

# **D1X Series Draper Header for Self-Propelled Windrowers**

**IMPORTANT: PAGE 29 HAS  
BEEN UPDATED SINCE THIS  
MANUAL WAS PUBLISHED.**

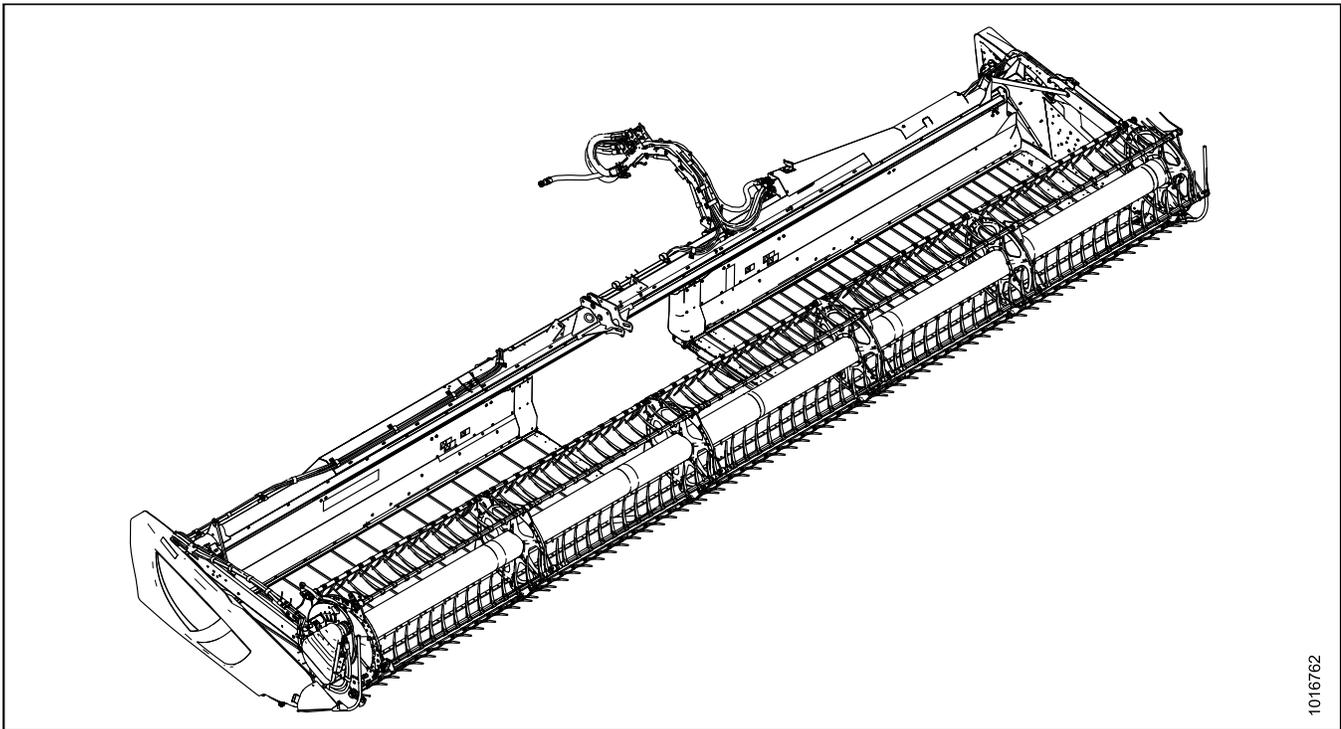
**Operator's Manual**

214044 Revision A

Model Year 2017

Original Instruction

D1X Series Draper Header for Self-Propelled Windrowers



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# Introduction

This instructional manual contains information on the D1X Series Draper Header. Teamed with your windrower, the D1X Series Draper Header will cut and lay crop into fluffy, uniform windrows.

The D1X Series Draper Header is designed as a straight-cut header, equipped to work well in all straight-cut conditions whether cutting on or above the ground.

Use this manual as your first source of information about the machine. If you follow the instructions provided, your header will work well for many years. If you require more detailed service information, a technical manual is available from your MacDon Dealer.

When setting up the machine or making adjustments, review and follow the recommended machine settings in all relevant MacDon publications. Failure to do so may compromise machine function and machine life and may result in a hazardous situation.

MacDon provides warranty for Customers who operate and maintain their equipment as described in this manual. A copy of the MacDon Industries Limited Warranty Policy, which explains this warranty, should have been provided to you by your Dealer. Damage resulting from any of the following conditions will void the warranty:

- Accident
- Misuse
- Abuse
- Improper maintenance or neglect
- Abnormal or extraordinary use of the machine
- Failure to use the machine, equipment, component, or part in accordance with the manufacturer's instructions

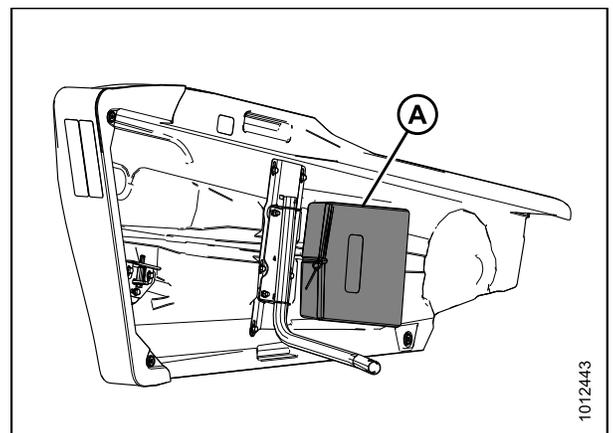
This manual is available in English only.

**Carefully read the information provided in this manual before attempting to maintain, service, or use the machine.**

The Table of Contents and Index will guide you to specific areas within this manual. Examine the Table of Contents and familiarize yourself with the organization of the information.

Keep this manual handy for frequent reference and to pass on to new Operators or Owners. A manual storage case (A) is located inside the endshield on the left side of the header.

Call your MacDon Dealer if you need assistance, information, or additional copies of this manual.



**Figure 1: Left Endshield Manual Storage Location**

# List of Revisions

Summary of Change	Refer to
Changed measurement format so that metric measurement appeared first followed by imperial in parenthesis.	Throughout the book.
Added warranty information.	<a href="#">Introduction, page i</a>
Revised topics/procedures.	<ul style="list-style-type: none"> <li>• <a href="#">1.7 Safety Decal Locations, page 8</a></li> <li>• <a href="#">1.8 Understanding Safety Signs, page 13</a></li> <li>• <a href="#">Checking and Adjusting Endshields, page 34</a></li> <li>• <a href="#">3.6.2 Header Settings, page 39</a></li> <li>• <a href="#">3.14 Upper Cross Auger (UCA), page 73</a></li> <li>• <a href="#">5.4 Electrical System, page 112</a></li> <li>• <a href="#">Tensioning Timed Knife Drive Belts, page 147</a></li> </ul>
Removed single knife information – not applicable.	<ul style="list-style-type: none"> <li>• <a href="#">2.1 Definitions, page 19</a></li> <li>• <a href="#">2.3 Specifications, page 23</a></li> <li>• <a href="#">5.6.1 Knife Drive Box, page 129</a></li> <li>• <a href="#">Removing Knife Drive Box, page 129</a></li> <li>• <a href="#">Installing Knife Drive Box, page 133</a></li> <li>• <a href="#">Removing Non-Timed Knife Drive Belt, page 139</a></li> </ul>
Added/updated information.	<a href="#">2.3 Specifications, page 23</a>
Changed transport speed.	<a href="#">Towing the Header, page 75</a>
<ul style="list-style-type: none"> <li>• Revised image to show new hydraulic hose management arm latch support for storage/transport position.</li> <li>• Revised step to store/remove the hydraulic hose management arm latch support to/from storage/transport position.</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">4.1 Attaching Header to M1170/M1240 Self-Propelled Windrower, page 91</a></li> <li>• <a href="#">4.2 Detaching Header from M1170/M1240 Windrower, page 94</a></li> </ul>
Revised image; beater bars not applicable to D1X Series.	<a href="#">Every 250 Hours, page 109</a>
Added note.	<a href="#">Adjusting Reel Clearance, page 176</a>
Updated bundle numbers.	<ul style="list-style-type: none"> <li>• <a href="#">6.2.2 Vertical Knife Mounts, page 217</a></li> <li>• <a href="#">6.3.1 Divider Latch Kit, page 218</a></li> <li>• <a href="#">6.3.3 Stabilizer/Slow Speed Transport Wheels, page 219</a></li> <li>• <a href="#">6.4.1 Double Draper Drive (DDD) Kit, page 220</a></li> <li>• <a href="#">6.4.4 Draper Extension Kit, page 221</a></li> <li>• <a href="#">6.4.6 Upper Cross Auger (UCA), page 221</a></li> </ul>

Summary of Change	Refer to
<p>Removed topics that are not applicable to D1X Series draper headers.</p> <ul style="list-style-type: none"> <li>• Battery Safety</li> <li>• PR15 Tine Tube Reel Conversion Kit</li> <li>• Cutterbar Wearplate</li> <li>• Knifehead Shield</li> <li>• Hydraulic Deck Shift Package</li> <li>• Upper Cross Auger Hydraulic Kit for Double Draper Drive</li> <li>• Upper Cross Auger Case Drain Kit for Single Draper Drive</li> <li>• Removing Beater Bars</li> <li>• Installing Beater Bars</li> </ul>	
<p>Added topic.</p>	<p><a href="#">9.1.8 Tapered Pipe Thread Fittings, page 251</a></p>

# Model and Serial Number

Record the model number, serial number, and model year of the header and Slow Speed Transport/Stabilizer Wheel option (if installed) on the lines below.

**NOTE:**

Right-hand (RH) and left-hand (LH) designations are determined from the operator's position, facing forward.

Header Model: \_\_\_\_\_

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

Year: \_\_\_\_\_

The serial number plate (A) is located beside the knife drive motor on the left-hand endsheet.



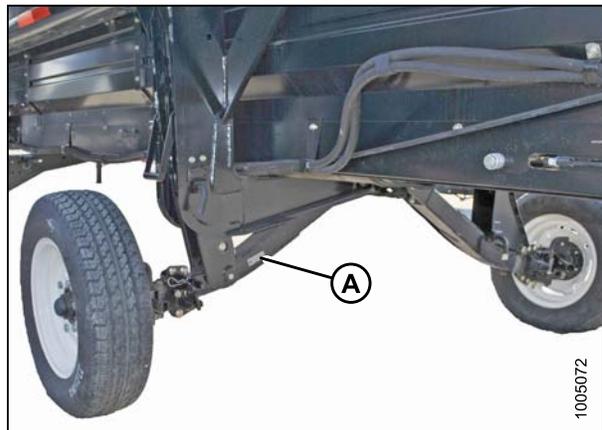
**Figure 2: Header**

**Slow Speed Transport/Stabilizer Wheel Option**

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

Year: \_\_\_\_\_

The serial number plate (A) is located on the right-hand axle assembly.



**Figure 3: Transport/Stabilizer Option**

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# 1 Safety

## 1.1 Safety Alert Symbols

This safety alert symbol indicates important safety messages in this manual and on safety signs on the machine.

This symbol means:

- **ATTENTION!**
- **BECOME ALERT!**
- **YOUR SAFETY IS INVOLVED!**

Carefully read and follow the safety message accompanying this symbol.

### **Why is safety important to you?**

- Accidents disable and kill
- Accidents cost
- Accidents can be avoided



**Figure 1.1: Safety Symbol**

## 1.2 Signal Words

Three signal words, **DANGER**, **WARNING**, and **CAUTION**, are used to alert you to hazardous situations. The appropriate signal word for each situation has been selected using the following guidelines:

### **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. It may also be used to alert against unsafe practices.

### **CAUTION**

Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may be used to alert against unsafe practices.

## 1.3 General Safety

### CAUTION

The following are general farm safety precautions that should be part of your operating procedure for all types of machinery.

Protect yourself.

- When assembling, operating, and servicing machinery, wear all protective clothing and personal safety devices that could be necessary for job at hand. Do **NOT** take chances. You may need the following:
  - Hard hat
  - Protective footwear with slip resistant soles
  - Protective glasses or goggles
  - Heavy gloves
  - Wet weather gear
  - Respirator or filter mask
- Be aware that exposure to loud noises can cause hearing impairment or loss. Wear suitable hearing protection devices such as ear muffs or ear plugs to help protect against objectionable or loud noises.

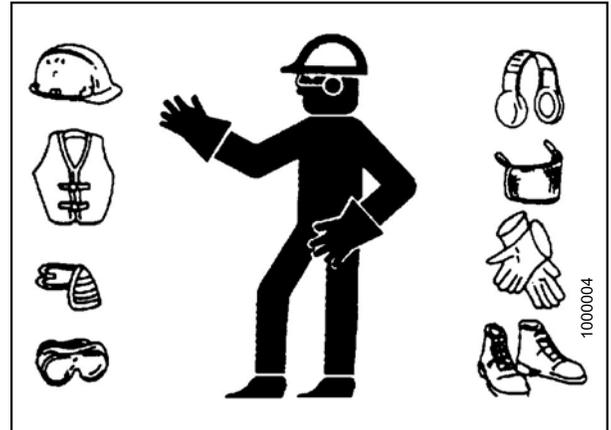


Figure 1.2: Safety Equipment



Figure 1.3: Safety Equipment

- Provide a first aid kit for use in case of emergencies.
- Keep a fire extinguisher on the machine. Be sure fire extinguisher is properly maintained. Be familiar with its proper use.
- Keep young children away from machinery at all times.
- Be aware that accidents often happen when Operator is tired or in a hurry. Take time to consider safest way. Never ignore warning signs of fatigue.

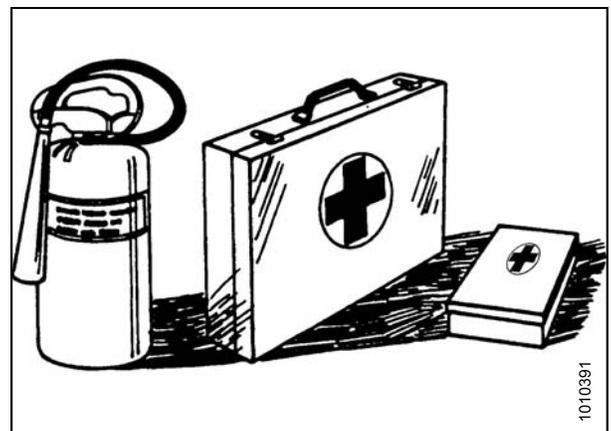


Figure 1.4: Safety Equipment

## SAFETY

- Wear close-fitting clothing and cover long hair. Never wear dangling items such as scarves or bracelets.
- Keep all shields in place. **NEVER** alter or remove safety equipment. Make sure driveline guards can rotate independently of shaft and can telescope freely.
- Use only service and repair parts made or approved by equipment manufacturer. Substituted parts may not meet strength, design, or safety requirements.



Figure 1.5: Safety around Equipment

- Keep hands, feet, clothing, and hair away from moving parts. **NEVER** attempt to clear obstructions or objects from a machine while engine is running.
- Do **NOT** modify machine. Unauthorized modifications may impair machine function and/or safety. It may also shorten machine's life.
- To avoid bodily injury or death from unexpected startup of machine, **ALWAYS** stop the engine and remove the key from the ignition before leaving the operator's seat for any reason.

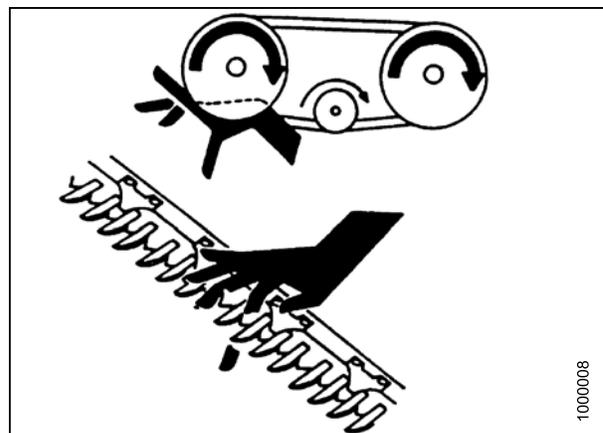


Figure 1.6: Safety around Equipment

- Keep service area clean and dry. Wet or oily floors are slippery. Wet spots can be dangerous when working with electrical equipment. Be sure all electrical outlets and tools are properly grounded.
- Keep work area well lit.
- Keep machinery clean. Straw and chaff on a hot engine is a fire hazard. Do **NOT** allow oil or grease to accumulate on service platforms, ladders, or controls. Clean machines before storage.
- **NEVER** use gasoline, naphtha, or any volatile material for cleaning purposes. These materials may be toxic and/or flammable.
- When storing machinery, cover sharp or extending components to prevent injury from accidental contact.



Figure 1.7: Safety around Equipment

## 1.4 Maintenance Safety

To ensure your safety while maintaining machine:

- Review operator's manual and all safety items before operation and/or maintenance of machine.
- Place all controls in Neutral, stop the engine, set the park brake, remove the ignition key, and wait for all moving parts to stop before servicing, adjusting, and/or repairing.
- Follow good shop practices:
  - Keep service areas clean and dry
  - Be sure electrical outlets and tools are properly grounded
  - Use adequate lighting for job at hand
- Relieve pressure from hydraulic circuits before servicing and/or disconnecting machine.
- Make sure all components are tight and that steel lines, hoses, and couplings are in good condition before applying pressure to hydraulic systems.
- Keep hands, feet, clothing, and hair away from all moving and/or rotating parts.
- Clear area of bystanders, especially children, when carrying out any maintenance, repairs or, adjustments.
- Install transport lock or place safety stands under frame before working under machine.
- If more than one person is servicing machine at same time, be aware that rotating a driveline or other mechanically-driven component by hand (for example, accessing a lube fitting) will cause drive components in other areas (belts, pulleys, and knives) to move. Stay clear of driven components at all times.
- Wear protective gear when working on machine.
- Wear heavy gloves when working on knife components.



Figure 1.8: Safety around Equipment

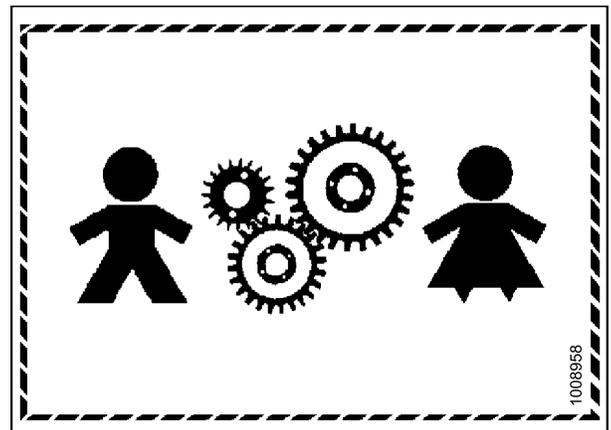


Figure 1.9: Equipment NOT Safe for Children

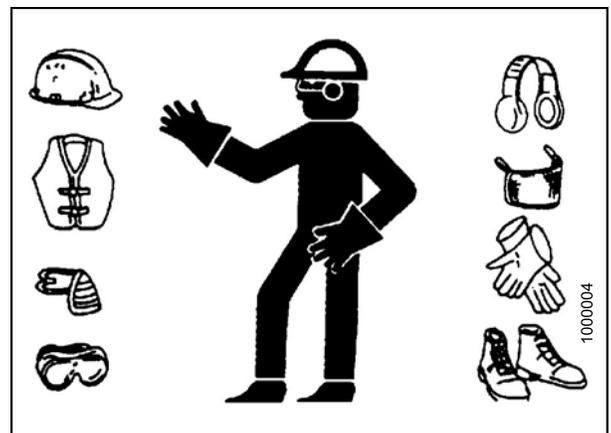


Figure 1.10: Safety Equipment

## 1.5 Hydraulic Safety

- Always place all hydraulic controls in Neutral before dismounting.
- Make sure that all components in hydraulic system are kept clean and in good condition.
- Replace any worn, cut, abraded, flattened, or crimped hoses and steel lines.
- Do **NOT** attempt any makeshift repairs to hydraulic lines, fittings, or hoses by using tapes, clamps, cements, or welding. The hydraulic system operates under extremely high pressure. Makeshift repairs will fail suddenly and create hazardous and unsafe conditions.

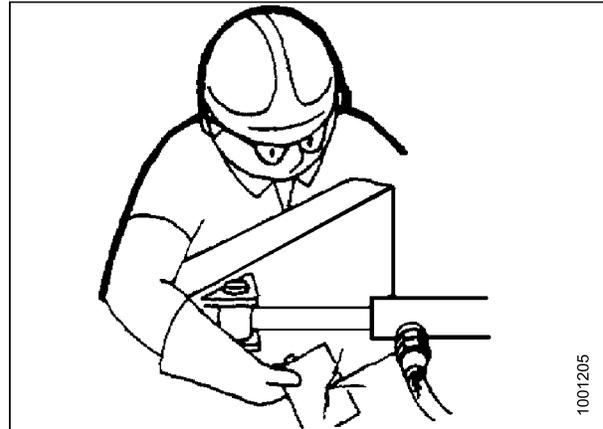


Figure 1.11: Testing for Hydraulic Leaks

- Wear proper hand and eye protection when searching for high-pressure hydraulic leaks. Use a piece of cardboard as a backstop instead of hands to isolate and identify a leak.
- If injured by a concentrated high-pressure stream of hydraulic fluid, seek medical attention immediately. Serious infection or toxic reaction can develop from hydraulic fluid piercing the skin.



Figure 1.12: Hydraulic Pressure Hazard

- Make sure all components are tight and steel lines, hoses, and couplings are in good condition before applying pressure to a hydraulic system.

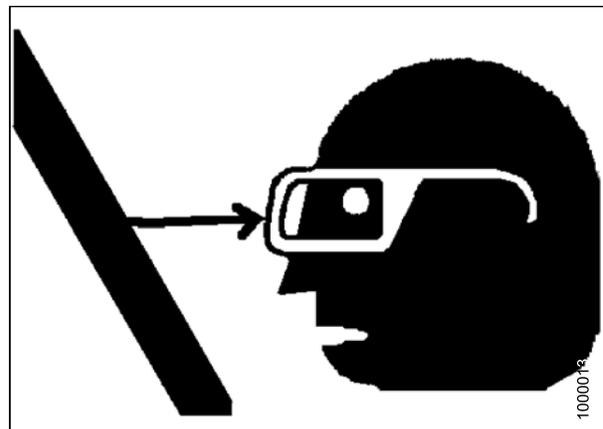
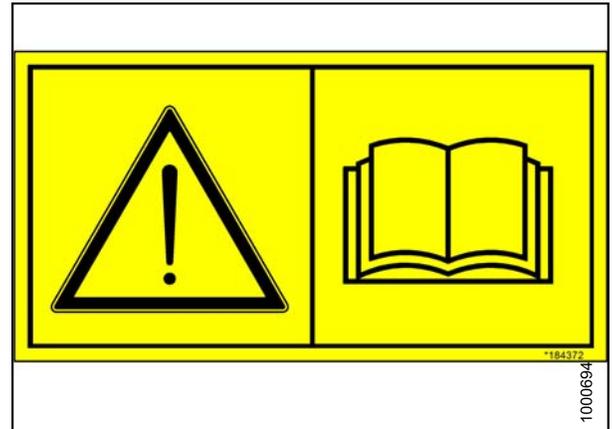


Figure 1.13: Safety around Equipment

## **1.6 Safety Signs**

- Keep safety signs clean and legible at all times.
- Replace safety signs that are missing or become illegible.
- If original parts on which a safety sign was installed are replaced, be sure repair part also bears current safety sign.
- Replacement safety signs are available from your Dealer Parts Department.

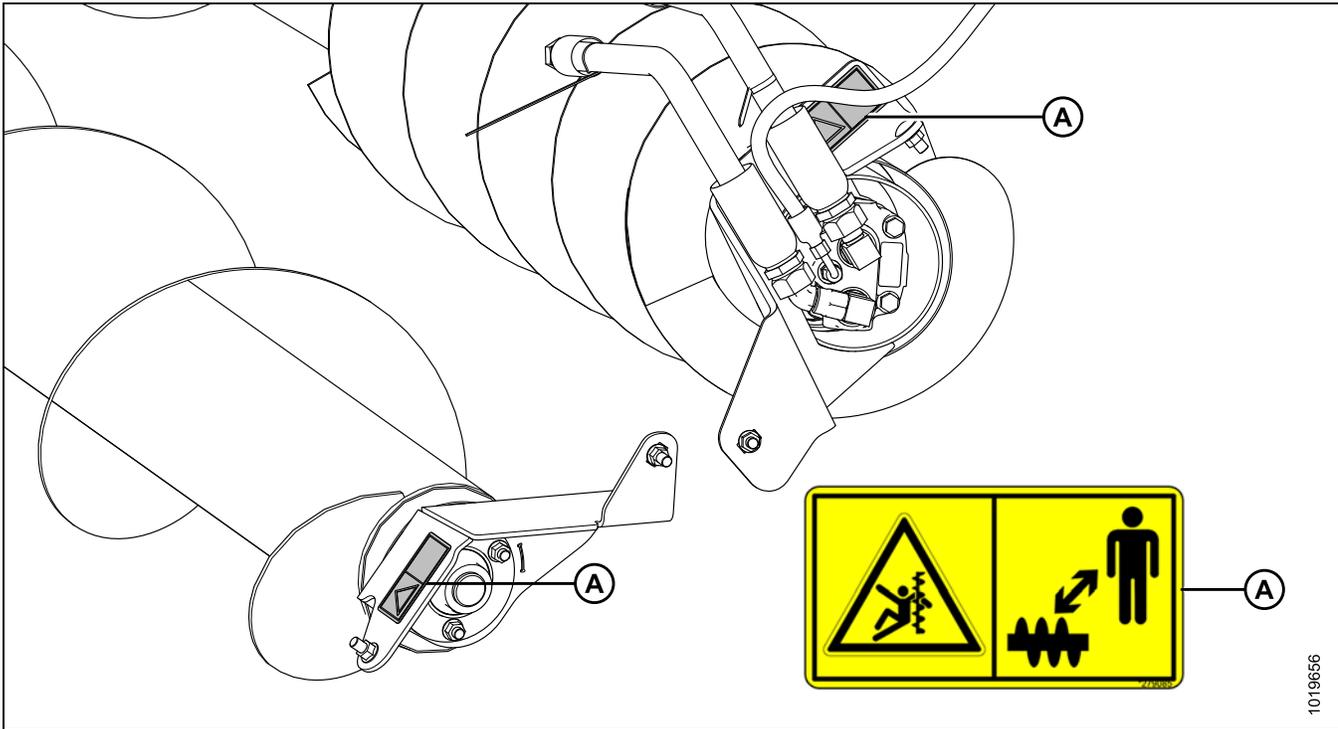


**Figure 1.14: Operator's Manual Decal**

### **1.6.1 Installing Safety Decals**

1. Clean and dry installation area.
2. Decide on exact location before you remove decal backing paper.
3. Remove smaller portion of split backing paper.
4. Place sign in position and slowly peel back remaining paper, smoothing sign as it is applied.
5. Prick small air pockets with a pin and smooth out.

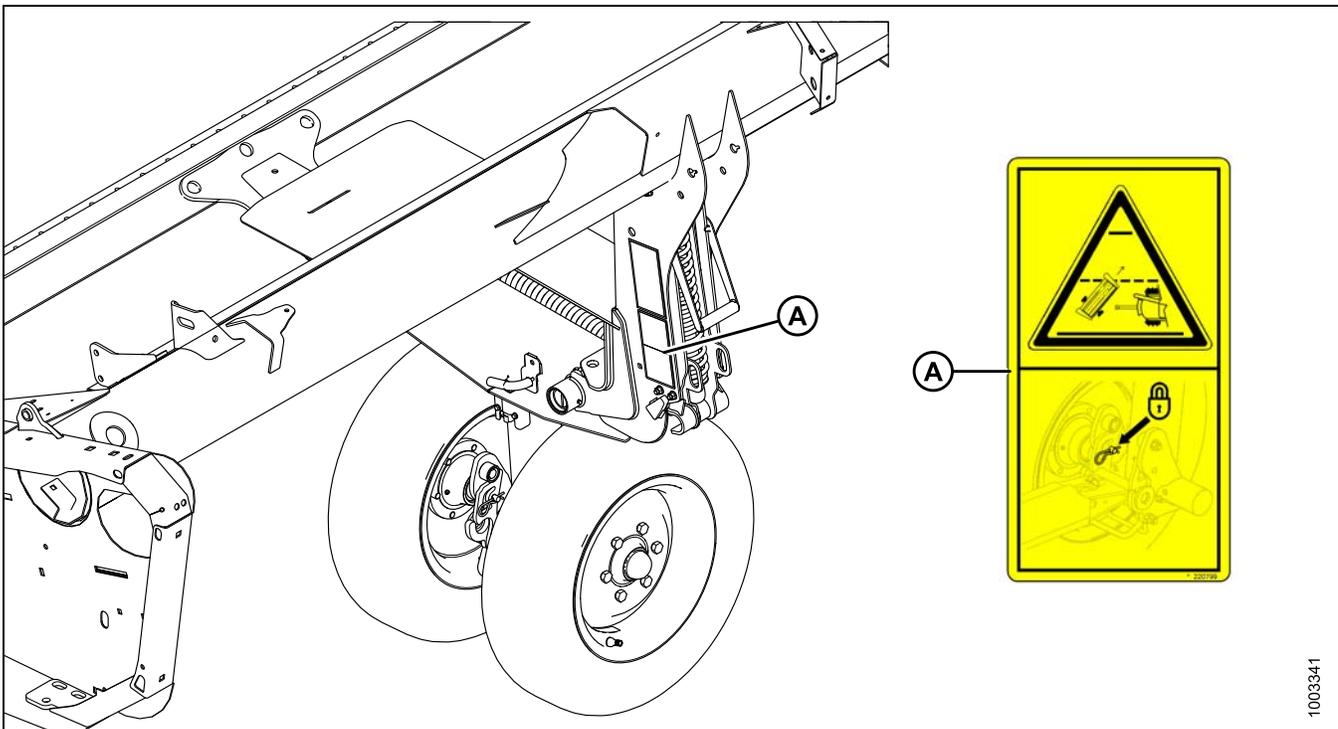
## 1.7 Safety Decal Locations



1019656

Figure 1.15: Upper Cross Auger

A - MD #279085

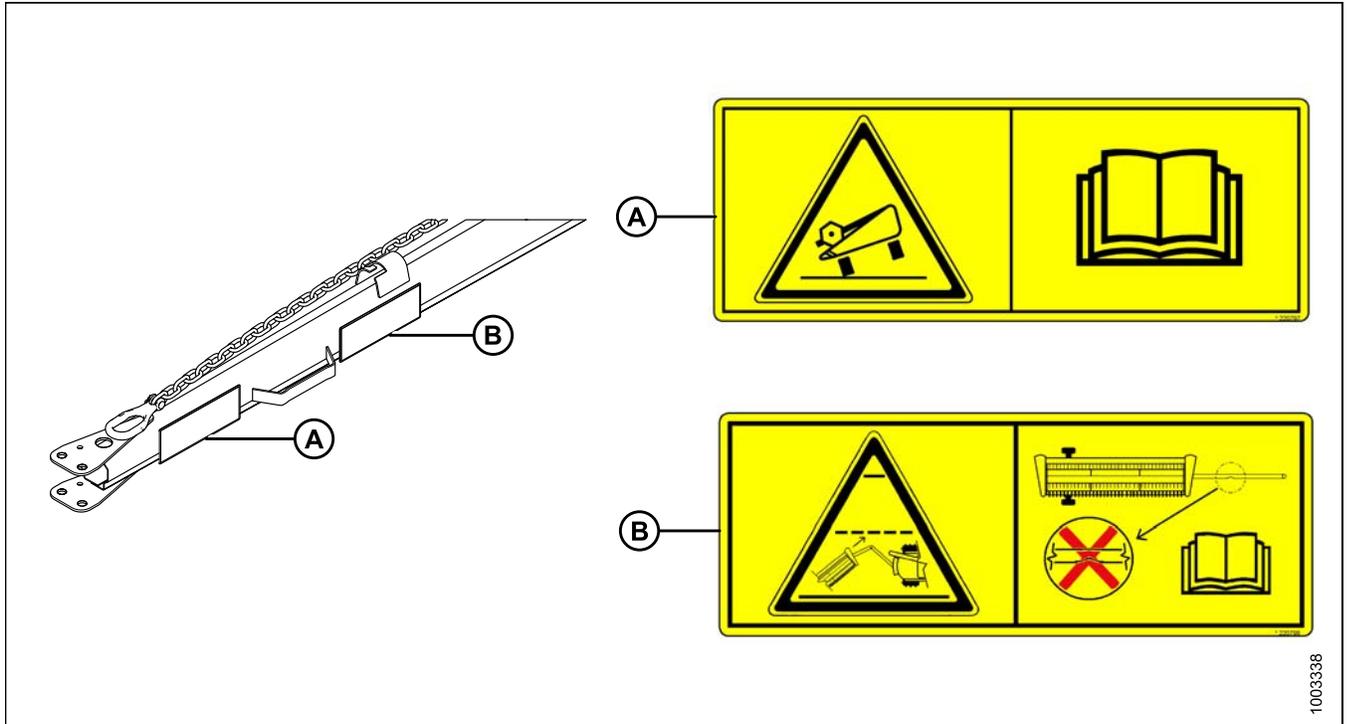


1003341

Figure 1.16: Slow Speed Transport

A - MD #220799

**SAFETY**

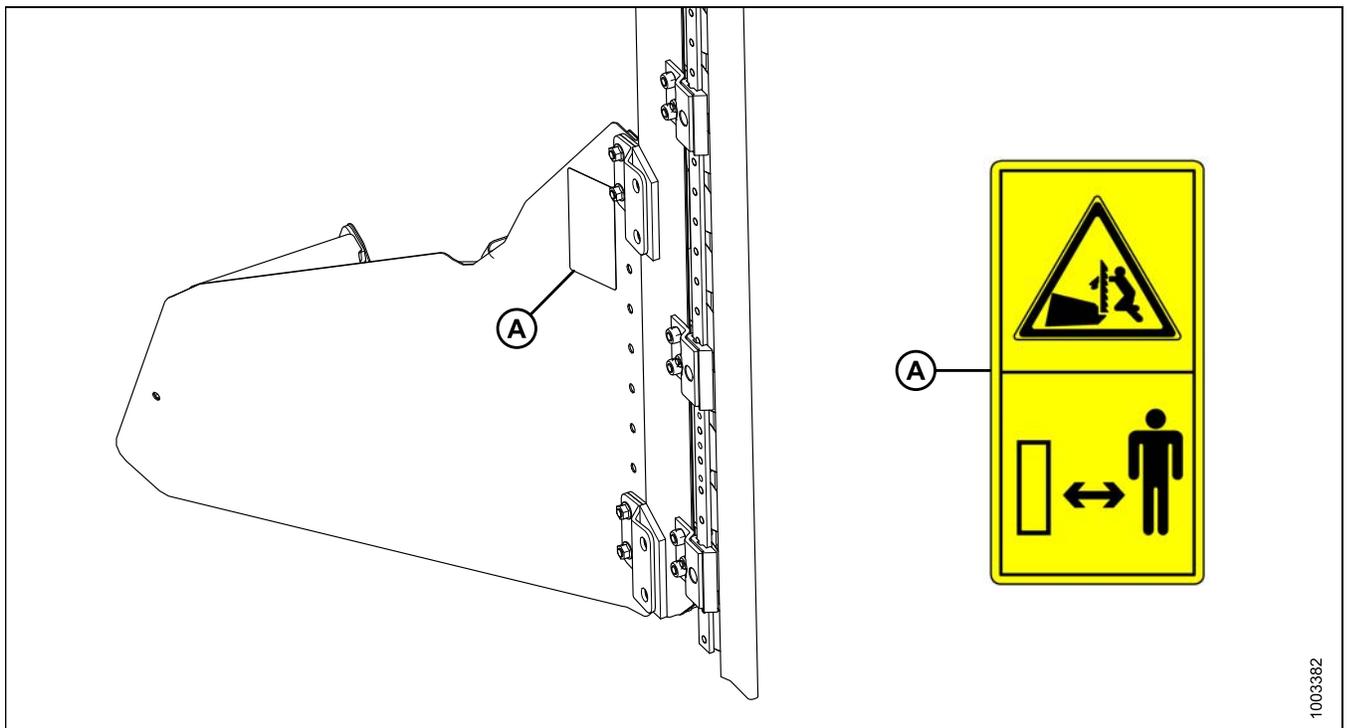


1003338

**Figure 1.17: Slow Speed Transport Tow-Bar**

A - MD #220797

B - MD #220798

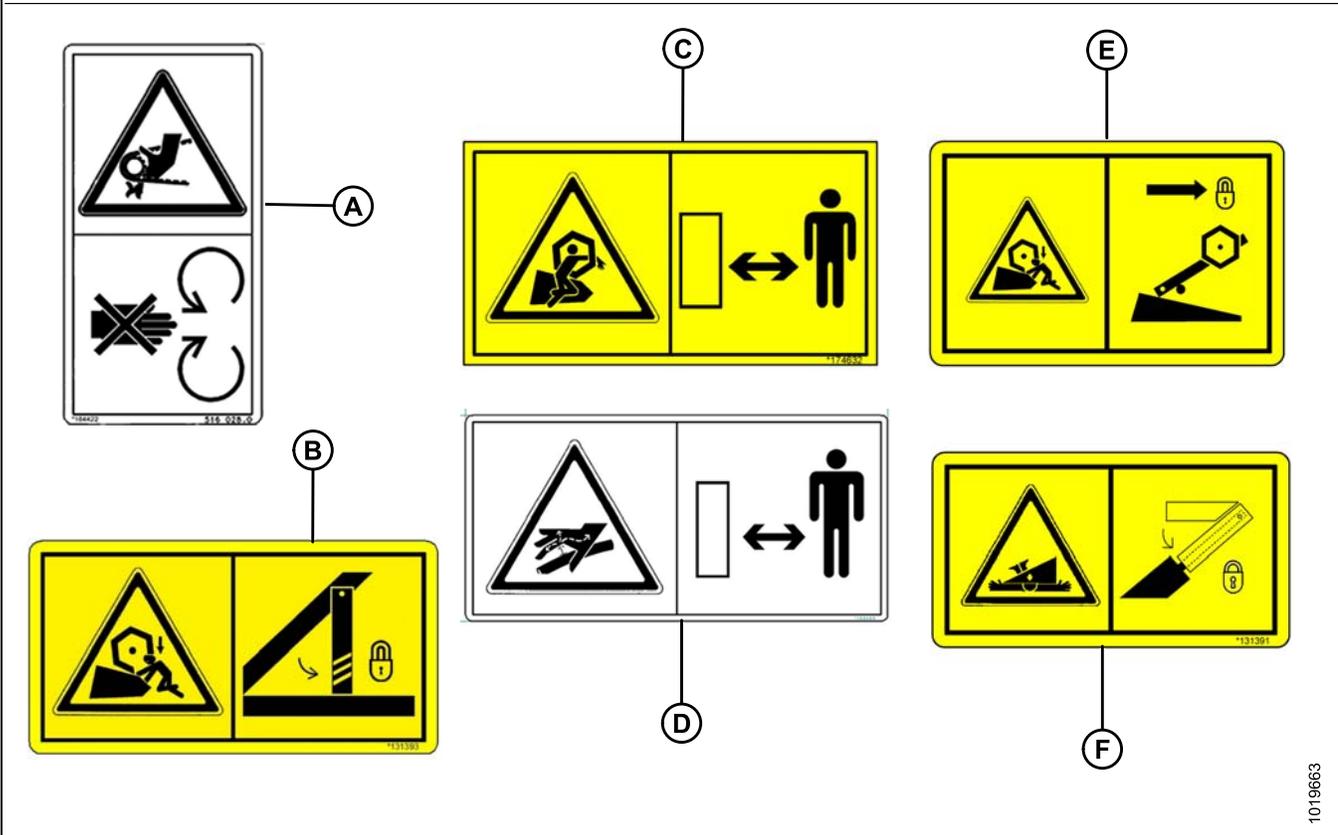
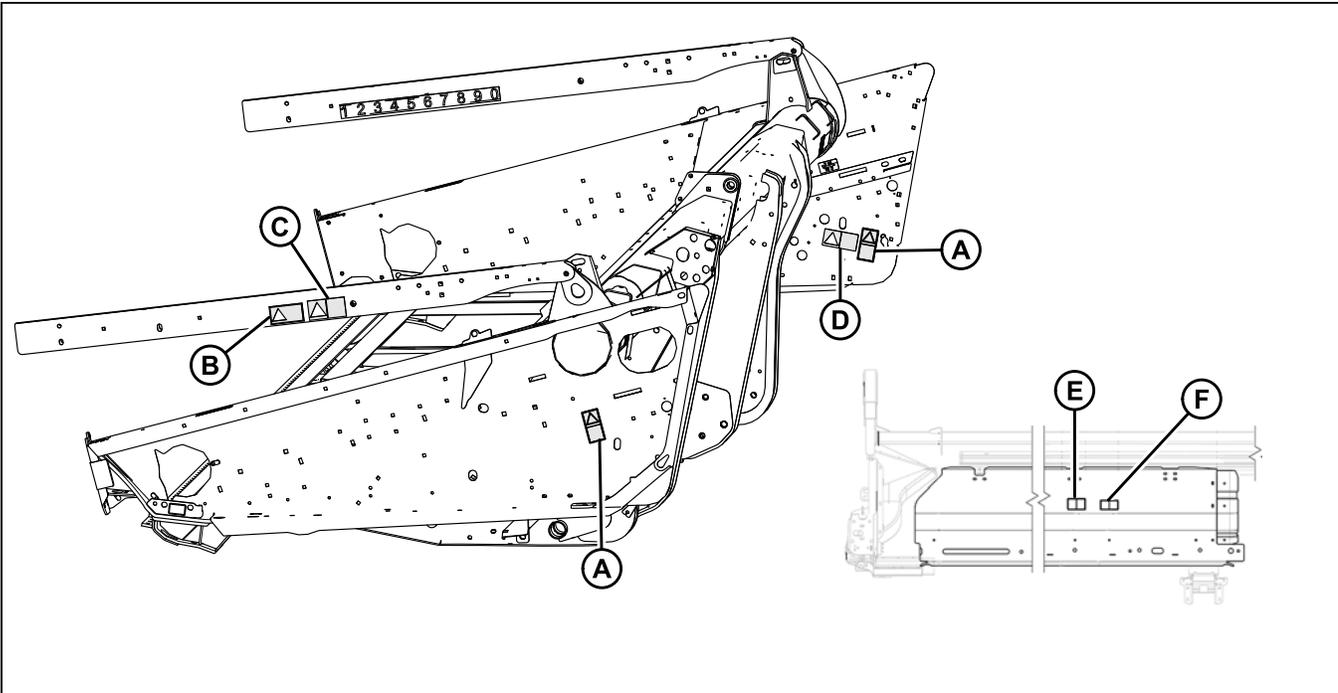


1003382

**Figure 1.18: Vertical Knife**

A - MD #174684

# SAFETY



**Figure 1.19: Endsheets, Reel Arms, and Backsheet**

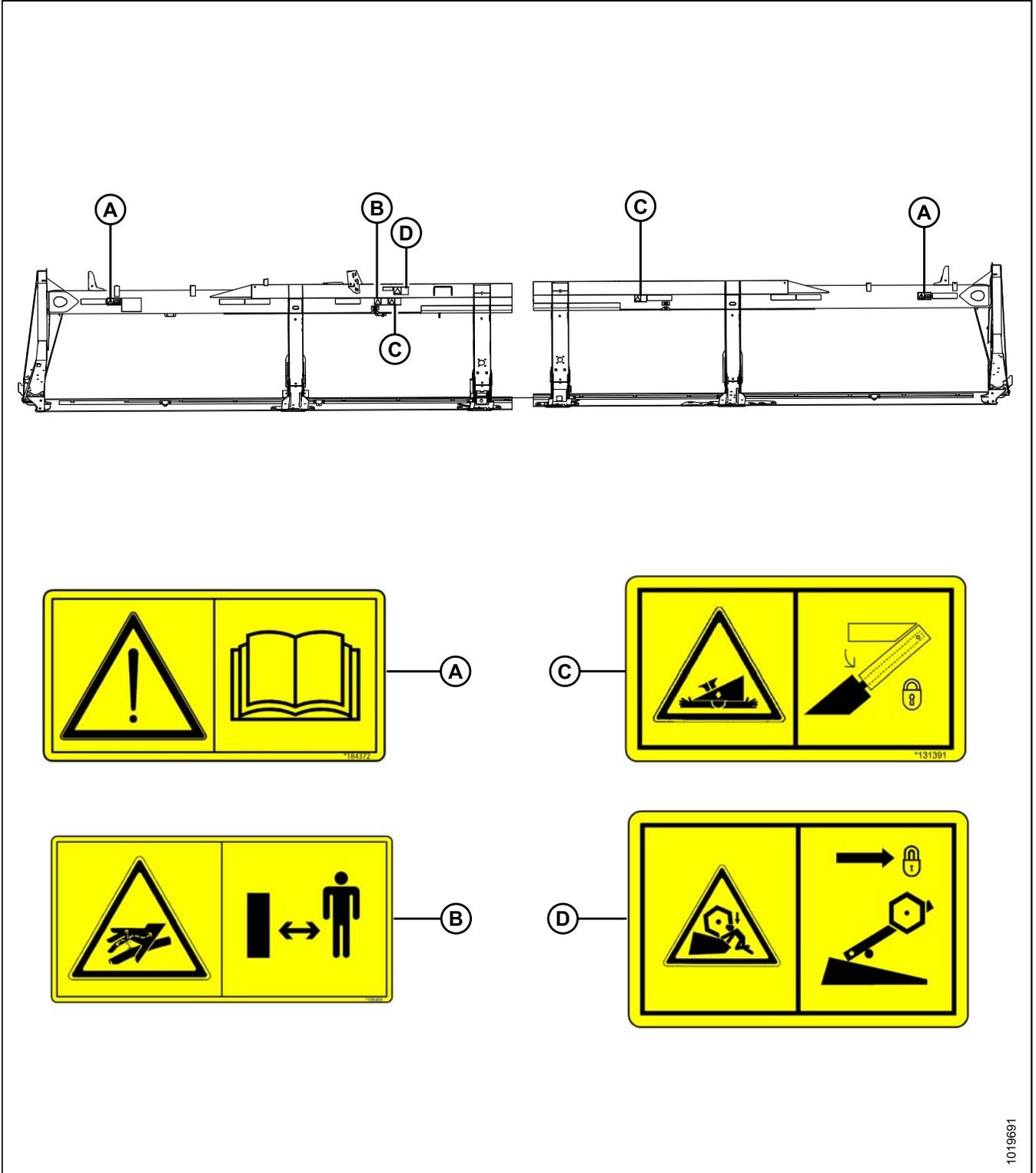
A - MD #184422 (Four Places)  
 D - MD #166466 (Two Places)

B - MD #131393  
 E - MD #131392 Double Reel – MD #131393  
 Single Reel (Two Places)

C - MD #174632  
 F - MD #131391 (Two Places)

1019663

**SAFETY**



**Figure 1.20: 35-Footer Header Backtube (30-Footer Header Similar)**

A - MD #184372

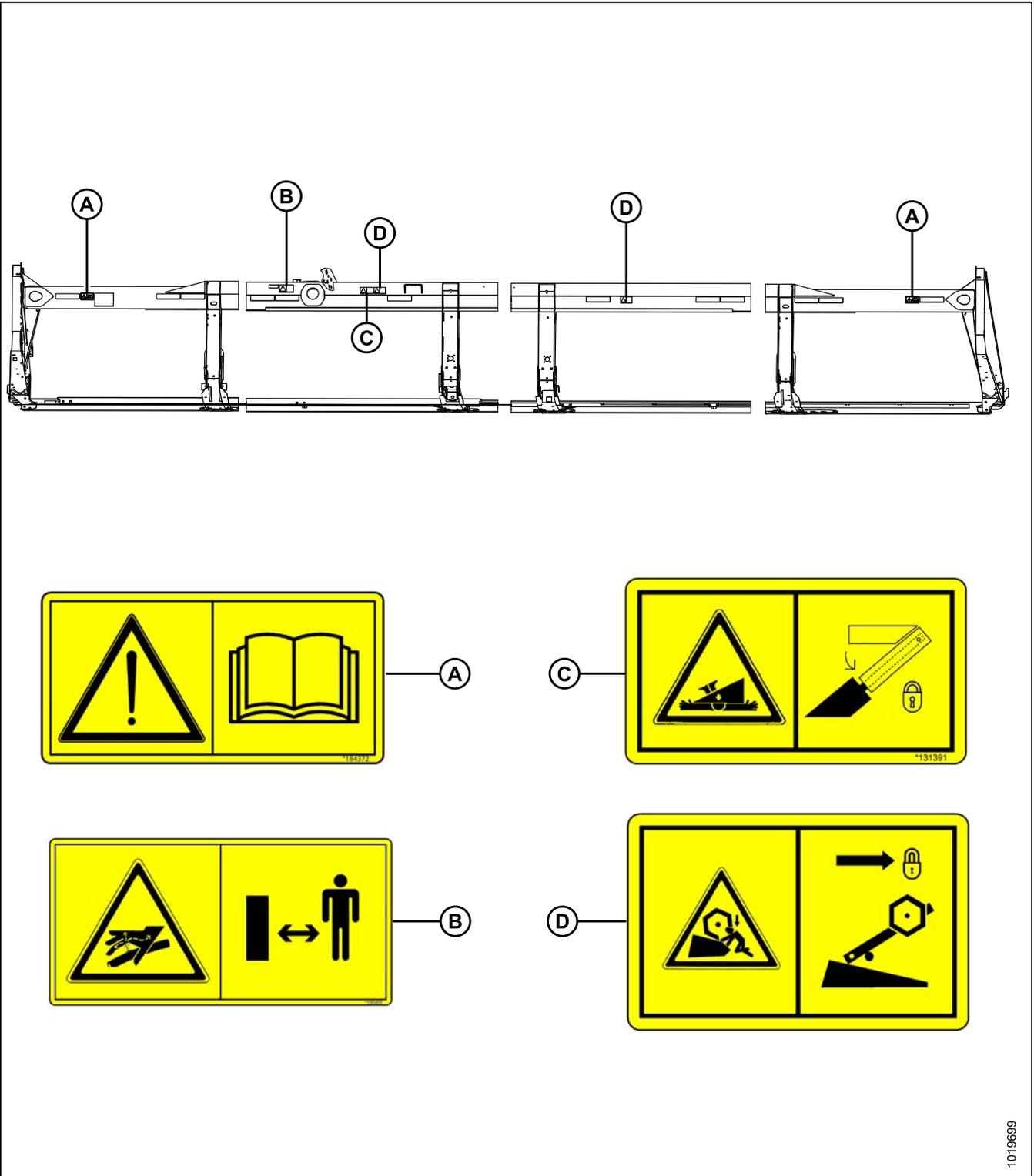
B - MD #166466

C - MD #131391

D - MD #131392 (35-Ft Double Reel Only)

1019691

**SAFETY**



**Figure 1.21: 40-Foot Header Backtube (45-Foot Header Similar)**

A - MD #184372

B - MD #131392

C - MD #166466

D - MD #131391

## 1.8 Understanding Safety Signs

### MD #113482

General hazard pertaining to machine operation and servicing

#### CAUTION

To avoid injury or death from improper or unsafe machine operation:

- Read the operator's manual and follow all safety instructions. If you do not have a manual, obtain one from your Dealer.
- Do not allow untrained persons to operate the machine.
- Review safety instructions with all Operators every year.
- Ensure that all safety signs are installed and legible.
- Make certain everyone is clear of machine before starting engine and during operation.
- Keep riders off the machine.
- Keep all shields in place and stay clear of moving parts.
- Disengage header drive, put transmission in Neutral, and wait for all movement to stop before leaving operator's position.
- Stop the engine and remove the key before servicing, adjusting, lubricating, cleaning, or unplugging machine.
- Engage safety props to prevent lowering of header or reel before servicing in the raised position (refer to the header operator's manual).
- Use slow moving vehicle emblem and flashing warning lights when operating on roadways unless prohibited by law.

### MD #131391

Crushing hazard

#### DANGER

- Rest header on ground or engage safety props before going under unit.

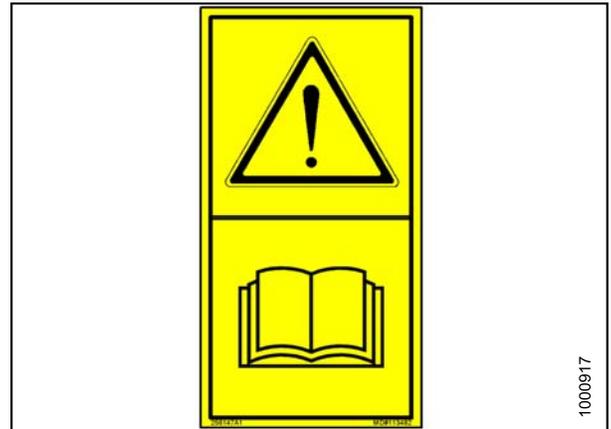


Figure 1.22: MD #113482

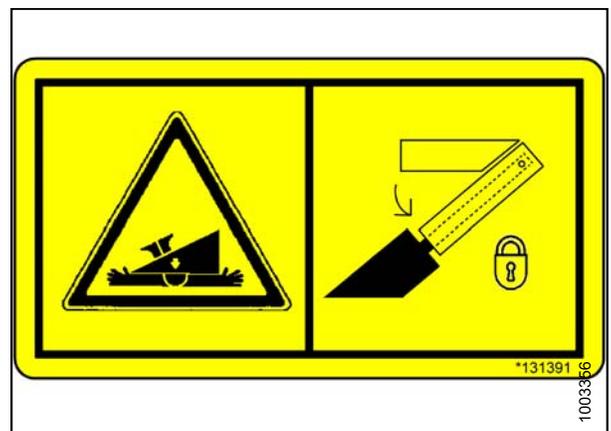


Figure 1.23: MD #131391

## SAFETY

### MD #131392

Crushing hazard

#### WARNING

- To avoid injury from fall of raised reel; fully raise reel, stop the engine, remove the key, and engage safety prop on each reel support arm before working on or under reel.



Figure 1.24: MD #131392

### MD #131393

Reel hazard

#### WARNING

- To avoid injury from fall of raised reel; fully raise reel, stop the engine, remove the key, and engage safety prop on each reel support arm before working on or under reel.



Figure 1.25: MD #131393

### MD #166466

High pressure oil hazard

#### WARNING

- Do not go near leaks.
- High pressure oil easily punctures skin causing serious injury, gangrene, or death.
- If injured, seek emergency medical help. Immediate surgery is required to remove oil.
- Do not use finger or skin to check for leaks.
- Lower load or relieve hydraulic pressure before loosening fittings.



Figure 1.26: MD #166466

## SAFETY

### MD #174436

High pressure oil hazard

#### WARNING

- Do not go near leaks.
- High pressure oil easily punctures skin causing serious injury, gangrene, or death.
- If injured, seek emergency medical help. Immediate surgery is required to remove oil.
- Do not use finger or skin to check for leaks.
- Lower load or relieve hydraulic pressure before loosening fittings.



Figure 1.27: MD #174436

### MD #174632

Reel entanglement hazard

#### CAUTION

- To avoid injury from entanglement with rotating reel, stand clear of header while machine is running.

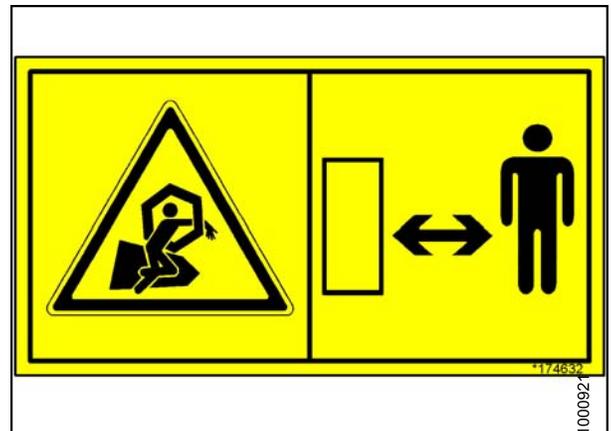


Figure 1.28: MD #174632

### MD #174684

Sharp component hazard

#### CAUTION

- Wear heavy canvas or leather gloves when working with knife.
- Be sure no one is near the vertical knife when removing or rotating knife.



Figure 1.29: MD #174684

## SAFETY

### MD #184372

General hazard pertaining to machine operation and servicing

#### CAUTION

To avoid injury or death from improper or unsafe machine operation:

- Read the operator's manual and follow all safety instructions. If you do not have a manual, obtain one from your Dealer.
- Do not allow untrained persons to operate the machine.
- Review safety instructions with all Operators annually.
- Ensure that all safety signs are installed and legible.
- Make certain everyone is clear of machine before starting engine and during operation.
- Keep riders off the machine.
- Keep all shields in place and stay clear of moving parts.
- Disengage header drive, put transmission in Neutral, and wait for all movement to stop before leaving operator's position.
- Stop the engine and remove the key from ignition before servicing, adjusting, lubricating, cleaning, or unplugging machine.
- Engage safety props to prevent lowering of raised unit before servicing in the raised position.
- Use slow moving vehicle emblem and flashing warning lights when operating on roadways unless prohibited by law.

### MD #184422

Keep shields in place hazard

#### WARNING

- Do not place hand.
- To avoid injury, stop the engine and remove the key before opening power drive system shield.
- Keep all shields in place.

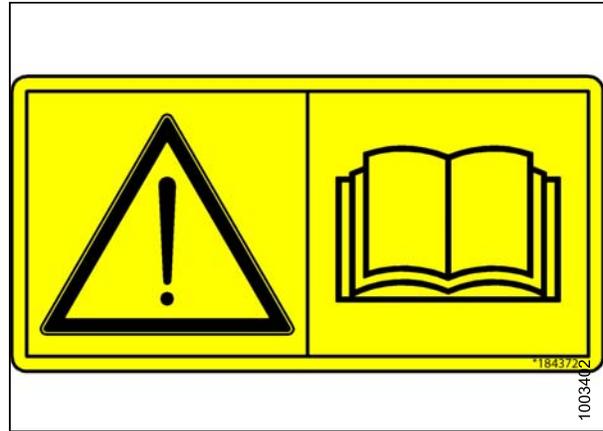


Figure 1.30: MD #184372



Figure 1.31: MD #184422

## SAFETY

### MD #193147

Transport/roading hazard

#### WARNING

- Ensure tow-bar lock mechanism is locked.



Figure 1.32: MD #193147

### MD #220797

Tipping hazard in transport mode

#### WARNING

- Read the operator's manual for more information on potential tipping or roll-over of header while transporting.

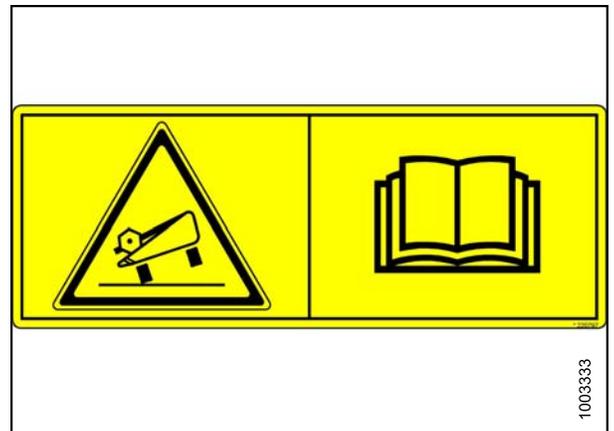


Figure 1.33: MD #220797

### MD #220798

Loss of control hazard in transport

#### CAUTION

- Do not tow the header with a dented or otherwise damaged tow pole (the circle with the red X shows a dent in the pole).
- Consult the operator's manual for more information.

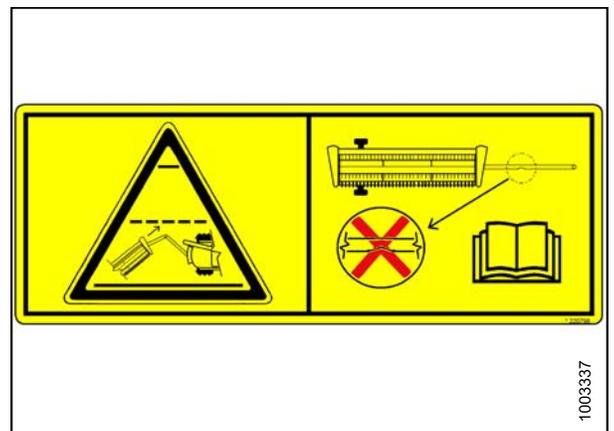


Figure 1.34: MD #220798

## SAFETY

### MD #220799

Transport/roading hazard

#### WARNING

- Ensure tow-bar lock mechanism is locked.

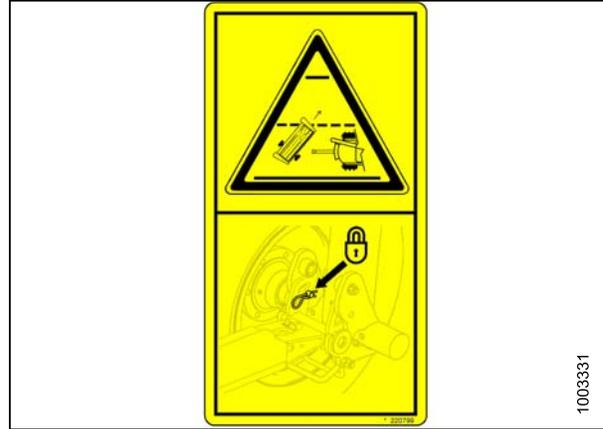


Figure 1.35: MD #220799

### MD #279085

Auger entanglement hazard

#### WARNING

- To avoid injury from rotating auger, stand clear of auger while machine is running.

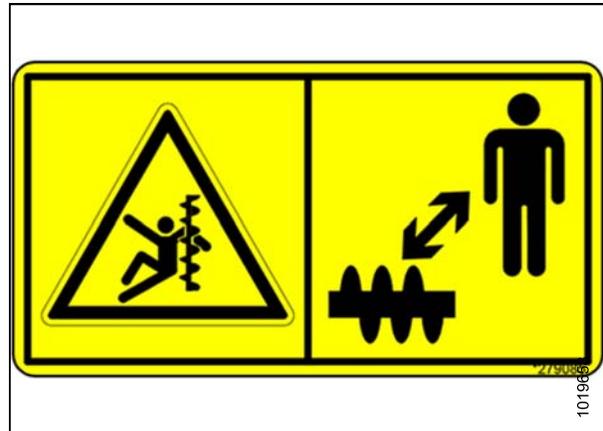


Figure 1.36: MD #279085

## 2 Product Overview

### 2.1 Definitions

The following terms and acronyms may be used in this manual.

