



# M11968F

ITEM NUMBER: 11968

SERIAL NUMBER:

## Owner's Manual

**Instructions for Assembly, Testing, Operation, Servicing, & Storage**  
**Log Splitter: Outdoor hydraulic machine that splits wood logs.**

### WARNING

**READ and UNDERSTAND this manual completely before using log splitter.**

All operators of this equipment must read and completely understand all safety information, operating instructions, maintenance and storage instructions. Failure to properly operate and maintain the log splitter could result in serious injury to the operator or bystanders from moving parts that can crush or cut, flying objects, burns, fire or explosion, escaping high pressure hydraulic fluid, or carbon monoxide poisoning. In particular, be aware of the following hazards:

#### Crush and Cut Hazards

Moving parts can crush and cut hands and fingers. Keep hands clear of endplate, wedge, and logs while splitting.

#### High Pressure Hydraulic Fluid Hazards

High fluid pressures and temperatures are developed in hydraulic log splitters. Hydraulic fluid escaping through even a pin-size hole opening can puncture skin and cause severe blood poisoning. Inspect hydraulic system regularly for possible leaks. Never check for leaks with your hand while the system is pressurized. Seek medical attention immediately if injured by escaping fluid.

#### Fire Hazards

- If your log splitter is intended for use near any ignitable forest, brush, or grassy covered land, the engine exhaust should be equipped with a spark arrestor. See the "Specifications" section of this manual to determine if your splitter already has a spark arrestor. If not equipped, call NorthStar Product Support for ordering information.
- Keep a fire extinguisher with you that is rated for ordinary combustibles and flammable liquids

### STOP!

**ADD OIL TO ENGINE BEFORE USING:** Engine is shipped without oil. DO NOT start log splitter without first adding oil. See instructions on p.8.

**VERIFY HYDRAULIC OIL LEVEL:** Hydraulic reservoir is shipped with oil. Verify oil level reads full. See instructions on p.9.

**PRIME THE PUMP:** The pump on your log splitter needs to be primed before use. Refer to Initial Setup section for instructions.

**Any Questions, Comments, Problems or Parts Orders**

***Call NorthStar Product Support 1-800-270-0810***

## Hazard Signal Word Definitions

	<p>This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.</p>
	<p>DANGER (red) indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.</p>
	<p>WARNING (orange) indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.</p>
	<p>CAUTION (yellow) indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.</p>
	<p>CAUTION (yellow) used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.</p>

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# About Your Log Splitter

**Thank you for purchasing your NorthStar log splitter!**

## **About Your Log Splitter**

This log splitter is a machine designed to split wood logs using a hydraulically powered moving ram that pushes the log against a splitting wedge. The log splitter's gasoline engine is used to pressurize the hydraulic system.

This log splitter is designed to split logs *up to 30" long and 24" in diameter, lengthwise with the grain only.*

Your splitter can be used in the horizontal splitting position only:

- When the splitter is set up to operate in the horizontal splitting position, a log is placed on the horizontal beam and the wedge moves horizontally into the end of the log to split it.

The technical specifications for your log splitter are provided in the Specifications section of this manual.

### **WARNING**

This log splitter uses a high pressure hydraulic system to generate a very strong splitting force. **Read the manual completely** before using the machine to understand how to safely operate and maintain it.

Follow all safety precautions presented throughout this manual. A summary of important safety information can be found at the end of the manual.

**Contact NorthStar Product Support at 1-800-270-0810 for any questions about the appropriate use of this log splitter and/or optional accessories.**

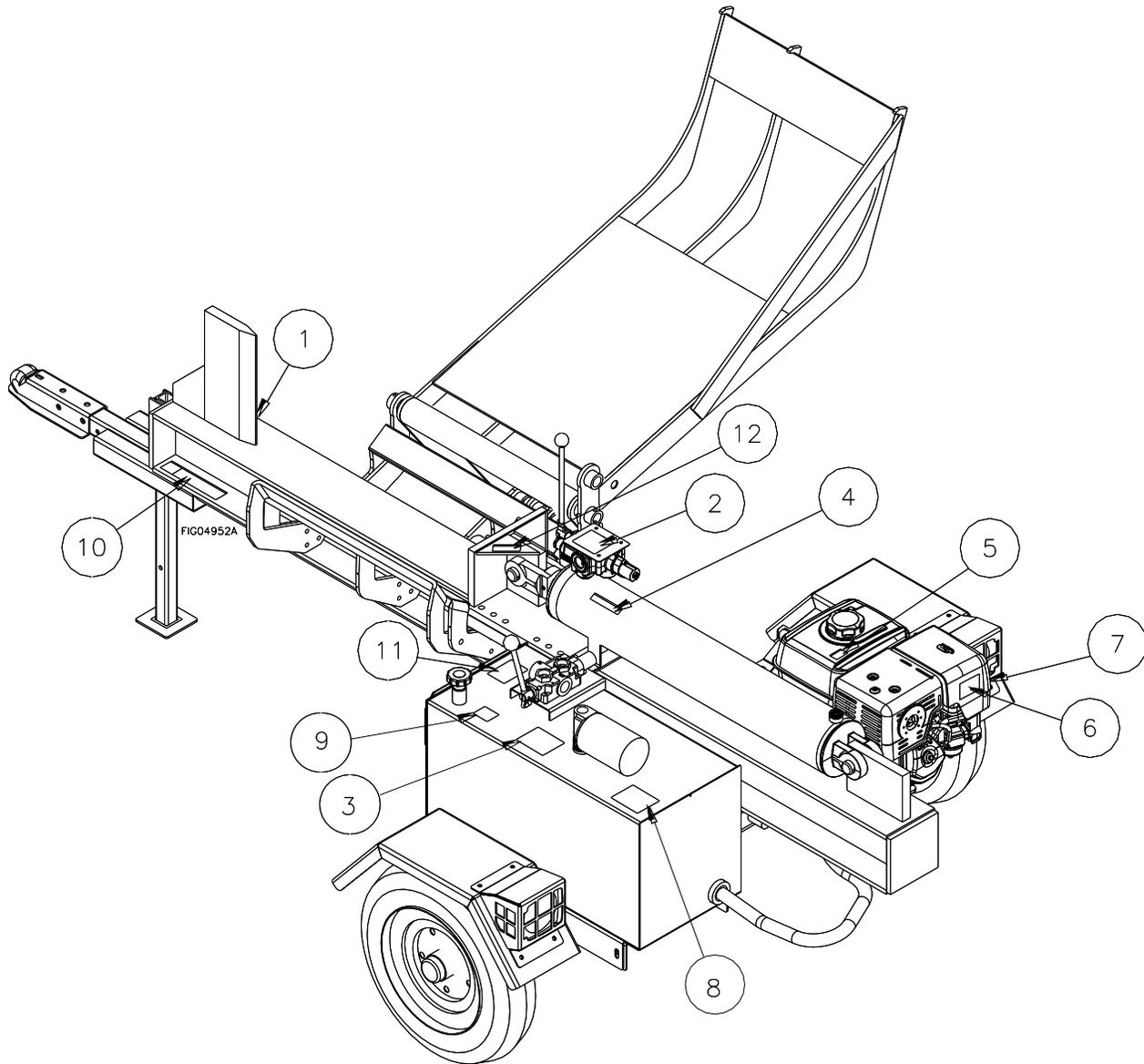
### **Warranty Registration:**

Please fill in the warranty registration information in the back of this manual and have it on hand when you call in on a warranty claim or replacement parts.

### **Attention: All Rental Companies and Private Owners who loan this equipment to others!**

*All persons to whom you rent/loan the log splitter must have access to and read this manual.* Keep this owner's manual with the splitter at all times and advise all persons who will operate the machine to read it. You must also provide personal instruction on how to safely operate the splitter and remain available to answer any questions a renter/borrower might have.

# Safety Label Locations



Ref	Part No	Description
1	777898	Log Lift Crush Hazard Decal
2	791291	Split Control Lever Operation Decal
3	777896	Operation Instruction Label
4	777891	Hydraulic Fluid Warning Decal
5	39260	Hot Muffler Decal
6	788937	Poisonous Gas Warning Decal

Ref	Part No	Description
7	777890	Fire Hazard Warning Decal
8	777888	Stuck Log Warning Decal
9	39262	Log Lift Control Caution Label
10	777892	Moving/Towing Instruction Decal
11	778610	Log Splitter Warning Decal
12	787944	Pinch Point Warning Decal

**Always make sure safety labels are in place and in good condition.** If a safety label is missing or not legible, order new labels or unsafe operation could result. **To order replacement safety labels,** call NorthStar Product Support at **1-800-270-0810.** See table for title and part number.

# Safety Label Locations

1

**▲ WARNING**  
**LOG LIFT CRUSH HAZARD**  
 • Activate log lift control only from designated operator position.  
 • Keep all other persons at least 10ft. away before activating log lift.  
 • Keep hands clear while log is rolling into splitting position.  
 • Activate lift control with hands only.  
**LOG LIFT ACCIDENTAL ACTIVATION HAZARD**  
 • NEVER reach across splitter to pull log off log lift into splitting position. Controls could be accidentally activated. Walk around to log lift side instead.

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**▲ WARNING**  
**FIRE HAZARD**  
 Hot exhaust can ignite dry brush, trees, or grass.  
 • Equip engine with a spark arrestor if you will be using near ignitable forest, brush or grassy covered land.  
 • Keep a fire extinguisher on hand that is rated for ordinary combustibles & flammable liquids.

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**SPLIT CONTROL LEVER OPERATION**  
 Split Log ← N → Return

**▲ WARNING**  
 Moving parts can crush and cut. Pieces can fly out while splitting. Follow safety rules for operating the log splitter or serious injury could result.  
 • READ the Owner's Manual completely before operation.  
 • Only one person should operate the log splitter. If an assistant is helping to load logs, the operator should not actuate controls until the assistant is at least 10 ft away.  
 • Stay in the designated OPERATOR POSITION while actuating the controls.  
 • Only use your hand to operate controls. No other tools should be used.  
 • Keep hands away from wedge, endplate/ram, and partly split logs.  
 • Split wood in direction of the grain only.  
 • Hold bark side of logs when loading.  
 • Never leave log splitter unattended during operation.  
 • Stay off slopes and slippery surfaces.  
 See additional safety rules in the Owner's Manual.

PN 778038

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**▲ WARNING**  
**IF LOG BECOMES STUCK ON WEDGE**  
 A log can become stuck to the wedge if the wedge becomes embedded in the log and the log doesn't split and separate. This can happen if the log is too stringy or tough to split completely. If this happens NEVER attempt to remove a stuck log by:  
 • Using the hydraulic force of the splitter  
 • Modifying the splitter  
 • Adding attachments to the splitter  
 Personal injury could result from log or metal pieces flying out at high speed toward the operator or bystanders, or the splitter could become damaged.  
**ALWAYS remove the log MANUALLY using this procedure:**  
 1. Retract ram fully.  
 2. Turn engine OFF.  
 3. Remove stuck log from wedge manually with a pry bar or sledgehammer.  
**Important:** Be extremely careful as log pieces may fly off as they separate from wedge. Wear safety goggles and make sure bystanders are clear.  
 4. Do not attempt to resplit a stuck log once it has been removed from wedge.

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**OPERATING INSTRUCTIONS**

**GENERAL**  
 • Stay in the OPERATOR POSITION while actuating controls.  
 • READ the Owner's Manual completely before operation.  
 • Only one person should operate the log splitter. If an assistant is helping to load logs, including any helpers assisting to load logs.  
 • Wear eye protection, hearing protection, snug fitting gloves, & safety shoes or heavy boots. No loose or dangling apparel.  
**SETTING UP**  
 • Place log splitter on dry, level ground.  
 • Secure splitter for unintended movement.  
 • Start engine

**SPLITTING LOG**  
 • Position log on beam, against wedge.  
 • Move split control to extend ram and split log.  
 • Release split control to stop ram.  
 • Move split control to return ram.  
 • Remove split wood from work area.

Operator Position

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**▲ CAUTION**  
 Rolling logs can crush and cut. Do not place hands between rolling logs and log lift, wedge, beam, or log cradle.

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LIFT CONTROL

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**▲ WARNING**  
**PINCH POINT**  
 Keep hands clear during operation.

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**▲ WARNING**  
**ESCAPING HIGH PRESSURE HYDRAULIC FLUID HAZARD**  
 High fluid pressures and temperatures are developed in the hydraulic system. Hydraulic fluid escaping through even a pin-size hole opening can puncture skin and cause blood poisoning.  
 • Inspect hydraulic system regularly for leaks  
 • NEVER check for leaks with your hand while system is pressurized.  
 • Seek medical attention immediately if injured by escaping fluid.

