast pump mounting capscrews to 175-185 in.-lbs, motor mounting capscrews to 15/20 ft.-lbs.



EMERGENCY PARTS

We suggest that you keep a WESTERN® Emergency Parts Kit #49205 in your vehicle for emergency use.

We recommend the following additional items be kept in your vehicle.

- 1 - 56131K Relay - Cable Hydraulic System
- 1 - 10" Adjustable Wrench
- 1 - Medium Screw Driver
- 1 - Pair of Pliers
- 1 - Quart Automatic Transmission Fluid (ATF)

Always use WESTERN® designed and tested replacement parts.

MECHANICS GUIDE

THEORY OF OPERATION

The ISARMATIC® Mark IIIa Hydraulic System performs four functions:

RAISES the snowplow

LOWERS the snowplow

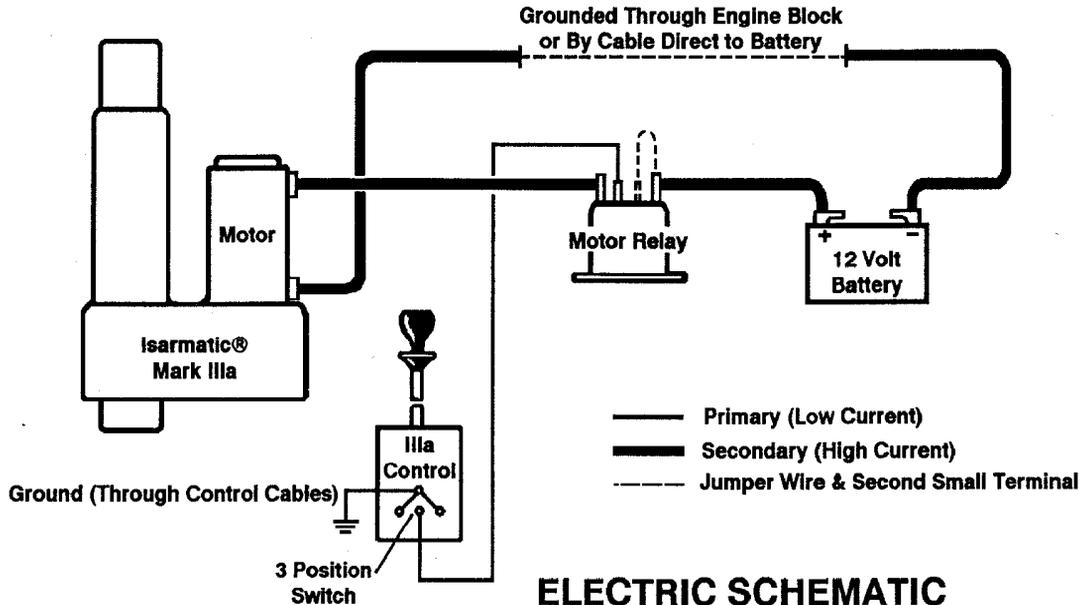
ANGLES snowplow RIGHT

ANGLES snowplow LEFT

Three of these functions (RAISE, ANGLE RIGHT, ANGLE LEFT) are accomplished by electrical and mechanical means. The fourth (LOWER) operates only by mechanical means (motor does not run).

ELECTRICAL

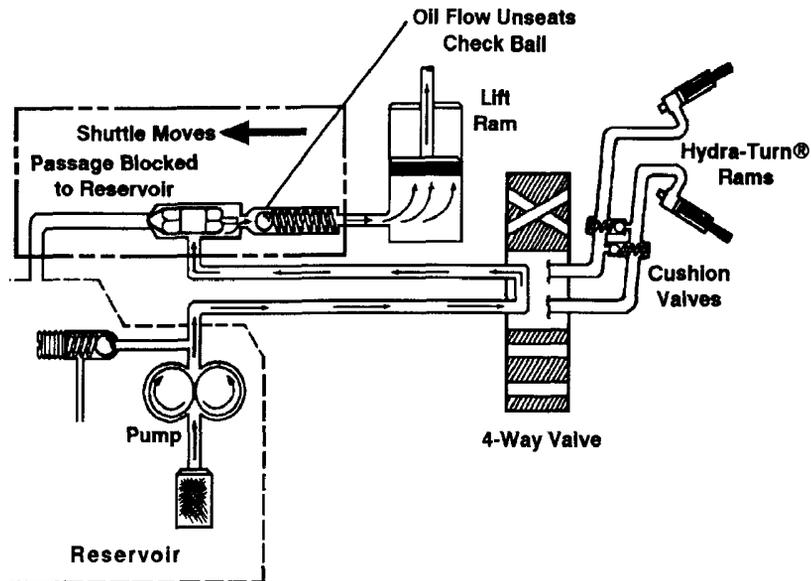
When the IIIa control is in the RAISE, LEFT (L) or RIGHT (R) position, contacts inside the control are grounded through the control cables to the hydraulic unit. That completes the motor relay (primary) circuit, energizing the relay coil. The energized relay coil causes the contacts inside the motor relay to close, completing the battery/motor (secondary) circuit. A direct, low resistance current path is now available to energize the electric motor. Current flows from the battery, through the contacts in the motor relay, the motor, the motor frame ground screw, the ground cable and back to the battery.



