



# OPERATOR'S MANUAL

**Contour  
Air Drill**

S44320-06



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# Section 1: Safety

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# Safety

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## SAFETY-ALERT SYMBOL



Watch for this symbol. It identifies potential hazards to health or personal safety. It means:

ATTENTION - BE ALERT.  
Your Safety is involved.

Familiarize yourself with the location of all decals. Read them carefully to understand the safe operation of your machine.

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### Signal Words

The words **DANGER**, **WARNING** or **CAUTION** are used with the safety alert symbol. Learn to recognize the safety alerts, and follow the recommended precautions and safe practices.

Three words are used in conjunction with the safety-alert symbol:



**DANGER**

Indicates an imminently hazardous situation that, if not avoided, will result in **DEATH OR SERIOUS INJURY**.



**WARNING**

Indicates a potentially hazardous situation that, if not avoided, could result in **DEATH OR SERIOUS INJURY**.



**CAUTION**

Indicates a potentially hazardous situation that, if not avoided, may result in **MINOR OR MODERATE INJURY**.

Replace any **DANGER**, **WARNING**, **CAUTION** or instructional decal that is not readable or is missing. The location and part number of these decals is identified later in this section of the manual.

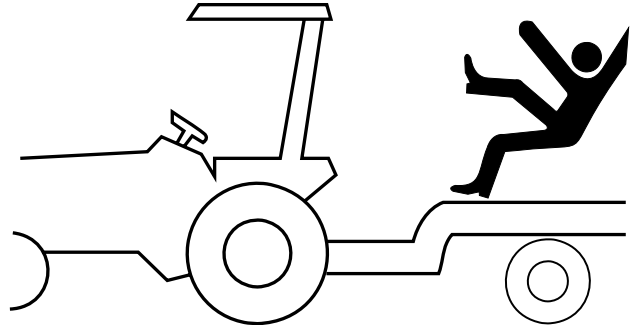
The words **Important** and **Note** are not related to personal safety but are used to give additional information and tips for operating or servicing this equipment.

**IMPORTANT:** Identifies special instructions or procedures which, if not strictly observed could result in damage to, or destruction of the machine, process or its surroundings.

**NOTE:** Indicates points of particular interest for more efficient and convenient repair or operation.

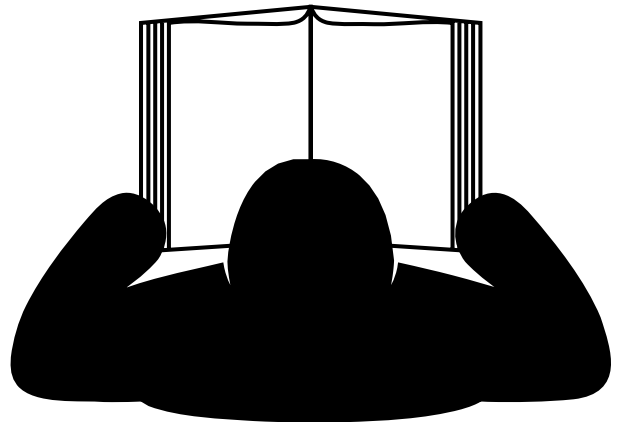
## General Operation

- **DO NOT RIDE!!** Do not allow riders on the implement when in motion.
- Do not allow extra riders in the tractor unless an instructor seat and seat belt are available.
- **Check behind** when backing up.
- **Reduce speed** when working in hilly terrain.
- Never allow anyone within the immediate area when operating machinery.
- **Stand clear** when raising or lowering wings.
- **Keep all shields in place**, replace them if removed for service work.



## Tractor Operation

- Be aware of the correct tractor operating procedures, when working with implements.
- Review tractor operator's manual.
- Secure hitch pin with a retainer and lock drawbar in centre position.



# Safety

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## Chemicals

- **Use extreme care** when cleaning, filling or making adjustments.
- **Always read** granular chemical or treated seed manufacturer's warning labels carefully and remember them.
- Wear close fitting clothing and appropriate personal protective equipment for the job as specified by the chemical and/or seed manufacturer.
- **Always wear** safety goggles, breathing apparatus and gloves when handling with granular chemical or treated seed.
- **Do not feed** any treated seed to livestock. Treated seed is poisonous and may cause harm to persons or livestock.
- **Wash exposed skin immediately** - do not leave chemicals on your skin.
- **Properly store** chemicals in original containers with labels intact per the manufacturer's instructions.
- Always follow the manufacturer's operating instructions and warning labels when operating an ammonia tank with the equipment.
- **Do Not enter Air Cart tank unless another person is present and the tractor engine has been shut off.**



## Danger

**Failure to comply may result in death or serious injury.**

Read Operator's Manual and decals on **Ammonia** tank before operating Air Cart. Become familiar with all warnings, instructions, and controls.

**Always** wear gloves and goggles when transferring or handling ammonia.

**Always** stay clear of hose and valve openings.

**Always** be sure pressure is relieved before disconnecting hoses or parts.

**Always** secure connecting parts and safety chains before towing ammonia trailer.

**Always** have ample water available in case of exposure to ammonia liquid or gases.

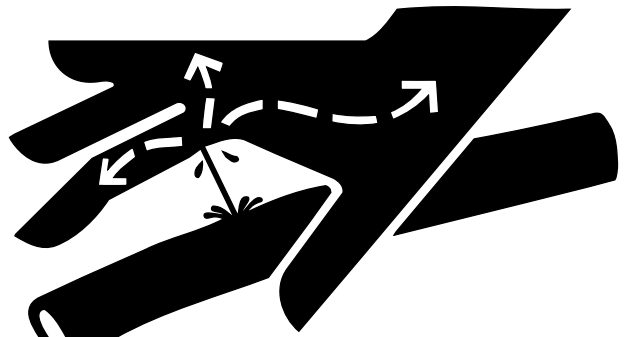


## Transporting

- **Be aware** of the height, length and width of implement. Make turns carefully and be aware of obstacles and overhead electrical lines.
- Always travel at a safe speed. Do Not Exceed 20 mph (32 kph).
- Use an agricultural tractor that is large enough with sufficient braking capacity so that the weight of the loaded equipment towed **does not exceed 1.5 times** the weight of the tractor.
- Use flashing amber warning lights, turn signals and SMV emblems when on public roads.
- Do not transport in poor visibility.
- The slow moving vehicle (SMV) emblem and reflectors must be secured and be visible on the machine for transport.
- Avoid soft surfaces, the additional wing weight on the centre wheels could cause the machine to sink.
- Ensure safety chain is attached correctly to the towing vehicle and the hitch of the implement.
- Check that wings are firmly seated on transport wing stops, and wing lift valve and opener valve are in locked position.
- Be familiar with and adhere to local laws.

## Hydraulics

- **Do not** search for high pressure hydraulic leaks without hand and face protection. A tiny, almost invisible leak can penetrate skin, thereby requiring immediate medical attention.
- Use cardboard or wood to detect leaks - never your hands.
- Double check that all is clear before operating hydraulics.
- **Never** remove hydraulic hoses or ends with machine elevated. Relieve hydraulic pressure before disconnecting hydraulic hoses or ends.
- Maintain proper hydraulic fluid levels.
- Keep all connectors clean for positive connections.
- Ensure all fittings and hoses are in good condition.
- Do not stand under wings.

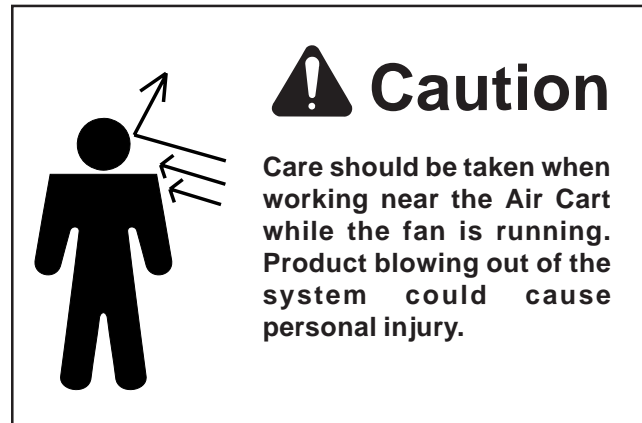


# Safety

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## Maintenance


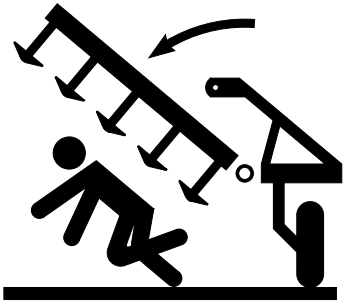
- **Shut tractor engine off** before making any adjustments or lubricating the machine.
- **Block** machine securely to prevent any movement during servicing.
- Wear close fitting clothing and appropriate personal protective equipment for the job.
- **Always wear** safety goggles, breathing apparatus and gloves when working on seeder filled with granular chemical or treated seed per the manufacture's instructions.
- Do not modify the machine.




## Storage

- Store implement away from areas of main activity.
- Level implement and block up securely to relieve pressure on jack.
- Do not allow children to play on or around stored implement.

## Safety Signs

 <h1 style="margin: 0;">DANGER</h1>	
<ul style="list-style-type: none"> <li>• WINGS MAY FALL RAPIDLY CAUSING BODILY INJURY.</li> <li>• ALWAYS STAY CLEAR OF FOLDING WINGS WHEN BEING RAISED, LOWERED, OR IN ELEVATED STATE.</li> <li>• ALWAYS INSTALL ALL LOCKUP DEVICES PROVIDED WHEN WINGS ARE IN ELEVATED POSITION.</li> <li>• ENSURE CYLINDER IS COMPLETELY FILLED WITH HYDRAULIC FLUID TO AVOID UNEXPECTED MOVEMENT.</li> </ul>	
C13704	

 <h1 style="margin: 0;">WARNING</h1>
<p><b>Personal injury or property damage may result from loss of control.</b></p> <ul style="list-style-type: none"> <li>• Always use large enough tractor with sufficient braking capacity. <ul style="list-style-type: none"> <li>➢ Weight of fully loaded implement should not be more than 1.5 times weight of tractor.</li> </ul> </li> <li>• Maximum recommended towing speed is 20 mph (32 km/h).</li> <li>• Use flashing amber warning lights and SMV emblem when on public roads, except where prohibited by law.</li> <li>• Refer to tractor and implement Operator's Manuals for weights and further information.</li> </ul>
N24301

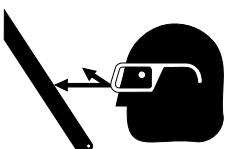

	 <h1 style="margin: 0;">WARNING</h1>
<p style="text-align: center;"><b>OVERHEAD HAZARD</b></p> <p><b>To prevent serious injury or death:</b></p> <ul style="list-style-type: none"> <li>• Front wheel castor may rotate rapidly causing bodily injury.</li> <li>• Stay away from beneath the wheels when in the raised position.</li> <li>• Keep others away.</li> </ul>	
S47332	




**Familiarize yourself with the location of all decals. Read them carefully to understand the safe operation of your machine.**

# Safety

## Safety Signs - Continued

	<div><b>WARNING</b></div> <div><b>HIGH-PRESSURE FLUID HAZARD</b> To prevent serious injury or death:<ul style="list-style-type: none"><li>• Relieve pressure on hydraulic system before servicing or disconnecting hoses.</li><li>• Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands.</li><li>• Keep all components in good repair.</li></ul></div>
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C-4262

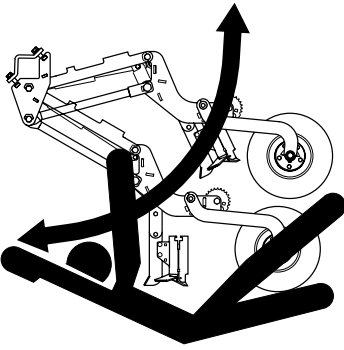

<div><b>WARNING</b></div>
<p>This implement may exceed maximum road regulations. Before you transport this implement contact a local agency regarding road regulations concerning maximum allowable implement dimensions.</p>

C31201

<div><b>WARNING</b></div>

<p>Keep off while machine is moving or mechanism is running.</p>

D13705

	<div><b>WARNING</b></div> <div><b>CRUSHING HAZARD</b> To prevent serious injury or death:<ul style="list-style-type: none"><li>• <b>STAND CLEAR</b> - openers move rapidly under hydraulic pressure.</li><li>• Before servicing hydraulics - Place "System" valve in service position and relieve pressure from hydraulic system.</li><li>• Shut tractor off and remove key before servicing or adjusting depth.</li><li>• Place "Openers" valve in locked position before adjusting depth or transporting.</li></ul></div>
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Familiarize yourself with the location of all decals. Read them carefully to understand the safe operation of your machine.

## Safety Signs - Continued

### Locations

#### Front



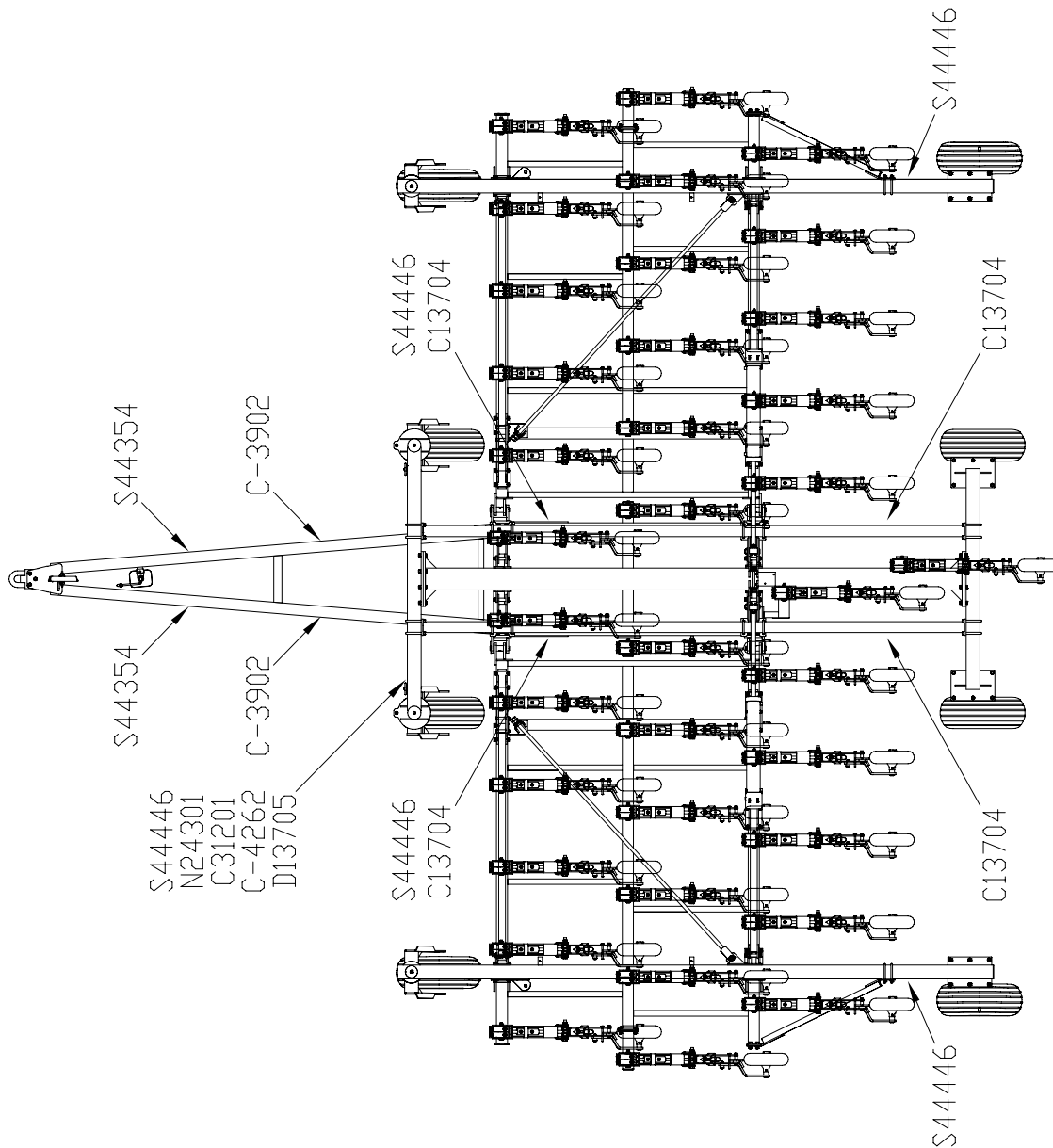
#### Rear



# Safety

## Safety Signs - Continued

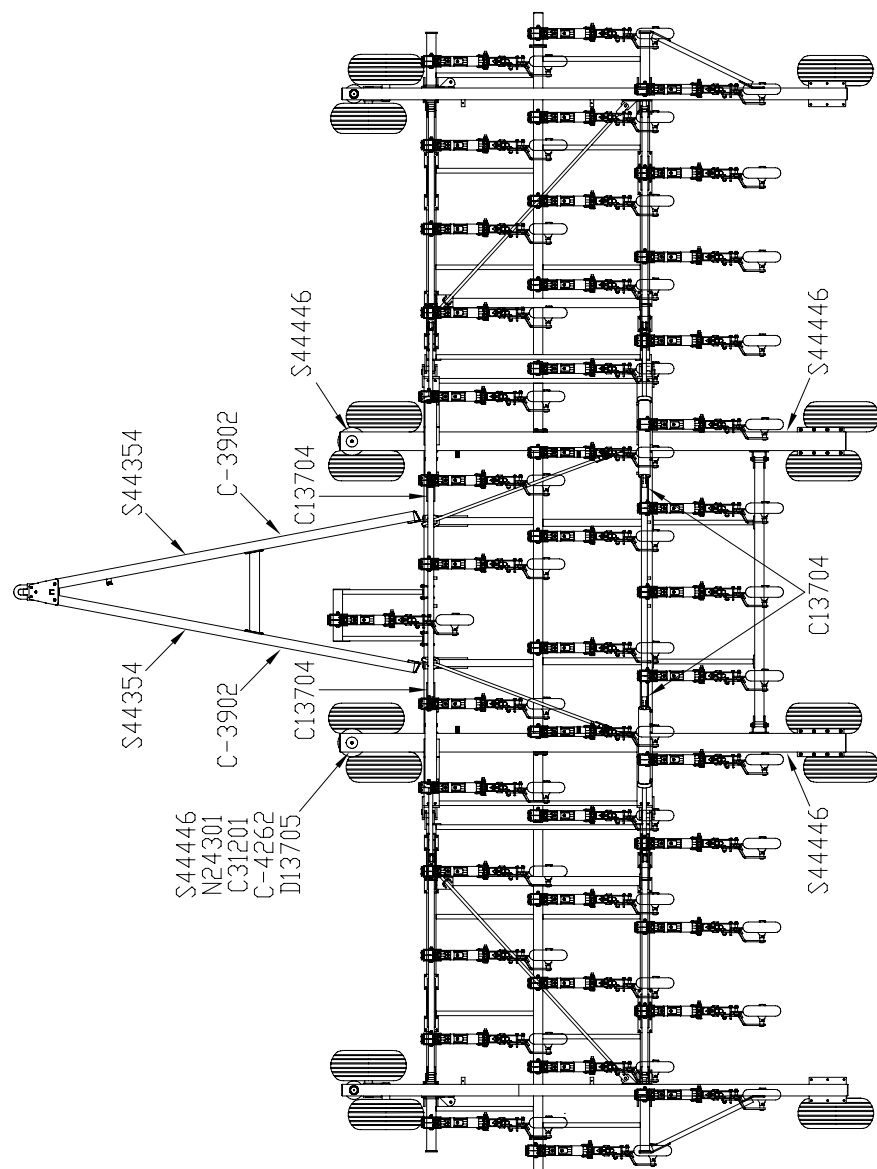
### Decal Locations - 25 and 31 Models





## Safety Signs - Continued

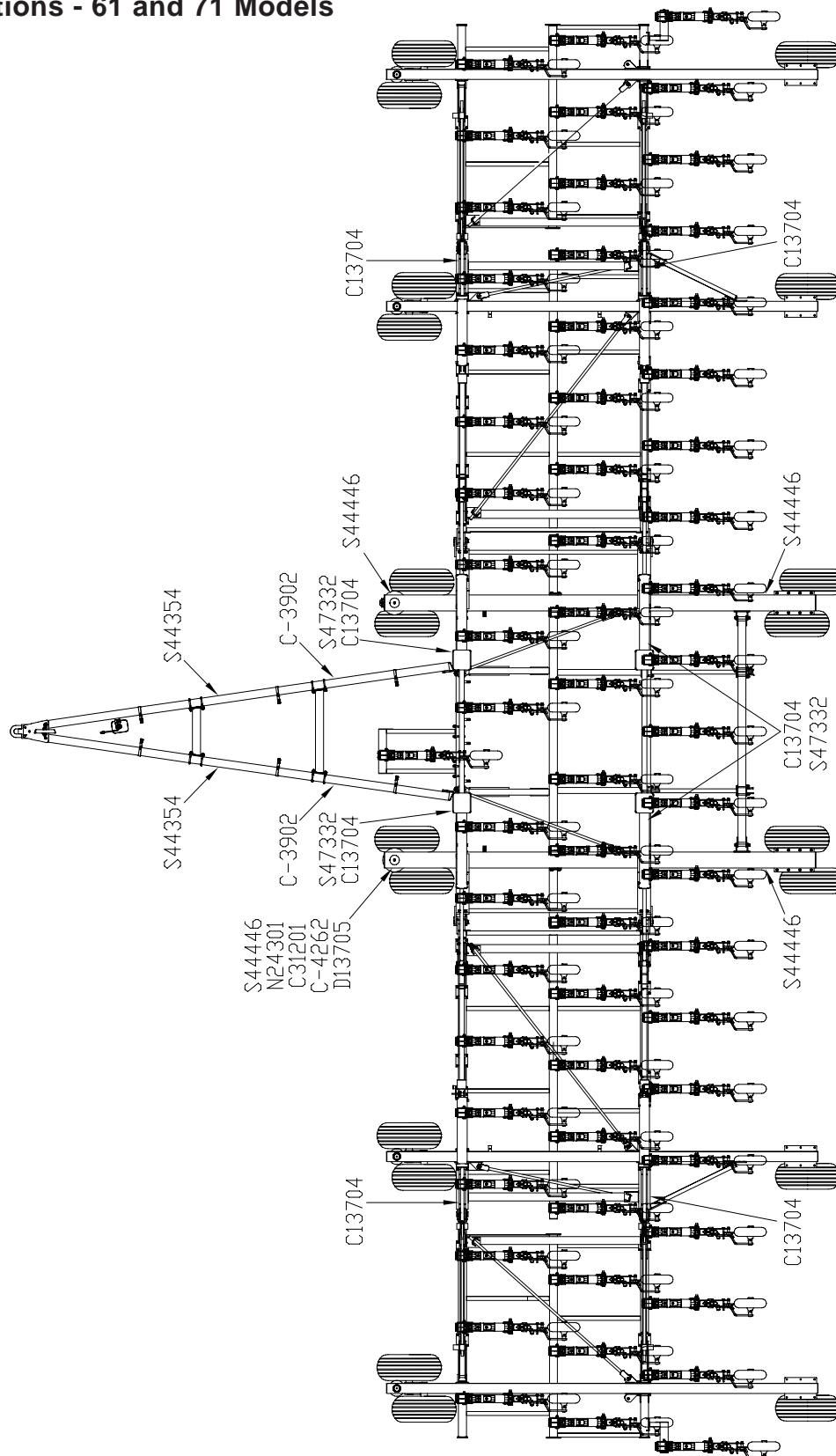
### Decal Locations - 41, 47 and 51 Models