Term	Definition
API	American Petroleum Institute
ASTM	American Society of Testing and Materials
Bolt	A headed and externally threaded fastener that is designed to be paired with a nut
Cab-forward	Windrower operation with Operator and cab facing in direction of travel
Center-link	A hydraulic cylinder link between header and machine to which it is attached: It is used to change header angle
CGVW	Combined vehicle gross weight
D1X Series header	MacDon D125X rigid draper headers for windrowers
D1XL Series header	MacDon D130XL, D135XL, D140XL, and D145XL rigid draper headers for windrowers.
DK	Double knife
DKD	Double-knife drive
DDD	Double-draper drive
DR	Double reel
ECU	Electronic control unit
Engine-forward	Windrower operation with Operator and engine facing in direction of travel
Export header	Header configuration typical outside North America
Finger tight	Finger tight is a reference position where sealing surfaces or components are making contact with each other and fitting has been tightened to a point where fitting is no longer loose
FFFT	Flats from finger tight
GSL	Ground speed lever
GVW	Gross vehicle weight
Hard joint	A joint made with use of a fastener where joining materials are highly incompressible
HPT display	Harvest Performance Tracker display module on a self-propelled windrower
Header	A machine that cuts and lays crop into a windrow and is attached to a self-propelled windrower
Hex key	A tool of hexagonal cross-section used to drive bolts and screws that have a hexagonal socket in head (internal-wrenching hexagon drive). Also known as an Allen key and various other synonyms.
HDS	Hydraulic deck shift
hp	Horsepower
JIC	Joint Industrial Council: A standards body that developed standard sizing and shape for original 37° flared fitting

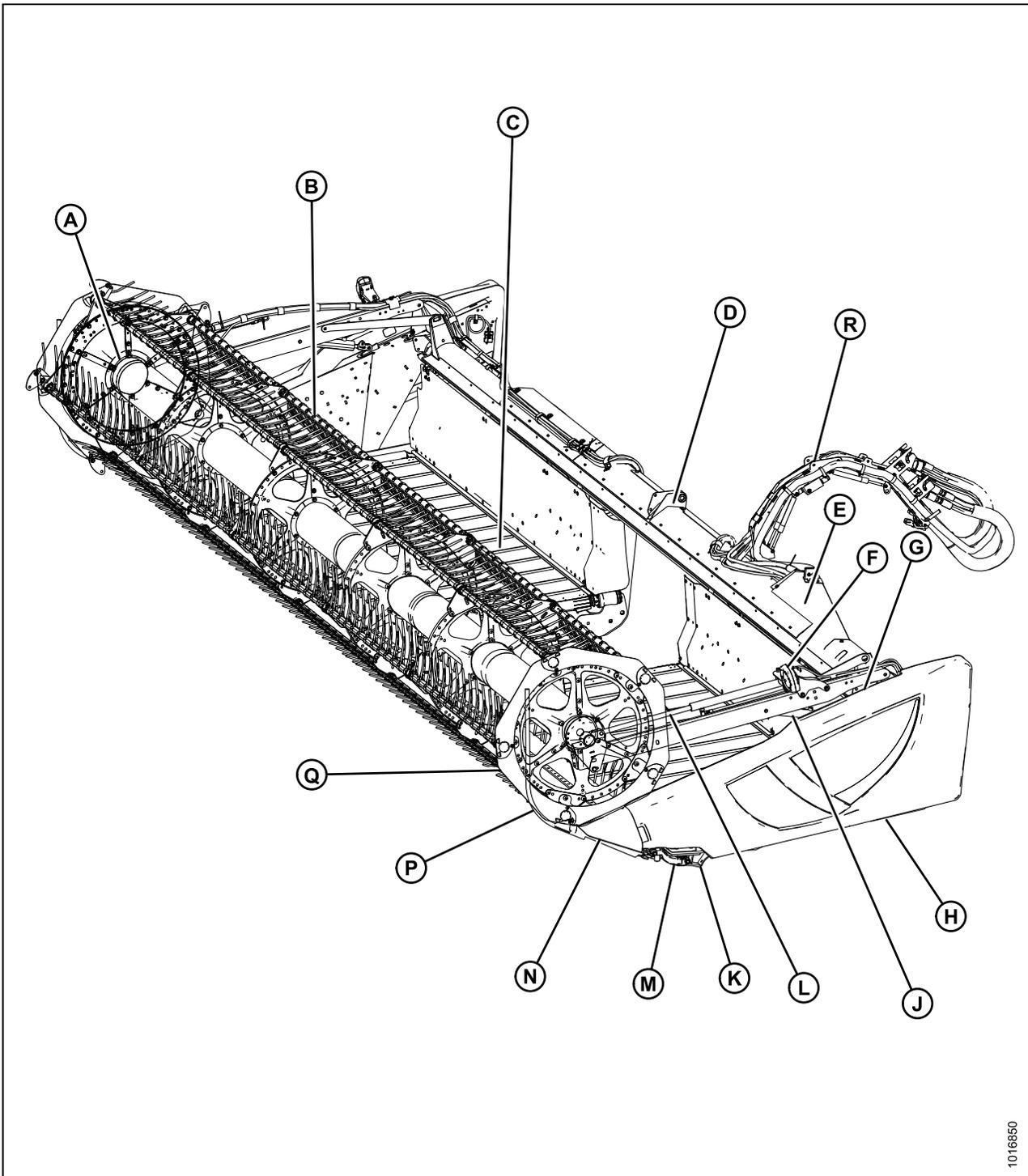
## PRODUCT OVERVIEW

<b>Term</b>	<b>Definition</b>
Knife	A cutting device which uses a reciprocating cutter (also called a sickle)
n/a	Not applicable
Nut	An internally threaded fastener that is designed to be paired with a bolt
N-DETENT	The slot opposite the NEUTRAL position on operator's console
North American header	Header configuration typical in North America
NPT	National Pipe Thread: A style of fitting used for low pressure port openings Threads on NPT fittings are uniquely tapered for an interference fit
ORB	O-ring boss: A style of fitting commonly used in port opening on manifolds, pumps, and motors
ORFS	O-ring face seal: A style of fitting commonly used for connecting hoses and tubes This style of fitting is also commonly called ORS, which stands for O-ring seal
rpm	Revolutions per minute
RoHS (Reduction of Hazardous Substances)	A directive by the European Union to restrict use of certain hazardous substances (such as hexavalent chromium used in some yellow zinc platings)
SAE	Society of Automotive Engineers
Screw	A headed and externally threaded fastener that threads into preformed threads or forms its own thread in one of mating parts
SDD	Single-drapeer drive
Self-Propelled (SP) Windrower	Self-propelled machine consisting of a power unit with a header
Soft joint	A joint made with use of a fastener where joining materials are compressible or experience relaxation over a period of time
spm	Strokes per minute
SR	Single reel
Truck	A four-wheel highway/road vehicle weighing no less than 3400 kg (7500 lb.)
Timed knife drive	Synchronized motion applied at cutterbar to two separately driven knives from a single hydraulic motor
Tension	Axial load placed on a bolt or screw, usually measured in Newtons (N) or pounds (lb.)
TFFT	Turns from finger tight
Torque	The product of a force X lever arm length, usually measured in Newton-meters (N·m) or foot-pounds (ft·lbf)
Torque angle	A tightening procedure where fitting is assembled to a precondition (finger tight) and then nut is turned farther a number of degrees or a number of flats to achieve its final position
Torque-tension	The relationship between assembly torque applied to a piece of hardware and axial load it induces in bolt or screw
UCA	Upper cross auger
Untimed knife drive	Unsynchronized motion applied at cutterbar to two separately driven knives from a single hydraulic motor or two hydraulic motors

## PRODUCT OVERVIEW

<b>Term</b>	<b>Definition</b>
Washer	A thin cylinder with a hole or slot located in the center that is to be used as a spacer, load distribution element, or a locking mechanism
Windrower	Power unit of a self-propelled header
WCM	Windrower control module

## 2.2 Component Identification



1016850

**Figure 2.1: Windrower Header Components**

- |                                 |                            |                        |
|---------------------------------|----------------------------|------------------------|
| A - Reel Cam                    | B - Pick-Up Reel Tines     | C - Draper             |
| D - Center Reel Arm Prop Handle | E - Hydraulic Connections  | F - Transport Light    |
| G - Reel Safety Prop            | H - Endshield              | J - Reel Lift Cylinder |
| K - Skid Shoe                   | L - Reel Fore-Aft Cylinder | M - Knife Drive Box    |
| N - Crop Divider                | P - Crop Divider Rod       | Q - Reel Endshield     |
| R - Hose Support Arm            |                            |                        |

## PRODUCT OVERVIEW

### 2.3 Specifications

The following symbol and letters are used in Table 2.1 *Header Specifications, page 23* and Table 2.2 *Header Attachments, page 26*:

- **S**: standard
- **O<sub>F</sub>**: optional (factory installed)
- **O<sub>D</sub>**: optional (dealer installed)
- **—** : not available

**Table 2.1 Header Specifications**

<b>Cutterbar</b>			
Effective cutting width (distance between crop divider points)			
25-foot header (D125X)		7620 mm (300 in.)	S
30-foot header (D130XL)		9144 mm (360 in.)	S
35-foot header (D135XL)		10,668 mm (420 in.)	S
40-foot header (D140XL)		12,192 mm (480 in.)	S
45-foot header (D145XL)		13,716 mm (540 in.)	S
Cutterbar lift range at guard tip (center-link fully retracted)		1265 mm (49-13/16 in.)	—
<b>Knife</b>			
Double-knife drive 25–35 foot (timed): One hydraulic motor with two banded-belts to two heavy duty MD knife drive boxes			S
Double-knife drive 40–45 foot (non-timed): Two untimed hydraulic motors with cogged-belts to two heavy duty MD knife drive boxes			S
Knife stroke		76 mm (3 in.)	S
Double-knife speed (strokes per minute) <sup>1</sup>	25 foot	1400–1700 spm	S
	30 foot	1200–1600 spm	S
	35 foot	1200–1400 spm	S
	40 foot	1100–1400 spm	S
	45 foot	1100–1400 spm	S

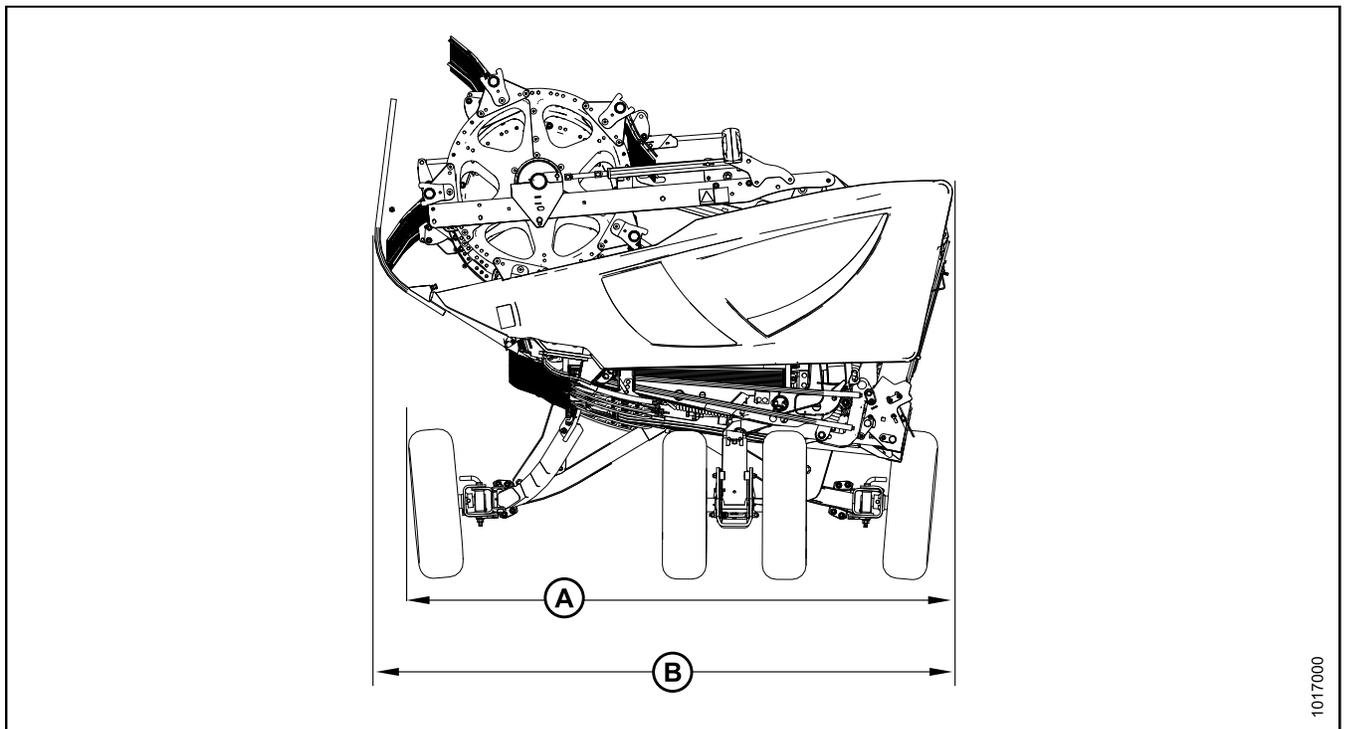
1. Under normal cutting conditions, set knife speed at the knife drive pulley between 600 and 640 rpm (1200 and 1280 spm). If set to low side of chart, you could experience knife stalling.

## PRODUCT OVERVIEW

<b>Knife Sections</b>			
Over-serrated / solid / bolted / 9 serrations per inch			S
Over-serrated / solid / bolted / 14 serrations per inch			O <sub>D</sub>
Knife overlap at center (double-knife headers)	3 mm (1/8 in.)		S
<b>Guards and Hold-Downs</b>			
Guard: pointed / forged / double heat treated (DHT) Hold-down: sheet metal / adjustment bolt			O <sub>F</sub>
Guard: stub / forged bottom / forged top / adjustment plate			O <sub>D</sub>
Guard: stub / forged bottom / sheet metal top / adjustment bolt			O <sub>D</sub>
<b>Guard Angle (Cutterbar on Ground)</b>			
Center-link retracted	30–40 foot	2.5 degrees	S
Center-link extended	30–40 foot	12.0 degrees	S
<b>Conveyor (Draper) and Decks</b>			
Draper width (D125X)		1057 mm (41.6 in.)	S
Draper width (D1XL Series)		1270 mm (50 in.)	S
Draper drive		Hydraulic	S
Draper speed		225 m/min. (0–742 fpm )	S
Delivery opening width (center delivery) / variable by shifting decks	30, 35, 40 foot	1720–1950 mm (67-1/8 – 76-11/16 in.)	S
<b>PR15 Pick-Up Reel</b>			
Quantity of tine tubes		5 or 6	
Center tube diameter	35 foot (single reel only)	254 mm (10 in.)	
	All reel sizes (except 35 foot single reel)	203 mm (8 in.)	
Finger tip radius	Factory-set	800 mm (31-1/2 in.)	
	Adjustment range	766–800 mm (30-3/16 – 31-1/2 in.)	
Effective reel diameter (via cam profile)		1650 mm (65 in.)	
Finger length		290 mm (11 in.)	
Finger spacing (staggered on alternate bats)		150 mm (6 in.)	
Reel drive		Hydraulic	S
Reel speed (auto-adjust from cab using ground speed index)		0–85 rpm	S

## PRODUCT OVERVIEW

Frame and Structure				
Header width (field mode)			Cut width + 384 mm (15-1/8 in.)	S
Header width (transport mode—reel fore-aft fully retracted)	D1XL Series headers only	(B) <sup>2</sup> (long dividers installed)	2845 mm (112 in.)	S
		(A) <sup>2</sup> (long dividers removed)	2667 mm (105 in.)	S
	D125X header only	(B) <sup>2</sup> (long dividers installed)	2636 mm (104 in.)	S



**Figure 2.2: Header Width**

1017000

2. Refer to Figure [2.2: Header Width](#), page 25.

## PRODUCT OVERVIEW

**Table 2.2 Header Attachments**

<b>Attachments</b>		
<b>Upper Cross Auger</b>		O <sub>D</sub>
Outside diameter		305 mm (12 in.)
Tube diameter	All sizes	152 mm (6 in.)
<b>Stabilizer Wheel / Slow Speed Transport</b>		O <sub>D</sub>
Wheels		15 in.
Tires		P205/75 R-15

<b>Weight</b>	
Estimated weight range with base header (variances are due to different package configurations)	
25-foot header (D125X)	1753 kg (3872 lb.)
30-foot header (D130XL)	2318 kg (5110 lb.)
35-foot header (D135XL)	2562–2730 kg (5649–6018 lb.)
40-foot header (D140XL)	2823 kg (6224 lb.)
45-foot header (D145XL)	2996 kg (6605 lb.)

## 3 Operation

### 3.1 Owner/Operator Responsibilities

#### CAUTION

- It is your responsibility to read and understand this manual completely before operating the header. Contact your MacDon Dealer if an instruction is not clear to you.
- Follow all safety messages in the manual and on safety decals on the machine.
- Remember that YOU are the key to safety. Good safety practices protect you and the people around you.
- Before allowing anyone to operate the header, for however short a time or distance, make sure they have been instructed in its safe and proper use.
- Review the manual and all safety related items with all Operators annually.
- Be alert for other Operators not using recommended procedures or not following safety precautions. Correct these mistakes immediately, before an accident occurs.
- Do NOT modify the machine. Unauthorized modifications may impair the function and/or safety of the machine and also may reduce the length of service you receive from your machine.
- The safety information given in this manual does not replace safety codes, insurance needs, or laws governing your area. Be sure your machine meets the standards set by these regulations.

## 3.2 Operational Safety

### CAUTION

Adhere to the following safety precautions:

- Follow all safety and operational instructions provided in your operator's manuals. If you do not have a windrower manual, get one from your Dealer and read it thoroughly.
- Never attempt to start the engine or operate the machine except from the windrower seat.
- Check the operation of all controls in a safe, clear area before starting work.
- Do NOT allow riders on the windrower.

### CAUTION

- Never start or move the machine until you are sure all bystanders have cleared the area.
- Avoid travelling over loose fill, rocks, ditches, or holes.
- Drive slowly through gates and doorways.
- When working on inclines, travel uphill or downhill whenever possible. Be sure to keep transmission in gear when travelling downhill.
- Never attempt to get on or off a moving machine.
- Do NOT leave operator's station while the engine is running.
- To avoid bodily injury or death from unexpected startup of a machine, always stop the engine and remove the key before adjusting or removing plugged material from the machine.
- Check for excessive vibration and unusual noises. If there is any indication of trouble, shut down and inspect the machine. Follow proper shutdown procedure. Refer to [3.4 Shutting down the Machine, page 37](#).
- Operate only in daylight or good artificial light.

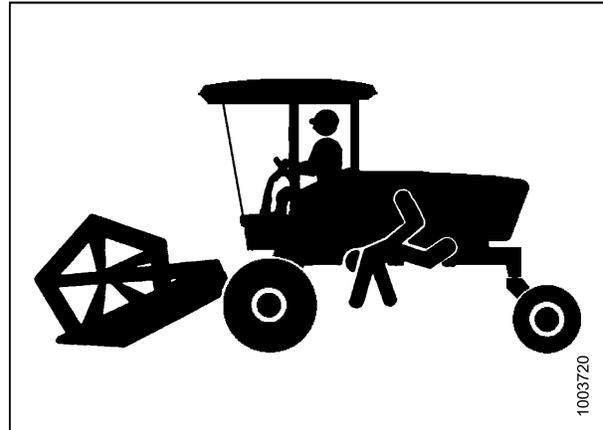


Figure 3.1: No Riders

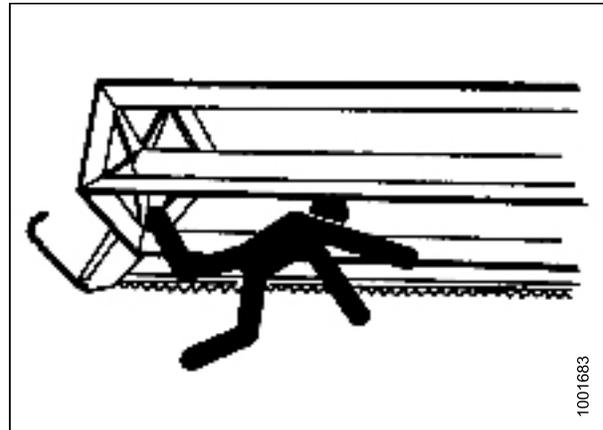


Figure 3.2: Bystander Safety

### 3.2.1 Header Safety Props

The header safety props, located on the header lift cylinders, prevent the lift cylinders from unexpectedly retracting and lowering the header. Refer to your windrower operator's manual for instructions.

#### **⚠ DANGER**

To avoid bodily injury or death from unexpected start-up or fall of raised machine, always stop engine, remove key, and engage safety props before going under header for any reason.

### 3.2.2 Reel Safety Props

The reel safety props, located on the reel support arms, prevent the reel from unexpectedly lowering.

#### **⚠ WARNING**

To avoid bodily injury from fall of raised reel, always engage reel safety props before going under raised reel for any reason.

#### **IMPORTANT:**

To prevent damage to the reel support arms, do **NOT** transport the header with the reel safety props engaged.

#### *Engaging Reel Safety Props*

#### **⚠ DANGER**

To prevent bodily injury or death from the unexpected start-up of the machine, always stop the engine and remove the key from the ignition before making adjustments to the machine.

1. Raise the reel fully.
2. Shut down the engine, and remove the key from the ignition.
3. Move reel safety props (A) to the engaged position (as shown). **The prop MUST be placed on the top surface of raised lug (B), making contact with the cylinder mount, to ensure positive engagement.**

#### **NOTE:**

Keep pivot bolt (C) sufficiently tight so that the prop remains in the stored position when not in use, but can still be engaged using hand force.

4. Repeat the previous step on the opposite side of the header.

**THE CONTENT ON THIS PAGE HAS CHANGED SINCE THIS MANUAL (214044 REVISION A) WAS PUBLISHED.**

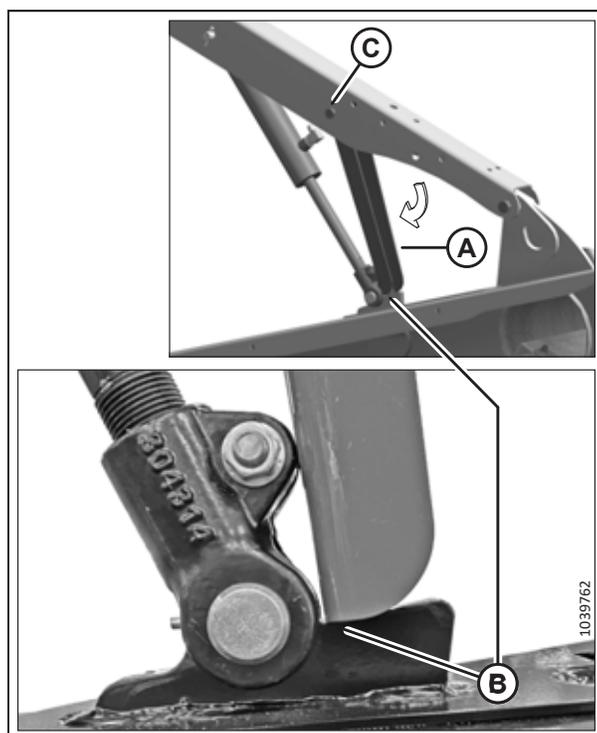


Figure 3.3: Engaged Reel Safety Prop – Left Shown

## OPERATION

3. Use handle (A) to move lock rod to inboard position (B), which engages pin (C) under prop.
4. Lower reel until safety props contact the outer arm cylinder mounts and the center arm pins.

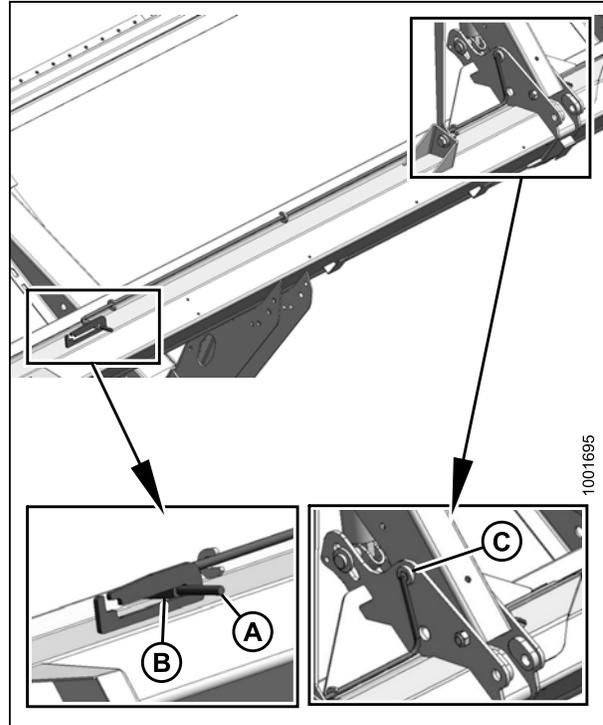


Figure 3.4: Reel Safety Prop – Center Arm

### *Disengaging Reel Safety Props*

1. Raise the reel to maximum height.
2. Move the reel safety props (A) back inside the reel arms.

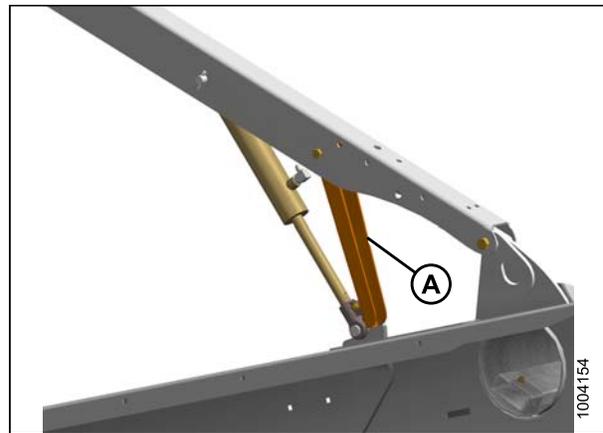


Figure 3.5: Reel Safety Prop – Left Side

## OPERATION

3. Use the handle (B) to move the lock rod (A) to the outboard position.

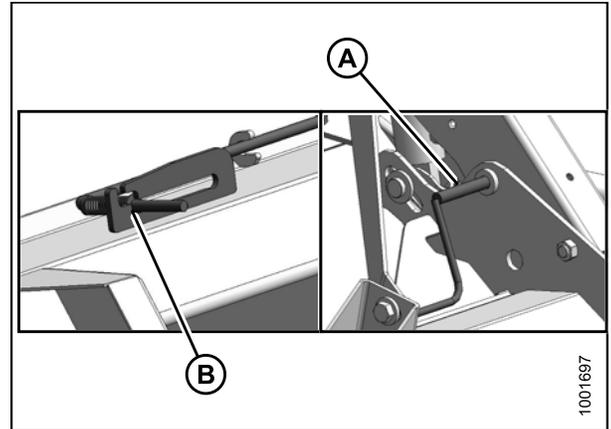


Figure 3.6: Reel Safety Prop – Center Arm

### 3.2.3 Endshields

A hinged, polyethylene endshield is fitted on each end of the header.

#### *Opening Endshields*

1. Push release lever (A) located on the backside of the endshield to unlock the shield.
2. Pull endshield open using handle depression (B).

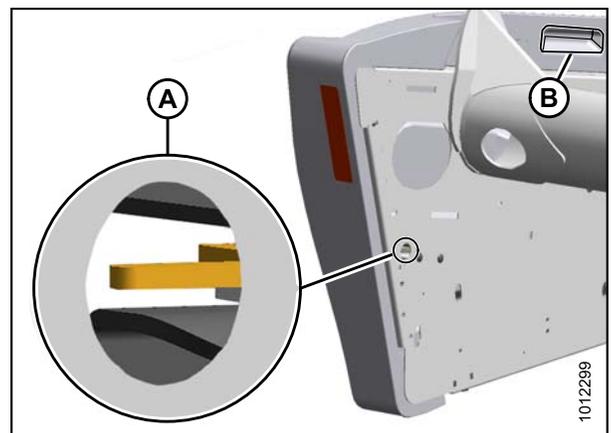


Figure 3.7: Left Endshield

3. Pull endshield at handle depression (A). Endshield is retained by a hinge tab (B) and will open in direction (C).

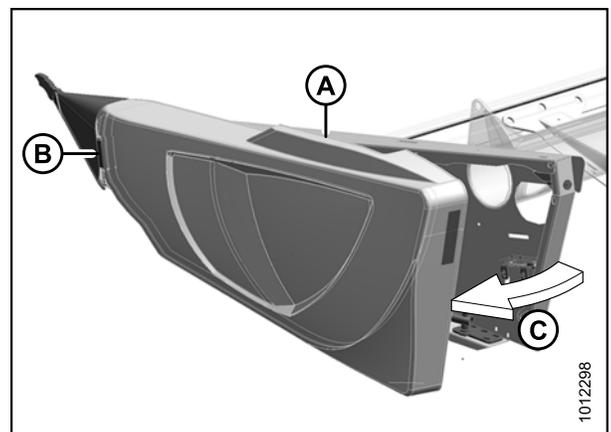
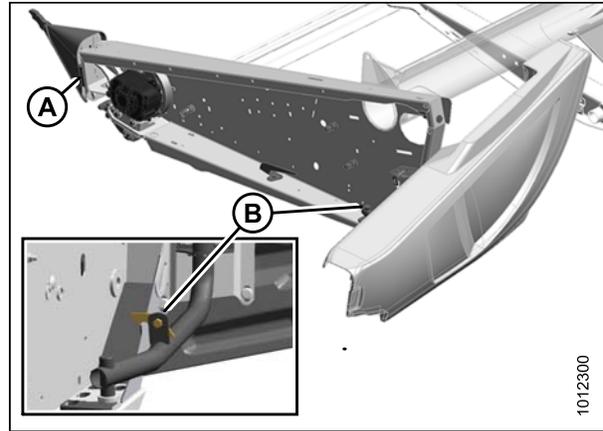


Figure 3.8: Left Endshield

## OPERATION

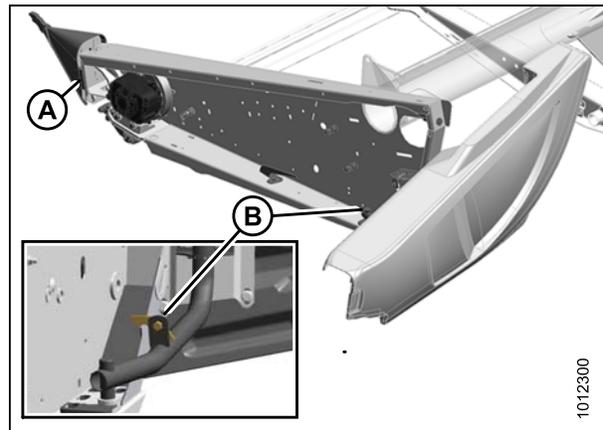
4. Pull the endshield free of hinge tab (A) if additional clearance is required, and swing shield towards the rear of the header.
5. Engage safety latch (B) on hinge arm to secure the shield in fully open position.



**Figure 3.9: Left Endshield**

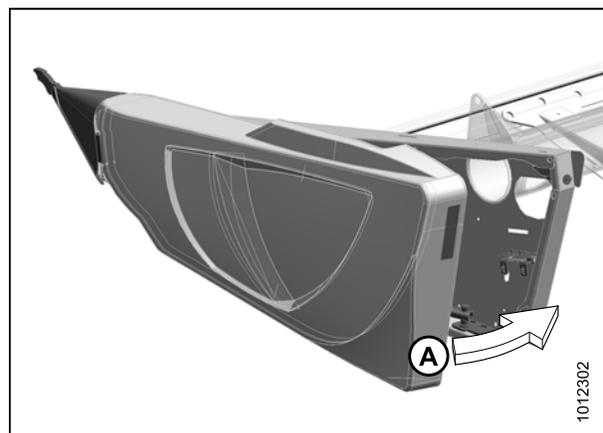
### *Closing Endshields*

1. Disengage lock (B) to allow endshield to move.
2. Insert front of endshield behind hinge tab (A) and into divider cone.



**Figure 3.10: Left Endshield**

3. Swing endshield in direction (A) into closed position. Engage lock with a firm push.
4. Verify that endshield is locked.



**Figure 3.11: Left Endshield**

## OPERATION

### Removing Endshields

1. Fully open endshield. Refer to [Opening Endshields, page 31](#).
2. Engage lock (A) to prevent endshield movement.
3. Remove self-tapping screw (B).
4. Slide endshield upwards and remove from hinge arm.
5. Place endshield away from work area.

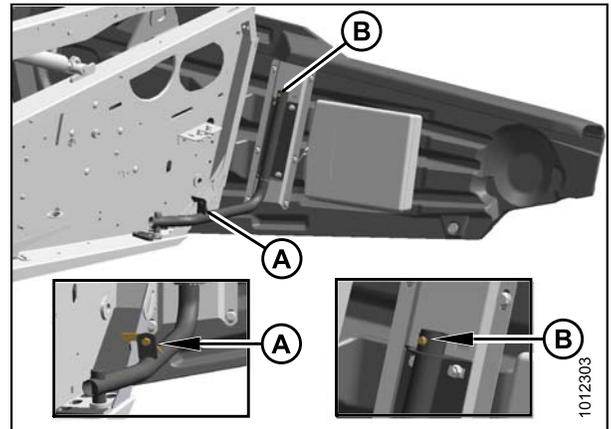


Figure 3.12: Left Endshield

### Installing Endshields

1. Guide endshield onto hinge arm and slowly slide it downwards.
2. Install self-tapping screw (B).
3. Disengage lock (A) to allow endshield movement.
4. Close endshield. Refer to [Closing Endshields, page 32](#).

**NOTE:**

Endshields may expand or contract when subjected to large temperature changes. Top pin and lower latch bracket positions can be adjusted to compensate for dimensional changes. Refer to [Checking and Adjusting Endshields, page 34](#).

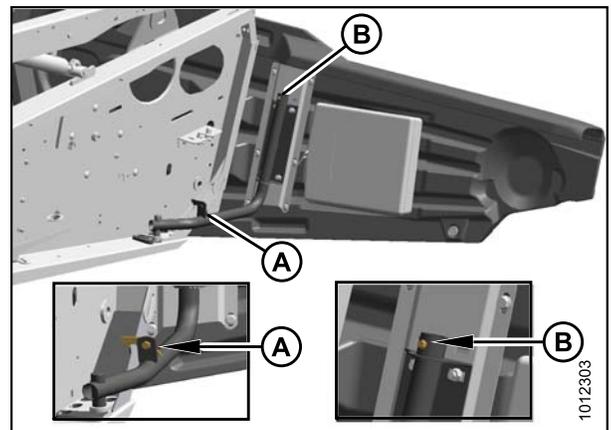


Figure 3.13: Left Endshield

## OPERATION

### Checking and Adjusting Endshields

Endshields are subject to expansion or contraction caused by large temperature variations. The position of the top pin and lower latch can be adjusted to compensate for dimensional changes.

1. Check gap (X) between front end of shields and header frame and compare to the values in Table 3.1 *Endshield Gap at Various Temperatures*, page 34.

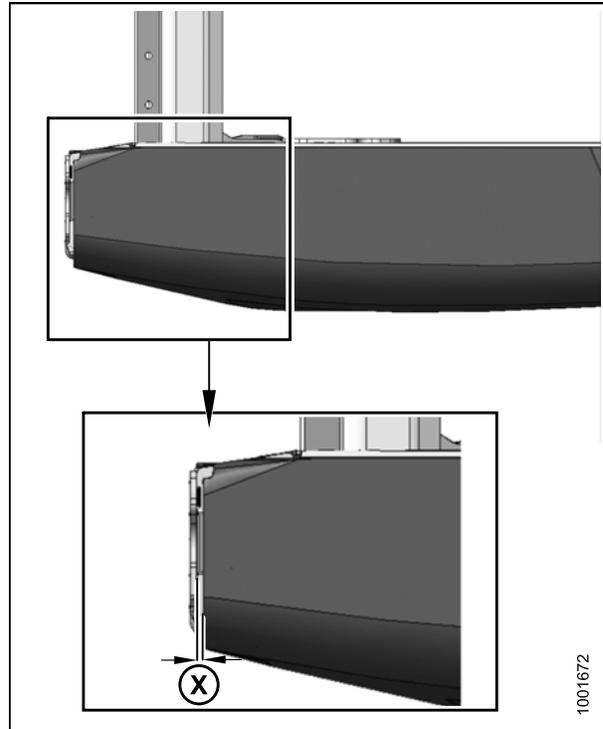
**Table 3.1 Endshield Gap at Various Temperatures**

Temperature in Degrees °C (°F)	Gap (X) in mm (in.)
7 (45)	13–18 (1/2 – 23/32)
18 (65)	10–15 (3/8 – 19/32)
29 (85)	7–12 (9/32 – 15/32)
41 (105)	4–9 (5/32 – 11/32)

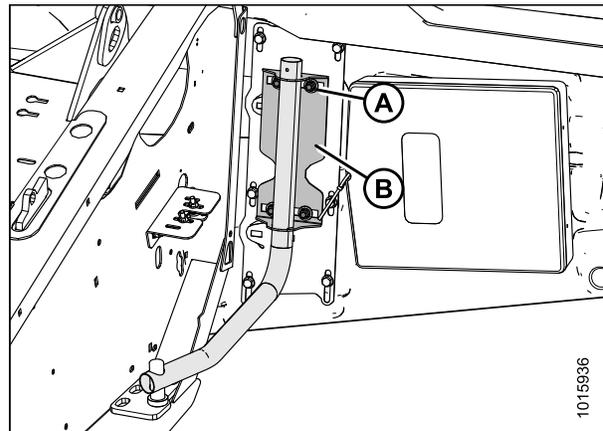
**NOTE:**

If adjustment is required, follow these steps:

2. Loosen the four bolts (A) on the support tube bracket (B).



**Figure 3.14: Gap between Endshield and Header Frame**



**Figure 3.15: LH Endshield Support Tube**

## OPERATION

- Loosen the three bolts (A) on latch assembly (B).
- Adjust latch assembly (B) to achieve the desired gap between the front end of shield and header frame in accordance with Table [3.1 Endshield Gap at Various Temperatures, page 34](#).
- Tighten the three bolts (A) on the latch assembly.
- Tighten the four bolts on the support tube bracket.
- Close endshield.

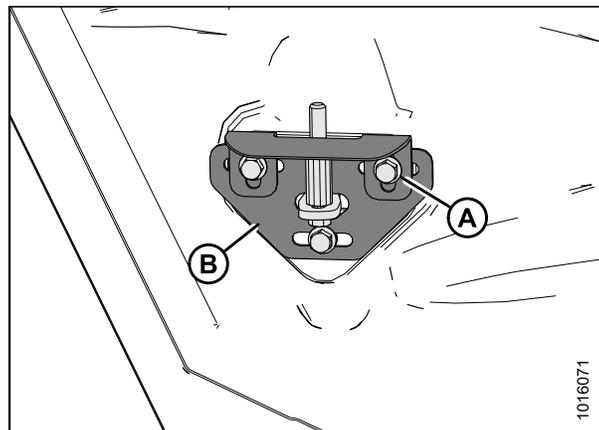


Figure 3.16: LH Endshield Latch Assembly

### 3.2.4 Daily Start-Up Check

#### CAUTION

- Clear the area of other persons, pets, etc. Keep children away from machinery. Walk around the machine to be sure no one is under, on, or close to it.
- Wear close-fitting clothing and protective shoes with slip-resistant soles.
- Remove foreign objects from the machine and surrounding area.
- Carry with you any protective clothing and personal safety devices that could be necessary through the day. Do NOT take chances. You may need a hard hat, protective glasses or goggles, heavy gloves, a respirator or filter mask, or wet weather gear.
- Protect against noise. Wear a suitable hearing protective device such as ear muffs or ear plugs to protect against objectionable or uncomfortably loud noises.

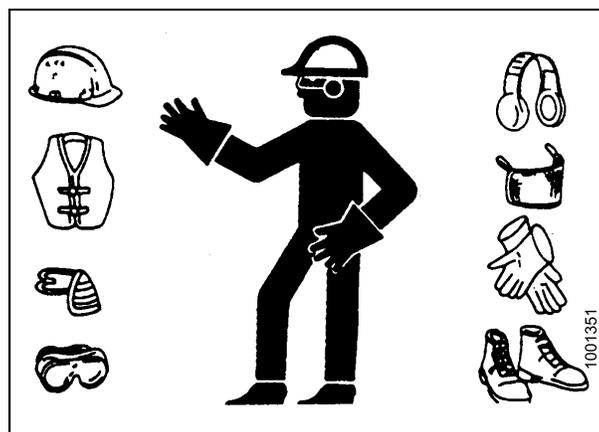


Figure 3.17: Safety Devices

Complete the following tasks each day before start-up:

- Check the machine for leaks and any parts that are missing, broken, or not working correctly.

#### NOTE:

Use proper procedure when searching for pressurized fluid leaks. Refer to [5.3.5 Checking Hydraulic Hoses and Lines, page 104](#).

- Clean all lights and reflective surfaces on the machine.
- Perform all daily maintenance. Refer to [5.3.1 Maintenance Schedule/Record, page 101](#).

### 3.3 Break-in Period

#### CAUTION

Before investigating an unusual sound or attempting to correct a problem, shut off engine and remove key.

#### NOTE:

Until you become familiar with the sound and feel of your new header, be extra alert and attentive.

After attaching the header to the windrower for the first time, follow these steps:

1. Operate the machine with the reels, drapers, and knives running slowly for five minutes. Watch and listen **FROM THE OPERATOR'S SEAT** for binding or interfering parts.

#### NOTE:

Reels and side drapers will not operate until oil flow fills the lines.

2. Refer to [5.3.2 Break-In Inspection, page 102](#) and perform all the specified tasks.

### 3.4 Shutting down the Machine

#### DANGER

**To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.**

To shut down, and before leaving the windrower seat for any reason, follow these steps:

1. Park on level ground whenever possible.
2. Lower the header fully.
3. Place all controls in NEUTRAL or PARK.
4. Disengage the header drive.
5. Lower and fully retract the reel.
6. Stop the engine and remove the key from the ignition.
7. Wait for all movement to stop.

## 3.5 Cab Controls

### CAUTION

**Be sure all bystanders are clear of machine before starting engine or engaging any header drives.**

Refer to your windrower operator's manual for identification of the following in-cab controls:

- Header engage/disengage control
- Header height
- Header angle
- Ground speed
- Reel speed
- Reel height
- Reel fore-aft position

## 3.6 Header Setup

### 3.6.1 Header Attachments

Several attachments to improve the performance of your header are available as options that can be installed by your MacDon Dealer. Refer to [6 Options and Attachments, page 215](#) for descriptions of available items.

### 3.6.2 Header Settings

Table [3.2 Recommended Header Settings, page 40](#) provides a guideline for setting up the header; however, the suggested settings can be changed to suit various crops and conditions not covered in the table.

Refer also to [3.6.3 Reel Settings, page 42](#).

Table 3.2 Recommended Header Settings

Crop Type	Stubble Height mm (in.)	Crop Condition	Divider Rods	Header Angle <sup>3</sup>	Knife Speed <sup>4</sup>	Reel Cam <sup>5</sup>	Reel Speed % <sup>6</sup>	Reel Position <sup>7</sup>	Skid Shoe Position <sup>8</sup>	Stabilizer Wheels <sup>9</sup>	Upper Cross Auger	Float N (lbf) <sup>10</sup>
Cereals	<102 (<4)	Light	On	0-3	High	2	10-15	6 or 7	Up or middle	Storage	Not required	311 (70)
		Normal		4-7	Medium							
		Heavy										
		Lodged										
	102-203 (4-8)	Light	On	0-3	High	2	10-15	6 or 7	Middle or down	Variable	Not required	311 (70)
		Normal		4-7	Medium							
		Heavy										
		Lodged										
	>203 (>8)	Light	On	0-3	High	2	10-15	6 or 7	Not applicable	Variable	Not required	667 (150)
		Normal		4-7	Medium							
		Heavy										
		Lodged										

3. Set header angle as shallow as possible (setting A) with center-link and skid shoes while maintaining cutting height. Refer to [3.7.3 Header Angle, page 50](#).
4. Refer to [3.7.7 Knife Speed, page 53](#).
5. Refer to [Reel Cam Settings, page 55](#).
6. Percentage above ground speed. Refer to [3.7.4 Reel Speed, page 50](#).
7. Refer to [3.7.9 Reel Fore-Aft Position, page 54](#).
8. Skid shoe position is used in combination with header angle to determine the cutting height when cutting on or very close to the ground. Refer to [Adjusting Skid Shoes, page 48](#).
9. Stabilizer wheels are used to limit the side-to-side movement when cutting off the ground in rolling terrain, and to minimize bouncing. Refer to [Adjusting Stabilizer Wheels, page 46](#).
10. Force required to lift header at ends. Refer to your windrower operator's manual for adjustment procedures.

## OPERATION

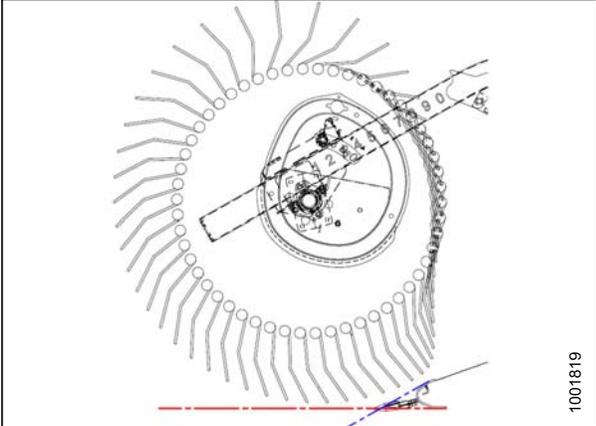
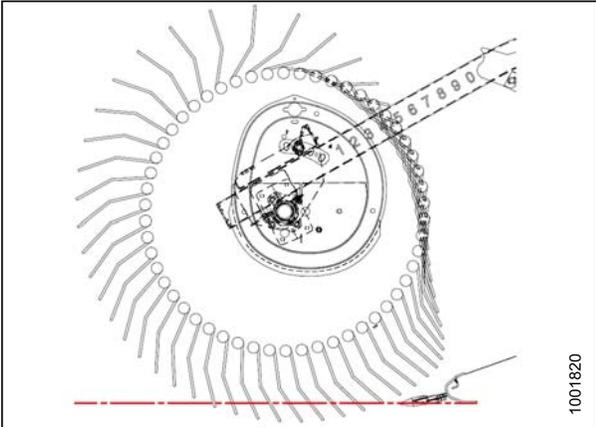
Crop Type	Stubble Height mm (in.)	Crop Condition	Divider Rods	Header Angle <sup>3</sup>	Knife Speed <sup>4</sup>	Reel Cam <sup>5</sup>	Reel Speed % <sup>6</sup>	Reel Position <sup>7</sup>	Skid Shoe Position <sup>8</sup>	Stabilizer Wheels <sup>9</sup>	Upper Cross Auger	Float N (lbf) <sup>10</sup>	
<b>Canola</b>	102-203 (4-8)	Light	On	8-10	Medium	2	5-10	6 or 7	Variable	Variable	Not required	311-445 (70-100)	
		Normal			1	10	3 or 4	Middle or down	Recommended				
		Heavy			2	5-10		Variable					
		Lodged					2	Middle or down					
	>203 (>8)	Light	On	8-10	Medium	2	5-10	6 or 7	Not applicable	Variable	Not required	667 (150)	
		Normal			3	10	3 or 4	Recommended					
		Heavy				5-10							
		Lodged			2		5-10						
<b>Flax</b>	51-153 (2-6)	Light	On	4-7	High	2	5-10	6 or 7	Middle or down	Variable	Not required	311-445 (70-100)	
		Normal		0-3									
		Heavy		4-7									
		Lodged		8-10									
	0 mm (ground level)	Light	Off	8-10	Medium	2	5-10	3 or 4	Up or middle	Storage	Not required	445 (100)	
		Normal			3								
		Heavy											
		Lodged											
<b>Edible Beans</b>	0 mm (ground level)	Light	On	Variable	High	2	10	6 or 7	Up or middle	Storage	Not required	311-445 (70-100)	
		Normal											3
		Heavy											
		Lodged											
<b>Grass</b>	0 mm (ground level)	Light	On	Variable	High	3	10-15	6 or 7	Up or middle	Storage	Not required	311-445 (70-100)	
		Normal											2
		Heavy											
		Lodged											
<b>Alfalfa</b>	0 mm (ground level)	Light	On	Variable	High	2	10	6 or 7	Up or middle	Storage	Not required	311-445 (70-100)	
		Normal											3
		Heavy											
		Lodged											

# OPERATION

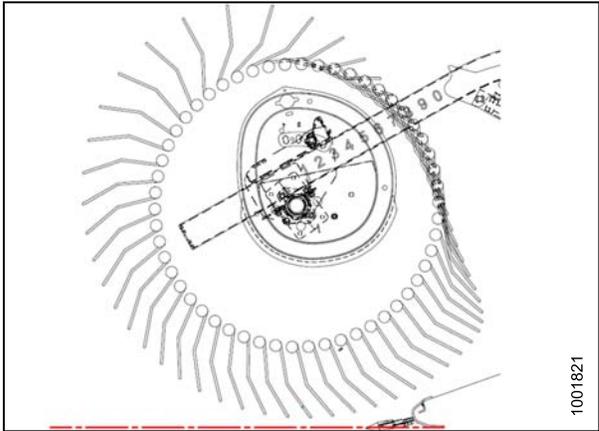
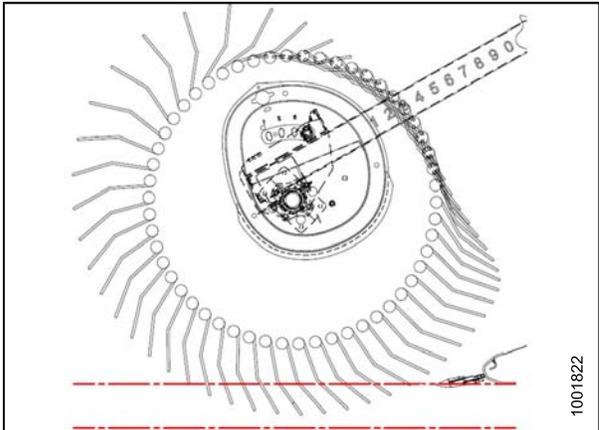
## 3.6.3 Reel Settings

Table 3.3 *Recommended Reel Settings*, page 42 illustrates the profile of the reel at each cam or finger pitch setting as well as the reel position relative to the ground at different positions on the reel arm. Refer to 3.6.2 *Header Settings*, page 39 for the applicability of each finger pattern and reel position.

**Table 3.3 Recommended Reel Settings**

Cam Setting Number (Finger Speed Gain)	Reel Position Number	Reel Finger Pattern
1 (0)	6 or 7	
2 (20%)	3 or 4	

## OPERATION

Cam Setting Number (Finger Speed Gain)	Reel Position Number	Reel Finger Pattern
3 (30%)	6 or 7	
4 (35%)	2 or 3	

### NOTE:

- Adjust the reel forward to get closer to the ground while tilting the header back. Fingers/tines will dig into the ground at extreme reel-forward positions, so adjust skid shoes or header angle to compensate. Adjust the reel rearwards to position the reel farther away from the ground when tilting the header forward.
- Header tilt can be increased to position the reel closer to the ground, or decreased to position the reel farther from the ground, while keeping material flowing onto drapers.
- To leave the maximum amount of stubble behind in lodged crop, raise the header and increase the header tilt to keep the reel close to the ground. Position the reel fully forward.
- The reel may have to be moved back to prevent lumps or plugging on the cutterbar in thinner crops.
- Minimum crop carrying capacity (minimum area of exposed draper between the reel and the header backsheet) occurs with the reel in the farthest aft position.
- Maximum crop carrying capacity (maximum area of exposed draper between the reel and the header backsheet) occurs with the reel in the farthest forward position.
- The tip speed of the fingers/tines at the cutterbar becomes higher than the reel speed at higher cam settings due to the nature of the cam action. Refer to [Table 3.3 Recommended Reel Settings, page 42](#).

## 3.7 Header Operating Variables

Satisfactory function of the header in all situations requires making proper adjustments to suit various crops and conditions.

Correct operation reduces crop loss and increases productivity. As well, proper adjustments and timely maintenance will increase the length of service you receive from your machine.

The variables listed in Table [3.4 Operating Variables, page 44](#) and detailed on the following pages will affect the performance of your header.

You will quickly become adept at adjusting the machine to achieve the results you desire. Most of the adjustments have been preset at the factory, but the settings can be changed to suit crop conditions.

**Table 3.4 Operating Variables**

Variable	Refer to
Cutting height	<a href="#">3.7.1 Cutting Height, page 44</a>
Header float	<a href="#">3.7.2 Header Float, page 49</a>
Header angle	<a href="#">3.7.3 Header Angle, page 50</a>
Reel speed	<a href="#">3.7.4 Reel Speed, page 50</a>
Ground speed	<a href="#">3.7.5 Ground Speed, page 51</a>
Reel height	<a href="#">3.7.8 Reel Height, page 53</a>
Reel fore-aft position	<a href="#">3.7.9 Reel Fore-Aft Position, page 54</a>
Reel tine pitch	<a href="#">3.7.10 Reel Tine Pitch, page 55</a>
Crop divider rods	<a href="#">3.7.12 Crop Divider Rods, page 62</a>

### 3.7.1 Cutting Height

The header design allows you to cut the crop above the ground in relation to the desired stubble height or to cut the crop at ground level with the header on the ground. Cutting height will vary depending on the type of crop, crop conditions, etc.

#### *Cutting off the Ground*

The stabilizer wheel system is designed to minimize bouncing at the header ends and may be used to float the header to achieve an even cutting height when cutting above ground level in cereal grains. The system produces even stubble height and greatly reduces operator fatigue.

Cutting height is controlled using a combination of the windrower header height control and a stabilizer wheel system (or stabilizer/slow speed transport wheel system).

The header stabilizer wheel system (or stabilizer/slow speed transport wheel system) is available for all header widths.

If stabilizer wheels are installed, refer to [Adjusting Stabilizer Wheels, page 46](#) to change the wheel position.

If stabilizer/slow speed transport wheels are installed, refer to [Adjusting Stabilizer / Slow Speed Transport Wheels, page 45](#) to change the wheel position.

## OPERATION

### Adjusting Stabilizer / Slow Speed Transport Wheels

A properly adjusted header will achieve a balance between the amount of header weight carried by the float and the amount carried by the stabilizer / slow speed transport wheels.

Refer to [3.6.2 Header Settings, page 39](#) for recommended use in specific crops and crop conditions.

#### **DANGER**

**To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.**

1. Raise the header so the stabilizer wheels are off the ground. Shut down engine and remove the key.
2. Check that the float is working properly. Refer to your windrower operator's manual for instructions.

#### **CAUTION**

**Handle may be under tension, especially when the wheels are on the ground. Raise header so that wheels are off the ground before making adjustments.**

3. Remove hairpin (A) from the latch on the right wheel assembly.
4. Disengage latch (B), lift wheel out of hook, and place wheel on the ground as shown. (This reduces weight of assembly and makes adjusting wheel position easier.)
5. Lift left wheel slightly to support weight of the wheel, and pull handle (C) upwards to release lock.
6. Lift left wheel to desired height and engage support channel into slot (D) in upper support.
7. Push down on handle (C) to lock.
8. Lift right wheel back into field position and ensure latch (B) is engaged.
9. Secure latch with hairpin (A).
10. Support wheel weight by lifting slightly with one hand, and pull up on handle (A) to release lock.
11. Lift wheels to desired height, and engage support channel into slot (B) in upper support.
12. Push down on handle (A) to lock.

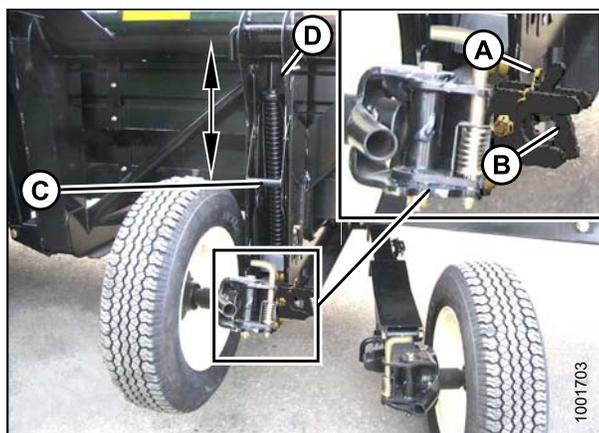


Figure 3.18: Right Wheels

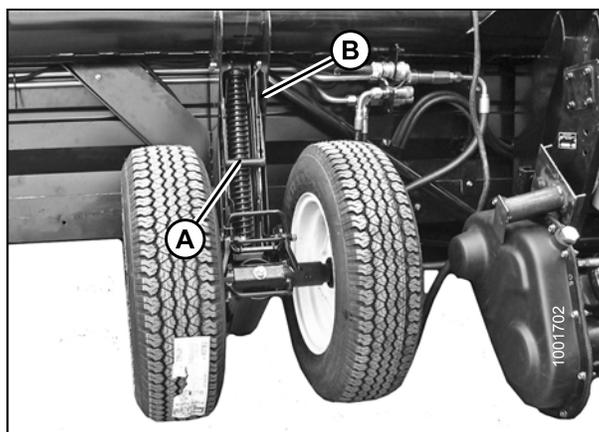


Figure 3.19: Left Wheels

## OPERATION

13. Lower header to desired cutting height using the windrower controls.
14. Check the load indicator.

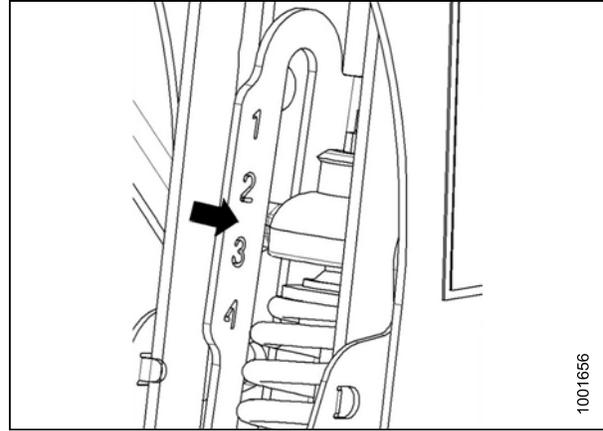


Figure 3.20: Load Indicator

### IMPORTANT:

Continuous operation with excessive spring compression (i.e., load indicator reading greater than '4' or a compressed length (A) less than 295 mm [11-5/8 in.]) can result in damage to the suspension system.

15. Adjust the header angle to the desired working angle using the windrower header angle controls. If header angle is not critical, set it to mid-position.
16. Use the windrower Harvest Performance Tracker (HPT) controls to automatically maintain cutting height. Refer to your windrower operator's manual for details.

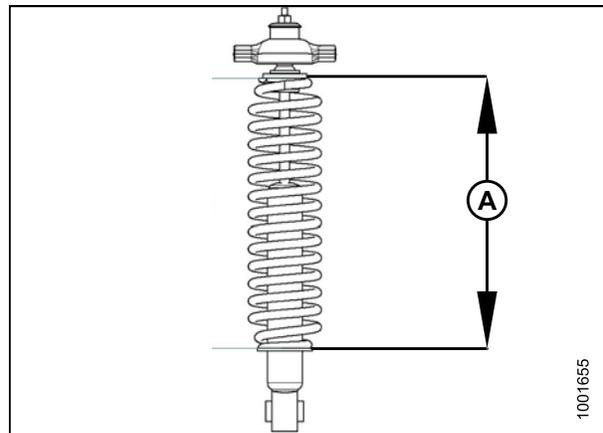


Figure 3.21: Spring Compression

### Adjusting Stabilizer Wheels

A properly adjusted header will achieve a balance between the amount of header weight carried by the float and the amount carried by the stabilizer wheels.

Refer to [3.6.2 Header Settings, page 39](#) for recommended use in specific crops and crop conditions.

### DANGER

To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.

### CAUTION

Handle may be under tension—especially when the wheels are on the ground. Raise the header until the wheels are off the ground before making adjustments.

1. Raise the header until the stabilizer wheels are off the ground. Shut down engine and remove the key.
2. Check that the float is working properly. Refer to your windrower operator's manual for instructions.

## OPERATION

3. Support the wheel weight by lifting slightly with one hand on handle (B), and pull up on handle (A) to release lock.
4. Lift the wheel using handle (B), and engage the support channel into center slot (C) in upper support.
5. Push down on handle (A) to lock.

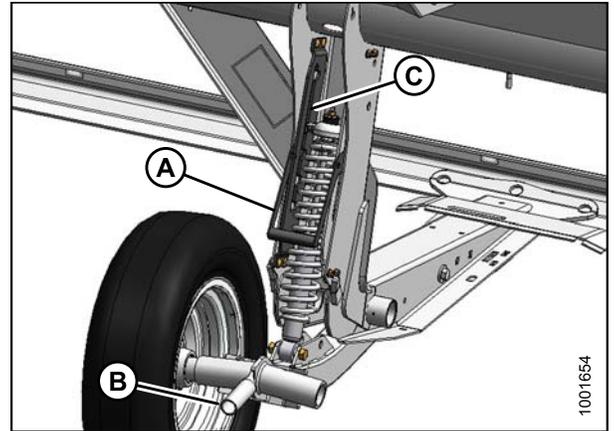


Figure 3.22: Stabilizer Wheel

6. Lower header to desired cutting height using windrower controls.
7. Check the load indicator.

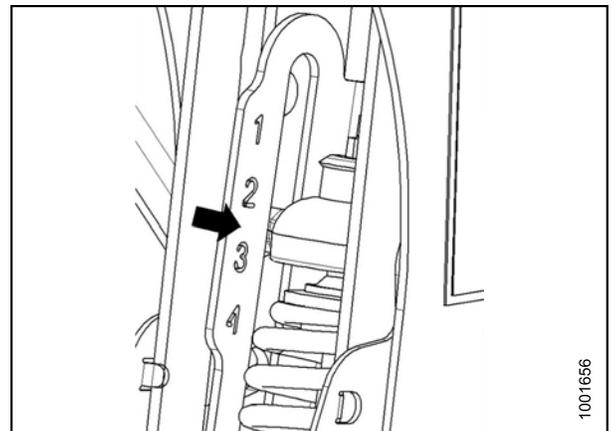


Figure 3.23: Load Indicator

### IMPORTANT:

Continuous operation with excessive spring compression (i.e., load indicator reading greater than 4 or a compressed length less than 295 mm [11-5/8 in.]) (A) can result in damage to the suspension system.

8. Adjust the header angle to the desired working angle with the windrower header angle controls. If angle is not critical, set it to mid-position.
9. Use the windrower Harvest Performance Tracker (HPT) controls to automatically maintain cutting height. Refer to your windrower operator's manual for details.

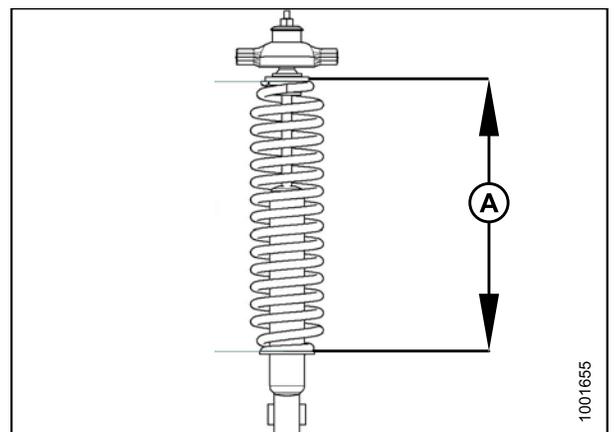


Figure 3.24: Spring Compression

## OPERATION

### *Cutting on the Ground*

Cutting on the ground is performed with the header fully lowered and the cutterbar on the ground. The orientation of the knife and knife guards relative to the ground (header angle) is controlled by the skid shoes and the center-link—it is **NOT** controlled by the header lift cylinders. The skid shoes and center-link allow the Operator to adjust to field conditions and maximize the amount of material cut while reducing damage to the knife caused by stones and debris.