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**MOVING/TOWING INSTRUCTIONS**

**Moving log splitter by hand:**  
 • Lock beam in horizontal position (tip-up models only).  
 • Lock towbar leg in DOWN position.  
 • Lock support leg in UP position (if equipped)  
 • Do not attempt to move log splitter up or down slope by hand.

**Towing log splitter:**  
 • Latch coupler securely to class 2 or higher hitch with 2" ball.  
 • Lock tow bar leg and support leg (if equipped) in the UP position.  
 • Attach safety chains to tow vehicle.  
 • Close fuel shut-off valve on engine (if equipped)  
 • Do not tow faster than 45 mph. Higher speeds can cause loss of control.  
 • Check local, state, and federal requirements before towing on public roads.

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**▲ WARNING**  
**BURN HAZARD**  
 Do not touch hot muffler.

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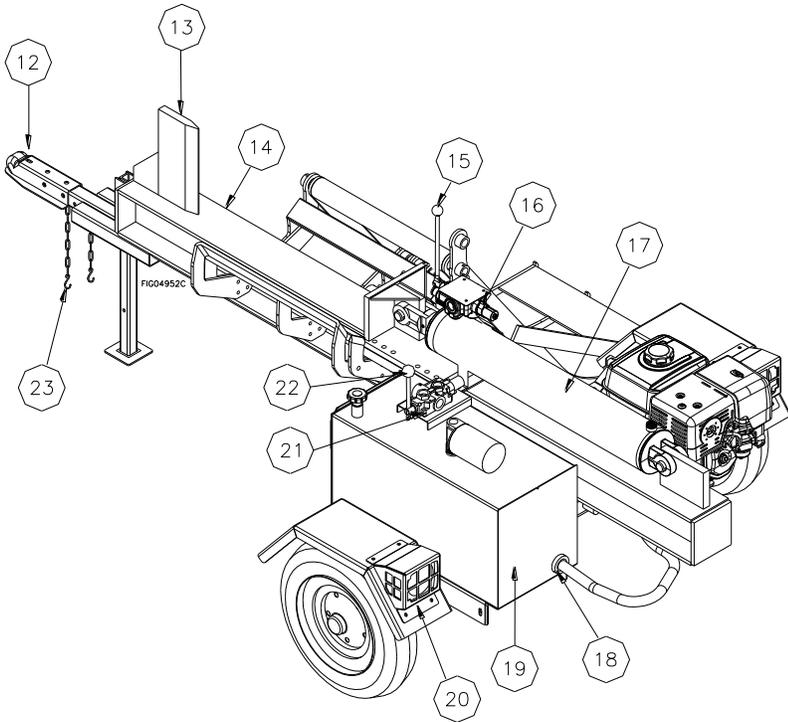
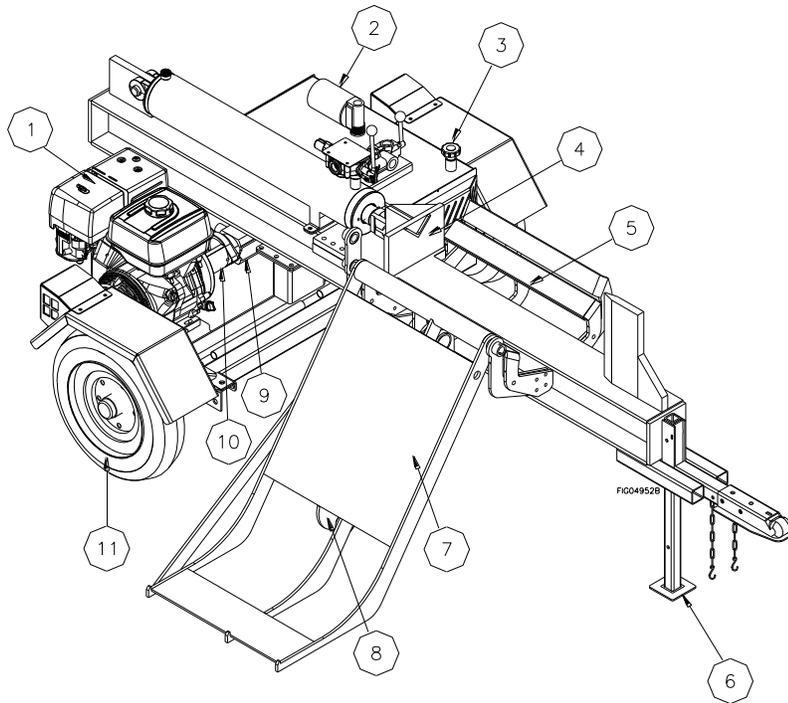
**▲ WARNING**  
**Poisonous Gas**  
 This product gives off carbon monoxide, a poisonous gas that can kill you. You CANNOT smell it, see it, or taste it.  
 - ONLY use outside & far away from windows, doors, & vents.  
 - NEVER use inside homes, garages, or sheds, EVEN if you run a fan or open doors or windows. See owner's manual for more details.

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**▲ WARNING**  
 Moving parts can crush and cut. Pieces can fly out while splitting. Follow safety rules for operating the log splitter or serious injury could result.  
 • READ the Owner's Manual completely before operating.  
 • Only one person should operate the log splitter. If an assistant is helping to load logs, the operator should not actuate controls until the assistant is at least 10 ft away.  
 • Stay in the designated OPERATOR POSITION while actuating the controls.  
 • Split wood in direction of the grain only.  
 • Hold bark side of logs when loading.  
 • Keep hands away from wedge, endplate/ram, and partly split logs.  
 • Never leave log splitter unattended during operation.  
 • Stay off slopes and slippery surfaces.  
 See additional safety rules in the Owner's Manual.

PN 778612

# Machine Component Identification

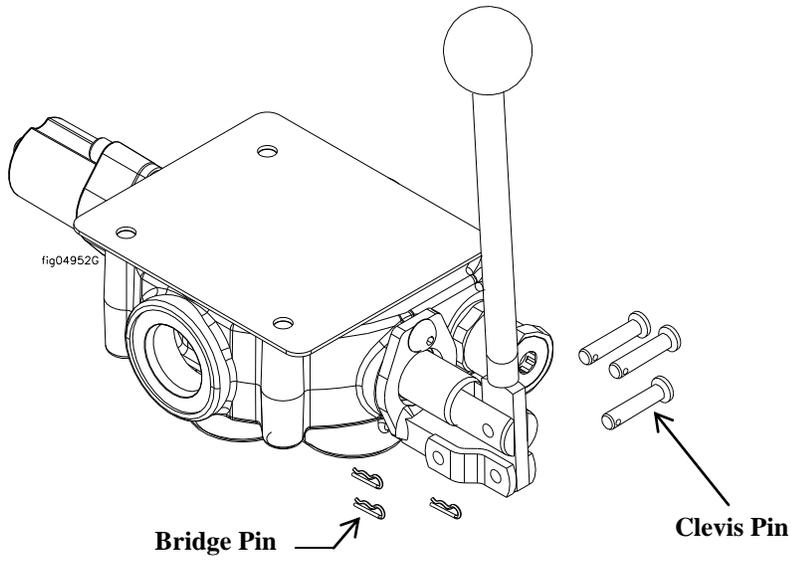


Ref	Description	Ref	Description	Ref	Description
1	Engine	9	Hydraulic Pump	17	Main Cylinder
2	Return Filter	10	Pump Bracket	18	Suction Strainer
3	Hydraulic Dipstick	11	Wheel	19	Hydraulic Tank
4	Beam Slide	12	2" Ball Coupler	20	Light Kit
5	Log Cradle	13	Wedge	21	Log Lift Control Valve
6	Tow Bar Leg	14	Beam	22	Log Lift Control Valve Lever
7	Log Lift Table	15	Split Control Lever	23	Safety Chains
8	Log Lift Cylinder	16	Control Valve		

# Initial Unpacking & Set-Up

## ⚠ IMPORTANT!

Engine is shipped without oil. DO NOT start the engine before adding oil.

<b>1. Step One: Add engine oil</b>	<b>Add oil to the engine.</b> Using a funnel, add SAE 10W-30 oil up to the FULL mark on the dip stick. (See engine Owner's Manual for oil capacity and location of fill cap.)
<b>2. Step Two: Secure Split Control Lever</b>	<b>Secure the Split Control Lever in the operating position.</b> Use following procedures: <ol style="list-style-type: none"><li>1. The Split Control Lever is shipped taped to the hydraulic cylinder. Untape to release.</li></ol>
	<ol style="list-style-type: none"><li>2. Raise lever until hole in lever aligns with the 2 holes on the control valve bracket. Insert the clevis pin through the aligned holes.</li><li>3. Insert the bridge pin into the protruding end of the clevis pin..</li></ol>  <p>The diagram, labeled 'fig04952G', shows a hydraulic cylinder with a split control lever. The lever is raised to align a hole with two holes on a control valve bracket. A clevis pin is shown being inserted through these holes. A bridge pin is shown being inserted into the protruding end of the clevis pin. Labels 'Bridge Pin' and 'Clevis Pin' with arrows point to the respective components.</p>
<b>3. Step Three: Inspect log splitter components</b>	<b>Closely inspect all splitter components.</b> (See Machine Components section of this manual on p. 7 for diagram of components.) <ul style="list-style-type: none"><li>• If you have any missing or damaged components, please contact Product Support at 1-800-270-0810.</li></ul>

# Initial Unpacking & Set-Up

## 4. Step Four: Verify Hydraulic oil level

### Verify hydraulic oil level.

Note: Hydraulic reservoir is shipped with oil.

1. Check hydraulic oil level:
  - a) Make sure engine is off and the cylinder is fully retracted.
  - b) Relieve all hydraulic system pressure by moving Split Control Lever back and forth several times.
  - c) Remove hydraulic dipstick. Verify that oil level reads full. **NOTE:** Do not thread the dipstick when checking oil level.

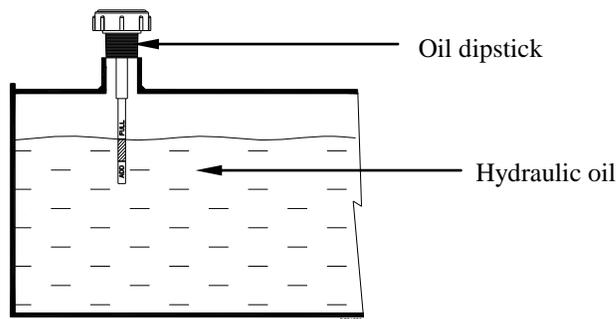
**⚠️ WARNING:** NEVER remove the hydraulic oil dipstick when the engine is running or hot. Hot oil can escape, causing severe burns. Allow log splitter to cool completely before removing hydraulic oil dipstick.

2. If hydraulic oil level is low:
 

Add 10 wt. AW32, ASLE H-150, or ISO 32 oil until oil level reads full. Use a funnel.

Note: The log splitter comes filled with LIGHT 150-ISO 32 hydraulic oil. If the log splitter will be run for long periods of time in outdoor temperatures above 70°F, we recommend changing the hydraulic oil to DEXRON III.

4. Replace hydraulic dipstick.
5. Disconnect the spark plug wire from the spark plug
6. Pull on the starter grip recoil at least 20 times so that hydraulic fluid has cycled through the pump
7. Reconnect the spark plug wire to the spark plug
8. Start engine and use Split Control Lever to extend and retract wedge 5 (five) times to remove air from the high pressure lines.
9. With the wedge retracted, check oil level again.



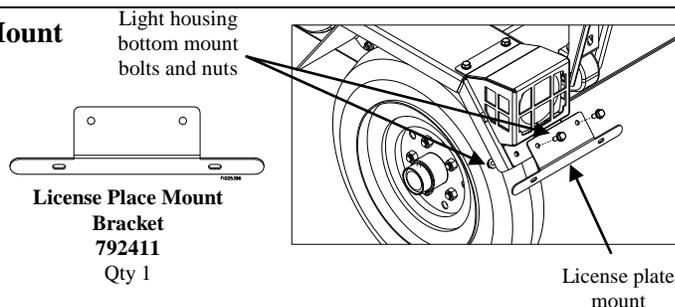
## 5. Step Five: Lubricate slide rail beam.

**Lubricate the surface of the slide rail beam with engine oil.** This will help prevent wear between the slide plates and beam.