# Safety

## Safety Signs - Continued

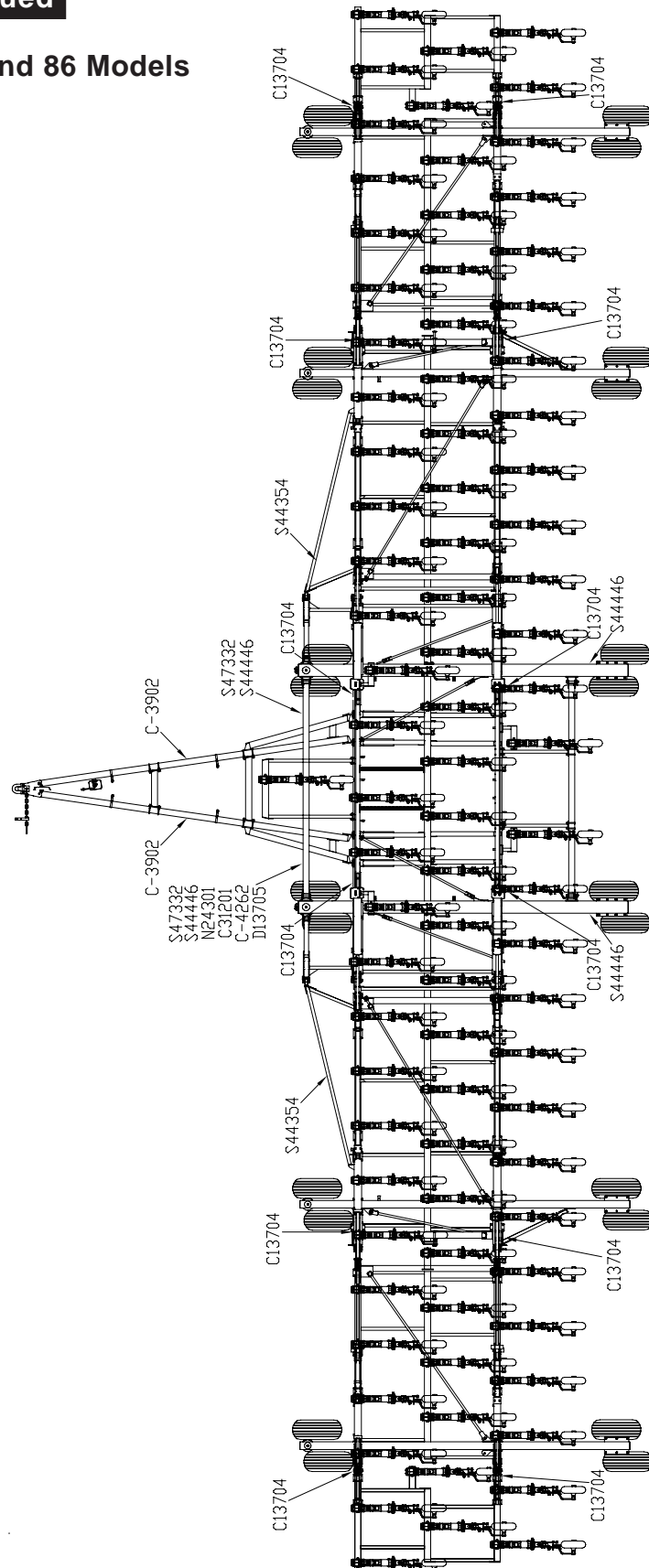
## Decal Locations - 61 and 71 Models





## Safety Signs - Continued

### Decal Locations - 80 and 86 Models



# Safety

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## Lighting and Marking

MORRIS recommends the use of correct lighting and marking to meet the ASAE standard for roadway travel. Be familiar with and adhere to local laws.

Amber warning and red tail lights secured on the machine promote correct transportation of this implement.

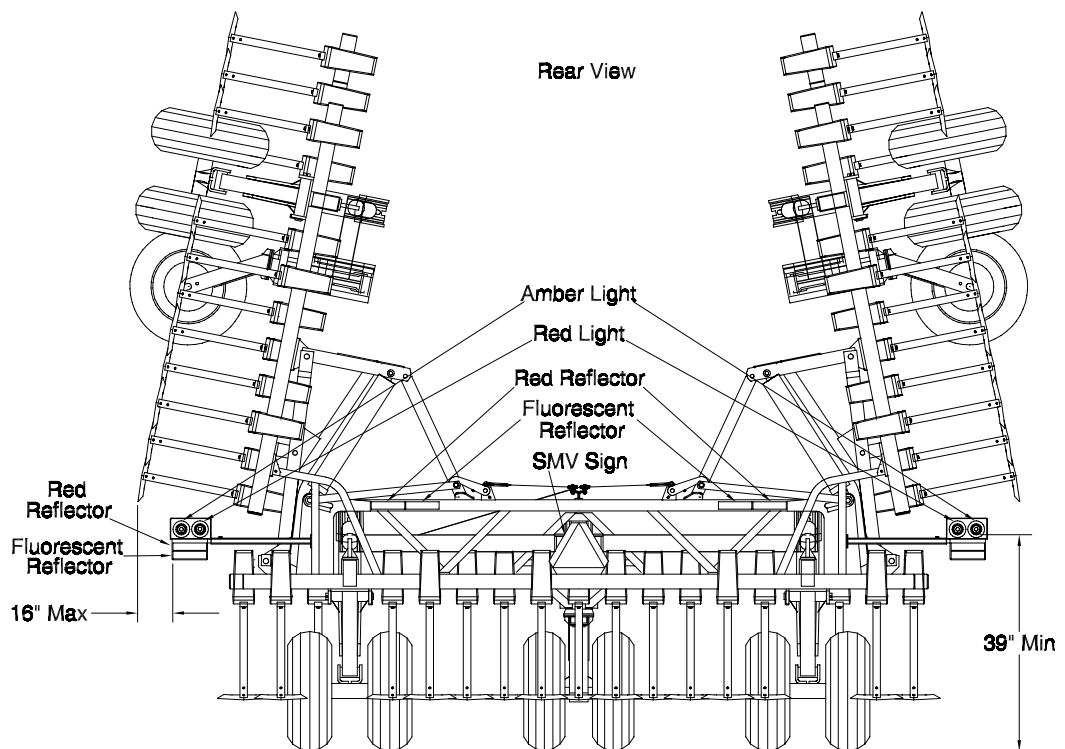
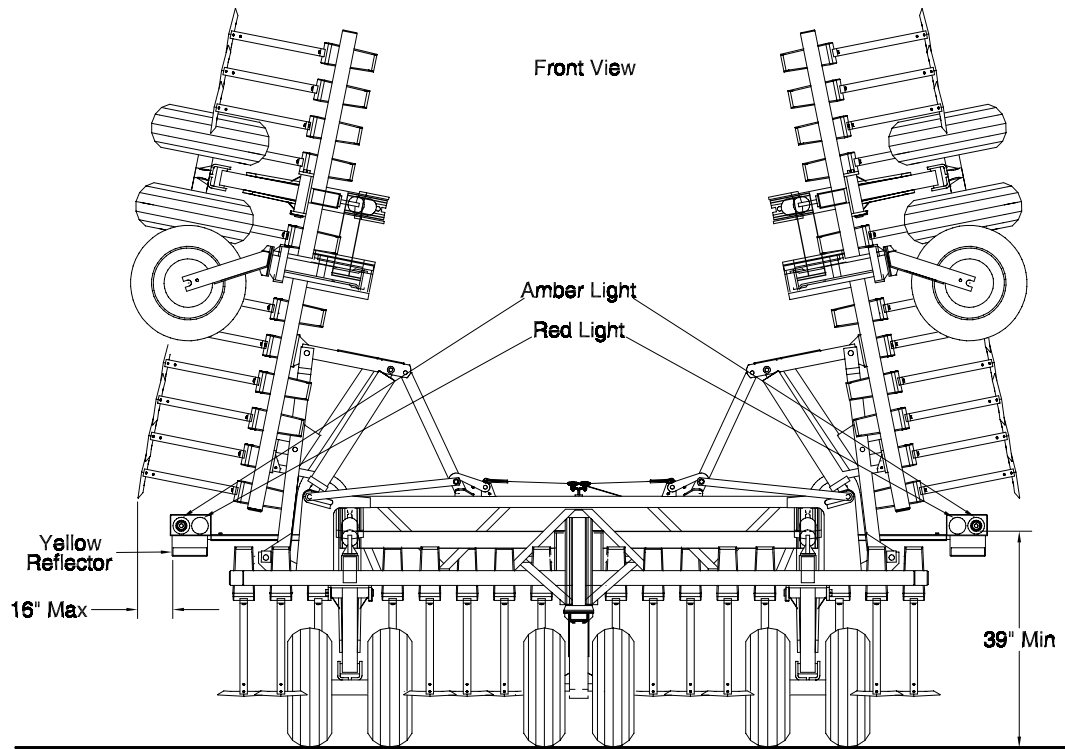
**Note: Always replace missing or damaged lights and/or connectors.**

Amber warning and red tail lights must be mounted to the rear of the implement and be visible from front and rear. The lights must be within 16 inches (41 cm) of the extremities of the machine and at least 24 inches (60 cm) but not over 10 feet (3 m) above ground level.

**Note: Always replace missing or damage front, side, rear reflectors and SMV emblem.**

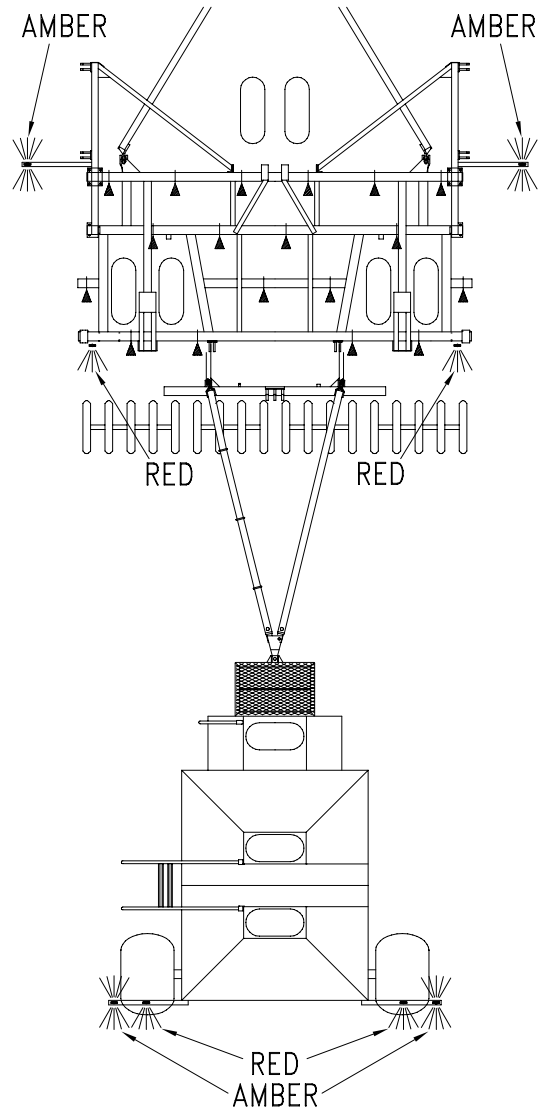
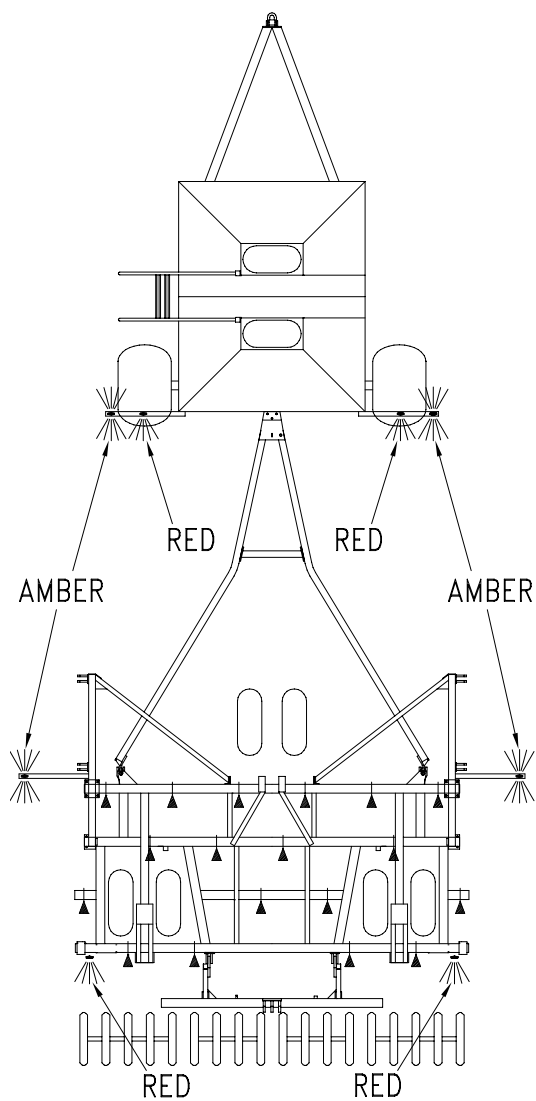


## Lighting and Marking - Continued



# Safety

## Lighting and Marking - Continued



## Section 2: Specifications

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# Specifications

## CONTOUR AIR DRILL Specifications and Options

Base Size		25' (7.62 m)	31' (9.45 m)
Weight	- 10" Spacing	14,738 lb	16,025 lb
	25.4 cm Spacing	6,685 kg	7,269 kg
	- 12" Spacing	13,933 lb	15,155 lb
	30.5 cm Spacing	6,320 kg	6,874 kg
Working Width	- 10" (25.4 cm) Spacing	25' (7.62 m)	30' (9.14 m)
	- 12" (30.5 cm) Spacing	25' (7.62 m)	31' (9.45 m)
Number of Shanks	- 10" (25.4 cm) Spacing	30	36
	- 12" (30.5 cm) Spacing	25	31
Frame Extensions	- 2 Ft (61 cm)	1 (12" spacing only)	1
Frame Width	- Main	5' (1.524 m)	5' (1.524 m)
	- Wing	10' (3.048 m)	13' (3.962 m)
Transport Position	- Width	9' 10" (3 m)	9' 10" (3 m)
	- Height	13' 6" (4.12 m)	15' 11" (4.851 m)
	- Length	31' 6" (9.6 m)	31' 6" (9.6 m)
Opener to Ground Clearance		12" (30.5 cm)	12" (30.5 cm)
Tires	- Main Frame Wheels	(4) 12.5L x 15 FI Load Range F	(4) 12.5L x 15 FI Load Range F
	- Wing Frame Front Castor Wheels (1 per wing)	(2) 12.5SL x 15 12 Ply Rating	(2) 12.5SL x 15 12 Ply Rating
	- Wing Frame Rear Wheels (1 per wing)	(2) 12.5SL x 15 12 Ply Rating	(2) 12.5SL x 15 12 Ply Rating
Opener	- Trip Out Force	Increases proportionally with Packing Force to a maximum of 600 lbs (272 kg)	
	- Packing Force	Adjustable from 70 lbs to 170 lbs (31.7 kg - 77.1 kg)	
	- Packer Wheel	4.80" x 16" Semi Pneumatic or Pneumatic 5.50" x 16" Semi-Pneumatic 4.00" x 16" "V" Crown	
Frame to Ground Clearance		32" (81 cm)	
Frame Depth		94" (238.8 cm) center to center	
Rank to Rank Spacing		47" (119.4 cm) center to center	
Number of Ranks		3 Rows	
Shank to Shank Spacing		30" (76.2 cm) on 10" (25.4 cm) Spacing 36" (91.4 cm) on 12" (30.5 cm) Spacing	
Weight Kit		Optional	
Safety Lights		Standard	
Safety Chain		Standard	

Specifications are estimates and subject to change.