ELECTRIC SCHEMATIC

RAISING PLOW

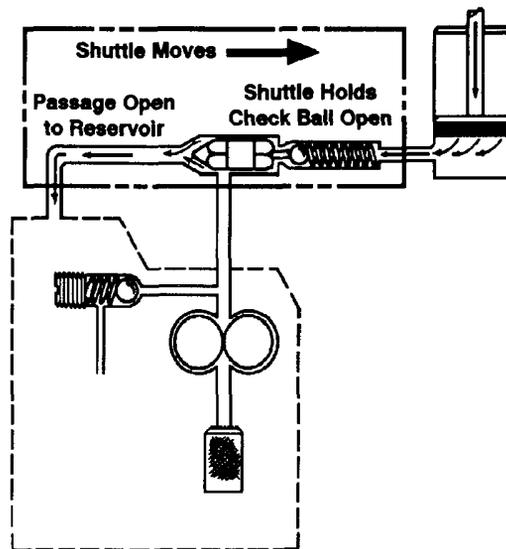
Moving the Illa control to the RAISE position activates the motor relay (and motor) and the cable moves the shuttle into the lift valve. This closes the passageway to the reservoir and directs flow from the pump outlet to the lift ram. Oil passes through the 4-way valve and into the 3-way valve. It flows around the shuttle stem and pushes the check valve ball off its seat. It then enters the lift ram, pushing the plunger (and the snowplow) up.



RAISING PLOW

LOWERING PLOW

Moving the Illa control to the LOWER (float) position moves the shuttle to push the check valve ball off its seat. This opens a passageway from the lift ram to the reservoir. Weight of the snowplow collapses the ram, forcing oil past the open check valve and shuttle, back to the reservoir. Note that the pump does not operate when the plow is being lowered.



LOWERING PLOW

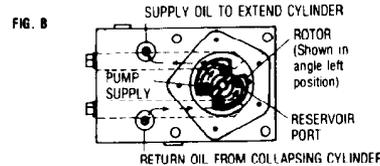
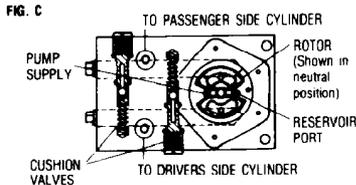
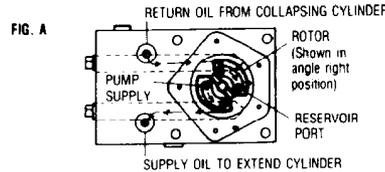
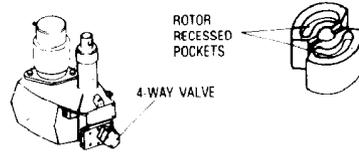
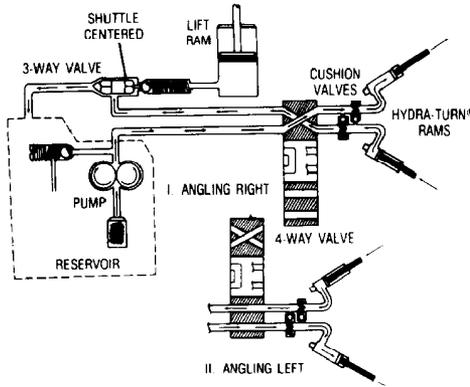
RIGHT OR LEFT FLOW ANGLING BY 4-WAY VALVE

RIGHT (Fig. A) The rotor is rotated 45° clockwise so the recessed pockets provide passages between the pump supply and left Hydra-Turn® ram and the reservoir port. Oil from the pump flows through the 4-way valve and enters the left Hydra-Turn® ram. As the ram extends, the plow angles to the right. As the plow angles, the right Hydra-Turn® ram collapses, pushing oil through the 4-way valve and past the shuttle in the 3-way valve to the reservoir.

LEFT (Fig. B) The rotor is rotated counterclockwise reversing the connections of Hydra-Turn® rams, pump supply, and reservoir port.

CUSHION VALVES (2) (Fig.C)

While plowing, oil is trapped in the extended Hydra-Turn® ram. When the blade meets an object, pressure rises in the extended Hydra-Turn® ram. As pressure in the ram exceeds the spring force holding the checkball against the seat, the cushion valve ball unseats allowing oil to flow to the collapsed ram. The blade angles in the opposite directions preventing damage to the hydraulic system and vehicle.



FLOW ANGLING AND CUSHION VALVES

TROUBLESHOOTING GUIDE

IIIa CONTROL POSITION	PROBLEM DESCRIPTION	DEFINE PROBLEM AND FOLLOW STEPS BELOW.						
Angle	Blade will not angle or angles too slow. Time: 4 seconds; (8 seconds - Heavy-Duty)	Check if motor runs, if not, see B (page 29)	Check oil level. (page 20)	All functions slow. see A, (page 28)	Verify 4-way valve lever travel. See E (page 31)	Adust lift valve out. See F1 (page 32)	Check disconnect couplers & hydraulic ram nuts.	Remove pump. Clean filter screen. ↓
Raise	Blade will not raise or raises too slow. Time: 2 seconds; (4 seconds - Heavy-Duty)				Verify 3-way valve lever travel. See D (page 30)	Adjust lift valve in. See F1 (page 32)	Check lift ram packing nut adjust. See Gen. info. (page28)	
Neutral	Blade will not remain angled while plowing.	Adjust cushion valves. See C (page 30)					FURTHER TROUBLESHOOTING REQUIRES THE USE OF TEST EQUIPMENT. SEE AUTHORIZED WESTERN DISTRIBUTOR OR SEE WESTERN® HYDRA-ELECTRIC™ TEST KIT AND/OR WESTERN SERVICE MANUAL OR SEE WESTERN® HYDRAULIC SERVICE SCHOOL VIDEO	
Neutral	Motor continues to run in neutral.	Disconnect IIIa Control wire from motor relay.	If motor runs, motor relay is shorted. Replace motor relay. If motor stops, short is in primary (IIIa Control) circuit. Isolate and repair.					
Angle	Blade raises while angling.	Verify 3-way valve lever travel. See D (page 30)	Adust lift valve (out). See F1 (page 32)					
Neutral	Blade lowers in neutral.		Adjust check valve (out). See F2 (page 32)	Remove check valve. Inspect O-ring & seat. See Service Manual.				
Lower	Blade lowers too fast.							
Lower	Blade will not lower or lowers too slow.		Adjust check valve (in). See F2 (page 32)	Check lift ram packing nut adjustment. See Gen. Information (page 28)				

SAFETY RULES



WARNING: Read all instructions, including safety information, before performing any service or maintenance on your snowplow.