## 6. Step Six: License Plate Mount Bracket installation

- **Only install License Plate Mount Bracket if you are required to mount a license plate.**

If a license plate is needed, install License Plate Mount Bracket on left fender using light housing bottom mount bolts and nuts



# Moving & Towing to the Job Site



## WARNING

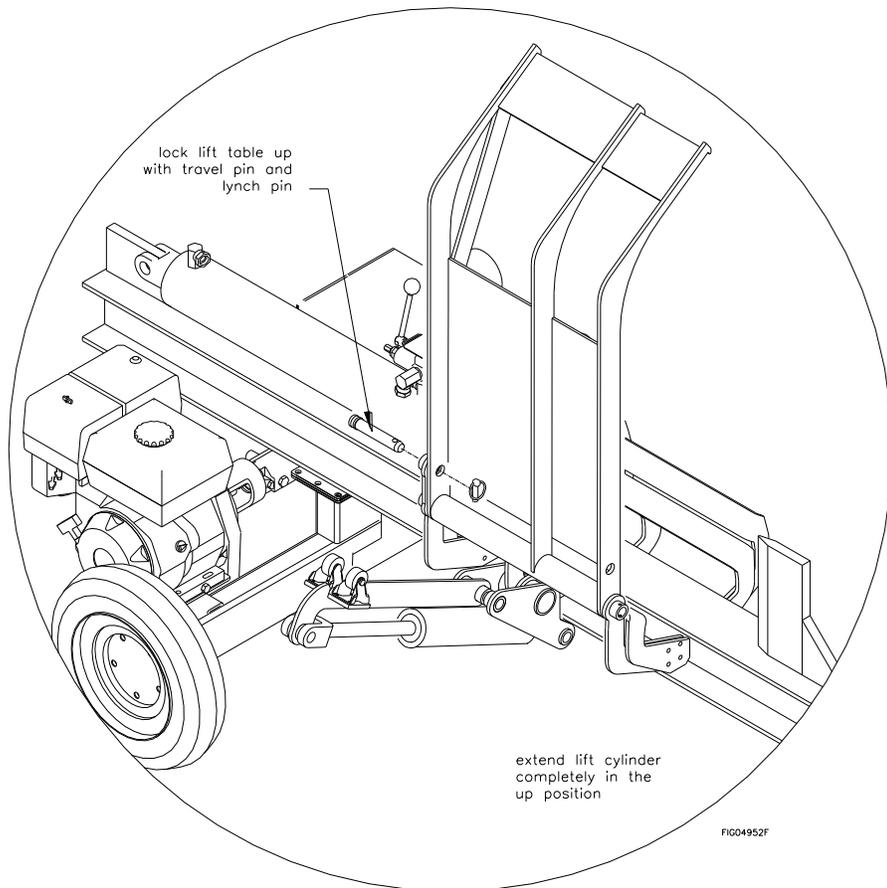
The log splitter is heavy. It can crush and cause serious injury if it rolls out of control or tips over. Follow the instructions below for safely moving and towing the log splitter.

### Moving the log splitter:

#### 1. Lock log lift in UP position

**NEVER** move log splitter when the log lift is down because the log splitter will be unbalanced and difficult to move, and the lifter is more likely to be damaged.

1. Raise the log lift to the full upright (vertical) position and lock in place.
2. Extend lift cylinder completely in the UP position.



#### 2. Engine off

**IMPORTANT: Ensure log splitter engine is off.**  
Never move the log splitter with its engine running.

#### 3. Fuel valve off

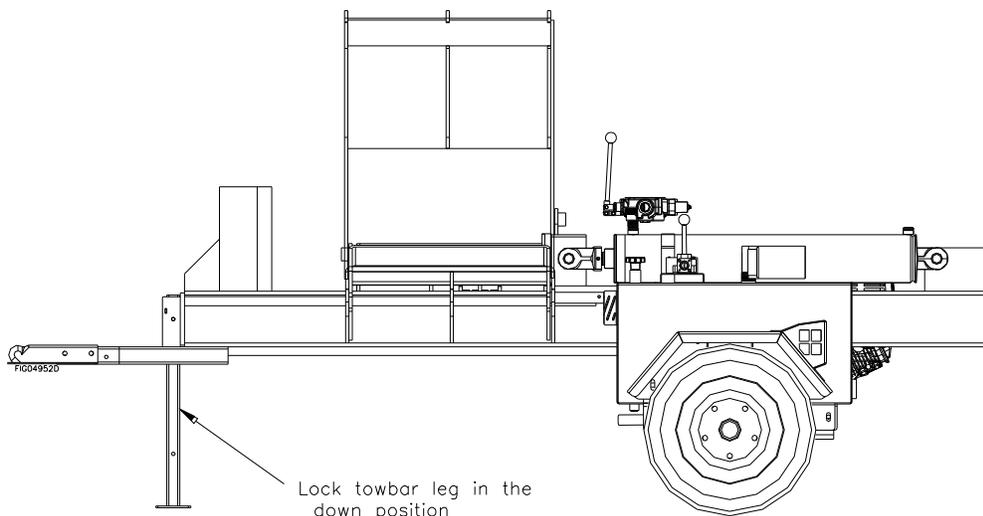
**Turn engine fuel valve off** to prevent carburetor flooding and reduce the chance of fuel leakage.

# Moving & Towing to the Job Site

**4. Tow bar leg  
DOWN**

Lock the tow bar leg in the “DOWN” position before you move the log splitter anywhere by hand.

**Moving Log Splitter by Hand**



**5. Move log splitter to work site or tow hitch**

Move log splitter by hand either directly to chosen work site or to vehicle hitch for towing.

(See instructions on p. 17 on selecting a work site)

**Important Safety Instructions:**

- **Hills.** Do not move the log splitter up or down hills by hand -- use a towing vehicle.
- **No riding.** Never allow anyone to sit or ride on the log splitter.
- **No cargo.** Never transport cargo or wood on the log splitter.

**Towing**

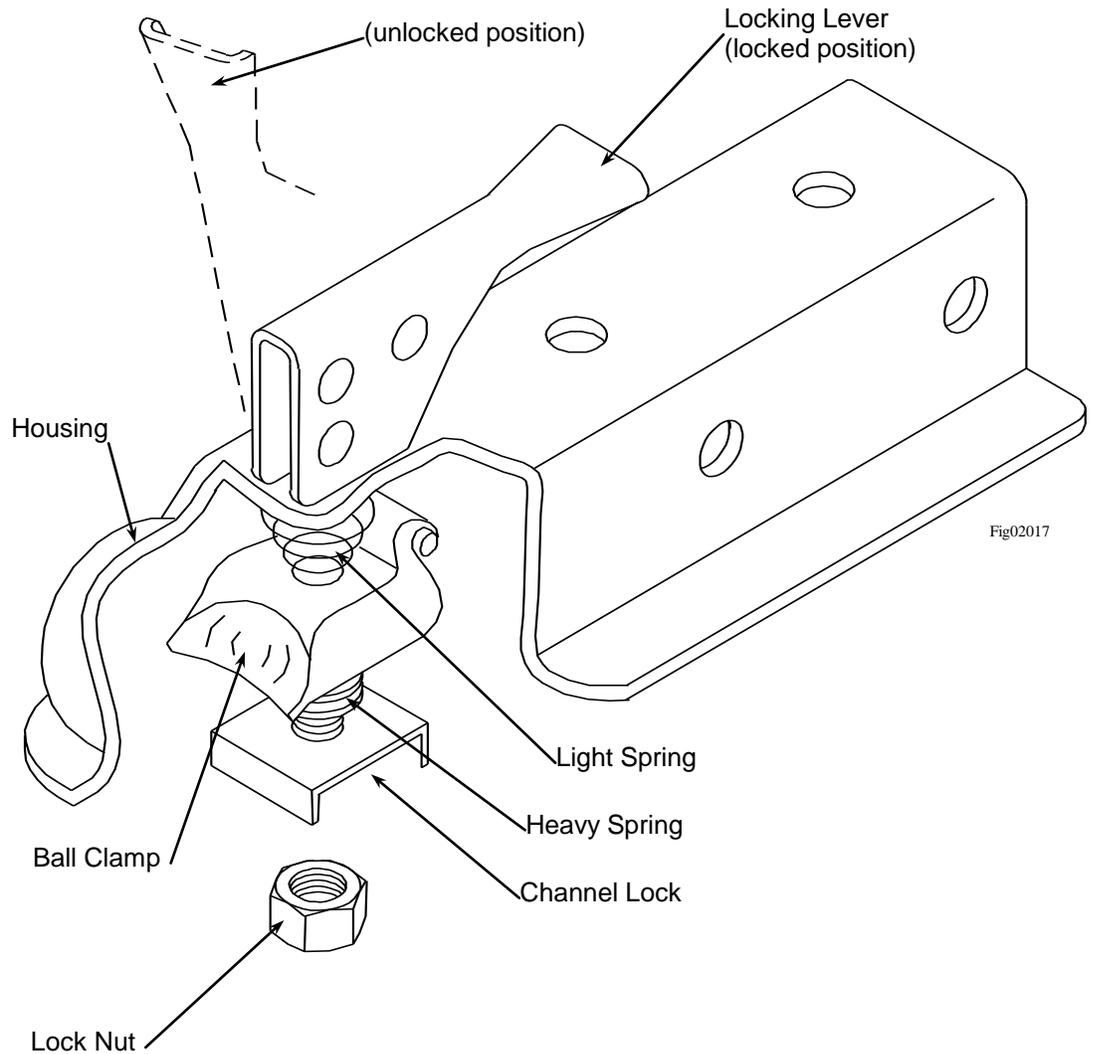
<b>1. Read Instructions</b>	<b>Review towing safety instructions in your vehicle manual.</b>
<b>2. Check tires</b>	<p><b>Make sure tires are fully inflated and in good repair.</b> See tire sidewall for recommended tire pressure.</p> <p><b>⚠WARNING:</b></p> <ul style="list-style-type: none"> <li>• Do not over-inflate tires. Serious injury can occur if tire explodes.</li> <li>• When seating a bead after repair, do not exceed pressure rating on tire sidewall. Pressures higher than rating can cause the tire and wheel to rupture and explode.</li> </ul>
<b>3. Engine off</b>	<p><b>IMPORTANT: Ensure log splitter engine is off.</b> Never move the log splitter with its engine running.</p>
<b>4. Fuel valve off</b>	<p><b>Turn engine fuel valve off</b> to prevent carburetor flooding and reduce the chance of fuel leakage.</p>

# Moving & Towing to the Job Site

## 5. Attach to hitch (2" Ball)

### Attach log splitter to vehicle hitch

1. Attach log splitter's coupler to a class 2 or higher hitch with 2" ball (only).
2. Adjust coupler to ball by raising locking lever and turning lock nut with fingers.
3. Proper adjustment is obtained when coupler is as tight as possible on ball and locking lever can still be opened and closed.
4. Lock lever closed to secure the attachment. An optional locking pin or padlock may be inserted in the locking lever hole for extra security.



## 6. Attach safety chains

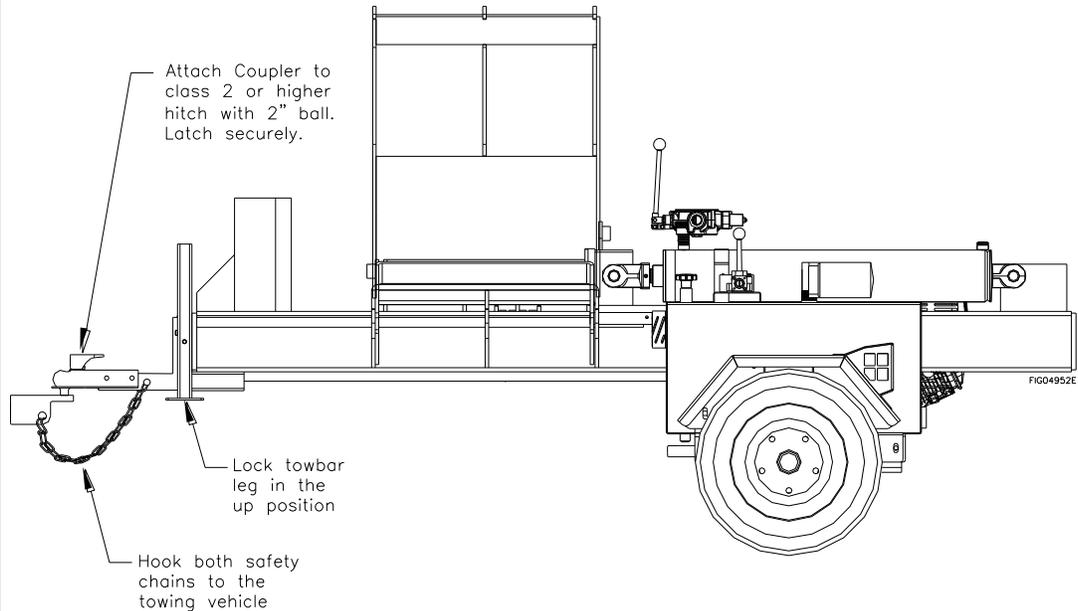
### Attach safety chains.

1. Two safety chains must be used while towing.
2. Cross safety chains under the coupler allowing only enough slack for vehicle turns.

# Moving & Towing to the Job Site

- 7. Put tow bar leg UP** Move the tow bar leg to the “UP” position and lock. (The support leg must remain in the up position during towing.)