## CONTOUR AIR DRILL Specifications and Options

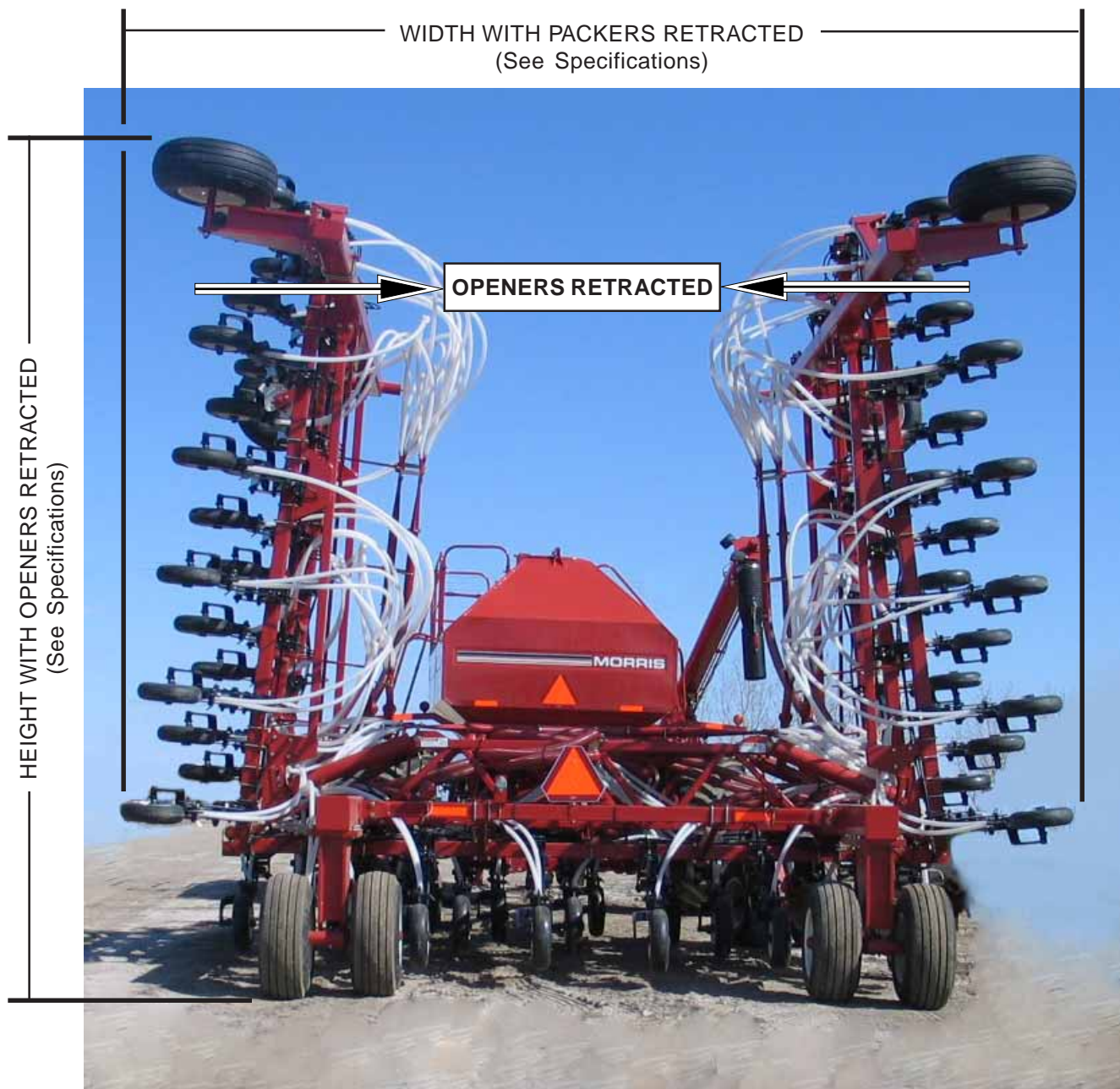
Base Size	3 Frame Models			5 Frame Models			
	41' (12.5 m)	47' (14.32 m)	51' (15.54 m)	61' (18.59 m)	71' (21.64 m)	80' (24.38 m)	86' (26.21 m)
Weight	- 10" Spacing	20,928 lb	22,873 lb	24,622 lb	31,392 lb	35,441 lb	NA
	25.4 cm Spacing	9,470 kg	10,350 kg	11,168 kg	14,239 kg	16,109kg	NA
	- 12" Spacing	19,572 lb	21,366 lb	23,137 lb	29,358 lb	33,264 lb	41,000 lb
	30.5 cm Spacing	8,856 kg	9,668 kg	10,495 kg	13,317 kg	15,120 kg	18,600 kg
Working Width	- 10" (25.4 cm) Spacing	41.67' (12.70 m)	46.67' (14.22 m)	50' (15.24 m)	60' (18.29 m)	70' (21.34 m)	NA
	- 12" (30.5 cm) Spacing	41' (12.5 m)	47' (14.32 m)	51' (15.54 m)	61' (18.59 m)	71' (21.64 m)	80' (24.38 m)
Number of Shanks	- 10" (25.4 cm) Spacing	50	56	60	72	84	NA
	- 12" (30.5 cm) Spacing	41	47	51	61	71	80
Frame Width	- Main	16' (4.88 m)	16' (4.88 m)	16' (4.88 m)	16' (4.88 m)	16' (4.88 m)	21' ( 6.40 m)
	- Wing Inner	12' (3.66 m)	15' (4.57 m)	17.5' (5.334 m)	12' (3.66 m)	15' (4.57 m)	15' (4.57 m)
	- Wing Outer	N/A	N/A	N/A	10' (3.05 m)	12' (3.66 m)	14.45 (4.4 m)
Transport Position	- Width	20' 6" (6.25 m)	20' 6" (6.25 m)	20' 6" (6.25 m)	20' 6" (6.25 m)	20' 6" (6.25 m)	25' (7.62 m)
	- Height	15' 2" (4.62 m)	18' 2" (5.54 m)	15' 2" (4.62 m)	15' 2" (4.62 m)	17' 10" (5.44 m)	17' 10" (5.44 m)
	- Length	31' 6" (9.6 m)	31' 6" (9.6 m)	31' 6" (9.6 m)	34' 10" (10.62 m)	34' 10" (10.62 m)	34' 10" (10.62 m)
Opener to Ground Clearance		12" (30.5 cm)	12" (30.5 cm)	12" (30.5 cm)	12" (30.5 cm)	12" (30.5 cm)	12" (30.5 cm)
Tires	- Main Frame Wheels	(8) 11L x 15 FI Load Range F	(8) 11L x 15 FI Load Range F	(8) 11L x 15 FI Load Range F	(8) 12.5L x 15 FI Load Range F	(8) 12.5L x 15 FI Load Range F	(8) 16.5 x16.1 FI Load Range E
	- Wing Frame Front Castor Wheels	Dual Castor (4) 11SL x 15 12 Ply Rating	Dual Castor (4) 11SL x 15 12 Ply Rating	Dual Castor (4) 11SL x 15 12 Ply Rating	Dual Castor (8) 12.5SL x 15 12 Ply Rating	Dual Castor (8) 12.5SL x 15 12 Ply Rating	Dual Castor (8) 12.5SL x 15 12 Ply Rating
	- Wing Frame Rear Wheels	(1 per wing) (2) 11SL x 15 12 Ply Rating	(1 per wing) (2) 11SL x 15 12 Ply Rating	(1 per wing) (2) 11SL x 15 12 Ply Rating	(1 per wing) (4) 12.5SL x 15 12 Ply Rating	(1 per wing) (4) 12.5SL x 15 12 Ply Rating	(2 per wing) (8) 12.5SL x 15 12 Ply Rating
Opener	- Trip Out Force	Increases proportionally with Packing Force to a maximum of 600 lbs (272 kg)					
	- Packing Force	Adjustable from 70 lbs to 170 lbs (31.7 kg - 77.1 kg)					
	- Packer Wheel	4.80" x 16" Semi Pneumatic or Pneumatic 5.50" x 16" Semi-Pneumatic 4.00" x 16" "V" Crown					
Frame to Ground Clearance		32" (81 cm)					
Frame Depth		94" (238.8 cm) center to center					
Rank to Rank Spacing		47" (119.4 cm) center to center					
Number of Ranks		3 Rows					
Shank to Shank Spacing		30" (76.2 cm) on 10" (25.4 cm) Spacing 36" (91.4 cm) on 12" (30.5 cm) Spacing					
Weight Kit		Optional					
Safety Lights		Standard					
Safety Chain		Standard					

Specifications are estimates and subject to change.



# Specifications

## Transport Dimensions





## Section 3: Checklist

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# Checklist

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## SAFETY-ALERT SYMBOL



Watch for this symbol. It identifies potential hazards to health or personal safety. It points out safety precautions. It means:

**ATTENTION - BE ALERT.**  
**Your safety is involved.**

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### Manuals

**Note:** Pre-Delivery Inspection Form must be completed and submitted to Morris Industries within 30 days of delivery date.

**Warranty Void if Not Registered**

**Parts Manual**

Order Part Number S44322

**Assembly Manual**

Order Part Number S44321 (For 41 ft to 86 ft)  
Order Part Number S45807 (For 25 ft and 31 ft)

## Checklist

Please read the Operator's Manual carefully and become a "SAFE" operator.

Adopt a good lubrication and maintenance program.

### General

- ☐ Check if assembled correctly.
- ☐ Check hose connections.

### Lubrication - Grease

- ☐ Opener Wheel Hubs
- ☐ Wheel Hubs
- ☐ Castor Pivots

### Tire Pressure

- ☐ See tire chart in Maintenance, Section 6.

### Transport

- ☐ Tighten wheel bolts.
- ☐ Check hose connections.
- ☐ Accumulator pressure is at 0.
- ☐ Ball valves are in locked position.

### OWNER REFERENCE

Model: \_\_\_\_\_  
Serial No: \_\_\_\_\_  
Dealer: \_\_\_\_\_  
Town: \_\_\_\_\_ State: \_\_\_\_\_  
Phone: \_\_\_\_\_  
OWNER/OPERATOR: \_\_\_\_\_  
Date: \_\_\_\_\_



**TAKE SAFETY SERIOUSLY.**

**DO NOT TAKE  
NEEDLESS CHANCES!!**

# Checklist

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**Notes**

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## **Section 4: Introduction**

### **Section Contents**

Introduction .....	4-2
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# Introduction

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## Introduction

This Operator's Manual has been carefully prepared to provide the necessary information regarding the operation and adjustments, so that you may obtain maximum service and satisfaction from your new MORRIS CONTOUR DRILL floating hitch cultivator.

To protect your investment, study your manual before starting or operating in the field. Learn how to operate and service your CONTOUR DRILL floating hitch cultivator correctly, failure to do so could result in personal injury or equipment damage.

If you should find that you require information not covered in this manual, contact your local MORRIS Dealer. The Dealer will be glad to answer any questions that may arise regarding the operation of your MORRIS CONTOUR DRILL floating hitch cultivator.

MORRIS Dealers are kept informed on the best methods of servicing and are equipped to provide prompt efficient service if needed.

Occasionally, your CONTOUR DRILL floating hitch cultivator may require replacement parts. Your Dealer will be able to supply you with the necessary replacement parts required. If the Dealer does not have the necessary part, the MORRIS Factory will supply the Dealer with it promptly.

Your MORRIS CONTOUR DRILL floating hitch cultivator is designed to give satisfaction even under difficult conditions. A small amount of time and effort spent in protecting it against rust, wear and replacing worn parts will increase the life and trade-in value.



**Keep this book handy for ready reference at all times.** It is the policy of Morris Industries Ltd. to improve its products whenever it is possible to do so. The Company reserves the right to make changes or add improvements at any time without incurring any obligation to make such changes on machines sold previously.

# Section 5: Operation

## Section Contents

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# Operation

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## CAUTION



**BE ALERT**

## SAFETY FIRST

**REFER TO SECTION 1 AND REVIEW ALL  
SAFETY RECOMMENDATIONS.**

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## Application

The Morris CONTOUR DRILL utilizes independent parallel link openers. Each opener moves independently of the frame and each other to follow every contour of the land closely. The unique design of the opener allows the Morris CONTOUR DRILL to be used in a variety of seeding applications from conventional to zero till applications.

---

## Tractor

### Tires

- Proper ballast and tire pressure are required when pulling heavy implements.
- Consult your tractor operator's manual and follow all recommended procedures.

### Hydraulics

- Wipe all hydraulic fittings and couplers with a clean cloth to avoid contaminating the system.
- Check that hydraulic reservoir is filled to the proper level.

### Drawbar

- Centre and pin in a fixed position for easier hitching and greater stability.



## Warning

**Do not permit smoking, sparks or an open flame where combustible fuels are being used. Keep the work area well ventilated.**



## Warning

**Do not search for high pressure hydraulic leaks without hand and face protection. A tiny, almost invisible leak can penetrate skin, that requires immediate medical attention.**

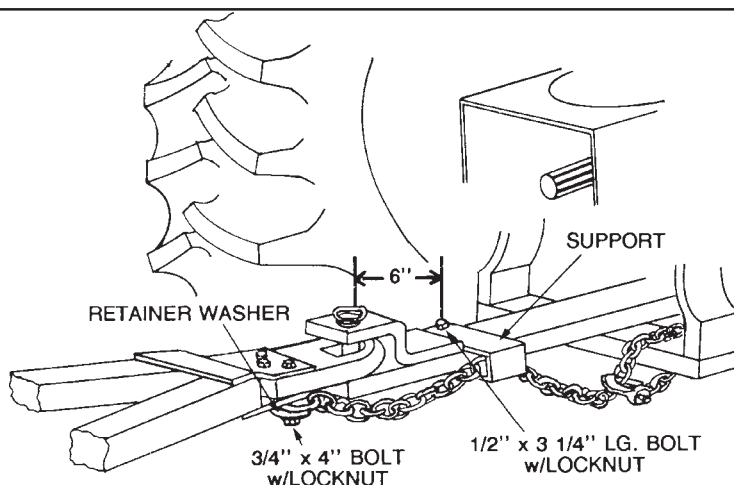


## Hitching



### Caution

A safety chain will help control towed machines should it accidentally separate from the drawbar while transporting. A runaway machine could cause severe injury or death. Use a safety chain with a strength rating equal to or greater than the gross weight of the towed machines.



Attach safety chain to the tractor drawbar support or other specified anchor location with the appropriate parts.

## Hitching to Tractor

- Ensure swinging drawbar is locked in the centre position.
- Ensure hitch pin is in good condition.
- Level clevis with tractor drawbar using hitch jack.
- Back tractor into position and attach hitch clevis to drawbar, using an adequate hitch pin.
- Lock hitch pin in place with a hairpin or other proper locking device.
- After tractor to implement connection is made, relieve pressure off the hitch jack.
- Place hitch jack in raised position.
- Route Safety Chain through chain support and drawbar support.
- Lock safety hook onto chain.

**Note:** Provide only enough slack in chain to permit turning.



Hitch Jack Raised



### Caution

Dirt in the hydraulic system could damage O-rings, causing leakage, pressure loss and total system failure.

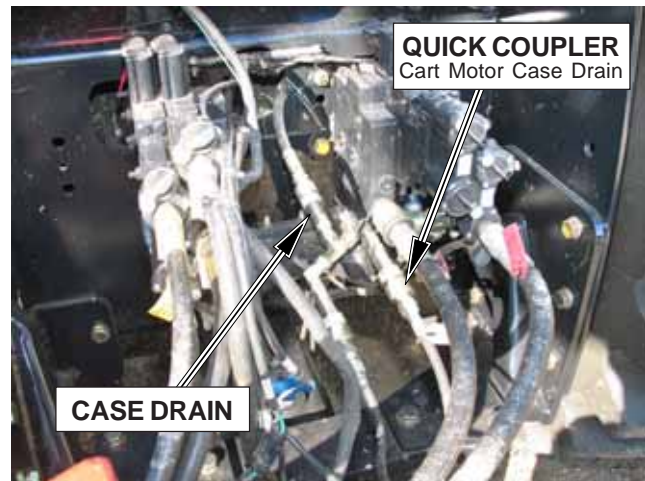
# Operation

## Hitching to Tractor - Continued

- Ensure hydraulic hose quick couplers are dirt free.
- Inspect all fittings and hoses for leaks and kinks. Repair as necessary
- Connect the hydraulic hoses to the tractor quick couplers.

**Note:** For proper venting of the pressure reducing valve, the 1/4" diameter hose marked "Case Drain" must be run directly into the hydraulic tank. Also, the Air Cart motor "Case Drain" hose must be connected to this line at the quick coupler provided. If the hose is run through the filler cap then ensure the cap is *VENTED*. A quick coupler can still be used between the tractor and the seeding tool.

- Mount digital pressure gauge in tractor cab with the LCD visible and with in easy reach to operate.
- Route the digital pressure gauge harness away from moving parts and sharp protrusions. Connect the red wires to the positive (+) terminal of the battery. Connect the black wires to the negative (-) terminal of the battery.



Hydraulic Coupling on Tractor



## Unhitching from Tractor

- Pin hitch jack in storage position.
- Lower hitch jack taking the weight off the hitch clevis.
- Ensure all transport locks are properly secured.
- Place "System" ball valve into service position and relieve accumulator pressure from the opener system before uncoupling hydraulic hoses.
- Relieve pressure in the wing lift hydraulic hoses by positioning tractor hydraulic lever in "float" position or turn tractor engine off and cycle lever back and forth several times.
- Disconnect the hydraulic hoses.
- Remove the safety chain.
- Remove the drawbar pin.
- Slowly move tractor away from cultivator.



Hitch Jack Lowered

## Transport

Observe all applicable safety precautions under transport heading in Safety, Section 1.

- Refer to Specifications, Section 2, for weight, transport height, and width.
- Transport with tractor only!
- Ensure safety chain is attached correctly to the towing vehicle and the hitch of the implement.
- Inspect tires for any serious cuts or abrasions. If such has occurred, tire should be replaced.
- Raise and lower wings on **level ground**.
- Never raise or lower wings when moving.

### Speed

- Always travel at a safe speed. Do Not Exceed 20 mph (32 kph).
- The weight of the implement being towed *must not exceed 1.5 times* the weight of towing vehicle.

### Lights

- Ensure proper reflectors are in place, refer to Safety, Section 1.
- Use flashing amber warning lights, turn signals and SMV emblems when on public roads.
- Be familiar with, and adhere to, local laws.

**MORRIS INDUSTRIES LTD. WILL NOT BE RESPONSIBLE FOR ANY DAMAGES OR OPERATOR INJURY RESULTING FROM NON-USE OR IMPROPER USE OF TRANSPORT LOCKS.**

## Caution

**Raise and lower wings on level ground. Never raise or lower wings when moving.**

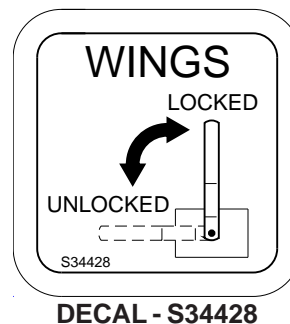
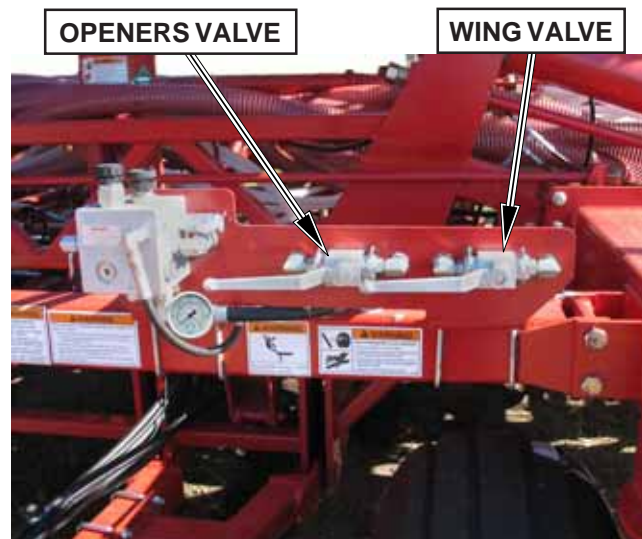
# Operation

## Transport - Continued

### Transport to Field Position

- Position machine on **level ground**.
- Stop tractor, and engage park brake.
- As a precaution, check surrounding area to be sure it is safe to lower wings.
- Remove castor lock pin from main frame gauge wheels.
- Unlock the wing valve and opener valve. Do not walk under raised wings.
- Operate opener hydraulics, to ensure all openers are retracted.
- Operate wing lift hydraulics until wings are lowered and the cylinder shafts are completely extended to allow wings to float when working in uneven land.  
**Never raise or lower wings when moving.**

**Note:** When raising or lowering wings, do so in **one continuous motion until fully up or down**. Do not stop flow part way allowing wings to fold on their own. This may disrupt the sequence of operation.



## **Danger**

Always stay clear of wings being raised, lowered or in elevated position. Ensure cylinders are completely filled with hydraulic fluid - wings may fall rapidly causing injury or death.





## Transport - Continued

### Field to Transport Position

- Position machine on **level ground**.
- Stop tractor, and engage park brake.
- Ensure wing lift cylinders are fully extended.

**Note:** The wing lift cylinders must be fully extended to ensure proper operation of the flow control valve (FCV) manifold.

- Operate the opener hydraulics, to raise the openers fully.
- Operate the wing lift hydraulics, to raise the wings fully into transport position. **Never raise or lower wings when moving.**

**Note:** When raising or lowering wings, do so in one continuous motion until fully up or down. Do not stop flow part way allowing wings to fold on their own. This may disrupt the sequence of operation.

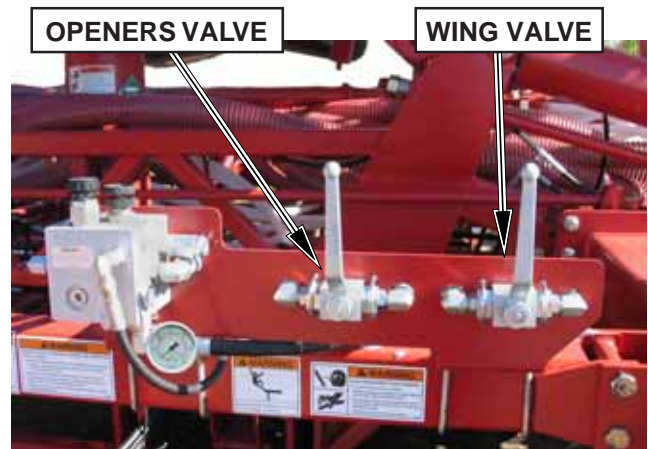
- Secure the main frame gauge wheel castors lock pins. **It is important to pin the castor wheels to prevent excessive shimmying of wheels at transport speeds.**
- Lock wing lift valve and opener valve. Do not walk under raised wings.
- Ensure safety chain is properly installed, see "Hitching to Tractor" of the Operation Section.

### Danger

**Always stay clear of wings being raised, lowered or in elevated position. Ensure cylinders are completely filled with hydraulic fluid - wings may fall rapidly causing injury or death.**

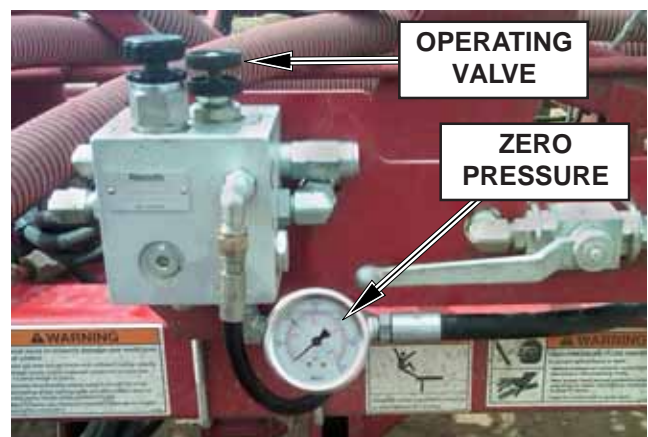
For long distance transport or storage bleed all pressure from Opener hydraulic system:

- Operate the opener hydraulics, to raise the openers fully.
- Screw "Operating" valve out to open position.
- Put tractor remote in "float" position.
- Let openers drop and pressure go to 0 psi (or near 0 psi) on gauge.
- Lift openers to transport position and lock "Openers" valve.



## Important

Castor wheel lock pins must be removed for 90 degree turns.



Pressure Gauge

# Operation

## Opener Operation

### Accumulator System Operation and Pre-Charge Information

- Always turn “Operating” valve out to bleed off/ service position and relieve hydraulic pressure from the system before performing maintenance or repairs.

**Note: Accumulator can store pressure even when disconnected from tractor.**

- The gas bladder in the hydraulic accumulator should be pre-charged with dry nitrogen gas before being mounted on the unit.
- Different accumulator pre-charge pressures will allow for different ranges of trip out force, as shown in the chart.
- Pre-charge pressure should be set for the most common working conditions.
- Lower pre-charge pressures with higher operating pressures will give longer lifting and lowering times.