BEFORE YOU BEGIN

1. Park the vehicle on a level surface, place shift lever in PARK or NEUTRAL, and set parking brake.
2. For most service procedures, leave the hydraulic components on the vehicle.



WARNING: Keep well clear of the blade when it is being raised, lowered, or angled. Do not stand between the vehicle and blade or directly in front of blade. If the blade hits you or drops on you, you could be seriously injured.

PERSONAL SAFETY

1. Wear only snug-fitting clothing while working on your vehicle or snowplow. Do not wear jewelry or a necktie. Secure long hair. Be especially careful near moving parts such as fan blades, pulleys, and belts.
2. Wear safety goggles to protect your eyes from battery acid, gasoline, and dust and dirt from machinery.
3. Avoid touching hot surfaces such as engine, radiator, exhaust pipes, and hoses.
4. Always have a fire extinguisher rated for flammable liquids and electrical fires (rated BC) handy.

VENTILATION



DANGER: Vehicle exhaust contains deadly carbon monoxide (CO) gas. Breathing this gas, even in low concentrations, can cause death. Never operate vehicle in an enclosed area without venting exhaust to the outside.

If you work on your vehicle or plow in a garage or other enclosed area, be sure to vent exhaust gas directly to the outside through a leakproof exhaust hose.

FIRE AND EXPLOSION



WARNING: Gasoline is highly flammable and gasoline vapor is explosive. Never smoke while working on vehicle. Keep all open flames away from gasoline tank and lines. Wipe up any spilled gasoline immediately.

Be extremely careful when using gasoline. Do not use gasoline to clean parts. Store only in approved containers away from sources of heat or flame.

BATTERY SAFETY



WARNING: A charging battery gives off gases that can explode if touched by spark or flame. Cover top of battery with electrically non-conductive material to keep sparks from testing operations away from battery gases.

1. Never lay tools or equipment on the battery. You could accidentally ground the POSITIVE (+) battery terminal, resulting in electrical shock or burns or damage to the vehicle or equipment.
2. Avoid contact with battery acid. It can burn your eyes or skin, and burn holes in clothing.
3. Always disconnect the battery ground before removing or replacing electrical components such as the motor relay or battery cables.

HYDRAULIC SAFETY



WARNING: Hydraulic oil under pressure can cause skin injection injury. If left untreated, these injuries can result in amputation or death. If you are injured by hydraulic oil, get medical treatment immediately.

1. Always inspect hydraulic components and hoses before use. Replace any damaged or worn parts immediately.
2. If you suspect a hose leak, DO NOT use your hand to locate it. Use a piece of cardboard or wood.

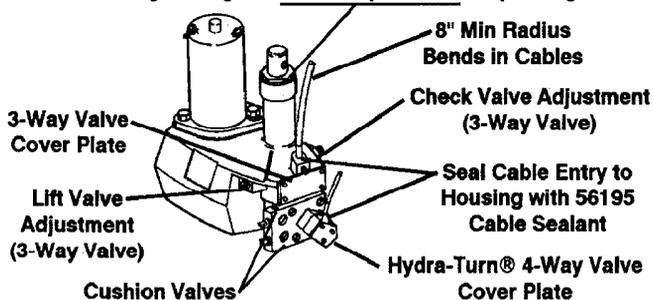
GENERAL INFORMATION

Most service can be performed with the hydraulic unit left on the vehicle. This should be done whenever possible because it permits evaluation of the entire system (vehicle electrical system, cables, Illa control, etc.) as well as saving considerable time.



WARNING: DO NOT 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. Serious bodily injury can result from blade striking a body or dropping on feet or hands.

PACKING NUT ADJUSTMENT — ISARMATIC® MARK Illa or HYDRAULIC RAMS If leaking, tighten packing nut NOT MORE THAN 1/4 TURN AFTER YOU FEEL PACKING NUT CONTACT PACKINGS. Over-tightening affects ram operation and packing life.



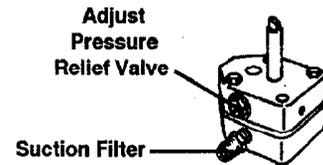
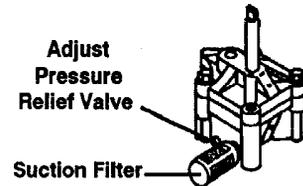
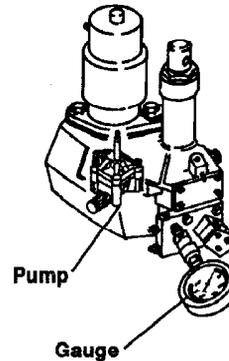
NOTE Manufacturer assumes no liability for accidents or damages notwithstanding the fact that suggestions have been followed.

A PUMP PRESSURE TEST

POOR CONDITION OF BATTERY OR MOTOR WILL CAUSE INVALID TEST RESULTS.

1. Disconnect lift chain and hoses to Hydra-Turn® rams.
2. Install 2000 PSI minimum gauge into female coupler on Valve Manifold.
3. Move Illa Control to angle "LEFT" and read gauge.
4. If pressure is 1650 - 1850 PSI, pump pressure is "OK".

If pressure is low, remove pump, clean or replace filter and adjust pressure relief valve. (1/4 turn equals approximately 225 PSI.)



Fastener Torque
Pump Capscrews - 175/185 In.Lbs.
Motor Capscrews - 15/20 Ft. Lbs.