## Towing Log Splitter



- 8. Tow to desired location**

**Tow log splitter carefully to desired work site.**  
(See instructions on p. 17 on selecting an appropriate work site)

### Important safety instructions:

- **Added length.** Be aware of the added length of the splitter.
- **Speed limit.** Never tow this log splitter over 45 mph. Faster speeds may result in loss of control.
- **Rough terrain.** Drive slowly and take extra caution when traveling over rough terrain.
- **On public roads.** If towing on a public road, make sure to comply with all local, state, and federal towing requirements. It is the sole responsibility of the purchaser to obtain licensing, trailer lights, safety chains or signage, as needed to comply.
- **Unattended.** Turn off the towing vehicle before leaving the splitter unattended.
- **Under the influence.** Never tow or operate this splitter while under the influence of alcohol, drugs, or medication

- 9. Lock leg down and unhitch**

**Lock tow bar leg in the DOWN position and unhitch from vehicle.**  
NEVER operate log splitter while it is attached to the vehicle.

# Before Each Use: Step One: Inspection / Maintenance

## **Step One: Inspect and Maintain log splitter before each use**

If the log splitter has been used previously, it must be inspected and maintained BEFORE EACH SUBSEQUENT USE.

** WARNING**

ALWAYS shut off the engine, disconnect the spark plug, and relieve system pressure before inspecting, cleaning, adjusting, or repairing the splitter. Relieve system pressure by moving Split Control Lever back and forth several times.

### **IMPORTANT:**

If a part needs replacement, only use parts that meet the manufacturer's specifications. Replacement parts that do not meet specifications may result in a safety hazard or poor operation of the log splitter.

<b>1. Engine off/relieve pressure</b>	<p><b>Perform all inspections/repairs with the engine off and hydraulic system pressure relieved.</b></p> <ol style="list-style-type: none"> <li>1. Make sure engine is off and cool.</li> <li>2. Disconnect the spark plug.</li> <li>3. Relieve all hydraulic system pressure by moving the Split Control Lever and the Log Lift Control Lever back and forth several times.</li> </ol>
<b>2. Remove debris</b>	<p><b>Remove debris from engine, muffler, and moving parts.</b></p> <ol style="list-style-type: none"> <li>1. <u>Engine debris.</u> Debris on a hot engine can be a fire hazard. Clean debris and chaff from engine cylinder head, cylinder head fins, blower housing rotating screen, and muffler areas. Avoid contact with hot muffler.</li> <li>2. <u>Other debris.</u> Debris on moving parts can cause excess wear. Clear debris from the slide beam, ram, and wedge.</li> </ol>
<b>3. Fuel tank/lines</b>	<p><b>Check fuel tank and fuel lines for leaks.</b> Any fuel leak is a fire hazard. Fix any fuel leaks before starting engine.</p>
<b>4. Mechanical parts</b>	<p><b>Check to be sure all nuts and bolts are tight</b> to make sure the log splitter is in safe working condition.</p>
<b>5. Hydraulic system</b>	<p><b>Check the hydraulic system carefully:</b></p> <ol style="list-style-type: none"> <li>1. Visually inspect all hoses, tubing, clamps/fittings, pump, and cylinder for cracks, fraying, kinks, or other damage.</li> <li>2. Check all components for oily residue, which may indicate a leak.</li> </ol> <p>DO NOT operate the log splitter if there is any indication of damage or oily residue. Small leaks in hydraulic lines can cause severe injuries and can also be an indication of catastrophic failure in the near future. The life of hydraulic hoses may be from a few months to a few years, depending on use and storage patterns.</p> <p><b> WARNING:</b> High fluid pressures and temperatures are developed in hydraulic log splitters. Hydraulic fluid escaping through a pin hole sized opening can burn or puncture skin, resulting in wounds that could cause blood poisoning, infection, disability, gangrene, amputation, or death. Therefore, the following instructions should be heeded at all times when inspecting or servicing the hydraulic components of the log splitter:</p>

## Before Each Use: Step One: Inspection / Maintenance

	<p>Stop the engine, disconnect the spark plug, and move all control valve handles back and forth to relieve pressure before changing or adjusting hydraulic system components such as hoses, tubing, fittings or other components.</p> <ul style="list-style-type: none"> <li>• NEVER check for leaks with your hand. Leaks can be located by holding a piece of cardboard or wood (at least two feet long) with your hand at one end and passing the other end over the suspected area (wear eye protection). Look for discoloration of the cardboard or wood.</li> <li>• NEVER adjust the pressure setting of the pump or valve.</li> <li>• If injured by escaping fluid, no matter how small the wound is, see a doctor at once. A typical injection injury may be a small puncture wound that does not look serious. However, severe infection or reaction can result if proper medical treatment is not administered immediately by a doctor who is familiar with injection injuries.</li> </ul>
<b>6. Hydraulic oil level</b>	<p><b>Check the hydraulic oil level using the dipstick.</b> Fill as needed. Note: Do not thread in the oil dipstick when checking hydraulic oil level.</p> <p><u>NOTE:</u> The log splitter comes filled with LIGHT 150-ISO 32 hydraulic oil. If the log splitter will be run for long periods of time in outdoor temperatures above 70°F, we recommend changing the hydraulic oil to DEXRON III.</p> <p><b>⚠ WARNING:</b> NEVER remove the hydraulic oil dipstick when the engine is running or hot. Hot oil can escape, causing severe burns. Allow log splitter to cool completely before removing hydraulic oil dipstick.</p>
<b>7. Engine</b>	<b>Inspect and perform engine maintenance as directed in the engine manual.</b>
<b>8. Spark arrestor muffler</b>	<b>If the engine is equipped with a spark arrestor muffler, clean and inspect it regularly (follow spark arrestor manufacturer's service instructions).</b> Replace if damaged
<b>9. Tires</b>	<p><b>Make sure tires are fully inflated and in good repair if you will be towing the splitter.</b></p> <p>See tire sidewall for recommended tire pressure.</p> <p><b>⚠ WARNING:</b></p> <ul style="list-style-type: none"> <li>• Do not over-inflate tires. Serious injury can occur if tire explodes.</li> <li>• When seating a bead after repair, do not exceed pressure rating on sidewall of tire. Pressures higher than rating can cause the tire and wheel to rupture and explode.</li> </ul>
<b>10. Shields/guards</b>	<b>Replace all guards and shields after serving the log splitter.</b>

# Before Each Use: Step Two: Fueling

## Step Two: Fueling

### ⚠ WARNING

Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel. Use extreme care when handling gasoline.

<b>1. Engine off/cool</b>	<p><b>The engine must be off and allowed to cool at least two minutes before adding fuel.</b></p> <p><b>⚠ WARNING:</b> A running engine is hot enough to ignite fuel. Never add fuel or remove gas cap if engine is running or still hot.</p>
<b>2. Outdoor location</b>	<p><b>Fill fuel tank outdoors – never indoors.</b></p> <p><b>⚠ WARNING:</b> Gasoline vapors can ignite if they collect inside an enclosure. Explosion can result.</p>
<b>3. Remove gas cap</b>	<p><b>Remove engine gas cap.</b></p>
<b>4. Add gasoline</b>	<p><b>Add gasoline through fill opening from a UL-listed container.</b></p> <p><b><u>Important Safety Instructions:</u></b></p> <ul style="list-style-type: none"> <li>• <b>Use approved container.</b> NEVER pump fuel directly into engine at gas station. Static charge can build and ignite fuel. Use a UL listed fuel container to transfer gas to the engine.</li> <li>• <b>Don't overfill.</b> DO NOT overfill the gas tank. Allow at least 1/2" of empty space below the fill neck to allow for fuel expansion</li> <li>• <b>Heat / flames / sparks.</b> Stay away from sources of heat, flame, or sparks while adding fuel.</li> </ul> <div style="text-align: center;">  </div>
<b>5. Spills/splashes</b>	<p><b>Clean up fuel spills/splashes immediately.</b></p> <ol style="list-style-type: none"> <li>1. Move log splitter away from spilled fuel on the ground.</li> <li>2. Wipe fuel off engine and wait 5 minutes for excess fuel to evaporate before starting engine.</li> <li>3. Gas soaked rags are flammable and should be disposed of properly.</li> <li>4. If gasoline is spilled on your skin or clothes, change clothes and wash skin immediately.</li> </ol>
<b>6. Replace gas cap</b>	<p><b>Replace gas cap securely before starting engine.</b></p>
<b>7. Gasoline storage</b>	<p><b>Store extra gasoline in a cool, dry place in an UL listed, tightly sealed container.</b></p>

# Before Each Use: Step Three: Work Site Selection & Set-Up

## Step Three: Work site selection and log splitter set-up

### WARNING

It is important to select an appropriate work site and properly set up the log splitter in order to minimize the risk of slips and falls, equipment rolling or tipping over, carbon monoxide poisoning, and accidental fires.

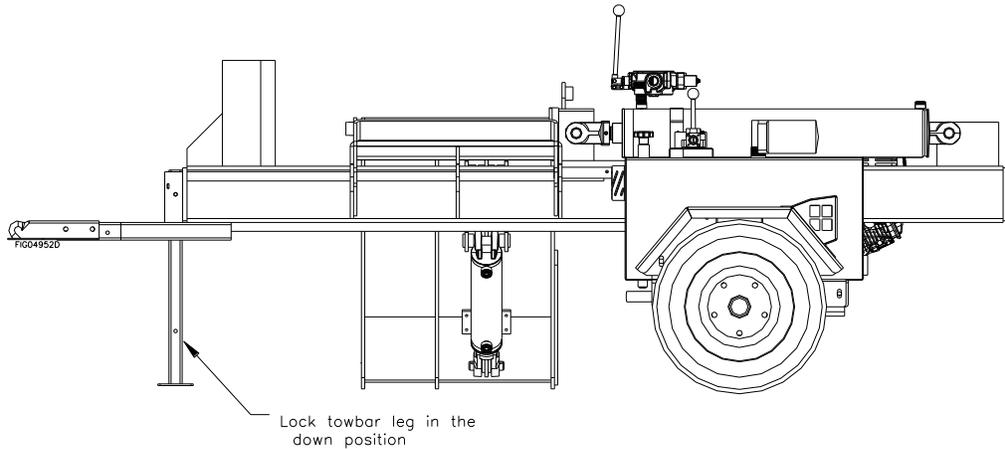
<b>1. Select location</b>	<p><b>Select an appropriate location for operating the log splitter.</b></p> <p><u>Requirements:</u></p> <ol style="list-style-type: none"> <li>1. Dry, level surface with good footing. Stay clear of areas with mud, ice, tall grass, weeds, or brush.</li> <li>2. Outdoors, away from air intakes.</li> </ol> <p><b> WARNING:</b> The running engine gives off carbon monoxide, a poisonous gas that can kill you. You CANNOT smell it, see it, or taste it.</p> <ul style="list-style-type: none"> <li>• ONLY run log splitter <u>OUTDOORS</u> and at least 20 feet from the home, away from windows, vents and air intakes, to allow proper ventilation. NEVER run log splitter inside homes, garages, sheds, or other buildings or semi-enclosed spaces. These spaces can trap poisonous gases, EVEN if you run a fan or open windows.</li> <li>• If you start to feel sick, dizzy, or weak while using the log splitter, shut off the engine and get to fresh air RIGHT AWAY. See a doctor. You may have carbon monoxide poisoning.</li> </ul>
<b>2. Fire precautions</b>	<p><b>Take the following precautions against fire:</b></p> <ol style="list-style-type: none"> <li>1. <b><u>IMPORTANT:</u></b> If your splitter will be used near any unimproved forest, brush, or grassy covered land, <i>then engine must be equipped with a <u>spark arrestor</u>.</i> (See the “Specifications” section of this manual to determine if your splitter already has a spark arrestor. Contact NorthStar Product Support at 1-800-270-0810 for information about obtaining a spark arrestor for your log splitter if it is unequipped.)</li> <li>2. Make sure you comply with applicable local, state and federal codes.</li> <li>3. Keep a fire extinguisher available (classified for both ordinary combustibles and flammable liquids) as a precautionary measure when operating the log splitter in dry areas.</li> </ol>
<b>3. Position 7' from any combustibles or flammable liquids</b>	<p><b>Position splitter at least 7 feet from combustible objects during operation.</b></p> <p>Hot exhaust fumes from engine could cause fire. Also, hydraulic oil leaking or spraying on hot engine can ignite.</p>

# Before Each Use: Step Three: Work Site Selection & Set-Up

## 4. Lock leg DOWN

Lock leg in the “DOWN” position.

In this position, splitter is level for splitting and less likely to roll during operation.



## 5. Block wheels

Block the wheels to prevent unintended movement of the log splitter.