## Warning



### **HIGH-PRESSURE FLUID HAZARD**

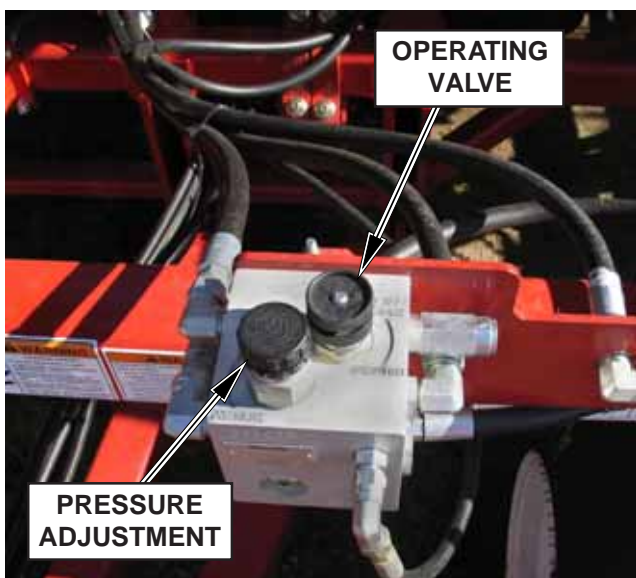
**To prevent serious injury or death:**

- **Relieve pressure on hydraulic system before servicing or disconnecting hoses.**
- **Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands.**
- **Keep all components in good repair.**

### Accumulator Operating Range

Nitrogen Pre-charge Pressure	Trip Force	
	Minimum	Maximum
500 psi (3,445 kPa)	250 lbs (113 kg)	600 lbs (272 kg)

\* Maximum system hydraulic pressure is 1200 psi or 4 times the pre-charge pressure, whichever is the lower number.



## Opener Operation - Continued

### Setting Maximum System Pressure (Trip Out Force)

- To determine the approximate trip out force in pounds on each shank, divide the system hydraulic pressure in the circuit by 2.

For example: A system hydraulic pressure of 1000 psi (6895 kPa) would be approximately 500 lbs (227 Kg) trip force at each shank.

**Note:** Due to the variation of friction effects, this trip force is approximate.

- Maximum hydraulic operating pressure can be set by dialing the reducing valve in to increase allowable pressure, and dialing it out to decrease allowable pressure. This adjustment is done in order to set a maximum working pressure; pressure can be decreased below the set point and increased back up to the set point on the go from the tractor.
- Ensure the “Operating” valve is set to operating position and the “Openers” ball valve is set to unlocked position to allow flow.
  - Begin by dialing the adjustment all the way out on the “Pressure” valve.
  - Dial the “Pressure” valve setting in 1 full turn.
  - Operate the tractor remote to pressurize the accumulator circuit. Once the pressure has stopped climbing check the system pressure on the gauge.

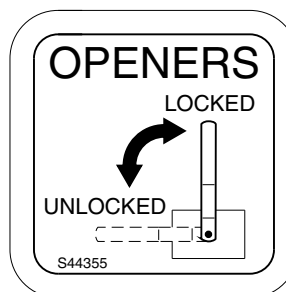
**Note:** Set “Pressure” valve pressure 100 - 150 psi above the desired working pressure in order to allow for pressure drop from accumulator cooling and valve hysteresis. System pressure will level off and hold after approximately 1 minute.

- If the pressure in the system is high enough to achieve the desired trip out force, setting is complete. If the pressure is too low, relieve the circuit pressure using the tractor remote and repeat steps 3 and 4 until the desired pressure is achieved.
- If the system pressure is too high, relieve the circuit pressure using the tractor remote, and then dial the “Pressure” valve adjustment out incrementally. Repeat step 4 until the desired system pressure has been reached.

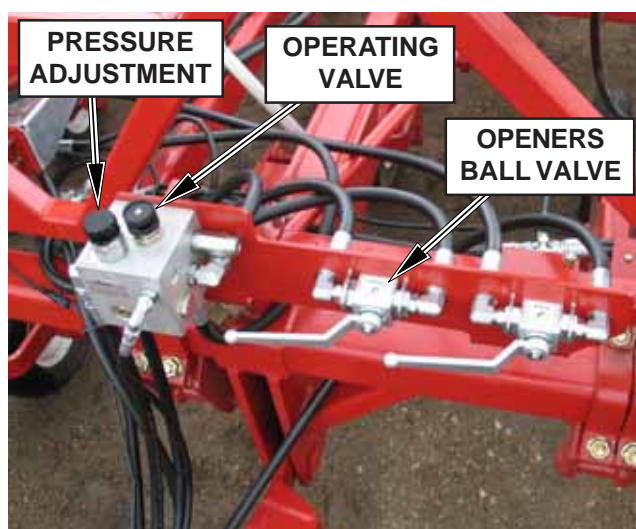
**Note:** Operate system at the lowest system pressure that will keep shanks locked vertical during seeding and provide adequate packing pressure. Excessive hydraulic pressure may disturb rocks and damage carbides.

## Important

Do not exceed 4 times the nitrogen pre-charge pressure or 1200 psi, whichever is the lower number.



DECAL - S44355



Valve Locations



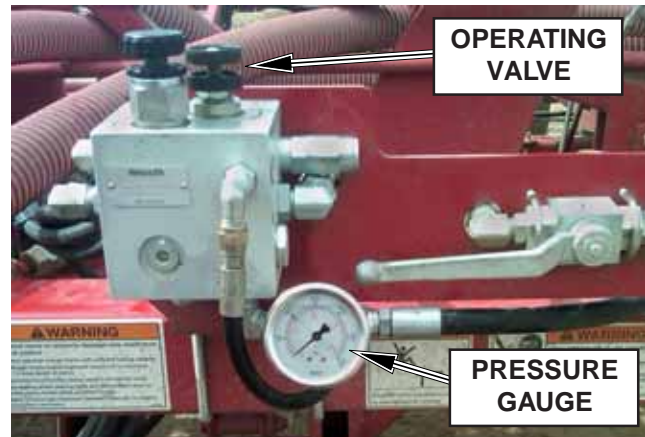
# Operation

## Opener Operation - Continued

### Relieve System Pressure

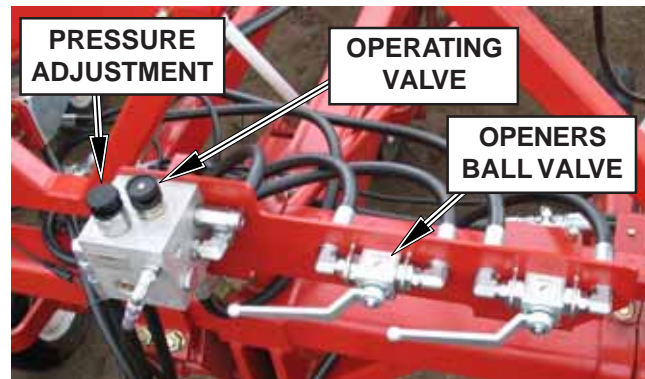
To bleed all pressure from Opener hydraulic system:

- Open “Operating” valve to service/bleed-off position.
- Lift openers to transport position.
- Put tractor remote in “float” position.
- Let openers drop and pressure go to 0 psi (or near 0 psi) on gauge.
- Lift openers to transport position and lock “Openers” valve.



### Normal Operation

- Set operating pressure as described under “Setting Maximum System Pressure”.
- Ensure the “Operating” valve is turned in to operating position and the “Openers” ball valve is set to unlocked position to allow oil flow.
- With the Contour Air Drill moving forward, lower openers into the ground. Hold tractor hydraulic lever until the maximum preset operating pressure is reached (see “Setting Maximum System Pressure”). This ensures that all of the openers are fully charged and engaged.
- When turning at head land, the openers do not need to be completely cycled from working to fully lifted position. The openers can be lifted just to the point that they do not contact the ground. This will reduce the time required to fully recharge the hydraulic accumulator to the preset operating pressure.
- Avoid sharp turns with drill in ground. Turns sharp enough to cause the inside openers of the air drill to reverse direction may cause openers to plug.



Valve Locations

**Note:** Under “Normal Operation” the valve block will maintain the set system pressure in the accumulator when openers are raised.





## Opener Operation - Continued

### Pressure Adjustment (On the go)

Pressure can be changed on the go to adjust for variable field conditions by using the tractor remote.

In order to lower the accumulator pressure on the go, the “Operating” valve must be turned out to the bleed-off/service position.

**Note: Operating pressure may drop more than the 100 psi (689 kPa) described under “Setting Maximum System Pressure” when the “Operating” valve is set to the bleed-off/service position. This is dependant on tractor valve leakage.**

- Screw “Operating” valve out to open position for “on the go” pressure adjustment.

Operate the openers as usual:

- With the Contour Air Drill moving forward, lower openers into the ground. Hold tractor hydraulic lever until the maximum preset operating pressure is reached (see “Setting Maximum System Pressure”). This ensures that all of the openers are fully charged and engaged.

To reduce operating pressure on the go:

- Place tractor hydraulic lever into “Float Position” until pressure drops to desired operating point.
- Release hydraulic lever once desired pressure is reached.

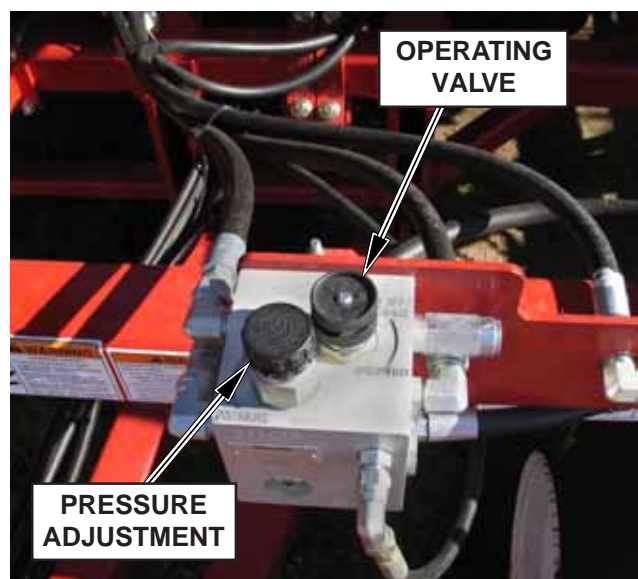
**Note: If pressure drops too rapidly when tractor remote is put into float, the “Operating” valve can be turned in a few turns to reduce bleed-off speed.**

To increase operating pressure:

- Operate tractor hydraulic lever to increase pressure to desired operating point.

## Important

The “Operating” valve must be set to the “Bleed Off / Service” Position in order to lower accumulator pressure with openers in operating position.

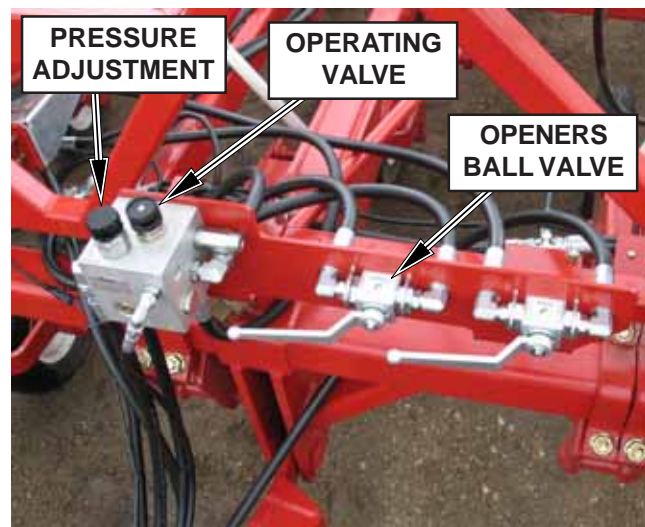
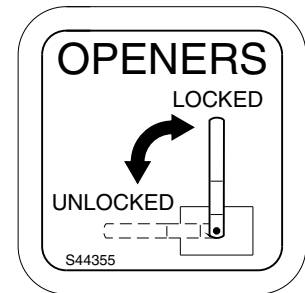


# Operation

## Depth Adjustment

To adjust seed depth:

- Lift openers to raised position (allow pressure gauge to reach zero).
- Shut tractor off and remove key.
- Ensure tractor park brake is engaged before proceeding.
- Place "Openers" ball valve into locked position to prevent accidental oil flow to openers.



Valve Locations

S44446

### WARNING

**CRUSHING HAZARD**

To prevent serious injury or death:

- **STAND CLEAR** - openers move rapidly under hydraulic pressure.
- Before servicing hydraulics - Place "System" valve in service position and relieve pressure from hydraulic system.
- Shut tractor off and remove key before servicing or adjusting depth.
- Place "Openers" valve in locked position before adjusting depth or transporting.

## Depth Adjustment - Continued

- Remove lynch pin from 1/2" diameter depth pin.
- Remove depth pin.
- Rotate depth cam to desired lettered setting ("A" is the shallowest position). Each increment changes the depth a 1/4" (6.4 mm).
- Reinstall 1/2" pin and lynch pin noting letter position before adjusting other openers.

**Note:** For ease of adjustment, adjust a few openers across the drill to confirm desired seeding depth before adjusting the remaining openers.

- Move the "Openers" ball valve to the unlocked position before using drill.



Adjustment Cam

## Important

**Pneumatic Tires Only.**

**Keep opener tires air pressure at the listed specifications to achieve and maintain proper seed depth.**





# Operation

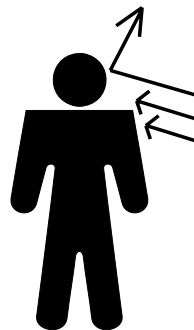
## General Guidelines

The results obtained from the Morris Contour Drill are directly related to the depth uniformity of the unit. Worn points, uneven tire pressures, and bent shanks must be avoided to obtain optimum field results.

- Operating depth should be uniform at all opener locations, when spot checking the implement in the field.
- Check openers running in tractor or air cart tracks and adjust depth accordingly.
- Repair or replace bent shanks. Bent shanks cause openers to work at uneven depths and can cause unnecessary ridging. See Maintenance Section.
- Keep tire pressure at the listed specifications to maintain proper level. See Maintenance Section.
- Have Air Drill moving forward before lowering into ground to avoid plugging openers.
- Avoid sharp turns. Turns sharp enough to cause the inside openers of the air drill to reverse direction are not recommended. This may cause the seed openers to plug.



**TAKE SAFETY SERIOUSLY.**  
**Do Not Take Needless Chances!**



## Caution

Care should be taken when working near the air cart while the fan is running. Product blowing out of the system could cause personal injury.



## Quick Tips

**Note: Read the Operator's Manual for detailed operating and adjustment instructions.**

### Shank Trip Force

Shank trip force (lbs) is calculated by dividing the display pressure by 2 (ex. 1000 psi display pressure = 500 lbs shank trip force). Shank trip out pressure is generally set at the minimum pressure that keeps the shanks solid in the vertical position and prevents them from repeatedly “tripping out”, while still providing adequate packing. Maximum recommended shank trip out pressure is 1200 psi.

### Packing Force

Packing force is proportional to shank trip out force and is roughly 1/3 of the shank trip force (ex. 500 lbs shank trip force would give approximately 167 lbs of packing force).

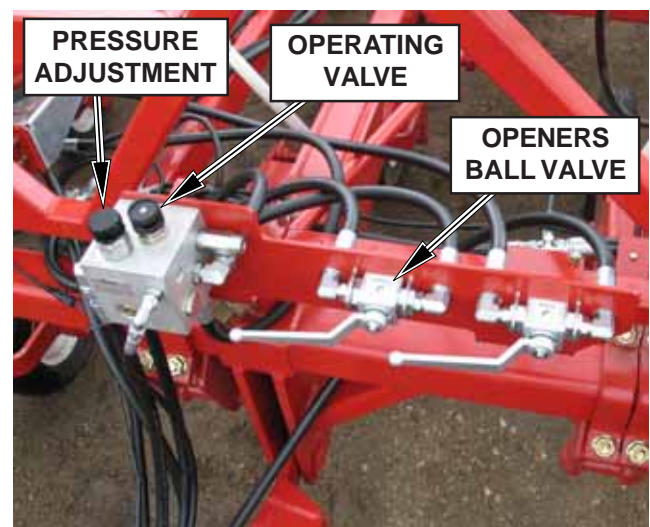
### Hydraulic System

The Contour Air Drill uses a passive hydraulic system (no constant flow is needed from the tractor during seeding). Maximum operating pressure is set using the reducing valve on the frame (see “Setting Maximum System Pressure”). Pressure can be changed on the go to adjust for variable field conditions by using the tractor remote (see “Pressure Adjustment”). If full range adjustment of pressure is desired, the reducing valve can be set at its maximum pressure and the operator can then adjust pressure manually by watching the pressure display and opener shanks.

**Note: It is normal for the pressure to drop 100 to 150 psi from the initial set point while the accumulator cools (the reducing valve can be set higher to account for this initial pressure drop). If the pressure continues to drop quickly, check the machine for a cylinder, fitting, or hydraulic line leak.**

### Lifting and Lowering the Openers

The openers do not need to be completely cycled from working to fully lifted position while turning. Openers can be lifted just to the point that they do not contact the ground while turning, in order to save time by not having to fully recharge the hydraulic accumulator with fluid each cycle (the display pressure won't drop all the way to zero). When transporting the drill, lift the openers and ensure that the display pressure goes down to zero.



Valve Locations

# Operation

## Quick Tips - Continued

### Setting the Seed Depth

Seed depth is measured from the packed soil surface to the seed. Set the seed depth on the drill by setting a few openers across the drill to different depths and seeding a test patch. Always seed the test patch at the same ground speed and opener pressure that you intend to maintain during regular seeding conditions. Then check the seed depth of these openers, pick the depth setting that you prefer, and set all openers to the desired letter setting on the depth adjustment cam. The openers perform best while seeding from 1/2" (13mm) to 1-1/2" (38 mm) seed depth, but each customer is responsible for choosing their own depth setting according to their preferences and experience. Each adjustment notch on the adjustment cam is 1/4" (6.4 mm) adjustment. Shallow depth settings can be consistently maintained with the Contour Air Drill system.

**Note: Be sure to check tractor and/or air cart tracks to see if the added soil compaction has affected the seed depth; the independent openers can be adjusted separately to compensate for wheel tracks.**

### Seeding Conditions

The Contour Air Drill is meant to be used as a minimum to no-till seeding system and care should be taken when attempting to seed into loose or pre-worked soil conditions. Shallow seeding depth, reducing operating speed and operating pressure may help reduce soil throw and ridging in soft conditions.

**Note: Soil throw onto adjacent seed rows also occurs on conventional air drills with gang style packers, but is less visible because the gang packers pack all rows simultaneously at the back of the drill.**

### Straw Management

Successful seeding starts at harvest. The height of the straw should not exceed the row spacing of the seeding unit. The combine should chop the straw and spread the straw and chaff evenly across the entire swath width. A heavy harrow may also be required to spread and break down the straw after the field has been harvested. If the straw height does exceed the row spacing a mower should be used to shorten the straw length.



## IMPORTANT

The Paired Row Opener with the NH3 adapter is intended to allow the operator the flexibility to switch between granular fertilizer and NH3 without having to change openers. The opener is not intended to apply granular fertilizer and NH3 in the same operation. Excessive gassing off of the NH3 will occur in such an operation. Producers are still able to place starter fertilizer with the seed.

**Morris Industries shall have no obligation or liability of any kind on account of the end-user incorrectly using this opener.**



## Quick Tips - Continued

### Air Drill Frame

The Contour Air Drill frame is a simple slab frame system, designed to let the parallel link openers do the work of depth control and leveling during seeding. No leveling of the frame is required. During normal operation of the drill there will be very little weight on the rear tires of the frame. The rear tires may even leave the ground while traveling through sharp gullies; this is normal, and it will not affect the seed depth control of the openers. If the tires are lifted in the air consistently, optional weight kits can be applied to the depth beams near the rear axles.



Weight Kit



Normal Frame Angle

### Trouble Shooting Guide

**\*Note:**The “Operating” valve must be turned out to the bleed-off/service position and remove all pressure from hydraulic systems before attempting any service work on hydraulic components.

Hydraulic system must be bled after it has been serviced (if any portion of the system has been opened to atmosphere). See “Bleeding Hydraulic System” in Maintenance Section.



# Operation

## Wing Lift Hydraulics

The wing lift hydraulic system is controlled by a parallel hydraulic system. A pressure compensated Flow Control Valve is used to control the flow of oil to the cylinders allowing both wings to fold and unfold simultaneously. A hydraulic circuit Shut Off valve is used to lock the hydraulic circuit and prevent any leak back, this ensures the wings remain in transport.

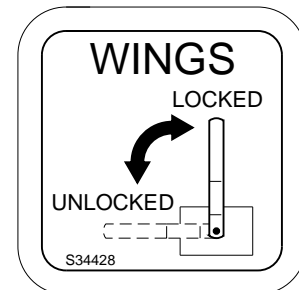
The Flow Control Valve is located on the main frame and there are no adjustments associated with the valve.

The Shut Off valve is located on the front wing lift truss for easy access.

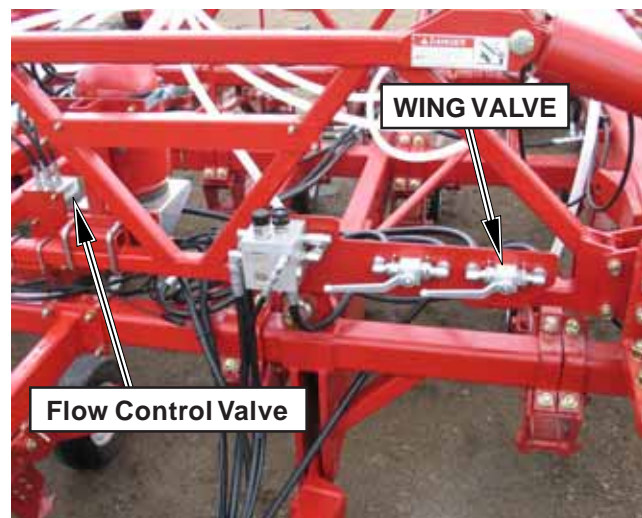
To unfold the Air Drill, the oil flows to the Flow Control Valve, from there to the butt end of all the wing lift cylinders extending the shafts and lowering the wings. All cylinders must be fully extended to ensure correct operation of the machine.