B RELAY TEST

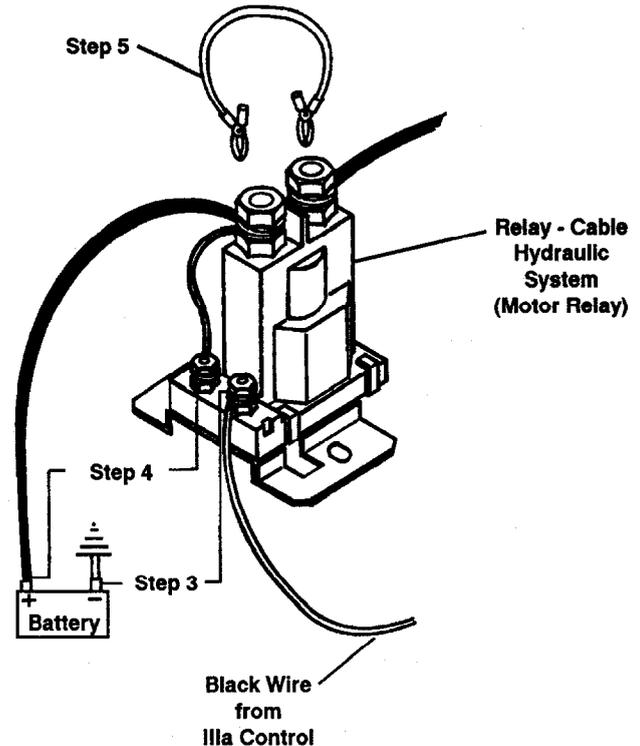
Condition - Motor does not run with Illa control in "RAISE", angle "RIGHT" or "LEFT". Battery has sufficient charge to start vehicle engine.

1. Disconnect lift chain and hoses to Hydra-Turn® rams.
2. Check all electrical cables and connections including grounds. Clean and tighten if necessary.



WARNING: Protect top of battery, sparks from testing operations could cause battery gases to explode causing severe eye or body burns, or other personal injury.

3. Use a jumper wire to connect small terminal with BLACK wire on motor relay to the "NEG -" terminal of the battery. If motor runs, problem is in Illa control (primary) circuit. Check for broken wire, loose connection or bent contacts in Illa control. Check if Illa control is grounded (through push-pull cables). If motor does not run...
4. Use a jumper wire to connect "POS +" terminal of battery to small terminal with RED wire attached on motor relay. Operate Illa control to "RAISE", angle "LEFT" or "RIGHT". If motor runs, check for broken or damaged red wire on relay. If motor does not run...
5. Use heavy jumper cables to by-pass (jump) the two large terminals on top of the motor relay. If motor runs, replace motor relay. If motor does not run...
6. Remove motor and check pump shaft rotation. If tight, repair or replace pump, if loose replace motor.



C CUSHION VALVE ADJUSTMENT

Whenever stems are removed, apply anti-seize compound or grease to threads of stem before assembly.

DISASSEMBLY & INSPECTION

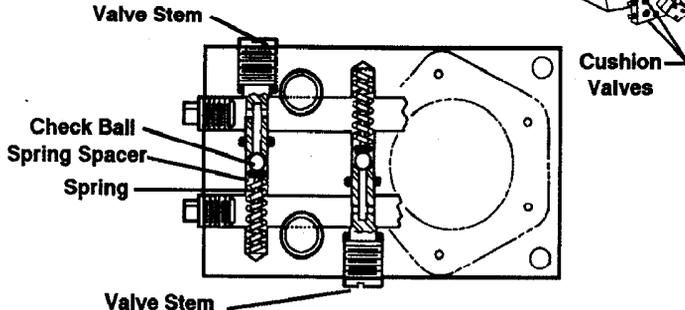
1. Remove cushion valve stem. Use a magnet to remove ball, spring spacer and spring. Inspect parts.
2. Replace O-rings or complete assembly if damaged.
3. If OK, place ball on wooden block, hold stem seat on ball, and lightly strike stem with hammer.

NOTE: Stem can be bent by not striking squarely.

4. Reassemble components and adjust per directions

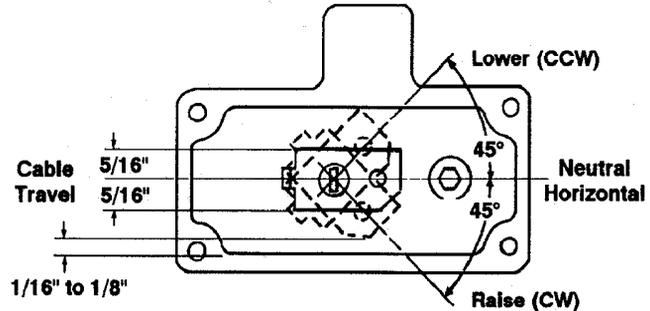
ADJUSTMENT

1. Tighten cushion valve stem as much as possible (until spring is fully compressed).
2. Back off valve stem (rotate counterclockwise) 1-1/4 turns. This adjustment will cause the cushion valve to open at approximately 3,500 PSI



D 3-WAY VALVE LEVER TRAVEL

1. Disconnect hydraulic hoses and lift chain.
2. Remove 3-way (rectangular) cover.
3. Move Illa control between "RAISE" and "LOWER". Observe valve lever travel and positions.
4. Lock Illa control in neutral. 3-way lever should be in the neutral position as shown.