The header float system floats the header over the surface to compensate for ridges, trenches, and other variations in ground contour to prevent the cutterbar from pushing into the ground or leaving uncut crop.

Refer to the following for additional information:

- [3.6.2 Header Settings, page 39](#)
- [Adjusting Skid Shoes, page 48](#)
- [3.7.2 Header Float, page 49](#)

#### **Adjusting Skid Shoes**



### **DANGER**

**To avoid bodily injury or death from unexpected start-up or fall of raised machine, always stop engine, remove key, and engage safety props before going under header for any reason.**

1. Raise header to full height, engage safety props, shut off engine, and remove key.
2. Raise the stabilizer wheels or slow speed transport wheels fully (if installed). Refer to the following:
  - [Adjusting Stabilizer / Slow Speed Transport Wheels, page 45](#)
  - [Adjusting Stabilizer Wheels, page 46](#)

## OPERATION

### IMPORTANT:

Note the adjustment hole position on support (A) and ensure each skid shoe is set to the same position.

3. Remove lynch pin (B) from each skid shoe.
4. Hold shoe and remove pin (C) by disengaging from frame and pulling away from shoe.
5. Raise or lower skid shoe to desired position using holes in support (A) as a guide.
6. Install pin (C), engage in frame, and secure with lynch pin (B).
7. Check that all of the skid shoes are adjusted to the same position.
8. Check header float as described in your windrower operator's manual.

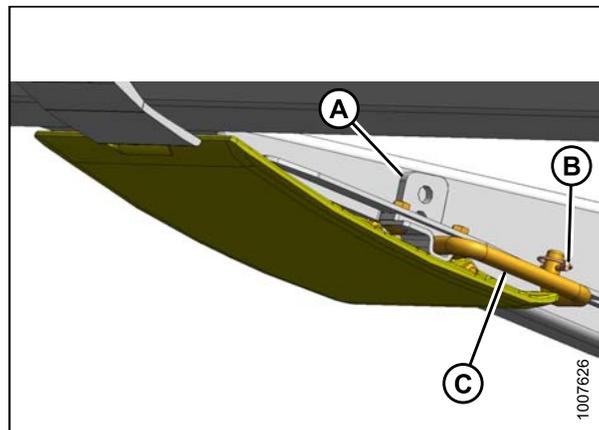


Figure 3.25: Inner Skid Shoe

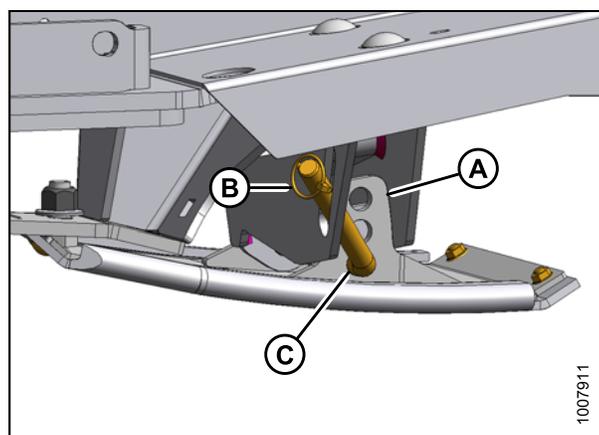


Figure 3.26: Outer Skid Shoe

### 3.7.2 Header Float

Headers are designed to ride on skid shoes while cutting on the ground. The windrower float system, however, reduces the ground pressure at the cutterbar allowing the header to float over obstacles and follow ground contours instead of being supported by the windrower lift cylinders. Refer to your windrower operator's manual for details about header float adjustments.



## OPERATION

### *Optional Reel Drive Sprockets*

Optional reel drive sprockets for use in special crop conditions are available as an alternative to the factory-installed sprocket.

The header is factory-equipped with a 19-tooth sprocket that drives the reel and it is suitable for most crop conditions. Other sprockets are available that provide more torque to the reel in heavy cutting conditions or allow for higher reel speeds in light crops when operating at increased ground speeds. See your MacDon Dealer for ordering information.

For installation details, refer to [5.9.3 Reel Drive Sprocket, page 203](#).

### **3.7.5 Ground Speed**

Operating at the proper ground speed will result in cleanly cut crops and evenly distributed material in uniform windrows.

Refer to [3.10 Windrow Types, page 67](#) for effects of ground speed on windrow formation.

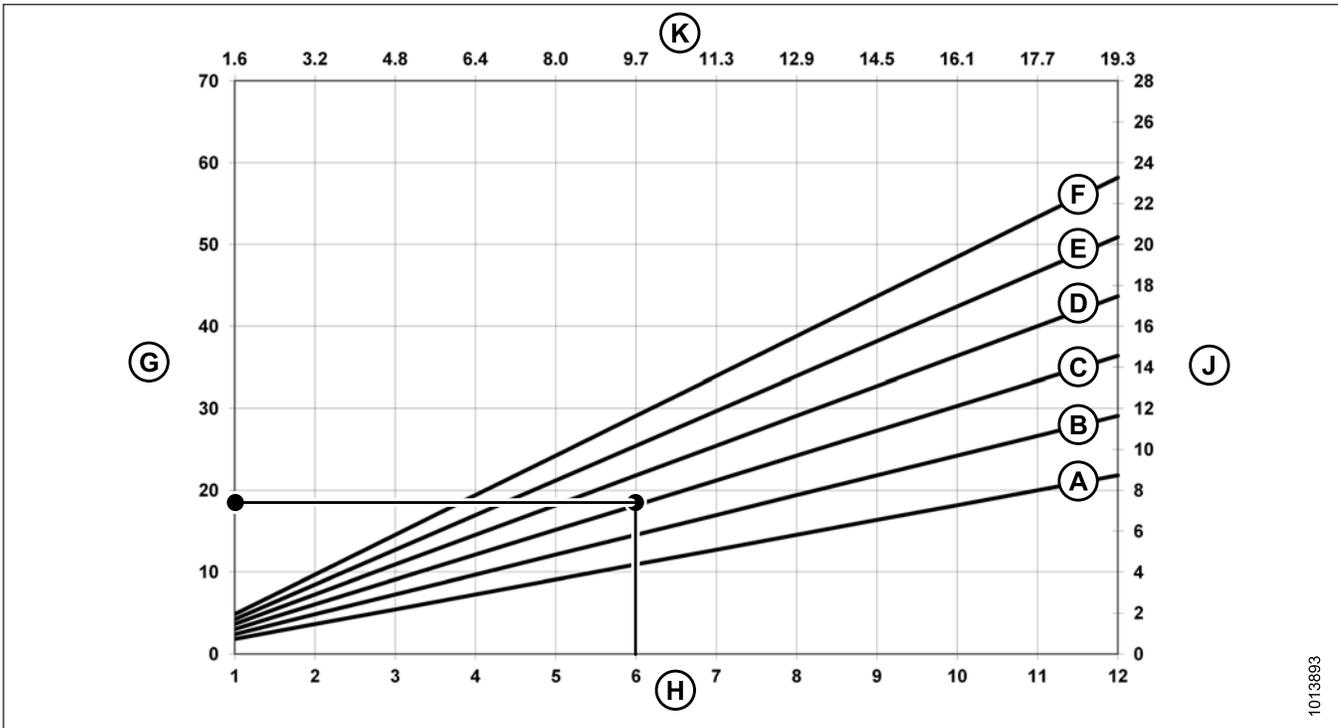
Reduce ground speed in difficult cutting conditions to reduce loads on cutting components and drives.

Use lower ground speeds in very light crops (e.g., short soybeans) to allow the reel to pull in short plants. Start at 4.8–5.8 km/h (3.0–3.5 mph) and adjust as required.

Higher ground speeds may require heavier float settings to prevent excessive bouncing that causes uneven cutting and possible damage to the cutting components. Increase ground pressure first before increasing the float. If ground speed is increased, draper and reel speeds should generally be increased to handle the extra material.

Figure [3.28: Ground Speed vs Acres, page 52](#) illustrates the relationship between ground speed and area cut for the various sized headers.

## OPERATION



**Figure 3.28: Ground Speed vs Acres**

- |                     |                |                       |
|---------------------|----------------|-----------------------|
| A - 15 Foot         | B - 20 Foot    | C - 25 Foot           |
| D - 30 Foot         | E - 35 Foot    | F - 40 Foot           |
| G - acres/hour      | H - miles/hour | J - hectares per hour |
| K - kilometers/hour |                |                       |

**Example:** A 25-foot header operating at a ground speed of 9.7 km/h (6 mph) would produce a cut area of approximately 7.3 hectares (18 acres) in one hour.

### 3.7.6 Draper Speed

Correct draper speed is an important factor for achieving good flow of the cut crop away from the cutterbar.

The draper speed is controlled with the windrower Harvest Performance Tracker (HPT). Refer to your windrower operator's manual for instructions.

Adjust the draper speed to achieve good feeding of crop for a good windrow. Excessive draper speed will reduce draper life.

### 3.7.7 Knife Speed

The header knife drive is powered by the windrower hydraulic pump and is controlled using the windrower Harvest Performance Tracker (HPT) (refer to your windrower operator's manual). The default speed is 1200 strokes per minute (spm).

**Table 3.5 D1X Series SP Knife Speed**

Header Size (ft.)	Recommended Knife Speed Range (spm)
25	1400–1700
30	1200–1600
35	1200–1400
40	1100–1400
45	1100–1400

### 3.7.8 Reel Height

Crop type and crop condition determine the operating height of the reel. You can create preset reel height positions using the Headland Management feature on either an M1170 or M1240 Self-Propelled Windrower. To set up this feature, refer to your windrower operator's manual. Set the reel height and fore-aft position to carry material past the knife and onto the drapers with minimal damage to the crop. Refer to [3.7.9 Reel Fore-Aft Position, page 54](#).

The reel height can be controlled manually using switches inside the windrower cab, or assigned to button presets on the ground speed lever (GSL). Refer to your windrower operator's manual for instructions on controlling reel height or setting up auto reel height presets.

The following conditions might result if the reel is set too low:

- Crop loss over the header backtube
- Crop disturbance on the drapers caused by the reel fingers
- Crop being pushed down by the tine tubes

The following conditions might result if the reel is set too high:

- Cutterbar plugging
- Crop lodging and being left uncut
- Grain stalks dropping ahead of cutterbar

Refer to [3.6.2 Header Settings, page 39](#) to determine recommended reel heights for specific crops and crop conditions.

**IMPORTANT:**

Maintain adequate clearance to prevent fingers contacting the knife or the ground. Refer to [5.8.1 Reel Clearance to Cutterbar, page 175](#).

### 3.7.9 Reel Fore-Aft Position

Reel fore-aft position is a critical factor for achieving the best results in adverse conditions. The reel position is factory-set for normal conditions, but it can be adjusted forwards or backwards as required using the controls inside the cab. You can create preset reel fore-aft positions using the Headland Management feature on either an M1170 or M1240 Self-Propelled Windrower. To set up this feature, refer to your windrower operator's manual.

Decal (A) is attached to the right reel support arm for identifying reel position. The aft edge of the cam disc (B) is the reel fore-aft position marker.

For straight standing crop, center the reel over the cutterbar (4–5 on decal).

For crops that are down, tangled, or leaning, it may be necessary to move the reel ahead of the cutterbar (lower number on decal).

**NOTE:**

If experiencing difficulty picking up flattened crop, adjust to a steeper header angle. Refer to [3.7.3 Header Angle, page 50](#) for adjustment instructions. Adjust reel position only if header angle adjustments are not satisfactory.

For recommended reel positions in specific crops and crop conditions, refer to [3.6.2 Header Settings, page 39](#).

**NOTE:**

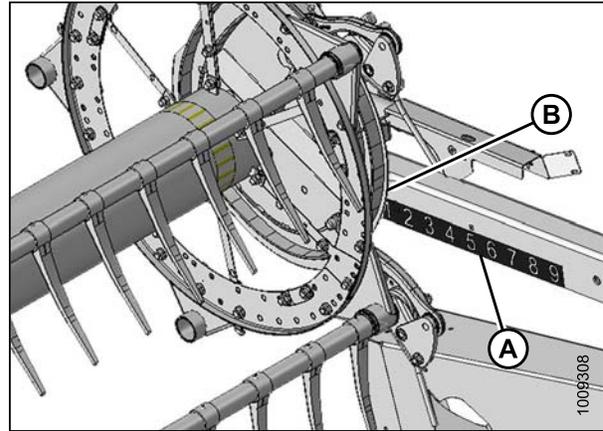
In crops that are difficult to pick up such as rice, or severely lodged crops that require full forward positioning of the reel, set the reel tine pitch to provide proper placement of the crop onto the drapers. Refer to [3.7.10 Reel Tine Pitch, page 55](#) for adjustment details.

#### *Adjusting Reel Fore-Aft Position*

1. Operate the hydraulics to move the reel to the desired position while using the gauge as a reference.
2. Check the reel clearance to cutterbar after making changes to the cam setting. Refer to the following for measurement and adjustment procedures:
  - [5.8.1 Reel Clearance to Cutterbar, page 175](#)
  - [Adjusting Reel Frown, page 177](#)

**IMPORTANT:**

Operating with the reel too far forward can result in the fingers contacting the ground. When operating with the reel in this position, lower the skid shoes or adjust the header tilt as required to prevent damaging the fingers.



**Figure 3.29: Fore-Aft Decal**

### 3.7.10 Reel Tine Pitch

**IMPORTANT:**

The following describes the conceptual and operational guidelines of the pick-up reel. Please read carefully before operating the machine.

The pick-up reel is designed to pick up flattened and severely lodged crops. Because the cam setting is mainly used to determine how the crop gets delivered onto the drapers, it is not always necessary to increase the tine pitch (select a higher cam setting) to pick up lodged crops.

The positioning of the fingers relative to the ground (tine pitch) is not significantly affected by the cam setting. For example, with the cam position range at 33°, the corresponding finger pitch range is only 5° at the lowest point of the reel's rotation.

For the best results, use the minimum cam setting that delivers the crop past the rear edge of the cutterbar and onto the drapers. Refer to [3.6.2 Header Settings, page 39](#).

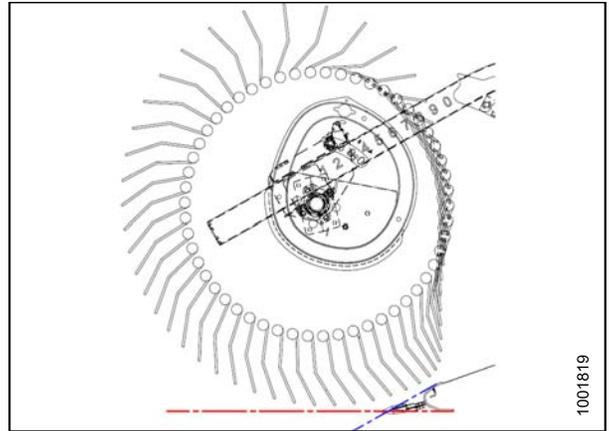
#### *Reel Cam Settings*

The following outlines the function of each cam setting and provides set-up guidelines for various crop conditions.

The setting numbers are visible above the slots on the cam disc. Refer to [Adjusting Reel Cam, page 57](#).

**Cam Position 1, Reel Position 6 or 7** delivers the most even crop flow onto the drapers without fluffing or disturbing the material.

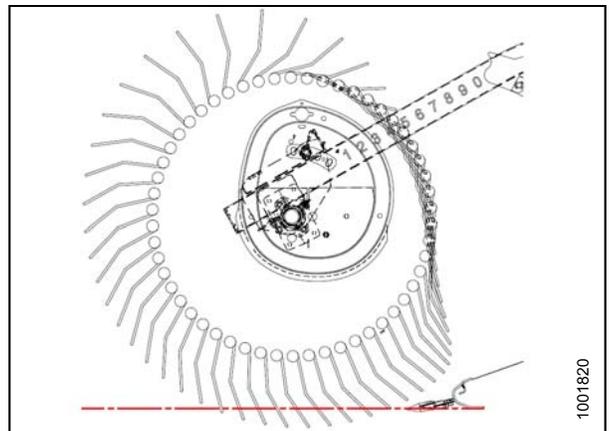
- This setting will release crop close to the cutterbar and works best if the cutterbar is on the ground.
- Some crops will not be delivered past the cutterbar when the cutterbar is raised off the ground and the reel is pushed forward; therefore, set the initial reel speed approximately equal to the ground speed.



**Figure 3.30: Finger Profile – Position 1**

**Cam Position 2, Reel Position 3 or 4** is the recommended starting position for most crops and conditions.

- If the crop is stalling on the cutterbar when the reel is in the forward position, increase the cam setting to push the crop past the rear edge of the cutterbar.
- If the crop is getting fluffed or if there is a disruption to the flow across the drapers, decrease the cam setting.
- This setting generates a fingertip speed that is approximately 20% faster than the reel speed.

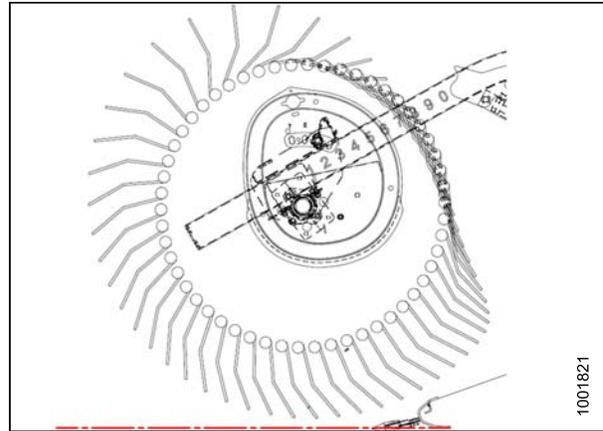


**Figure 3.31: Finger Profile – Position 2**

## OPERATION

**Cam Position 3, Reel Position 6 or 7** is mainly used to leave long stubble.

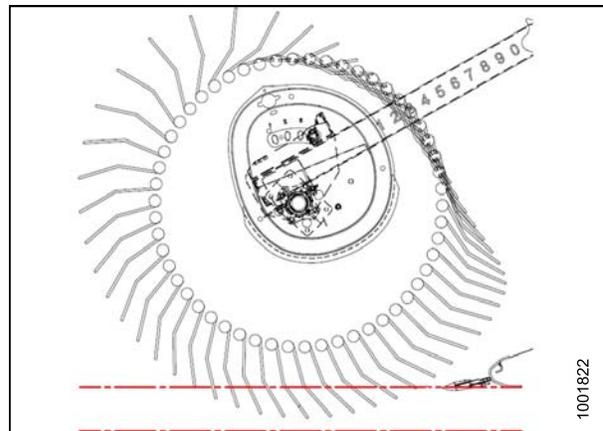
- This position allows the reel to reach forward and lift the crop across the knife and onto the drapers.
- This setting generates a fingertip speed that is approximately 30% faster than the reel speed.



**Figure 3.32: Finger Profile – Position 3**

**Cam Position 4, Reel Position 2 or 3** is used with the reel fully forward to leave the maximum amount of stubble in lodged crops.

- This position allows the reel to reach forward and lift the crop across the knife and onto the drapers.
- This setting generates a fingertip speed that is approximately 35% faster than the reel speed.



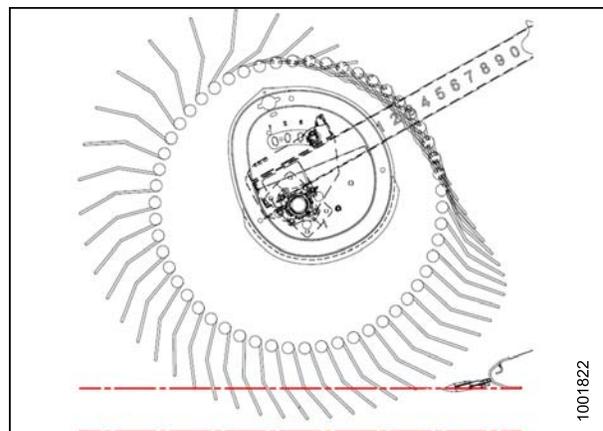
**Figure 3.33: Finger Profile – Position 4**

**Cam Position 4, Header Angle At Maximum, and Reel Fully Forward** provides the maximum amount of reel reach below the cutterbar to pick up lodged crops.

- Leaves a significant amount of stubble when cutting height is set to approximately 203 mm (8 in.). In damp materials such as rice, it's possible to double the ground speed because of the reduction of cut material.
- This setting generates a fingertip speed that is approximately 35% faster than the reel speed.

### NOTE:

Higher cam settings with the reel fore-aft position set between 4–5 sharply decreases the draper capacity because the reel disrupts the crop flow across the drapers and the fingers engage the crop that is moving on the drapers. High cam settings are recommended only with the reel at, or close to, full forward settings.



**Figure 3.34: Finger Profile – Position 4**

## OPERATION

### IMPORTANT:

The reel to cutterbar clearance should always be checked following adjustments to reel tine pitch and reel fore-aft position (refer to [5.8.1 Reel Clearance to Cutterbar, page 175](#)). Refer to [3.6.2 Header Settings, page 39](#) for recommended reel tine pitch in specific crops and crop conditions.

### Adjusting Reel Cam

#### DANGER

To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.

1. Turn the latch pin (A) counterclockwise using a 3/4 in. wrench to release the cam disc.
2. Use the wrench on bolt (B) to rotate the cam disc and align the latch pin (A) with the desired cam disc hole position (C) (1 to 4).

#### NOTE:

Bolt (B) is positioned through the cam disc (transparent view shown in illustration for improved clarity).

3. Turn the latch pin (A) clockwise to engage and lock the cam disc.
4. Repeat the above procedure for the opposite reel.

#### IMPORTANT:

Ensure the cam is secured into position before operating the machine.

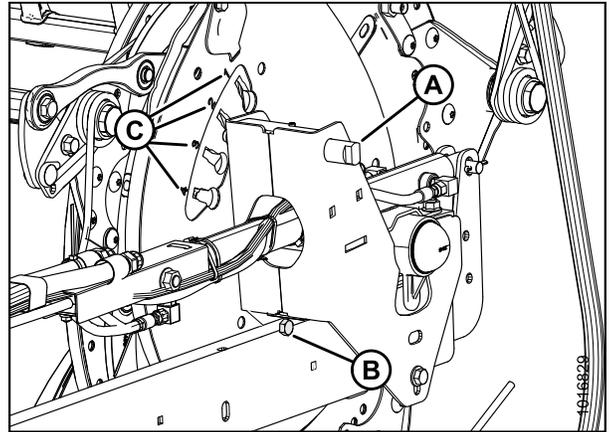


Figure 3.35: Cam Disc Positions

## 3.7.11 Crop Dividers

Crop dividers are used to help divide the crop when harvesting. They are removable to allow installation of vertical knives and to decrease transport width.

### Removing Crop Dividers with Latch Option from Header

#### DANGER

To avoid bodily injury or death from unexpected start-up or fall of raised machine, always stop engine, remove key, and engage safety props before going under header for any reason.

1. Lower reel, raise header, stop engine, remove key, and engage header safety props. Refer to your windrower operator's manual for instructions.
2. Open or remove endshields. Refer to [3.2.3 Endshields, page 31](#).

## OPERATION

3. Lift safety lever (A).
4. Hold onto crop divider (B), push lever (C) to open latch, and lower crop divider.

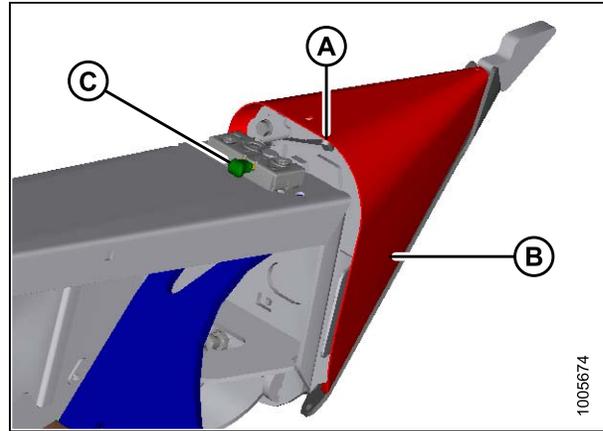


Figure 3.36: Crop Divider

5. Lift crop divider off endsheet and store as follows:
  - a. Insert pin (A) on crop divider into hole in endsheet at location shown.
  - b. Lift crop divider and position lugs (B) on crop divider into bracket on endsheet. Ensure lugs engage bracket.
6. Close or install endshields. Refer to [3.2.3 Endshields, page 31](#).

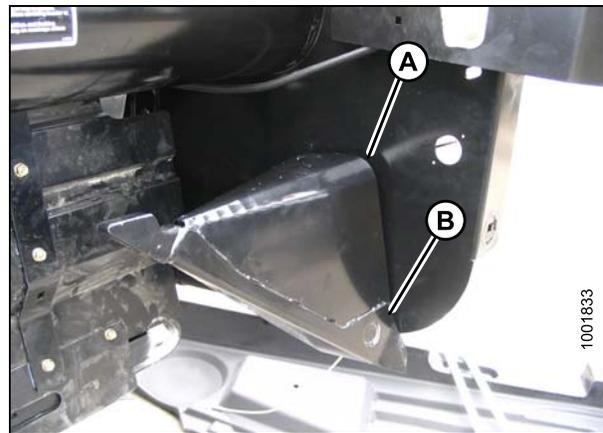


Figure 3.37: Stored Crop Divider

### *Removing Crop Dividers without Latch Option from Header*

#### **⚠ DANGER**

**To avoid bodily injury or death from unexpected start-up or fall of raised machine, always stop engine, remove key, and engage safety props before going under header for any reason.**

1. Lower reel and raise header. Refer to your windrower operator's manual for instructions.
2. Stop engine and remove key.
3. Engage safety props. Refer to your windrower operator's manual for instructions.
4. Open or remove endshields. Refer to [3.2.3 Endshields, page 31](#).

## OPERATION

5. Remove bolt (A), lock washer, and flat washer.
6. Lower crop divider (B) and then lift to remove from endsheet.
7. Close or install endshields. Refer to [3.2.3 Endshields, page 31](#).

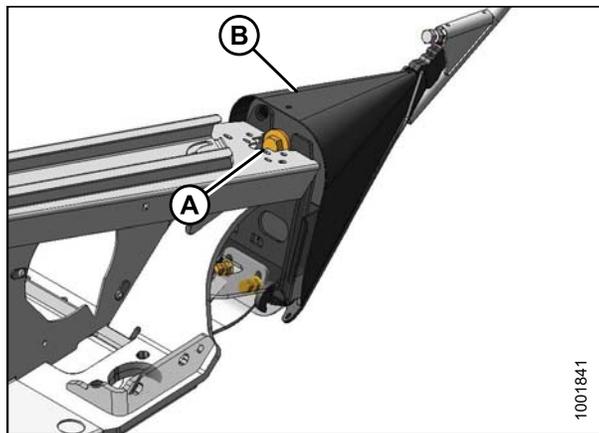


Figure 3.38: Crop Divider

### *Installing Crop Dividers with Latch Option onto Header*

#### **⚠ DANGER**

To avoid bodily injury or death from unexpected start-up or fall of raised machine, always stop engine, remove key, and engage safety props before going under header for any reason.

1. Lower reel and raise header. Refer to your windrower operator's manual for instructions.
2. Stop engine and remove key.
3. Engage safety props. Refer to your windrower operator's manual for instructions.
4. Open or remove endshields. Refer to [3.2.3 Endshields, page 31](#).
5. Remove crop divider from storage location by lifting crop divider to disengage lugs (A) at lower end and then lowering it slightly to disengage pin (B) from endsheet.

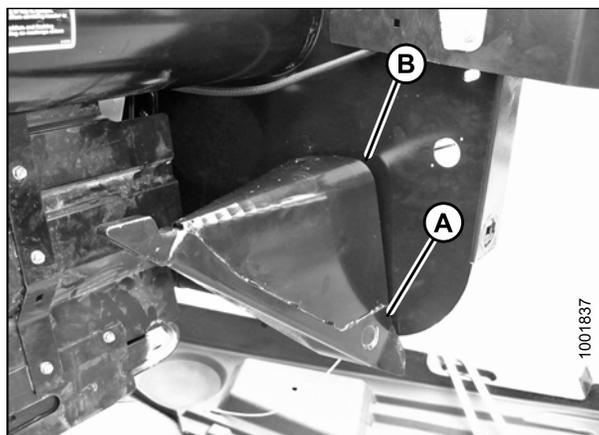


Figure 3.39: Stored Crop Divider

## OPERATION

6. Position crop divider as shown by inserting lugs (A) into holes in endsheet.
7. Lift forward end of crop divider until pin (B) at top of crop divider engages and closes latch (C).
8. Push safety lever (D) downwards to lock pin into latch (C).

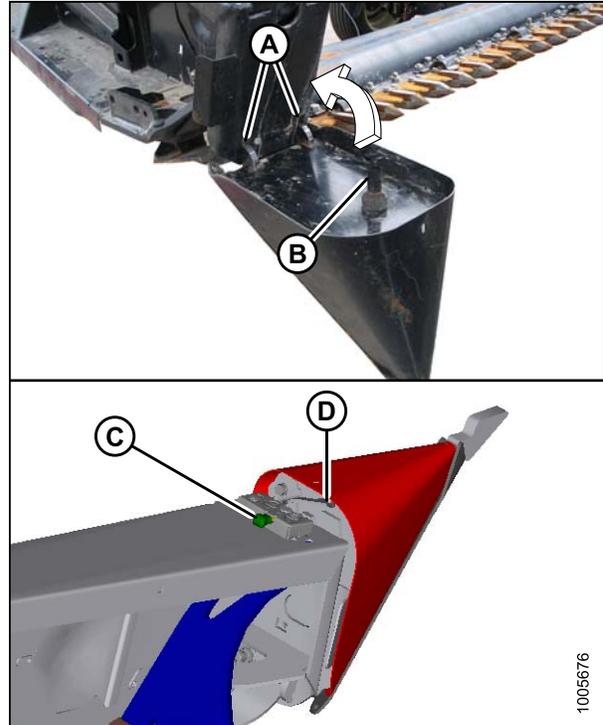


Figure 3.40: Crop Divider

9. Pull the tip of the crop divider to ensure there is no lateral movement. If necessary, adjust bolts (A) to tighten crop divider and eliminate lateral movement.
10. Close or install endshields. Refer to [3.2.3 Endshields, page 31](#).



Figure 3.41: Crop Divider

### *Installing Crop Dividers without Latch Option onto Header*

#### **⚠ DANGER**

**To avoid bodily injury or death from unexpected start-up or fall of raised machine, always stop engine, remove key, and engage safety props before going under header for any reason.**

1. Lower reel and raise header. Refer to your windrower operator's manual for instructions.
2. Stop engine and remove key.
3. Engage safety props. Refer to your windrower operator's manual for instructions.
4. Open or remove endshields. Refer to [3.2.3 Endshields, page 31](#).

## OPERATION

5. Remove crop divider from storage location by lifting crop divider to disengage lugs (A) at lower end and then lowering it slightly to disengage pin (B) from endsheet.

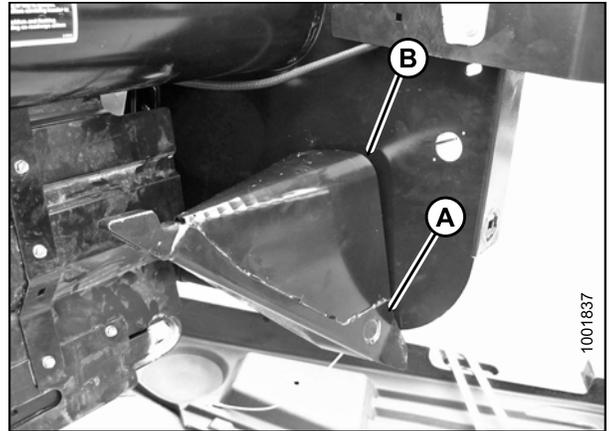


Figure 3.42: Stored Crop Divider

6. Position crop divider as shown by inserting lugs (A) into holes in endsheet.

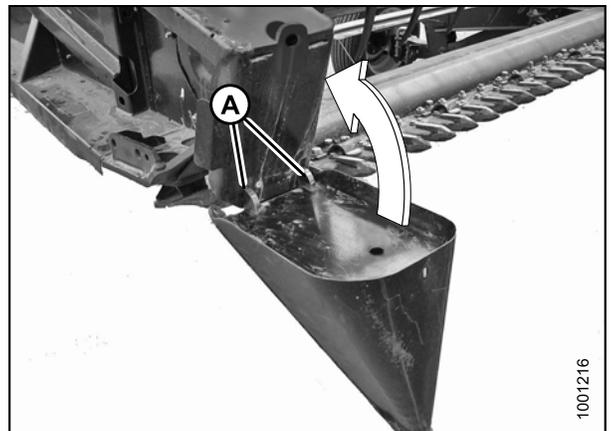


Figure 3.43: Crop Divider

7. Lift forward end of crop divider and install bolt (A) and special stepped washer (B) (step towards divider). Tighten bolt.
8. Pull the tip of the crop divider to ensure there is no lateral movement. If necessary, adjust bolts (C) to tighten crop divider and eliminate lateral movement.
9. Close or install endshields. Refer to [3.2.3 Endshields, page 31](#).

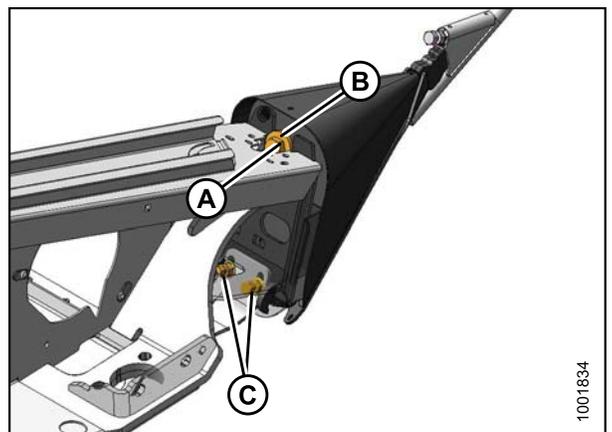


Figure 3.44: Crop Divider

## OPERATION

### 3.7.12 Crop Divider Rods

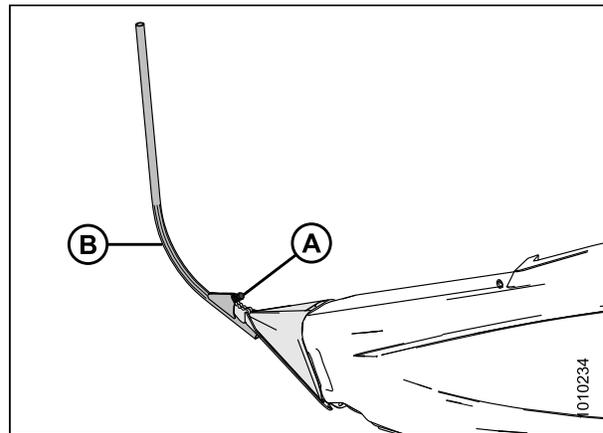
Crop divider rods are used in conjunction with crop dividers. The removable crop divider rods are most useful when crop is down. In standing crops, using only crop dividers is recommended.

**Table 3.6 Crop Divider Rods Recommended Use**

With Divider Rods		Without Divider Rods
Alfalfa	Lodged cereal	Edible beans
Canola	Peas	Milo
Flax	Soybeans	Rice
Grass seed	Sudan grass	Soybeans
Lentils	Winter forage	Standing cereal

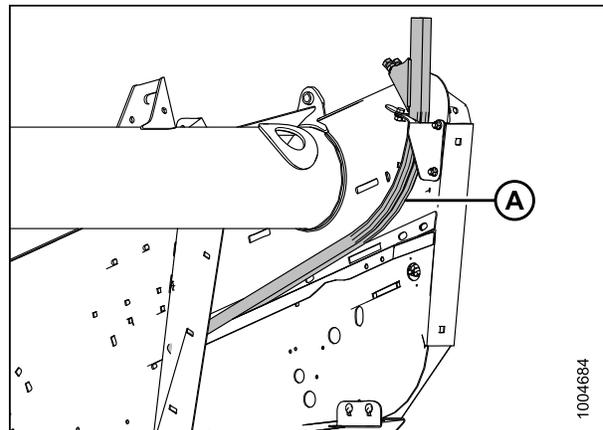
#### *Removing Crop Divider Rods*

1. Loosen bolt (A) and remove crop divider rod (B) from both sides of header.



**Figure 3.45: Crop Divider Rod**

2. Store both crop divider rods inboard on the right side endsheet.

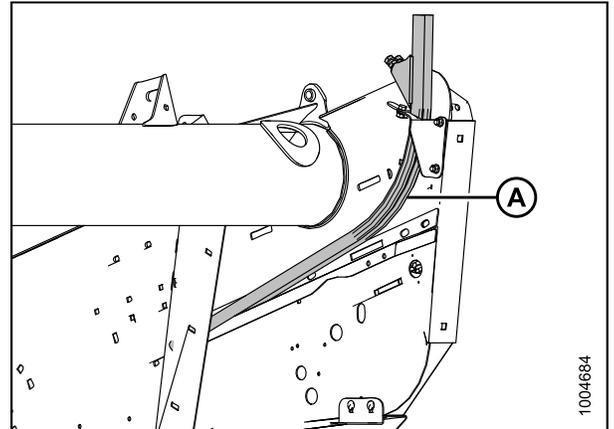


**Figure 3.46: Right Side Endsheet**

## OPERATION

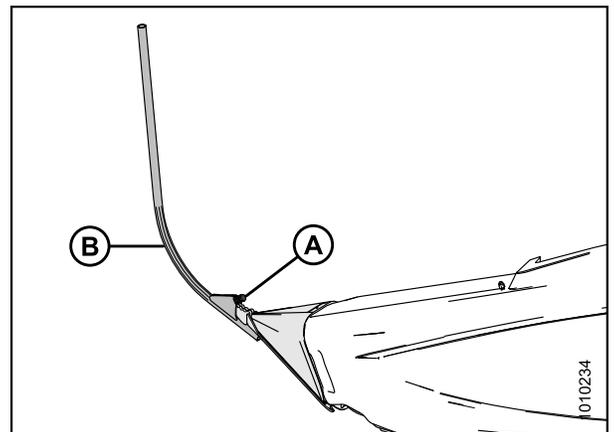
### *Installing Crop Divider Rods*

1. Remove crop divider rods from storage location on inboard of right side endsheet.



**Figure 3.47: Right Side Endsheet**

2. Position crop divider rod (B) on tip of crop divider as shown and tighten bolt (A).
3. Repeat procedure at opposite end of header.



**Figure 3.48: Divider Rod on Crop Divider**

## 3.8 Delivery Opening

The width and location of the delivery opening affects the width and configuration of the windrow.

The decision to widen or narrow the center delivery opening, or to double windrow, should be based on the following factors:

- Windrower pick-up capability
- Type and yield of crop
- Weather conditions (rain, humidity, wind, etc.)
- Available drying time

Refer to [3.10 Windrow Types, page 67](#) for the pros and cons of various windrow configurations with respect to these factors, and also refer to [3.9 Double Windrowing, page 66](#).

### 3.8.1 Adjusting Delivery Opening on Header

Both decks can be moved manually to adjust the delivery opening between 1720 and 1950 mm ( 67-1/8 and 76-11/16 in.).

1. Loosen bolts (A) on both decks.
2. Slide decks desired amount. Retighten bolts (A).

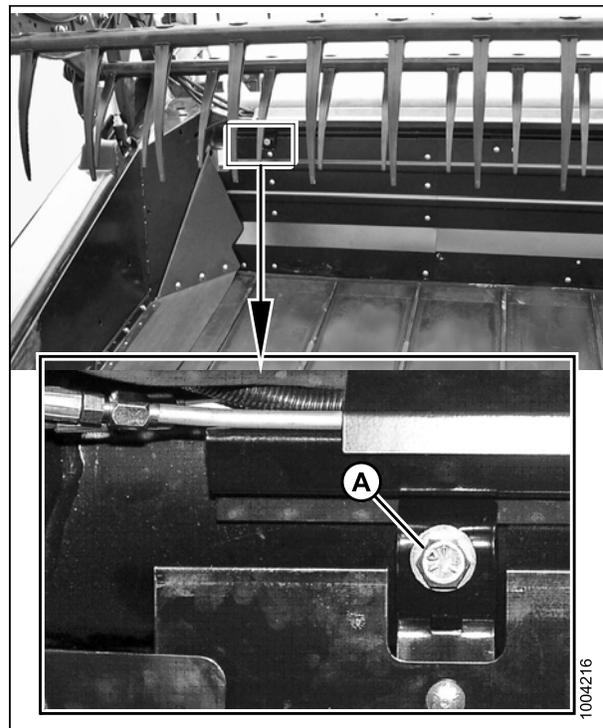


Figure 3.49: Manual Deck Shift

### 3.8.2 Adjusting Delivery Opening on Header using Hydraulic Deck Shift

The delivery opening can be adjusted by moving the inboard deck shift stops.

#### **Adjusting inboard deck shift stop**

1. Remove two 1/4 in. hex head bolts (A) and nuts.
2. Slide stop (B) outboard to decrease the maximum opening size, or slide stop inboard to increase the maximum opening size.

#### **CAUTION**

**Adjust the outboard stops to prevent the decks from contacting each other.**

3. Install two 1/4 in. hex head bolts (A) and nuts and tighten.

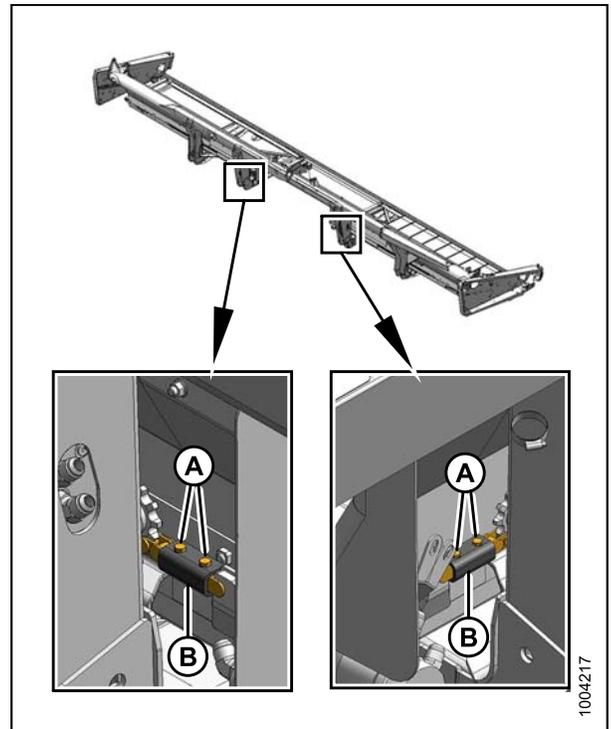


Figure 3.50: Inboard Hydraulic Deck Shift Stops

#### **Adjusting outboard deck shift stop**

4. Remove two 1/4 in. hex head bolts (A) and nuts.
5. To prevent decks from contacting each other, slide stop (B) inboard to move decks away from each other, or outboard to move decks closer to each other.
6. Install two 1/4 in. hex head bolts (A) and nuts and tighten.

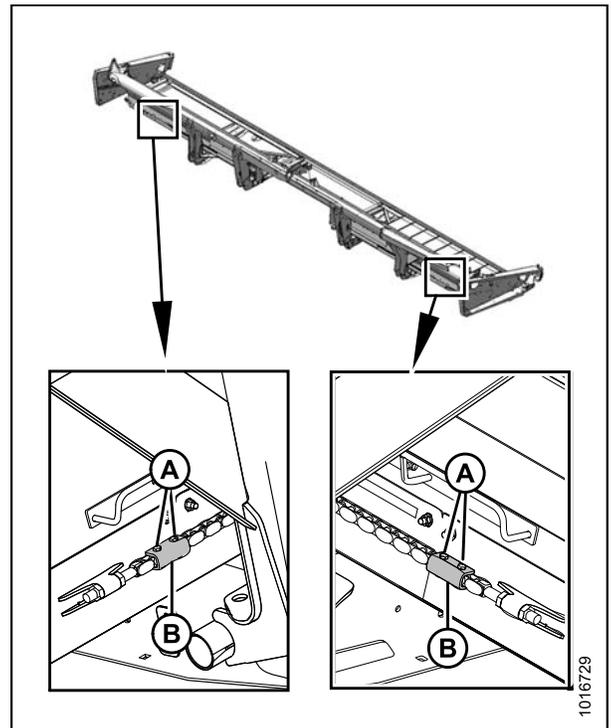


Figure 3.51: Inboard Hydraulic Deck Shift Stops

## 3.9 Double Windrowing

Double windrowing involves laying two swaths side-by-side. Larger capacity combines or forage harvesters can then pick up twice as much material in a single pass which saves time and fuel.

Double windrowing is performed using the header's deck shifting ability.

Deck shifting is used for crops that don't require conditioning such as grains, canola, and beans. Refer to [3.9.1 Shifting Decks Hydraulically](#), page 66.

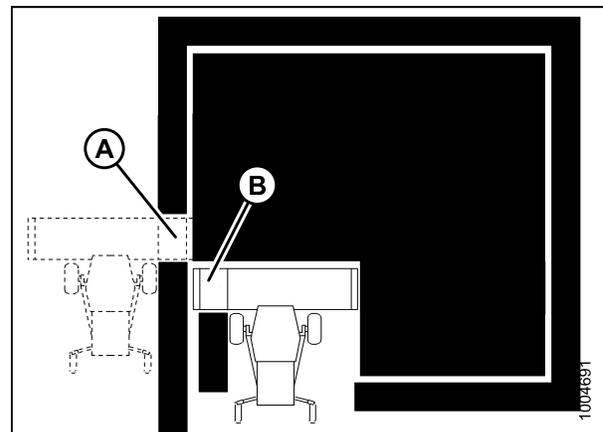
### 3.9.1 Shifting Decks Hydraulically

The hydraulic deck shift feature allows the Operator to select center, left, or right delivery from the windrower cab. It is available only on 30- and 35-foot headers.

Refer to your windrower operator's manual for identification and operation of the deck shift control.

#### *Laying a double windrow*

1. Use the deck shift control in the windrower to position decks at the left end of header and deliver crop from right end (A), or shift the decks to the right end of the header and deliver crop from left end (B).



**Figure 3.52: Left and Right End Crop Delivery**

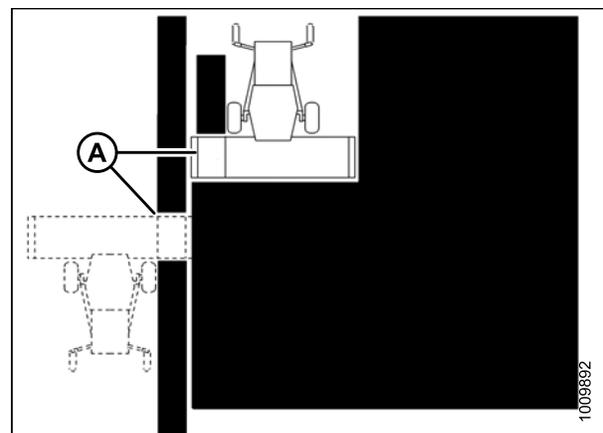
**NOTE:**

Raise transport or stabilizer system wheels on 30-foot headers to avoid interference with windrow.

2. Shift decks to the left end of the header to deliver crop from the right end (A).
3. Complete one round or one length of the field.
4. Complete the second round or length in the opposite direction to lay a double windrow.
5. Repeat above steps to lay the second double windrow.

**NOTE:**

The end delivery opening is designed to provide adequate clearance between the first windrow and the standing crop while maintaining optimum space between the two windrows.



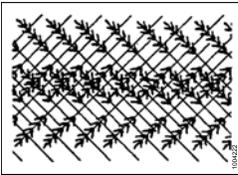
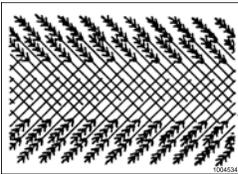
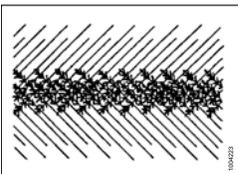
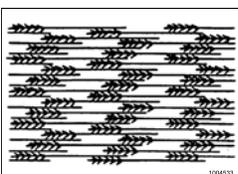
**Figure 3.53: Double Windrowing**

### 3.10 Windrow Types

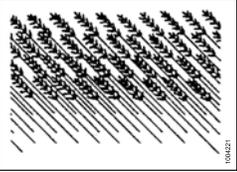
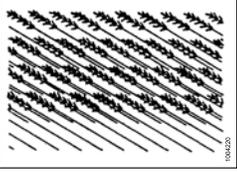
The following criteria determine windrow quality:

- **Weight Distribution:** Heads and stalks distributed evenly across full width of windrow.
- **Good Curing:** A loose, open windrow for better drying.
- **Good Weatherability:** A well-formed windrow that supports heads off the ground and holds together in extreme weather conditions.

**Table 3.7 Windrow Types**

Windrow Type	Description	Weight Distribution	Curing	Weatherability	Machine Setting Guidelines
<p>Herringbone</p> 	<p>The most desirable form of windrow, stalks are crossed and interwoven. Heads are distributed across full width of windrow. This windrow can be formed by center delivery only.</p>	Good	Good	Excellent	<ul style="list-style-type: none"> <li>• Reel and ground speed approximately equal</li> <li>• Medium draper speed</li> <li>• Center delivery</li> </ul>
<p>Fantail</p> 	<p>The stalks are crossed in the center and the heads are in line along outside edges. This windrow can be formed by center delivery only.</p>	Fair	Fair	Fair	<ul style="list-style-type: none"> <li>• Low draper speed</li> <li>• Low header angle</li> <li>• Center delivery</li> </ul>
<p>Dovetail</p> 	<p>The stalks are lined along outside edges of windrow and heads are crossed in center. This windrow can be formed by center delivery only.</p>	Poor	Fair	Poor	<ul style="list-style-type: none"> <li>• High draper speed</li> <li>• High header angle</li> <li>• Center delivery</li> </ul>
<p>Parallel</p> 	<p>The stalks are parallel to windrow and heads are evenly distributed across width of windrow. This windrow can be formed by center delivery or end delivery.</p>	Good	Good	Good	<ul style="list-style-type: none"> <li>• Medium draper speed</li> <li>• Medium header angle</li> <li>• Center or end delivery</li> </ul>

## OPERATION

Windrow Type	Description	Weight Distribution	Curing	Weatherability	Machine Setting Guidelines
<p>45° diagonal</p> 	<p>The stalks are lined along one edge and heads are lined along opposite edge, 45° to windrow perpendicular. This windrow can be formed by end deliver or by center delivery if the crop is leaning to one side.</p>	<p>Poor</p>	<p>Fair</p>	<p>Poor</p>	<ul style="list-style-type: none"> <li>• Low reel speed</li> <li>• Less aggressive tine pitch</li> <li>• End delivery or center delivery if crop is leaning</li> </ul>
<p>75° diagonal</p> 	<p>The stalks are closer to parallel than the 45° windrow. Stalk tips are lined along one edge with heads opposite, 75° to windrow perpendicular. This windrow can be formed by end delivery or by center delivery if the crop is leaning to one side.</p>	<p>Fair</p>	<p>Good</p>	<p>Fair</p>	<ul style="list-style-type: none"> <li>• Low reel speed</li> <li>• Less aggressive tine pitch</li> <li>• End delivery or center delivery if crop is leaning</li> </ul>

## 3.11 Haying Tips

### 3.11.1 Curing

Curing crops quickly helps maintain the highest quality because for each day that hay lies on the ground, 5% of the protein is lost.

Leaving the windrow as wide and fluffy as possible results in the quickest curing. Cured hay should be baled as soon as possible.

### 3.11.2 Topsoil Moisture

**Table 3.8 Topsoil Moisture Levels**

Level	% Moisture	Condition
Wet	Over 45%	Soil is muddy
Damp	25–45%	Shows footprints
Dry	Under 25%	Surface is dusty

- On wet soil, the general rule of wide and thin does not apply. A narrower windrow will dry faster than hay left flat on wet ground.
- When the ground is wetter than the hay, moisture from the soil is absorbed by the hay above it. Determine topsoil moisture level before cutting. Use a moisture tester or estimate level.
- If ground is wet due to irrigation, wait until soil moisture drops below 45%.
- If ground is wet due to frequent rains, cut when weather allows and let the forage lie on wet ground until it dries to the moisture level of the ground.
- Cut hay will dry only to the moisture level of the ground beneath it, so consider moving the windrow to drier ground.

### 3.11.3 Weather and Topography

- Cut as much hay as possible by midday when drying conditions are best.
- Fields sloping south get up to 100% more exposure to the sun's heat than do north sloping fields. If hay is baled and chopped, consider baling the south facing fields and chopping those facing north.
- When relative humidity is high, the evaporation rate is low and hay dries slowly.
- If there is no wind, saturated air becomes trapped around the windrow. Raking or tedding will expose the hay to fresh, less saturated air.
- Cut hay perpendicular to the direction of the prevailing winds if possible.

### 3.11.4 Windrow Characteristics

Producing windrows with the recommended characteristics will achieve the greatest results. Refer to [3.7 Header Operating Variables, page 44](#) for instructions on adjusting the header.

## OPERATION

**Table 3.9 Recommended Windrow Characteristics**

<b>Characteristic</b>	<b>Advantage</b>
High and fluffy	Enables airflow through windrow which is more important to the curing process than direct sunlight
Consistent formation (not bunching)	Permits an even flow of material into the baler, chopper, etc.
Even distribution of material across windrow	Results in even and consistent bales to minimize handling and stacking problems
Properly conditioned	Prevents excessive leaf damage

### 3.11.5 Driving on Windrow

Driving on previously cut windrows that will not be raked can lengthen drying time by a full day. If practical, set forming shields to produce a narrower windrow that the machine can straddle.

**NOTE:**

Driving on the windrow in high-yield crops may be unavoidable if a full width windrow is necessary.

### 3.11.6 Raking and Tedding

Raking or tedding speeds up drying; however, the resulting leaf loss may outweigh the benefits. There is little or no advantage to raking or tedding if the ground beneath the windrow is dry.

Large windrows on damp or wet ground should be turned over when moisture levels reach 40–50%. Hay should not be raked or tilled at moisture levels below 25% or excessive yield loss will result.

### 3.11.7 Using Chemical Drying Agents

Hay drying agents work by removing wax from legume surfaces and enabling water to escape and evaporate faster. However, treated hay lying on wet ground will absorb ground moisture faster.

Before deciding to use a drying agent, carefully compare the relative costs and benefits for your area.

## 3.12 Levelling the Header

The windrower linkages are factory-set to provide the proper level for the header and should not normally require adjustment.

**NOTE:**

The float springs are **NOT** used to level the header.

If the header is not level, check the pressure of the windrower's tires to ensure proper inflation (refer to your windrower operator's manual).

If the windrower's tires are properly inflated and the header is still not level, adjust the windrower linkages as required (refer to the appropriate section in the windrower operator's manual).

### 3.13 Unplugging the Cutterbar

#### DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, always stop engine and remove key before leaving the operator's seat, and always engage safety props before going under the machine for any reason.

#### CAUTION

Wear heavy gloves when working around or handling knives.

#### CAUTION

Lowering rotating reel on a plugged cutterbar will damage the reel components.

To unplug cutterbar, reverse the combine feeder house. If still plugged, do the following:

1. Stop the forward movement of the machine and disengage the header drives.
2. Raise the header to prevent it from filling with dirt, and engage the header drive clutch.
3. Disengage the header drive clutch and fully raise the header if plug does **NOT** clear.
4. Shut off the engine, remove the key from the ignition, and engage the park brake.
5. Engage the header safety props.
6. Clean off the cutterbar by hand.

**NOTE:**

If cutterbar plugging persists, refer to [8 Troubleshooting, page 225](#).

### 3.14 Upper Cross Auger (UCA)

The UCA (A) improves delivery of very bulky crops across the header.

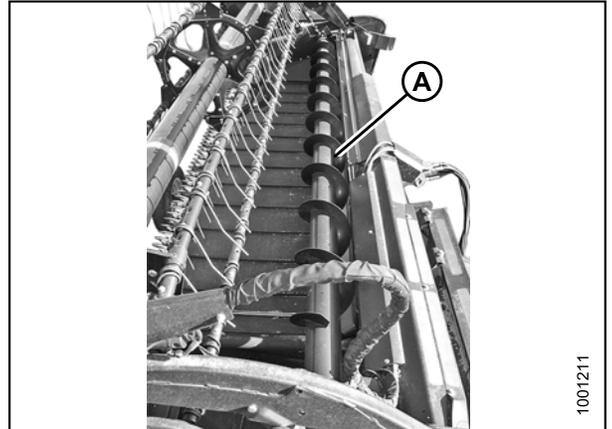


Figure 3.54: Upper Cross Auger

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## 3.15 Transporting Header

### WARNING

Do NOT drive windrower with header attached on a road or highway at night, or in conditions which reduce visibility, such as fog or rain. The width of the header may not be apparent under these conditions.

### 3.15.1 Transporting Header on Windrower

#### CAUTION

- Check local laws for width regulations and lighting or marking requirements before transporting on roads.
- Follow all recommended procedures in your windrower operator's manual for transporting, towing, etc.
- Disengage header drive clutch when travelling to and from the field.
- Before driving windrower on a roadway, be sure flashing amber lamps, red tail lamps, and head lamps are clean and working properly. Pivot amber lamps for best visibility by approaching traffic. Always use lamps when travelling on roads to provide adequate warning to other vehicles.
- Do NOT use field lamps on roads—they may confuse other drivers.
- Before driving on a roadway, clean slow moving vehicle signs and reflectors, adjust rear view mirrors, and clean windows.
- Lower the reel fully and raise the header unless transporting in hills.
- Maintain adequate visibility and be alert for roadside obstructions, oncoming traffic, and bridges.
- When travelling downhill, reduce speed and keep header at a minimum height to provide maximum stability if forward momentum is stopped for any reason. Raise header completely at bottom of grade to avoid contacting the ground.
- Travel at safe speeds to ensure complete machine control and stability at all times.

### 3.15.2 Towing

Headers with the Slow Speed Transport / Stabilizer Wheel option can be towed behind a properly configured MacDon windrower or an agricultural tractor. Refer to the windrower operator's manual for instructions.

## OPERATION

### *Attaching Header to Towing Vehicle*

#### **CAUTION**

Adhere to the following slow speed transport instructions to prevent loss of control leading to bodily injury and/or machine damage:

- Weight of towing vehicle must exceed header weight to ensure adequate control and braking performance.
- Do NOT tow with any highway-capable vehicle. Use only an agricultural tractor, agricultural combine, or a properly configured MacDon windrower.
- Ensure reel is fully lowered and back on support arms to increase header stability during transport. For headers with hydraulic reel fore-aft, never connect the fore-aft couplers to each other or the circuit will be complete and the reel could creep forward during transport.
- Check that all pins are properly secured in transport position at wheel supports, cutterbar support, and hitch.
- Check tire condition and pressure prior to transporting.
- Connect hitch to towing vehicle using a proper hitch pin with a spring locking pin or other suitable fastener.
- Attach hitch safety chain to towing vehicle. Adjust safety chain length to provide only enough slack to permit turning.
- Connect header seven-pole plug wiring harness to mating receptacle on towing vehicle. (The seven-pole receptacle is available from your MacDon Dealer parts department).
- Ensure lights are functioning properly and clean the slow moving vehicle sign and other reflectors. Use flashing warning lights unless prohibited by law.

### *Towing the Header*

#### **CAUTION**

Adhere to the following slow speed transport instructions to prevent loss of control leading to bodily injury and/or machine damage:

- Do NOT exceed 32 km/h (20 mph). Reduce transport speed to less than 8 km/h (5 mph) for corners and slippery or rough conditions.
- Turn corners at only very low speeds (8 km/h [5 mph] or less). Header stability is reduced while cornering because front wheel moves to the left.
- Do NOT accelerate when making or coming out of a turn.
- Obey all highway traffic regulations in your area when transporting on public roads. Use flashing amber lights unless prohibited by law.

### 3.15.3 Converting from Transport to Field Position

#### Removing Tow-Bar

1. Block the tires to prevent the header from rolling, and unhook the header from the towing vehicle.
2. Disconnect the electrical connector (A) on the tow-bar.
3. Remove pin (B) from the tow-bar, and disassemble the outer section (C) from the inner section (D).

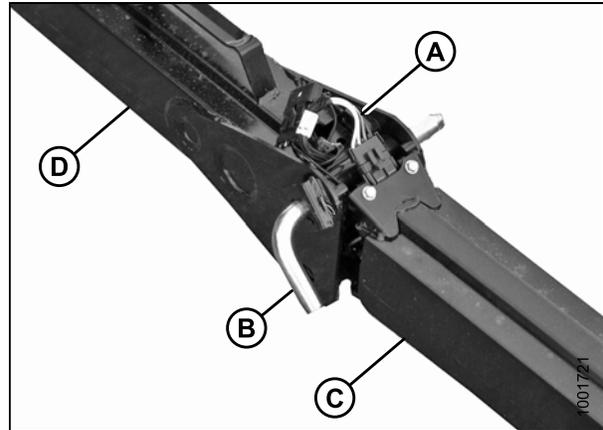


Figure 3.55: Tow-Bar Assembly

4. Disconnect the electrical connector (A) at the front wheel.



Figure 3.56: Wiring Connector

5. Remove clevis pin (A) and set aside for reinstallation.
6. Push latch (B) and lift the tow-bar (C) from the hook. Release latch.
7. Install clevis pin (A).

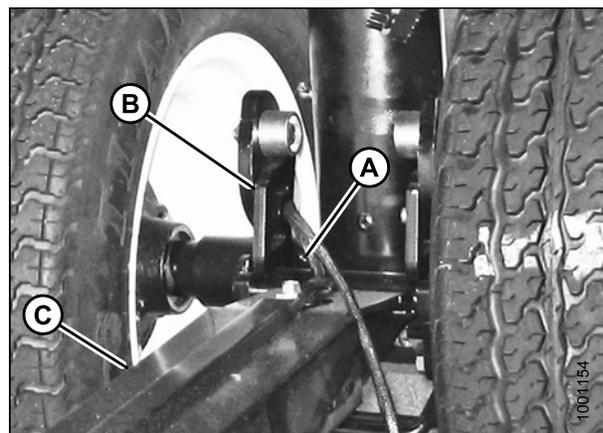


Figure 3.57: Tow-Bar Latch

## OPERATION

### Storing the Tow-Bar

1. Place the inner end of the outer half of the tow-bar into the cradle (A) on the left side of the header backtube.
2. Secure clevis/pintle end of the tow-bar in support (B) on the endsheet using hitch pin (C). Secure with lynch pin.
3. Install the rubber strap (D) on the cradle (A).