# Splitting Operation

## WARNING

Before starting the log splitter, review the following instructions and safety information for safe operation. Failure to follow these rules may result in serious injury to the operator or bystanders from moving parts that crush, cut, or entangle; from flying objects, burns, fire, falling or tripping; or from carbon monoxide poisoning.

### General safety information:

- **Read manual.** Do not allow anyone to operate the log splitter who has not read the Owner's Manual or has not been instructed on the safe use of the splitter. The log splitter owner should instruct all operators in safe log splitter operation.
- **Age restrictions.** Never allow anyone under 16 years old to operate the log splitter. Children 16 years and older must be trained and supervised by a trained adult.
- **Intended use.** Log splitters should only be used for splitting wood logs, lengthwise with the grain. Do not use for other purposes as unforeseen hazards may result.
- **Modifications.** Never modify or alter the log splitter in any way. Modifications can create serious safety hazards and will void the warranty:
- **Attachments.** Never add attachments to the splitter, except for authorized accessories supplied by the manufacturer with instructions for safe installation and use.
- **Engine speed.** The maximum engine speed is preset at a safe limit. Never attempt to modify the engine speed setting to run at a higher speed.
- **Fuel/exhaust system.** NEVER modify or add to the exhaust system, fuel tanks, or fuel lines. Fire can result.
- **Remote control.** NEVER attach a rope, cable, or other remote device to the splitting control.
- **Splitting wedge.** NEVER attempt to change the height or speed of the splitting wedge.
- **Pressure setting.** NEVER increase the pressure setting of the pump or control valve.
- **Safety equipment/controls.** Always operate the log splitter with all safety equipment in place and in good working order, and all controls properly adjusted for safe operation.
- **Know how to stop.** Be thoroughly familiar with all controls and with the proper use of the equipment. Know how to stop the log splitter and relieve system pressures quickly if needed.
- **Operating speed.** Always operate the log splitter at the manufacturer's recommended speed. The maximum speed of the engine, pump and ram are preset within safe limits.
- **Daylight only.** Only use the log splitter in daylight so you can see what you are doing.
- **Smoking/sparks.** Never smoke while operating the log splitter, and never operate near sources of sparks or flames.
- **Under the influence.** Never operate, or let anyone else operate, the log splitter while under the influence of alcohol, drugs, or medication.
- **Unattended.** Never leave the machine unattended while the engine is running.
- **Refueling.** Never refuel the engine until it has cooled at least two minutes.
- **Adjusting/repairing.** Always make sure the engine is off before cleaning, repairing or adjusting the splitter, except as recommended by the manufacturer. In addition, disconnect the spark plug and move all control handles back and forth to relieve system pressure *before changing or adjusting hydraulic system components* such as hoses, tubing, fittings or other components.
- **Replace labels.** Always make sure safety labels are in place and in good condition. If a safety label is missing or not legible, order new labels because unsafe operation can result. Call 1-800-270-0810 to order new safety labels.

# Splitting Operation

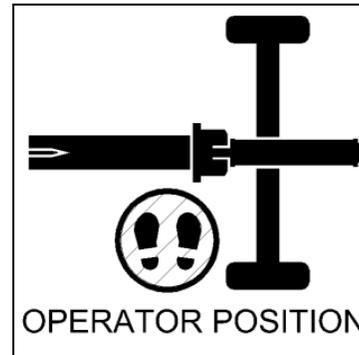
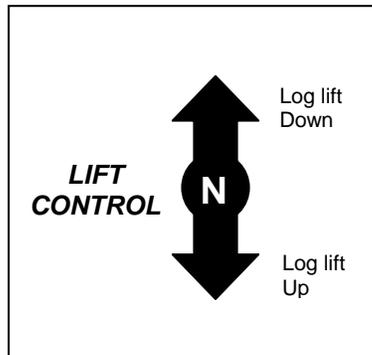
<b>1. Put on protective clothing / gear</b>	<p><b>Wear the following protective clothing and safety gear:</b></p> <ol style="list-style-type: none"> <li>1. <b>Eye protection.</b> Always wear safety glasses or goggles when operating the machine. Pieces of log may fly out and serious eye injury can occur.</li> <li>2. <b>Boots.</b> Falling logs can crush feet. Always wear safety shoes or heavy boots when operating or helping to load logs.</li> <li>3. <b>Gloves.</b> Wear snug fitting gloves without draw strings or loose cuffs.</li> <li>4. <b>Hearing protection.</b> The use of ear plugs or other hearing protection device is recommended.</li> <li>5. <b>No Loose/dangling.</b> Loose or dangling apparel can become entangled in moving parts. Never wear jewelry or loose-fitting clothing.</li> </ol>
<b>2. Lock &amp; block</b>	<p><b>Secure log splitter from unintended movement. Check that:</b></p> <ol style="list-style-type: none"> <li>1. The leg is locked in the DOWN position. (In this position, the splitter is level for splitting and less likely to roll during operation.)</li> <li>2. The wheels are blocked.</li> </ol>
<b>3. Start engine</b>	<p><b>Start the engine.</b></p> <p>See the engine owner's manual for engine starting instructions.</p> <p>NOTE:</p> <ol style="list-style-type: none"> <li>a) Make sure the hydraulic oil is above 10°F before starting the engine. Cold hydraulic oil can damage the hydraulic pump.</li> <li>b) If outdoor air temperature is below 32°F, allow log splitter to warm up by extending and returning the wedge several times before splitting wood.</li> </ol> <p><b>⚠️ WARNING:</b></p> <ul style="list-style-type: none"> <li>• <b>Burns.</b> To avoid burns, stay clear of hot muffler if you are starting a warm engine.</li> <li>• <b>Carbon monoxide.</b> The running engine gives off carbon monoxide, a poisonous gas that can kill you. You CANNOT smell it, see it, or taste it. If you start to feel sick, dizzy, or weak while using the log splitter, shut off the engine and get to fresh air RIGHT AWAY. See a doctor. You may have carbon monoxide poisoning.</li> <li>• <b>Other exhaust dangers.</b> Engine exhaust, some of its constituents and certain vehicle components contain or emit chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm. Avoid inhalation of exhaust.</li> </ul>
<b>4. Use power log lift to load log (optional)</b>	<p><b>Use the power log lift to load log onto the beam.</b></p> <p><u>NOTE:</u> You can also load logs manually onto the beam. However, note that musculoskeletal injury can result from lifting logs onto the log splitter if proper lifting techniques are not used or the logs are too heavy for a person's size, weight, or strength. In some cases, logs as small as 8" in diameter and 14" in length may be heavier than what some persons should be repeatedly lifting onto the splitter.</p> <p>The use of the power log lift can greatly reduce the need to lift logs. Employers are advised to consider NIOSH lifting guidelines when assigning employees to log splitting tasks for an extended period of time.</p>

# Splitting Operation

Instructions for operating the power log lift:

**⚠ WARNING: Crush hazard**

- **Operator position.** Stay in the designated OPERATOR position while operating log lift control.
  - **Second person.** If a helper is assisting in loading logs to be split, do not actuate log lift control until the helper is at least 10 feet away.
  - **Hand activate.** Use only your hand to operate the log lift control. Never use any other body part, or a rope, cable, or other remote device to actuate the control.
1. **Lower the log lift** by pushing the Lift Control Lever away from you while standing in the designated OPERATOR position.



2. **Load log onto log lift.**
3. **Raise the log lift** by pulling the Lift Control Lever toward you while standing in the designated OPERATOR position.
4. **Stop lift movement** by releasing the Lift Control Lever.
5. Important: If a hazardous situation is encountered at any time during the lifting operation, release the Lift and Split Control Lever and the log lift will stop moving
6. **Allow log to roll onto beam.**
7. If log is oddly shaped, it may not roll down the log lift by itself. If this happens, walk around the log splitter to the log lift side and move the log onto the beam by hand.

**⚠ WARNING: Crush hazard**

- Keep hands clear while log is rolling onto the beam.
- NEVER reach across the beam to move a log off the log lift onto the beam – the controls could be accidentally activated.

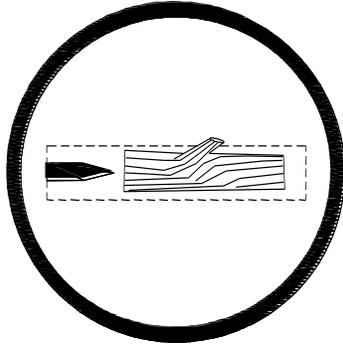
**5. Load log**

**Load log onto beam with a cut end against wedge – positioned for a lengthwise cut.**

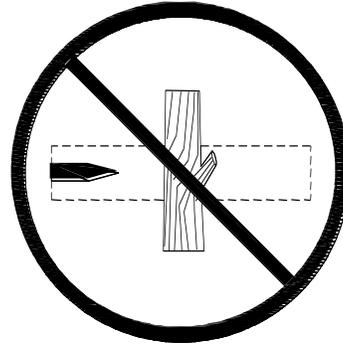
NOTES:

- a) The log splitter is designed only for cutting lengthwise with the grain, NOT for cutting across the grain.
- b) This log splitter is designed for cutting logs only up to a maximum of 30" long and 24" in diameter. Larger diameter logs could get stuck on the wedge and longer logs will not fit on the beam.

# Splitting Operation



Correct Log Orientation



Incorrect Log Orientation

**⚠ WARNING:** ALWAYS keep hands and feet away from the ram, wedge, and partially split logs while loading, operating and unloading the log splitter.

**Important safety instructions:**

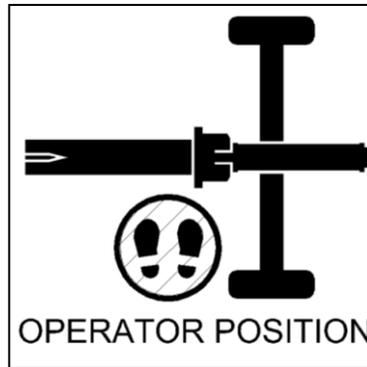
- **Hold bark side.** Hold the bark side of logs when loading or positioning, never the ends. Never place your hands or any part of your body between a log and any part of the log splitter.
- **Ram moving.** NEVER load or unload while the ram is moving.
- **Straddling/reaching across.** Never straddle, reach across, or step over the beam while the engine is running and the log splitter is in the horizontal position. You could trip, actuate the controls, and get seriously injured.
- **Unsplit log pile.** Do not pile logs to be split in a place that will make you reach across the log splitter in order to load them.
- **Square log ends.** Logs that are not cut square can slide out while splitting and become a safety hazard or cause excessive force to log splitter components. Use a chain saw to cut logs square on each end before attempting to split them.
- **Single log.** Never attempt to split more than one log at a time. Pieces of log can unexpectedly be thrown from the machine causing serious injury.
- **Split along grain.** Do not use the log splitter to split logs across the grain. Doing so will damage the log splitter and could also cause pieces of log to be thrown, injuring the operator or bystanders.

**6. Extend ram**

Move Split Control Lever toward wedge to extend ram and split log.



# Splitting Operation



## **Important safety instructions:**

- **Operator position.** ALWAYS operate the log splitter from the manufacturer's indicated OPERATOR POSITION. (See diagram above.) Other positions are unsafe because they can increase the risk of injury from crushing, cutting, flying objects, or burns.
- **Remove hands.** Remove both hands from log before activating Split Control Lever
- **Hand Activate.** Use only your hand to operate the Split Control Lever. Never use any other body part, or rope, cable, or other remote device to actuate the control.
- **Second Person.** Many accidents occur when there is more than one person involved in loading and operating the log splitter. Only one person should operate the controls. *If a second person is assisting in loading logs, the operator must NEVER actuate the Split Control Lever until the assistant and all bystanders are at least 10 feet away. NEVER allow an assistant to hold the log in place while the operator actuates the Split Control Lever.*

## **7. Stop ram**

**Release Split Control Lever to stop ram movement when log is split.**



**⚠ WARNING:** Cracks in logs can close quickly and pinch fingers. Keep fingers away from any cracks that open in partially split logs.

# Splitting Operation

## 8. Important STUCK LOG procedure

**If a log does not split completely and becomes stuck on the wedge, follow the instructions below to remove the log.**

A log can become stuck to the wedge if the wedge becomes embedded in the log and the log doesn't split and separate. This can happen if the log is too stringy or tough to split completely. If this happens, follow the directions below.

**⚠ WARNING: NEVER** attempt to remove a stuck log by:

- Using the hydraulic force of the splitter
- Modifying the splitter
- Adding attachments to the splitter
- Personal injury could result from log or metal pieces flying out at high speed toward the operator or bystanders, or the splitter could become damaged.