3-WAY VALVE LEVER TRAVEL

POSSIBLE CAUSE OF INADEQUATE TRAVEL OR INCORRECT VALVE LEVER POSITION

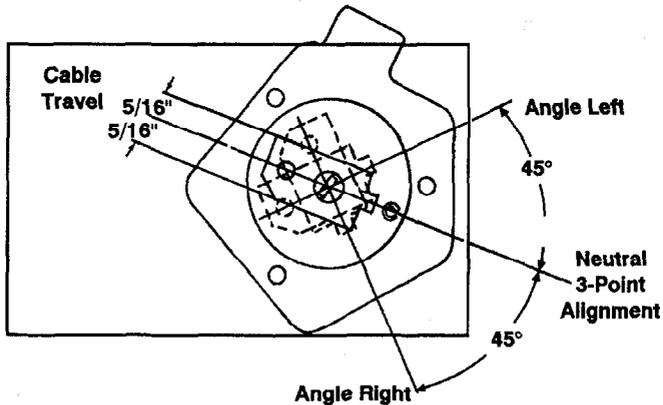
1. Dirt, or ice buildup in enclosure.
2. Cable disconnected in valve enclosure or in Illa control.
3. Binding, kinked or broken cable. (8" minimum radius)
4. Set-screw not in groove in cable.
5. Lift valve too far in (3-way valve only). (See F1)

NOTE

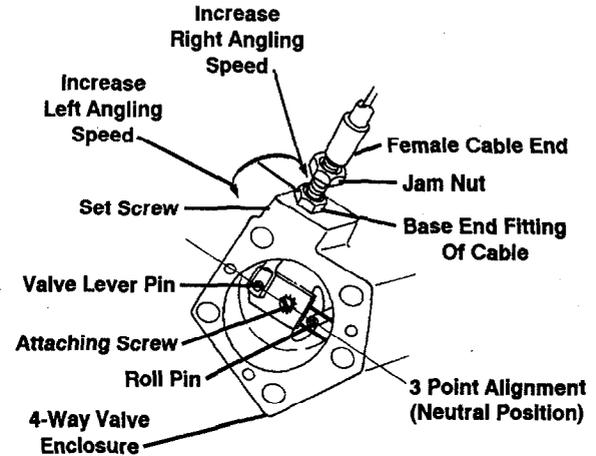
Seal cable entries into housing with 56195 Cable Sealant.

E 4-WAY (ANGLE) VALVE LEVER TRAVEL & ADJUSTMENT

1. Disconnect hydraulic hoses and lift chain.
2. Remove 4-way (5 sided) cover.
3. Move IIIa control between angle "RIGHT" and "LEFT". Observe lever movement especially for EQUAL TRAVEL IN EACH DIRECTION. If unequal, adjust cable per right diagram, this page.
4. When travel is equal in both directions, lock IIIa control in neutral. 4-way lever may be in line or slightly down from the indicated 3 point alignment in diagram.



4-WAY VALVE LEVER TRAVEL



4-WAY CABLE ADJUSTMENT

POSSIBLE CAUSE OF INADEQUATE TRAVEL OR INCORRECT VALVE LEVER POSITION

1. Dirt, or ice buildup in enclosure.
2. Cable disconnected in valve enclosure or in IIIa control.
3. Binding, kinked or broken cable. (8" minimum radius)
4. Set-screw not in groove in cable.
5. Cable out of adjustment or insufficient ring/rotor clearance

NOTE

Seal cable entries into housing with 56195 Cable Sealant.

F 3-WAY (RAISE-LOWER) VALVE ADJUSTMENT

SENSITIVE ADJUSTMENT - MAX. 1/8 TURN AT A TIME

Make adjustments with blade on ground and control in neutral. Stand back after adjustment to avoid being pinched by blade while checking operation.

F1 LIFT VALVE ADJUSTMENT

From initial adjustment below, using 1/8 turn increments, turn OUT (counterclockwise) lift valve until "RAISE" does NOT function properly. Turn lift valve IN in 1/8 turn increments until unit is able to lift plow. Turning valve in more than 1/4 turn beyond lifting point may slow angling speed.

F2 CHECK VALVE ADJUSTMENT

Hold check valve (hex socket wrench) while loosening or tightening locknut. To prevent O-ring from "blowing out", loosen locknut 1/4 turn maximum. Tighten locknut maximum 1 Ft. Lb.

If plow will not lower or lowers too slowly, turn check valve IN (CW).

If plow lowers too fast, turn check valve OUT (CCW).

INITIAL ADJUSTMENT (IF VALVES HAVE BEEN DISTURBED OR REMOVED)

LIFT VALVE

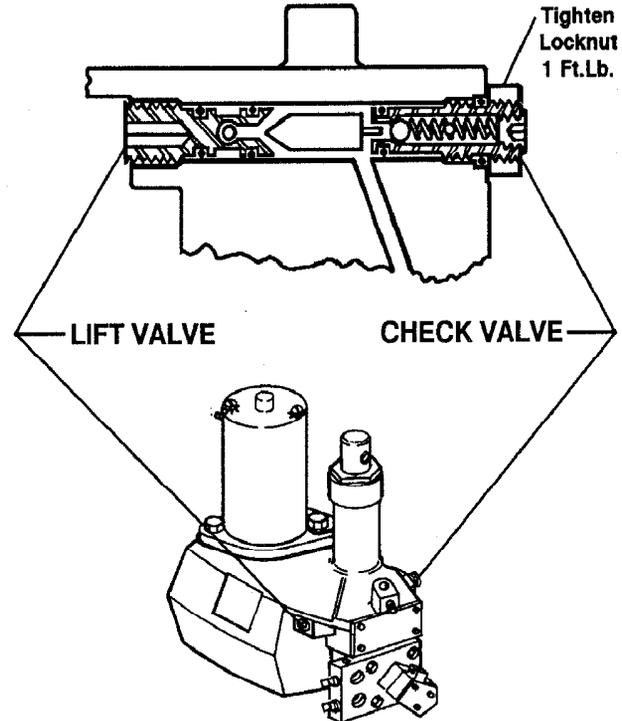
Remove cable from pin and place valve lever in neutral position (See D). Turn lift valve in until it is flush to the casting surface. Rotate lever to the RAISE position. It should stop 1/16" to 1/8" from enclosure bottom (see D). If not, turn valve in or out until this dimension is obtained. See F1 for final adjustment.