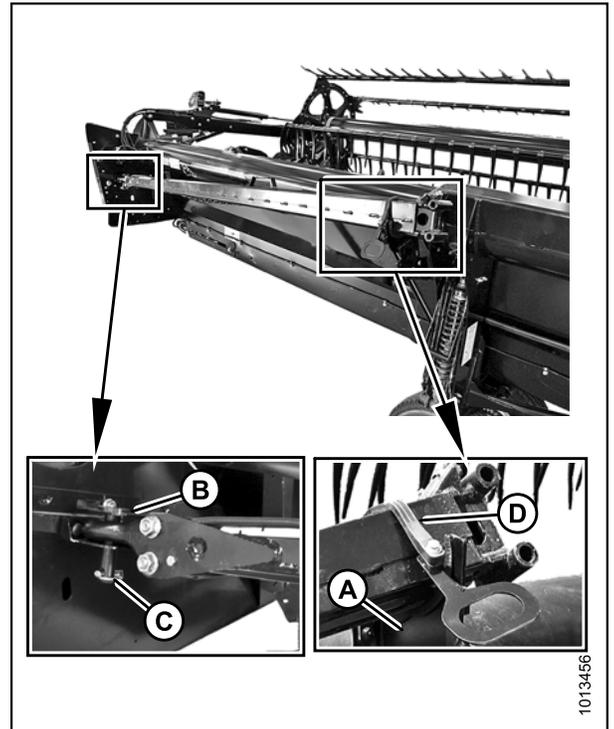


Figure 3.58: Tow-Bar Storage – Left Side

4. Place the inner end of the outer half of the tow-bar into the cradle (A) on the right side of the header backtube.
5. Secure the tube end of the tow-bar in support (B) on the endsheet using hitch pin (C). Secure with hairpin.
6. Install the rubber strap (D) on the cradle (A).

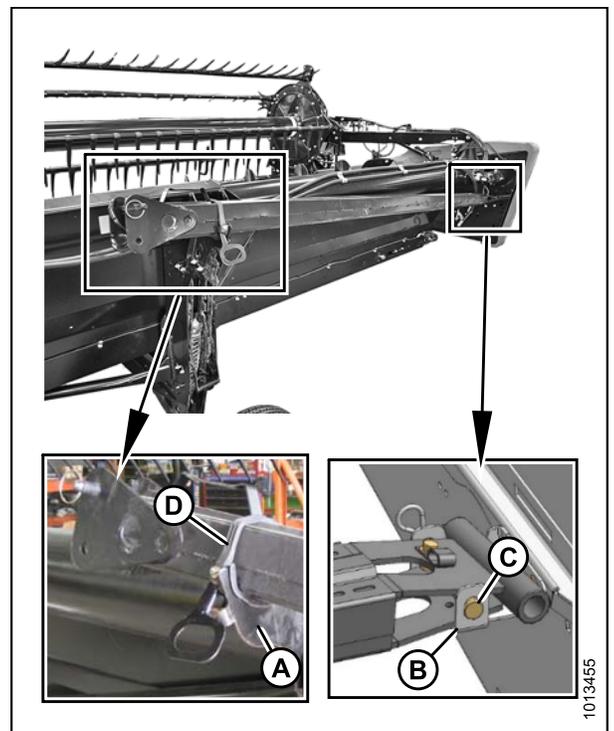


Figure 3.59: Tow-Bar Storage – Right Side

## OPERATION

7. **At the right end of the 35- and 40-ft. header:**
  - a. Place the inner end of the inner half of the tow-bar in cradle (A) on header backtube.
  - b. Secure tube end in support (B) with clevis pin (C). Secure with hairpin.
  - c. Install rubber strap (D) on cradle (A).

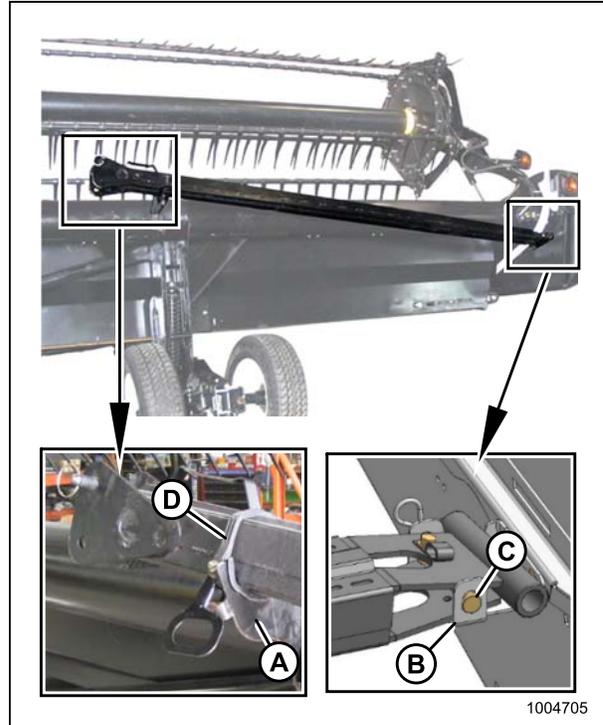


Figure 3.60: 35- and 40-ft. Header

8. **At the right end of the 30-ft. header:**
  - a. Place the inner end of the inner half of the tow-bar in cradle (A) on header backtube.
  - b. Secure tube end in support (B) with pin (C).
  - c. Install rubber strap on cradle (A).

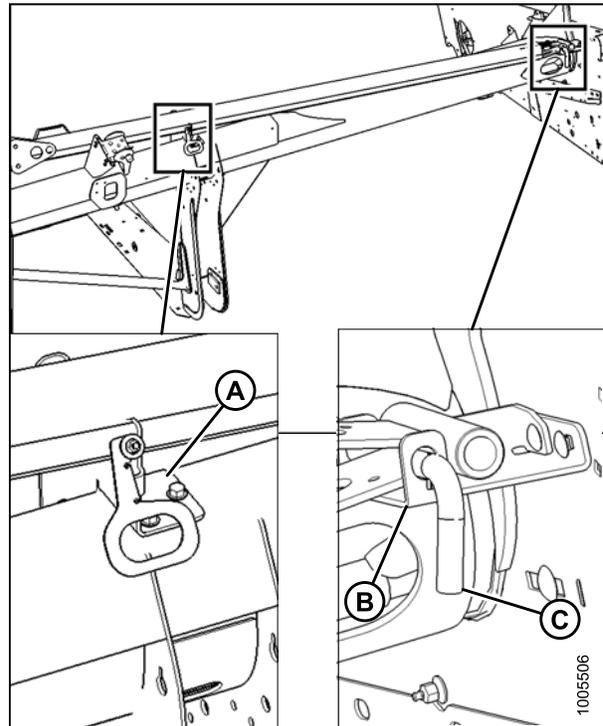


Figure 3.61: 30-ft. Header

## OPERATION

9. Attach the header to the windrower. Refer to the windrower operator's manual for instructions.

### IMPORTANT:

Carrying the tow-bar on the header will affect the main header float. Refer to your windrower operator's manual for adjustment procedures.

10. Place the transport wheels into field position. Refer to the following:
  - [Moving Front \(Left\) Wheels into Field Position, page 79](#)
  - [Moving Rear \(Right\) Wheels into Field Position, page 80](#)

### Moving Front (Left) Wheels into Field Position

#### DANGER

To avoid bodily injury or death from unexpected start-up or fall of raised machine, always stop engine, remove key, and engage safety props before going under header for any reason.

1. Raise the header fully and engage the header safety props.
2. Swivel the front wheel assembly (A) so the wheels are aligned with the lower frame.
3. Remove pin (B) and pull the wheel assembly towards the rear of header. Store the pin in hole (C) at the top of the leg.
4. Pull handle (D) upwards to release and lower the linkage into the vertical support.

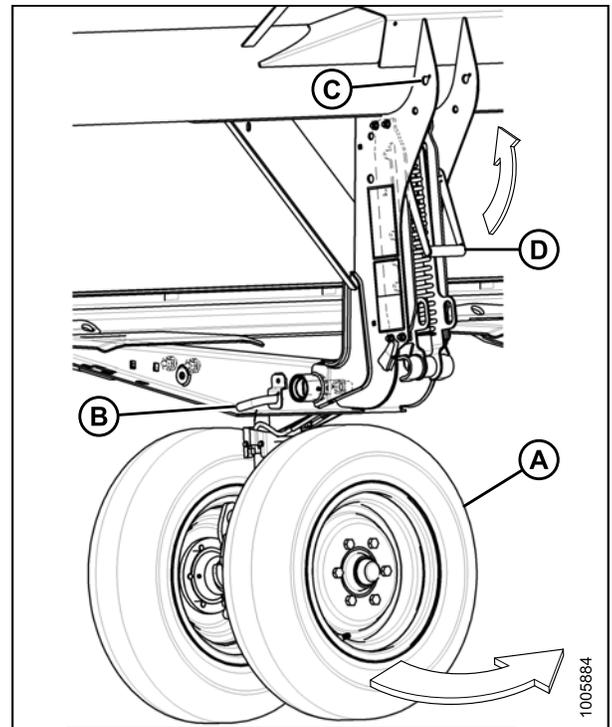


Figure 3.62: Front (Left) Wheels

## OPERATION

5. Align lift hook (A) with lug (B) and lift the wheel assembly to engage the pin in the lift hook. Ensure latch (C) is engaged.
6. Install clevis pin (D) and secure to the center of the axle with hairpin.

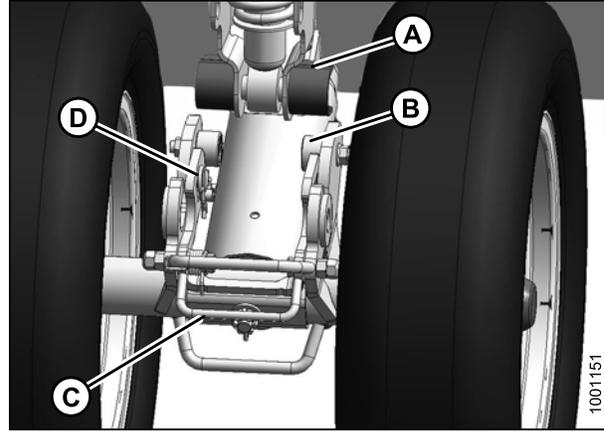


Figure 3.63: Front (Left) Wheels

7. Lift the wheel assembly to the desired height and slide the linkage (A) into the appropriate slot in the vertical support.
8. Push down on the handle (B) to lock.

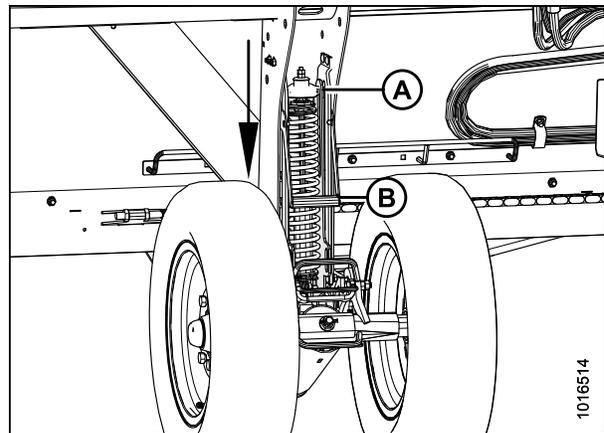


Figure 3.64: Front (Left) Wheels

### *Moving Rear (Right) Wheels into Field Position*

1. Pull pin (A) on the left side rear wheel. Swivel the wheel clockwise and lock with pin.

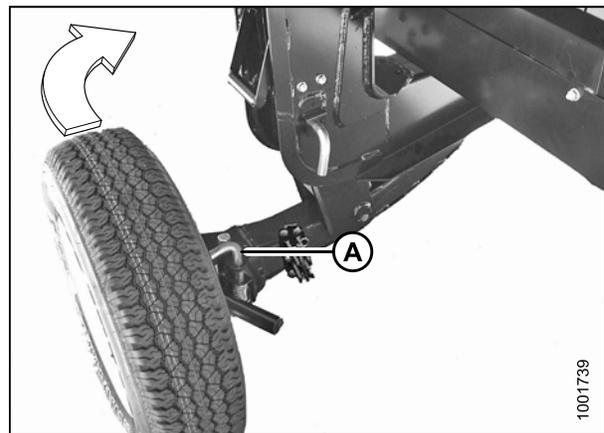


Figure 3.65: Rear Wheel – Left Side

## OPERATION

2. Remove pin (A) and store at location (B).
3. Pull handle (C) upwards to release.
4. Lift the wheel to the desired height, and engage the support channel into slot (D) in the vertical support.
5. Push down on handle (C) to lock.

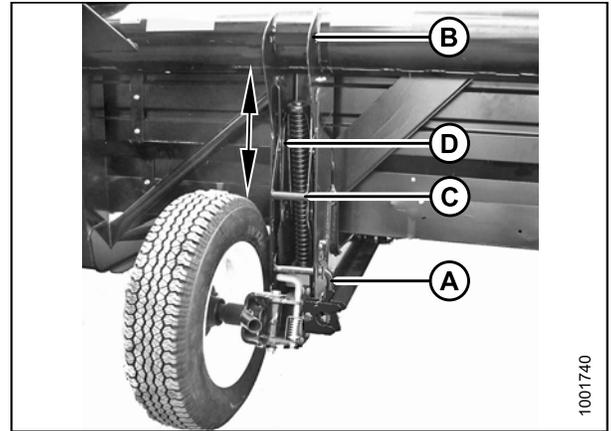


Figure 3.66: Rear Wheel – Left Side

6. Pull the pin (A) on brace (B) on the left-hand wheel in front of the cutterbar. Disengage the brace from the cutterbar, and lower the brace against the axle (C).
7. Remove pin (D), lower support (E) onto axle, and reinsert pin into support.
8. Swing the axle (C) clockwise towards the rear of the header.

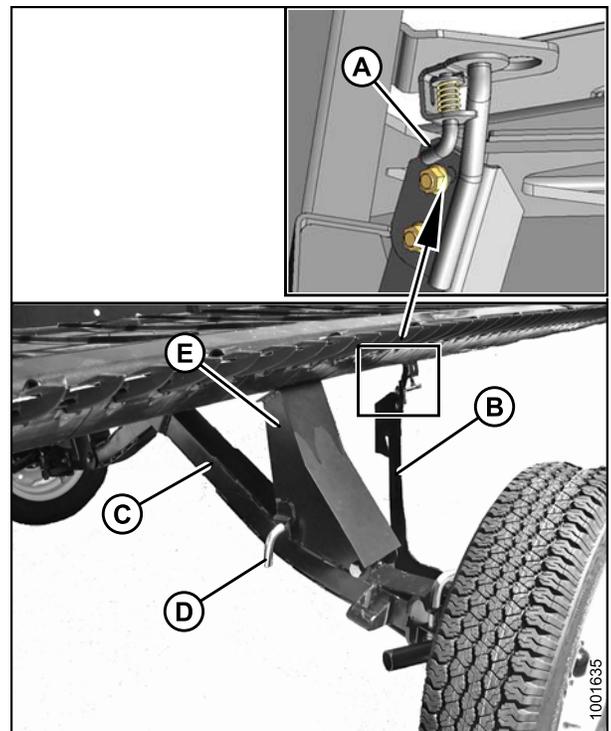


Figure 3.67: Right Rear Axle

## OPERATION

9. Pull pin (A) on right-hand wheel, swivel the wheel counterclockwise to position shown, and lock with pin (A).
10. Remove the hairpin (B) from the latch (C).
11. Lift the wheel, lift latch (C), and engage lug (D) onto the left axle. Ensure the latch closes.
12. Secure the latch with hairpin (B), ensuring the open end of the pin faces the rear of the windrower.

**NOTE:**

The hairpin can become dislodged by crop if installed with the open end facing the cutterbar.

**IMPORTANT:**

Check that wheels are locked and that handle is in locked position.

13. Complete the conversion by ensuring the left side (A) and right side (B) wheels are in the position shown.

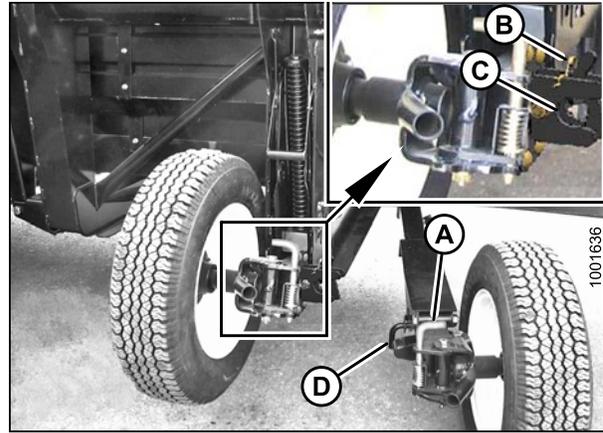


Figure 3.68: Rear Axles

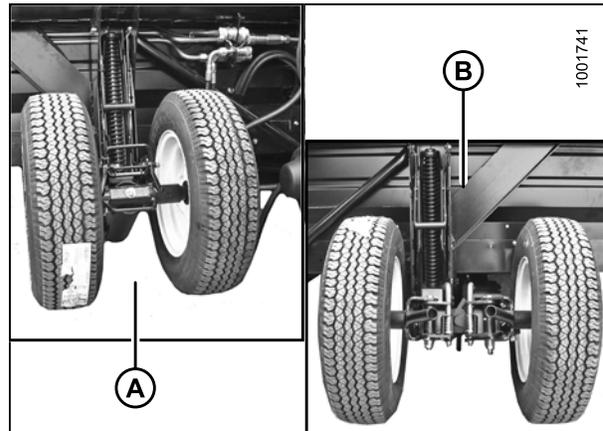


Figure 3.69: Field Position

### 3.15.4 Converting from Field to Transport Position

#### *Moving Front (Left) Wheels into Transport Position*

**⚠ DANGER**

To avoid bodily injury or death from unexpected start-up or fall of raised machine, always stop engine, remove key, and engage safety props before going under header for any reason.

**⚠ CAUTION**

Stand clear of wheels and release linkage carefully as wheels will drop once the mechanism is released.

1. Pull the handle (B) upwards to release and raise the linkage (A) fully upwards into the vertical support.
2. Raise the header fully, stop the engine, and remove the key from ignition. Engage the header safety props.

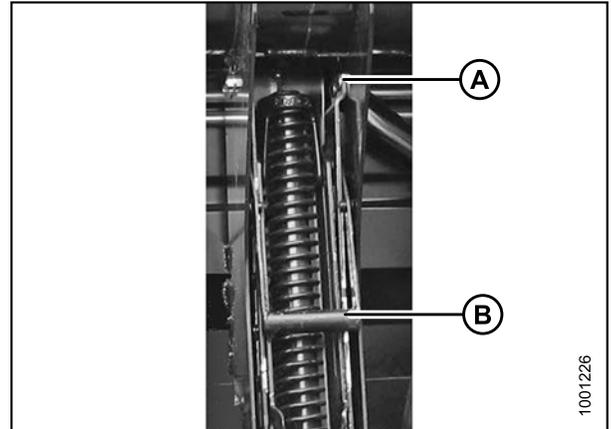


Figure 3.70: Suspension Linkage

3. Remove the hair pin and clevis pin (A).
4. Pull the latch handle (B) to release the suspension linkage (C), and pull the suspension linkage away from the spindle (D).
5. Lower the wheels slowly.

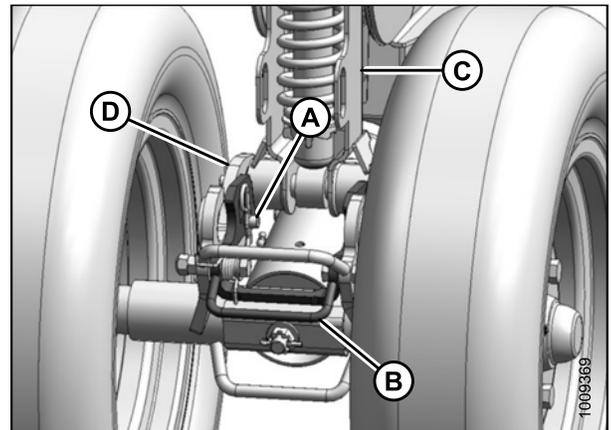


Figure 3.71: Left Front Wheels

6. Lower the handle (B) to lock.

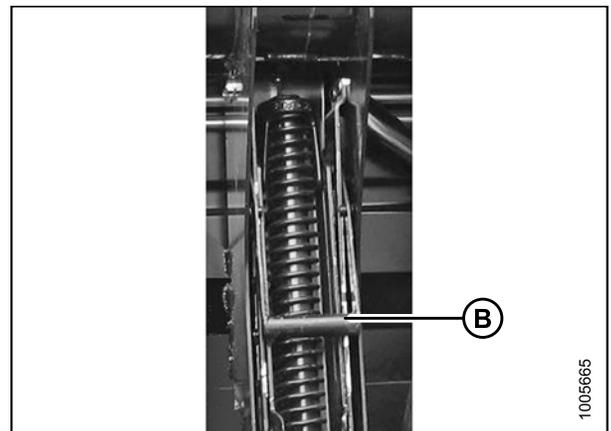


Figure 3.72: Suspension Linkage

## OPERATION

7. Remove the pin (A) from storage at the top of the leg (B).
8. Move and swivel the wheels clockwise until the connector (C) is turned towards the front end of the header.
9. Insert pin (A) and turn to lock.
10. Lower the header until the left wheels are just touching the ground.

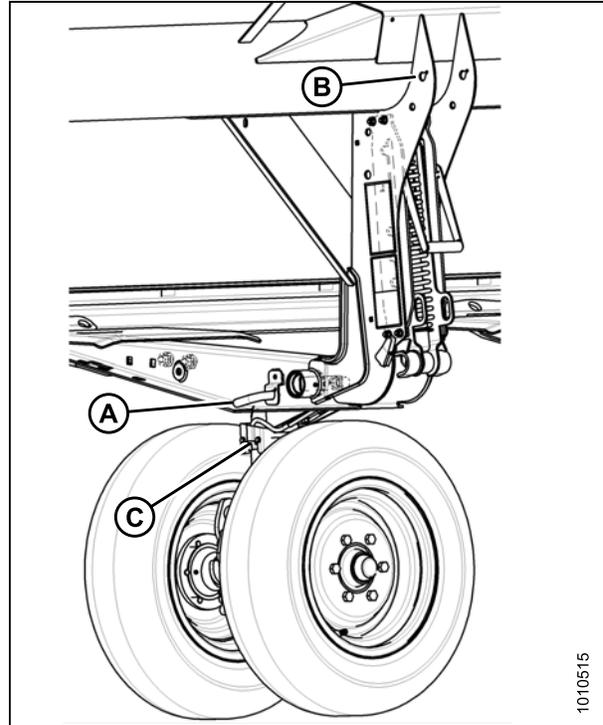


Figure 3.73: Left Front Wheels

### *Moving Rear (Right) Wheels into Transport Position*

1. Remove the hairpin (A) from the latch (B).
2. Lift the latch (B), disengage the right axle (C), and lower to the ground.

#### **CAUTION**

**Stand clear of wheels and release linkage carefully as wheels will drop once the mechanism is released.**

3. Pull handle (D) carefully to release the spring and lower the wheel to the ground.
4. Lift the wheel and linkage with handle (E) and position the linkage in the second slot from the bottom.
5. Lower the handle (C) to lock.

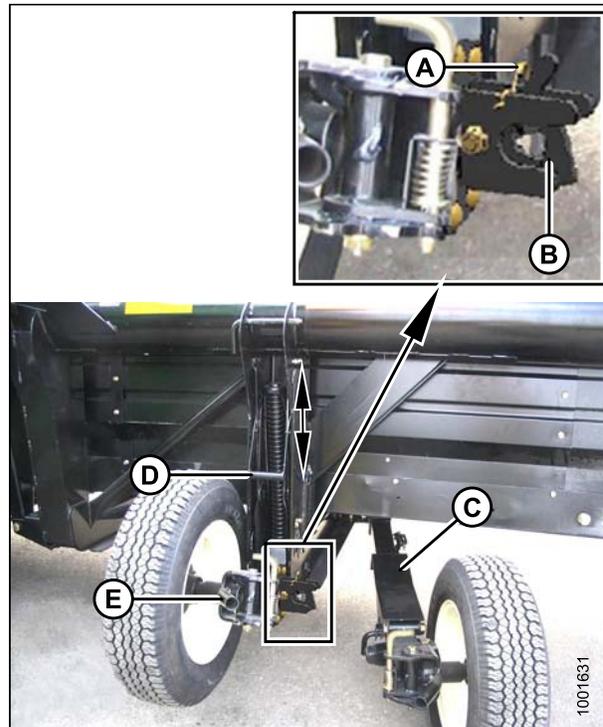
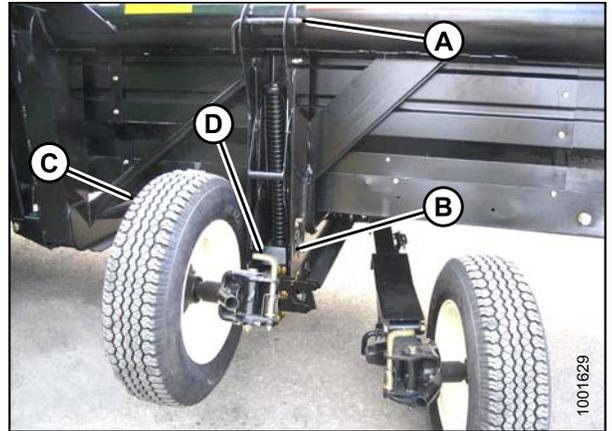


Figure 3.74: Separating Axles

## OPERATION

6. Remove the pin (A) and install at location (B) to secure the linkage. Turn the pin to lock.
7. Pull the pin (D), swivel the wheel (C) counterclockwise 90°, and release the pin to lock.



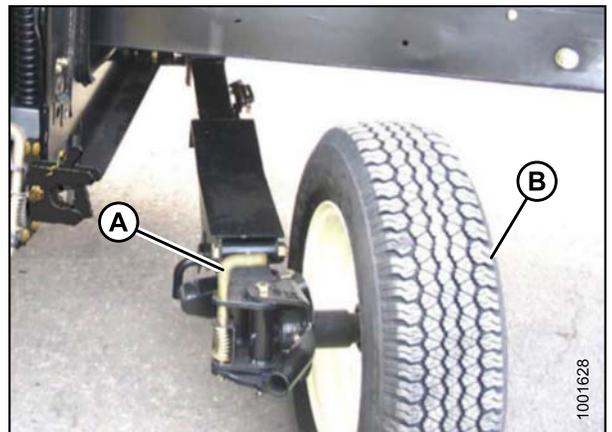
**Figure 3.75: Wheel Position**

8. Ensure the left wheel is in the transport position as shown.



**Figure 3.76: Left Wheel in Transport Position**

9. Pull the pin (A) and swivel the right rear wheel (B) clockwise 90°.



**Figure 3.77: Right Rear Wheel**

## OPERATION

10. Lock the wheel (A) with pin (B). Move the right axle (C) to the front of the header.

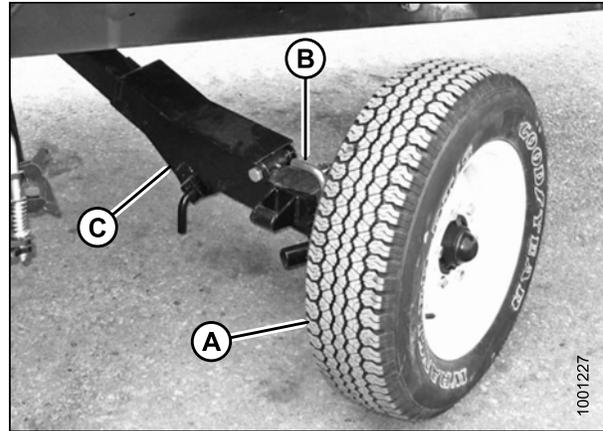


Figure 3.78: Right Rear Wheel

11. Remove the pin (A), raise support (B) to the position shown, and reinsert pin.

**IMPORTANT:**

Ensure the pin (A) engages the tube on the axle.

12. Swing the brace (C) into the position shown and insert the brace into the slot (D) behind the cutterbar. Position the brace so that pin (E) engages the hole in the bracket (F). The right hand wheel is now in transport position.
13. Disengage the header cylinder lift stops.
14. Detach the header's hydraulic and electrical connections from the windrower. Refer to [4 Header Attachment/Detachment, page 91](#).
15. Start the windrower and lower the header to the ground.

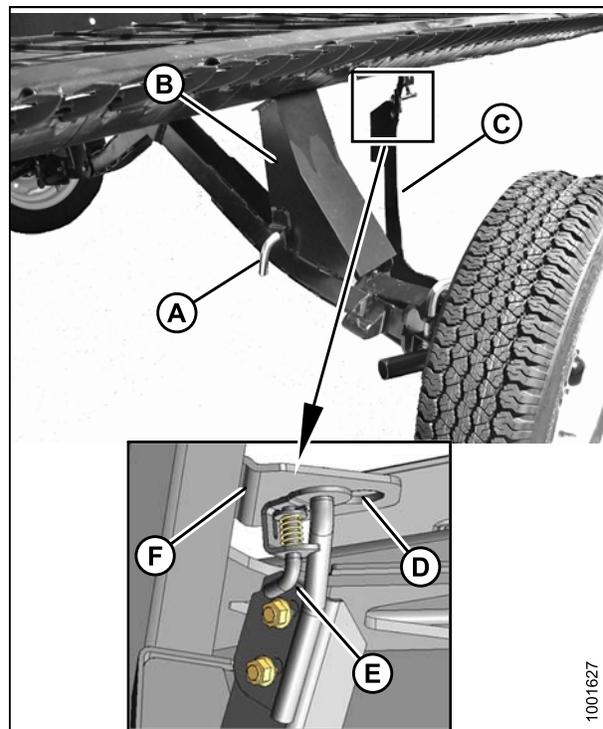


Figure 3.79: Right Rear Wheel Position

## OPERATION

### Attaching Tow-Bar

The tow-bar consists of two sections making for easier storage and handling.

1. Unhook the rubber strap (D) from the cradle (A) on the right side of the header.
2. Remove the clevis pin (C) and detach the tube end from the support (B).
3. Replace the clevis pin (C).
4. Lift the inner half of the tow-bar off the header and place it near the left side of the header.

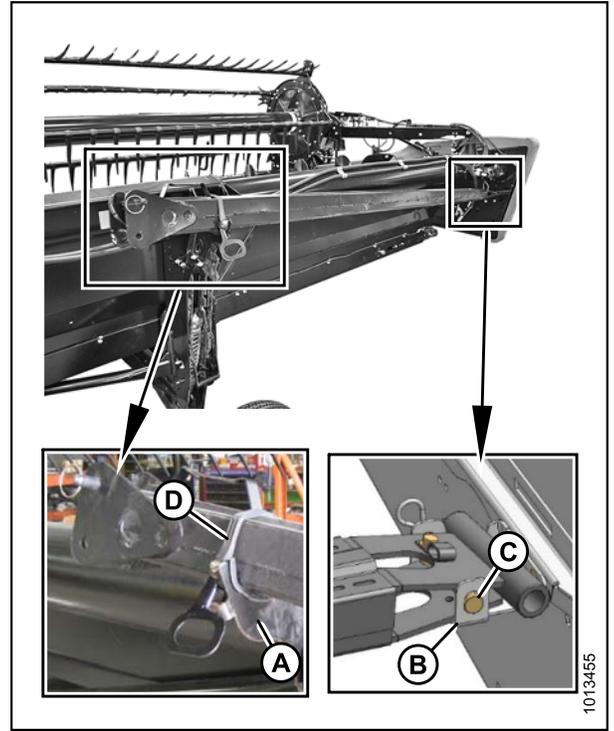


Figure 3.80: Tow-Bar Removal – Right Side

5. Unhook the rubber strap (D) from the cradle (A) on the left side of the header.
6. Remove the hitch pin (C) from the support (B), and remove the tow-bar.
7. Install the rubber strap (D) on the cradle (A).

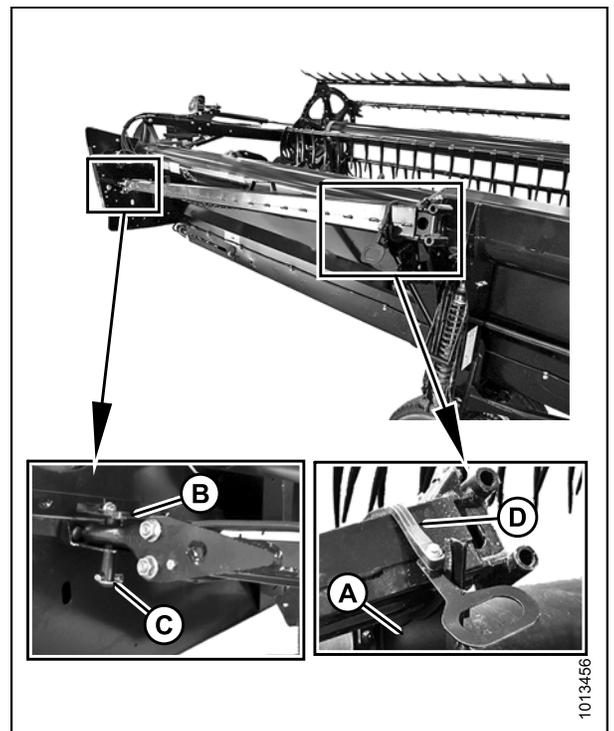
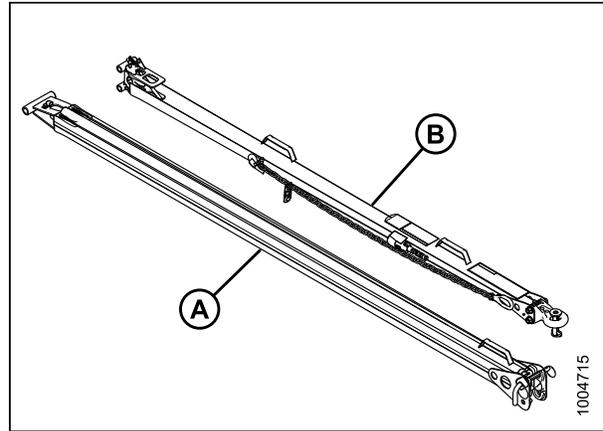


Figure 3.81: Tow-Bar Removal – Left Side

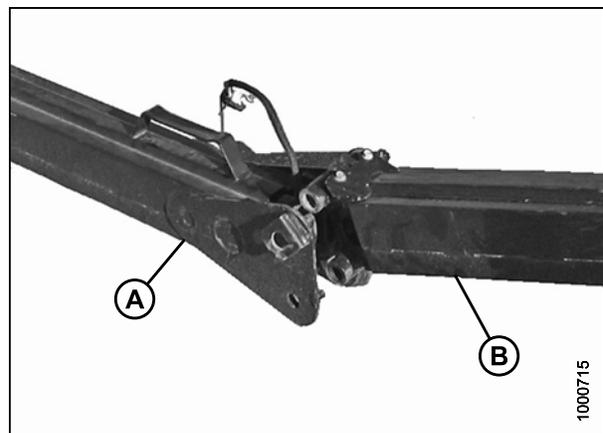
## OPERATION

8. Connect the outer half (B) of the tow-bar to the inner half (A).



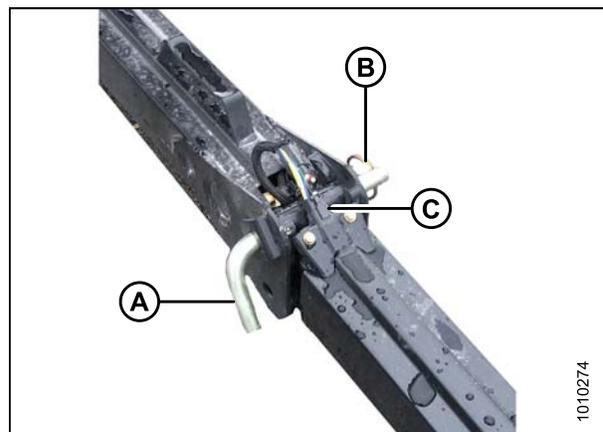
**Figure 3.82: Tow-Bar Assembly**

9. Lift the outer half (B) and insert it into the inner half (A).



**Figure 3.83: Tow-Bar Assembly**

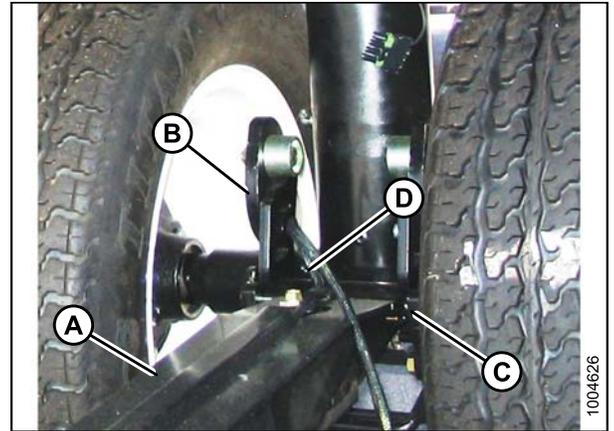
10. Secure the two halves together with the L-pin (A) and then turn to lock. Secure the L-pin with ring (B).
11. Connect the electrical harness to connector (C).



**Figure 3.84: Tow-Bar Assembly**

## OPERATION

12. Position the tow-bar (A) onto the axle, and push against the latch (B) until the tow-bar pins drop into the hooks (C).
13. Check that latch (B) has engaged the tow-bar.
14. Install the clevis pin (D) and secure with hairpin.



**Figure 3.85: Attaching Tow-Bar**

15. Connect the electrical harness (A) at the front wheel.



**Figure 3.86: Harness Connection**



## 4 Header Attachment/Detachment

This chapter includes instructions for setting up, attaching, and detaching the header.

### 4.1 Attaching Header to M1170/M1240 Self-Propelled Windrower

**NOTE:**

Attaching the D125X or D1XL Series header to an M1170 or M1240 windrower requires the installation of the hydraulic hose management arm onto the header (see your MacDon Dealer). Refer to your windrower operator's manual for procedures to mechanically attach the header to the self-propelled windrower.

1. Swing the left side windrower platform backwards.  
Refer to windrower operator's manual.

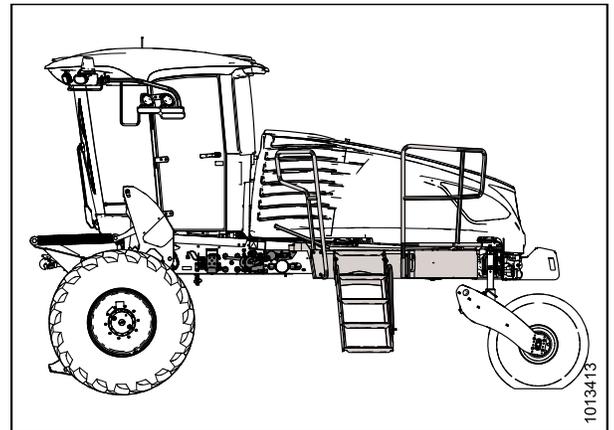


Figure 4.1: Left Side Windrower Platform

2. Push the lever (A) up and pull the arm (B) to get the pin (C) out of the latch (D).

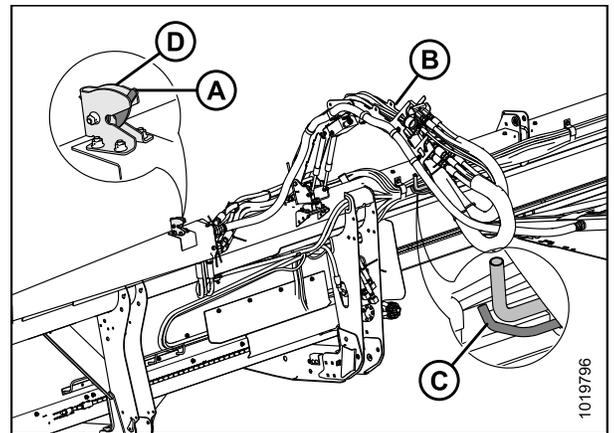


Figure 4.2: Hydraulic Hose Management Arm

## HEADER ATTACHMENT/DETACHMENT

3. Connect the hydraulic hose management arm (A) to the left-hand outer leg of the windrower by pushing the right-hand ball stud (B) into the ball stud latch (C).

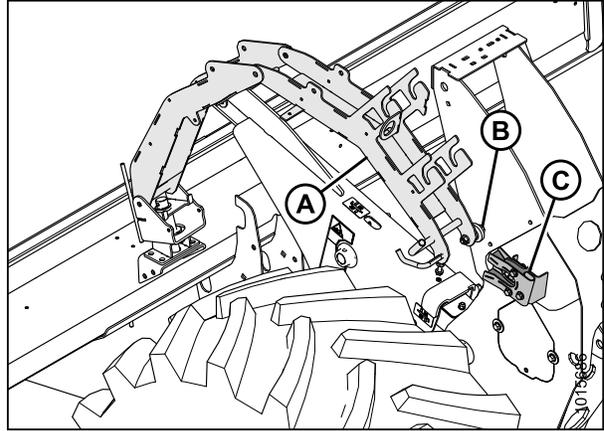


Figure 4.3: Windrower Left-Hand Outer Leg

4. Check connectors and ensure they are clean before connecting hydraulics and electrical harnesses.
5. Retrieve draper drive and reel control multicoupler (A) from hose management arm.
6. Push knob (B) on hydraulic receptacle and pull handle (C) fully away from windrower.
7. Open cover (D) and position coupler onto receptacle. Align pins in coupler with slots in handle (C) and push handle toward windrower so that coupler is locked onto receptacle and knob (B) snaps out.
8. Remove cover from electrical connector (E), push electrical connector onto receptacles, and secure by turning collar on electrical connector clockwise.
9. Retrieve knife and reel drive multicoupler (A) from hose management arm.
10. Push knob (B) on hydraulic receptacle and pull handle (C) fully away from windrower.
11. Open cover (D) and position coupler onto receptacle. Align pins in coupler with slots in handle (C) and push handle toward windrower so that coupler is locked onto receptacle and knob (B) snaps out.

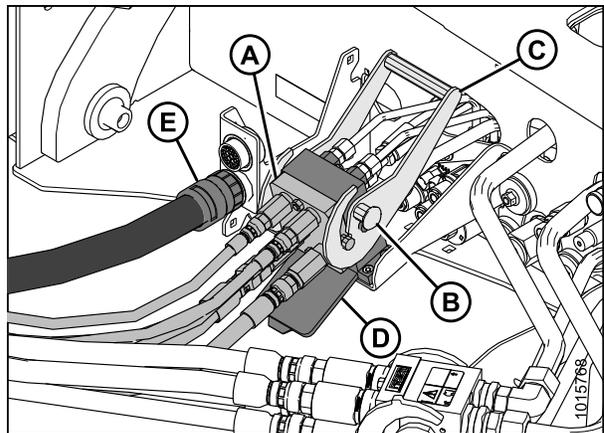


Figure 4.4: Draper/Reel Multicoupler

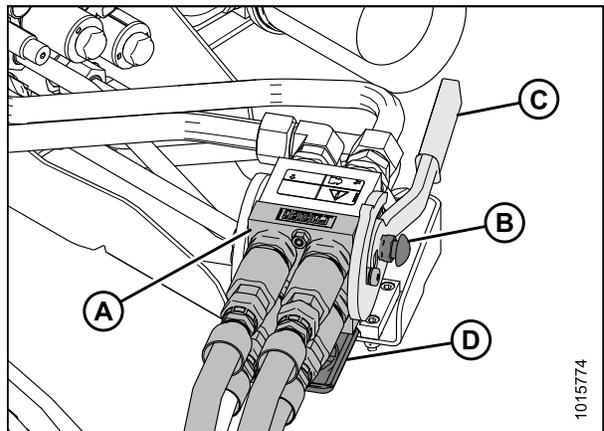
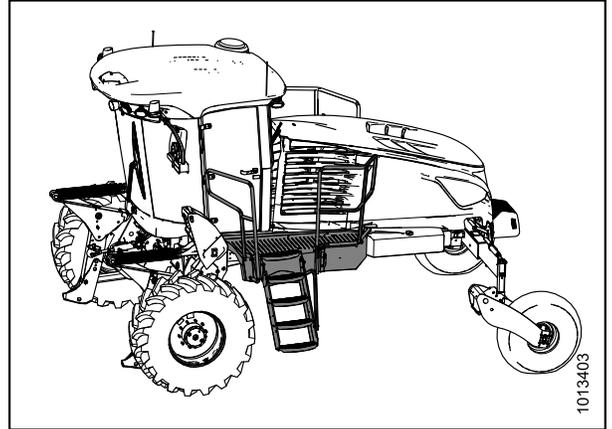


Figure 4.5: Knife/Reel Drive Multicoupler

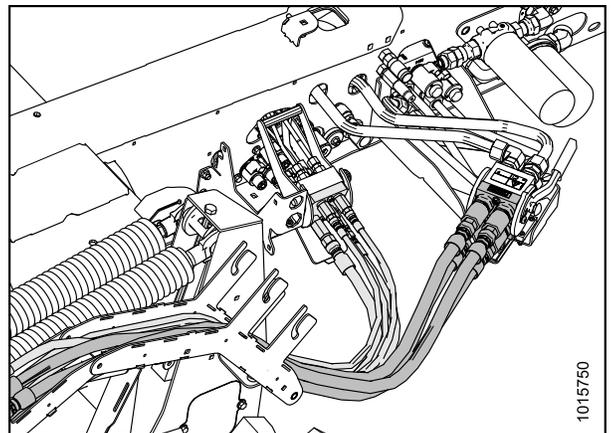
## HEADER ATTACHMENT/DETACHMENT

12. Swing the left side windrower platform forwards. Refer to windrower operator's manual.



**Figure 4.6: Left Side Windrower Platform**

13. Ensure hydraulic hose routing is as straight as possible and avoids potential rub/wear points.



**Figure 4.7: Hydraulic Multicouplers and Hose Routing**

## 4.2 Detaching Header from M1170/M1240 Windrower

1. Lower the reel fully.
2. Swing the left side windrower platform backwards. Refer to windrower operator's manual.

**NOTE:**

Firmly hold handle (C) when disconnecting the multicoupler (A). Pressure may cause the handle to kick back with force.

3. Push lock button (B) and pull handle (C) to disengage multicoupler (A) and disconnect the hydraulics from the windrower knife/reel drive receptacle.
4. Remove any debris that may have accumulated on the receptacle, and close the cover (D).
5. Route hose bundle with multicoupler (A) back to the storage position on the hydraulic hose management arm.
6. Push lock button (B), and pull handle (C) to disengage multicoupler (A) and disconnect the hydraulics from the windrower draper/reel receptacle.
7. Remove any debris that may have accumulated on the windrower front receptacle, and close cover (D).
8. Disconnect electrical connector (E).
9. Route hose bundle with multicoupler back to the storage position on the hydraulic hose management arm.

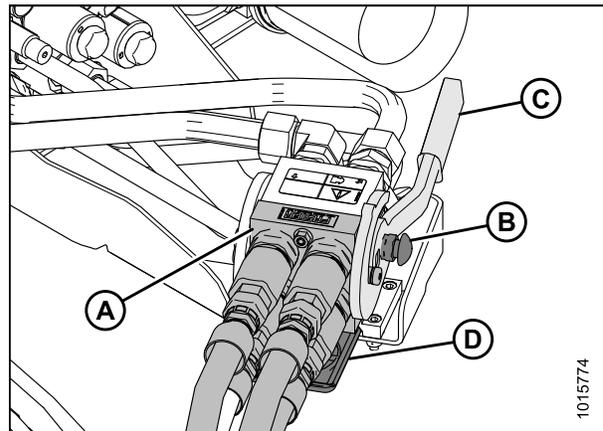


Figure 4.8: Knife/Reel Drive Multicoupler

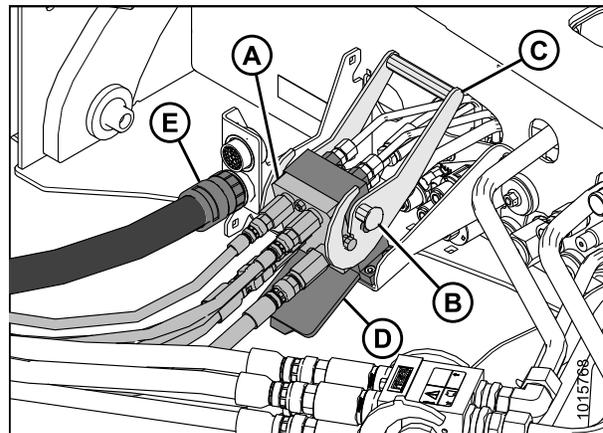


Figure 4.9: Draper/Reel Multicoupler

10. Disconnect the hydraulic hose management arm (A) from the left-hand outer leg of the windrower by pulling ball stud latch handle (C) to disengage the ball stud (B) from the support.

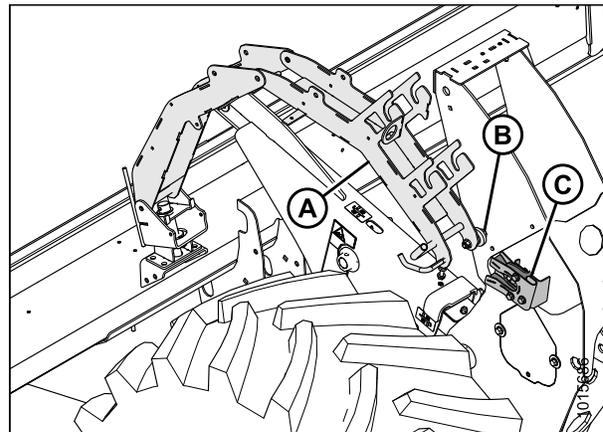
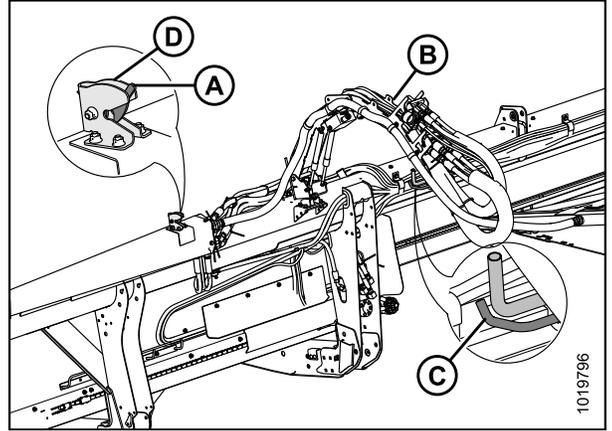


Figure 4.10: Windrower Left-Hand Outer Leg

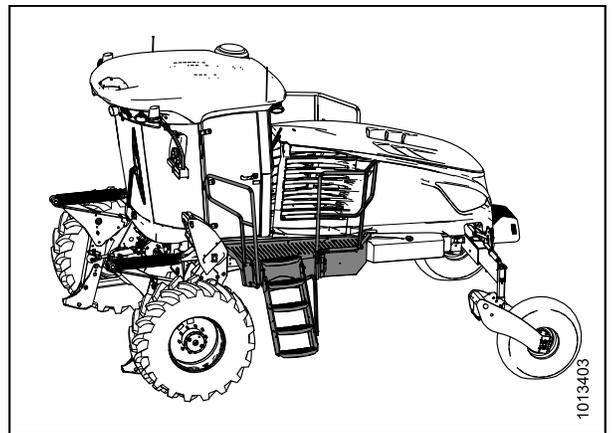
## HEADER ATTACHMENT/DETACHMENT

11. Pull arm (B) to the latch (D) on the left side of the header, and align pin (C) to the latch opening. Push arm (B) so lever (A) can secure the pin.



**Figure 4.11: Hydraulic Hose Management Arm**

12. Swing the left side windrower platform forwards. Refer to windrower operator's manual.
13. Detach header from windrower. Refer to the windrower operator's manual.



**Figure 4.12: Left Side Windrower Platform**



## 5 Maintenance and Servicing

The following instructions provide information about routine header service. Detailed maintenance and service information is available in the technical service manual that is available from your Dealer. A parts catalog is provided in the plastic manual case inside the left endshield of the header.

Log hours of operation and use the maintenance record provided (refer to [5.3.1 Maintenance Schedule/Record, page 101](#)) to keep track of your scheduled maintenance.

### 5.1 Preparing Machine for Servicing

#### DANGER

**To avoid bodily injury or death from unexpected start-up or fall of a raised machine, always stop engine and remove key before leaving the operator's seat, and always engage safety props before going under the machine for any reason.**

#### CAUTION

**To avoid personal injury, follow all the safety precautions listed before servicing header or opening drive covers.**

1. Lower the header fully. If it is necessary to service the header in the raised position, always engage the safety props.
2. Stop the engine and remove the key from the ignition.
3. Engage the park brake.
4. Wait for all moving parts to stop.

## 5.2 Maintenance Specifications

### 5.2.1 Recommended Fluids and Lubricants

Ensure your machine operates at top efficiency by using clean fluids and lubricants only.

- Use clean containers to handle all fluids and lubricants.
- Store fluids and lubricants in an area protected from dust, moisture, and other contaminants.

**Table 5.1 Recommended Fluids and Lubricants**

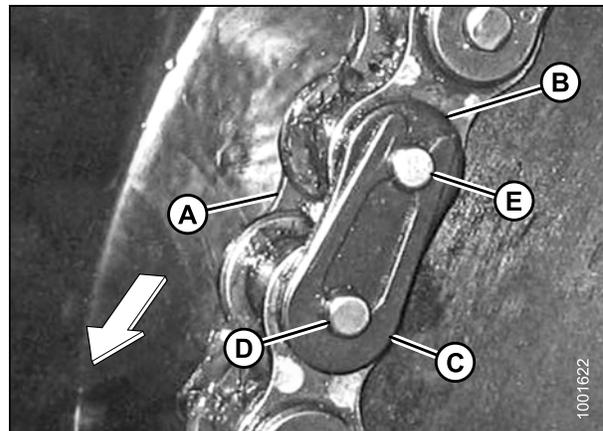
Lubricant	Specification	Description	Use	Capacities
<b>Grease</b>	SAE multi-purpose	High temperature extreme pressure (EP) performance with 1% max. Molybdenum Disulphide (NLGI Grade 2) lithium base	As required unless otherwise specified	—
<b>Gear lubricant</b>	SAE 85W-140	API service class GL-5	Knife drive box	2.2 liters (2.3 quarts)

### 5.2.2 Installing a Roller Chain

#### DANGER

To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.

1. Position the ends of the chain onto the sprocket.
2. Install the pin connector (A) (not available as a MacDon part) into the chain (preferably from backside of sprocket).
3. Install connector (B) onto the pins.
4. Install the spring clip (C) onto the front pin (D) with the closed end of the spring clip facing the direction of sprocket rotation.
5. Position one leg of the spring clip (C) into the groove of the aft pin (E).
6. Press the other leg of the spring clip (C) over the face of the aft pin (E) until it slips into the groove. Do **NOT** press the spring clip lengthwise from the closed end.
7. Ensure the spring clip (C) is seated into the grooves of the front pin (D) and the aft pin (E).



**Figure 5.1: Chain**

### 5.2.3 Installing a Sealed Bearing

1. Clean the shaft and apply a rust preventive coating.
2. Install the flangette (A), bearing (B), second flangette (C), and lock the collar (D).

**NOTE:**

The locking cam is on only one side of the bearing.

3. Install the flangette bolts (E). Do not tighten.
4. Position the shaft correctly, and lock the lock collar with a punch. Lock the collar in the same direction the shaft rotates, and tighten the setscrew in the collar.
5. Tighten the flangette bolts (E).
6. Loosen the flangette bolts on the mating bearing (one turn) and then retighten. This will enable the bearing to properly line up.

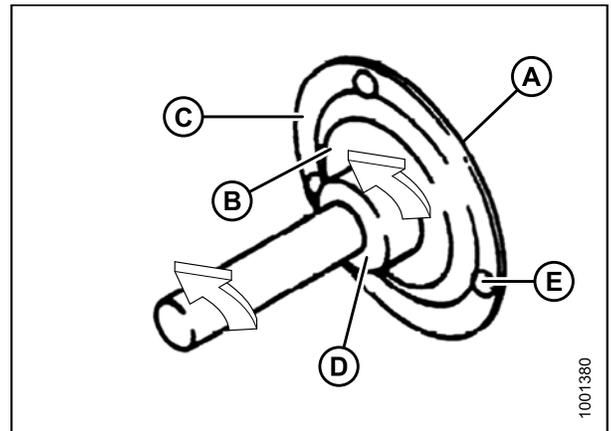


Figure 5.2: Sealed Bearing

## 5.3 Maintenance Requirements

Periodic maintenance requirements are organized according to service intervals.

Regular maintenance is the best insurance against early wear and untimely breakdowns. Following the maintenance schedule will increase your machine's life.

When servicing the machine, refer to the specific headings in this section and use only fluids and lubricants specified in [5.2.1 Recommended Fluids and Lubricants, page 98](#).

Log hours of operation, use the maintenance record, and keep copies of your maintenance records (refer to [5.3.1 Maintenance Schedule/Record, page 101](#)).

If a service interval specifies more than one timeframe, e.g., 100 hours or Annually, service the machine at whichever interval is reached first.

### **IMPORTANT:**

Recommended intervals are for average conditions. Service the machine more often if operating under adverse conditions (severe dust, extra heavy loads, etc.).



### **CAUTION**

Carefully follow safety messages. Refer to [5.1 Preparing Machine for Servicing, page 97](#) and [1 Safety, page 1](#).

**MAINTENANCE AND SERVICING**

**5.3.1 Maintenance Schedule/Record**

Action:		✓ - Check				◆ - Lubricate				▲ - Change			
	Hour Meter Reading												
	Service Date												
	Serviced By												
<b>First Use</b>						Refer to <a href="#">5.3.2 Break-In Inspection, page 102</a>							
<b>End Of Season</b>						Refer to <a href="#">5.3.4 End-of-Season Service, page 103</a>							
<b>10 Hours Or Daily</b>													
✓	Hydraulic Hoses and Lines - Refer to <a href="#">5.3.5 Checking Hydraulic Hoses and Lines, page 104</a> .	<b>NOTE: Keep a record of daily maintenance as evidence of a properly maintained machine; however, daily maintenance records are not required to meet normal warranty conditions.</b>											
✓	Knife Sections, Guards, and Hold-Downs - Refer to <a href="#">5.5 Cutterbar, page 116</a> .												
✓	Tire Pressure - Refer to <a href="#">5.10.3 Checking Tire Pressure, page 214</a> .												
◆	Knife (except in sandy conditions) - Refer to <a href="#">5.5 Cutterbar, page 116</a> .												
<b>25 Hours</b>													
◆	Knifehead(s) - Refer to <a href="#">5.5 Cutterbar, page 116</a> .	<b>NOTE: Keep a record of daily maintenance as evidence of a properly maintained machine; however, daily maintenance records are not required to meet normal warranty conditions.</b>											
<b>50 Hours</b>													
✓	Draper Roller Bearings - Refer to <a href="#">5.7.6 Header Draper Roller Maintenance, page 163</a> .												
▲	Knife Drive Box Lubricant (First 50 Hours Only) - Refer to <a href="#">5.6.1 Knife Drive Box, page 129</a> .												
<b>250 Hours</b>													
✓	Draper Seal - Refer to <a href="#">5.7.2 Installing Drapers, page 155</a> .												
◆	Reel Drive U-Joint - Refer to <a href="#">5.9 Reel System, page 198</a> .												
◆	Transport Axle Pivot Bushings - Refer to <a href="#">5.10 Transport System (Optional), page 212</a> .												
◆	Upper Cross Auger Center Support and U-Joint - Refer to <a href="#">3.14 Upper Cross Auger (UCA), page 73</a> .												

## MAINTENANCE AND SERVICING

500 Hours													
✓	Draper Seal - Refer to <a href="#">5.7.2 Installing Drapers, page 155</a> .												
●	Reel Drive U-Joint - Refer to <a href="#">5.9 Reel System, page 198</a> .												
●	Stabilizer/Slow Speed Transport Wheel Bearings - Refer to <a href="#">5.10 Transport System (Optional), page 212</a> .												
1000 Hours													
▲	Knife Drive Box Lubricant - Refer to <a href="#">5.6.1 Knife Drive Box, page 129</a> .												

### 5.3.2 Break-In Inspection

Break-in inspection involves checking belts, fluids, and performing general machine inspections for loose hardware or other areas of concern. Break-in inspections ensure that all components can operate for an extended period without requiring service or replacement. The break-in period is the first 50 hours of operation after the machine's initial start up.

Inspection Interval	Item	Refer to
<b>5 Hours</b>	Check for loose hardware and tighten to required torque.	<a href="#">9.1 Torque Specifications, page 239</a>
	Check knife drive belts tension (check periodically for first 50 hours).	<a href="#">Tensioning Non-Timed Knife Drive Belts, page 141</a> <a href="#">Tensioning Timed Knife Drive Belts, page 147</a>
<b>10 Hours</b>	Check knife drive box mounting bolts.	<a href="#">Checking Mounting Bolts, page 129</a>
<b>50 Hours</b>	Change knife drive box lubricant.	<a href="#">Changing Oil in Knife Drive Box, page 138</a>

### 5.3.3 Preseason Servicing

Perform the following procedures at the beginning of each operating season:

#### CAUTION

- Review this manual to refresh your memory on the safety and operating recommendations.
  - Review all the safety decals and other decals on the header and note the hazard areas.
  - Be sure all the shields and guards are properly installed and secured. Never alter or remove safety equipment.
  - Be sure you understand and have practiced safe use of all controls. Know the capacity and operating characteristics of the machine.
  - Ensure you have a first aid kit and fire extinguisher. Know where they are and how to use them.
1. Lubricate the machine completely. Refer to [5.3.6 Lubrication and Servicing, page 104](#).
  2. Adjust the tension on the drive belts. Refer to [Tensioning Non-Timed Knife Drive Belts, page 141](#) or [Tensioning Timed Knife Drive Belts, page 147](#).

3. Perform all annual maintenance tasks. Refer to [5.3.1 Maintenance Schedule/Record, page 101](#).

### 5.3.4 End-of-Season Service

Perform the following procedures at the end of each operating season:

#### CAUTION

Never use gasoline, naphtha, or any volatile material for cleaning purposes. These materials may be toxic and/or flammable.

#### CAUTION

Cover cutterbar and knife guards to prevent injury from accidental contact.

1. Clean the header thoroughly.
2. Bring the machine for storage in a dry and protected place if possible. If storing outside, always cover the machine with a waterproof canvas or other protective material.

#### NOTE:

If storing the machine outside, remove the drapers and store them in a dark, dry place. If not removing the drapers, store the header with the cutterbar lowered so water and snow will not accumulate on the drapers. The weight of water and snow accumulation puts excessive stress on the drapers and header.

3. Lower the header onto blocks to keep the cutterbar off the ground.
4. Lower the reel completely. If stored outside, tie the reel to the frame to prevent rotation caused by the wind.
5. Repaint all worn or chipped painted surfaces to prevent rust.
6. Loosen the drive belts.
7. Lubricate the header thoroughly leaving excess grease on the fittings to keep moisture out of the bearings.
8. Apply grease to exposed threads, cylinder rods, and sliding surfaces of components.
9. Check for worn components and repair as necessary.
10. Check for broken components and order replacements from your Dealer. Immediate repair of these items will save time and effort at the beginning of next season.
11. Replace or tighten any missing or loose hardware. Refer to [9.1 Torque Specifications, page 239](#).

### 5.3.5 Checking Hydraulic Hoses and Lines

Check hydraulic hoses and lines daily for signs of leaks.