1. Retract ram fully.
2. Turn engine OFF.
3. Remove stuck log from the wedge **manually** with a pry bar or a sledgehammer.  
Important: Be extremely careful as log pieces may fly off as they separate from the wedge. Make sure bystanders are clear and wear safety goggles.
4. Do not attempt to resplit a stuck log once it has been removed from the wedge. Manually split with an axe or cut with a chainsaw.

## 9. Return ram

**Move Split Control Lever away from wedge to return ram.**

Once the control valve is actuated in the return direction, the ram is designed to keep returning by itself completely and then stop automatically.



**⚠ WARNING:**

Stay clear while the ram is returning. It is still powerful enough on the return stroke to cause serious injury.

## 10. Remove split wood from area

**Remove split wood from area.**

Move each log away from log splitter after it is split. Split logs left near the log splitter are a trip hazard.

## 11. After use

**1. Turn off engine.**

**2. Remove engine debris.**

Debris on a hot engine can be a fire hazard. After the engine is off, clean debris and chaff from engine cylinder head, cylinder head fins, blower housing rotating screen, and muffler areas.

**⚠ WARNING:**

Avoid contact with hot muffler. Never touch hot muffler, hot exhaust manifold, or engine cooling fins. Exhaust and engine parts can be very hot and will burn you.

# Storage

## **WARNING**

Gasoline vapors can ignite and cause a fire. Select a well-ventilated storage area away from sources of heat, flame, or sparks.

Follow the instructions below for storing your log splitter between uses.

<b>1. Retract wedge</b>	<b>Retract the wedge completely to keep the rod protected from corrosion.</b>
<b>2. Cool</b>	<b>Allow the machine to cool 5 minutes before storing.</b>   <b>WARNING:</b> A hot engine can be a fire hazard.
<b>3. Wipe with oily rag</b>	<b>Wipe the beam and wedge with an oily rag to prevent corrosion.</b>
<b>4. Engine manual</b>	<b>Refer to the engine manual for proper engine storage instructions.</b>  <b>CAUTION:</b> Gasoline will oxidize and deteriorate in storage. Old gasoline in the engine will cause hard starting and leave gum deposits that can clog the fuel system. Deterioration problems may occur within a few months, or even less if gasoline was not fresh when you filled the fuel tank.  <b>Short-Term Storage:</b> <ol style="list-style-type: none"> <li>1. Consider adding a fuel stabilizer to extend fuel storage life.</li> <li>2. Leave the fuel valve lever in the OFF position to reduce the possibility of fuel leakage.</li> </ol> <b>Long Term Storage:</b> (between infrequent uses and at end of season) Drain the fuel tank and carburetor as instructed in the engine owner's manual.  <u>Important Safety Instructions:</u> <ul style="list-style-type: none"> <li>• Always drain fuel from tank in outdoor, well-ventilated area.</li> <li>• Stay away from sources of heat, flame, or sparks while handling fuel.</li> <li>• Clean up fuel spills/splashes immediately.</li> </ul>
<b>5. Splitter storage location</b>	<b>Store the log splitter in a location away from corrosive material, sources of heat, open flames, sparks or pilot lights.</b>   <b>WARNING:</b> Never store log splitter inside where there is a source of heat or an open flame, spark, or pilot light – such as water heaters, space heaters, furnaces, clothes dryers, or other gas appliances. Even if the log splitter's gas tank is empty, residual gasoline vapors could ignite.  <b>NOTE:</b> Do not store the log splitter near fertilizer or any other corrosive material.
<b>6. Gasoline storage</b>	<b>Store gasoline in a cool, dry place in an UL listed, tightly sealed container.</b>   <b>WARNING:</b> Gasoline vapors can ignite if they collect inside an enclosure and explosion can result.

# Periodic Maintenance

In addition to the maintenance performed with each use, periodic maintenance should also be performed according to the following schedule.

## ⚠ WARNING

ALWAYS shut off the engine, disconnect the spark plug, and relieve system pressure before cleaning, adjusting, or repairing the splitter. Relieve system pressure by moving Split Control Lever back and forth several times.

### **IMPORTANT:**

If a part needs replacement, only use parts that meet the manufacturer's specifications. Replacement parts that do not meet specifications may result in a safety hazard or poor operation of the log splitter.

<b>1. Engine maintenance</b>	As specified in engine manual	<b>Perform engine maintenance as specified in the engine owner's manual.</b>
<b>2. Hydraulic oil change</b>	Annually / 100 hours	<p><b>Change hydraulic oil.</b></p> <p><b>⚠WARNING:</b> High fluid pressures and temperatures are developed in hydraulic log splitters. Hydraulic fluid escaping through a pin hole sized opening can burn or puncture skin, resulting in wounds that could cause blood poisoning, infection, disability, gangrene, amputation, or death. Therefore, the following instructions should be heeded at all times when inspecting or servicing the hydraulic components of the log splitter:</p> <ul style="list-style-type: none"> <li>• NEVER check for leaks with your hand. Leaks can be located by holding a piece of cardboard or wood (at least two feet long) with your hand at one end and passing the other end over the suspected area (wear eye protection). Look for discoloration of the cardboard or wood.</li> <li>• NEVER adjust the pressure setting of the pump or valve.</li> <li>• If injured by escaping fluid, no matter how small the wound is, see a doctor at once. A typical injection injury may be a small puncture wound that does not look serious. However, severe infection or reaction can result if proper medical treatment is not administered immediately by a doctor who is familiar with injection injuries.</li> </ul> <ol style="list-style-type: none"> <li>1. Use 10 wt AW32, ASLE H-150, or ISO32 oil.</li> <li>2. Relieve hydraulic system pressure by moving Split Control Lever back and forth several times.</li> <li>3. Remove hydraulic oil dipstick. <ul style="list-style-type: none"> <li>⚠WARNING: NEVER remove the hydraulic oil dipstick when the engine is running or hot. Hot oil can escape causing severe burns. Allow log splitter to cool completely before removing hydraulic oil dipstick.</li> </ul> </li> <li>4. Remove the drain plug from the hydraulic tank to drain the hydraulic oil into a 10 gallon pan.</li> <li>5. Remove suction strainer and wipe off debris with a dry cloth.</li> <li>6. Fill the hydraulic tank with wedge retracted.</li> <li>7. Disconnect the spark plug wire from the spark plug</li> <li>8. Pull on the starter grip recoil at least 20 times so that hydraulic fluid has cycled through the pump</li> <li>9. Reconnect the spark plug wire to the spark plug</li> <li>10. Dispose of used oil at an oil-recycling center. Used hydraulic oil is hazardous waste.</li> <li>11. Extend and retract wedge 5 (five) times to purge air from the system.</li> <li>12. Check hydraulic oil level and fill if necessary. Note: Do not thread in the oil dipstick when checking the hydraulic oil level.</li> </ol>
<b>3. Spark arrester muffler</b>	As specified in the engine owner's manual	<b>If the engine is equipped with a spark arrester muffler, clean and inspect it regularly (follow engine manufacturer's service instructions). Replace if damaged.</b>

# Troubleshooting



## WARNING

Before troubleshooting or attempting to service, read the following safety instructions to avoid serious injury to the operator or bystanders from moving parts that can crush or cut, burns, fire or explosion, or escaping high pressure hydraulic fluid.

### **Important Safety Instructions:**

1. **Engine off.** Always make sure the engine is off before cleaning, repairing or adjusting the splitter, except as recommended by the manufacturer.
2. **Hydraulic safety.** High fluid pressures and temperatures are developed in hydraulic log splitters. Hydraulic fluid escaping through a pin hole sized opening can burn or puncture skin, resulting in wounds that could cause blood poisoning, infection, disability, gangrene, amputation, or death. Therefore, the following instructions should be heeded at all times when inspecting or servicing the hydraulic components of the log splitter:
  - Stop the engine, disconnect the spark plug, and move all control valve handles back and forth to relieve pressure before changing or adjusting hydraulic system components such as hoses, tubing, fittings or other components
  - Do not remove the hydraulic oil dipstick when the engine is running. Hot oil can escape causing severe burns. Allow log splitter to cool completely before removing hydraulic oil dipstick.
  - Do not adjust the pressure setting of the pump or valve.
  - NEVER check for leaks with your hand. Leaks can be located by holding a piece of cardboard or wood (at least two feet long) with your hand at one end and passing the other end over the suspected area (wear eye protection). Look for discoloration of the cardboard or wood.
  - If injured by escaping fluid, no matter how small the wound is, see a doctor at once. A typical injection injury may be a small puncture wound that does not look serious. However, severe infection or reaction can result if proper medical treatment is not administered immediately by a doctor who is familiar with injection injuries.

Problem	Solution
Ram will not move	Solution: A,D,E,H,J
Slow ram speed when extending or retracting	Solution: A,B,C,H,I,K
Wood will not split or splits extremely slowly	Solution: A,B,C,F,I,K
Engine bogs down during splitting	Solution: G
Engine stalls under low load condition	Solution: D,E
Engine will not start	Solution: L
Cause	Solution
<b>A-</b> Insufficient oil to pump	Check oil level in reservoir
<b>B-</b> Air in oil	Check oil level in reservoir, check for leaks in the suction line
<b>C-</b> Excessive pump inlet vacuum	Check pump inlet hose for blockage or kinks
<b>D-</b> Blocked hydraulic lines	Flush and clean the splitter hydraulic system
<b>E-</b> Blocked control valve	Flush and clean the splitter hydraulic system
<b>F-</b> Low control valve setting	Adjust control valve with a pressure gauge
<b>G-</b> High control valve setting	Adjust control valve with a pressure gauge
<b>H-</b> Damaged control valve	Return control valve for authorized repair
<b>I-</b> Internal control valve leak	Return control valve for authorized repair
<b>J-</b> Damaged cylinder piston	Return cylinder for authorized repair
<b>K-</b> Internally damaged cylinder	Return cylinder for authorized repair
<b>L-</b> Problem with engine	Refer to your Engine Manual

**Any Questions, Comments, Problems or Parts Orders**  
*Call NorthStar Product Support 1-800-270-0810*

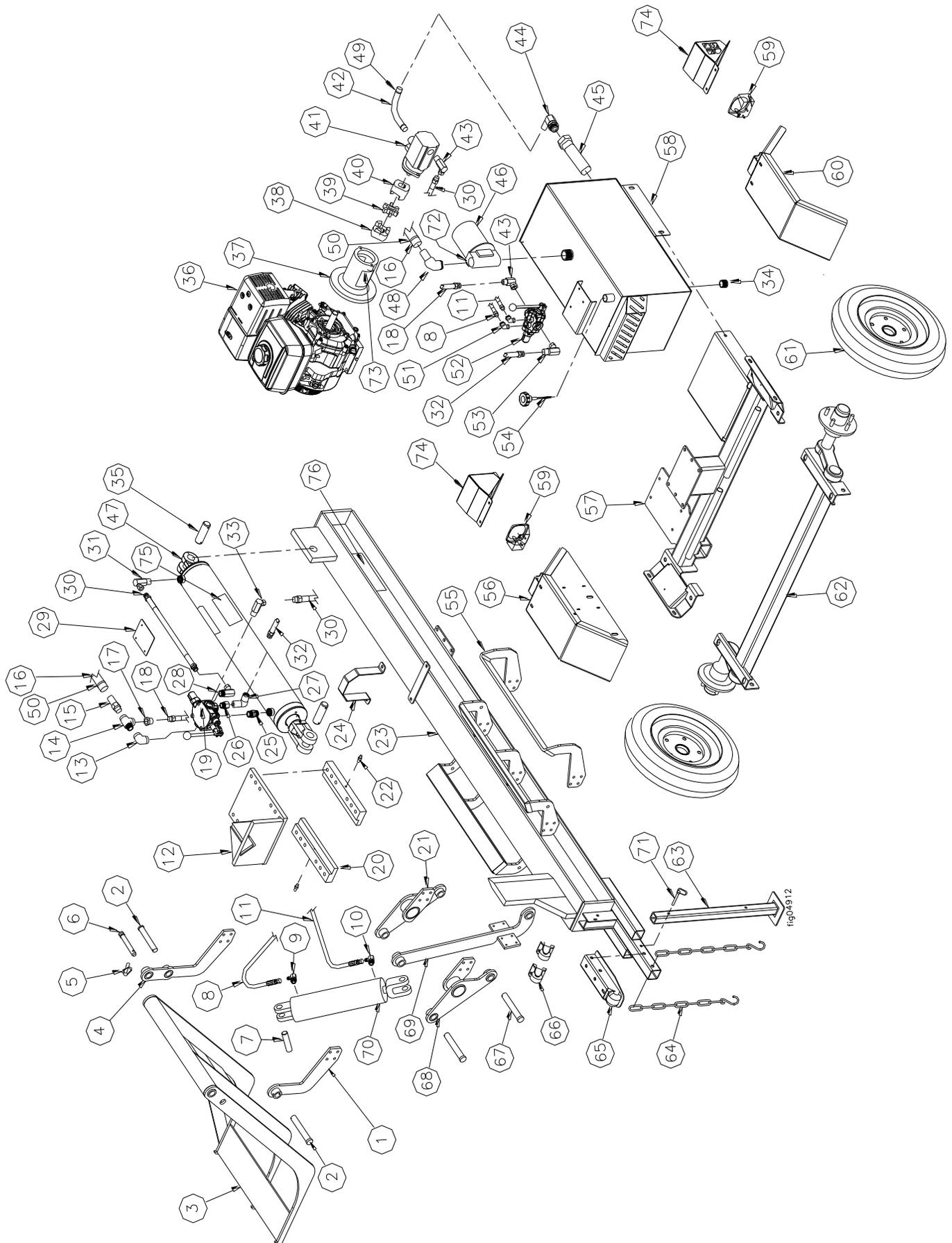
## Specifications

Maximum Pressure .....	3500 PSI
Maximum Flow .....	16 gpm
Hydraulic Fluid Capacity.....	18 gallons
Hydraulic Fluid Type.....	10 wt AW32, ASLE H-150, or ISO32
Coupler Size.....	2" Ball
Maximum Towing Speed.....	45 MPH
Maximum Log Length .....	30 in.
Maximum log Diameter.....	24 in.
Maximum Log Weight .....	340 lbs.
Pressure Relief Setting .....	3500 PSI
Hydraulic Cylinder Bore .....	5 in.
Hydraulic Cylinder Stroke .....	30 in.
Spark Arrester.....	Yes
Fuel Valve.....	Yes
Overall Dimensions .....	37" H x 105" L x 60" W
Dry Weight .....	1175 LB

The manufacturer reserves the right to make improvements in design and/or changes in specifications at any time without incurring any obligation to install them on units previously sold.