CHECK VALVE

Turn check valve in until threads are flush with thick locknut when nut is bottomed on housing. (Early models with thin jam nuts - turn check valve in until three (3) full threads protrude from the jam nut with jam nut bottomed on housing.) See F2 for final adjustment.

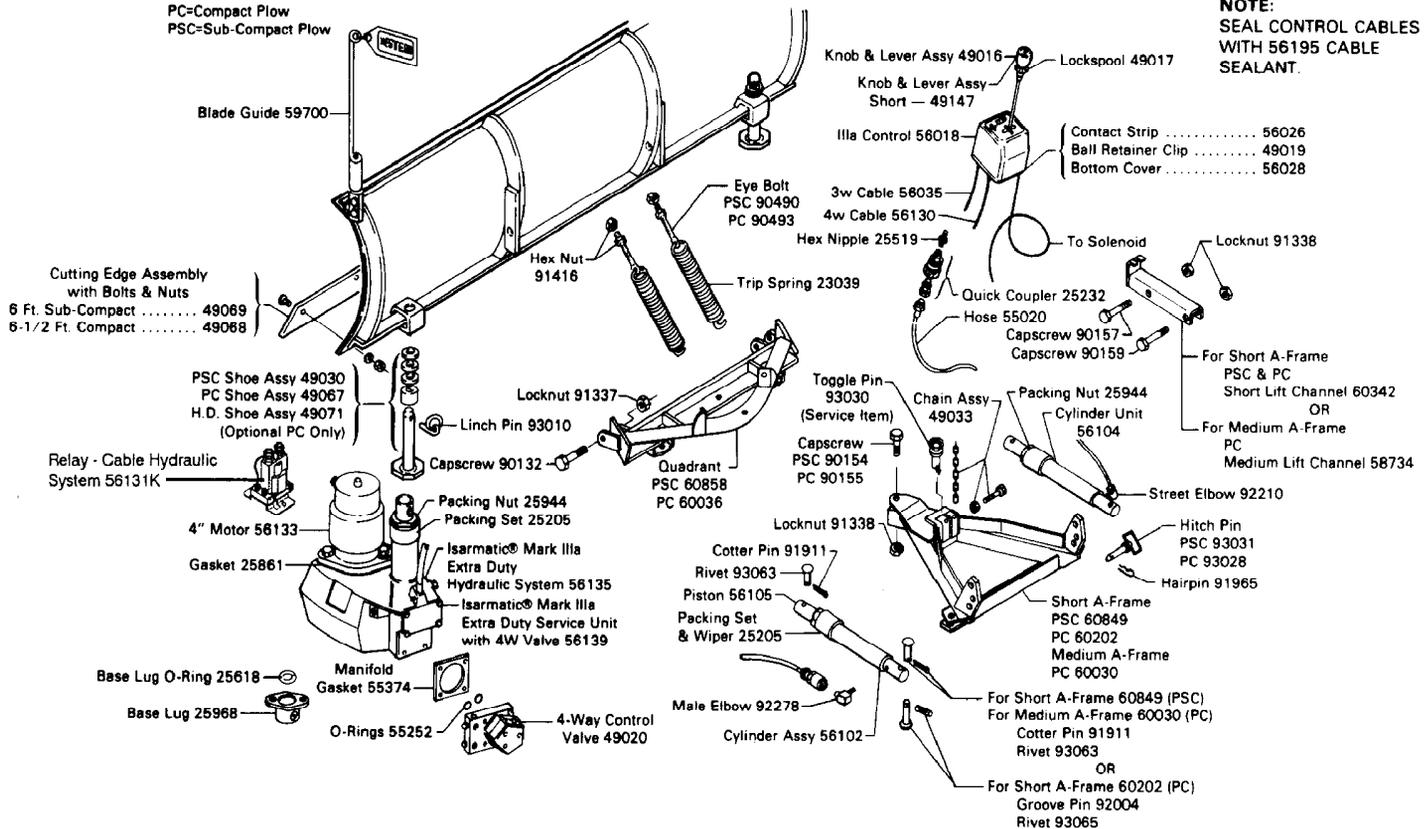


WARNING: DO NOT stand between the vehicle and blade or directly in front of blade when it is being raised, lowered or angled. Clearance between vehicle and blade decreases as blade is operated. Serious bodily injury can result from blade striking a body or dropping on feet or hands.