#### WARNING

- Avoid high-pressure fluids. Escaping fluid can penetrate the skin causing serious injury. Relieve pressure before disconnecting hydraulic lines. Tighten all connections before applying pressure. Keep hands and body away from pin holes and nozzles which eject fluids under high pressure.
- If any fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type of injury or gangrene may result.

- Use a piece of cardboard or paper to search for leaks.

#### IMPORTANT:

Keep hydraulic coupler tips and connectors clean. Allowing dust, dirt, water, or foreign material to enter the system is the major cause of hydraulic system damage. Do NOT attempt to service hydraulic systems in the field. Precision fits require a perfectly clean connection during overhaul.



Figure 5.3: Hydraulic Pressure Hazard

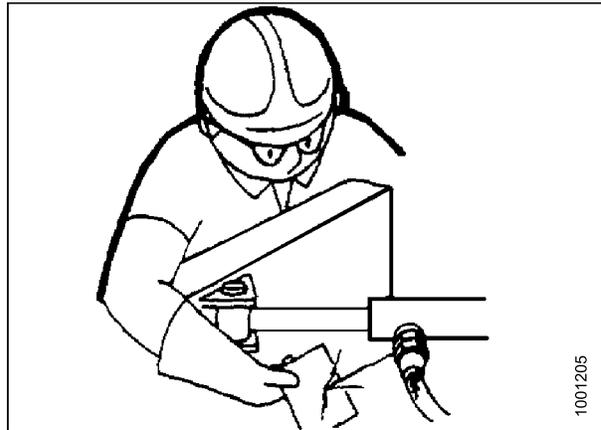


Figure 5.4: Testing for Hydraulic Leaks

### 5.3.6 Lubrication and Servicing

#### WARNING

To avoid personal injury, before servicing mower conditioner or opening drive covers, refer to [5.1 Preparing Machine for Servicing, page 97](#).

## MAINTENANCE AND SERVICING

Greasing points are marked on the machine by decals showing a grease gun and the grease interval in hours of operation.

Refer to [5.2.1 Recommended Fluids and Lubricants, page 98](#) for recommended lubricants.

Log hours of operation and use the Maintenance Record provided to keep a record of scheduled maintenance. Refer to [5.3.1 Maintenance Schedule/Record, page 101](#).

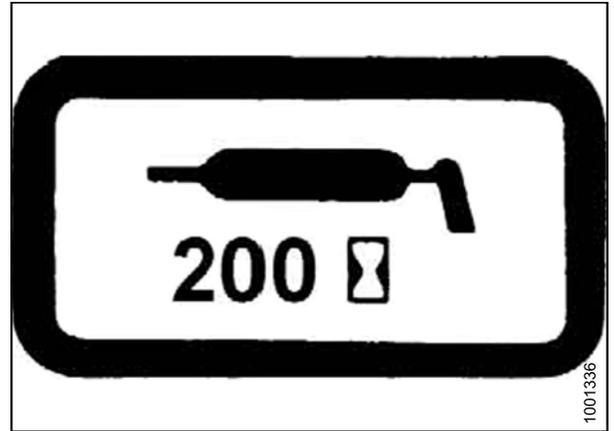


Figure 5.5: Grease Interval Decal

### Greasing Procedure

#### **DANGER**

To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.

1. Open driveshields at ends of header to access greasing points. Refer to [Opening Endshields, page 31](#).
2. Wipe grease fitting with a clean cloth before greasing to avoid injecting dirt and grit.
3. Inject grease through fitting with grease gun until grease overflows fitting, except where noted.

#### **IMPORTANT:**

Use only recommended lubricants specified in this manual. Refer to [5.2.1 Recommended Fluids and Lubricants, page 98](#)

4. Leave excess grease on fitting to keep out dirt.
5. Replace any loose or broken fittings immediately.
6. Remove and thoroughly clean any fitting that will not take grease. Also clean lubricant passageway. Replace fitting if necessary.

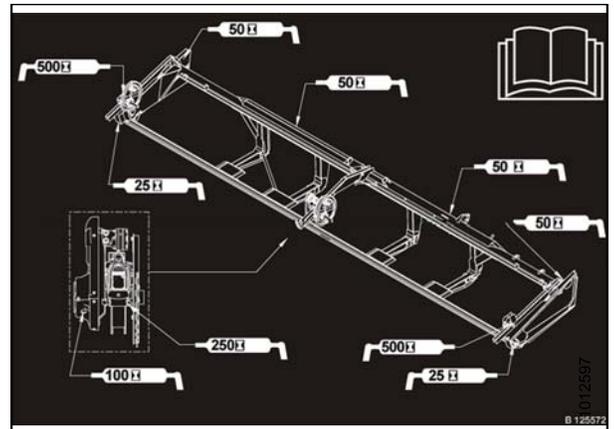


Figure 5.6: Grease Point Location Decal

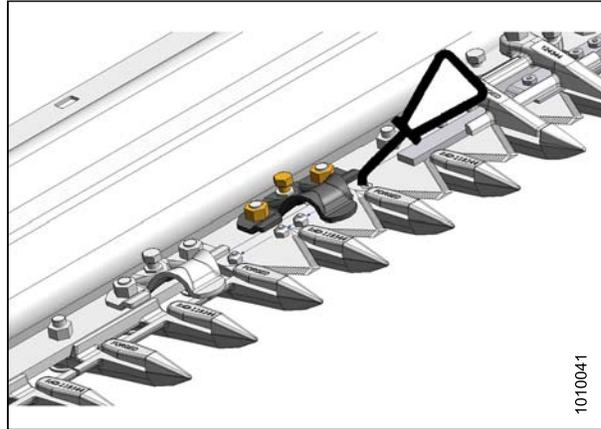
## MAINTENANCE AND SERVICING

### *Service Intervals*

#### **Every 10 Hours**

Use high temperature extreme pressure (EP2) performance with 1% max molybdenum disulphide (NLGI Grade 2) lithium base unless otherwise specified.

**Knife:** Lubricate the knife every 10 hours or daily, except in sandy conditions.



**Figure 5.7: Lubricating Knife**

## MAINTENANCE AND SERVICING

### Every 25 Hours

Use high temperature extreme pressure (EP2) performance with 1% max molybdenum disulphide (NLGI Grade 2) lithium base unless otherwise specified.

**Knifehead:** Lubricate the knifehead (A) every 25 hours. Check for signs of excessive heating on the first few guards after greasing. If required, relieve the pressure by pressing the check-ball in the grease fitting.

#### **IMPORTANT:**

Over-greasing the knifehead puts pressure on the knife causing it to rub against the guards, resulting in excessive wear from binding. Do **NOT** over-grease the knifehead. Apply only one to two pumps using a mechanical grease gun (do **NOT** use an electric grease gun). If more than six to eight pumps of the grease gun are required to fill the cavity, replace the seal in the knifehead. Refer to [5.5.3 Removing Knifehead Bearing, page 118](#).

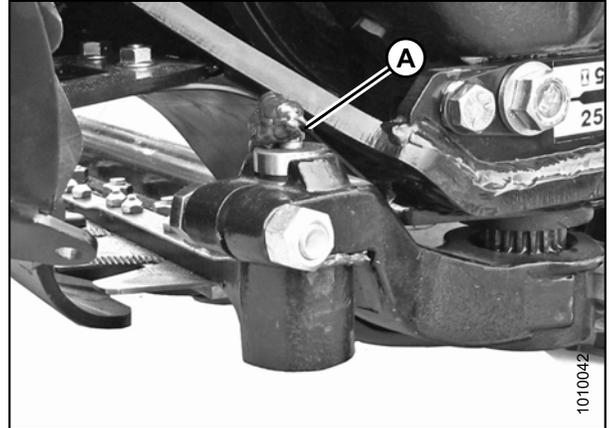


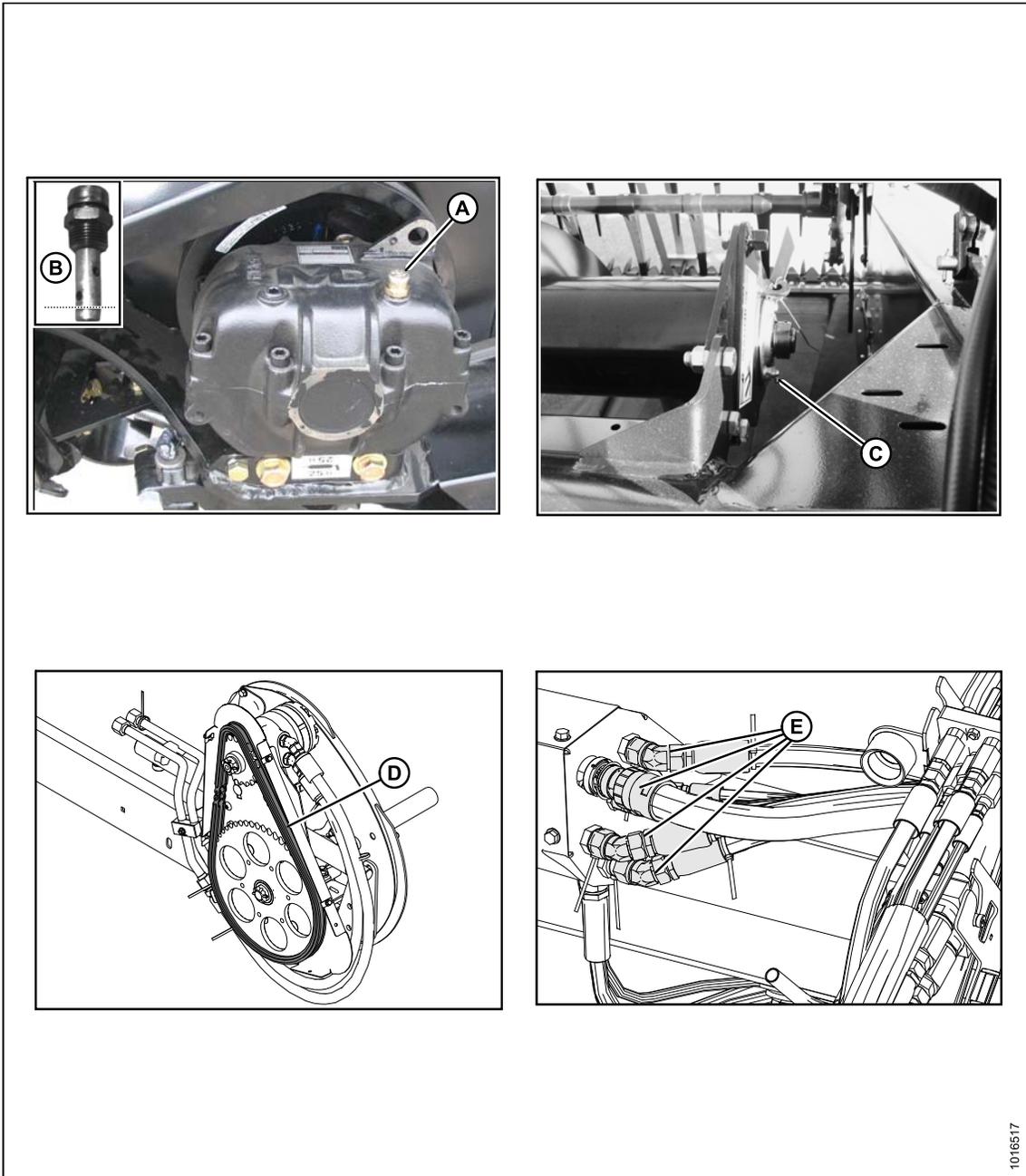
Figure 5.8: Every 25 Hours

## MAINTENANCE AND SERVICING

### Every 100 Hours

#### NOTE:

Use High Temperature Extreme Pressure (EP2) Performance with 1% Max Molybdenum Disulphide (NLGI Grade 2) Lithium Base unless otherwise specified.



**Figure 5.9: Every 100 Hours**

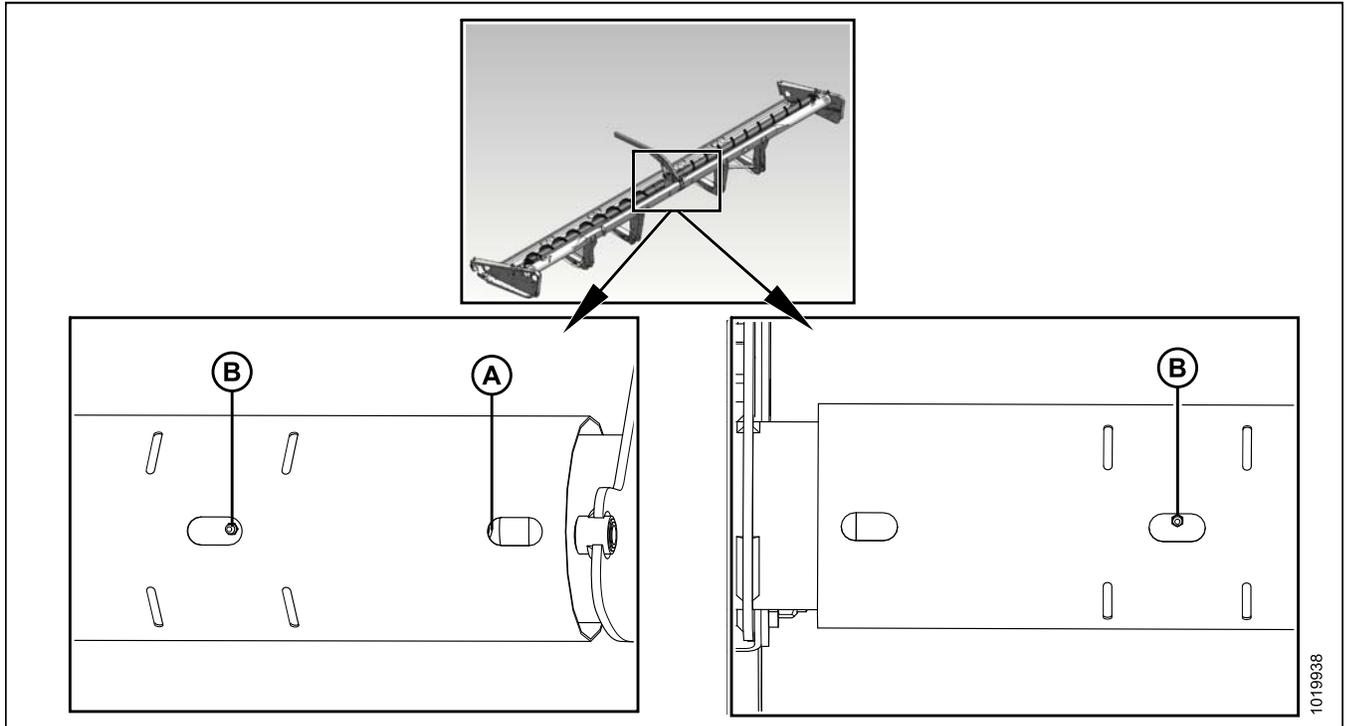
- A - Knife Drive Box (Check Oil Level with Top of Knife Drive Box in Horizontal Position)
- B - Dipstick (Level between Lower Hole and End of Dipstick)
- C - Upper Cross Auger Bearing
- D - Reel Drive Chain
- E - Hydraulic Couplers (Use WD40® or Equivalent)

## MAINTENANCE AND SERVICING

### Every 250 Hours

#### NOTE:

Use High Temperature Extreme Pressure (EP2) Performance with 1% Max Molybdenum Disulphide (NLGI Grade 2) Lithium Base unless otherwise specified.



**Figure 5.10: Every 250 Hours**

A - Upper Cross Auger U-Joint<sup>11</sup>

B - Upper Cross Auger Bearing (Two Places)<sup>12</sup>

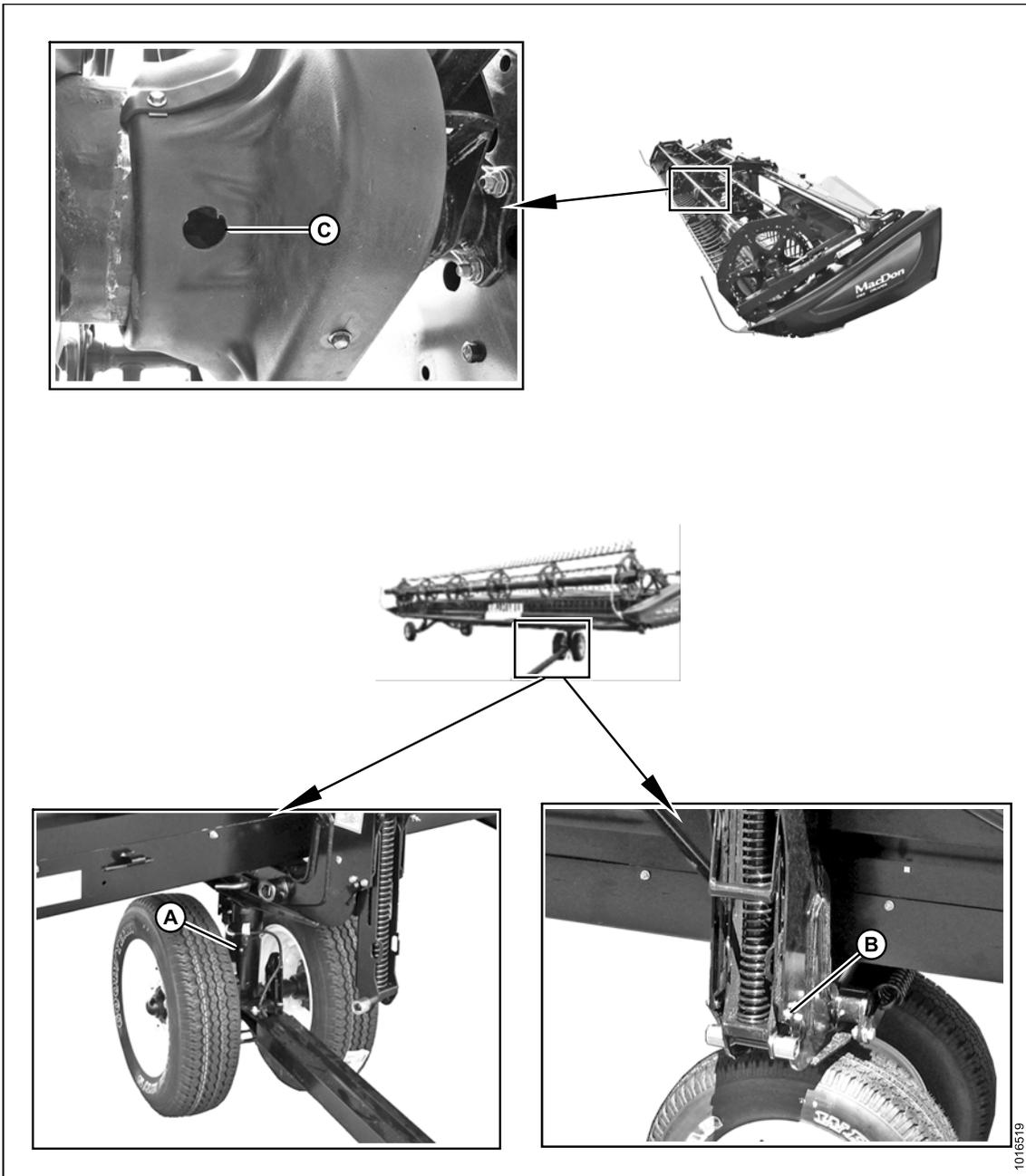
11. U-joint has an extended lubrication cross and bearing kit. Stop greasing when greasing becomes difficult or if U-joint stops taking grease. Overgreasing will damage U-joint. Six to eight pumps are sufficient at first grease (factory). Decrease grease interval as U-joint wears and requires more than six pumps.

12. Use High Temperature Extreme Pressure (EP2) Performance With 1.5–5.0% Molybdenum Disulphide (NLGI Grade 2) Lithium Base Grease.

## MAINTENANCE AND SERVICING

### NOTE:

Use High Temperature Extreme Pressure (EP2) Performance with 1% Max Molybdenum Disulphide (NLGI Grade 2) Lithium Base unless otherwise specified.



**Figure 5.11: Every 250 Hours**

B - Front Wheel Pivot

D - Double Reel U-Joint<sup>13</sup>

C - Frame/Wheel Pivot (Both Sides)

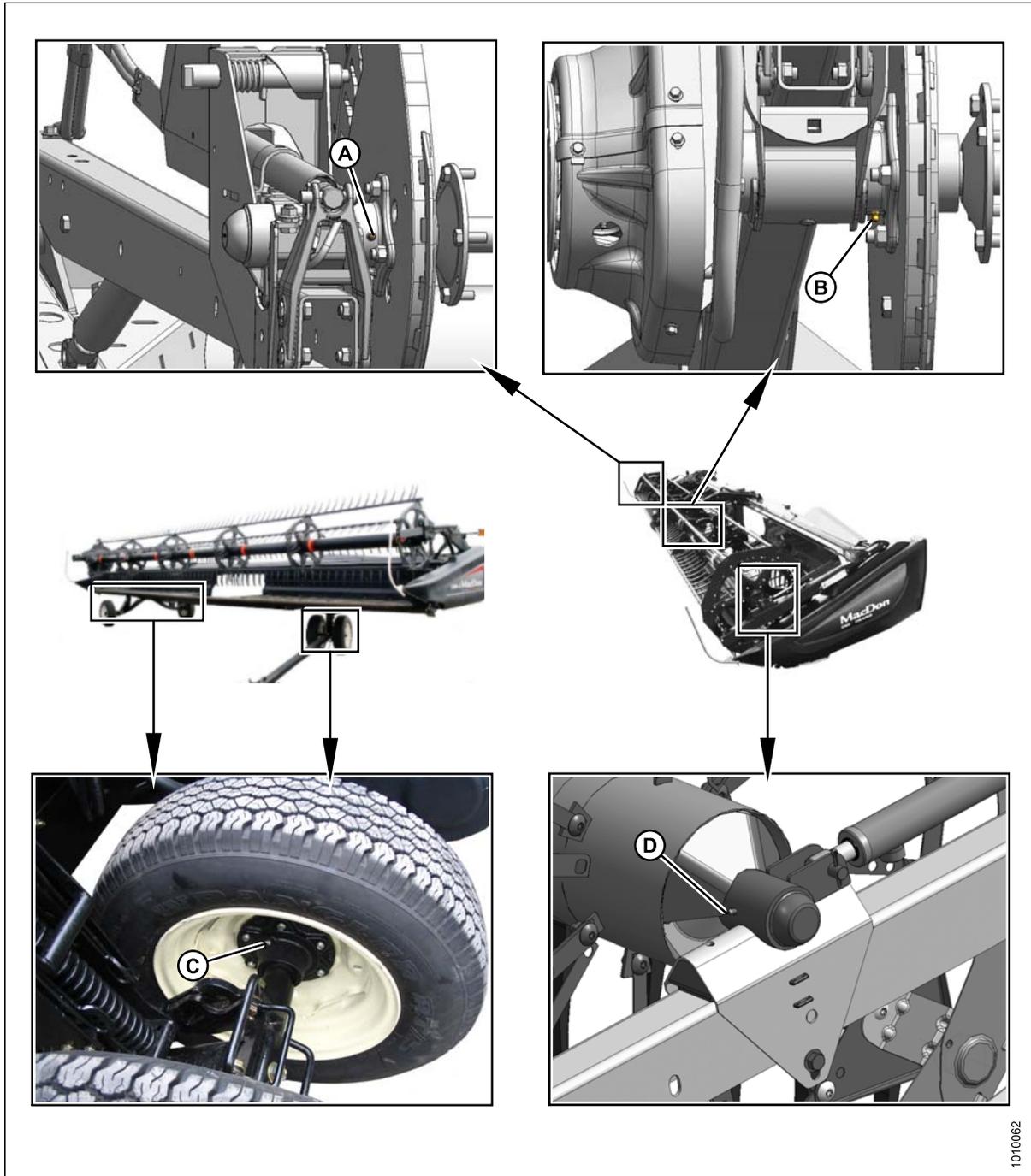
13. U-joint has an extended lubrication cross and bearing kit. Stop greasing when greasing becomes difficult or if U-joint stops taking grease. Overgreasing will damage U-joint. Six to eight pumps are sufficient at first grease (factory). Decrease grease interval as U-joint wears and requires more than six pumps.

# MAINTENANCE AND SERVICING

## Every 500 Hours

### NOTE:

Use High Temperature Extreme Pressure (EP2) Performance with 1% Max Molybdenum Disulphide (NLGI Grade 2) Lithium Base unless otherwise specified.



**Figure 5.12: Every 500 Hours**

A - Reel – Right Side Bearing

B - Reel – Center Bearing

C - Wheel Bearings (Four Places)

D - Reel – Left Bearing

## 5.4 Electrical System

Use electrical tape and wire clips as required to prevent wires from dragging or rubbing.

Keep lights clean and replace defective bulbs.

Electrical wires are identified by a two letter wire location (A), four digit identification number (B), one digit branch wire location (C), one letter for color (D), and two digit wire size (E). The wire identification is printed on each wire covering.

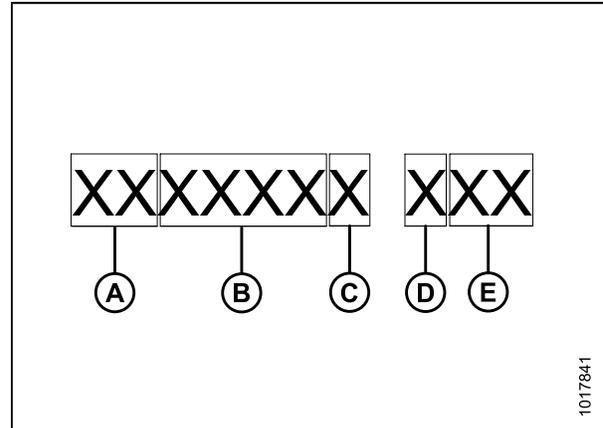


Figure 5.13: Wire Identification

Wire example, CH1234B XXX is located in the chassis harness. The identification number is 1234. The branch wire location is B. This means that there is one splice point before you reach CH1234B.

Table 5.2 Wire Prefix Identification

Wire Prefix	Wire System
DR	Draper speed
DS	Header deck shift
HA	Auger/draper adapter
HR	Reel extend
HT	Transport lights
IDA	Header identification (30 ft)
IDB	Header identification (35 ft)
IDC	Header identification (40/45 ft)
XL	Draper speed (left)
XR	Draper speed (right)

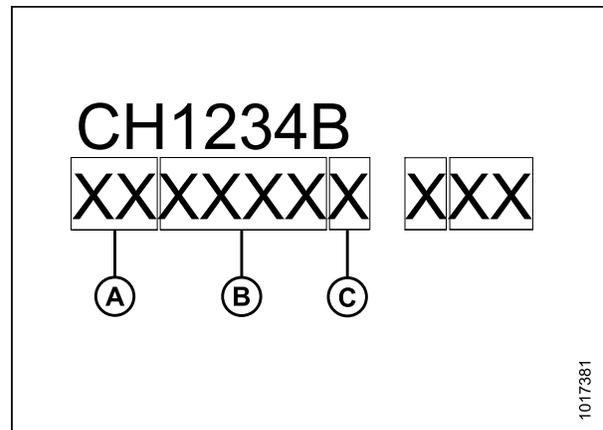


Figure 5.14: Wire Identification

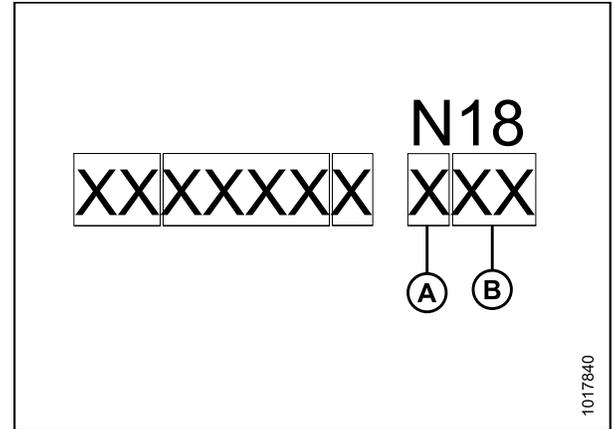
## MAINTENANCE AND SERVICING

Color codes apply to actual wire colors on the windrower. For the color code legend, refer to Table 5.3 *Wire Color Identification*, page 113.

Wire example, XXXXXXXX N18. The wire color is brown and the wire gauge is 18.

**Table 5.3 Wire Color Identification**

ID	Color	Description
B	Black	Black
N	Brown	Brown
DN	Brown	Dark brown
LN	Brown	Light brown
U	Blue	Blue
DU	Blue	Dark blue
LU	Blue	Light blue
G	Green	Green
DG	Green	Dark green
LG	Light green	Light green
P	Purple	Purple
R	Red	Red
W	White	White
Y	Yellow	Yellow
O	Orange	Orange
S	Slate	Slate (gray)
K	Pink	Pink
V	Violet	Violet



**Figure 5.15: Wire Identification**

### 5.4.1 Replacing Light Bulbs

#### **WARNING**

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

## MAINTENANCE AND SERVICING

1. Use a Phillips screwdriver to remove the screws (A) from the fixture, and remove the plastic lens.
2. Replace the bulb, and reinstall the plastic lens and screws.

**NOTE:**

Use bulb trade #1156 for amber transport lights and #1157 for red tail light (Slow Speed Transport option).

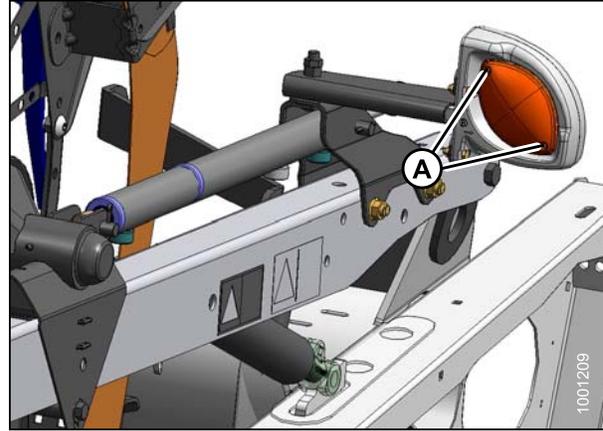


Figure 5.16: Transport Light

### 5.4.2 Checking and Adjusting Reel Height Sensor

The output voltage range of the auto reel height sensor can be checked from inside the windrower or manually at the sensor. For in cab instructions, refer to the windrower operator's manual. To check the voltage range manually, refer to the procedure below.

**⚠ DANGER**

To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.

**⚠ CAUTION**

Check to be sure all bystanders have cleared the area.

**IMPORTANT:**

Ensure reel height is properly set before adjusting reel height sensor. Refer to [Measuring Reel Clearance](#), page 175.

**IMPORTANT:**

To measure the output voltage of the reel height sensor, the windrower needs to be turned ON and supplying power to the sensor. Always engage the combine parking brake to and stay away from the reel.

Table 5.4 Reel Height Sensor Voltage Limits

Power Unit	Voltage Range	
	X Voltage	Y Voltage
M1 Series Windrower	0.5–0.9 V	4.1–4.5 V

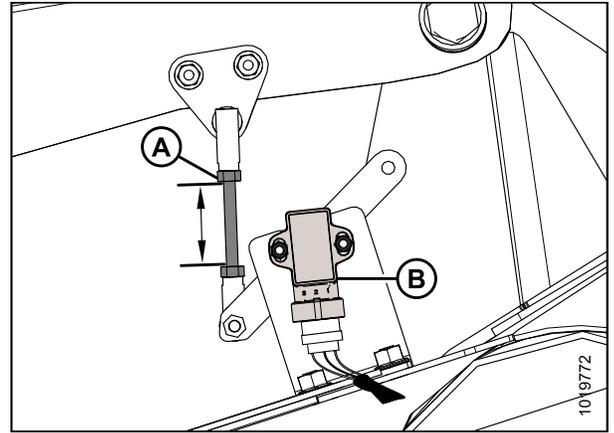
**NOTE:**

For Lexion Combines: To avoid a collision of the reel with the cab, the machine is equipped with an automatic reel height limitation. When raising the header by more than 80 percent, the reel is automatically lowered. The automatic lower of the reel can be overridden manually, and a warning will appear on the CEBIS terminal.

1. Engage the windrower parking brake.
2. Start the windrower engine and lower reel fully.

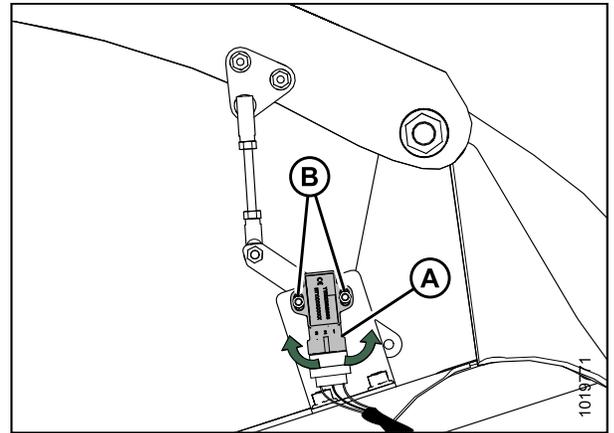
## MAINTENANCE AND SERVICING

3. Use the windrower display or a voltmeter (if measuring the sensor manually), to measure voltage range X. Refer to Table [5.4 Reel Height Sensor Voltage Limits, page 114](#) for range requirements.
4. If using a voltmeter, measure the voltage between the ground (Pin 2 wire) and the signal (Pin 3 wire) at the reel height sensor (B).
5. Stop the windrower engine and remove key.
6. Adjust length of threaded rod (A) to modify voltage range X.
7. Repeat checking and adjusting until voltage range X is within the range specified.



**Figure 5.17: Reel Height Sensor – Right Reel Arm (Reel Down)**

8. Start the windrower engine, and raise the reel fully.
9. Use the windrower display or a voltmeter (if measuring the sensor manually), to measure voltage range Y. Refer to Table [5.4 Reel Height Sensor Voltage Limits, page 114](#) for range requirements.
10. If using a voltmeter, measure the voltage between the ground (Pin 2 wire) and the signal (Pin 3 wire) at the reel height sensor (A).
11. Stop the windrower engine and remove key.
12. Loosen two M5 hex nuts (B) and rotate sensor (A) to achieve voltage range Y.
13. Repeat checking and adjusting until voltage range Y is within the range specified.
14. Start the windrower engine and lower reel fully.
15. Recheck voltage range X and ensure it is still within the range specified. Adjust if required.



**Figure 5.18: Reel Height Sensor – Right Reel Arm (Reel Up)**

## 5.5 Cutterbar

### WARNING

Keep hands clear of the area between guards and knife at all times.

### CAUTION

To avoid personal injury, before servicing machine or opening drive covers, refer to [5.1 Preparing Machine for Servicing, page 97](#).

### CAUTION

Wear heavy gloves when working around or handling knives.

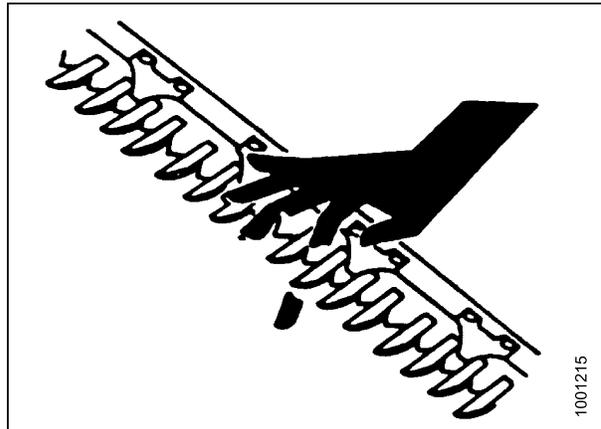


Figure 5.19: Cutterbar Hazard

### 5.5.1 Replacing Knife Section

Inspect the knife sections daily and ensure they are firmly bolted to the knife back and are not worn or damaged (worn and damaged sections leave behind uncut plants). Worn or damaged sections can be replaced without removing the knife from the cutterbar.

### WARNING

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

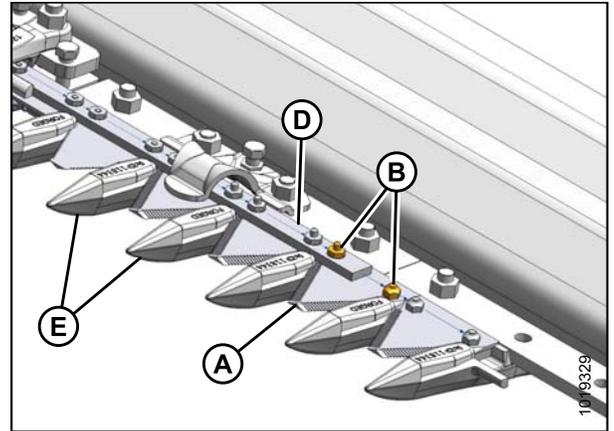
## MAINTENANCE AND SERVICING

1. Shut down the windrower, and remove the key from the ignition.
2. Stroke the knife as required to center the knife section (A) between the guards (E).
3. Remove nuts (B).
4. Remove bars (C) and lift the knife section off the knife bar.
5. Remove the splice bar (D) if knife section is under the bar.
6. Clean dirt off the knife back, and position the new knife section onto the knife back.
7. Reposition bars (C) and/or (D) and install the nuts (B).

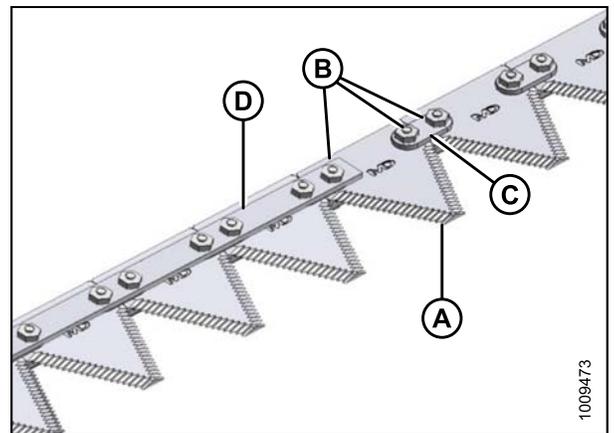
**NOTE:**

If replacing screws, ensure they are fully inserted.  
Do not use nuts to draw screws into the knife bar.

8. Torque nuts to 9.5 N·m (7 ft·lbf).



**Figure 5.20: Cutterbar**



**Figure 5.21: Cutterbar**

## 5.5.2 Removing Knife

### WARNING

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

### WARNING

Stand to rear of knife during removal to reduce risk of injury from cutting edges. Wear heavy gloves when handling knife.

1. Shut down the windrower, and remove the key from the ignition.
2. Stroke the knife manually to its outer limit.
3. Clean the area around the knifehead.
4. Remove the grease zerk (B) from the pin.
5. Remove bolt (A).
6. Use a screwdriver or chisel in slot (C) to release the load on the knifehead pin.
7. Use a screwdriver or chisel to pry the pin upwards in the pin groove until the pin is clear of the knifehead.
8. Push the knife assembly inboard until it is clear of the output arm.
9. Seal the knifehead bearing with plastic or tape unless it is being replaced.
10. Wrap a chain around the knifehead and pull out the knife.

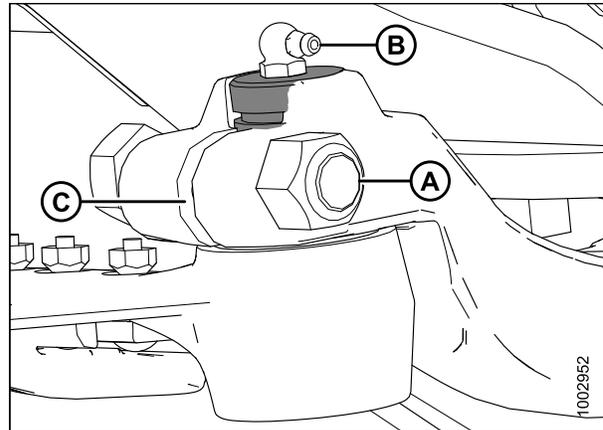


Figure 5.22: Knifehead

## 5.5.3 Removing Knifehead Bearing

### WARNING

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

### WARNING

Stand to rear of knife during removal to reduce risk of injury from cutting edges. Wear heavy gloves when handling knife.

#### IMPORTANT:

Repeat this procedure for each knife.

## MAINTENANCE AND SERVICING

1. Shut down the windrower, and remove the key from the ignition.
2. Remove the knife. Refer to [5.5.2 Removing Knife, page 118](#).

**NOTE:**

Because the bearing is being replaced, it is not necessary to wrap the knifehead to protect the bearing.

3. Use a flat-ended tool with the same approximate diameter as the pin (A). Tap the seal (B), bearing (C), plug (D), and O-ring (E) from the underside of the knifehead.

**NOTE:**

Seal (B) can be replaced without removing the bearing. When changing the seal, check the pin and needle bearing for wear and replace if necessary.

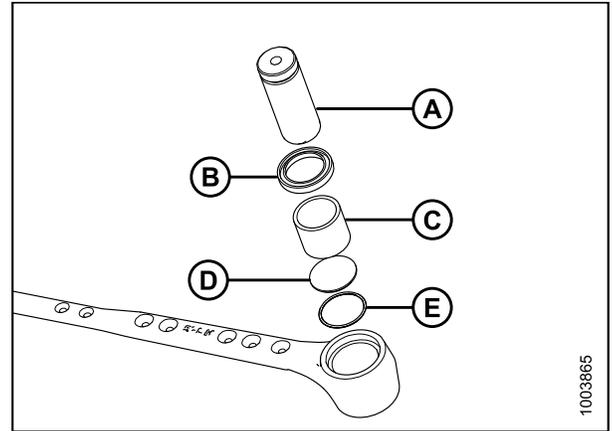


Figure 5.23: Knifehead Bearing Assembly

### 5.5.4 Installing Knifehead Bearing

1. Place O-ring (E) and plug (D) into knifehead.

**IMPORTANT:**

Install the bearing with the stamped end (the end with the identification markings) facing up.

2. Use a flat-ended tool (A) with the same approximate diameter as the bearing (C), and push the bearing into the knifehead until the top of the bearing is flush with the step in the knifehead.
3. Install seal (B) into knifehead with the lip facing outwards.

**IMPORTANT:**

To prevent premature knifehead or knife drive box failure, ensure there's a tight fit between the knifehead pin and the needle bearing, and also between the knifehead pin and the output arm.

4. Install the knife. Refer to [5.5.5 Installing Knife, page 119](#).

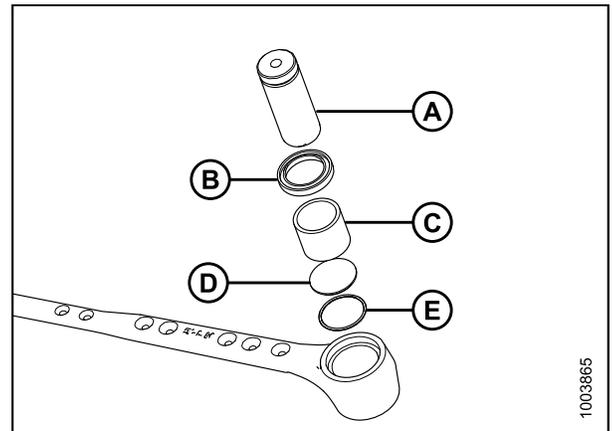


Figure 5.24: Knifehead Bearing Assembly

### 5.5.5 Installing Knife



**WARNING**

Stand to rear of knife during installation to reduce risk of injury from cutting edges. Wear heavy gloves when handling knife.

## MAINTENANCE AND SERVICING

1. Slide the knife into place and align the knifehead with the output arm.

### NOTE:

Remove the grease zerk from the knifehead pin for easier installation of knifehead pin.

2. Install the knifehead pin (A) through the output arm (C) and into the knifehead.
3. Set the groove (B) in the knifehead pin 1.5 mm (1/16 in.) above the output arm (C). Secure with 5/8 x 3 in. hex head bolt and nut (D), and torque to 217 N·m (160 ft·lbf).

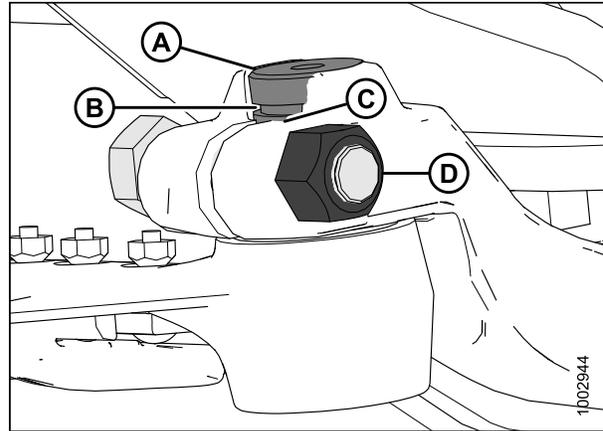


Figure 5.25: Knifehead

4. Install the grease zerk (A) into the knifehead pin, and turn the grease zerk for easy access.

### IMPORTANT:

Slowly apply grease to the knifehead until slight downward movement of the knifehead is observed. Do **NOT** overgrease the knifehead. Overgreasing leads to knife misalignment causing excessive heating of guards and overloading of drive systems. If overgreasing occurs, remove the grease zerk to release pressure.

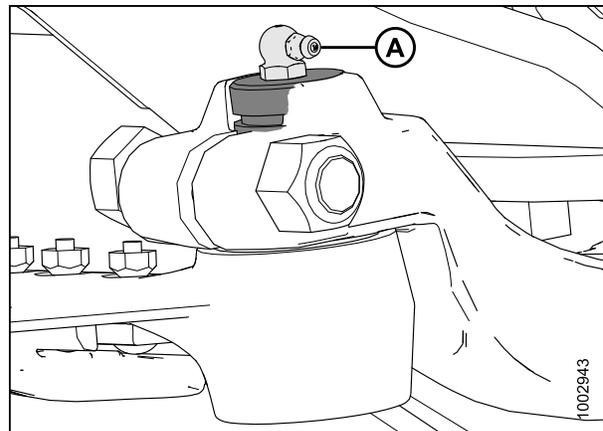


Figure 5.26: Knifehead

### 5.5.6 Spare Knife

A spare knife can be stored in the header frame tube (A) at the left end. Ensure the spare knife is secured in place.

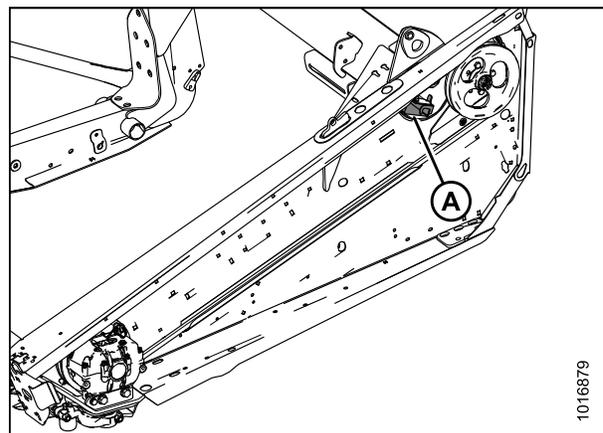


Figure 5.27: Spare Knife

### 5.5.7 Knife Guards

Perform **DAILY** inspections to ensure the knife guards are aligned and the knife sections are contacting the shear surfaces of the knife guards.

### Adjusting Knife Guards

#### **WARNING**

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

#### **NOTE:**

Use guard straightening tool (MD #140135) available from your MacDon Dealer.

1. Position the tool as shown, and pull up to adjust the guard tips upwards.



Figure 5.28: Upward Adjustment

2. Position the tool as shown, and push down to adjust the guard tips downwards.

#### **TIP:**

If material is tough to cut, install stub guards with top guard and adjuster plate. A kit is available from your MacDon Dealer. Refer to [6.2.1 Stub Guard Conversion Kit, page 217](#).

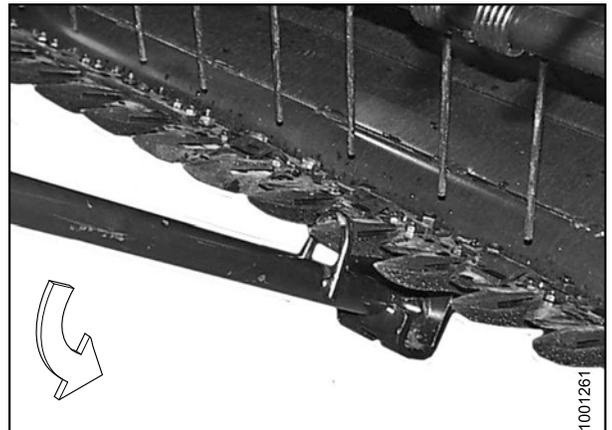


Figure 5.29: Downward Adjustment

### Replacing Pointed Guards

#### **WARNING**

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

## MAINTENANCE AND SERVICING

### Replacing normal and drive side guard

1. Shut down the windrower, and remove the key from the ignition.
2. Stroke the knife manually until the knife sections are spaced midway between the guards.
3. Remove two nuts (B) and bolts attaching the guard (A) and hold-down (C) (if applicable) to the cutterbar.
4. Remove the guard (A), hold-down (C), and plastic wearplate (if installed).

### IMPORTANT:

The first four outboard guards (B) on the drive sides of the header do not have ledger plates. Ensure proper replacement guards are installed at these locations.

5. Position the new guard (A), hold-down (C), and plastic wear plate (if applicable) onto the cutterbar. Secure with two nuts (B) and bolts, but do **NOT** tighten.
6. Check and adjust the clearance between the hold-downs and the knife. Refer to [Checking Knife Hold-Downs, page 125](#).

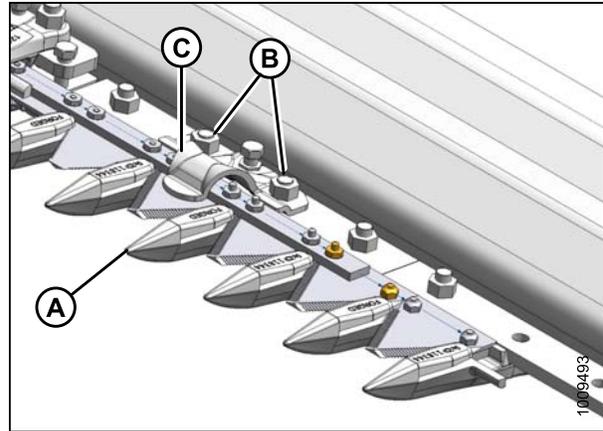


Figure 5.30: Pointed Guards

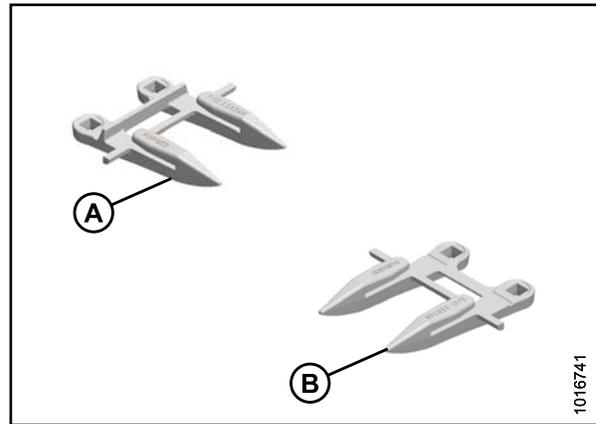


Figure 5.31: Pointed Guards

A - Normal

B - Drive Side

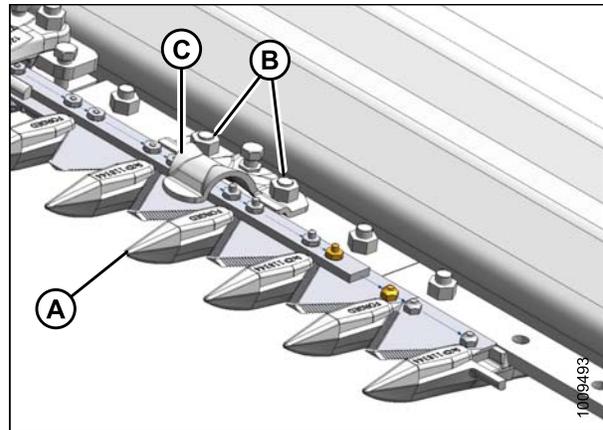


Figure 5.32: Pointed Guards

**Replacing center guard**

**NOTE:**

The guard at the center of a double-knife header (where the two knives overlap) requires a slightly different replacement procedure.

1. Shut down the windrower, and remove the key from the ignition.
2. Remove the two nuts (B) and bolts attaching the guard (A) and top guide (C) to the cutterbar.
3. Remove the guard (A), plastic wear plate (if installed), top guide (C), and adjuster bar (D).
4. Position the plastic wear plate (if applicable), replacement center guard (A), adjuster bar, and top guide (B) onto the cutterbar. Install bolts, but do **NOT** tighten.

**IMPORTANT:**

Ensure the center guard (A) (right of the cutterbar split) has offset cutting surfaces.

**NOTE:**

The top guide (B) must accommodate the two overlapping knives at the center guard location. Ensure the proper replacement guard is installed at this location.

5. Check and adjust the clearance between the hold-down and knife. Refer to [Checking Knife Hold-Downs, page 125](#).

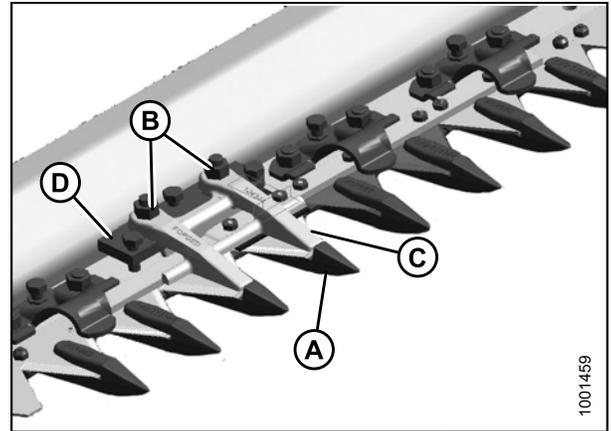


Figure 5.33: Center Guards

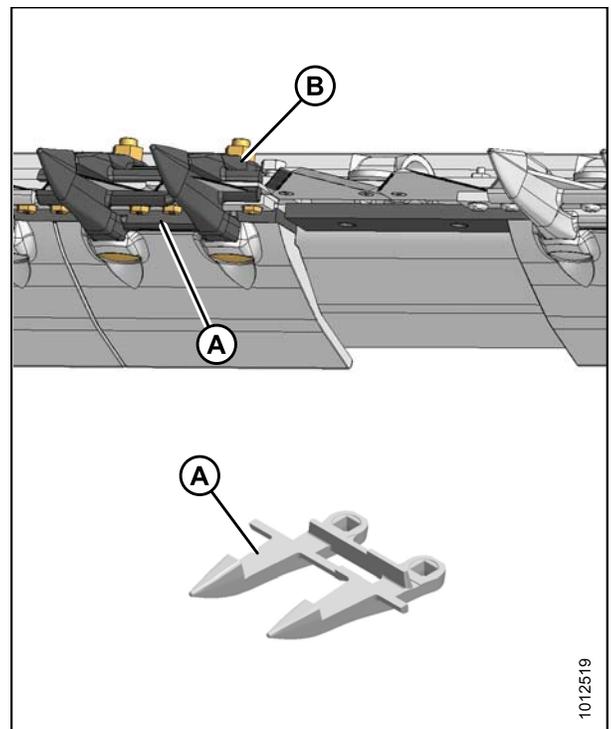


Figure 5.34: Center Guards

**Replacing Stub Guards**

Stub guards, complete with top guides and adjuster plates, are designed to cut tough crops and are factory-installed at the outer ends of specific headers.

**⚠ WARNING**

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

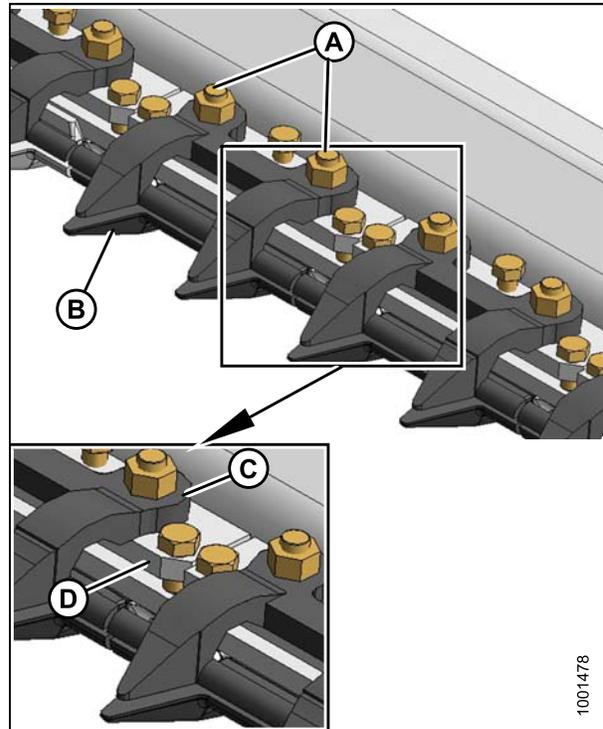
## MAINTENANCE AND SERVICING

### **Replacing normal, drive side, and end guard**

1. Shut down the windrower, and remove the key from the ignition.
2. Stroke the knife manually until the knife sections are spaced midway between the guards.
3. Remove the two nuts (A) and bolts attaching the guard (B) and top guide (C) to the cutterbar.
4. Remove the guard (B), plastic wear plate (if installed), top guide (C), and adjuster bar (D).

#### **IMPORTANT:**

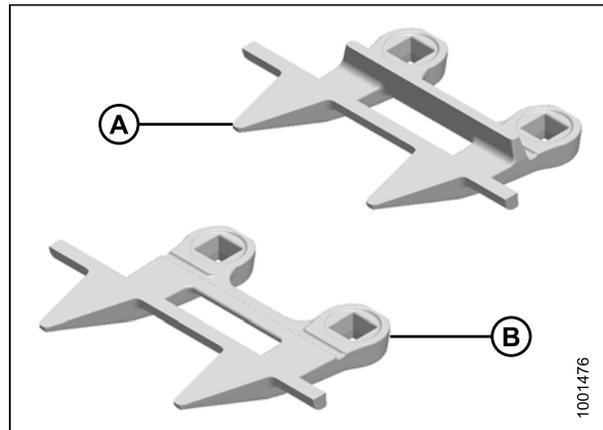
Note the position of the mitre on the adjuster bar (D), and reinstall the adjuster bar in the same position. Mitres should not be adjacent to each other.



**Figure 5.35: Stub Guards**

#### **IMPORTANT:**

The first four outboard guards (B) on the drive sides of the header do not have ledger plates. Ensure the proper replacement guards are installed at these locations.



**Figure 5.36: Stub Guards**

A - Normal Guard

B - Drive Side Guard

## MAINTENANCE AND SERVICING

5. Position the plastic wear plate (if applicable), replacement guard (B), adjuster bar (D), top guide (C), and install bolts and nuts (A). Do **NOT** tighten.
6. Check and adjust the clearance between the hold-downs and the knife. Refer to [Checking Knife Hold-Downs, page 125](#).

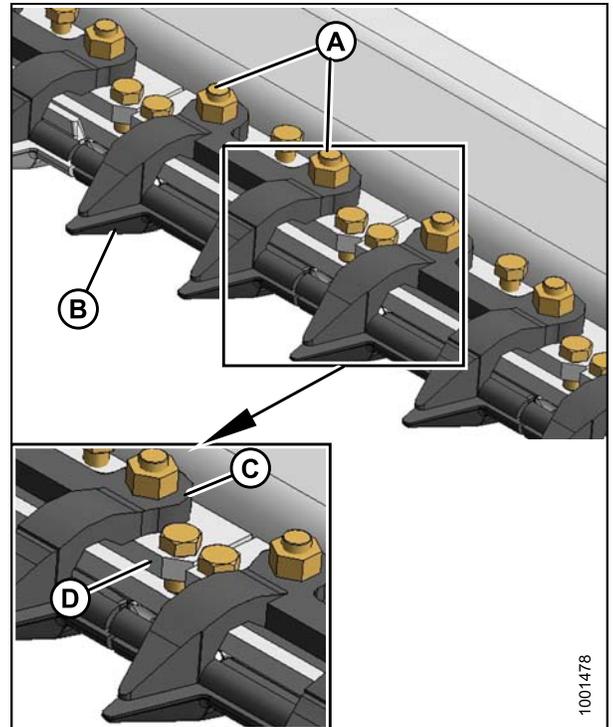


Figure 5.37: Stub Guards

### Checking Knife Hold-Downs

Perform daily inspections to ensure the knife hold-downs are preventing the knife sections from lifting off the guards while permitting the knife to slide without binding. Use a feeler gauge to measure the clearance between the hold-downs and knife sections and refer to the following for adjustment procedures:

- [Adjusting Hold-Downs with Pointed Guards, page 125](#)
- [Adjusting Hold-Downs with Stub Guards, page 126](#)

#### NOTE:

Align guards prior to adjusting the hold-downs. Refer to [Adjusting Knife Guards, page 121](#).

### Adjusting Hold-Downs with Pointed Guards

#### **WARNING**

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

## MAINTENANCE AND SERVICING

1. Shut down the windrower, and remove the key from the ignition.
2. Use a feeler gauge to measure the clearance between the normal guard hold-down (A) and the knife section. Ensure the clearance is 0.1–0.6 mm (0.004–0.024 in.).
3. To lower the front of the hold-down and decrease clearance, turn bolt (B) clockwise; to raise the front of the hold-down and increase clearance, turn bolt (B) counterclockwise.

### NOTE:

For larger adjustments, it may be necessary to loosen nuts (C), turn adjuster bolt (B), and then retighten nuts.

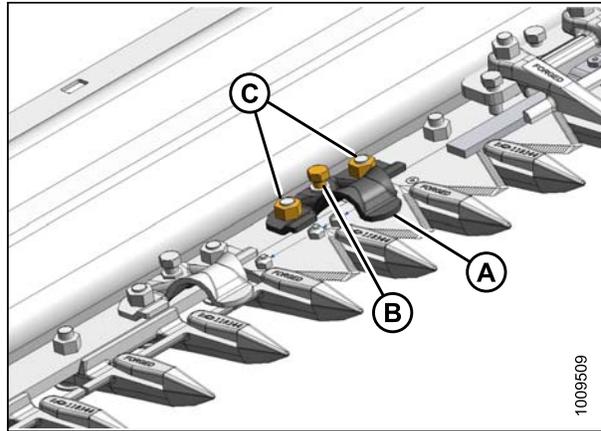


Figure 5.38: Normal Guard Hold-Down

4. Use a feeler gauge to measure the clearance between the center guard hold-down (A) and the knife section. Ensure the clearance is between the following measurements:
  - **At guide tip (B):** 0.1–0.4 mm (0.004–0.016 in.)
  - **At rear of guide (C):** 0.1–1.0 mm (0.004–0.040 in.)
5. Adjust the clearance as follows:
  - a. Tighten nuts (D) until they are finger tight.
  - b. Turn the three adjuster bolts (E) clockwise to raise the front of the hold-down and increase clearance, or counterclockwise to lower the front of the hold-down and decrease clearance.
  - c. Torque the nuts (D) to 72 N·m (53 ft·lbf) after all the adjustments are complete and the specified clearances are achieved.