Placing the unit into transport is the reverse of unfolding the unit. Oil is fed to the shaft end of the cylinders retracting the cylinders and lifting the wings into transport position.

**Note:** When raising or lowering wings, do so in one continuous motion until fully up or down. Do not stop flow part way allowing wings to fold on their own. This may disrupt the sequence of operation.



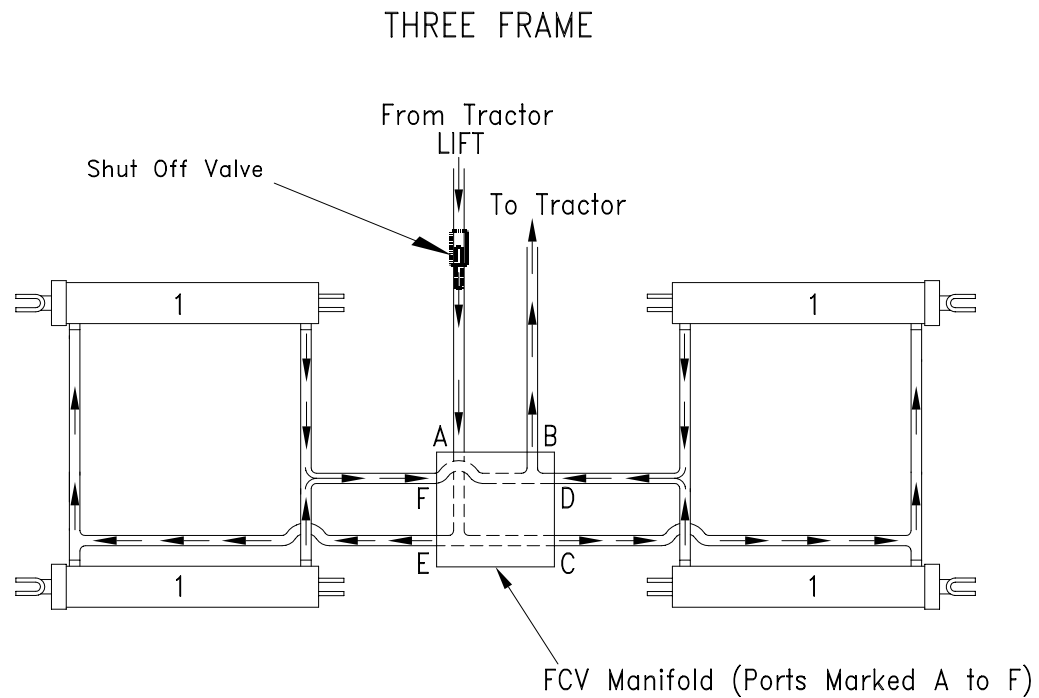
DECAL - S34428



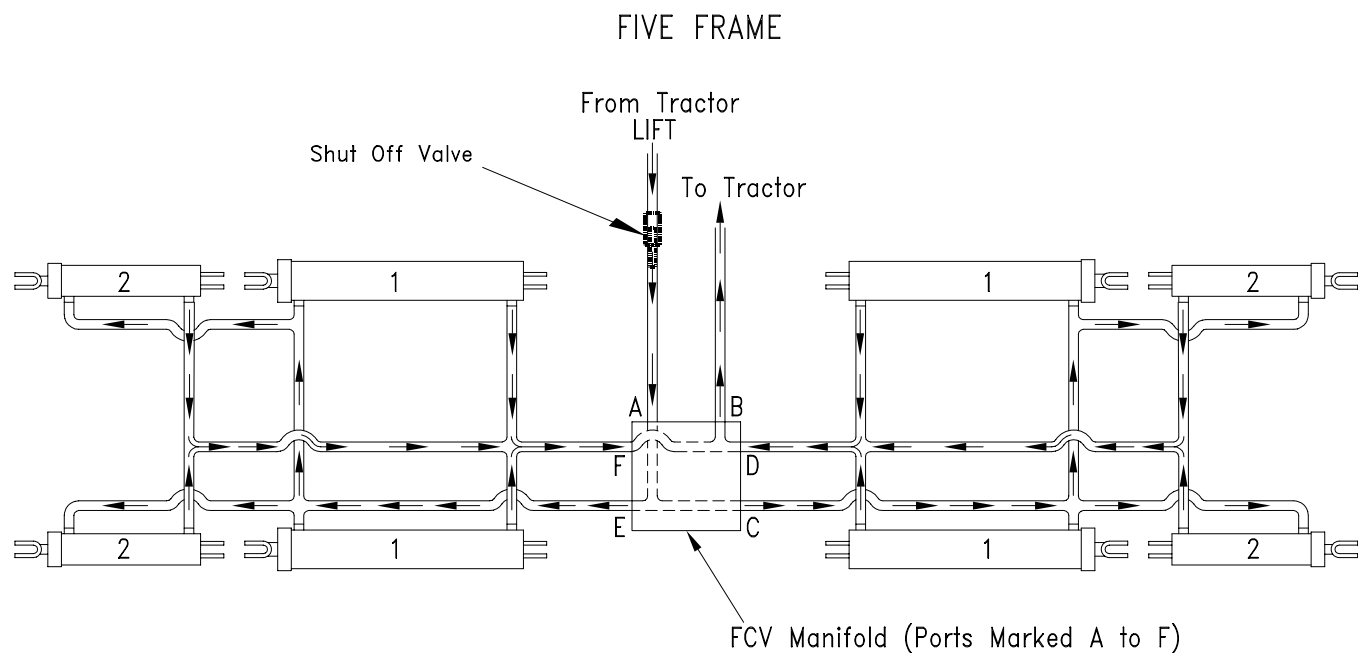


## Wing Lift Hydraulics - Continued

### Three Frame Models



### Five Frame Models



# Operation

## Opener Hydraulics

The contour openers can be operated using two methods as described in the operators manual as Normal Operation and Pressure Adjustment (On the go).

The following is the oil flow for both operating types and can be used for problem diagnosis.

### Normal Operation

The opener ball valve is in the unlocked position. This ball valve is open. The operation valve is screwed in fully to the operating position. This needle valve is closed.

**To lower** the openers, oil flows through the hose to port “A” of valve block. The oil is allowed to flow simultaneously through ports “D” and “F”. Port “F” charges up the accumulator to operating pressure set by the pressure valve. Port “D” charges the butt end of the opener cylinders causing the openers to lower.

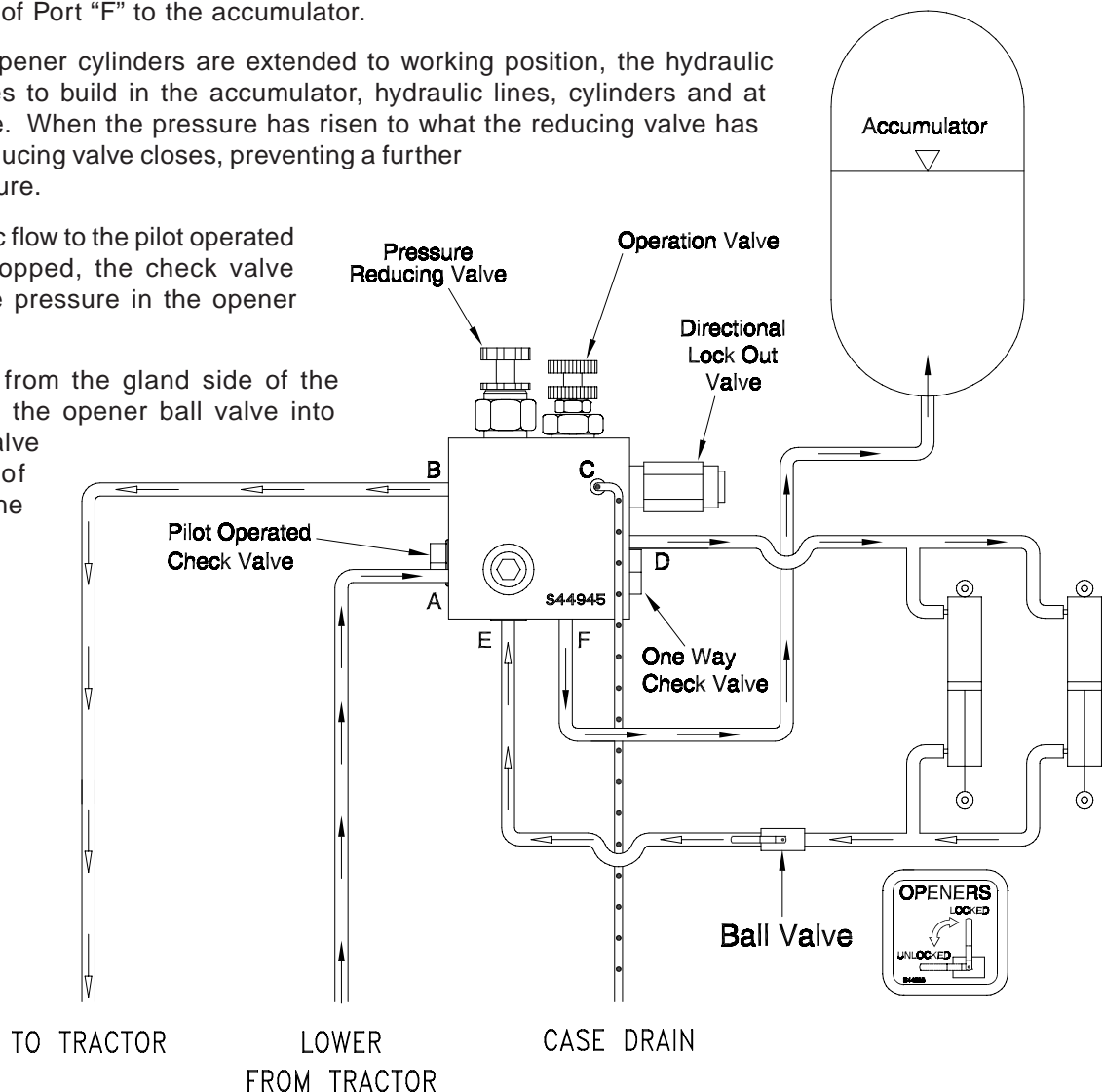
Once the operating pressure is reached the oil will stop flowing.

From port “A” of valve block, oil flows through the pressure reducing valve, to the pilot operated check valve unseating the check valve and out of Port “D” to the butt end of the opener cylinders causing the openers to lower. Simultaneously, oil flows from the check valve through the directional lock out valve and out of Port “F” to the accumulator.

When all of the opener cylinders are extended to working position, the hydraulic pressure continues to build in the accumulator, hydraulic lines, cylinders and at the reducing valve. When the pressure has risen to what the reducing valve has been set to the reducing valve closes, preventing a further increase in pressure.

When the hydraulic flow to the pilot operated check valve is stopped, the check valve seats, holding the pressure in the opener circuit.

The oil returning from the gland side of the cylinders flows to the opener ball valve into port “E” of the valve block and out of port “B” back to the tractor.



## Opener Hydraulics - Continued

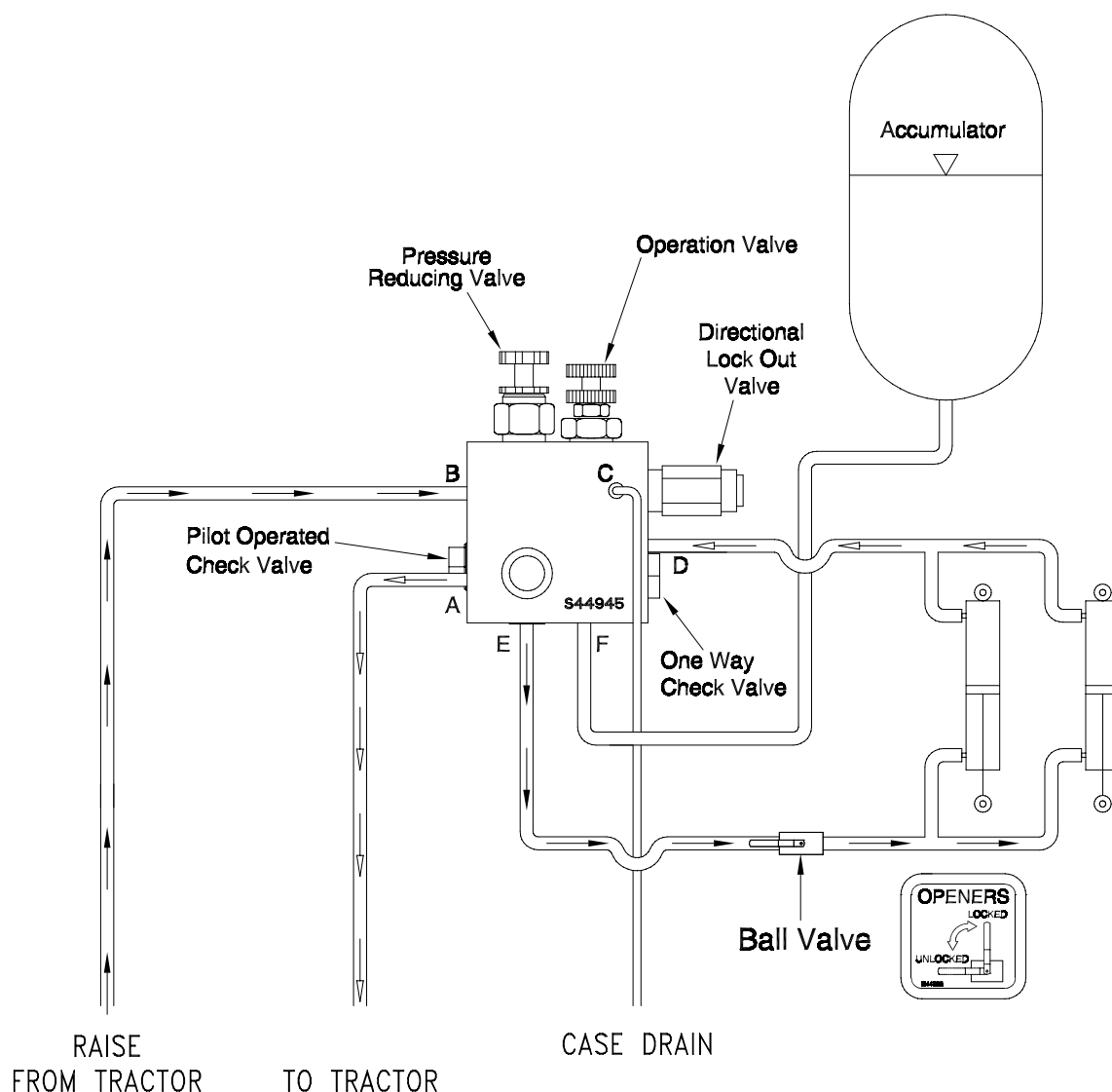
### Normal Operation - Continued

**To raise** the openers, oil flows from the tractor hose to port “B” of the valve block and out of port “E” to the opener valve and on to the gland side of the cylinders. Oil is also felt on the line that operates the pilot operated check valve. This causes the check valve to open and allow return oil back to the tractor.

Oil from the butt side of the cylinders travels to port “D” and through the opened pilot operated check valve to the pressure relief valve. Oil can not go through the relief valve in this direction and is directed to the one way check valve. The oil then travels through the one way check valve to port “A” of the valve block.

The oil flows through the port “A” of the valve block and back to the tractor.

Oil is also felt on the line that operates the directional lock out valve. This causes the directional lock out valve to close preventing the oil in the accumulator from returning back to the tractor. The directional lock out valve maintains the pressure in the accumulator in this position.



# Operation

## Opener Hydraulics - Continued

### Pressure Adjustment (On the Go)

The opener ball valve is in the unlocked position. This ball valve is open. The operation valve is screwed out fully to the service/bleed-off position. This needle valve is open.

**To lower** the openers, oil flows through the hose to port “A” of valve block. The oil is allowed to flow simultaneously through ports “D” and “F”. Port “F” charges up the accumulator to operating pressure set by the pressure valve. Port “D” charges the butt end of the opener cylinders causing the openers to lower.

Once the operating pressure is reached the oil will stop flowing.

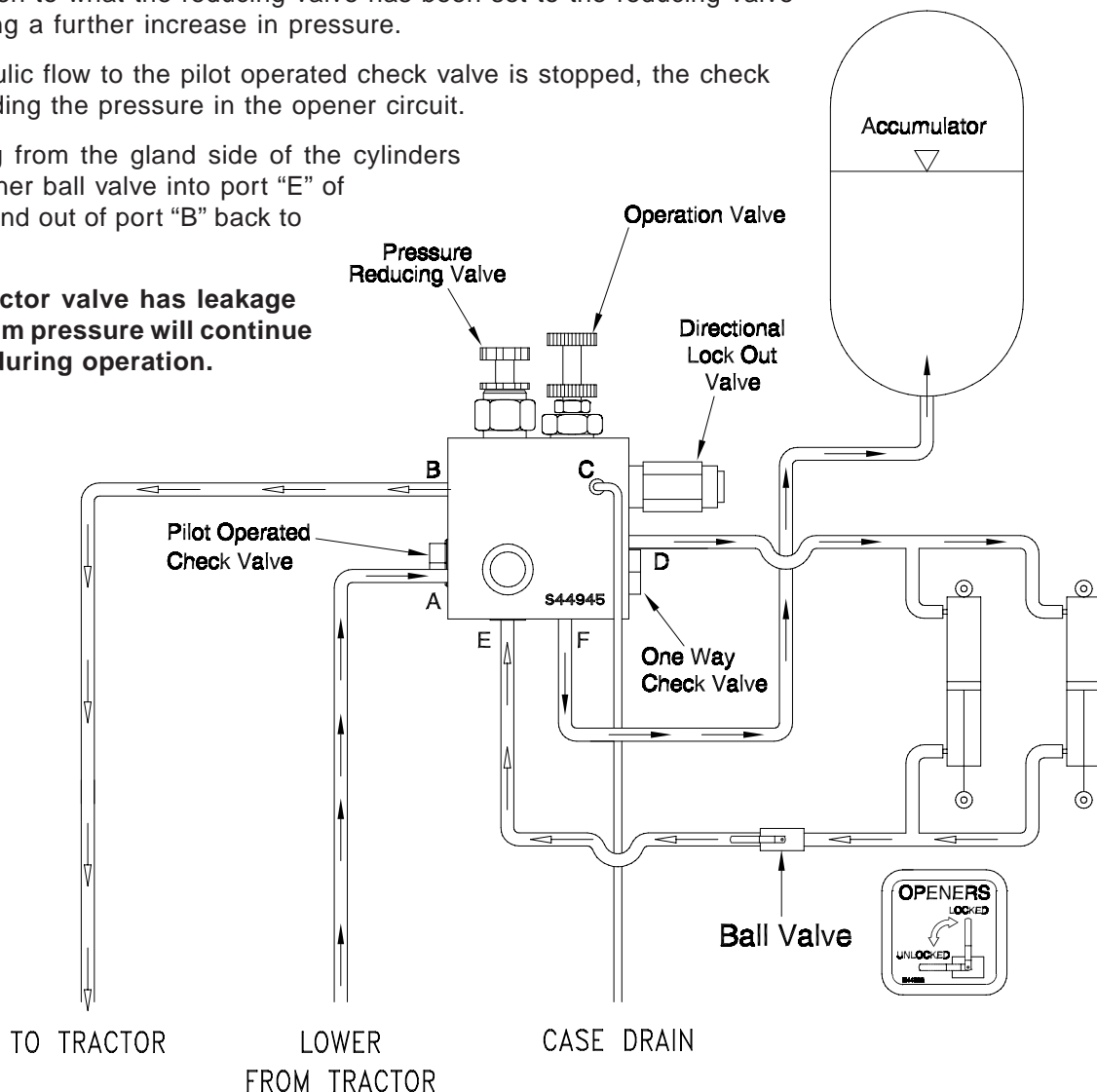
From port “A” of valve block, oil flows through the pressure reducing valve, to the pilot operated check valve unseating the check valve and out of Port “D” to the butt end of the opener cylinders causing the openers to lower. Simultaneously, oil flows from the check valve through the directional lock out valve and out of Port “F” to the accumulator.

When all of the opener cylinders are extended to working position, the hydraulic pressure continues to build in the accumulator, hydraulic lines, cylinders and at the reducing valve. When the pressure has risen to what the reducing valve has been set to the reducing valve closes, preventing a further increase in pressure.

When the hydraulic flow to the pilot operated check valve is stopped, the check valve seats, holding the pressure in the opener circuit.

The oil returning from the gland side of the cylinders flows to the opener ball valve into port “E” of the valve block and out of port “B” back to the tractor.