**Any Questions, Comments, Problems or Parts Orders**  
*Call NorthStar Product Support 1-800-270-0810*

# Parts Breakdown- Exploded View 11968 – Rev F



## Parts Breakdown- Exploded View 11968 – Rev F

Ref	Part No	Description	Qty
1	39124	Right mount arm	1
2	38983	Lift pin	2
3	777324	Lift table	1
4	796300	Left mount arm	1
5	39159	Lynch pin	1
6	777918	Travel pin	1
7	406518	3-1/4" clevis pin	1
8	791071	3/8 JIC hose w/green marking, 69"	1
9	788079	Flow reducer	1
10	5018	1/2 x JIC6 elbow	1
11	791072	3/8 JIC hose w/red marking, 84"	1
12	791722	Beam slide weldment	1
13	791157	SAE-12 x 1" NPT swivel elbow	1
14	791158	1" NPT street tee	1
15	791160	1-1/4" Beaded HB x 1" NPT	1
16	36130	1-1/4" Low pressure hose	1
17	791159	1" NPT x 3/4" FNPT reducer	1
18	791068	Hose, Hyd 3/4" x 20" 3500 psi	1
19	795786	Control valve	1
20	791723	Keeper	2
21	788001	Left cylinder mount	1
22	82146	5/16" grease zerk	2
23	790690	Beam weldment	1
24	790783	Hoop	1
25	791165	SAE-8 x SAE-10	1
26	791161	SAE-10 x 1/2" FNPT	1
27	50RAS8	1/2"M x 1/2"F R Angle Swivel	1
28	791163	SAE-10 x 3/4" NPT swivel elbow	1
29	790784	Valve plate	1
30	791070	Hose, Hyd 3/4" x 30" 3500 psi	2
31	791164	SAE-8 x 3/4" NPT swivel elbow	1
32	791069	Hose, Hyd 1/2" x 12" 3500 psi	1
33	791162	SAE-12 x 3/4" NPT Swivel elbow	2
34	790064	Magnetic drain plug	1
35	778592	Clevis pin	2
36	601091	Honda GX390 engine	1
37	779683	Pump bracket	1
38	777911	1" coupling	1
39	777912	Coupling insert	1

Ref	Part No	Description	Qty
40	777909	1/2" coupling	1
41	791861	16 GPM pump	1
42	791170	100R4 Super flex hose	1
43	50RAS812	1/2" NPT x 3/4" NPT Swivel Elbow	1
44	788504	1" NPT x 1" HB elbow	1
45	790470	Suction strainer	1
46	791248	Return Line Filter Canister	1
47	791060	5 X 30 cylinder	1
48	790487	1 1/4" NPT x 1 1/4 HB elbow	1
49	777835	Hose clamp	2
50	781700	T-bolt clamp	2
51	789050	6MJ x 10MOR elbow	2
52	791129	Lift control valve w/handle	1
53	778831	12 MOR x HB Elbow 12 - 12	1
54	784455	Dipstick/breather	1
55	777332	Backstop	1
56	790781	Fender, left	1
57	790721	Axle sub assembly	1
58	790732	Hydraulic tank assembly	1
59	789590	Light kit	1
60	790729	Fender, right	1
61	791172	480X12 LRC 5H wheel assembly	2
62	782489	Torsion axle assembly	1
63	790737	Tow bar leg	1
64	1130	27" safety chain	2
65	38587	2" ball coupler	1
66	189900	2" x 1" Steel rigid caster/roller	2
67	37878	6" clevis pin	2
68	788002	Right cylinder mount	1
69	788003	Lift arm	1
70	788105	3" x 12" Hydraulic cylinder	1
71	38070	Cotter hitch pin	1
72	791245	Return Line Filter Head	1
73	779681	Guard Insert for 779683	2
74	792414	Light housing	2
75	790808	Decal, Tonnage	2
76	790776	Decal, Branding	2

# Summary of Important Safety Information for Operation



## WARNING

Carefully read and make sure you understand the following safety information before using the log splitter.

Improper use or maintenance of the log splitter can result in serious injury to the operator or bystanders from moving parts that can crush or cut, flying objects, escaping high pressure hydraulic fluid, or carbon monoxide poisoning.

### Introduction

- **Read manual.** Read this Operator's Manual and the engine Owner's Manual completely before attempting to use the log splitter. Serious injury or death can result if safety instructions are not followed.
- **Instruct operators.** The log splitter owner should instruct all operators in safe log splitter operation.
- **Intended use.** Log splitters should only be used for splitting wood logs, lengthwise with the grain. Do not use for other purposes, as unforeseen hazards may result.

### Prohibition Against Modifications

Never modify or alter the log splitter in any way. Modifications can create serious safety hazards and will void the warranty.

- **Attachments.** Never add attachments to the splitter, except for authorized accessories supplied by the manufacturer with instructions for safe installation and use.
- **Engine speed.** The maximum engine speed is preset at a safe limit. Never attempt to modify the engine speed setting to run at a higher speed.
- **Fuel/exhaust system.** NEVER modify or add to the exhaust system, fuel tanks, or fuel lines. Fire can result.
- **Remote control.** NEVER attach a rope, cable, or other remote device to the splitting control.
- **Splitting wedge.** NEVER attempt to change the height or speed of the splitting wedge.
- **Pressure setting.** NEVER increase the pressure setting of the pump or control valve.

### Operator Restrictions

- **Untrained operators.** Do not allow anyone to operate the log splitter who has not read the Owner's Manual or been instructed on the safe use of the splitter.
- **Minimum operator age.** Never allow anyone under 16 years old to operate the log splitter. Children 16 years and older must be trained and supervised by a trained adult.

### Safety in Moving and Towing the Log Splitter



## WARNING

The log splitter is very heavy. It can crush and cause serious injury if it rolls out of control or tips over.

Follow the instructions below for safely moving and towing the log splitter.

### General Safety While Moving

- **Log lift raised upright.** Make sure the log lift is raised to its full upright (vertical) position before moving the splitter. DO NOT move the log splitter when the log lift is down because it will be unbalanced and difficult to move, and the lifter is more likely to be damaged
- **Hills.** Do not move the log splitter up or down hills by hand -- use a towing vehicle.
- **Engine off.** Never move the log splitter with its engine running.
- **No riding.** Never allow anyone to sit or ride on the log splitter.
- **No cargo.** Never transport cargo or wood on the log splitter.

### Safety During Towing

- **Read instructions.** Review towing safety instructions in your towing vehicle manual.
- **Securely attached.** Be sure the log splitter is securely attached to the towing vehicle before towing.
- **Tires.** Be sure tires are fully inflated and in good repair before towing the splitter. When adding air to tires, do not over-inflate -- serious injury could occur if tire explodes.
- **Added length.** Be aware of the added length of the splitter.
- **Speed limit.** Never tow this log splitter over 45 mph. Faster speeds may result in loss of control.

# Summary of Important Safety Information for Operation

- **Rough terrain.** Be extra cautious and drive slowly when traveling over rough terrain.
- **Under the influence.** Never tow this splitter while under the influence of alcohol, drugs, or medication.
- **On public roads.** If towing on a public road, make sure to comply with all local, state, and federal towing requirements. It is the sole responsibility of the purchaser to obtain licensing, trailer lights, safety chains or signage, as needed to comply.
- **Unattended.** Turn off the towing vehicle before leaving the splitter unattended.
- **Disconnect before operating.** Do not use the log splitter while it is connected to the towing vehicle.

## Safety – Before Use Read/instruct

- **Read manual.** Do not allow anyone to operate the log splitter who has not read the Owner's Manual or has not been instructed on the safe use of the splitter.
- **Review safety rules.** Before starting this log splitter, review the instructions for safe operation. Failure to follow these instructions may result in serious injury to the operator or bystanders.
- **Know how to stop.** Be thoroughly familiar with all controls and with the proper use of the equipment. Know how to stop the log splitter and relieve system pressure quickly if needed.

## Personal protective equipment

- **Eye protection.** Always wear safety glasses or goggles when operating the machine. Pieces of log may fly out and serious eye injury can occur.
- **Boots.** Falling logs can crush feet. Always wear safety shoes or heavy boots when operating or helping to load logs.
- **Loose/dangling.** Loose or dangling apparel can become entangled in moving parts. Never wear jewelry or loose-fitting clothing.
- **Gloves.** Wear snug fitting gloves without draw strings or loose cuffs.
- **Hearing protection.** The use of ear plugs or other hearing protection device is recommended.

## Safety During Inspection/Maintenance

Always inspect your log splitter before each use, and repair as needed, to keep it in safe working condition:

- **Engine off.** Always make sure the engine is off before cleaning, repairing or adjusting the splitter, except as recommended by the manufacturer.
- **Engine debris.** Debris on a hot engine can be a fire hazard. With the engine off, clean debris and chaff from engine cylinder head, cylinder head fins, blower housing rotating screen, and muffler areas. Avoid contact with hot muffler.
- **Other debris.** Debris on moving parts can cause excess wear. With the splitter engine off, clear debris from moving parts.
- **Fuel tank/lines.** Before each use, check fuel tank and fuel lines for leaks. Any fuel leak is a fire hazard. Fix any fuel leaks before starting engine.
- **Mechanical parts.** Check to be sure all nuts and bolts are tight to make sure the log splitter is in safe working condition.
- **Hydraulic system.** Check the hydraulic system (hoses, tubing, clamps/fittings, pump, and cylinder) carefully before each use. Do not operate the log splitter with frayed, kinked, cracked or damaged hydraulic hoses, fittings, or tubing, or if oily residue is observed on any of the components. High fluid pressures and temperatures are developed in the log splitter. Hydraulic fluid escaping through a pin hole sized opening can burn or puncture skin, resulting in wounds that could cause blood poisoning, infection, disability, gangrene, amputation, or death. Therefore, the following instructions should be heeded at all times when inspecting or servicing the hydraulic components of the log splitter:
  - Do not remove the hydraulic oil dipstick when the engine is running. Hot oil can escape causing severe burns. Allow log splitter to cool completely before removing hydraulic oil dipstick.
  - Do not adjust the pressure setting of the pump or valve.
  - Do not check for leaks with your hand. Leaks can be located by holding a piece of cardboard or wood (at least two feet long) with your hand at one end and passing the other end over the suspected area (wear eye protection). Look for discoloration of the cardboard or wood.
  - Stop the engine, disconnect the spark plug, and move all control valve handles back and forth to relieve pressure before changing or adjusting hydraulic system components such as hoses, tubing, fittings or other components.
  - If injured by escaping fluid, no matter how small the wound is, see a doctor at once. A typical injection injury may be a small puncture wound that does not look serious. However, severe infection or reaction can result if proper medical treatment is not administered immediately by a doctor who is familiar with injection injuries.
- **Spark arrestor muffler.** If the engine is equipped with a spark arrestor muffler, clean and inspect it regularly (follow manufacturer's service instructions). Replace if damaged.