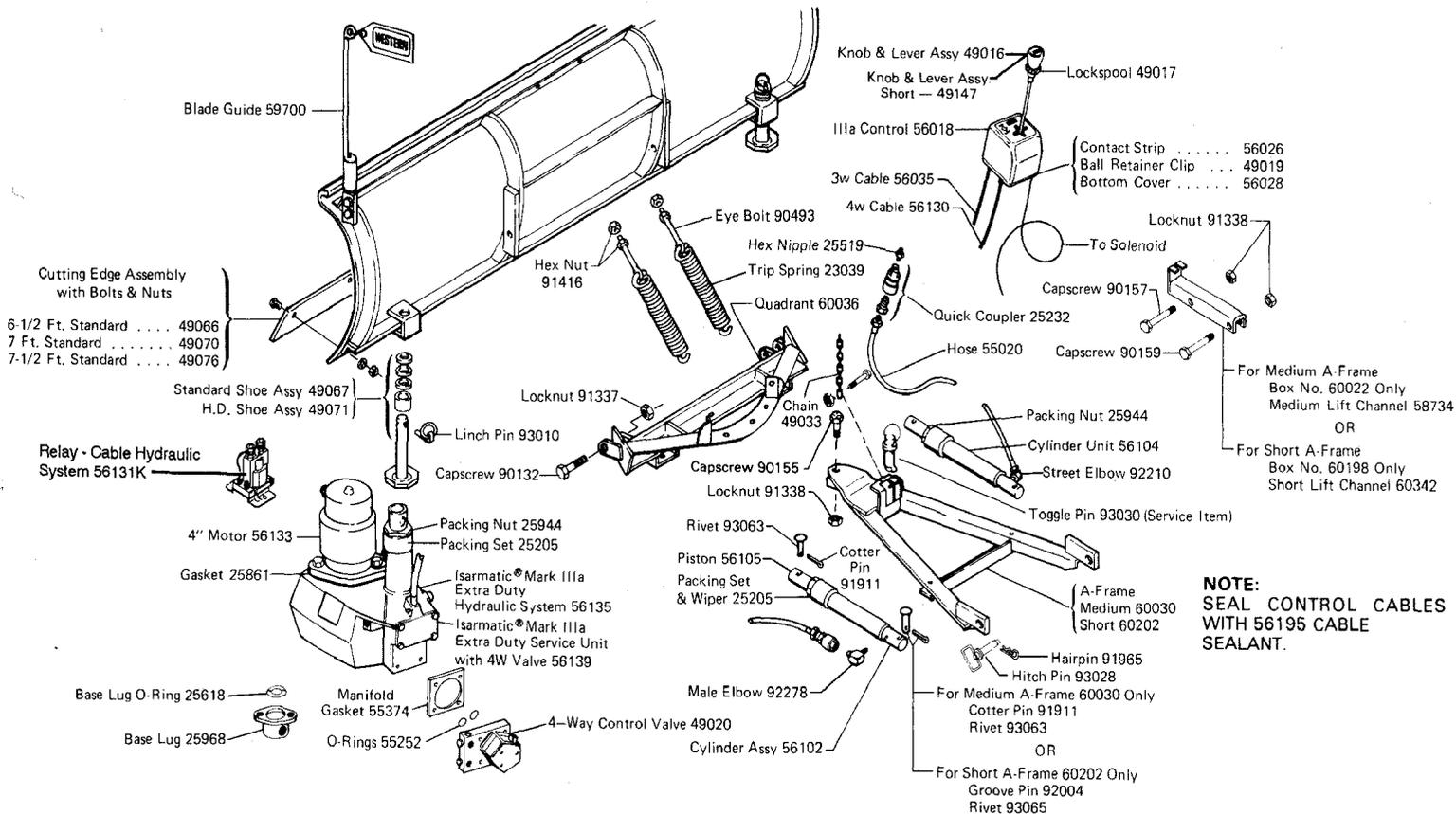
SUB-COMPACT & COMPACT PLOW PARTS DIAGRAM

NOTE:
SEAL CONTROL CABLES
WITH 56195 CABLE
SEALANT.



USE ONLY GENUINE WESTERN® REPLACEMENT PARTS

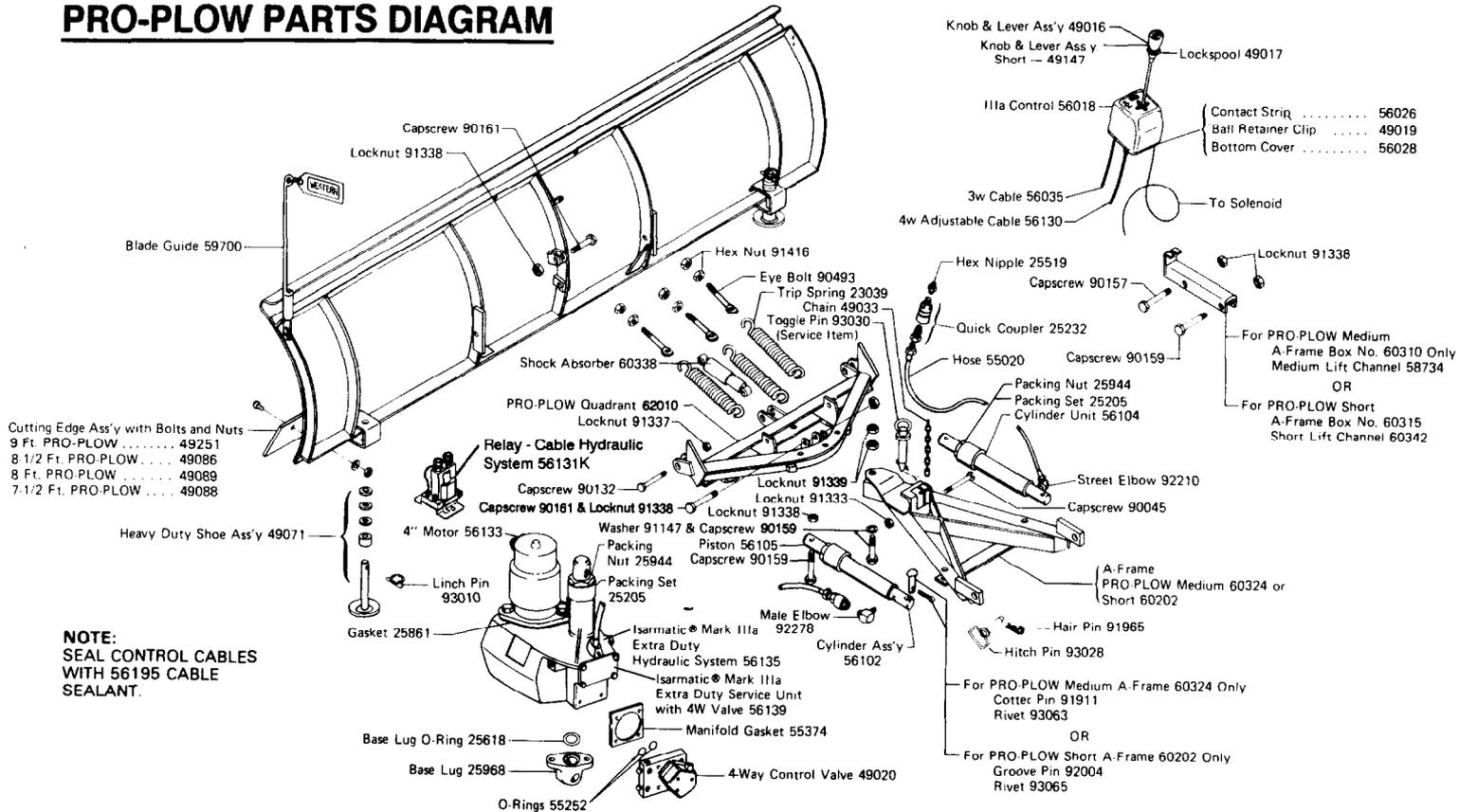
STANDARD PLOW PARTS DIAGRAM



NOTE:
SEAL CONTROL CABLES
WITH 56195 CABLE
SEALANT.