**Note: If the tractor valve has leakage the system pressure will continue to drop during operation.**



## Opener Hydraulics - Continued

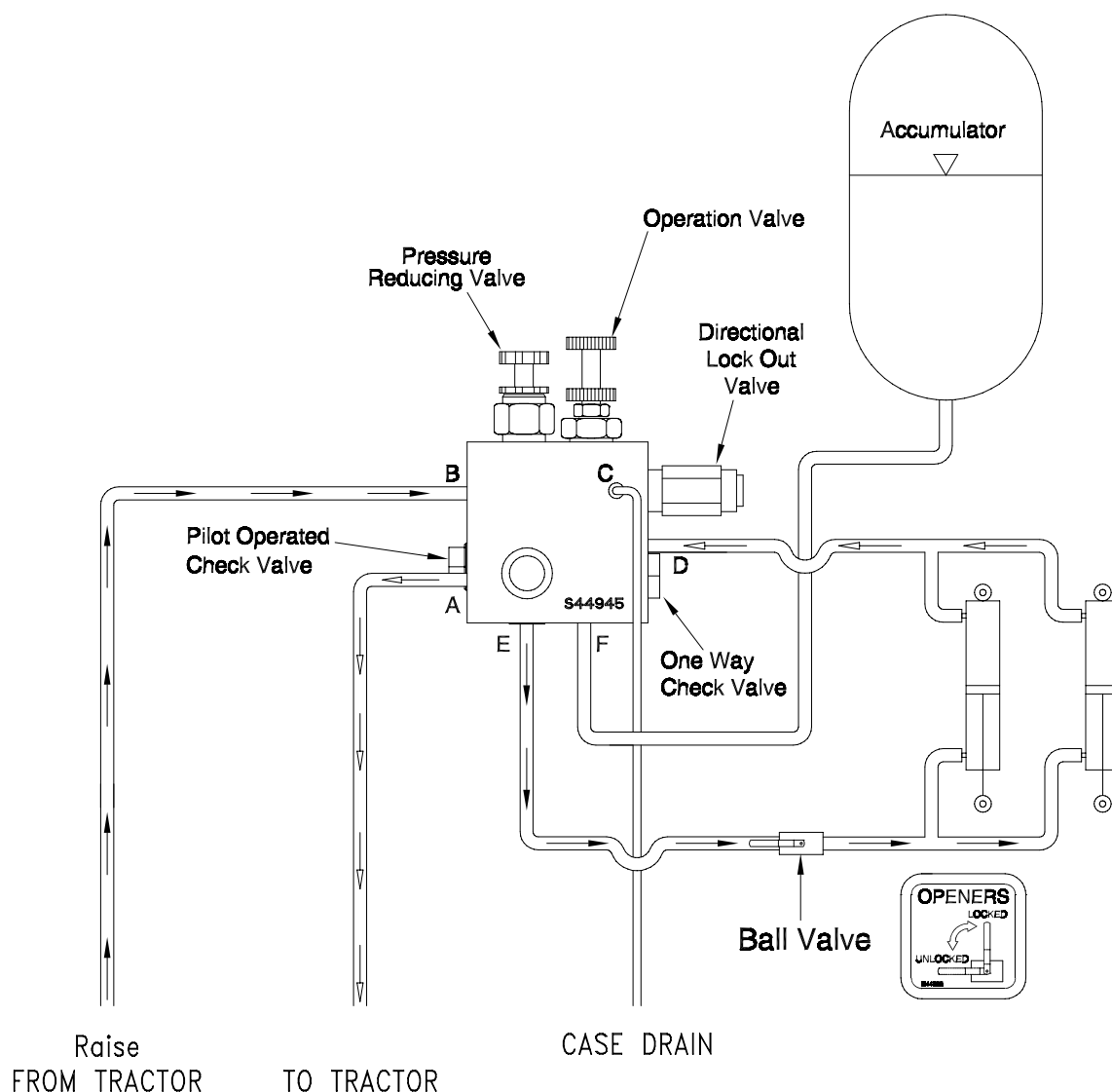
### Pressure Adjustment (On the Go) - Continued

**To raise** the openers, oil flows from the tractor hose to port “B” of the valve block and out of port “E” to the opener valve and on to the gland side of the cylinders. Oil is also felt on the line that operates the pilot operated check valve. This causes the check valve to open and allow return oil back to the tractor.

Oil from the butt side of the cylinders travels to port “D” and through the opened pilot operated check valve to the pressure reducing valve. Oil can not go through the reducing valve in this direction and is directed to the one way check valve. The oil then travels through the one way check valve to port “A” of the valve block.

The oil flows through the port “A” of the valve block and back to the tractor.

Oil is also felt on the line that operates the directional lock out valve. This causes the directional lock out valve to close preventing the oil in the accumulator from returning back to the tractor. The directional lock out valve maintains the pressure in the accumulator in this position.



# Operation

## Opener Hydraulics - Continued

### Pressure Adjustment (On the Go) - Continued

**Pressure adjustment on the go**, requires input from the operator to function.

The operator will have selected the operation valve to be in the bleed off/service position.

The adjustable reducing valve (Pressure Valve) will be set to provide correct trip and packing pressure.

With the Contour Air Drill moving forward, lower openers into the ground. Hold tractor hydraulic lever until the maximum preset operating pressure is reached. This ensures that all of the openers are fully charged and engaged. To reduce operating pressure on the go:

- Place tractor hydraulic lever into “Float Position” until pressure drops to desired operating point.
- Release hydraulic lever once desired pressure is reached.

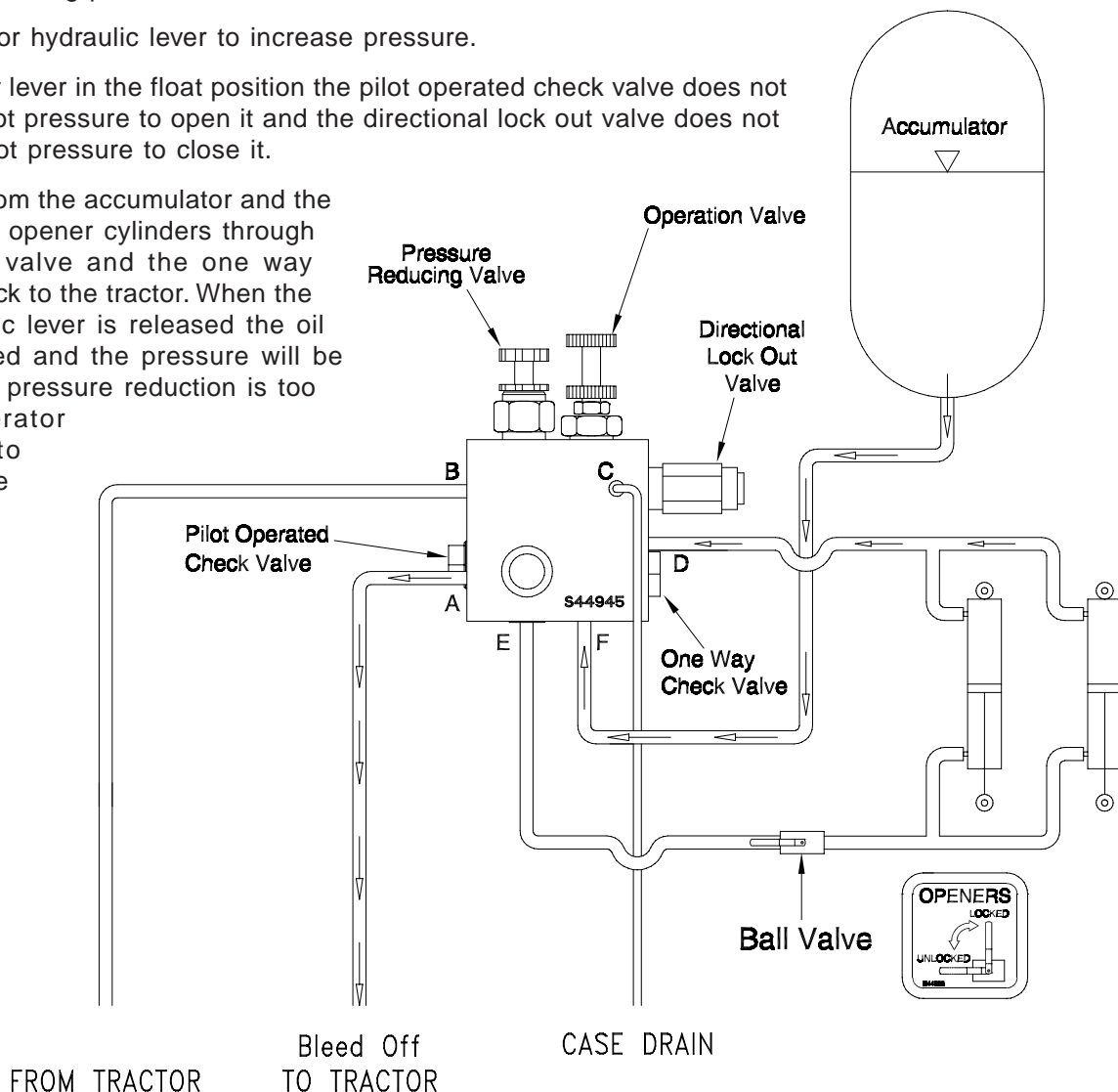
**Note:** If pressure drops too rapidly when tractor remote is put into float, the “Operating” valve can be turned in a few turns to reduce bleed-off speed.

To increase operating pressure:

- Operate tractor hydraulic lever to increase pressure.

With the tractor lever in the float position the pilot operated check valve does not receive any pilot pressure to open it and the directional lock out valve does not receive any pilot pressure to close it.

The oil flows from the accumulator and the butt end of the opener cylinders through the operation valve and the one way check valve back to the tractor. When the tractor hydraulic lever is released the oil is again trapped and the pressure will be reduced. If the pressure reduction is too great the operator will have to pressure the system up to the desired pressure.



# Section 6: Maintenance

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# Maintenance

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## CAUTION



**BE ALERT**

## SAFETY FIRST

**REFER TO SECTION 1 AND REVIEW ALL  
SAFETY RECOMMENDATIONS.**

---

### General

This section deals with two goals, maximum life and dependable operation. Adopt a regular maintenance and lubrication program. Care and sufficient lubrication is the best insurance against delays.

---

### Safety

- Always shut off the tractor and remove key before dismounting.
- Guard against hydraulic high pressure leaks with hand and face protection.
- Never work under the implement unless it is in the down position or transport lock pins are in place and secured with hair pins. Do not depend on the hydraulic system to support the frame.
- Always wear safety goggles, breathing apparatus and gloves when working on seeder filled with chemical. Follow manufactures recommended safety procedures when working with chemicals or treated seeds.
- Do not feed left over treated seed to livestock, treated seed is poisonous and may cause harm to persons or livestock.



## Warning

**Securely support any machine elements that  
must be raised for service work.**



## Caution



**Keep service area  
clean and dry. Wet or  
oily floors are slippery.**





## Tighten Bolts

- Before operating the machine.
- After the first two hours of operation.
- Check tightness periodically thereafter.
- Use Bolt Torque Chart for correct values on various bolts.
- Note dashes on hex heads to determine correct grade.

**Note: DO NOT use the values in the Bolt Torque Chart if a different torque value or tightening procedure is given for a specific application.**

- Fasteners should be replaced with the same or higher grade. If higher grade is used, only tighten to the strength of the original.

Bolt Torque Chart				
Grade 5 Bolt Marking 		Bolt Size	Grade 8 Bolt Marking 	
Nm	lb. ft.		lb. ft.	Nm
11	8	1/4	12	16
23	17	5/16	24	33
41	30	3/8	45	61
68	50	7/16	70	95
102	75	1/2	105	142
149	110	9/16	155	210
203	150	5/8	210	285
366	270	3/4	375	508
536	395	7/8	610	827
800	590	1	910	1234
1150	850	1-1/8	1350	1850
1650	1200	1-1/4	1950	2600
2150	1550	1-3/8	2550	3400
2850	2100	1-1/2	3350	4550

## Tires

- Inspect tires and wheels daily for tread wear, side wall abrasions, damaged rims or missing lug bolts and nuts. Replace if necessary.
- Tighten wheel bolts - refer to Bolt Torque Chart.
- Check tire pressure daily, when tires are cold.
- Correct tire pressure is important.
- Do not inflate tire above the recommended pressure.



## Caution

**Tire replacement should be done by trained personnel using the proper equipment.**

Tire Specifications		
SIZE	LOAD RANGE	PRESSURE
4.80-8 NHS	4 ply rating	12 P.S.I.
11L x 15SL	6 ply rating	28 P.S.I.
11L x 15SL	12 ply rating	52 P.S.I.
11L x 15FI	F	90 P.S.I.
12.5L x 15SL	8 ply rating	36 P.S.I.
12.5L x 15SL	12 ply rating	52 P.S.I.
12.5L x 15FI	F	90 P.S.I.
16.5L x 16.1FI	E	60 P.S.I.

# Maintenance

## Lubrication

Greasing pivot points prevents wear and helps restrict dirt from entering. However, once dirt does enter a bearing, it combines with the lubricant and becomes an abrasive grinding paste, more destructive than grit alone.

- Apply new lubricant frequently during operation to flush out old contaminated lubricant.
- Use a good grade of **lithium based grease**.
- Use a good grade of machine oil.
- Clean grease fittings and lubricator gun before applying lubricant.

Refer to the photos for grease fitting locations.

### 1. Wheel Hubs

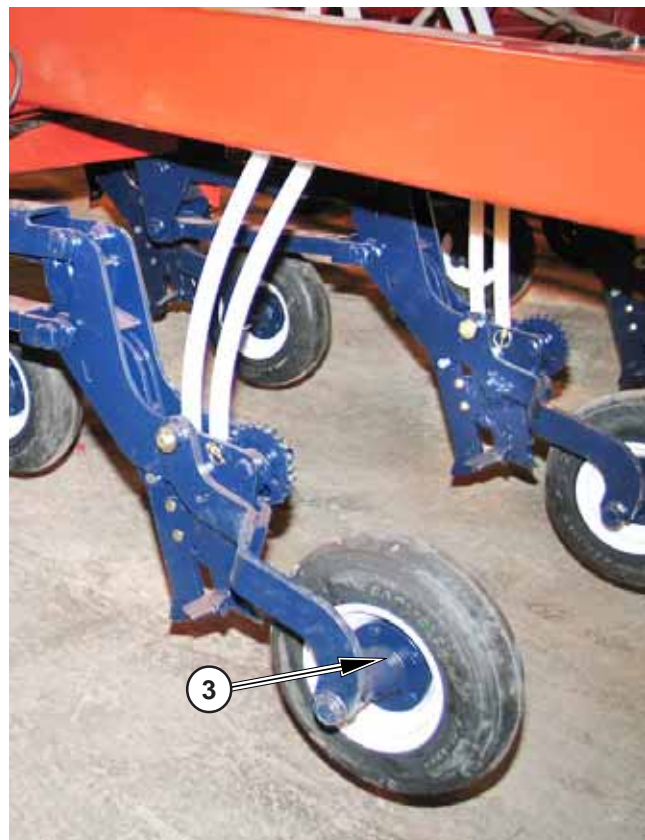
- Grease every 500 hours or seasonally, whichever occurs first.

### 2. Gauge Wheel Castor Pivot

- Grease every 100 hours.

### 3. Packer Wheel Hubs

- Grease every 5,000 acres (2,000 hectares) or seasonally, whichever occurs first.



## Opener Maintenance

### Bushing Replacement

In the event the pivot pin bushings need replacing, use the following procedure.

- Turn “Operating” valve out to bleed off/service position and **relieve all pressure** from the accumulator circuit using the tractor remote.
- Shut tractor engine off and ensure park brake is engaged before proceeding.
- Place “Openers” ball valve into locked position to prevent accidental oil flow to openers.
- Once the pressure is off of the accumulator circuit, opener can be disassembled as illustrated in diagram on the following page.

Reverse the above procedure to reassemble trip.

**Note:** Bleed air from hydraulic circuit before using unit. Refer to “Bleeding Hydraulic System” for details.

### Cylinder Replacement

In the event the opener cylinder needs repair or replacing, use the following procedure.

- Turn “Operating” valve out to bleed off/service position and **relieve all pressure** from the accumulator circuit by placing the tractor remote in “float” position.
- Shut tractor engine off and ensure park brake is engaged before proceeding.
- Place “Openers” ball valve into locked position to prevent accidental oil flow to openers.
- Once the pressure is off of the accumulator circuit, disconnect hydraulic hoses from opener cylinder.
- Refer to diagram on following page to remove the pins from the opener cylinder.
- Remove the cylinder. Repair or replace cylinder as necessary.

Reverse the above procedure to reassemble trip.

**Note:** Bleed air from hydraulic circuit before using unit. Refer to “Bleeding Hydraulic System” for details.

### Warning



#### HIGH-PRESSURE FLUID HAZARD

To prevent serious injury or death:

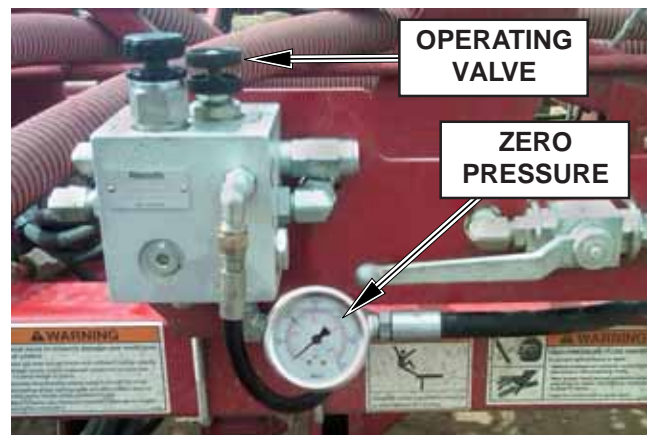
- Relieve pressure on hydraulic system before servicing or disconnecting hoses.
- Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands.
- Keep all components in good repair.

### Warning

#### CRUSHING HAZARD

To prevent serious injury or death:

- Stand clear - openers move rapidly under hydraulic pressure.
- Place valve in service position.
- Relieve pressure on hydraulic system before servicing.
- Lower openers to ground before adjusting depth.
- Shut tractor off and remove key.

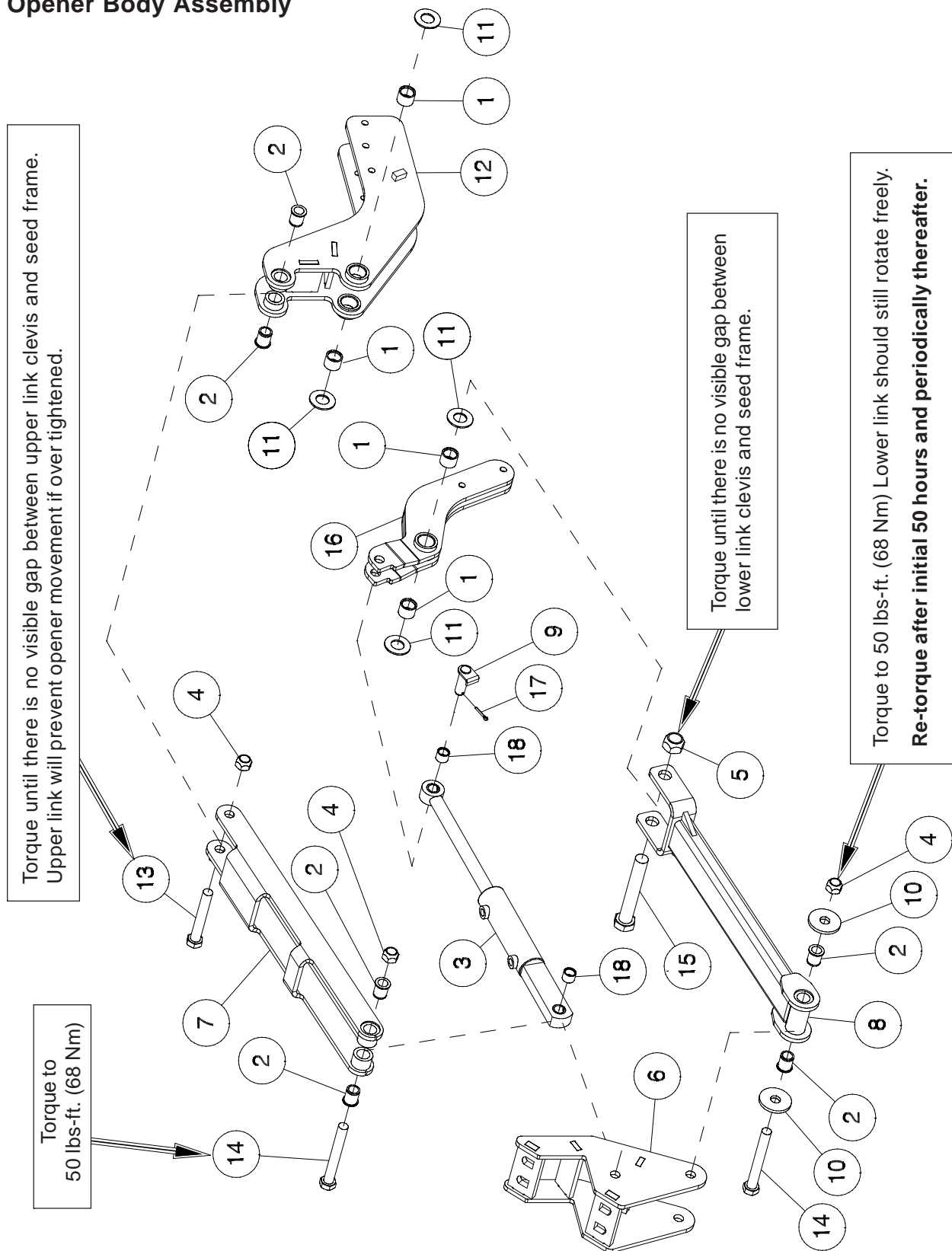


Pressure Gauge

# Maintenance

## Opener Maintenance - Continued

### Opener Body Assembly



## Opener Maintenance - Continued

### Opener Body Assembly

Item	Part No.	Description	Qty
1	S47527	Bottom Bushing - 1.0062 ID x 1.261 OD x 1 Lg .....	4
2	C26525	Nylon Bushing .....	6
3	C42912	Hyd Cylinder - 1-3/4 Bore - 3-1/4 Stroke .....	1
4	D-5273	Unitorque Locknut - 3/4 .....	3
5	D-5274	Unitorque Locknut - 1 .....	1
6	S42565	Mounting Bracket .....	1
7	S42583	Top Link .....	1
8	S42661	Lower Link .....	1
9	S42673	Lipped Pin - 3/4 Dia x 1 29/32 UL .....	1
10	S42674	Washer - 2-1/2 OD x 25/32 ID x 1/4 .....	2
11	S42675	Washer - 1-1/32 ID x 2 OD 1/8 .....	4
12	S42690	Seed Frame .....	1
13	S42949	Hex Bolt - 3/4 x 5 Lg .....	1
14	S42951	Hex Bolt - 3/4 x 5-7/8 Lg .....	2
15	S42952	Hex Bolt - 1 x 6-1/2 Lg .....	1
16	S44920	Shankholder .....	1
17	W-530	Cotter Pin - 5/32 x 1 Lg .....	1
18	S44397	Bushing .....	2

**Note:** Openers should drop to the ground under their own weight, when the tractor remote is placed into float position relieving oil pressure.