# Summary of Important Safety Information for Operation

- **Tires.** Make sure tires are fully inflated and in good repair before towing the splitter. When adding air to tires, do not over-inflate -- serious injury could occur if tire explodes.
- **Guards/shields.** Make sure all guards and shields are replaced after servicing the log splitter.
- **Replacement parts.** If a part needs replacement, only use parts that meet the manufacturer's specifications. Replacement parts that do not meet specifications may result in a safety hazard or poor operation of the log splitter.

## Safety During Fueling

Gasoline is highly flammable and explosive. You can be burned or seriously injured when handling fuel. Use extreme care when handling gasoline:

- **Fuel outdoors.** Fill fuel tank outdoors – never indoors. Gasoline vapors can ignite if they collect inside an enclosure. Explosion can result.
- **Use approved container.** Never pump fuel directly into engine at gas station. Static charge can build and ignite fuel. Use an UL listed fuel container to transfer gas to the engine.
- **Running/hot engine.** A running engine is hot enough to ignite fuel. Never add fuel or remove gas cap if engine is running or still hot. Stop the engine and allow to cool at least two minutes before adding fuel.
- **Heat/flames/sparks.** Stay away from sources of heat, flame, or sparks while adding fuel.
- **Don't overfill.** DO NOT overfill the gas tank. Allow at least 1/2" of empty space below the fill neck to allow for fuel expansion.
- **Replace cap.** Replace gas cap securely before starting engine.
- **Spills.** Clean up fuel spills immediately. Move log splitter away from spilled fuel on the ground. Wipe fuel off engine and wait 5 minutes for excess fuel to evaporate before starting engine. Gas soaked rags should be disposed of properly.
- **On skin/clothes.** If gasoline is spilled on your skin or clothes, change clothes and wash skin immediately.
- **Gasoline storage.** Store gasoline in a cool, dry place in an UL listed, tightly sealed container.

## Safety in Work Site Selection/Setup

- **Spark arrestor.** If your splitter will be used near any unimproved forest, brush, or grassy covered land, then engine should be equipped with a spark arrestor. See the "Specifications" section of this manual to determine if your splitter already has a spark arrestor. Make sure you comply with applicable local, state and federal codes
- **Hot exhaust.** Hot exhaust fumes from engine can cause fire. Position muffler at least 7 feet from combustible objects during operation
- **Fire extinguisher.** Have a Class B fire extinguisher available as a precautionary measure when operating the log splitter in dry areas.
- **Level, dry surface.** To prevent accidental falls and equipment tip over, make sure the splitter is situated on a dry, level surface with good footing. Stay clear of areas with mud, ice, tall grass, weeds, or brush.
- **Block wheels.** Always block the wheels to prevent unintended movement of the log splitter.
- **Carbon monoxide.** The running engine gives off carbon monoxide, a poisonous gas that can kill you. You CANNOT smell it, see it, or taste it. ONLY run log splitter OUTDOORS and at least 20 feet from the home, away from windows, vents and air intakes, to allow proper ventilation. NEVER run log splitter inside homes, garages, sheds, or other semi-enclosed spaces. These spaces can trap poisonous gases, EVEN if you run a fan or open windows. If you start to feel sick, dizzy, or weak while using the log splitter, shut off the engine and get to fresh air RIGHT AWAY. See a doctor. You may have carbon monoxide poisoning.

## Safety – During Use

### General Safety During Use

- **⚠️ WARNING:** Before starting this log splitter, review the following rules for safe operation. Failure to follow these rules may result in serious injury to the operator or bystanders.
- **Safety equipment/controls.** Always operate the log splitter with all safety equipment in place and in good working order, and all controls properly adjusted for safe operation.
- **Operating speed.** Always operate the log splitter at the manufacturer's recommended speed. The maximum speed of the engine, pump and ram are preset within safe limits.
- **Know how to stop.** Be thoroughly familiar with all controls and with the proper use of the equipment. Know how to stop the log splitter and relieve system pressures quickly if needed.
- **Daylight only.** Only use the log splitter in daylight so you can see what you are doing.
- **Smoking/sparks.** Never smoke while operating the log splitter, and never operate near sources of sparks or flames.
- **Hot muffler.** If you are starting a warm engine, stay clear of muffler. It may still be hot enough to burn you.

# Summary of Important Safety Information for Operation

- **Unattended.** Never leave the machine unattended while the engine is running.
- **Under the influence.** Never operate, or let anyone else operate, the log splitter while under the influence of alcohol, drugs, or medication.
- **Adjusting/repairing.** Always make sure the engine is off before cleaning, repairing or adjusting the splitter, except as recommended by the manufacturer. In addition, disconnect the spark plug and move all control handles back and forth to relieve system pressure *before changing or adjusting hydraulic system components* such as hoses, tubing, fittings or other components.
- **Carbon monoxide.** The running engine gives off carbon monoxide, a poisonous gas that can kill you. You CANNOT smell it, see it, or taste it. If you start to feel sick, dizzy, or weak while using the log splitter, shut off the engine and get to fresh air RIGHT AWAY. See a doctor. You may have carbon monoxide poisoning.
- **Other exhaust dangers.** Engine exhaust, some of its constituents and certain vehicle components contain or emit chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm. Avoid inhalation of exhaust.

## **Safety in Loading, Operating, and Unloading**

- **Square log ends.** Logs that are not cut square can slide out while splitting and become a safety hazard or cause excessive force to log splitter components. Use a chainsaw to cut logs square on each end before attempting to split them.
- **Single log.** Never attempt to split more than one log at a time. Pieces of log can unexpectedly be thrown from the machine causing serious injury.
- **Split along grain.** Do not use the log splitter to split logs across the grain. Doing so will damage the log splitter and could also cause pieces of log to be thrown, injuring the operator or bystanders.
- **Keep hands clear.** ALWAYS keep hands and feet away from the ram, wedge, and partially split logs while loading, operating and unloading the log splitter.
- **Operator position.** ALWAYS operate the log splitter from the manufacturer's indicated OPERATOR POSITION. Other positions are unsafe because they can increase the risk of injury from crushing, cutting, flying objects, or burns.
- **Straddling / reaching across.** Never straddle, reach across, or step over the beam while the engine is running and the log splitter is in the horizontal position. You could trip, actuate the controls, and get seriously injured.
- **Second person.** Many accidents occur when there is more than one person involved in loading and operating the log splitter. Only one person should operate the controls. ***If a second person is assisting in loading logs, the operator must NEVER actuate the Split Control Lever until the assistant and all bystanders are at least 10 feet away. NEVER allow an assistant to hold the log in place while the operator actuates the Split Control Lever.***
- **Loading/Unloading**
  - **Unsplit log pile.** Do not pile logs to be split in a place that will make you reach across the log splitter in order to load them.
  - **Hold bark side.** Hold the bark side of logs when loading or positioning, never the ends. Never place your hands or any part of your body between a log and any part of the log splitter.
  - **Ram moving.** NEVER load or unload logs while the ram is moving.
  - **Cracks.** Cracks in logs can close quickly and pinch fingers. Keep fingers away from any cracks that open in partially split logs.
  - **Split log pile.** Move each log away from log splitter after it is split. Split logs left near the log splitter are a trip hazard.
- **Remove hands.** Remove both hands from log before activating Split Control Lever.
- **Hand activate.** Use only your hand to operate the Split Control Lever. Never use any other body part, or a rope, cable, or other remote device to actuate the control.
- **Returning ram.** Once the control valve is actuated in the return direction, the ram is designed to keep returning by itself completely and then stop automatically. Stay clear while the ram is returning. It is still powerful enough on the return stroke to cause serious injury.
- **Log stuck on wedge.** A log can become stuck to the wedge if the wedge becomes embedded in the log and the log doesn't split and separate. This can happen if the log is too stringy or tough to split completely. If this happens, follow the directions below to manually remove the log:
  - IMPORTANT:** NEVER attempt to remove a stuck log by using the hydraulic force of the splitter, or by modifying or adding attachments to splitter. Personal injury could result from log or metal pieces flying out at high speed toward the operator or bystanders, or the splitter could become damaged.
  - 1. Retract ram fully.
  - 2. Turn engine OFF.
  - 3. Remove stuck log from the wedge **manually** with a pry bar or a sledgehammer. Be extremely careful, as log pieces may fly off as they separate from the wedge. Wear safety goggles and make sure bystanders are clear.
  - 4. Do not attempt to resplit a stuck log once it has been removed from the wedge.
- **Refueling.** Never refuel the engine until it has cooled at least two minutes.

# Summary of Important Safety Information for Operation

## Safety – After use

- **Remove engine debris.** Debris on a hot engine can be a fire hazard. With the engine off, clean debris and chaff from engine cylinder head, cylinder head fins, blower housing rotating screen, and muffler areas. Avoid contact with hot muffler.
- **Let engine cool before storing.** Let engine cool for at least five minutes before storing. A hot engine can be a fire hazard.
- **Storage location.** Store the log splitter in a location away from sources of heat, open flames, sparks or pilot lights – such as water heaters, space heaters, furnaces, clothes dryers, or other gas appliances. Even if the log splitter's gas tank is empty, residual gasoline vapors could ignite.
- **Gasoline storage.** Store extra gasoline in a cool, dry place in an UL listed, tightly sealed container. Gasoline vapors can ignite if they collect inside an enclosure.
- **Periodic maintenance.** Perform periodic maintenance as directed in this manual to keep the log splitter in safe working condition.

# Limited Warranty

Dear Valued Customer:

The NorthStar Product you just purchased is built with the finest material and craftsmanship. Use this product properly and enjoy the benefits from its high performance. By purchasing a NorthStar product, you show a desire for quality and durability. Like all mechanical equipment this unit requires a due amount of care. Treat this unit like the high quality piece of machinery it is. Neglect and improper handling may impair its performance. Please thoroughly read the instructions and understand the operation before using your product. Always contact NorthStar Product Support at 1-800-270-0810 prior to having any service or warranty work performed, as some services performed by parties other than NorthStar approved service centers may void this warranty. This warranty is in lieu of any other warranty expressed or implied and NorthStar assumes no other responsibility or liability outside that expressed within this warranty.

## Limited Warranty

NorthStar shall warranty any piece of equipment manufactured, or parts of equipment manufactured, to be free from defects in material or workmanship for a period of:

<b>NorthStar Warranty</b>		
<b>Item #</b>	<b>Consumer Warranty Period</b>	<b>Commercial Warranty Period</b>
11968	4 years from date of purchase by user	1 year from date of purchase by user

<b>Engine Warranty</b>		
<b>Item #</b>	<b>Consumer Warranty Period</b>	<b>Commercial Warranty Period</b>
11968	3 years from date of purchase by user	3 years from date of purchase by user

“Consumer use” means personal residential household use by a consumer. “Commercial use” means all other uses, including use for commercial, income producing or rental purposes or when purchased by a business.

This warranty applies to the original purchaser of the equipment (verification of purchase, in the form of a receipt, is the responsibility of the buyer), is non-transferable, and covers parts and labor. Parts will be replaced or repaired at no charge, except when the equipment has failed due to lack of proper maintenance. If a part is no longer available, the part may be replaced with a similar part of equal function. Any misuse, abuse, alteration or improper installation or operations will void warranty. Determining whether a part is to be replaced or repaired is the sole decision of NorthStar. NorthStar will not provide for replacement of complete products due to defective parts. Any costs incurred due to replacement or repair of items outside of a NorthStar approved facility is the responsibility of the buyer and not covered under warranty. Transportation costs to and from service center is the responsibility of the customer.

In addition to the normal warranty, NorthStar shall warrant any normal wear item from defects in material or workmanship for a period of 90 days from the date of purchase by user. Normal wear items include, but are not limited to, tires and filter elements.

This warranty specifically excludes the following; failure of parts due to damage caused by accident, fire, flood, windstorm, acts of God, applications not approved by NorthStar in writing, corrosion caused by chemicals, use of replacement parts which do not conform to manufacturer’s specifications, damage related to rodent and/or insect infestation and damage caused by vandalism. Additional exclusions: loss of running time, inconvenience, loss of income, or loss of use, including any implied warranty of merchantability of fitness for a specific use. Also, Outdoor Power Equipment needs periodic parts and service to perform well, and this warranty does not cover instances when normal use has exhausted the life of a component or the engine.

This warranty does not cover any personal injury or damage to surrounding property caused by failure of any part. Repair or replacement of parts does not extend the warranty period.

The engine warranty is covered under the terms and conditions as outlined by the engine manufactures warranty contained herein and is the sole responsibility of the engine manufacture. Normal engine maintenance such as spark plugs, air filters, adjustments, fuel system cleaning and obstruction due to build up is not covered by this NorthStar warranty.

Please fill in the following information and have it on hand when you call in on a warranty claim.

Customer Number: \_\_\_\_\_

Date of Purchase: \_\_\_\_\_

NorthStar Serial Number: \_\_\_\_\_

Item Number: \_\_\_\_\_

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Manufactured by  
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