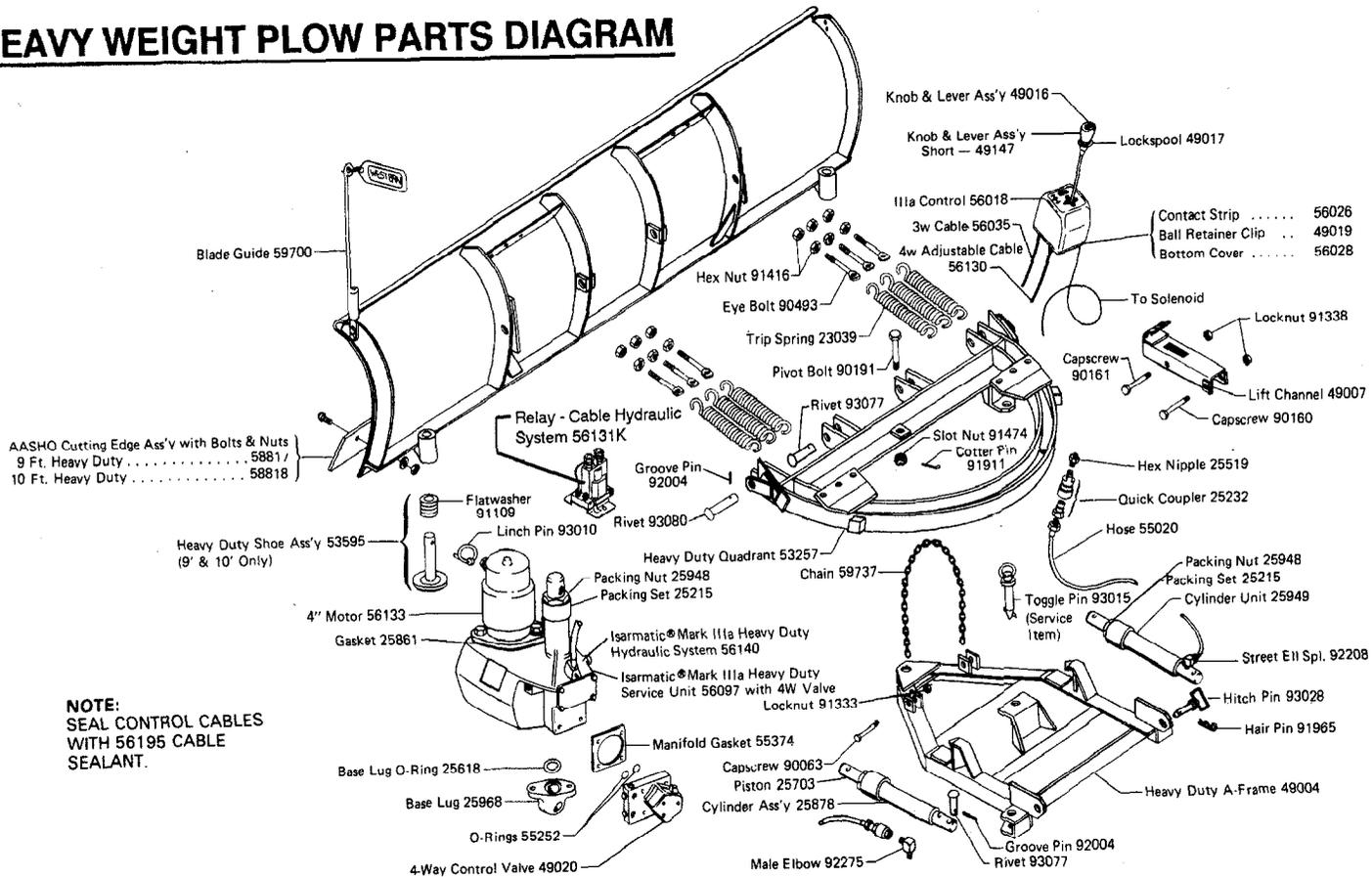
USE ONLY GENUINE WESTERN® REPLACEMENT PARTS

PRO-PLOW PARTS DIAGRAM



USE ONLY GENUINE WESTERN® REPLACEMENT PARTS

HEAVY WEIGHT PLOW PARTS DIAGRAM



USE ONLY GENUINE WESTERN® REPLACEMENT PARTS



**WESTERN PRODUCTS
7777 NORTH 73RD STREET
P.O. BOX 23045
MILWAUKEE, WISCONSIN 53223**

 A DIVISION OF DOUGLAS DYNAMICS INC.

Western reserves the right under its Product Improvement Policy to change construction or design details and furnish equipment when so altered without reference to illustrations or specifications used herein. The following are registered® and unregistered™ Trade Marks of Douglas Dynamics, Inc: WESTERN®, ISARMATIC®, Hydra-Turn®, UniMount®, Roll Action™, PRO-GUARD™. Western and the vehicle manufacturer may require and/or recommend optional equipment for snow removal. See Western's installation instructions for details. Western offers a one year limited warranty for all snowplows and accessories. See separately printed page for this important information.