If it requires pressure to push an opener down to the ground during this procedure, one or more of the pivot bolts are over tightened.

Check and adjust pivot bolts as required.

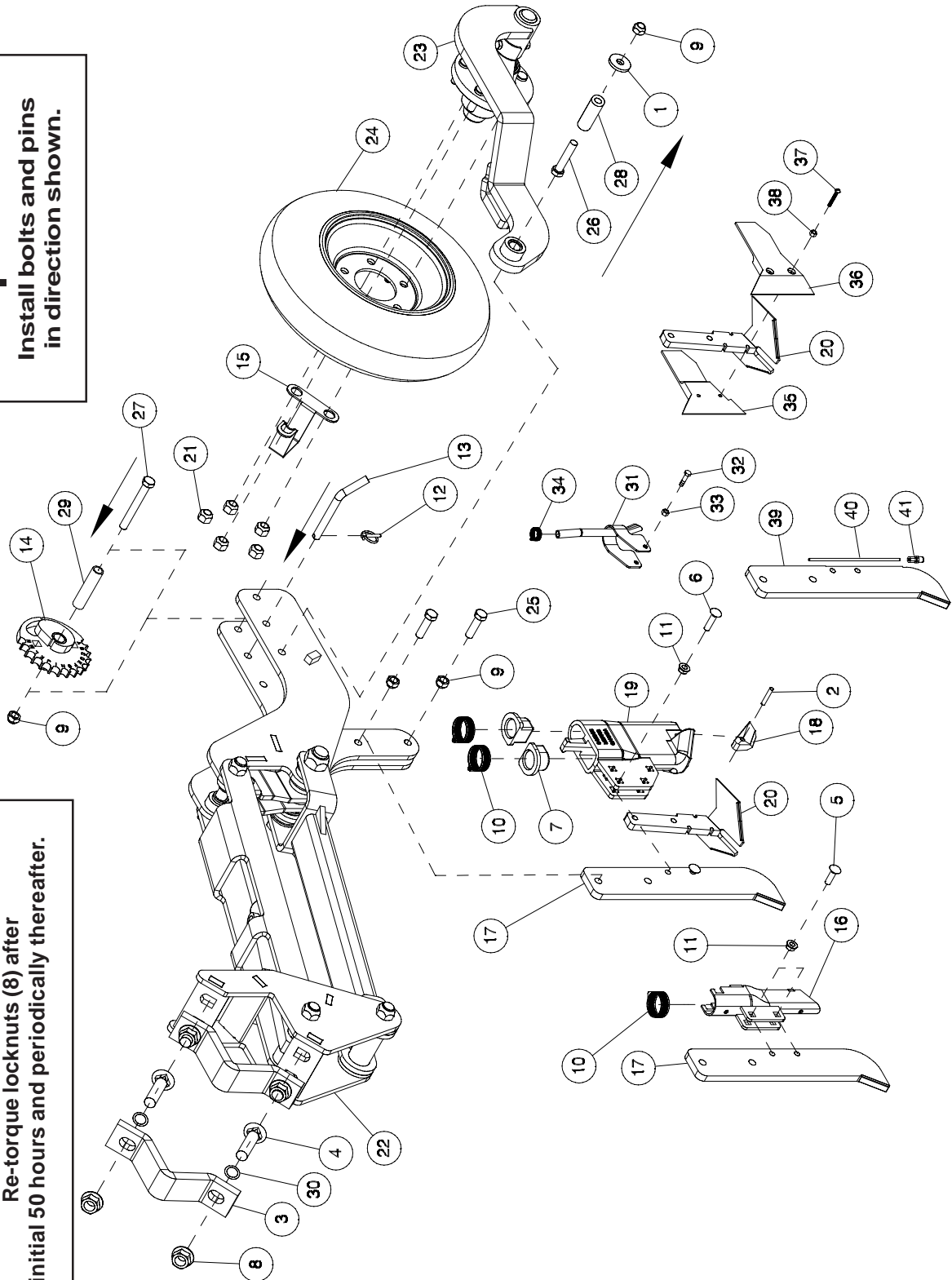
## Important

Turn “Operating” valve out to “Bleed Off/ Service” position and remove all pressure from hydraulic systems before attempting any service work on hydraulic components.

Hydraulic system must be bled after it has been serviced (if any portion of the system has been opened to atmosphere)

## Opener Maintenance - Continued

## Important



# Important

**Torque Locknuts (8) to  
170 ft. lbs. (230 Nm)**

**Re-torque locknuts (8) after initial 50 hours and periodically thereafter.**



## Opener Maintenance - Continued

### Opener Assembly

Item	Part No.	Description	Qty
1	C-333	Washer - 33/64 ID x 1 1/2 OD X 3/16 Thick .....	1
2	D-5243	Spiral Pin - 1/4 x 1 1/4 Lg .....	1
3	C26506	Clamp Strap .....	2
4	C33957	Carriage Bolt - 3/4 x 3 Lg .....	4
5	D-5260	Carriage Bolt - 3/8 x 1-1/4 Lg - Single Shoot Opener .....	2
6	D-5261	Carriage Bolt - 3/8 x 1-1/2 Lg - Double Shoot Opener .....	4
7	S47076	Grommet - For .929 ID x 1.169 OD Secondary Hose - Double Shoot Boot .....	2
8	D12942	Flange Lock Nut - 3/4 .....	4
9	S47110	Locknut - 1/2 .....	4
10	N11470	Hose Clamp - Single Shoot .....	1
		Hose Clamp - Double Shoot .....	2
11	S27987	Flange Lock Nut - 3/8 W/Center Lock .....	6
12	S42294	Lynch Pin - 3/16 Dia .....	1
13	S42659	Depth Pin - 1/2 .....	1
14	S42687	Adjustment Cam .....	1
15	S42698	Dust Cap Retainer .....	1
16	S42865	Single Shoot Boot .....	1
17	S42940	Shank .....	1
	S47993	Shank - Heavy Duty .....	1
18	S42962	Cast Wear Tail .....	1
	S47980	Carbide Wear Tail .....	1
	S42965	Double Shoot Boot .....	1
19	S42978	Paired Row Sweep .....	1
20	S-1196	Tapered Wheel Nut - 1/2 .....	1
21	S44330	Subassembly - Parallel Link/Seed Frame .....	1
22	S44363	Packer Arm - Sub Assembly .....	1
23	S44405	Pneumatic Tire - 480 .....	1
24	S44300	Semi Pneumatic Tire - 480 .....	1
	S44900	Semi Pneumatic Tire - 550 .....	1
	S47093	"V" Crown Packer Tire - 400 .....	1
25	W-487	Hex Bolt - 1/2 x 1 3/4 Lg .....	2
26	W-490	Hex Bolt - 1/2 x 2 1/2 Lg .....	1
27	W-495	Hex Bolt - 1/2 x 4 Lg .....	1
28	S42593	Bushing - 3/4 OD x .510 ID x 1.391 Lg .....	1
29	S44402	Bushing - 3/4 OD x .510 ID x 2 9/16 Lg .....	1
30	C33958	Retaining Ring .....	4
31	S44450	NH3 Tube .....	1
32	S45286	Hex Bolt - 1/4 x 1 13/16 Lg (Special) .....	1
33	N42510	Lock Nut - 1/4 Center .....	1
34	S31745	Hose Clamp - 3/4 .....	1
35	S45313	Mud Guard - Right .....	1
36	S45312	Mud Guard - Left .....	1
37	S47128	Machine Screw - #10-24 x 1 3/4 Lg .....	2
38	N37787	Locknut - #10-24 UNC .....	2
39	S48832	Shank - High Pressure NH3 .....	1
40	S48813	Injector tube - High Pressure NH3 .....	1
41	S48814	Compression fitting - High Pressure NH3 - 1/8 tube x 1/8 male pipe .....	1
	S46181	Kit - Mud Guard (Includes Items 35 to 38)	

## Important

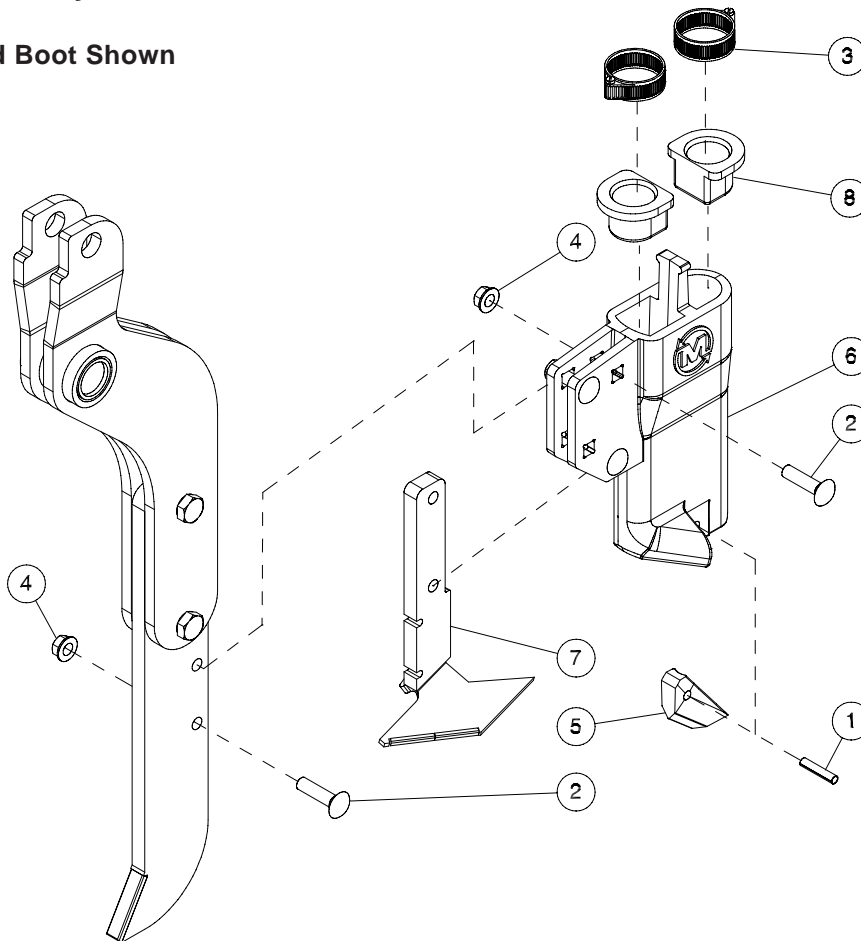
Turn "Operating" valve out to "Bleed Off/Service" position and remove all pressure from hydraulic systems before attempting any service work on hydraulic components. Hydraulic system must be bled after it has been serviced (if any portion of the system has been opened to atmosphere)

# Maintenance

## Opener Maintenance - Continued

### Opener Assembly - Continued

Left Side Band Boot Shown

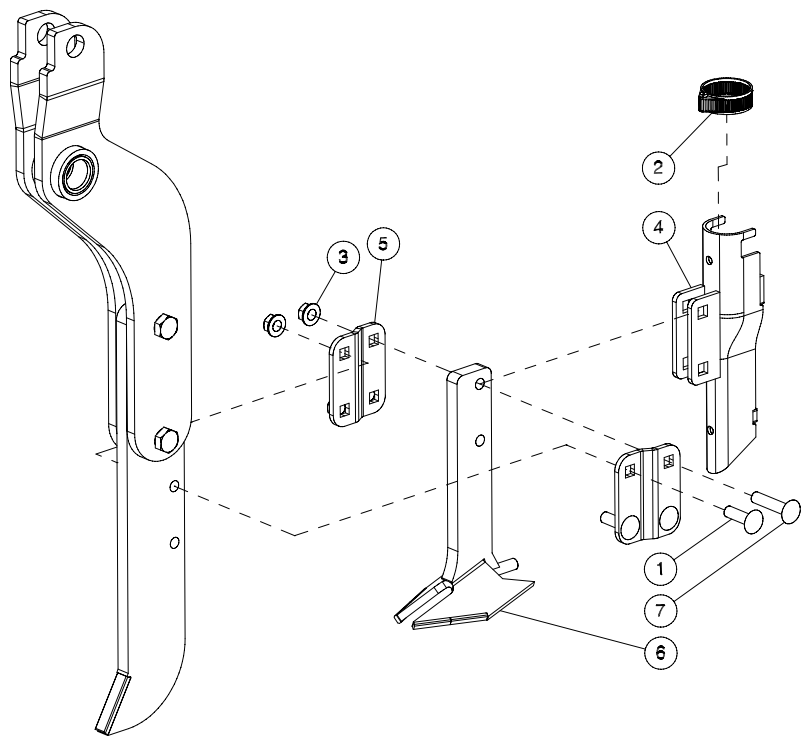


Item	Part No.	Description	Qty
1	D-5243	Roll Pin .....	1
2	D-5261	Carriage Bolt - 3/8 x 1 1/2 Lg.....	4
3	N11470	Hose Clamp .....	2
4	S27987	Flange Lock Nut - 3/8 .....	4
5	S42962	Cast Wear Tail .....	1
	S47980	Carbide Wear Tail .....	1
6	S44977	Side Band Boot - Left .....	1
6A	S44976	Side Band Boot - Right .....	1
7	S44425	Seed Shovel - Side Band Boot - Left .....	1
7A	S45715	Seed Shovel - Side Band Boot - Right .....	1
8	S47076	Grommet - For .929 ID x 1.169 OD Secondary Hose .....	2
	N46131	Double Shoot Side Band BTS Kit - Left - (Includes items 1, 2, 3, 4, 5, 6, 7 and 8)	
	N46130	Double Shoot Side Band BTS Kit - Right - (Includes items 1, 2, 3, 4, 5, 6A, 7A and 8)	



Opener Maintenance - Continued

Opener Assembly - Continued



Item	Part No.	Description	Qty
1	D-5260	Carriage Bolt - 3/8 x 1 1/2 Lg.....	2
2	N11470	Hose Clamp .....	1
3	S27987	Flange Lock Nut - 3/8 .....	4
4	S42865	Single Shoot Boot .....	1
5	S45269	Mounting Plate .....	2
6	S45270	3" Wear Shovel.....	1
7	W14502	Carriage Bolt - 3/8 x 1 3/4 Lg.....	2
	N46129	Single Shoot 3" Spreader Kit - Includes all above Items	

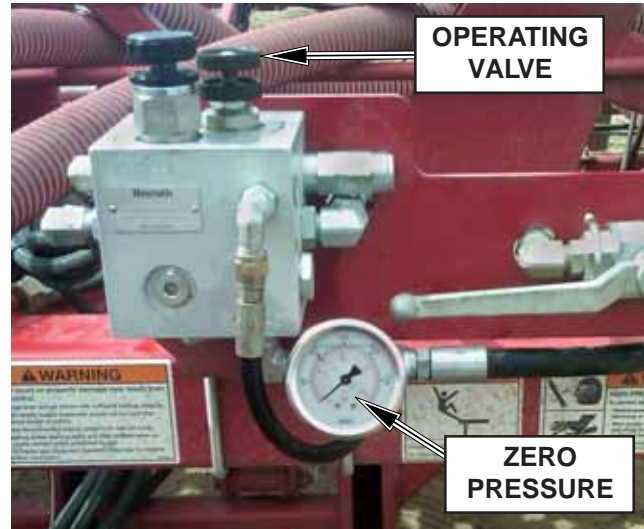
# Maintenance

## Opener Maintenance - Continued

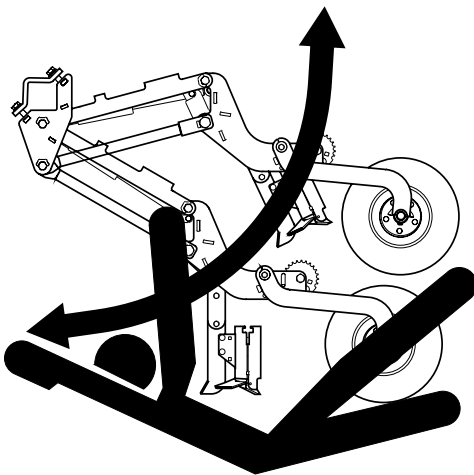
### Shank Replacement

In the event a shank needs replacing, use the following procedure.

- Turn "Operating" valve out to bleed off/service position and **relieve all pressure** from the accumulator circuit by placing the tractor remote in "float" position.
- Shut tractor engine off and ensure park brake is engaged before proceeding.
- Place "Openers" ball valve into locked position to prevent accidental oil flow to openers.
- Once the pressure is off of the accumulator circuit, remove retaining bolts from shank holder. See diagram on previous page.
- Remove shank from shank holder.
- Remove opener from shank.
- Reverse above procedure to reassemble.



Pressure Gauge



S44446



## WARNING

### CRUSHING HAZARD

To prevent serious injury or death:

- **STAND CLEAR** - openers move rapidly under hydraulic pressure.
- **Before servicing hydraulics** - Place "System" valve in service position and relieve pressure from hydraulic system.
- **Shut tractor off** and remove key before servicing or adjusting depth.
- Place "Openers" valve in locked position before adjusting depth or transporting.

## Opener Maintenance - Continued

### Bleeding Hydraulic System

If hydraulic system has been serviced air will need to be bleed out of system as follows:

To bleed hydraulic system of air:

- Lift openers up and lock tractor remote in lift position.
- With tractor hydraulics operating, open bleed-off ball valves on end of drill wings.
- Allow oil to cycle for a few minutes then change direction of tractor remote to lower openers and cycle for a few more minutes.
- Close bleed-off ball valves and lift openers up.
- Repeat above procedure for a second time.
- Close bleed-off ball valves and lift openers up.
- Lock “Openers” valve and check to see that openers stay firmly in position.
- If openers are spongy repeat procedure until air is gone.

### Warning



#### HIGH-PRESSURE FLUID HAZARD

To prevent serious injury or death:

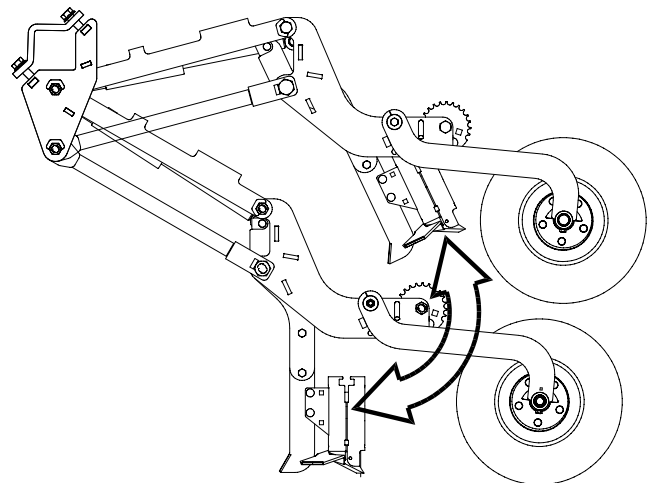
- Relieve pressure on hydraulic system before servicing or disconnecting hoses.
- Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands.
- Keep all components in good repair.



### Important

Turn “Operating” valve out to “Bleed Off/Service” position and remove all pressure from hydraulic systems before attempting any service work on hydraulic components.