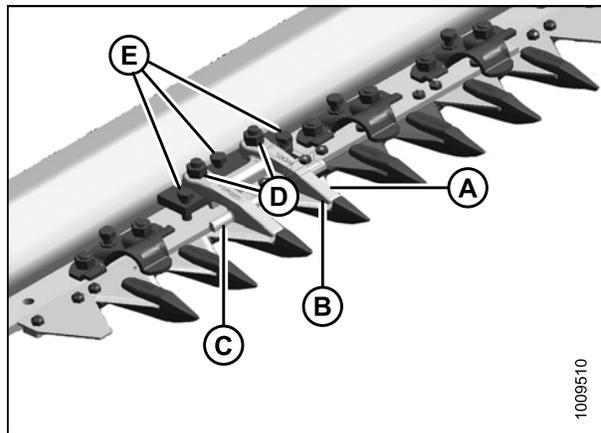


Figure 5.39: Center Guard Hold-Down

## WARNING

Check to be sure all bystanders have cleared the area.

6. Complete the hold-down adjustments, run the header at low engine speed, and listen for noise caused by insufficient clearance.

### NOTE:

Insufficient hold-down clearance will result in overheating of the knife and guards—readjust as necessary.

### Adjusting Hold-Downs with Stub Guards

## WARNING

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

## MAINTENANCE AND SERVICING

1. Shut down the windrower, and remove the key from the ignition.
2. Use a feeler gauge to measure the clearance between the stub guard hold-down (A) and the knife section. Ensure the clearance is between the following measurements:
  - **At guide tip (B):** 0.1–0.4 mm (0.004–0.016 in.)
  - **At rear of guide (C):** 0.1–1.0 mm (0.004–0.040 in.)
3. Adjust the clearance as follows:
  - a. Tighten nuts (D) until they are finger tight.
  - b. To lower the front of the hold-down and decrease clearance, turn the three adjuster bolts (E) clockwise; to raise the front of the hold-down and increase clearance, turn the adjuster bolts (E) counterclockwise.
  - c. Torque the nuts (D) to 72 N·m (53 ft·lbf) after all the adjustments are complete and the specified clearances are achieved.

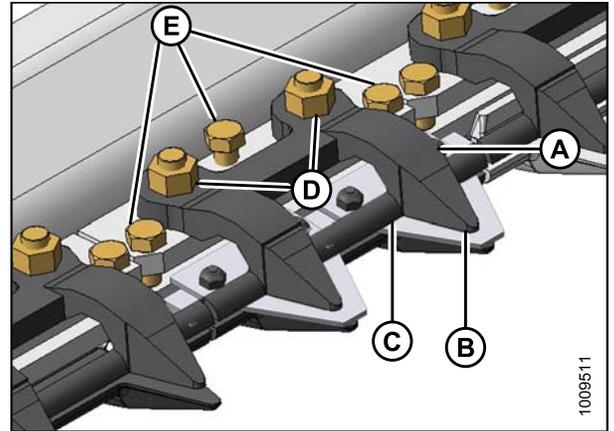


Figure 5.40: Stub Guards

### **WARNING**

**Check to be sure all bystanders have cleared the area.**

4. Complete the hold-down adjustments, run the header at low engine speed, and listen for noise caused by insufficient clearance.

#### **NOTE:**

Insufficient hold-down clearance will result in overheating of the knife and guards—readjust as necessary.

### 5.5.8 Knifehead Shield

The knifehead shield attaches to the endsheet and reduces the knifehead opening to prevent cut crop from accumulating in the knifehead cut-out.

The shields and mounting hardware are available from your MacDon Dealer.

#### **IMPORTANT:**

Remove the shields when cutting with the cutterbar on the ground in muddy conditions. Mud may pack into the cavity behind the shield which could result in knife drive box failure.

### *Installing Knifehead Shield*

The knifehead shield is supplied in flattened form, but it can be bent to suit installation on pointed or stub guard cutterbars. Knifehead shields differ slightly depending on header size and guard configuration, so ensure you are using the proper knifehead shield for your header. Refer to your parts catalog for proper replacement parts.

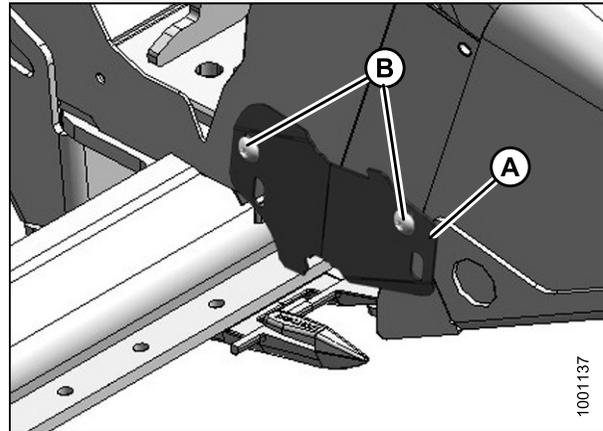
#### **⚠ DANGER**

To avoid bodily injury or death from unexpected start-up or fall of raised machine, always stop engine, remove key, and engage safety props before going under header for any reason.

#### **⚠ CAUTION**

Wear heavy gloves when working around or handling knives.

1. Raise the reel to its full height, lower the header to the ground.
2. Shut down the engine, and remove the key from the ignition.
3. Engage the reel arm locks.
4. Place the knifehead shield (A) against the endsheet as shown. Align the shield so the cutout matches the profile of the knifehead and/or hold-downs.
5. Bend the knifehead shield (A) along the slit to conform to the endsheet.
6. Align the mounting holes and secure with two 3/8 x 1/2 in. Torx® head bolts (B).
7. Tighten the bolts (B) just enough to hold the knifehead shield (A) in place while allowing it to be adjusted as close to the knifehead as possible.
8. Rotate the knife drive box pulley manually to move the knife and check for areas of contact between the knifehead and knifehead shield (A). Adjust the shield to eliminate interference with the knife if necessary.
9. Tighten the bolts (B).



**Figure 5.41: Knifehead Shield**

## 5.6 Knife Drive System

### 5.6.1 Knife Drive Box

#### CAUTION

To avoid personal injury, before servicing machine or opening drive covers, refer to [5.1 Preparing Machine for Servicing, page 97](#).

Double-knife headers have a knife drive box at each end. Knife drive boxes are belt driven by a hydraulic motor, and convert rotational motion into the reciprocating motion of the knife.

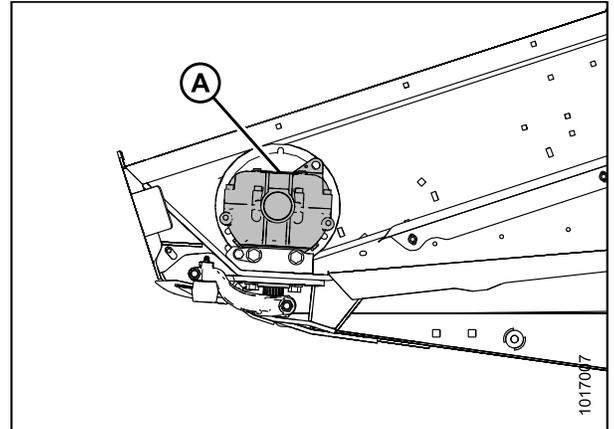


Figure 5.42: Left Side Knife Drive Box Shown – Right Side Similar

#### *Checking Mounting Bolts*

Check the torque on the four knife drive box mounting bolts (A) and (B) after the first 10 hours operation and every 100 hours thereafter.

1. Torque the side bolts (A) first, then torque the bottom bolts (B). Torque all bolts to 271 N·m (200 ft·lbf).

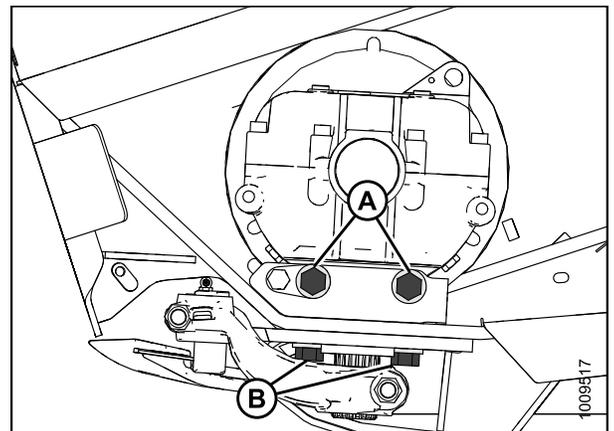


Figure 5.43: Knife Drive Box

#### *Removing Knife Drive Box*

#### WARNING

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

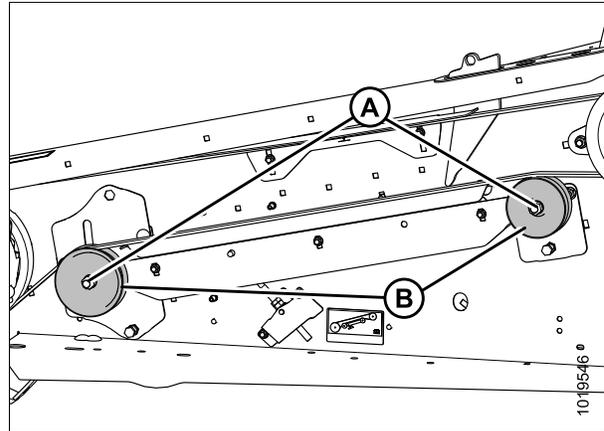
## MAINTENANCE AND SERVICING

### *For timed double-knife headers:*

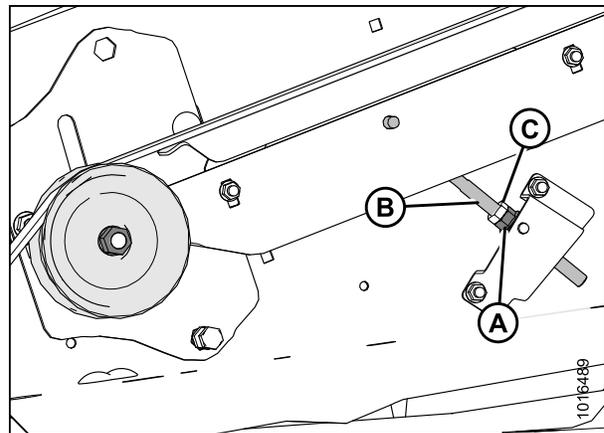
#### **NOTE:**

The procedure is the same for both ends of a timed double-knife header. Images shown are for the left end—the right end is opposite.

1. Shut down the windrower, and remove the key from the ignition.
2. Open the endshield. Refer to [Opening Endshields, page 31](#).
3. Loosen the two nuts (A) enough to allow the idler pulleys (B) to pivot.
4. Loosen the jam nut (C).
5. Turn flange nut (A) counterclockwise on adjuster bolt (B) to relieve knife drive belt tension.
6. Proceed to Step [12., page 131](#).



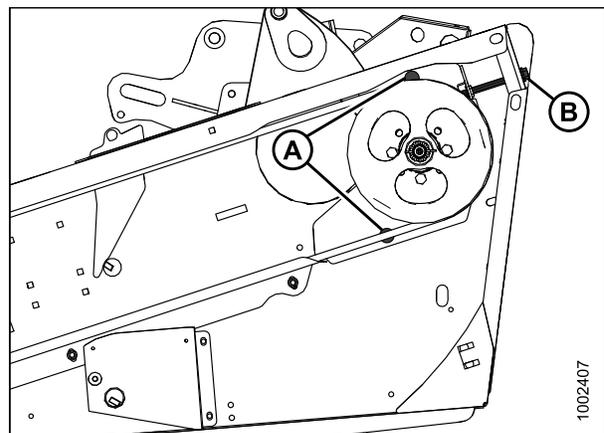
**Figure 5.44: Timed Double-Knife Drive**



**Figure 5.45: Timed Double-Knife Drive**

### *For non-timed double-knife headers:*

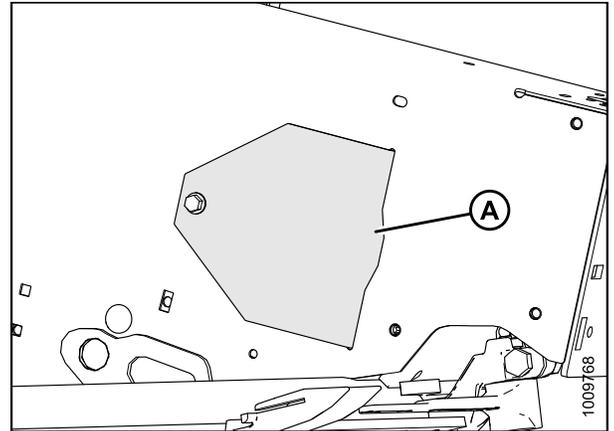
7. Shut down the windrower, and remove the key from the ignition.
8. Open the endshield. Refer to [Opening Endshields, page 31](#).
9. Loosen the two bolts (A) securing the motor assembly to the header endsheet.
10. Loosen the belt tension by turning the tensioning bolt (B) counterclockwise.
11. Proceed to Step [12., page 131](#).



**Figure 5.46: Non-Timed Double-Knife Drive**

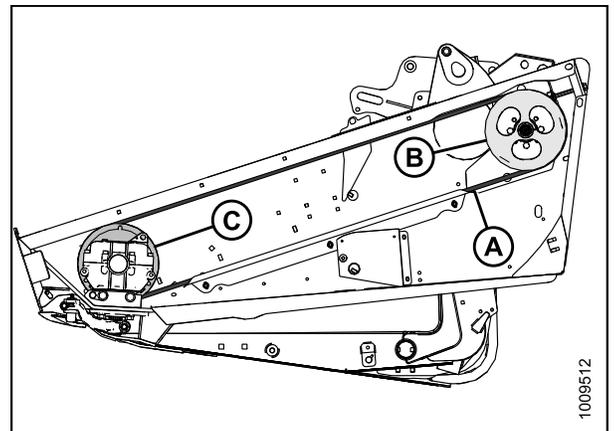
## MAINTENANCE AND SERVICING

12. To provide clearance between the knife drive box pulley and the endsheet, open the access cover (A) on the endsheet behind the cutterbar.



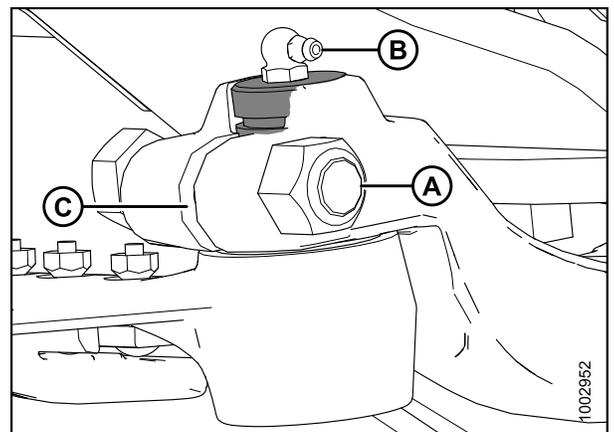
**Figure 5.47: Access Cover**

13. Remove the belt (A) from the drive pulley (B).
14. Slip the belt (A) over and behind the knife drive box pulley (C). Use the notch in the pulley to assist with belt removal.



**Figure 5.48: Knife Drive**

15. Stroke the knife manually to its outer limit.
16. Clean the area around the knifehead.
17. Remove the grease zerk (B) from the pin.
18. Remove bolt (A).
19. Use a screwdriver or chisel in slot (C) to release the load on the knifehead pin.
20. Use a screwdriver or chisel to pry the pin upwards in the pin groove until the pin is clear of the knifehead.
21. Push the knife assembly inboard until it is clear of the output arm.
22. Seal the knifehead bearing with plastic or tape unless it is being replaced.



**Figure 5.49: Knifehead**

## MAINTENANCE AND SERVICING

23. Remove the bolt (A) that clamps the knife drive arm to the knife drive box output shaft.
24. Remove the knife drive arm (B) from the knife drive box output shaft.
25. Remove the four knife drive box mounting bolts (C) and (D).

### NOTE:

Do **NOT** remove bolt (E); it is factory-set to properly position the knife drive box in the correct fore-aft position.

### CAUTION

Knife drive box with pulley weighs over 35 kg (65 lb.). Use care when removing or installing. Lug (L) can be used for lifting.

26. Repeat procedure for the opposite end of the header.

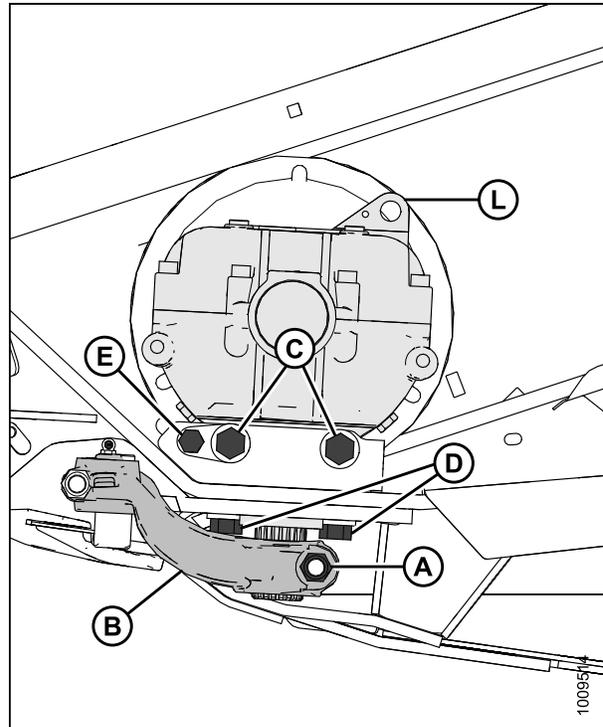


Figure 5.50: Knife Drive Box

### *Removing Knife Drive Box Pulley*

Before removing the knife drive box pulley, remove the knife drive box from the header. Refer to [Removing Knife Drive Box, page 129](#).

1. Loosen and remove the knife drive box pulley clamping bolt (A) and nut (B).
2. Remove the knife drive box pulley (C) using a three-jaw puller.

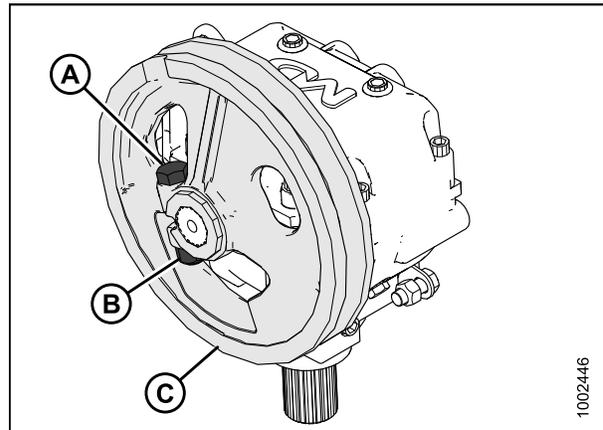


Figure 5.51: Knife Drive Box and Pulley

### *Installing Knife Drive Box Pulley*

Before removing the knife drive box pulley, remove the knife drive box from the header. Refer to [Removing Knife Drive Box, page 129](#).

## MAINTENANCE AND SERVICING

1. Ensure the splines and bores in the pulley and drive arm are free of paint, oil, and solvents.
2. Apply two bands (A) of Loctite® #243 adhesive (or equivalent) around the shaft as shown. Apply one band at the end of the spline and the second band in the middle.
3. Install the pulley (B) until flush with the end of the shaft.
4. Secure the pulley with 5/8 x 3 in. hex head bolt with distorted thread NC lock nut and torque to 217 N·m (160 ft·lbf).

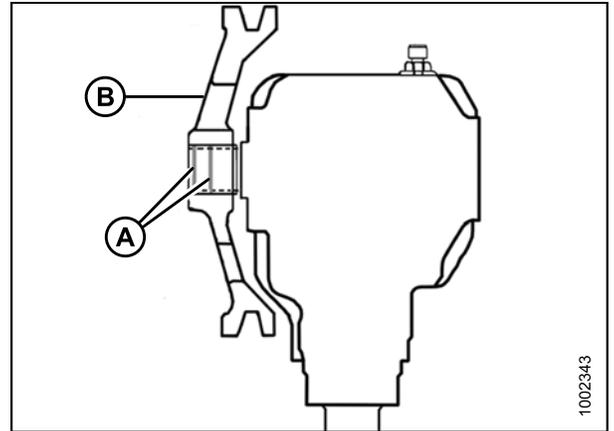


Figure 5.52: Knife Drive Box

### Installing Knife Drive Box

#### NOTE:

If the pulley was removed from the knife drive box, refer to [Installing Knife Drive Box Pulley, page 132](#). If the pulley was **NOT** removed, proceed to Step 1., [page 133](#).

#### CAUTION

**Knife drive box with pulley weighs over 35 kg (65 lb.). Use care when removing or installing. Lug (L) can be used for lifting.**

1. Position the knife drive box onto the header mount and install the belt onto the pulley.
2. Secure the knife drive box to the frame using two 5/8 x 1-3/4 in. grade 8 hex head bolts (A) on the side and two 5/8 x 2-1/4 in. grade 8 hex head bolts (B) on the bottom.
3. Tighten the knife drive box side bolts (A) slightly, then tighten the bottom bolts (B) to ensure proper contact with the vertical and horizontal mounting surfaces. Do **NOT** torque the bolts at this time.

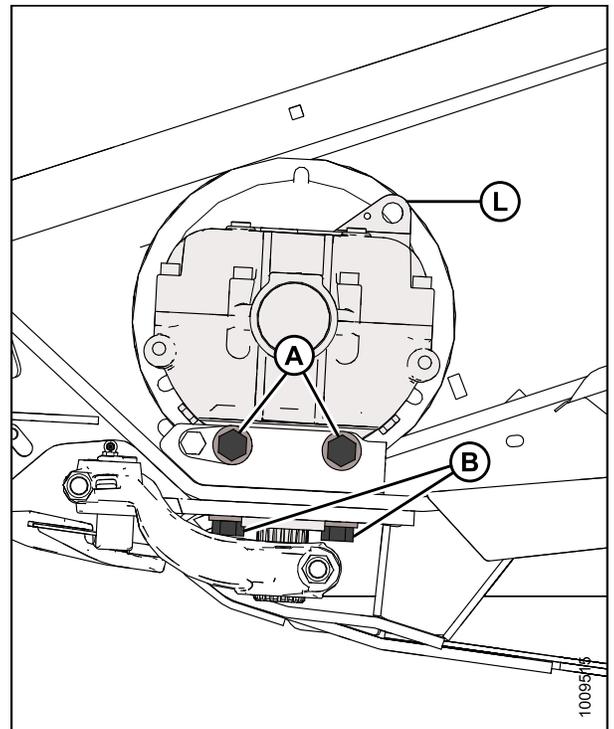


Figure 5.53: Knife Drive Box

## MAINTENANCE AND SERVICING

4. Apply two bands (A) of Loctite® #243 (or equivalent) to the output shaft as shown. Apply one band at the end of the output shaft and the second band in the middle.
5. Slide the output arm (B) onto the output shaft. Rotate the pulley to ensure the splines are properly aligned and the drive arm clears the frame on the inboard stroke.

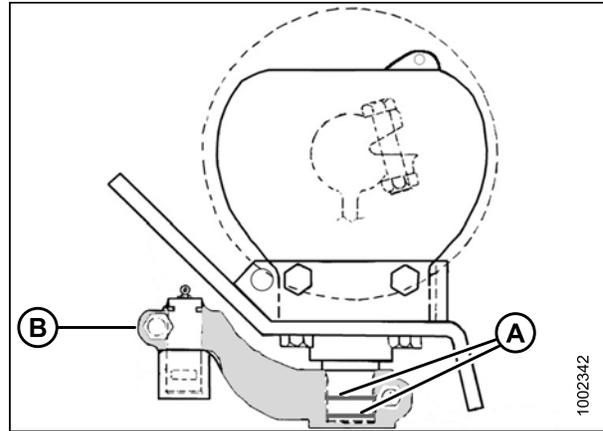


Figure 5.54: Knife Drive Box

6. Position the output arm (A) to the farthest outboard position. Move the output arm (A) up or down on the splined shaft until it is almost contacting the knifehead (B) (exact clearance [C] is set during the knifehead pin installation).

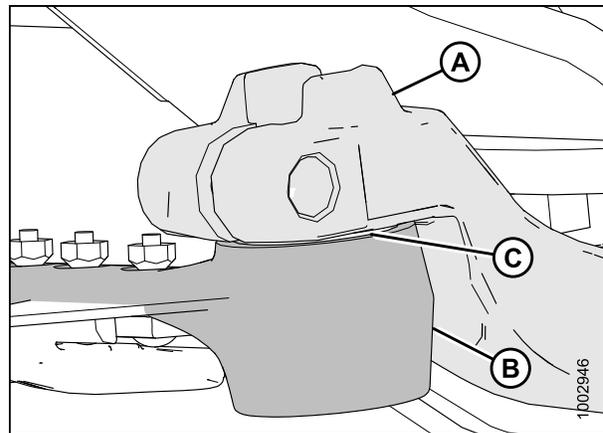


Figure 5.55: Knifehead

7. Torque the output arm bolt (B) to 217 N·m (160 ft·lbf).

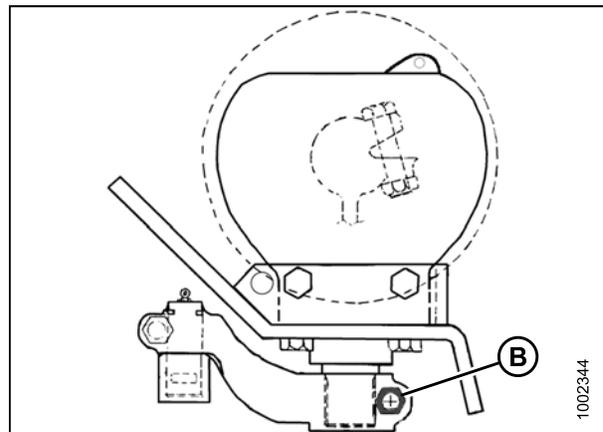


Figure 5.56: Knife Drive Box

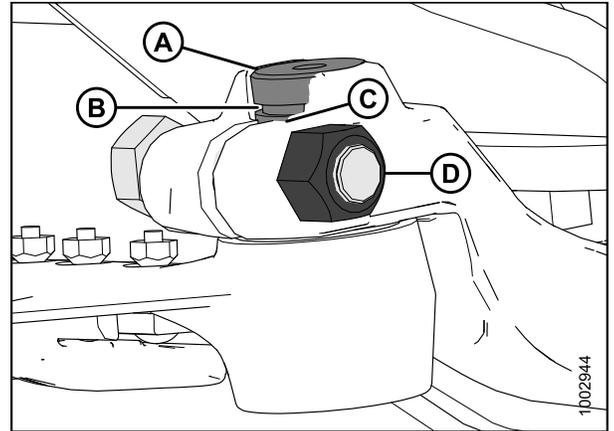
## MAINTENANCE AND SERVICING

- Slide the knife into place and align the knifehead with the output arm.

**NOTE:**

Remove the grease zerk from the knifehead pin for easier installation of knifehead pin.

- Install the knifehead pin (A) through the output arm (C) and into the knifehead.
- Set the groove (B) in the knifehead pin 1.5 mm (1/16 in.) above the output arm (C). Secure with 5/8 x 3 in. hex head bolt and nut (D), and torque to 217 N·m (160 ft·lbf).

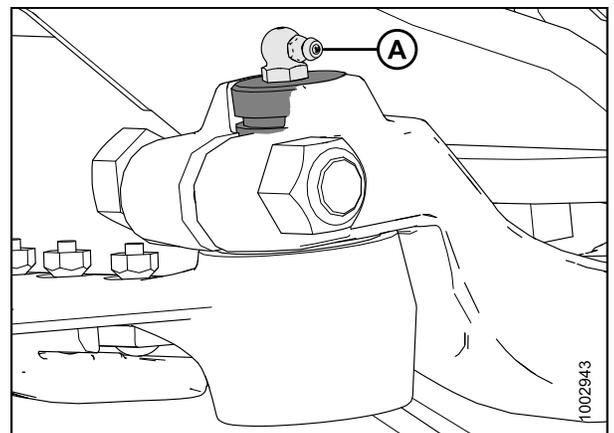


**Figure 5.57: Knifehead**

- Install the grease zerk (A) into the knifehead pin, and turn the grease zerk for easy access.

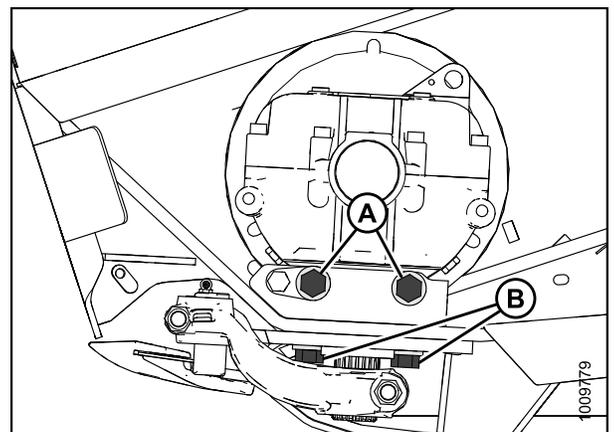
**IMPORTANT:**

Slowly apply grease to the knifehead until slight downward movement of the knifehead is observed. Do **NOT** overgrease the knifehead. Overgreasing leads to knife misalignment causing excessive heating of guards and overloading of drive systems. If overgreasing occurs, remove the grease zerk to release pressure.



**Figure 5.58: Knifehead**

- Check the alignment of the knife drive box pulley and the drive pulley. If pulleys require adjustment, contact your MacDon Dealer.
- Tighten the knife drive box side bolts (A) first, then tighten the bottom bolts (B). Torque to 271 N·m (200 ft·lbf).
- Move the output arm to the mid-stroke position, and ensure the knife bar doesn't contact the front of the first guard. If the knife drive box requires adjustment, contact your MacDon Dealer.
- Install and tension the knife drive belts. For non-timed belts refer to [Tensioning Non-Timed Knife Drive Belts, page 141](#), for timed belts refer to [Tensioning Timed Knife Drive Belts, page 147](#). For timed double-knife headers, also check the knife timing, refer to [Adjusting Double-Knife Timing, page 149](#).
- Close the endshield. Refer to [Closing Endshields, page 32](#).



**Figure 5.59: Knife Drive Box**

## MAINTENANCE AND SERVICING

### Adjusting Knife Drive Box Squareness

1. Place a straight edge (A) along the face of the knife drive box pulley (B) and measure a distance of 1000 mm (39-3/8 in.) between points (C) and (D).
2. Measure the distance (E) between the straightedge and endsheet at each point (C) and (D). Check that the measurements at (C) and (D) are within a tolerance of +/- 3 mm (3/8 in.).

**NOTE:**

If the difference between measurements at point (C) and point (D) is greater than 5 mm (3/16 in.), install a shim.

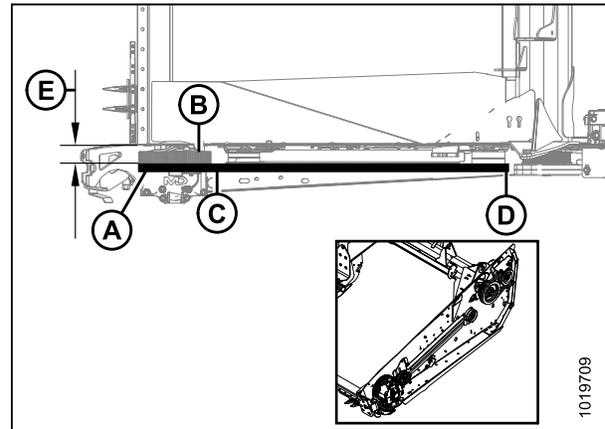


Figure 5.60: Knife Drive Box (Top View)

3. Loosen four bolts (A) securing the knife drive box to the frame.

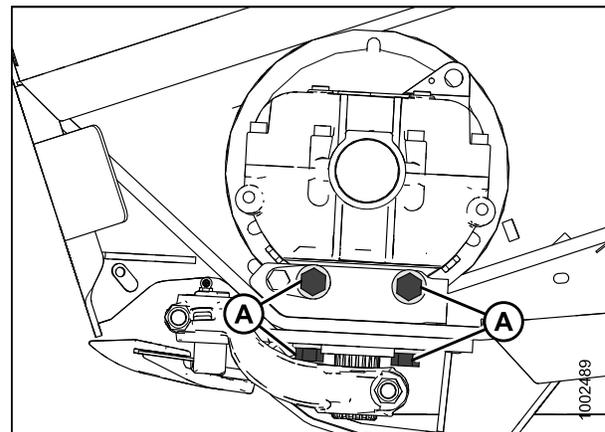


Figure 5.61: Knife Drive Box

4. Manufacture a U-shaped shim (A) to fit under the side bolts securing the knife drive box to the frame. Place the shim between the header mount and the knife drive box. Shim the drive box as required to align the pulley.
5. Refer to [Installing Knife Drive Box, page 133](#) for bolt installation instructions.
6. Tighten bolts and recheck squareness.
7. Refer to [Tensioning Non-Timed Knife Drive Belts, page 141](#) for belt tensioning instructions.

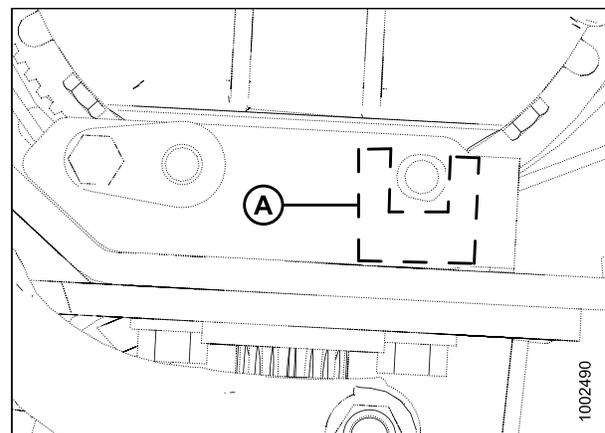


Figure 5.62: U-Shaped Shim

**Adjusting Knife Drive Box Fore-Aft**

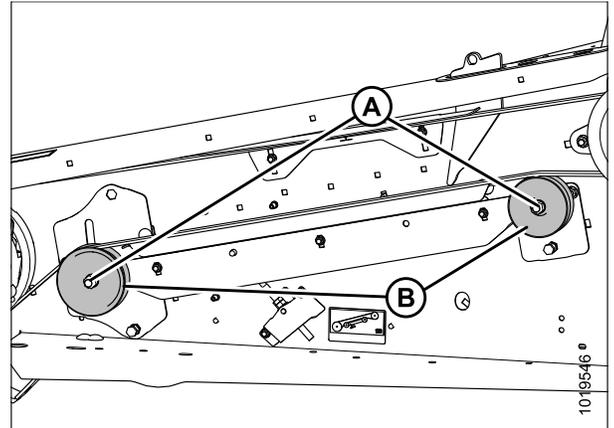
Perform this procedure if there is contact between the guard and the knife bar, or if adjustments have been made to the alignment tab.

1. Identify the location of the contact between the guard and the knife bar to determine which direction to move the knife drive box.

**NOTE:**

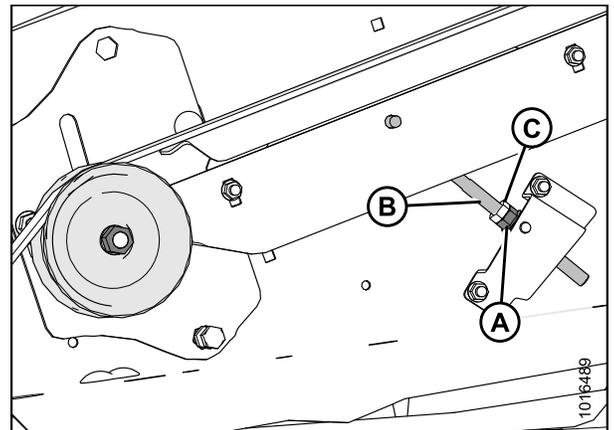
The procedure is the same for both ends of a timed double-knife header. Images shown are for the left end—the right end is opposite.

2. Shut down the windrower, and remove the key from the ignition.
3. Open the endshield. Refer to [Opening Endshields, page 31](#).
4. Loosen the two nuts (A) enough to allow the idler pulleys (B) to pivot.



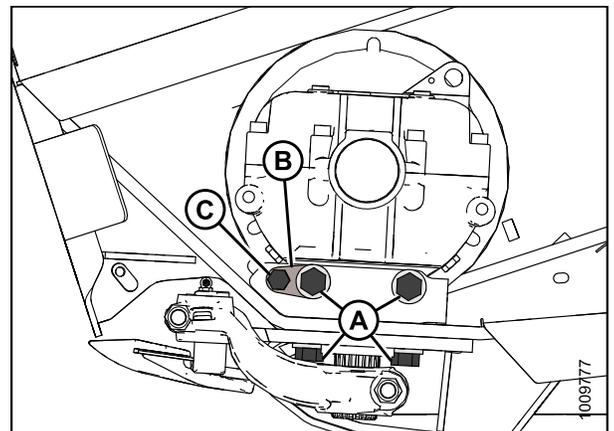
**Figure 5.63: Timed Double-Knife Drive**

5. Loosen the jam nut (C).
6. Turn flange nut (A) counterclockwise on adjuster bolt (B) to relieve knife drive belt tension.



**Figure 5.64: Timed Double-Knife Drive**

7. Loosen four bolts (A) securing the knife drive box to the mount.
8. Loosen bolt (C) securing the knife drive box locating tab (B).



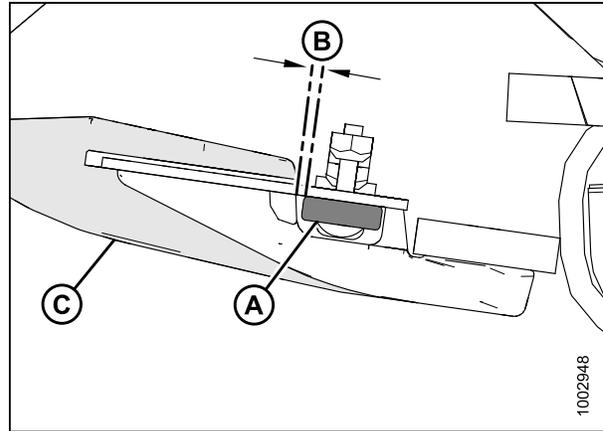
**Figure 5.65: Knife Drive Box**

## MAINTENANCE AND SERVICING

9. Move the output arm to the mid-stroke position, and adjust the knife drive box until there is a 1–2 mm (1/32–1/16 in.) gap (B) between the front of knife bar (A) and guard (C).

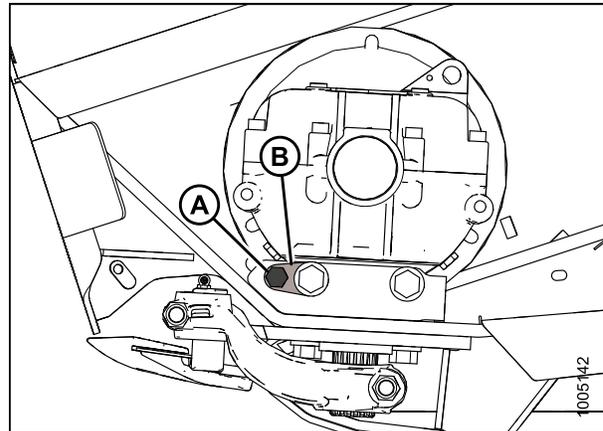
**NOTE:**

If the knife bar (A) makes contact with the front of the guard (C), move the knife drive box rearwards. If the knife bar makes contact with the rear of the guard, move the knife drive box forwards.



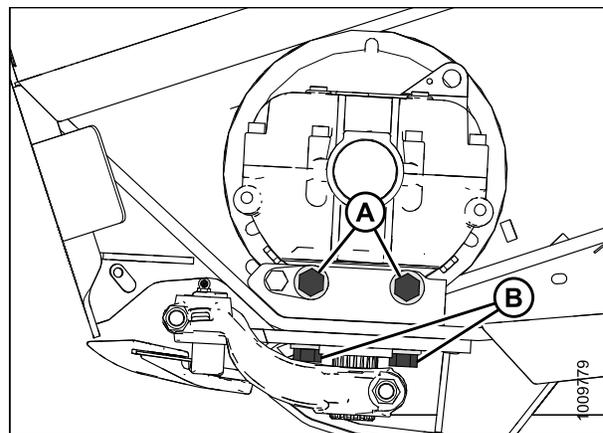
**Figure 5.66: Clearance between Guard and Front of Knife Bar**

10. Tighten bolt (A) securing the knife drive box locating tab (B).



**Figure 5.67: Knife Drive Box**

11. Tighten knife drive box side bolts (A) first, then tighten the bottom bolts (B). Torque to 271 N·m (200 ft·lbf).
12. Install and tension the knife drive belts. For non-timed belts, refer to [Tensioning Non-Timed Knife Drive Belts, page 141](#). For timed belts, refer to [Tensioning Timed Knife Drive Belts, page 147](#).



**Figure 5.68: Knife Drive Box**

### Changing Oil in Knife Drive Box

**! WARNING**

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

## MAINTENANCE AND SERVICING

Change the knife drive box lubricant after the first 50 hours of operation and every 1000 hours (or 3 years) thereafter.

1. Start engine to warm up oil.
2. Shut down the windrower, and remove the key from the ignition.
3. Raise the header and place a container large enough to hold approximately 2.2 liters (2.3 quarts) under the knife drive box to collect the oil.
4. Open the endshield. Refer to [Opening Endshields, page 31](#).
5. Remove the breather/dipstick (A) and the drain plug (B).
6. Allow the oil to drain from the knife drive box and into the container placed below it.
7. Reinstall the drain plug (B).
8. Add 2.2 liters (2.3 quarts) SAE 85W-140 to the knife drive box. Refer to [5.2.1 Recommended Fluids and Lubricants, page 98](#).
9. Close the endshield. Refer to [Closing Endshields, page 32](#).

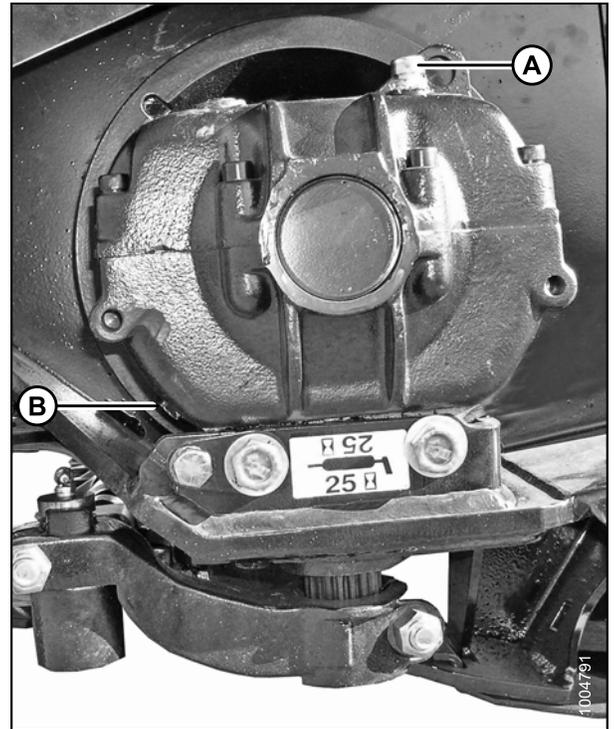


Figure 5.69: Knife Drive Box

### 5.6.2 Knife Drive Belts

#### *Non-Timed Knife Drive Belts*

The knife drive box is driven by a V-belt that is powered by a hydraulic motor on the header endsheets.

#### **Removing Non-Timed Knife Drive Belt**

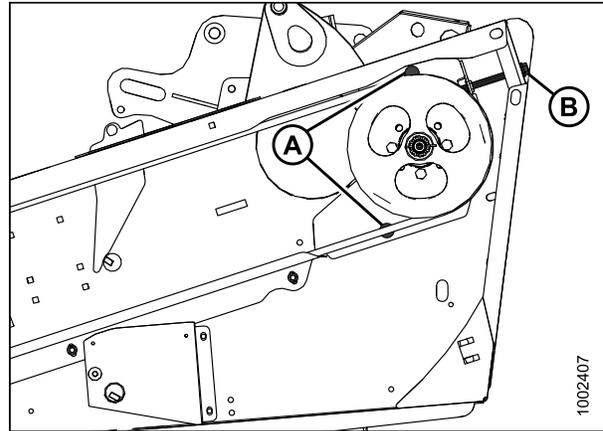
The non-timed knife drive belt removal procedure is the same for both sides of a double-knife header.

#### **⚠ WARNING**

**To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.**

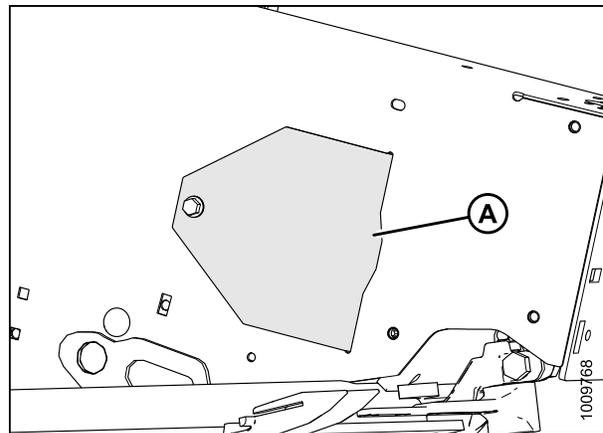
## MAINTENANCE AND SERVICING

1. Shut down the windrower, and remove the key from the ignition.
2. Open the endshield. Refer to [Opening Endshields, page 31](#).
3. Loosen the two bolts (A) securing the motor assembly to the header endsheet.
4. Loosen the belt tension by turning the tensioning bolt (B) counterclockwise.



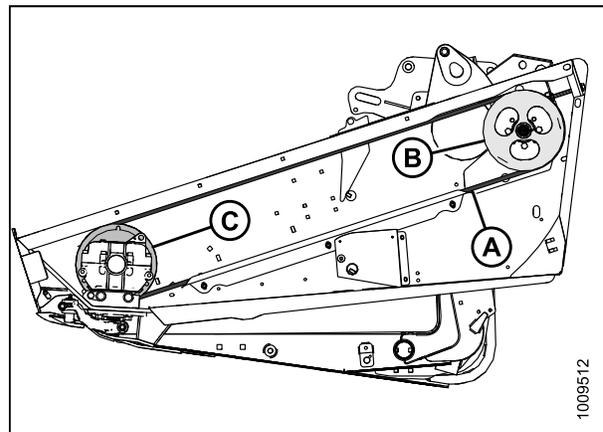
**Figure 5.70: Non-Timed Double-Knife Drive**

5. To provide clearance between the knife drive box pulley and the endsheet, open the access cover (A) on the endsheet behind the cutterbar.



**Figure 5.71: Access Cover**

6. Remove the belt (A) from the drive pulley (B).
7. Slip the belt (A) over and behind the knife drive box pulley (C). Use the notch in the pulley to assist with belt removal.



**Figure 5.72: Knife Drive**

### Installing Non-Timed Knife Drive Belts

The procedure for installing non-timed knife drive belts is the same for both sides of the header.

#### **WARNING**

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

1. Shut down the windrower, and remove the key from the ignition.
2. Route the knife drive belt (A) around the knife drive box pulley (C) and knife drive pulley (B). Use the notch in the pulley to assist with the belt installation.

**NOTE:**

Ensure the drive motor is fully forward, do **NOT** pry the belt over the pulley.

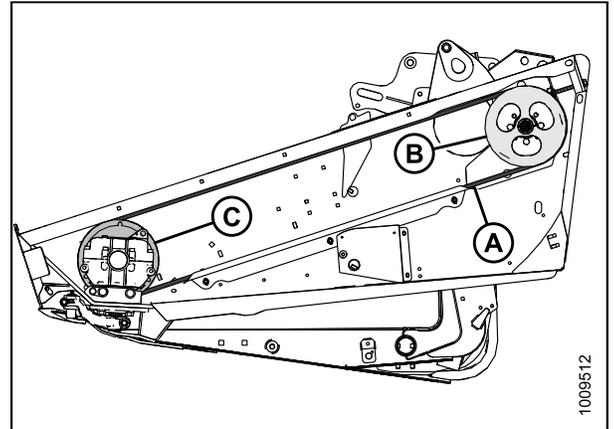


Figure 5.73: Knife Drive

3. Tension the knife drive belt. Refer to [Tensioning Non-Timed Knife Drive Belts, page 141](#).
4. Install the access cover (A) and secure with bolt.
5. Close the endshield. Refer to [Closing Endshields, page 32](#).

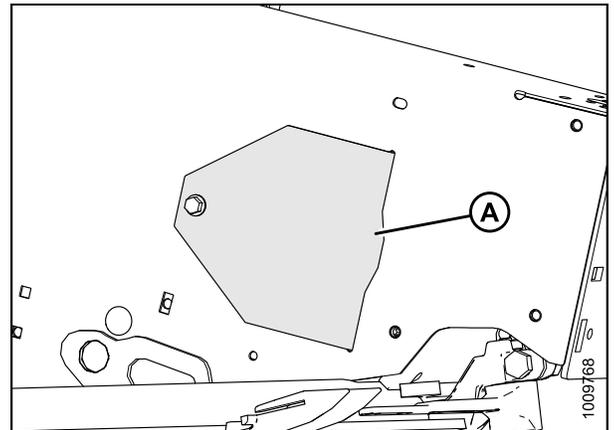


Figure 5.74: Access Cover

### Tensioning Non-Timed Knife Drive Belts

#### **WARNING**

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

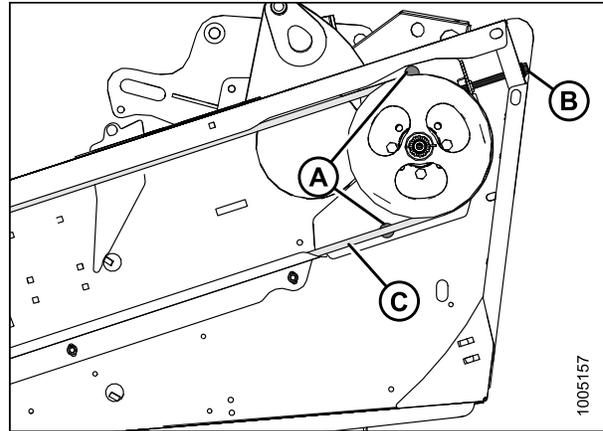
**IMPORTANT:**

To prolong the belt and drive life, do **NOT** overtighten the belt.

1. Shut down the windrower, and remove the key from the ignition.
2. Open the left endshield. Refer to [Opening Endshields, page 31](#).

## MAINTENANCE AND SERVICING

- Loosen the two bolts (A) securing the motor assembly to the header endsheet.
- Turn the adjuster bolt (B) clockwise to move the drive motor until a force of 133 N (30 lbf) deflects the belt (C) 24–28 mm (15/16–1-1/8 in.) at the midspan.



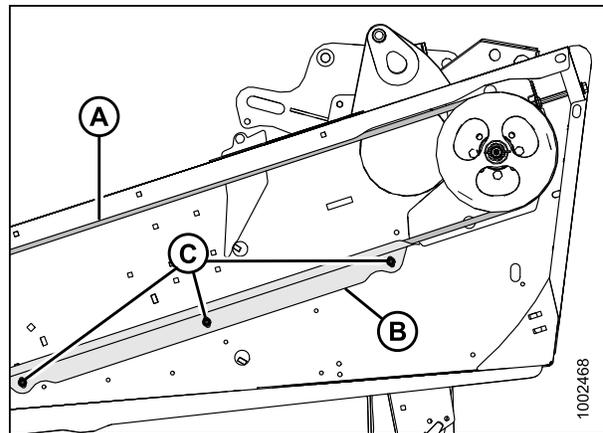
**Figure 5.75: Left Side Shown – Right Side Opposite for Double-Knife Headers**

- Ensure the clearance between the belt (A) and the belt guide (B) is 1 mm (1/16 in.).
- Loosen the three bolts (C), and adjust the position of the guide (B) as required.
- Tighten the three bolts (C).
- Close the endshield. Refer to [Closing Endshields, page 32](#).

### NOTE:

Readjust the tension of a new belt after a short run-in period (about five hours).

- Double-knife headers only:** Repeat procedure on the other side of the header.



**Figure 5.76: Knife Drive**

### *Timed Double-Knife Drive Belts*

#### Removing Timed Drive V-Belts

### **WARNING**

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

## MAINTENANCE AND SERVICING

1. Shut down the windrower, and remove the key from the ignition.
2. Open the endshield. Refer to [Opening Endshields, page 31](#).
3. Loosen the two bolts (A) securing the motor assembly to the header endsheet.
4. Turn the adjuster bolt (B) counterclockwise to loosen and remove the two V-belts (C).

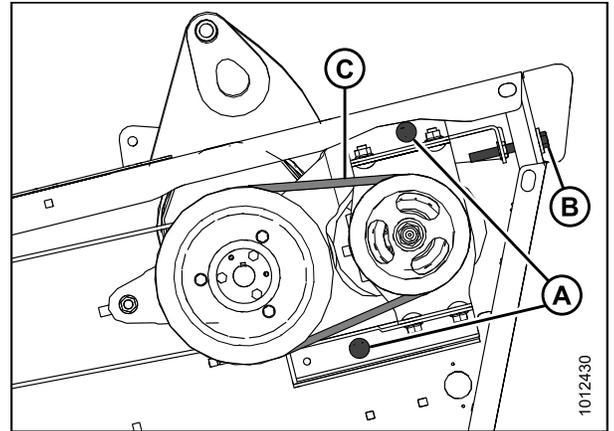


Figure 5.77: Knife Drive V-Belts

### Installing Timed Drive V-Belts

#### NOTE:

Install new V-belts in matching pairs.

1. Shut down the windrower, and remove the key from the ignition.
2. Install the V-belts (C) onto the pulleys.

#### NOTE:

Ensure the drive motor is fully forward, do **NOT** pry the belts over the pulley.

3. Turn the adjuster bolt (B) clockwise to tighten the V-belts. A properly tensioned V-belt should deflect 4 mm (5/32 in.) when 52–77 N (12–17 lbf) is applied at the midspan.

#### IMPORTANT:

To prolong the life of V-belts and drives. Do **NOT** overtighten the V-belts.

4. Tighten the two bolts (A) on the endsheet.
5. Close the endshield. Refer to [Closing Endshields, page 32](#).
6. Check the tension of the new V-belts after a short run-in period (about five hours).

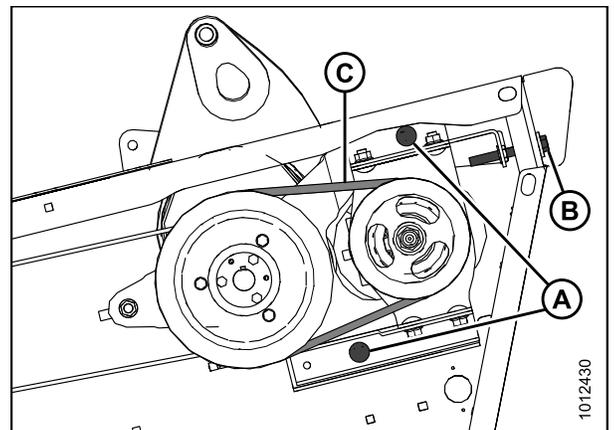


Figure 5.78: Knife Drive V-Belts

### Removing Timed Knife Drive Belt

The timed knife drive belt removal procedure is the same for both sides of the header.

#### **WARNING**

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

## MAINTENANCE AND SERVICING

1. Shut down the windrower, and remove the key from the ignition.
2. Open the endshield. Refer to [Opening Endshields, page 31](#).
3. Loosen the two nuts (A) enough to allow the idler pulleys (B) to pivot.

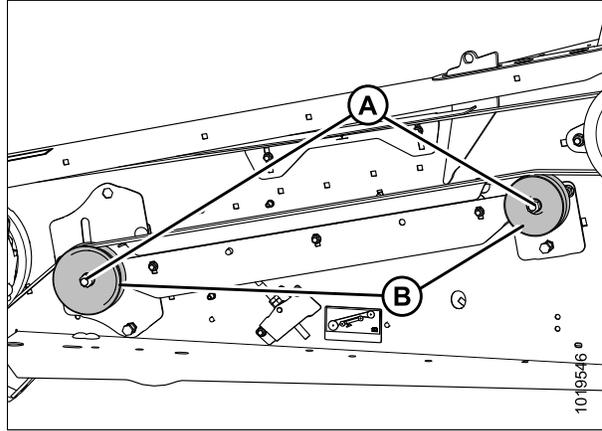


Figure 5.79: Knife Drive

4. Loosen the jam nut (C).
5. To relieve knife drive belt tension, turn flange nut (A) counterclockwise on adjuster bolt (B).

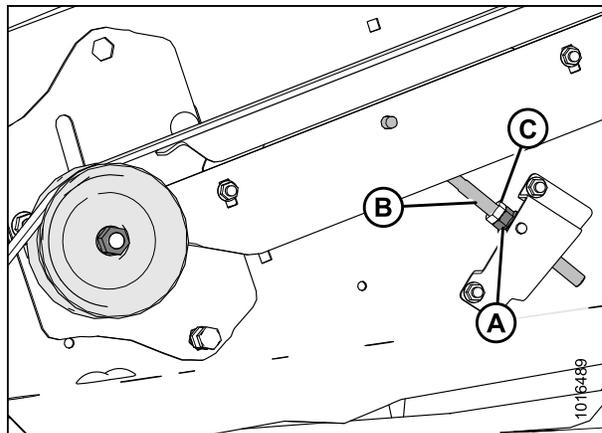


Figure 5.80: Timed Double-Knife Drive

### NOTE:

The following two steps apply only to the left-side drive.

6. Loosen two bolts (A) on the endsheet.
7. Turn the adjuster bolt (B) counterclockwise to loosen and remove the two V-belts (C).

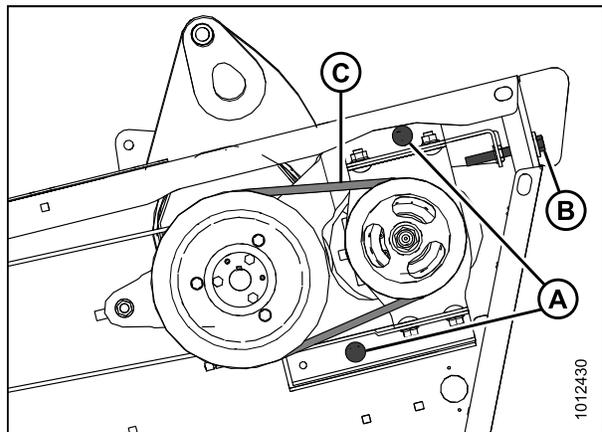


Figure 5.81: Knife Drive V-Belts

## MAINTENANCE AND SERVICING

- Open the access cover (A) on the endsheet behind the cutterbar to provide clearance between the knife drive box pulley and the endsheet.
- Remove the knife drive belt.

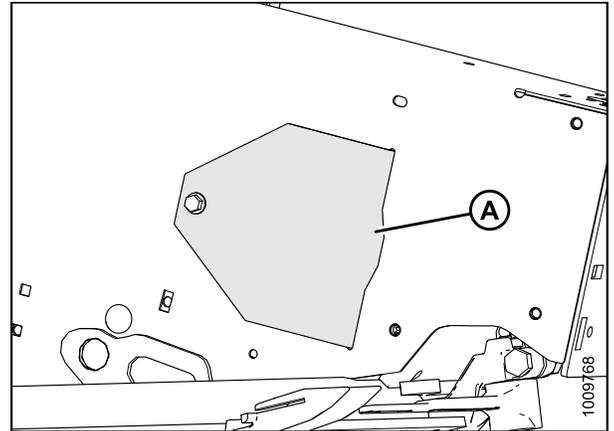


Figure 5.82: Access Cover

### Installing Timed Knife Drive Belt

The procedure for installing timed knife drive belts is the same for both sides of the header.

#### **WARNING**

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

If the belt is out of alignment, refer to [Adjusting Belt Tracking](#) , page 152.

- Shut down the windrower, and remove the key from the ignition.
- Route the knife drive belt (A) around the pulley (B) and the knife drive box pulley (C).

#### **NOTE:**

Ensure the drive motor is fully forward. Do **NOT** pry the belt over the pulley.

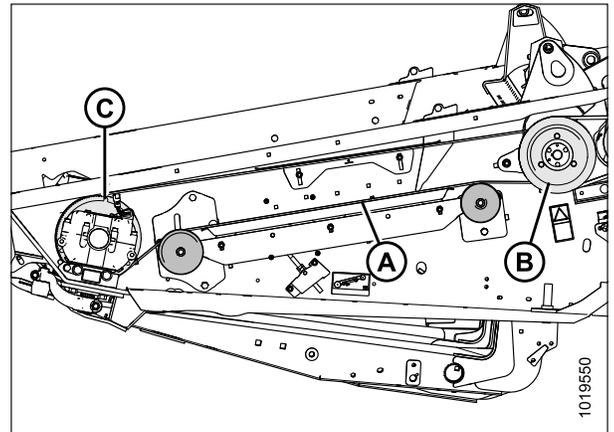


Figure 5.83: Left Side Shown – Right Side Similar

## MAINTENANCE AND SERVICING

### NOTE:

The following two steps apply only to the left side drive.

3. Install the V-belts (C) onto the pulleys.

### NOTE:

Ensure the drive motor is fully forward, do **NOT** pry the belts over the pulley.

4. Turn the adjuster bolt (B) clockwise to tighten the V-belts. A properly tensioned V-belt should deflect 4 mm (5/32 in.) when 52–77 N (12–17 lbf) is applied at the midspan.

### IMPORTANT:

To prolong the life of V-belts and drives. Do **NOT** overtighten the V-belts.

5. Tighten the two bolts (A) on the endsheet.
6. Ensure the knives are timed before tightening the belt. Refer to [Adjusting Double-Knife Timing](#), page 149.
7. Slide pulley (A) up on support bracket (B) to take-up the slack in the timing belt and tighten adjuster nut (B).

### NOTE:

Ensure idler pulley (A) is as high as possible in the support bracket (B) slot.

8. Tighten nut (C) to 212–234 N·m (157–173 ft·lbf).

9. Tension the knife drive belt. Refer to [Tensioning Timed Knife Drive Belts](#), page 147.

10. Install the access cover (A) and secure with bolt.

11. Close the endshield. Refer to [Closing Endshields](#), page 32.

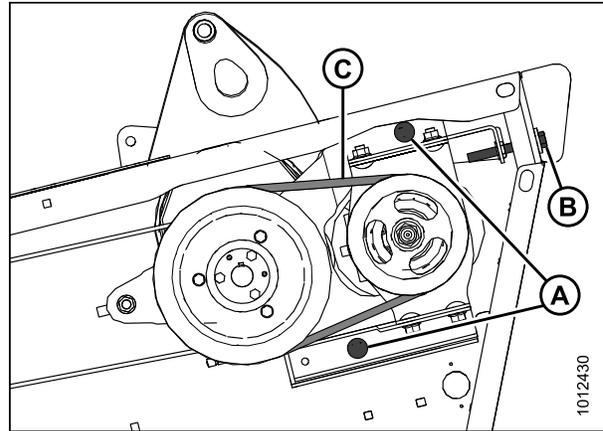


Figure 5.84: Knife Drive V-Belts

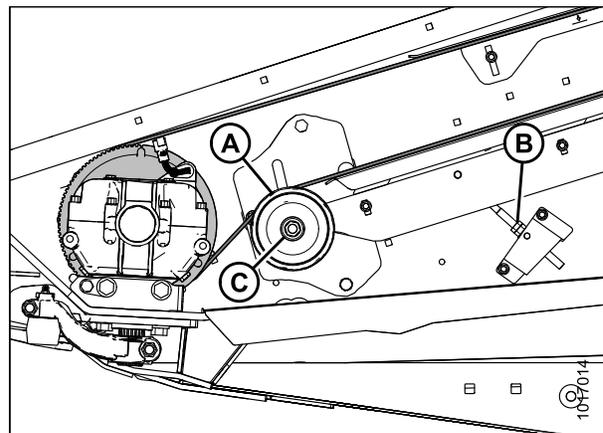


Figure 5.85: Knife Drive

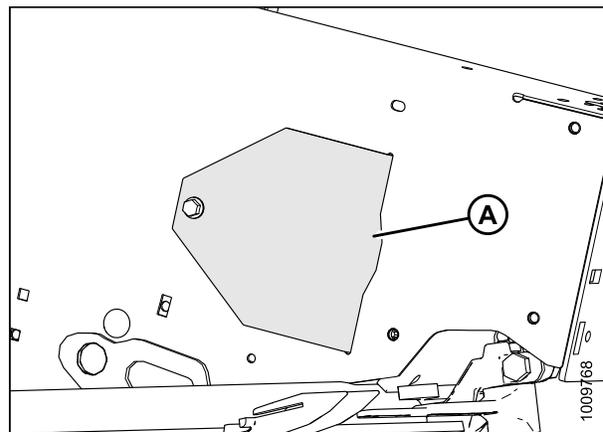


Figure 5.86: Access Cover

### Tensioning Timed Knife Drive Belts

The procedure for tensioning timed knife drive belts is the same for both sides of the header. The illustrations shown are for the left side—the right side is opposite.

**IMPORTANT:**

To prolong belt and drive life, do **NOT** over tighten belt.

**IMPORTANT:**

Do **NOT** use the adjuster bolt at the drive pulley to adjust timing belt tension.

1. Shut down the windrower, and remove the key from the ignition.
2. Open the endshield. Refer to [Opening Endshields, page 31](#).
3. Loosen two nuts (A) enough to allow the idler pulleys (B) to pivot.

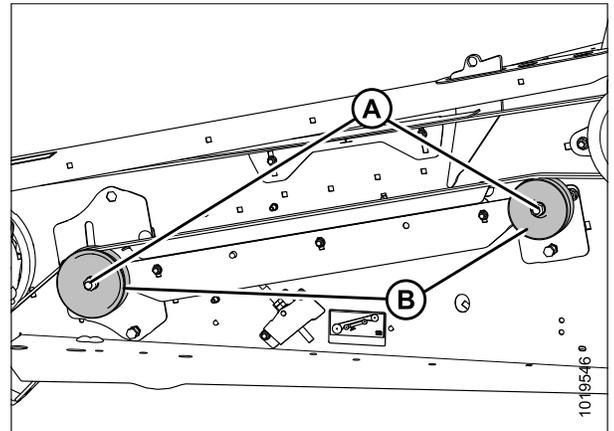


Figure 5.87: LH Knife Drive

4. Thread flange nut (C) down adjuster bolt (B) to push the bracket (A) up.

**NOTE:**

Tension is checked at midspan of the belts. The belts should deflect 20 mm (3/4 in.) with 89 N (20 lbf) of force applied to belt.

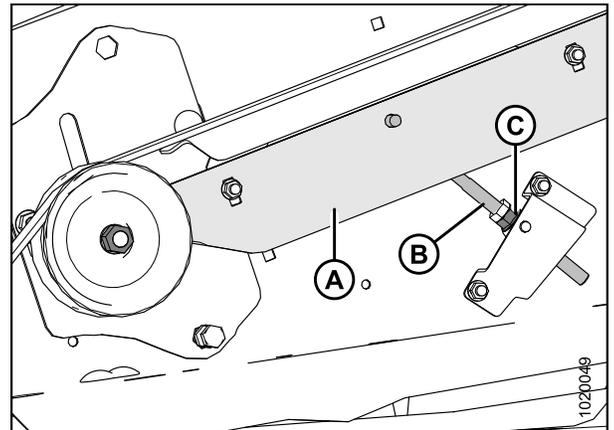


Figure 5.88: LH Knife Drive

## MAINTENANCE AND SERVICING

5. Tighten nuts (A) on idler pulleys (B) to 217 N·m (160 ft·lbf).

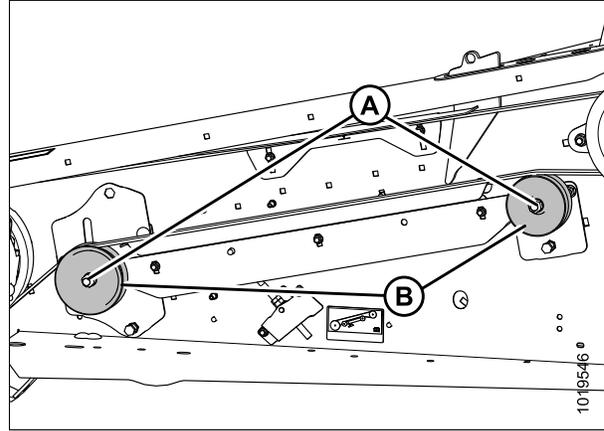


Figure 5.89: LH Knife Drive

6. Tighten jam nut (A) to prevent loosening of the adjuster bolt (B).

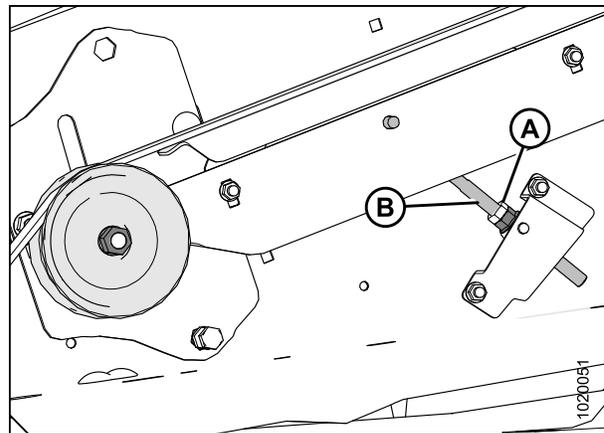


Figure 5.90: LH Knife Drive

7. Ensure there is a clearance of 2.5–3.5 mm (1/8 in.) between the lower belt (A) and lower guide (B).
8. If necessary, loosen the three bolts (C) and adjust lower guide (B) as required. Tighten bolts.
9. Check that upper belt (D) and upper guide (E) also has a clearance of 1.5–2.5 mm (1/16–1/8 in.). If necessary, loosen the two bolts (F) and adjust as required. Tighten the bolts.
10. Close the endshield.
11. Repeat procedure for other side of header.

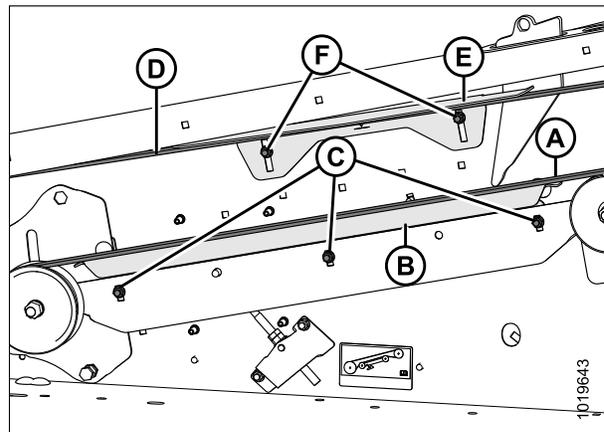


Figure 5.91: LH Knife Drive

### Adjusting Double-Knife Timing

Timed double-knife drive headers (35-foot and smaller) require the knives to be properly timed to move in opposite directions.

#### **WARNING**

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

1. Shut down the windrower, and remove the key from the ignition.
2. Open both endshields. Refer to [Opening Endshields, page 31](#).
3. Remove the right-hand belt. Refer to [Removing Timed Knife Drive Belt, page 143](#).
4. Rotate the left knife drive box driven pulley clockwise until the left knife (A) is at the center of the inboard stroke (B) (moving towards the center of the header).

**NOTE:**

The center stroke is when the knife sections (C) are centered between the guard points.

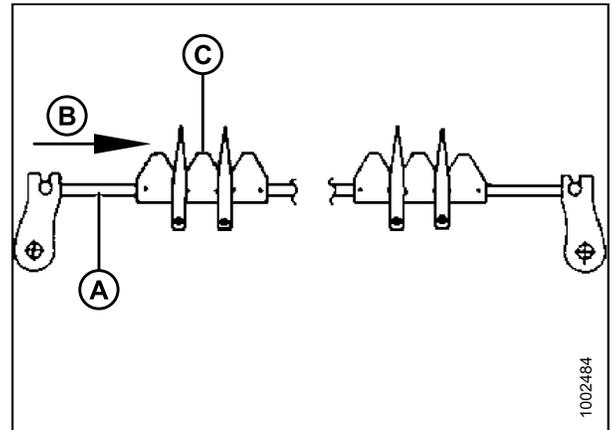


Figure 5.92: Adjusting Timing – Left Side

5. Rotate the right knife drive box pulley counterclockwise until the right knife (A) is at the center of the inboard stroke (B) (moving towards the center of the header).

**NOTE:**

The center stroke is when the knife sections (C) are centered between the guard points.

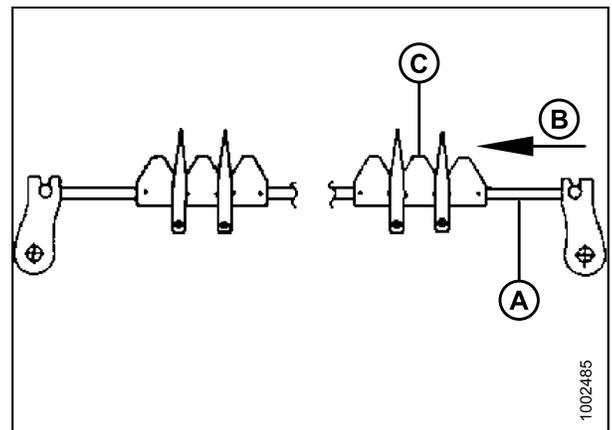


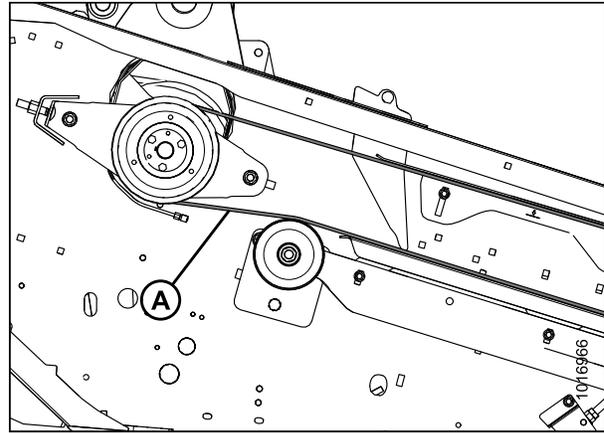
Figure 5.93: Adjusting Timing – Right Side

## MAINTENANCE AND SERVICING

6. Install the right-side belt (A).

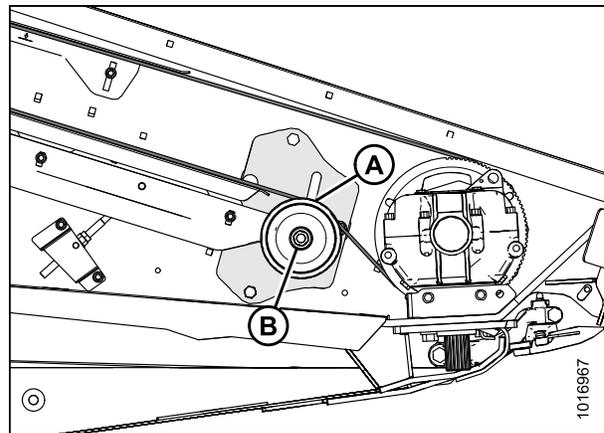
**NOTE:**

Ensure the knife drive box driver and driven pulleys do **NOT** rotate during belt installation.



**Figure 5.94: Knife Drive – Right Side**

7. Slide the idler pulley (A) up by hand to remove most of the belt slack. Tighten the nut (B).

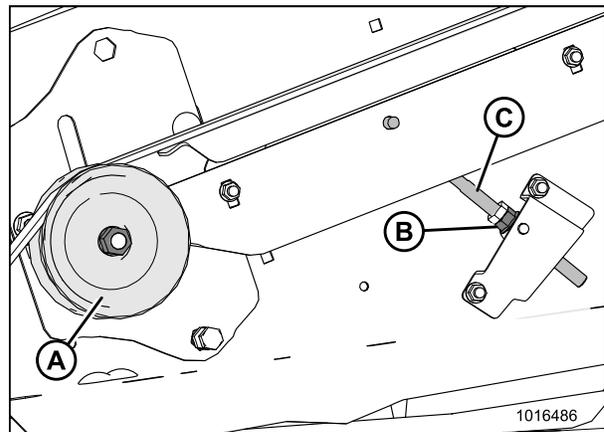


**Figure 5.95: Knife Drive – Right Side**

8. Pull the idler pulley (A) as high as possible by hand.
9. Thread flange nut (B) down adjuster bolt (C) to achieve final tension.

**NOTE:**

Tension is checked at midspan of the belts. The belts should deflect 18–22 mm (11/16–7/8 in.) with 89 N (20 lbf) of force applied to belt.



**Figure 5.96: Left Side Shown – Right Side Opposite**

## MAINTENANCE AND SERVICING

10. Tighten hex nuts (A) on idler pulleys (B).
11. To check for the correct knife timing, rotate the drive slowly by hand, and observe where the knives overlap at the center of the header.

**IMPORTANT:**

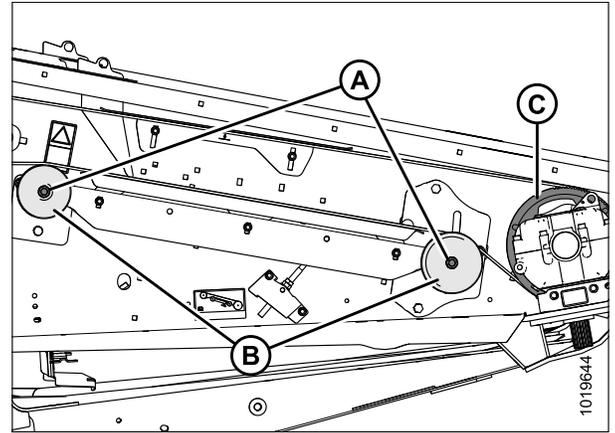
The knives must begin moving at the exact same time, and must move in opposite directions.

12. If necessary, adjust the knife timing by loosening the right-side drive belt just enough to reposition it to the next cog(s), and proceed as follows:
  - a. If the right knife leads the left knife, rotate the right-side driven pulley (C) clockwise.
  - b. If the right knife lags the left knife, rotate the right-side driven pulley (C) counterclockwise.
13. Ensure the drive pulleys don't rotate, and tension the right-side drive belts (refer to Step 10., page 151 to Step 11., page 151).

**IMPORTANT:**

Do **NOT** use the adjuster bolt at the drive pulley to adjust the timing belt tension.

14. Recheck the timing (refer to Step 11., page 151) and readjust if necessary (refer to Step 12., page 151).
15. Close both endshields. Refer to *Closing Endshields*, page 32.



**Figure 5.97: Knife Drive – Right Side**

### Adjusting Belt Tracking

The procedure for adjusting belt tracking is the same for both sides of timed knife headers.

**IMPORTANT:**

Belts that are not tracking properly are subject to premature failure; ensure the pulleys are aligned and parallel. Follow the belt tensioning procedures in this manual to prevent misalignment.

Cogged timing belts should be centered on the knife drive box pulley and positioned at least 2 mm (3/32 in.) from either edge of the pulley when the header is running (a gap should be visible between the belt and the edge of the pulley).

**NOTE:**

The belt should not make continuous contact with the flanges of the drive pulley, but occasional contact is acceptable.

**⚠ DANGER**

To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.

1. Open both endshields. Refer to [Opening Endshields, page 31](#).

**⚠ CAUTION**

Exercise extreme care when operating the header with the endshields open.

2. Operate the header. Observe the belt tracking on both the drive pulley and the knife drive box pulley on both sides of the header. Shut down the windrower and remove the key from the ignition before making any adjustments.
3. If the belt is tracking towards the inboard side of the drive pulley, the likely cause is a toe-out problem (A) and (B). If the belt tends to move towards the low tension [inboard] side of the pulley, proceed to Step 6., [page 153](#).
4. If the belt is tracking towards the outboard side of the drive pulley, the likely cause is a toe-in problem (C) and (D). If the belt tends to move towards the high tension [outboard] side of the pulley, proceed to Step 6., [page 153](#).

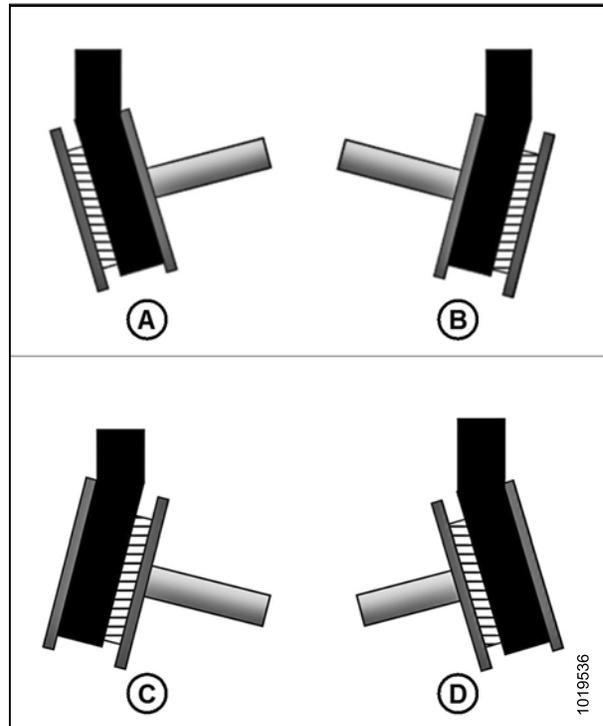


Figure 5.98: Knife Drive Pulley

## MAINTENANCE AND SERVICING

5. If the belt (A) is tracking to one side of the knife drive box pulley (B), the likely cause is an out of position idler pulley (C). Proceed to Step 7., page 153.

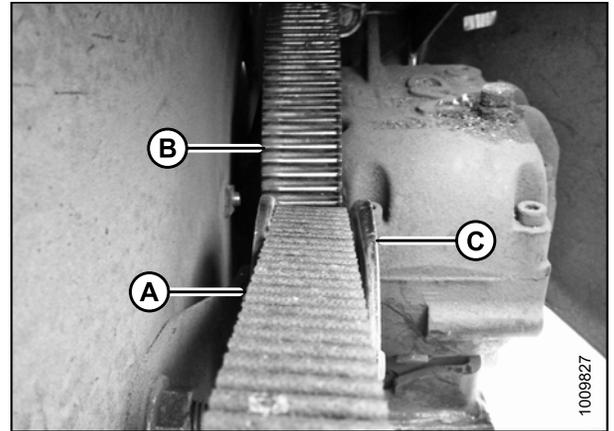


Figure 5.99: Knife Drive Belt

6. If there is a tracking problem on the drive pulley, adjust the position of the cross shaft support tube as follows:
  - a. Loosen nut (A) on the support assembly (B).
  - b. To correct a toe-out condition, slide the support assembly (B) rearwards in slot (C).
  - c. To correct a toe-in condition, slide the support assembly (B) forward.
  - d. Tighten nut (A).
  - e. Operate the header and check the belt tracking. Adjust the support assembly as required.
  - f. If belt tracking problems continue, proceed to Step 8., page 154.

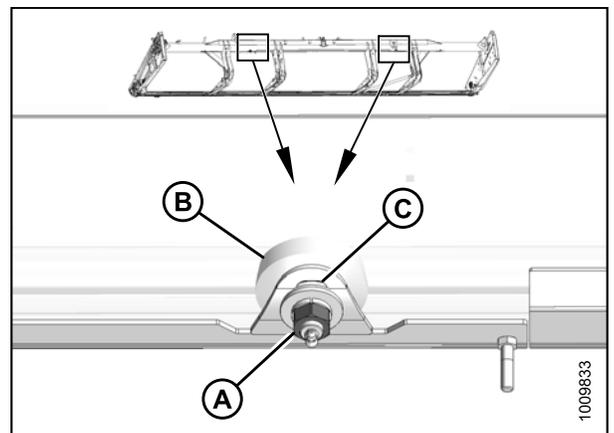


Figure 5.100: Cross-Shaft Support

7. Correct a tracking problem on the knife drive box pulley by adjusting idler positions as follows:
  - a. Loosen jam nuts (A).
  - b. Loosen jam nut and adjuster bolt (B) to relieve belt tension.
  - c. Turn bolts (C) and (D) clockwise to move belt inboard, or counterclockwise to move belt outboard.

**NOTE:**

Bolts must touch the endsheet to prevent vibration.

- d. Check that belt does not ride against flanges on pulley (E).
- e. Tighten jam nuts (A).
- f. Tension the belt. Refer to *Tensioning Timed Knife Drive Belts*, page 147.
- g. Operate the header and check the belt tracking.

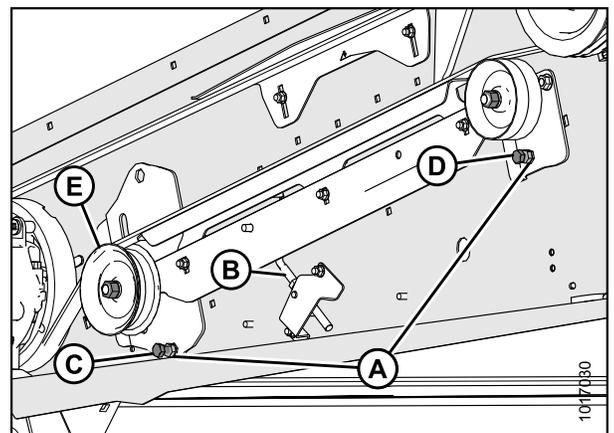


Figure 5.101: Knife Drive – Left Side

## MAINTENANCE AND SERVICING

8. If further adjustment is required to correct drive pulley tracking, proceed as follows:
  - a. Loosen jam nuts (A).
  - b. Loosen jam nut and adjuster bolt (B) to relieve belt tension.
  - c. Loosen nuts (C) at the drive pulley location.
  - d. To correct toe-in problems, turn the adjuster bolt (D) clockwise to enable the belt to track inboard.
  - e. To correct toe-out problems, turn the adjuster bolt (D) counterclockwise to enable the belt to track outboard.
  - f. Tighten the nuts (C) at the drive pulley location.
  - g. Tension the belt. Refer to [Tensioning Timed Knife Drive Belts, page 147](#).
  - h. Operate the header, check the belt tracking, and readjust the drive pulley as necessary.

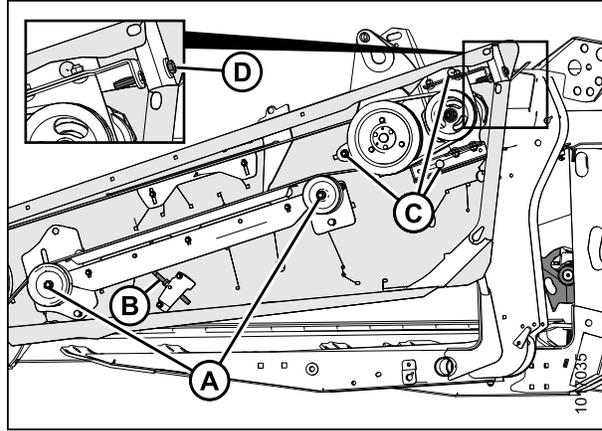


Figure 5.102: Knife Drive – Left Side

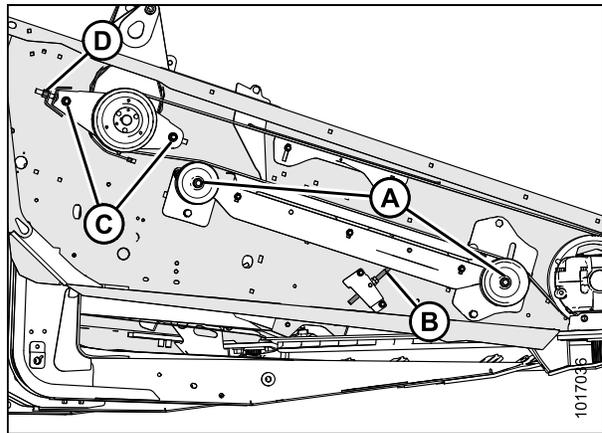


Figure 5.103: Knife Drive – Right Side

## 5.7 Side Drapers

Replace drapers if torn, cracked, or missing slats.

### 5.7.1 Removing Drapers

#### DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, always stop engine and remove key before leaving the operator's seat, and always engage safety props before going under the machine for any reason.

1. Raise the reel and engage the reel safety props.
2. Raise the header and engage the safety props.
3. Move the draper until the draper joint is in the work area.

#### NOTE:

The deck also can be shifted towards the center to provide an opening at the endsheet.

4. Stop the engine and remove the key from the ignition.
5. Release the tension on the draper. Refer to [5.7.3 Adjusting Draper Tension, page 157](#).
6. Remove the screws (A) and tube connectors (B) at the draper joint.
7. Pull the draper from deck.

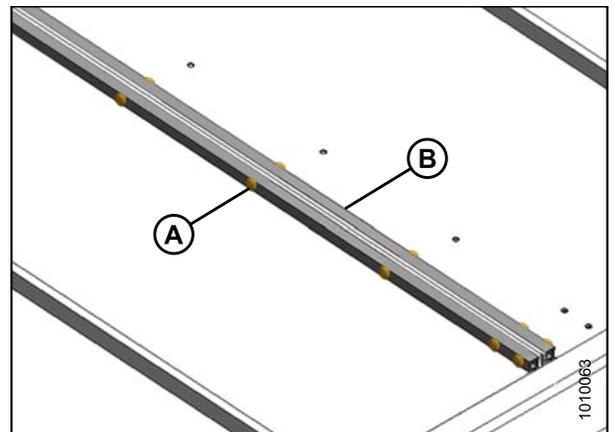


Figure 5.104: Draper Connector

### 5.7.2 Installing Drapers

#### WARNING

To avoid bodily injury from fall of raised reel, always engage reel safety props before going under raised reel for any reason.

#### NOTE:

Check the deck height before installing the drapers. Refer to [5.7.5 Adjusting Deck Height, page 161](#).

## MAINTENANCE AND SERVICING

1. Apply talc, baby powder, or talc/graphite lubricant mix to the draper surface that forms the seal with the cutterbar and to the underside of the draper guides.
2. Insert the draper into the deck at the outboard end under the rollers. Pull the draper into the deck while feeding it at the end.
3. Feed in the draper until it can be wrapped around the drive roller.
4. Insert the opposite end of the draper into the deck over the rollers. Pull the draper fully into the deck.



Figure 5.105: Installing Draper

5. Loosen the mounting bolts (B) on the rear deck deflector (A) (this may help with draper installation).

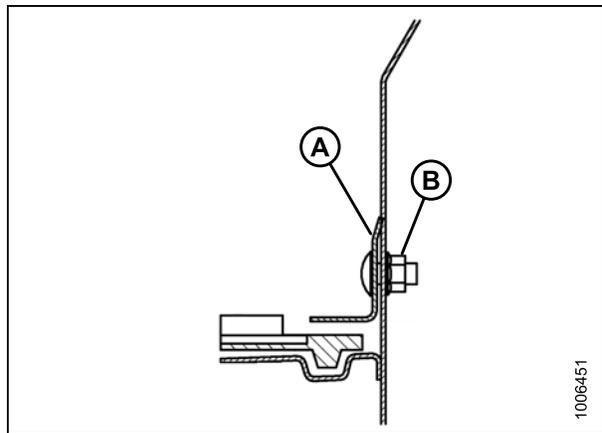


Figure 5.106: Draper Seal

6. Attach the ends of the draper with tube connectors (B), screws (A) (with the heads facing the center opening), and nuts.
7. Adjust the draper tension. Refer to [5.7.3 Adjusting Draper Tension, page 157](#).

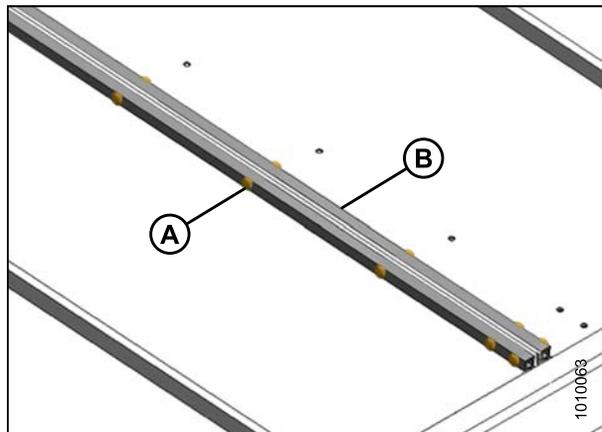


Figure 5.107: Draper Connector

## MAINTENANCE AND SERVICING

8. Check clearance (A) between drapers (B) and cutterbar (C). It should be 3 mm (0–0.04 in.). Refer to [5.7.5 Adjusting Deck Height, page 161](#) to adjust if necessary.

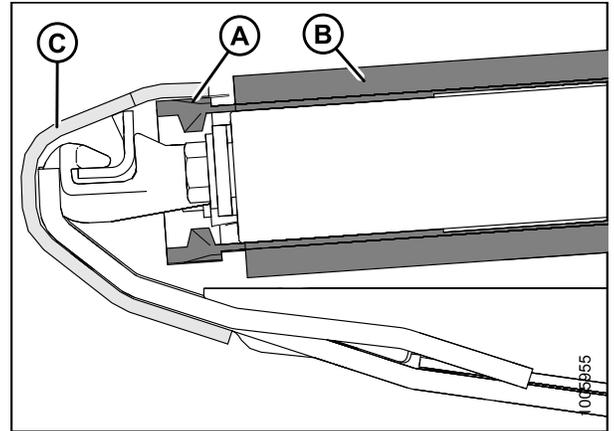


Figure 5.108: Draper Seal

9. If adjustment of the backsheet deflector (A) is required, loosen nut (D) and move the deflector until there is a 1–7 mm (1/32–5/16 in.) gap (C) between the draper (B) and the deflector.
10. Operate the drapers with the engine at idle so the talc or talc/graphite lubricant makes contact and adheres to the draper seal surfaces.

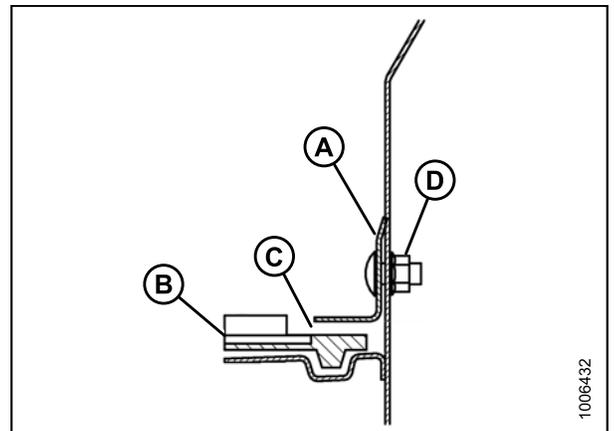


Figure 5.109: Draper Seal

### 5.7.3 Adjusting Draper Tension

#### WARNING

To avoid bodily injury or death from unexpected start-up or fall of raised machine, always stop engine, remove key, and engage safety props before going under machine for any reason.

1. Ensure the white indicator bar (A) is at the halfway point in the window.

#### WARNING

Check to be sure all bystanders have cleared the area.

2. Start the engine and raise the header.
3. Stop the engine, remove the key from the ignition, and engage the header safety props.

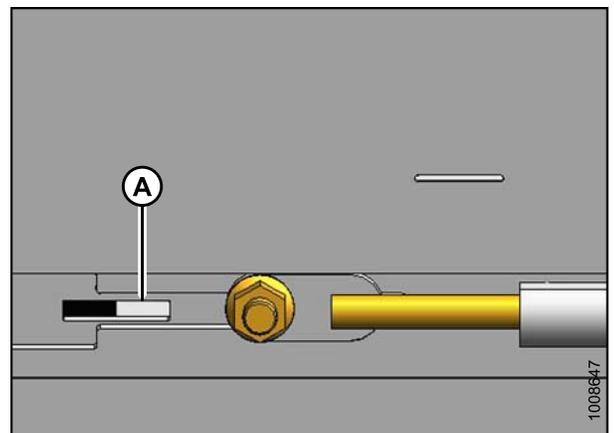
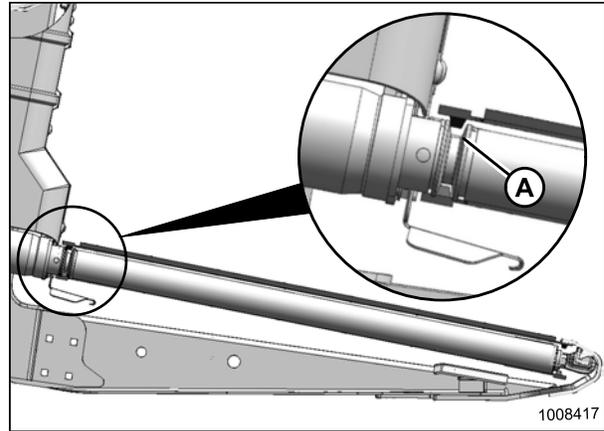


Figure 5.110: Left Tension Adjuster Shown – Right Opposite

## MAINTENANCE AND SERVICING

4. Ensure the draper guide (the rubber track on the underside of the draper) is properly engaged in the groove (A) on the drive roller.

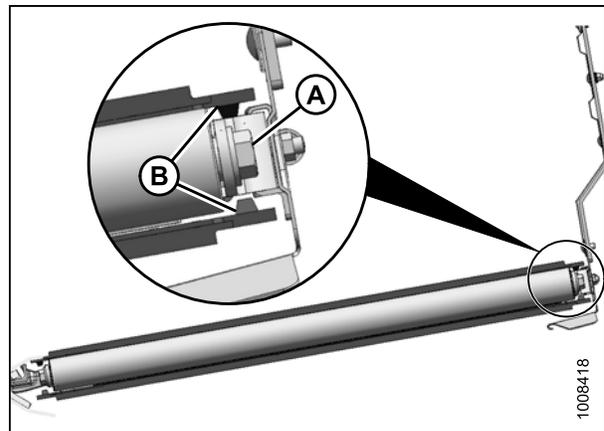


**Figure 5.111: Drive Roller**

5. Ensure the idler roller (A) is between the draper guides (B).

**NOTE:**

The drapers are tensioned at the factory and rarely need adjustment. If adjustment is required, tension the drapers just enough to prevent slipping and to keep the draper from sagging below the cutterbar.



**Figure 5.112: Idler Roller**

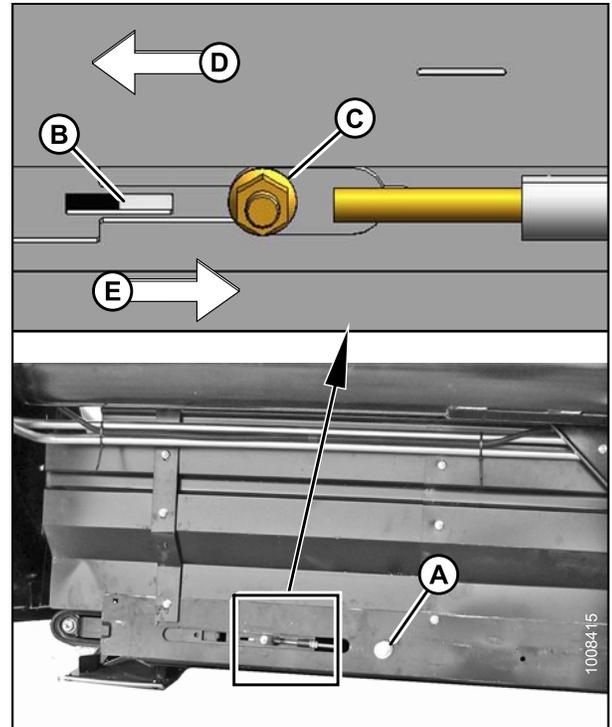
**IMPORTANT:**

Do **NOT** adjust nut (C). This nut is used for draper alignment only.

6. To loosen the adjuster bolt (A), turn it counterclockwise. The white indicator bar (B) will move outboard in the direction of arrow (D) to indicate that the draper is loosening. Loosen until the white indicator bar is at the halfway point in the window.
7. To tighten the adjuster bolt (A), turn it clockwise. The white indicator bar (B) will move inboard in the direction of arrow (E) to indicate that the draper is tightening. Tighten until the white indicator bar is at the halfway point in the window.

**IMPORTANT:**

- To avoid premature failure of the draper, draper rollers, and/or tightener components, do not operate with the tension set so the white bar is not visible.
- To prevent scooping dirt, ensure the draper is tight enough that it does not sag below the point where the cutterbar contacts the ground.



**Figure 5.113: Left Tension Adjuster Shown – Right Opposite**

### 5.7.4 Adjusting Draper Tracking

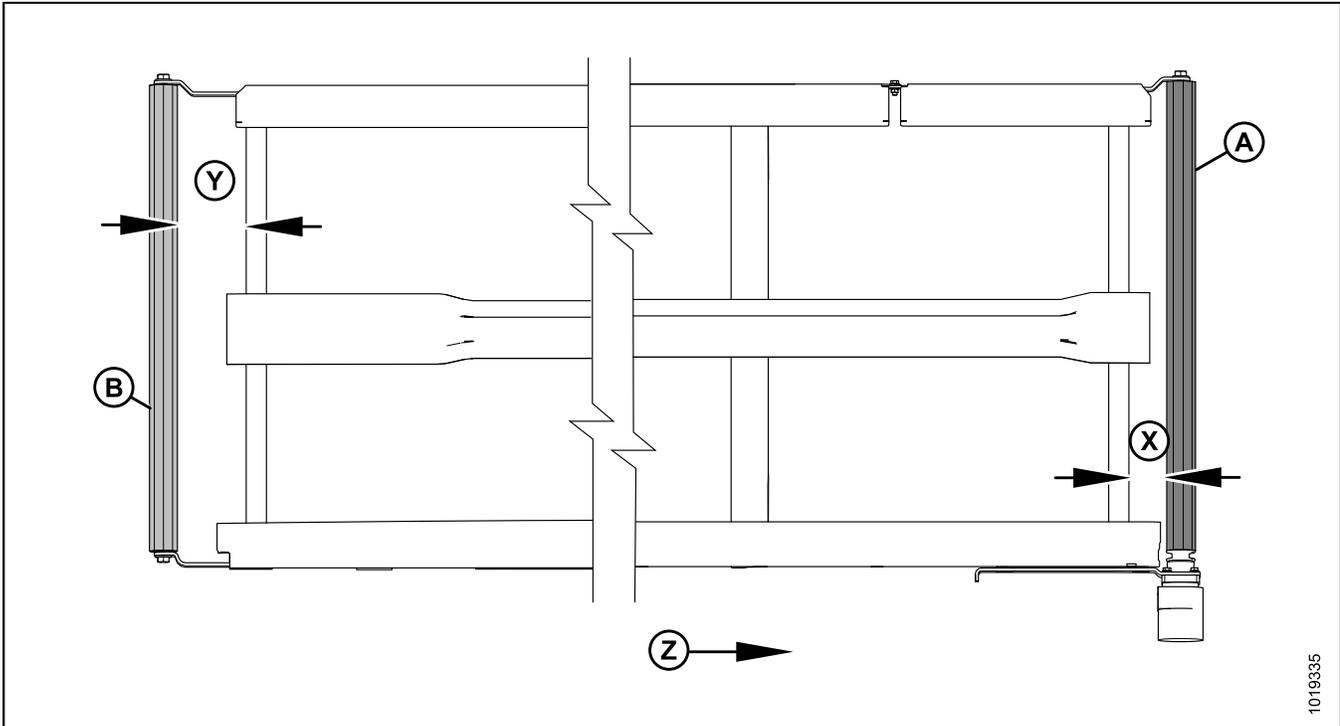
The draper tracking is adjusted by aligning the drive and idler draper rollers.

**CAUTION**

To avoid personal injury, before servicing machine or opening drive covers, refer to [5.1 Preparing Machine for Servicing, page 97](#).

The images shown in the following procedure are applicable to the left draper deck. Use opposite views for the right draper deck.

## MAINTENANCE AND SERVICING



**Figure 5.114: Draper Tracking Adjustments**

A - Drive Roller

B - Idler Roller

X- Drive Roller Adjust

Y- Idler Roller Adjust

Z- Draper Direction

1. Refer to the following table to determine which roller requires adjustment and which adjustments are necessary.

**Table 5.5 Header Draper Tracking**

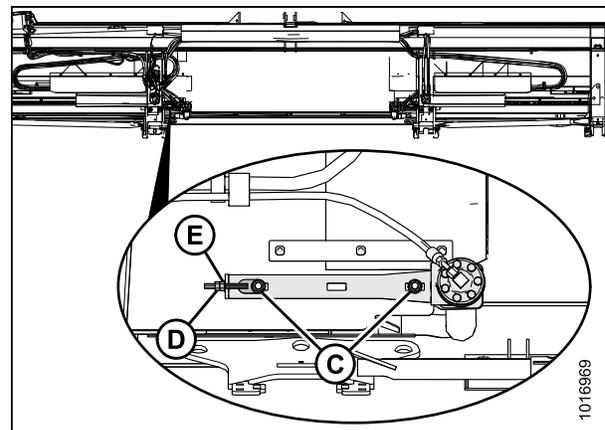
Tracking	At Location	Adjustment	Method
Backward	Drive roller	Increase X	Tighten nut (E)
Forward		Decrease X	Loosen nut (E)
Backward	Idler roller	Increase Y	Tighten nut (H)
Forward		Decrease Y	Loosen nut (H)

2. Adjust drive roller (A) to change X as follows:

- a. Loosen nuts (C) and jam nut (D).
- b. Turn the adjuster nut (E).

**NOTE:**

Some parts removed from illustration for clarity.



**Figure 5.115: Left Deck Drive Roller (Left Shown - Right Opposite)**

## MAINTENANCE AND SERVICING

3. Adjust idler roller (B) to change  $Y$  as follows:
  - a. Loosen nut (F) and jam nut (G).
  - b. Turn the adjuster nut (H).

**NOTE:**

If the draper does not track at the idler roller end after the idler roller adjustment, the drive roller is likely not square to the deck. Adjust the drive roller, and then readjust the idler roller.

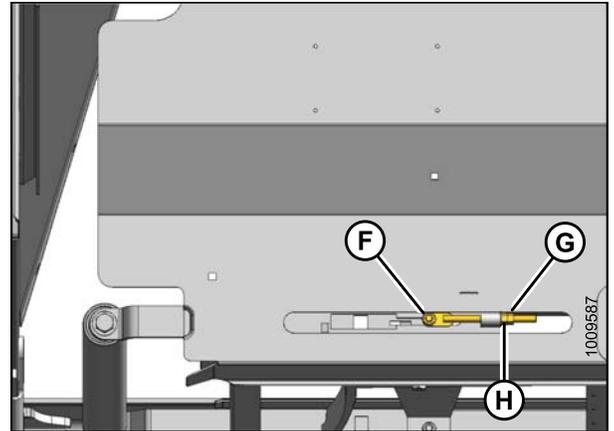


Figure 5.116: Left Deck Idler Roller (Left Shown – Right Opposite)

### 5.7.5 Adjusting Deck Height

**⚠ DANGER**

To avoid bodily injury or death from unexpected start-up or fall of raised machine, always stop engine, remove key, and engage safety props before going under header for any reason.

1. Shut down windrower, and remove key from ignition.
2. Check that clearance (A) between draper (B) and cutterbar (C) is 3 mm (0–1/8 in.). Refer to [5.7.5 Adjusting Deck Height, page 161](#).

**NOTE:**

Measure clearance at the supports with the header in working position.

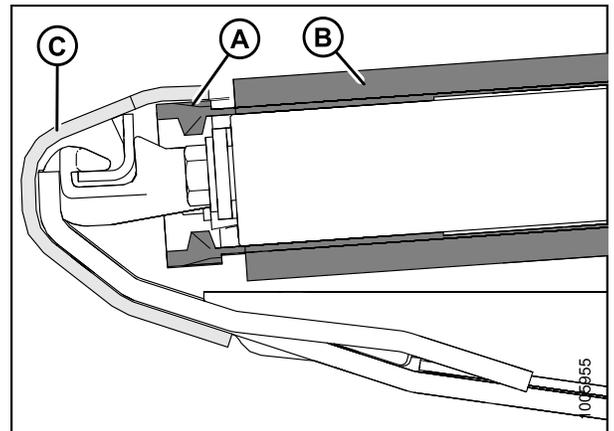


Figure 5.117: Draper Seal

3. Loosen the draper tension. Refer to [5.7.3 Adjusting Draper Tension, page 157](#).
4. Lift the front edge of the draper (A) past the cutterbar (B) to expose the deck support.
5. Measure and note the thickness of the draper belt.

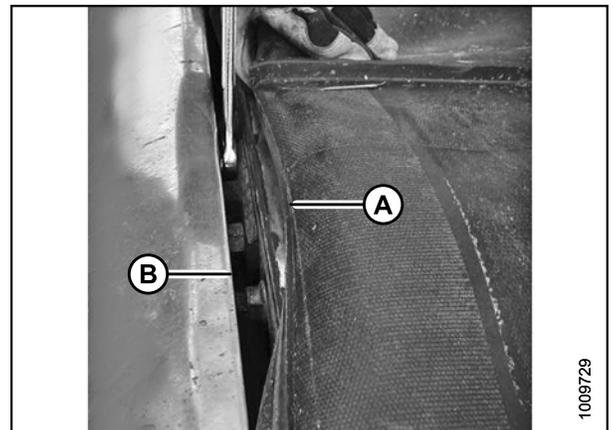


Figure 5.118: Draper Adjustment

## MAINTENANCE AND SERVICING

- Loosen the two lock nuts (A) on the deck support (B) **one-half turn only**.

### NOTE:

The number of deck supports (B) is determined by the header size: four on single reels, and eight on double reels.

- Tap the deck (C) to lower the deck relative to the deck supports. Tap the deck support (B) using a punch to raise the deck relative to the deck supports.

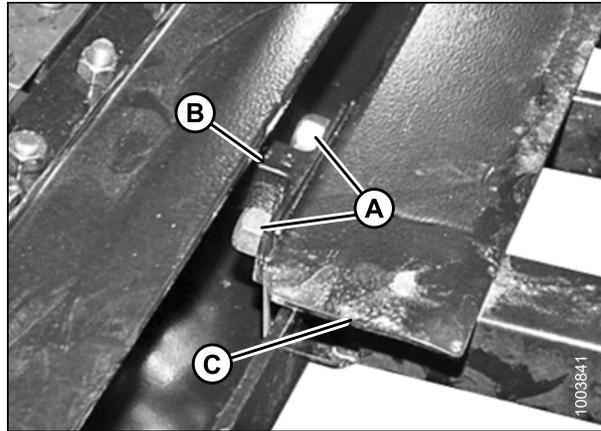


Figure 5.119: Deck Support

- Adjust deck (A) to 1 mm (0.04 in.) add the draper thickness as measured in Step 5., page 161 below (B) cutterbar (C) to create a seal.
- Tighten deck support hardware (D).
- Recheck gap (B). Refer to Step 8., page 162.
- Tension the draper. Refer to 5.7.3 *Adjusting Draper Tension*, page 157.

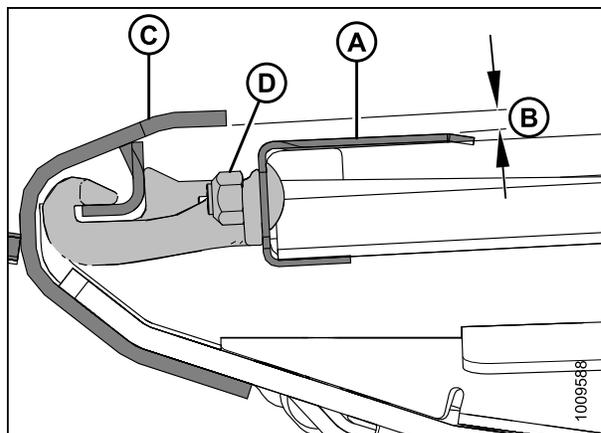


Figure 5.120: Deck Support

- Adjust the backsheet deflector (A) (if required) by loosening nut (D) and moving the deflector until there is a 1–7 mm (1/32–5/16 in.) gap (C) between the draper (B) and the deflector.

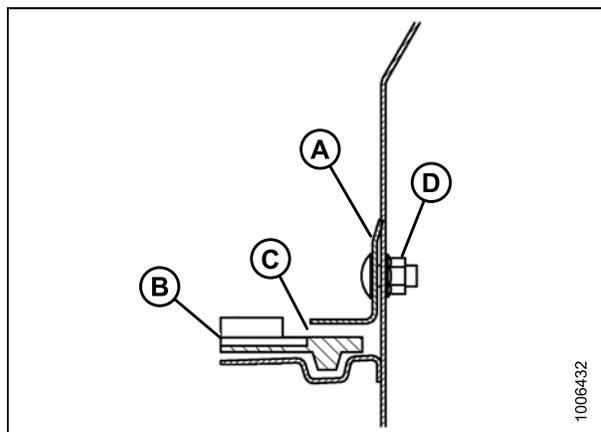


Figure 5.121: Backsheet Deflector

## 5.7.6 Header Draper Roller Maintenance

The draper rollers have non-greaseable bearings; however, the external seal should be checked every 200 hours (more frequently in sandy conditions) to achieve maximum bearing life.

### *Inspecting Draper Roller Bearing*

Using an infrared thermometer, check for bad draper roller bearings as follows:

1. Engage the header and run the drapers for approximately three minutes.
2. Check the temperature of the draper roller bearings at each of the roller arms (A), (B), and (C) on each deck. Ensure the temperature does not exceed 44°C (80°F) above the ambient temperature.

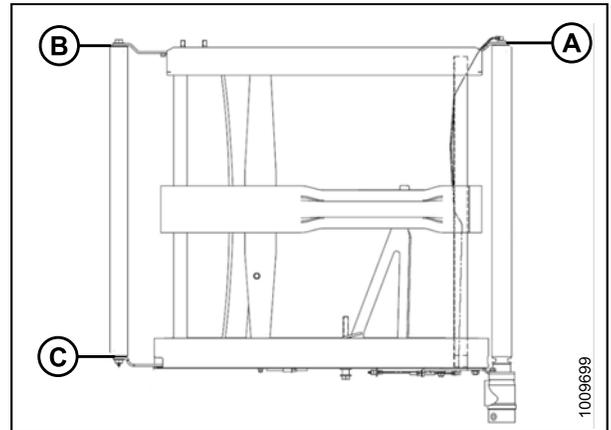


Figure 5.122: Roller Arms

### *Draper Deck Idler Roller*

#### Removing Draper Idler Roller



**To avoid bodily injury or death from unexpected start-up or fall of a raised machine, always stop engine and remove key before leaving the operator's seat, and always engage safety props before going under the machine for any reason.**

#### **NOTE:**

If the draper connector is not visible, engage the header until the connector is accessible (preferably close to the outboard end of the deck).

1. Start the engine, raise the header, and raise the reel.
2. Stop the engine, and remove the key from the ignition.
3. Engage the reel safety props, and engage the header safety props.
4. Loosen the draper by turning adjuster bolt (A) counterclockwise.

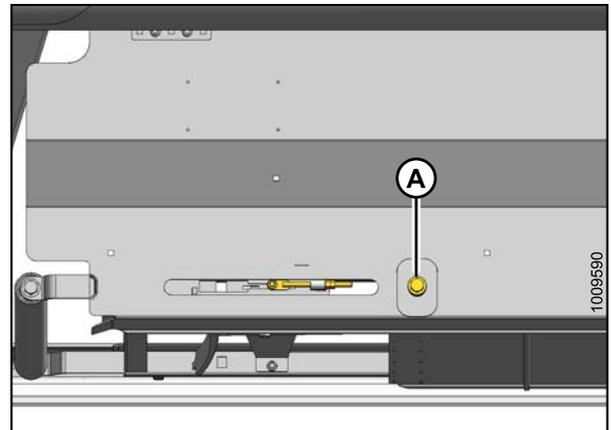


Figure 5.123: Tensioner

## MAINTENANCE AND SERVICING

5. Remove the screws (A), tube connectors (B), and nuts from the draper joint to uncouple the draper.
6. Pull the draper off the idler roller.

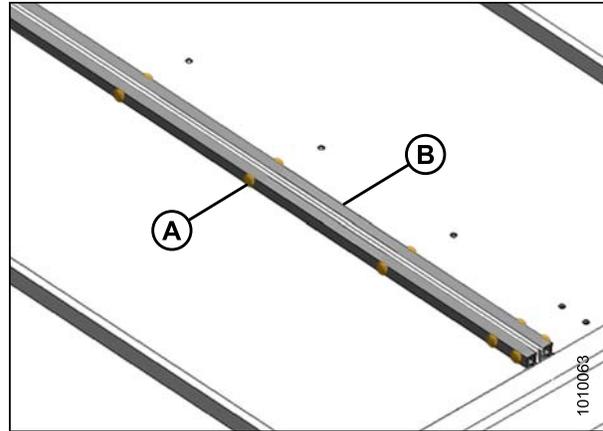


Figure 5.124: Draper Connector

7. Remove the bolts (A) and washer at both ends of the idler roller.
8. Spread the roller arms (B) and (C), and remove the idler roller.

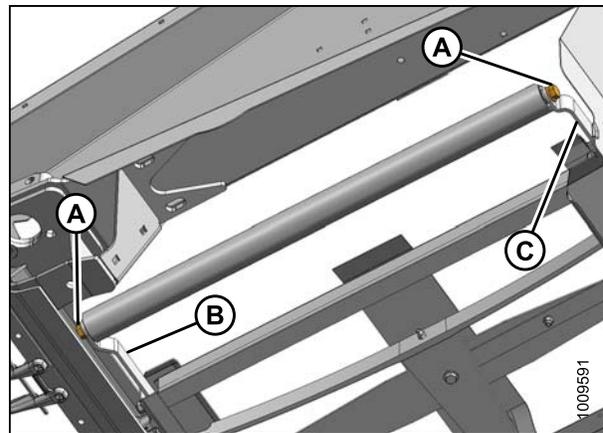


Figure 5.125: Idler Roller

### Replacing Draper Idler Roller Bearing

1. Remove two bolts (A) holding the roller to the idler arms.
2. Remove seal (B).
3. Use a slide hammer to remove bearing (C) from the roller.

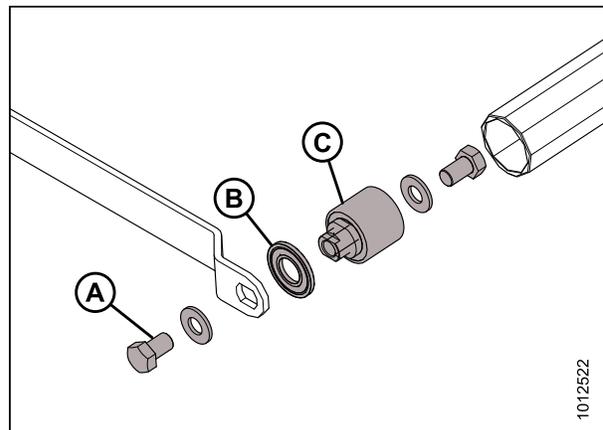


Figure 5.126: Idler Roller Assembly

## MAINTENANCE AND SERVICING

4. Install the new bearing assembly (C) by pressing the outer race of the bearing into the tube until it is 14–15 mm (9/16–19/32 in.) (B) from the outside edge of the tube.

**NOTE:**

Before installing new seal, fill area (A) with 8 pumps of grease.

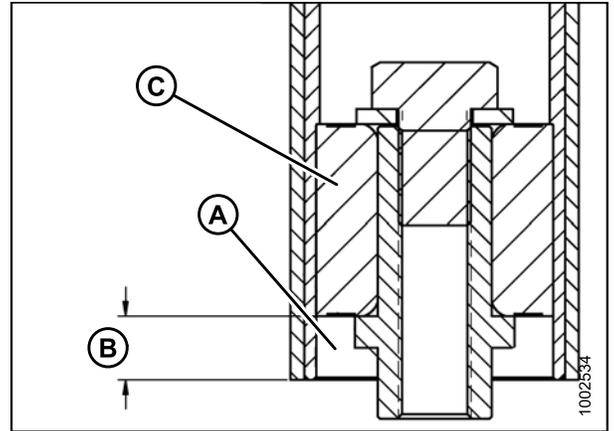


Figure 5.127: Idler Roller Bearing

5. Install new seal (A) by pressing on the inner and outer race of the seal until it is 3–4 mm (1/8–3/16 in.) (B) from the outside edge of the tube.

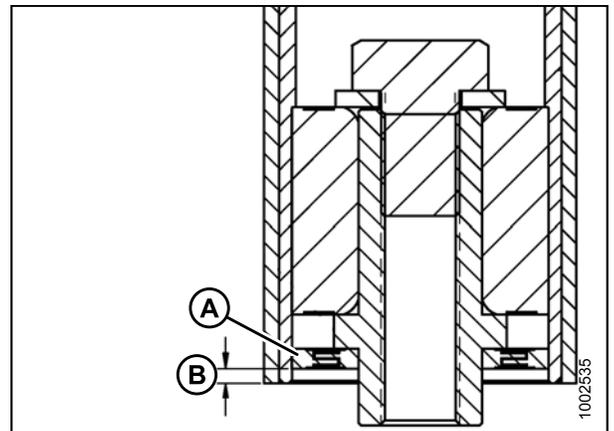


Figure 5.128: Idler Roller Bearing

6. Install the idler roller (A) between the idler arms and secure with two bolts (B). Torque bolts to 95 N·m (70 ft·lbf).

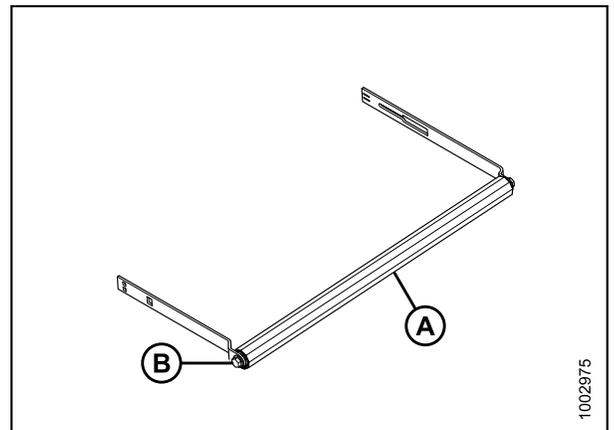


Figure 5.129: Idler Roller

### Installing Draper Idler Roller

1. Install the idler roller (A) into the channels on the draper deck (B).
2. Connect the ends of the draper together with the connector slat.

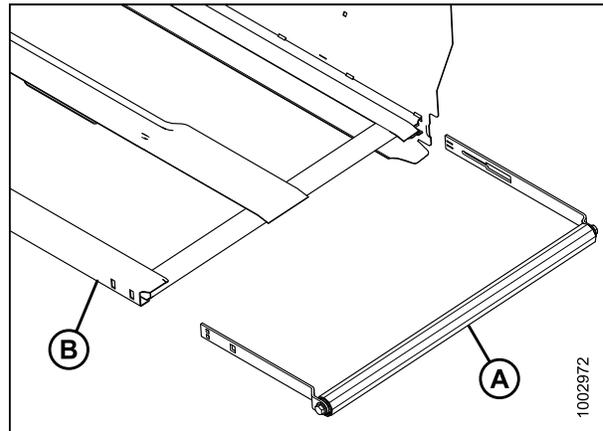


Figure 5.130: Idler Roller and Draper Deck

3. Tension the draper. Locate adjuster bolt (A) and follow the directions on the decal for proper draper tensioning or refer to [5.7.3 Adjusting Draper Tension, page 157](#).
4. Disengage the reel and header safety props.

**CAUTION**

Check to be sure all bystanders have cleared the area.

5. Start the engine and lower the header and reel.
6. Run machine to verify that draper tracks correctly. Refer to [5.7.4 Adjusting Draper Tracking, page 159](#) if further adjustment is necessary.

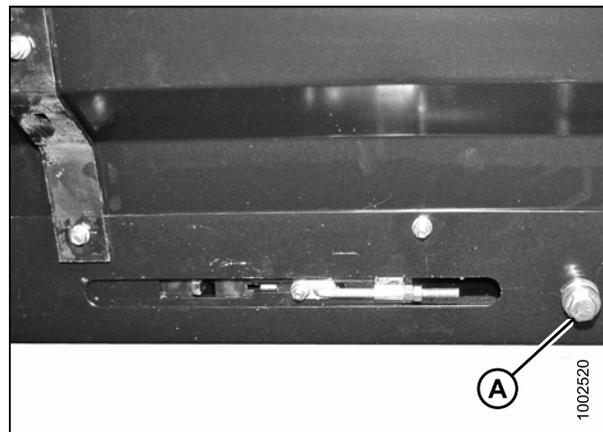


Figure 5.131: Tension Adjuster

### Draper Deck Drive Roller

#### Removing Draper Drive Roller

**DANGER**

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, always stop engine and remove key before leaving the operator's seat, and always engage safety props before going under the machine for any reason.

**NOTE:**

If the draper connector is not visible, engage the header until the connector is accessible (preferably close to the outboard end of the deck).

## MAINTENANCE AND SERVICING

1. Start the engine, raise the header, and raise the reel.
2. Stop the engine, and remove the key from the ignition.
3. Loosen the draper by turning the adjuster bolt (A) counterclockwise.

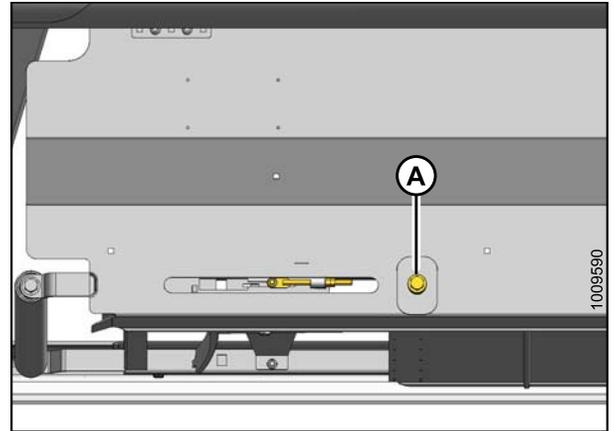


Figure 5.132: Tensioner

4. Remove the tube connectors (B), screws (A), and nuts from the draper joint to uncouple the draper.
5. Pull the draper off the drive roller.