Hydraulic system must be bled after it has been serviced (if any portion of the system has been opened to atmosphere)



# Maintenance

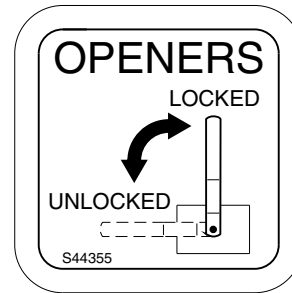
## Opener Maintenance - Continued

### Hydraulic System Trouble Shooting

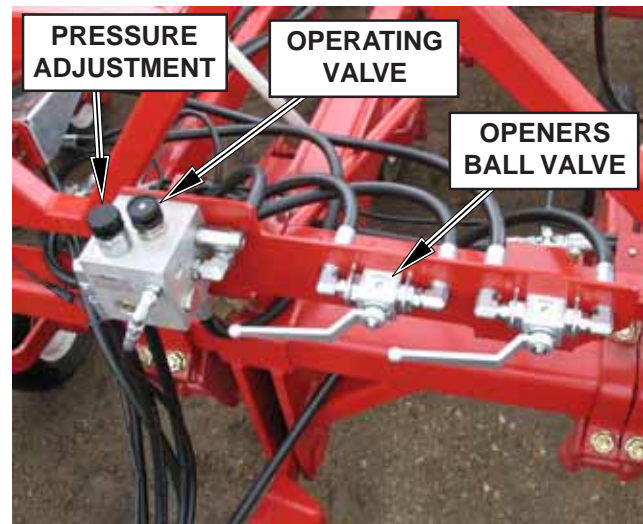
If pressure can not be maintained in the hydraulic system, or openers drop rapidly from transport position, a leaky hydraulic cylinder (bypassing oil across the piston seal) may be present. To locate a hydraulic leak in the Contour Air Drill hydraulic system, the following procedure can be used:

1. Remove pressure from the hydraulic system.
2. Check the drill frame and hoses to make sure that the leak is not external (leaking oil out of the circuit).
3. Lift the contour openers into their raised position.
4. Lock the hydraulic ball valve marked "OPENERS".
5. Watch the openers carefully across the drill and locate the first opener(s) to visibly drop down from the raised position (NOTE: This is the general area of the leaking cylinder, but the first opener to drop is not always the leaking cylinder.).
6. Unlock the "OPENERS" hydraulic ball valve and lift the openers to the raised position and lock the hydraulic remote in the raised position to apply flow to the circuit for about five minutes.
7. Let the hydraulic remote go back to neutral, shut off the tractor, and then go and check the temperature of the opener cylinders by feeling the cylinder barrels. Start at the group of cylinders that were located in step 5) and then work from the outer openers in to center until a "hot" cylinder is located.
8. Under normal conditions the cylinders should remain cool (ambient temperature or slightly above); the opener with a "hot" cylinder barrel has the leaky seal and should be serviced or replaced.

**NOTE: All hydraulic cylinders have a natural leakage rate. The openers on the contour drill will drop over a long period of time during storage; this is normal. Only check for leaky cylinders if accumulator system pressure drops rapidly during operation or openers drop rapidly from transport in a short period of time.**



DECAL - S44355



Valve Locations

## Hydraulics

Refer to Section 1 regarding hydraulic safety. In addition:

- Inspect hydraulic system for leaks, damaged hoses and loose fittings.
- Damaged hoses and hydraulic tubing can only be repaired by replacement. **DO NOT ATTEMPT REPAIRS WITH TAPE OR CEMENTS.** High pressure will burst such repairs and cause system failure and possible injury.
- Always place “Operating” valve into service position and relieve hydraulic pressure from the system before performing maintenance or repairs.

**Note: Accumulator can store pressure even when disconnected from tractor.**

- Leaking cylinders - install a new seal kit.
- Fittings - use liquid Teflon on all NPT hydraulic joints. **Do not use liquid Teflon or Teflon tape on JIC or ORB ends.**
- Hydraulic Hose Connections - when connecting the hoses to the cylinders, tubing, etc. always use one wrench to keep the hose from twisting and another wrench to tighten the union. Excessive twisting will shorten hose life.
- Keep fittings and couplers clean.
- Check the Tractor Manual for proper filter replacement schedule.

Refer to the Trouble Shooting Section.

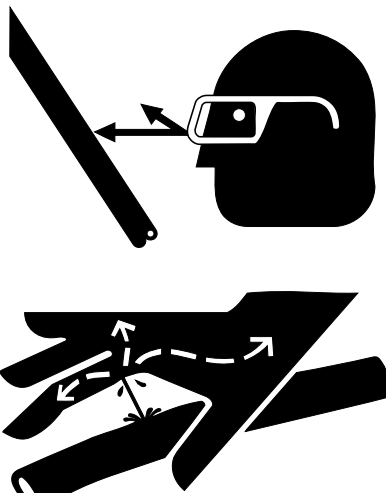


Contact your nearest Dealer for genuine repair parts. Dealers carry ample stocks and are backed by the manufacture and regional associations.

### Caution

**Dirt in the hydraulic system could damage O-rings, causing leakage, pressure loss and total system failure.**

**Note: Extreme care must be taken to maintain a clean hydraulic system. Use only new hydraulic fluid when filling reservoir.**



### Warning

#### HIGH-PRESSURE FLUID HAZARD

To prevent serious injury or death:

- Relieve pressure on hydraulic system before servicing or disconnecting hoses.
- Wear proper hand and eye protection when searching for leaks. Use wood or cardboard instead of hands.
- Keep all components in good repair.

# Maintenance

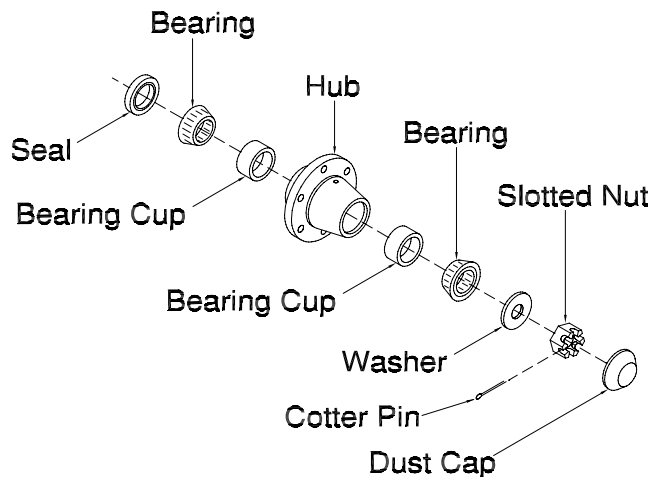
## Wheel Bearings

### Implement Hub

- Position implement in field position.
- Shut tractor off, remove key, and engage park brake.
- Block wheel on tractor.
- Raise the implement wheel enough to clear the surface.
- Securely block implement frame.
- Remove wheel from hub.
- Remove the dust cap, cotter pin, and the slotted nut and washer.
- Be careful when pulling the hub off as not to drop the outer bearing.
- Clean spindle and bearing components with solvent.
- Inspect for wear on bearings, spindle and cups, replace parts as required.
- Do not reuse old seals. Use only new seals when assembling.
- Pack inner hub with bearing grease.
- Be sure bearing and cup are dry and clean.
- Work grease into the bearing rollers, until each part of the bearing is completely full of grease.
- Install inner bearing and cup first, then press new seals in place.
- Place hub on spindle.
- Install outer bearing, washer and slotted nut.
- Tighten nut while turning the wheel until a slight drag is felt.
- Back nut off one slot and install a cotter pin. Bend cotter pin up around nut.
- Pack grease inside the dust cap and tap into position.

### Contour Opener Hub

- Position implement in field position.
- Move “System” ball valve to service position and **relieve all pressure** from the accumulator circuit using the tractor remote.
- Shut tractor engine off and remove key. Engage park brake before proceeding.
- Place “Openers” ball valve into locked position to prevent accidental oil flow to openers.
- Follow procedure for hub removal and bearing replacement outlined under “Implement Hub”.



## Important

**Check wheel bearings for play every  
5,000 acres (2,000 hectares)  
or yearly, whichever occurs first.  
Tighten as required.**



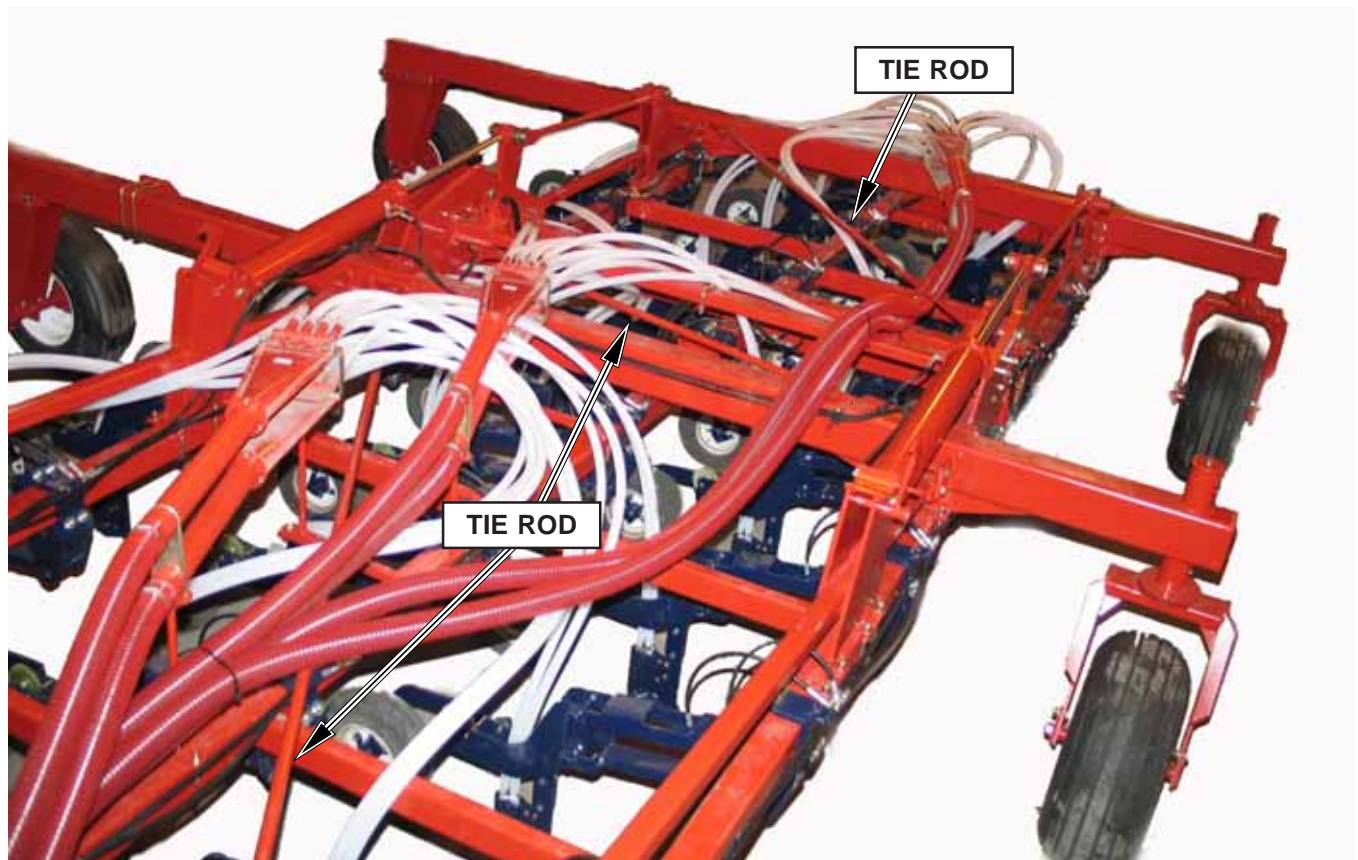
## Wing Section Tie Rods

The tie rods are an integral part of the frame structure.

The wing tie rods must be torque to 175 - 200 ft lbs. (237 - 271 Nm). Check periodically as indicated below:

1. On delivery before field operation.
2. After first 1 hour of use.
3. After first 50 hours of use.
4. Check seasonally to ensure the tie rods on the wings are tight.

**Note: Damage to frame components could result if tie rod tension is not maintained.**



71 Foot Unit Shown



# Maintenance

## Outer Wing Lift Rod

Check seasonally to ensure the wing lift rods on the outer wings are adjusted correctly.

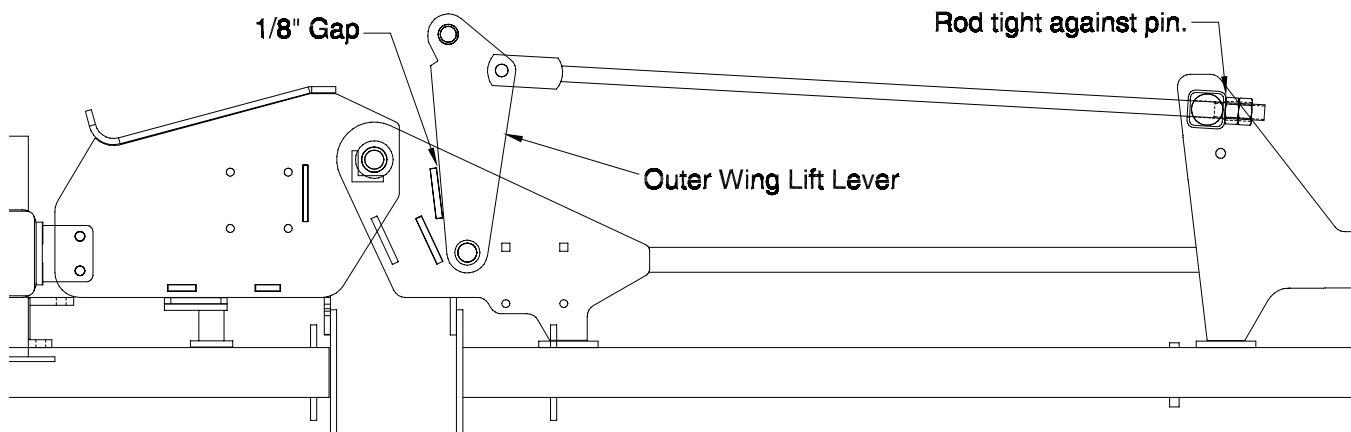
Adjust the Outer Wing Lift Rod as follows:

- With the cylinder disconnected pull the outer wing lift lever against the gusset in the lift arm.
- Adjust rod length until there is an 1/8" (3 mm) clearance between the outer wing lift lever and gusset.

**Note: Do not exceed 1/8" (3 mm) clearance. Damage to frame components may result.**

- Tighten jam nut to secure in place.

After initial wing-up the clearance will decrease, but do not re-adjust clearance.



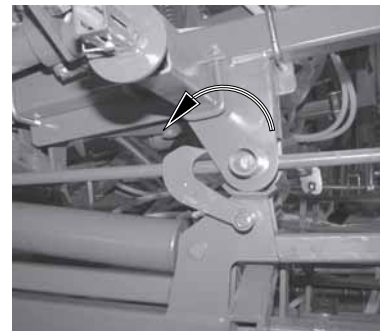
## Gravity Lock

Ensure gravity locks move freely in both directions.

**Note: Damage to wing lift components will result if gravity locks malfunction.**



Winged Up



Winged Down

# Section 7: Storage

## Section Contents

Preparing for Storage .....	7-2
Wing Lift Cylinder Shaft Protection .....	7-3
Removing From Storage .....	7-3

# Storage

## Preparing for Storage

- To insure longer life and satisfactory operation, store the implement in a shed.
- If building storage is impossible, store away from areas of main activity on firm, dry ground.
- Clean machine thoroughly.
- Inspect all parts for wear or damage.
- Avoid delays - if parts are required, order at the end of the season.
- Lubricate grease fittings. (Refer to Maintenance Section).
- Tighten all bolts to proper specifications (Refer to Maintenance Section).
- For a safer storage, lower the implement into field position and release the hydraulic pressure.
- If implement must be stored in a raised position, ensure that wings are properly secured with lock pins.
- Level implement using hitch jack and block up.
- Relieve pressure from hydraulic system.
- Cover tires with canvas to protect them from the elements when stored outside.
- Coat exposed wing lift cylinder shafts (**Refer to Wing Lift Cylinder Shaft Protection**).
- Paint any surfaces that have become worn.



## Warning

**Do not allow children to play  
on or around the machine.**

## MORRIS PAINT

### Spray Cans:

Part Number	Description
W-4647	Red MORRIS Spray Can
W-4648	Blue MORRIS Spray Can
N31087	White MORRIS Spray Can

### Litre Cans:

Part Number	Description
Z-10	Red MORRIS Paint/Litre
Z-11	Blue MORRIS Paint/Litre

## Wing Lift Cylinder Shaft Protection

The steps summarized below should be followed when protecting chrome plated shafting on equipment:

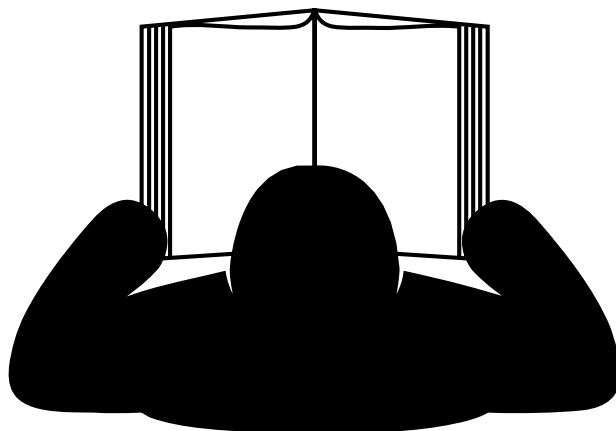
- Position the equipment as it will be stored, and identify all the exposed portions of the chrome plated shafts.
- Clean dirt and dust from the exposed portions of the shafting using a dry cloth or a cloth which has been dampened with an appropriate solvent.
- Prepare a mixture of 60% oil-based rust inhibitor and 40% Kerosene. Apply a thin coating of this mixture to the exposed surfaces of the chrome plated shafting. No. 1 fuel oil may be substituted for Kerosene. A cloth dipped in the mixture can be used to apply the coating.
- Inspect the shaft surfaces after six months and apply additional corrosion preventative mixture.
- If the equipment is to be moved and then stored again for an extended period of time, the steps above should be repeated for all shafts that were stroked during the move.
- **Before retracting the cylinders the protective coating should be removed**, to prevent fine sand and dirt that has accumulated in the coating, from damaging the shaft seal. **Under no circumstances should sandpaper or other abrasive be used to clean the surfaces.** Plastic or copper wool in combination with an appropriate solvent will remove most of the dirt.

### Caution

**Dirt in the hydraulic system could damage O-rings, causing leakage, pressure loss and total system failure.**

## Removing From Storage

- Review Operator's Manual.
- Check tire pressure (Refer to Tire Pressure List)
- Clean machine thoroughly. Remove coating from exposed cylinder shafts (**Refer to Wing Lift Cylinder Shaft Protection**).
- Lubricate grease fittings. (Refer to Lubricating Section).
- Tighten all bolts to proper specifications (Refer to Bolt Torque Chart).



# Storage

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Notes

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# Section 8: Troubleshooting

## Section Contents

Machine not operating straight. ....	8-2
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Openers wearing unevenly ....	8-2
Wing lifting too slowly. ....	8-2
Wings not lowering. ....	8-2
One wing will lift, other will not. ....	8-2
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Openers not fully lifting to transport position. ....	8-4



# Troubleshooting

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Problem	Cause	Correction
Machine not operating straight.	Uneven opener depth.	Refer to Operation Section on depth adjustment.
		Check tire pressure.
Lack of penetration.	Openers worn.	Replacement necessary.
	System pressure too low.	Refer to Operation Section on setting maximum system pressure.
Openers wearing unevenly	Tire tracks. Front row always wears more than the others.	Replace worn openers.
Wing lifting too slowly.	Tractor hydraulic pressure.	Repair pump. Pressure relief valve needs resetting.
	Hydraulic breakaways.	Foreign material or sticking. Check compatibility.
	Hose restriction.	Cylinder linkage binding.
Wings not lowering.	Transport valve in locked position.	Place opener valve into unlocked position.
One wing will lift, other will not.	Assembly.	Hoses reversed at cylinder.
	Restriction in line.	Clean.
	Internal cylinder leak.	Repair cylinder.
Oil accumulation.	Damaged seal.	Replace seals.
	Loose fittings.	Tighten hose and pipe connections.
	Scored cylinder shaft will damage shaft seal.	Replace.
	Normal.	Slight seepage from seal is normal.

# Troubleshooting

Problem	Cause	Correction
Accumulator system pressure drop excessive.	Valve in Bleed-Off position.	Place valve into operating position.
	Leaking opener cylinder.	Repair or replace cylinder.
Openers won't lift or lower.	Openers valve in locked position.	Place openers valve in unlocked position.
	Hydraulic line, fitting or cylinder leak.	Locate leaking line, fitting or cylinder and repair or replace.
	Low oil level.	Fill tractor reservoir.
	Hydraulics clogged.	Replace filter.
	Pivot bolts too tight.	Refer to Maintenance Section on Opener Body Assembly for adjusting procedure.
Openers can not be fully pressurized.	Hydraulic line, fitting or cylinder leak.	Locate leaking line, fitting or cylinder and repair or replace .
	Pressure reducing valve dirty or stuck.	Put openers in float and adjust the reducing valve fully in and out to loosen stuck spool.
Shanks hang back and trip out during normal operation.	System pressure too low for seed depth and soil conditions.	Adjust reducing valve to higher pressure until shanks no longer hang back.
	Air in hydraulic lines.	Bleed hydraulic system.
Seed rows covered in loose soil after seeding.	Ground speed too fast.	Reduce speed and check field finish.
	Back of drill frame is lifting.	Add factory weight kit to rear depth beams.
Packer wheels bounce and chatter excessively in field.	Packing pressure too low.	Adjust reducing valve to higher pressure until packer arms have desired pressure.
	Depth setting too deep.	Reduce opener seeding depth.
Openers drop quickly after transport lock valve is closed.	Hydraulic line, fitting or cylinder leak.	Locate leaking line, fitting or cylinder and repair or replace.

# Troubleshooting

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Problem	Cause	Correction
Opener pressure drops quickly during normal operation. (more than 150psi after charging system).	Hydraulic line, fitting or cylinder leak.	Locate leaking line, fitting or cylinder and repair or replace.
	Damaged or stuck pilot operated check valve.	Replace valve.
Excessive seed depth and soil throw.	Soft field conditions.	Reduce pressure and seed depth settings.
	Ground speed too fast.	Reduce speed and re-check depth.
	Hydraulic pressure too high.	Reduce pressure and re-check depth.
Openers not fully lifting to transport position.	Air in hydraulic lines.	Bleed hydraulic system.
	Parallel link pivot bolts too tight.	Loosen pivot bolts in small increments until all openers will drop quickly from raised position under their own weight (put tractor remote in float to allow openers to drop).





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