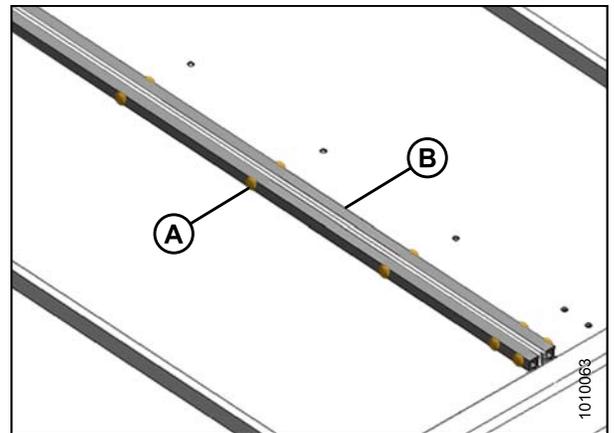


Figure 5.133: Draper Connector

6. Align the setscrews with the hole (A) in the guard. Remove the two setscrews holding the motor onto the drive roller.

**NOTE:**

The setscrews are 1/4 turn apart.

7. Remove the four bolts (B) securing the motor to the drive roller arm.

**NOTE:**

It may be necessary to remove the plastic shield (C) to gain access to the top bolt.

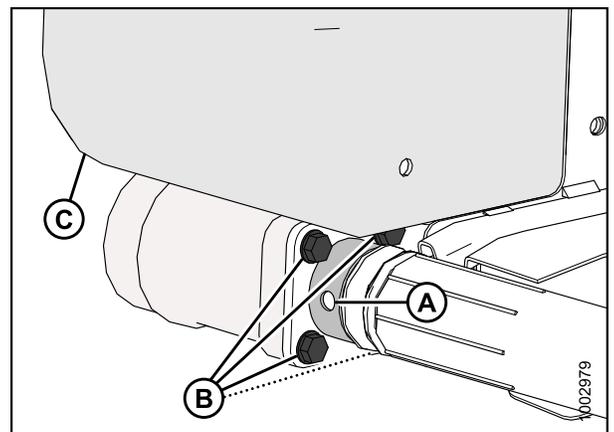


Figure 5.134: Drive Roller

## MAINTENANCE AND SERVICING

8. Remove the bolt (A) securing the opposite end of the drive roller (B) to the support arm.
9. Remove the drive roller (B).

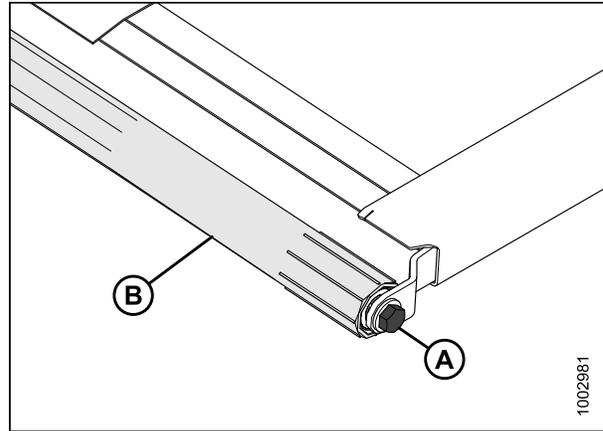


Figure 5.135: Drive Roller

### Replacing Draper Drive Roller Bearing

1. Remove draper idler roller assembly. Refer to [Removing Draper Drive Roller, page 166](#).
2. Remove bearing assembly (A) and seal (B) from roller tube (C) as follows:
  - a. Attach a slide hammer (D) to threaded shaft (E) in bearing assembly.
  - b. Tap out the bearing assembly (A) and seal (B).
3. Clean inside of roller tube (C). Check tube for wear or damage and replace if necessary.

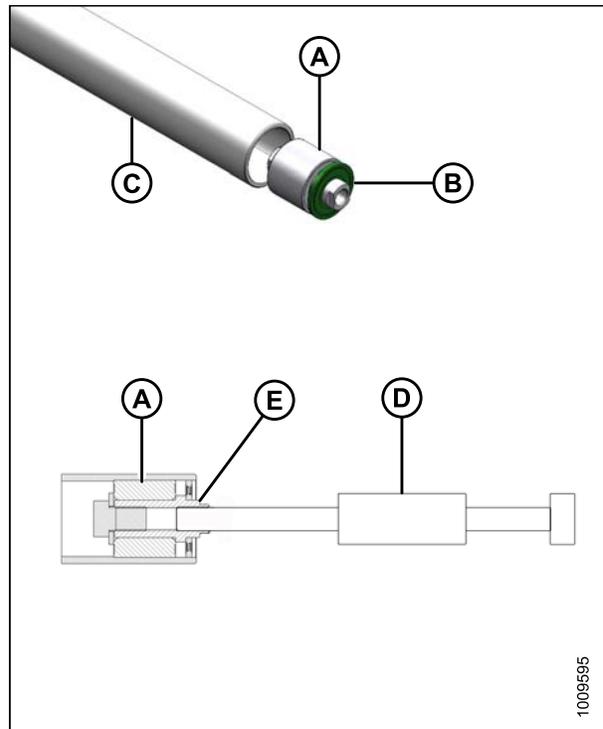


Figure 5.136: Drive Roller Bearing

## MAINTENANCE AND SERVICING

4. Install new bearing assembly (A) into roller by pushing on the outer race of the bearing. The bearing is properly positioned when a dimension of 14 mm (9/16 in.) (B) is achieved.
5. Apply approximately 8 pumps of high temperature extreme pressure (EP) performance with 1% max. Molybdenum Disulphide (NLGI Grade 2) lithium base grease in front of bearing.
6. Position seal (C) at roller opening, and position a flat washer (1.0 in. I.D. x 2.0 in. O.D.) onto seal.
7. Tap seal into roller opening using a suitable socket on the washer until it seats on the bearing assembly (A). Seal (C) is properly positioned when a dimension of 3 mm (1/8 in.) (D) is achieved.

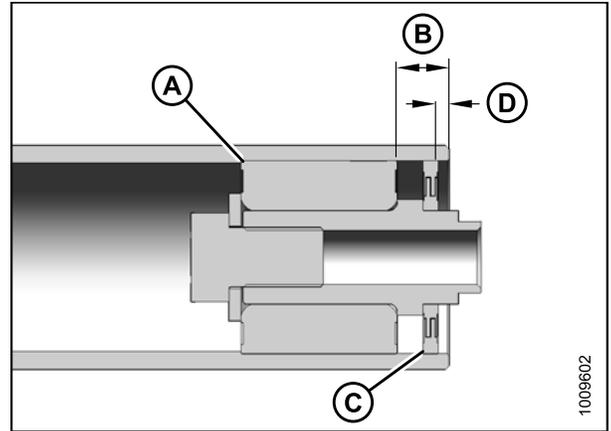


Figure 5.137: Drive Roller Bearing

### Installing Draper Drive Roller

1. Position the drive roller (B) between the roller support arms.
2. Install the bolt (A) to secure the drive roller to the arm closest to the cutterbar. Torque bolt to 95 N·m (70 ft·lbf).
3. Grease the motor shaft and insert into the end of the drive roller (B).

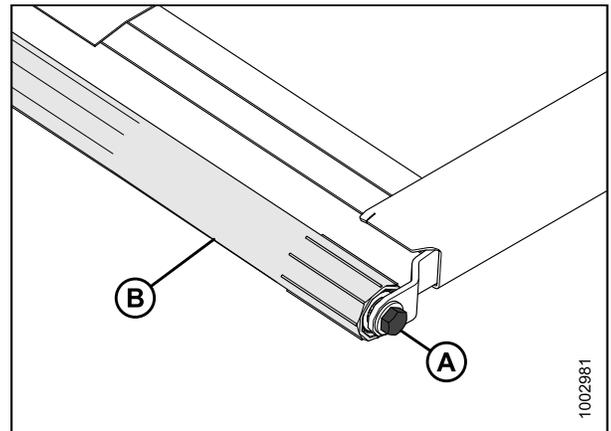


Figure 5.138: Drive Roller

4. Secure the motor to the roller support with four bolts (B). Torque to 27 N·m (20 ft·lbf).

#### NOTE:

Tighten any loosened bolts and reinstall the plastic shield (C) if previously removed.

5. Ensure the motor is all the way into the roller, and tighten the two setscrews (not shown) through the access hole (A).

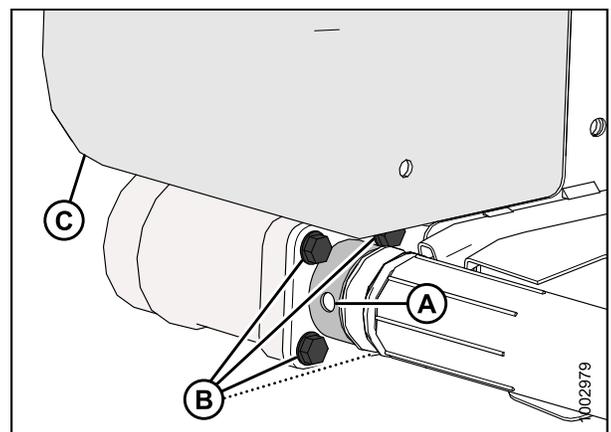


Figure 5.139: Drive Roller

## MAINTENANCE AND SERVICING

6. Wrap the draper over the drive roller and attach the ends of the draper using the tube connectors (B), screws (A), and nuts.

**NOTE:**

The heads of the screws must face the center opening.

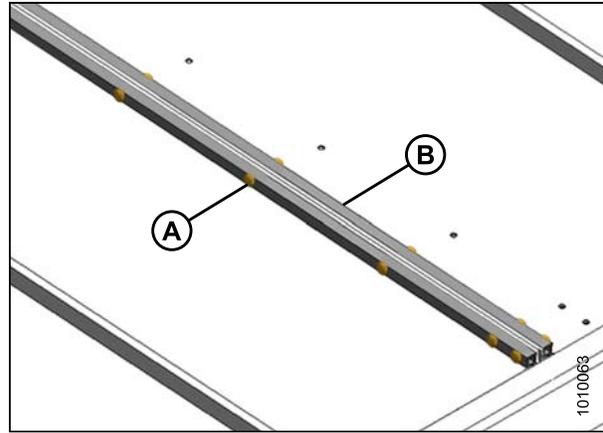


Figure 5.140: Draper Connector

7. Tension the draper. Locate adjuster bolt (A) and follow the directions on the decal for the proper draper tensioning or refer to [5.7.3 Adjusting Draper Tension, page 157](#).
8. Disengage the reel and header safety props.
9. Start the engine and lower the header and reel.
10. Run the machine to verify the draper tracks correctly. Refer to [5.7.4 Adjusting Draper Tracking, page 159](#) if further adjustment is necessary.

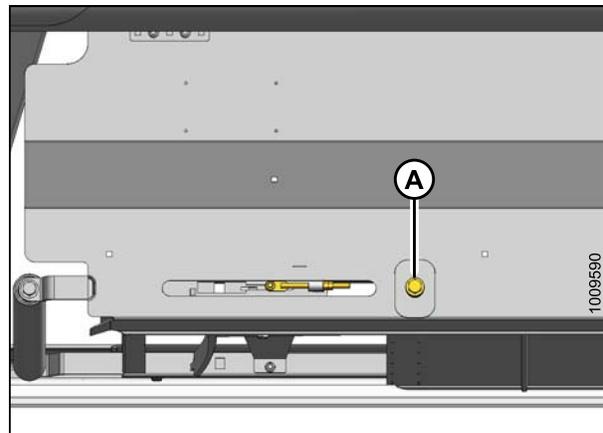


Figure 5.141: Draper Tensioner

### 5.7.7 Draper Deflectors

#### *Removing Wide Draper Deflectors*

#### **⚠ DANGER**

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, always stop engine and remove key before leaving the operator's seat, and always engage safety props before going under the machine for any reason.

1. Raise reel fully and lower header to ground.
2. Shift decks to create work space at one end of header if hydraulic deck shift is installed; otherwise, move decks manually after shutting down windrower.
3. Stop engine, remove key, and engage reel safety props.

## MAINTENANCE AND SERVICING

4. Open endshield. Refer to *Opening Endshields, page 31*.
5. Loosen nuts (A) on cutterbar until retainer (B) is loose.

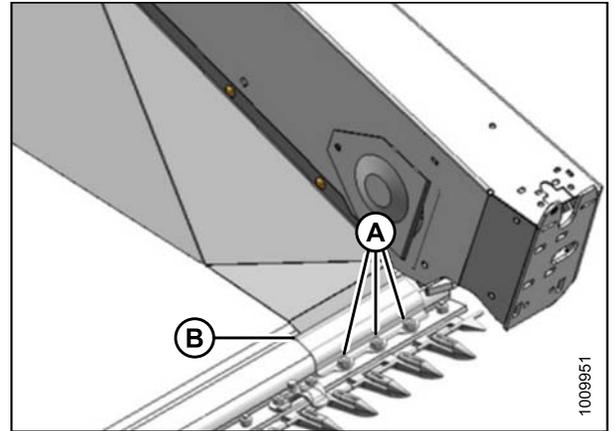


Figure 5.142: Deflector Retainer

6. Remove fasteners securing deflector to endsheet. Nuts (A) are accessible from the side of the endshield, and nuts (B) on the uppermost fasteners are accessible from behind deflector (C).
7. Remove deflector (C).

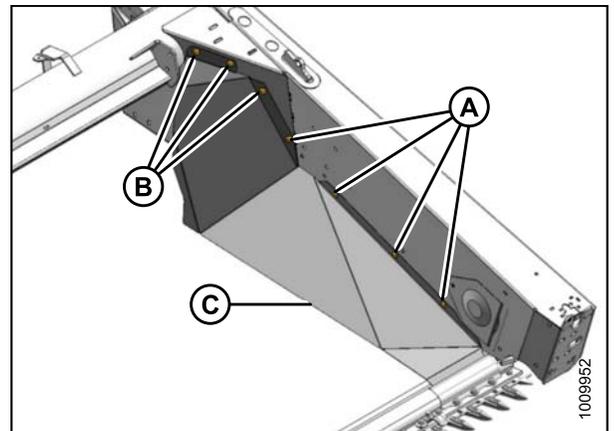


Figure 5.143: Wide Deflector

8. Remove bolts (A) and remove deflector support (B).
9. Replace lower bolt (A) (if not reinstalling support [B]) to secure belt guide (C) to opposite side of endsheet.
10. Repeat for opposite end of header.

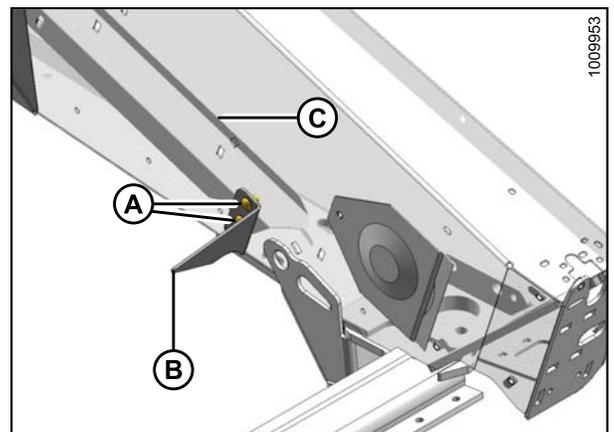


Figure 5.144: Deflector Support

### *Installing Wide Draper Deflectors*

#### **DANGER**

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, always stop engine and remove key before leaving the operator's seat, and always engage safety props before going under the machine for any reason.

## MAINTENANCE AND SERVICING

1. Raise reel fully and lower header to ground.
2. Shift decks to create work space at one end of header if hydraulic deck shift is installed; otherwise, move decks manually after shutting down windrower.
3. Stop engine, remove key, and engage reel safety props.
4. Open endshield. Refer to [Opening Endshields, page 31](#).
5. Loosen nuts (A) on cutterbar until retainer (B) is loose.
6. Remove existing bolt securing belt guide (C) to opposite side of endsheet.
7. Position support (D) as shown and secure with bolt (E) and lock nut.
8. Install a second 3/8 x 3/4 in. carriage bolt (F) and lock nut. Do not tighten bolts.

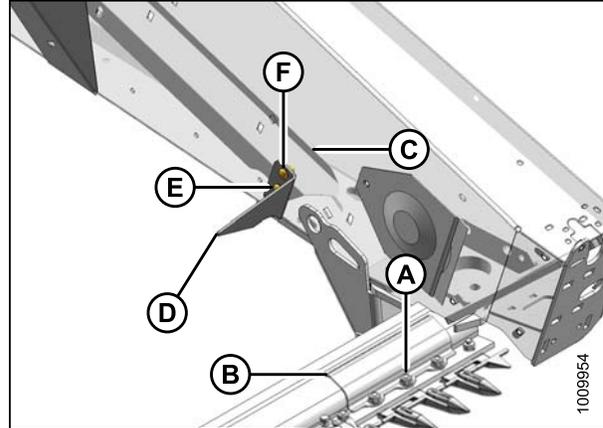


Figure 5.145: Deflector Support

9. Position deflector (A) as shown and adjust forward edge for best fit on cutterbar. Slide deflector under retainer (B).
10. Loosely install seven 3/8 x 3/4 in. carriage bolts (C) with lock nuts to attach deflector (A) to endsheet. Bolt heads must face inboard.
11. Adjust position of deflector (A) to achieve the best fit at the cutterbar and aft edge. Tighten bolts (C) to maintain best fit.
12. Tighten bolts (D) on retainer (B). Torque to 88 N·m (65 ft·lbf).

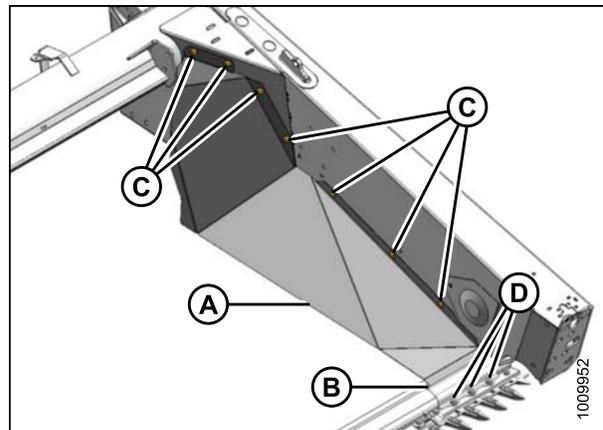


Figure 5.146: Wide Deflector

13. Adjust position of support (A) so the tip contacts deflector (B). Tighten bolts (C).
14. Repeat for opposite end of header.

**NOTE:**

Draper deflector may be damaged by reel tines if reel height is set incorrectly. Refer to [3.7.8 Reel Height, page 53](#).

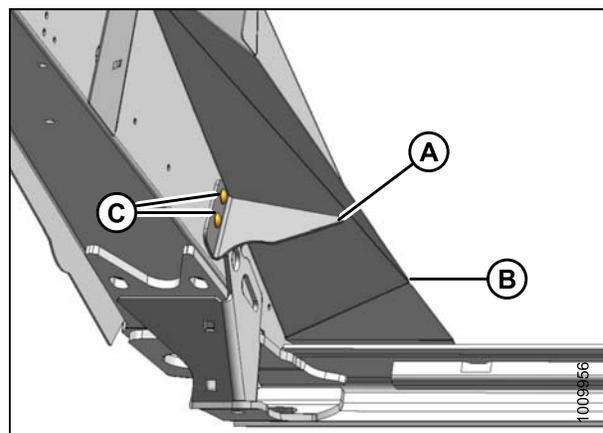


Figure 5.147: Deflector Support

### Removing Narrow Draper Deflectors

Narrow draper deflectors can replace wide deflectors if bunching occurs at the ends of the header when decks are set for center delivery.

#### **DANGER**

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, always stop engine and remove key before leaving the operator's seat, and always engage safety props before going under the machine for any reason.

1. Raise the reel to its full height and lower the header to the ground.
2. Shift the decks to create a work space at one end of the header if hydraulic deck shift is installed; otherwise, move the decks manually after shutting down the windrower.
3. Stop the engine, remove the key, and engage the reel safety props.
4. Open the endshield. Refer to [Opening Endshields, page 31](#).
5. Remove two Torx® head screws (A) and lock nuts.
6. Remove three carriage bolts (B) and lock nuts and remove the aft deflector (C).

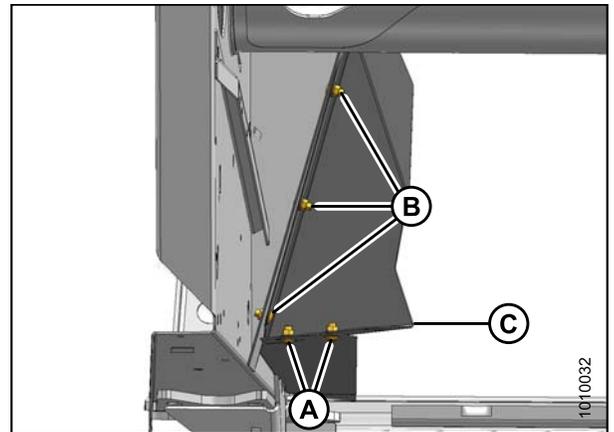


Figure 5.148: Aft Deflector

7. Remove four screws (A) and remove the deflector (B).
8. Repeat for the opposite end of the header.

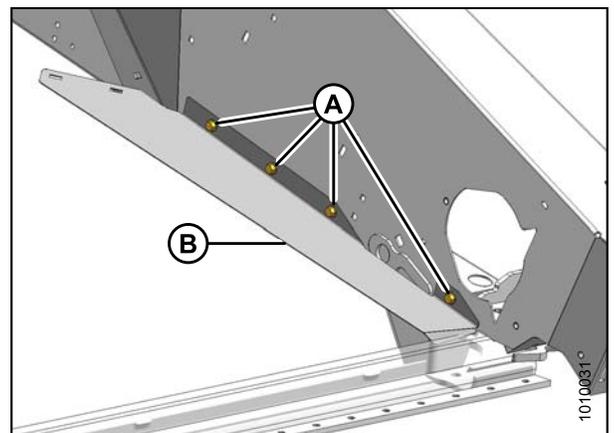


Figure 5.149: Forward Deflector

### Installing Narrow Draper Deflectors

Narrow draper deflectors can replace wide deflectors if bunching occurs at the ends of the header when decks are set for center delivery.

#### DANGER

To avoid bodily injury or death from unexpected start-up or fall of a raised machine, always stop engine and remove key before leaving the operator's seat, and always engage safety props before going under the machine for any reason.

1. Raise the reel to its full height and lower the header to the ground.
2. Shift the decks to create a work space at one end of the header if hydraulic deck shift is installed; otherwise, move the decks manually after shutting down the windrower.
3. Stop the engine, remove the key, and engage the reel safety props.
4. Open the endshield. Refer to [Opening Endshields, page 31](#).
5. Position the forward deflector (B) onto the endsheet and temporarily install forward and aft 3/8 x 5/8 in. self tapping screws (A).
6. Check the fit of the forward end of the deflector (B) on the cutterbar and ensure there is no gap between the deflector and cutterbar. Remove and bend the deflector as required to obtain the best fit.
7. Install two 3/8 x 5/8 in. self tapping screws (A) and tighten all four screws.
8. Position the aft deflector (C) as shown and install three 3/8 x 3/4 in. carriage bolts (B) and lock nuts.
9. Install two Torx® head screws (A) and lock nuts with the heads facing down.
10. Tighten all fasteners.
11. Repeat for the opposite end of the header.

**NOTE:**

Draper deflector may be damaged by reel tines if reel height is set incorrectly. Refer to [3.7.8 Reel Height, page 53](#).

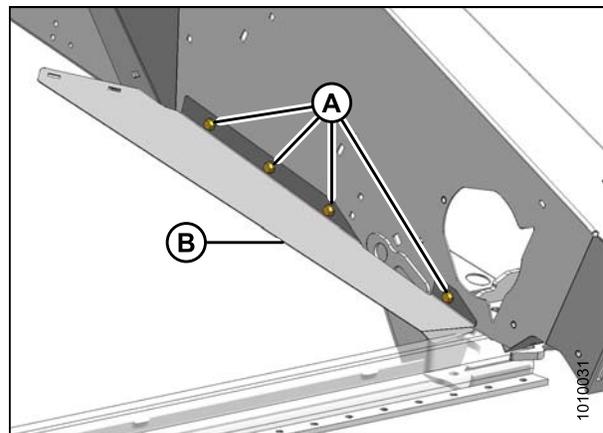


Figure 5.150: Forward Deflector

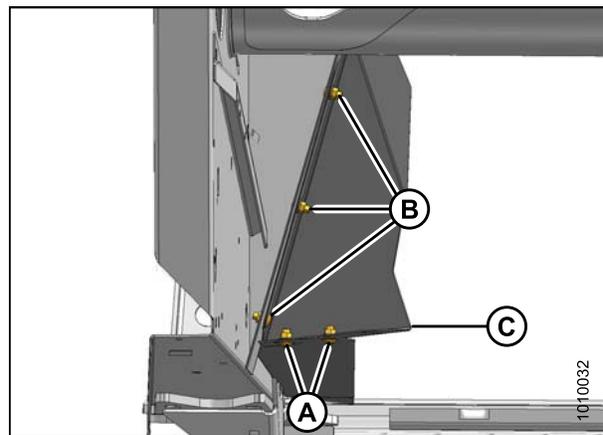


Figure 5.151: Aft Deflector

## 5.8 Reel

### CAUTION

To avoid personal injury, before servicing machine or opening drive covers, refer to [5.1 Preparing Machine for Servicing, page 97](#).

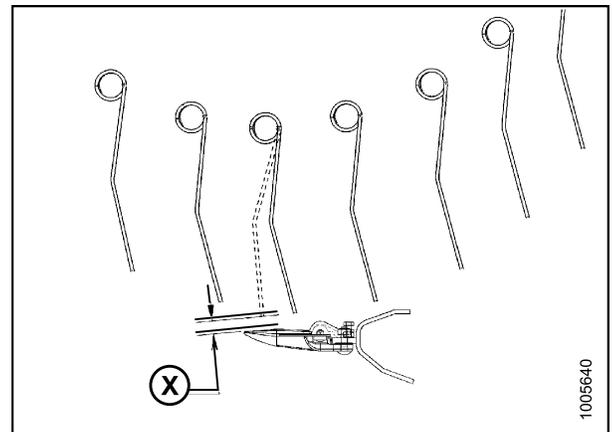
### 5.8.1 Reel Clearance to Cutterbar

The minimum clearance between the reel fingers and the cutterbar ensures that the reel fingers do not contact the cutterbar during operation. The clearance is set at the factory, but some adjustment may be necessary before operation.

The finger to guard/cutterbar clearances with reels fully lowered are shown in [Table 5.6 Finger to Guard/Cutterbar Clearance, page 175](#).

**Table 5.6 Finger to Guard/Cutterbar Clearance**

Header Width	(X) 3 mm (+/- 1/8 in.) at Reel Ends	
	Single Reel	Double Reel
25 ft.	25 mm (1 in.)	
30 ft.	45 mm (1-3/4 in.)	—
35 ft.	60 mm (2-3/8 in.)	20 mm (3/4 in.)
40 ft.	—	
45 ft.	—	



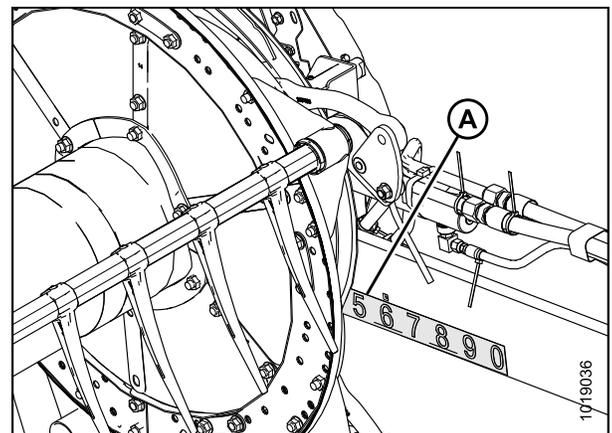
**Figure 5.152: Finger Clearance**

### *Measuring Reel Clearance*

### DANGER

To avoid bodily injury or death from unexpected start-up or fall of raised machine, always stop engine, remove key, and engage safety props before going under header for any reason.

1. Park the header on level ground.
2. Set the fore-aft position to the middle position (5) on the fore-aft position decal (A).
3. Lower the reel fully.
4. Shut down the engine and remove key from the ignition.



**Figure 5.153: Fore-Aft Position**

## MAINTENANCE AND SERVICING

5. Measure the clearance (X) at all possible points of contact between points (B) and (C) at the ends of each reel (A).

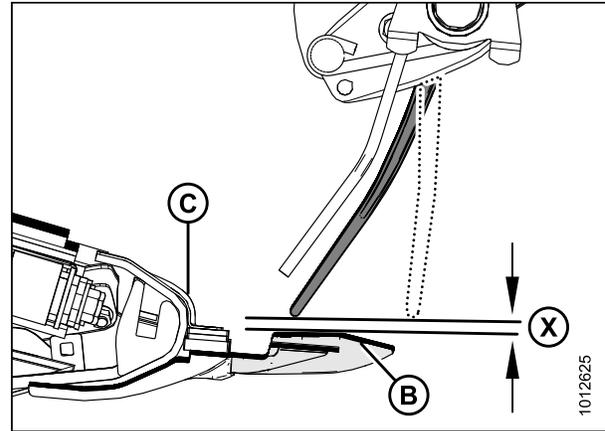
**NOTE:**

The reel is factory-set to provide more clearance at the center of the reel than at the ends (frown) to compensate for reel flexing.

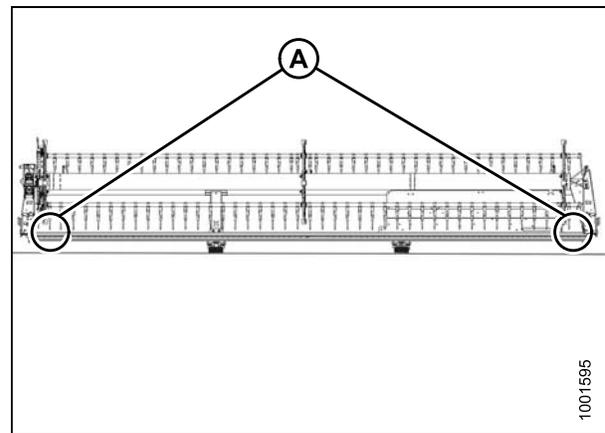
**NOTE:**

When measuring reel clearance at the center of a double reel header, measure the lowest reel.

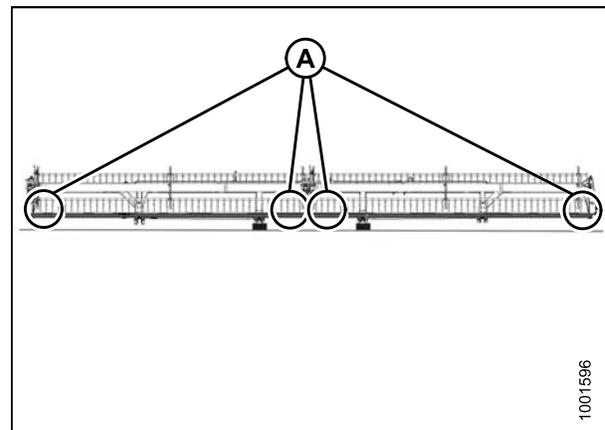
6. Check all possible points of contact between points (B) and (C). Depending on the reel fore-aft position, minimum clearance can result at the guard tine, hold-down, or cutterbar.
7. Adjust the reel if necessary. Refer to [Adjusting Reel Clearance, page 176](#).



**Figure 5.154: Reel Clearance**



**Figure 5.155: Single Reel Measurement Locations (Two Places)**



**Figure 5.156: Double Reel Measurement Locations (Four Places)**

### *Adjusting Reel Clearance*

**⚠ DANGER**

To avoid bodily injury or death from unexpected start-up or fall of raised machine, always stop engine, remove key, and engage safety props before going under header for any reason.

## MAINTENANCE AND SERVICING

### IMPORTANT:

After setting the recommended reel clearance to cutterbar, while reel is still fully lowered, move reel back to ensure steel end fingers do NOT contact deflector shields. If contact is detected, adjust reel upward until contact to deflector shields is avoided at all reel fore/aft positions. Alternatively, with the reel fully lowered, trim the steel end fingers until contact to deflector shields is avoided at all reel fore/aft positions. Periodically monitor to ensure contact is avoided and repeat procedure if necessary.

1. Stop the engine and remove the key.
2. Adjust outboard reel arm lift cylinders to set clearance at outboard ends of reel as follows:
  - a. Loosen bolt (A).
  - b. Turn cylinder rod (B) out of clevis to raise reel and increase clearance to cutterbar, or turn cylinder rod into clevis to lower reel and decrease clearance.
  - c. Tighten bolt (A).
  - d. Repeat at opposite side.

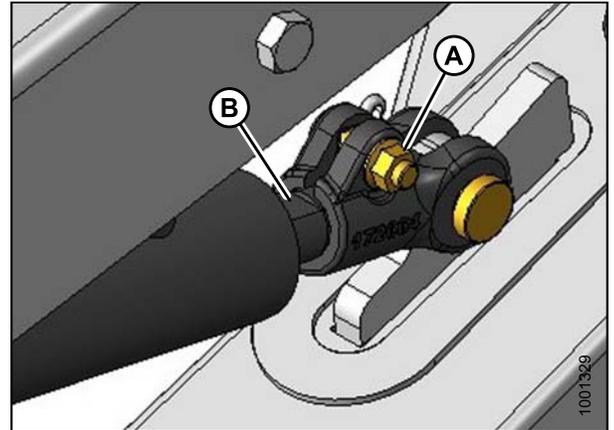


Figure 5.157: Outside Reel Arm

3. **For double reel only:** Adjust center arm lift cylinder stop (A) to change clearance at inboard ends of reels as follows:

### NOTE:

Instructions apply to double-reel headers only and are performed from the underside of the arm.

- a. Loosen nut (B).
  - b. Turn nut (C) counterclockwise to raise reel and increase clearance to cutterbar, or clockwise to lower reel and decrease clearance.
  - c. Tighten nut (B).
4. Check measurements and if necessary, repeat adjustment procedures.

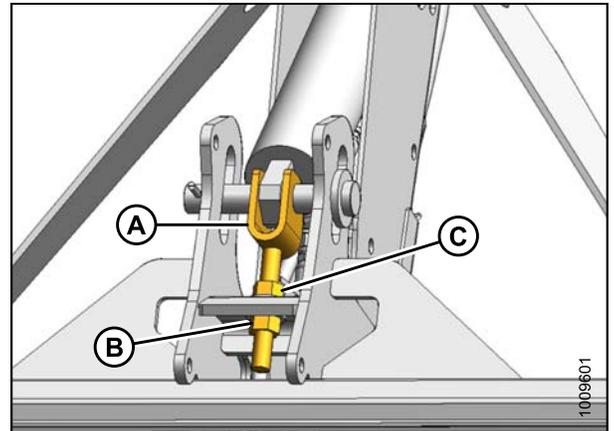


Figure 5.158: Underside of Center Arm

### 5.8.2 Reel Frown

The reel is factory-set to frown (provide more clearance at the center of the reel than at the ends) to compensate for reel flexing.

#### Adjusting Reel Frown



### WARNING

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

## MAINTENANCE AND SERVICING

Adjust the frown by repositioning the hardware connecting the reel tube arms to the reel discs.

### NOTE:

Measure the frown profile before disassembling the reel for servicing so the profile can be maintained during reassembly.

1. Position the reel over the cutterbar (between 4 and 5 on the fore-aft position decal) (A) to provide adequate clearance at all reel fore-aft positions.
2. Record the measurement at each reel disc location for each reel tube.
3. Shut down the engine and remove the key from the ignition.

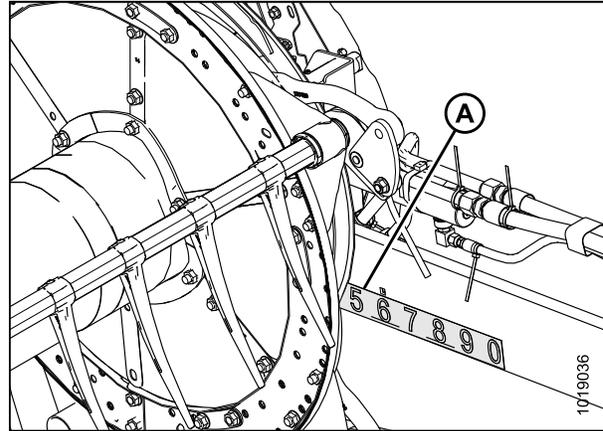


Figure 5.159: Fore-Aft Position Decal

4. Start with the reel disc closest to the center of the header and proceed outward towards the ends adjusting the header profile as follows:
  - a. Remove bolts (A).
  - b. Loosen the bolt (B) and adjust arm (C) until the desired measurement is obtained between the reel tube and cutterbar.

### NOTE:

Allow the reel tubes to curve naturally and position the hardware accordingly.

- c. Reinstall the bolts (A) in the aligned holes and tighten.

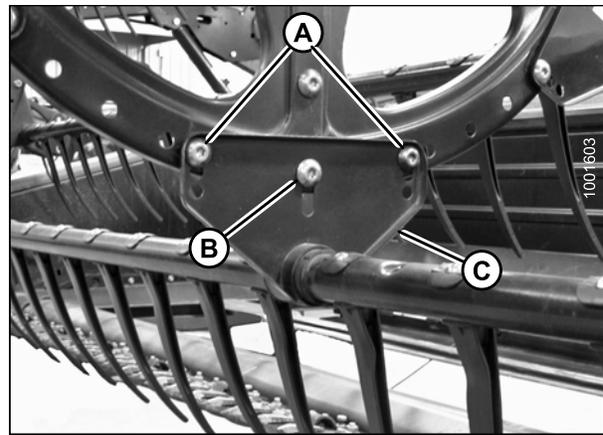


Figure 5.160: Reel Arm

### 5.8.3 Centering the Reel

To check and center the reel, follow these steps:

#### **DANGER**

To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.

#### **CAUTION**

Never start or move the machine until you are sure all bystanders have cleared the area.

*Centering Double Reels*

**⚠ WARNING**

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

1. Loosen bolts (A) on each brace (B) located on both sides of the reel support arm (C).
2. Move the forward end of the reel center support arm (C) laterally as required, to center both reels.
3. Tighten bolts (A) and torque to 359 N·m (265 ft·lbf).

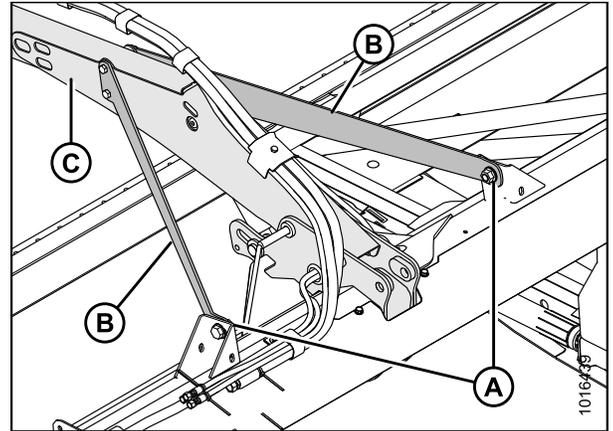


Figure 5.161: Reel Center Support Arm

*Centering Single Reels*

**⚠ WARNING**

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

1. Loosen bolt (A) on the brace (B) at both ends of the reel.
2. Move the forward end of the reel support arm (C) laterally as required, to center the reel.
3. Tighten bolts (A) and torque to 359 N·m (265 ft·lbf).

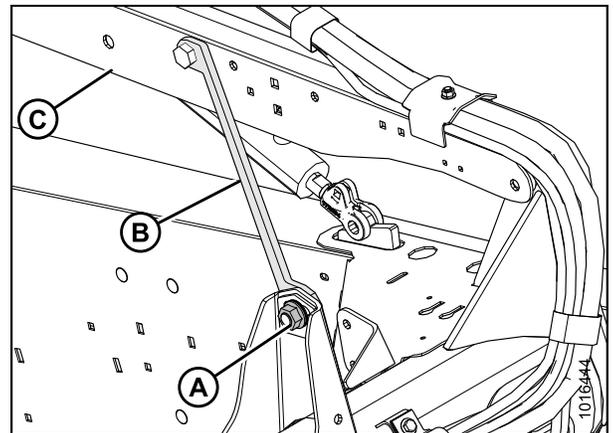


Figure 5.162: Reel Support Arm

## 5.8.4 Reel Fingers

**IMPORTANT:**

Keep the reel fingers in good condition and straighten or replace them as necessary.

*Removing Steel Fingers*

**⚠ WARNING**

To avoid bodily injury from fall of raised reel, always engage reel safety props before going under raised reel for any reason.

**IMPORTANT:**

Ensure the tine tube is supported at all times to prevent damage to the tube and other components.

1. Lower the header, raise the reel, and engage the reel safety props.
2. Shut down the engine and remove the key from the ignition.
3. Remove the tine tube bushings from the applicable tine tube at the center and left reel discs. Refer to [Removing Bushings from Five-, Six-, or Nine-Bat Reels, page 182](#).
4. Attach reel arms (B) (temporarily) to the reel disc at the original attachment locations (A).
5. Cut the damaged finger so it can be removed from the tine tube.
6. Remove bolts from the existing fingers and slide the fingers over to replace the finger that was cut off in Step 4., [page 180](#) (remove the reel arms [B] from the tine tubes as necessary).

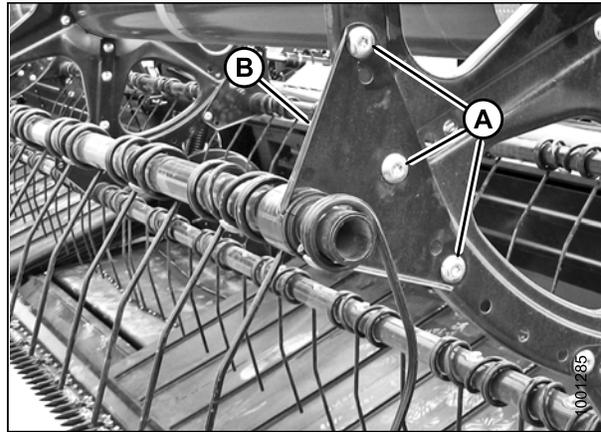


Figure 5.163: Reel Arm

*Installing Steel Fingers*

**⚠ WARNING**

To avoid bodily injury from fall of raised reel, always engage reel safety props before going under raised reel for any reason.

**IMPORTANT:**

Ensure the tine tube is supported at all times to prevent damage to the tube and other components.

1. Remove the applicable finger. Refer to [Removing Steel Fingers, page 180](#).
2. Slide the new fingers and reel arm (A) onto the end of the tube.
3. Install the tine tube bushings. Refer to [5.8.5 Tine Tube Bushings, page 182](#).
4. Attach the fingers to the tine bar with bolts and nuts (B).

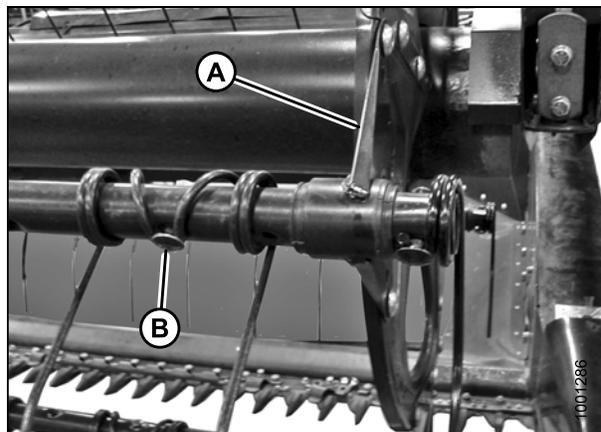


Figure 5.164: Tine Tube

*Removing Plastic Fingers*

**⚠ WARNING**

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

**⚠ WARNING**

To avoid bodily injury from fall of raised reel, always engage reel safety props before going under raised reel for any reason.

1. Shut down the engine and remove key from the ignition.
2. Remove screw (A) using a Torx® Plus 27 IP socket wrench.

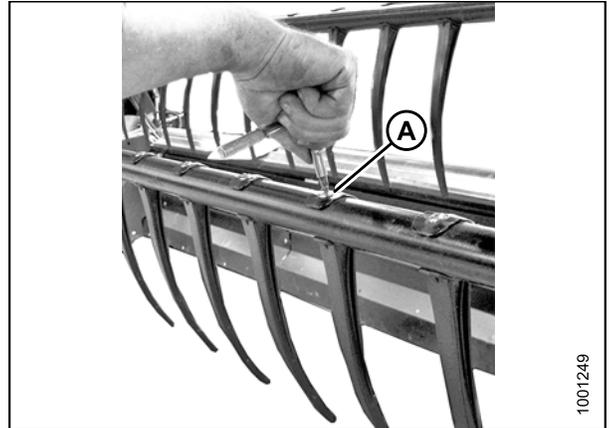


Figure 5.165: Removing Plastic Finger

3. Push the clip at the top of the finger back towards the reel tube and remove the finger from the tube.

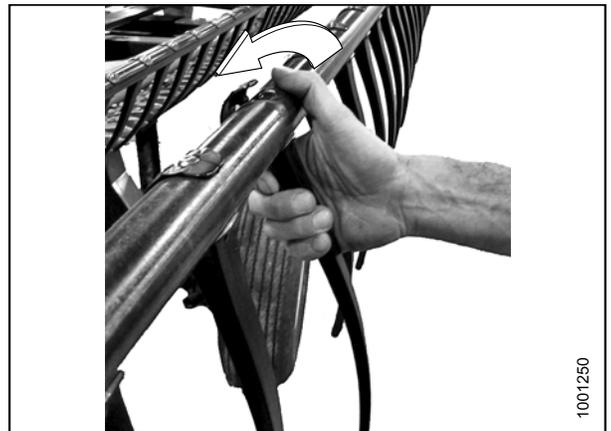


Figure 5.166: Removing Plastic Finger

*Installing Plastic Fingers*

**⚠ WARNING**

To avoid bodily injury from fall of raised reel, always engage reel safety props before going under raised reel for any reason.

## MAINTENANCE AND SERVICING

1. Position the finger on the rear of the finger tube and engage the lug at the bottom of the finger in the lower hole in the finger tube.
2. Lift the top flange gently and rotate the finger until the lug in the top of the finger engages the upper hole in the finger tube.



Figure 5.167: Installing Finger

### IMPORTANT:

Do **NOT** apply force to the finger prior to tightening the mounting screw. Applying force without tightening the mounting screw will break the finger or shear the locating pins.

3. Install the screw (A) using a Torx® Plus 27 IP socket wrench and torque to 8.5–9.0 N·m (75–80 in·lbf).

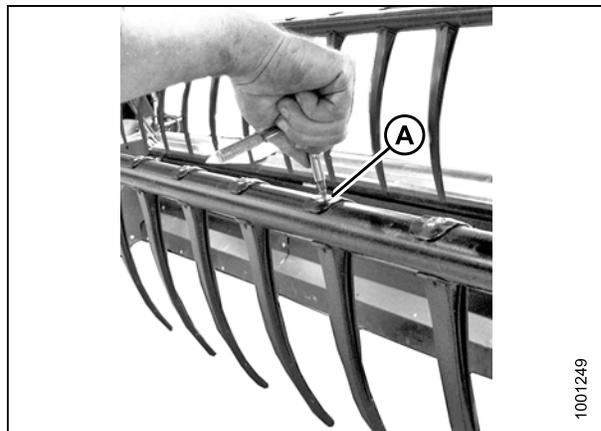


Figure 5.168: Installing Finger

## 5.8.5 Tine Tube Bushings

### *Removing Bushings from Five-, Six-, or Nine-Bat Reels*

#### **WARNING**

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

#### **WARNING**

To avoid bodily injury from fall of raised reel, always engage reel safety props before going under raised reel for any reason.

### IMPORTANT:

Ensure the tine tube is supported at all times to prevent damage to the tube and other components.

1. Lower the header, raise the reel, and engage the reel safety props.
2. Shut down the engine, and remove the key from the ignition.

### NOTE:

If replacing only the cam end bushing, refer to Step [8.](#), [page 184.](#)

**Center disc and tail-end bushings**

3. Remove the reel endshields and endshield support (C) from the tail end of the reel at the applicable tine tube location.

**NOTE:**

There are no endshields on the center disc.

4. Remove bolts (A) securing arm (B) to the disc.

**IMPORTANT:**

Note the hole locations in the arm and disc and ensure the bolts (A) are reinstalled at the original locations.

5. Release the bushing clamps (A) using a small screwdriver to separate the serrations. Pull the clamp off the tine tube.

6. Rotate the arm (A) until clear of the disc and slide the arm inboard off of bushing (B).

7. Remove the bushing halves (B). If required, remove the next tine or plastic finger so the arm can slide off the bushing. Refer to the following procedures as necessary:

- [Removing Plastic Fingers, page 181](#)
- [Removing Steel Fingers, page 180](#)

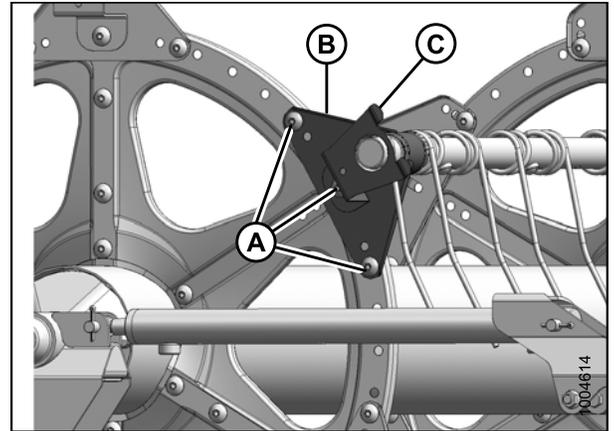


Figure 5.169: Tail End

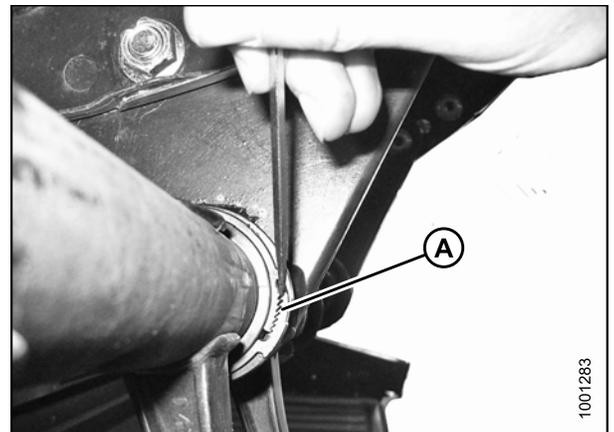


Figure 5.170: Bushing Clamp

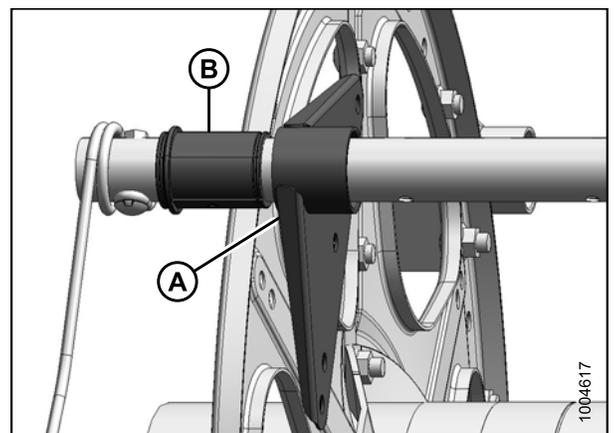


Figure 5.171: Bushing

## MAINTENANCE AND SERVICING

### Cam end bushings

8. Remove the endshields and endshield support (A) at the applicable tine tube location on the cam end.

**NOTE:**

Removing cam end bushings requires the tine tube be moved through the disc arms to expose the bushing.

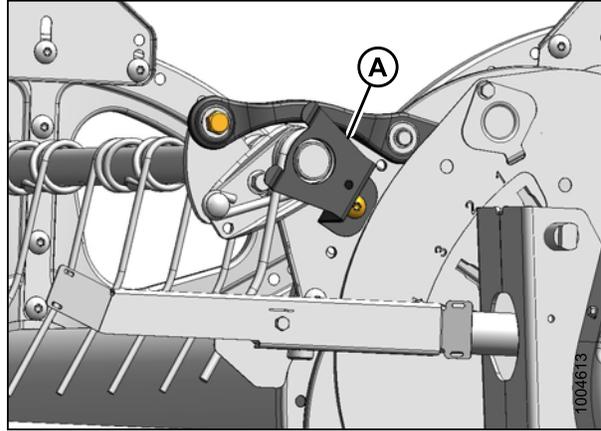


Figure 5.172: Cam End

9. Remove the reel endshields and endshield support (C) from the tail end of the reel at the applicable tine tube location.

**NOTE:**

There are no endshields on the center disc.

10. Remove the bolts (A) securing the arms (B) to the tail and center discs.

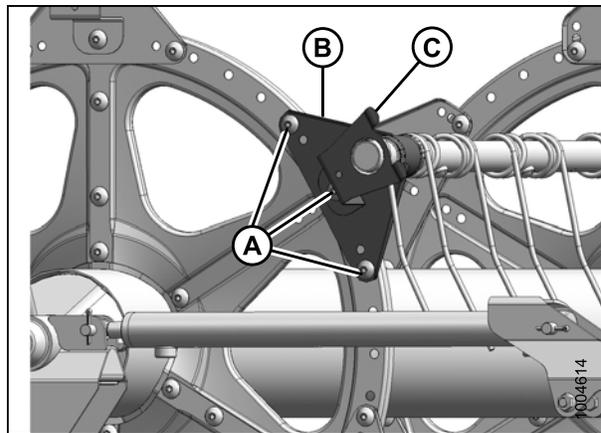


Figure 5.173: Tail End

11. Release the bushing clamps or disconnect the support channels from the tine tube support (if installed) depending on which tine tube is being moved. Three tine tubes (B) require channel disconnection and two tine tubes (C) require only bushing clamp removal.

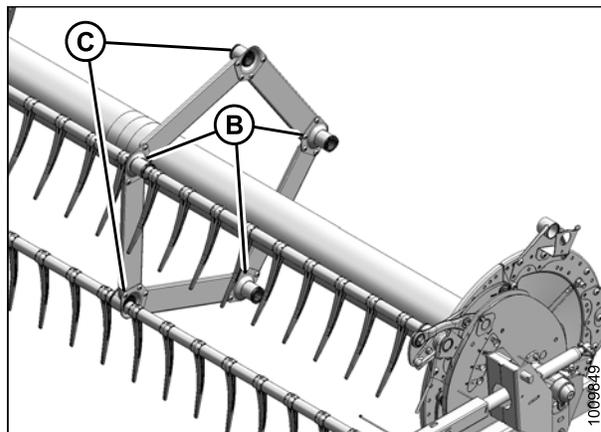


Figure 5.174: Tine Tube Supports

## MAINTENANCE AND SERVICING

12. Remove bolt (A) from the cam linkage so the tine tube (B) is free to rotate.

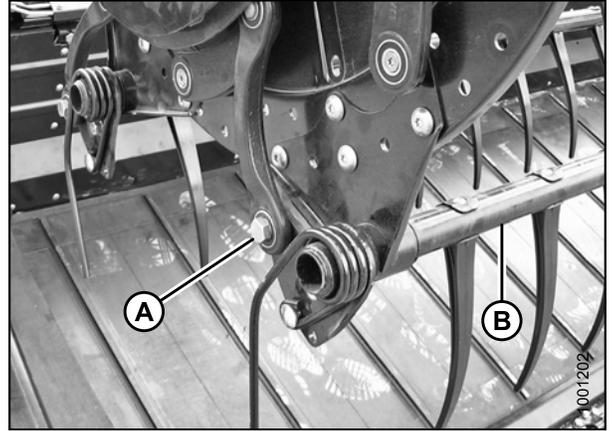


Figure 5.175: Cam End

13. Release the bushing clamps (A) at the cam disc using a small screwdriver to separate the serrations. Move the clamps off the bushings.

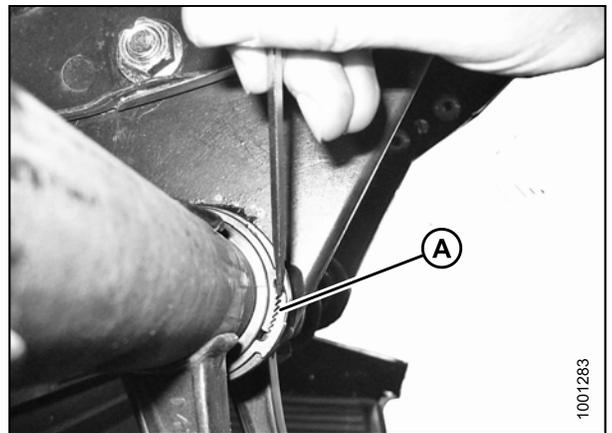


Figure 5.176: Bushing Clamp

14. Slide the tine tube (A) outboard to expose the bushing (B).
15. Remove the bushing halves (B). If required, remove the next tine or plastic finger so the arm can slide off the bushing. Refer to the following procedures if necessary:
  - [Removing Plastic Fingers, page 181](#)
  - [Removing Steel Fingers, page 180](#)

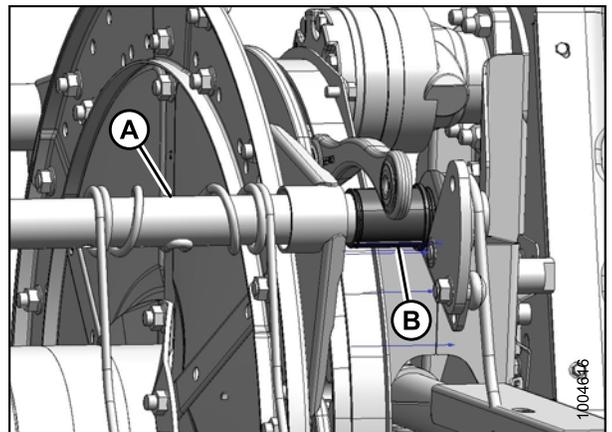
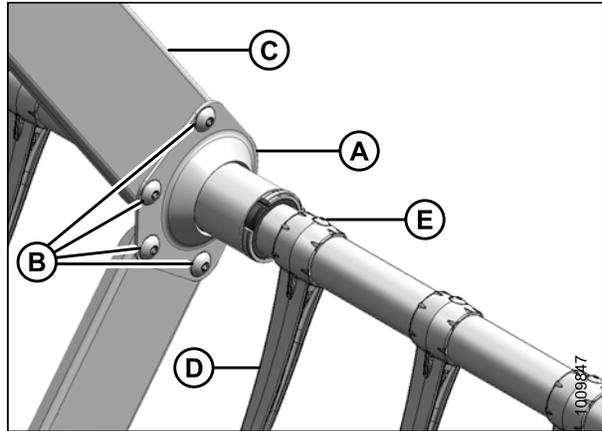


Figure 5.177: Cam End

## MAINTENANCE AND SERVICING

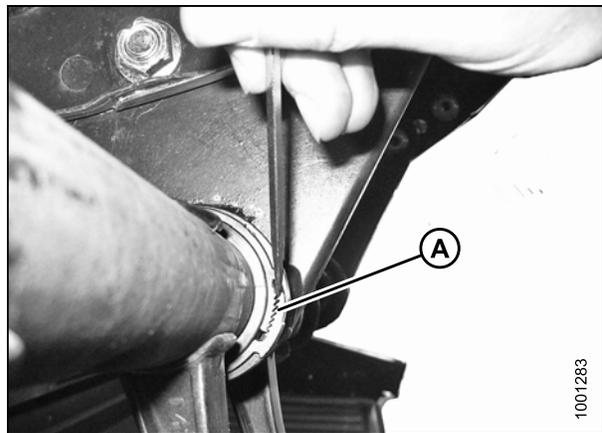
### *Tine tube bushings (if installed)*

16. Locate the support (A) that requires a new bushing.
17. Remove the four bolts (B) securing channels (C) to the support (A).
18. Remove screw (E) and remove the finger (D) if it is too close to the support to allow access to the bushing. Refer to [Removing Plastic Fingers, page 181](#).

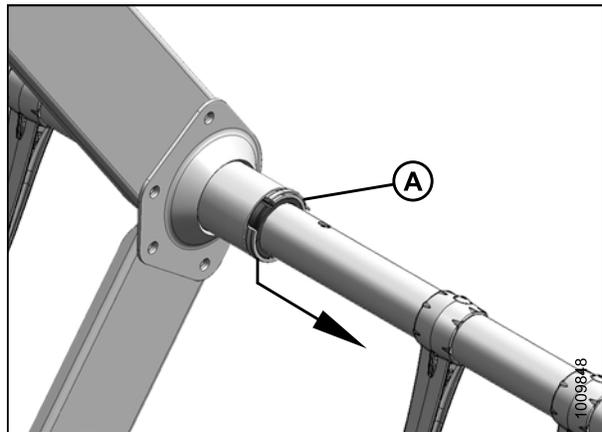


**Figure 5.178: Tine Tube Support**

19. Release the bushing clamps (A) using a small screwdriver to separate the serrations. Move the clamps off the bushings.



**Figure 5.179: Bushing Clamp**



**Figure 5.180: Bushing Clamp**

## MAINTENANCE AND SERVICING

20. Slide the support (A) off the bushing halves (B).

**NOTE:**

Two tine tubes have opposite supports (C).  
Rotate the supports until the flanges clear the channels before moving them off the bushing (B).  
Move the tine tube outwards slightly if necessary.

21. Remove the bushing halves (B).

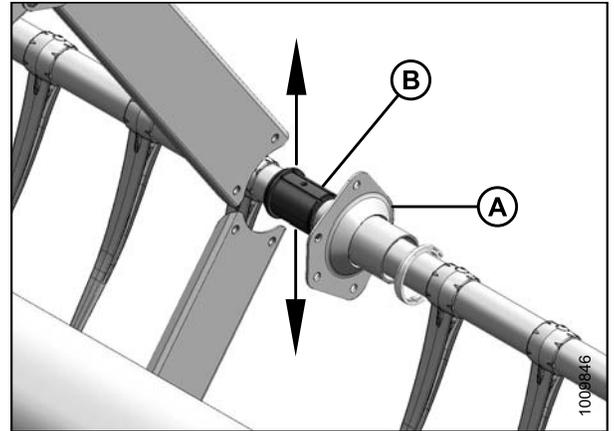


Figure 5.181: Support

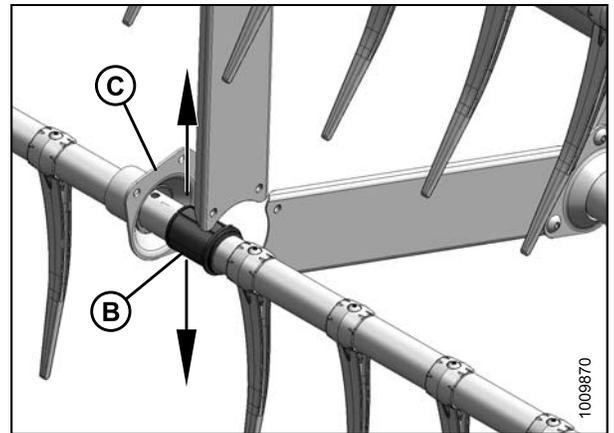


Figure 5.182: Opposite Support

### *Installing Bushings on Five-, Six-, or Nine-Bat Reels*

**⚠ WARNING**

To avoid bodily injury from fall of raised reel, always engage reel safety props before going under raised reel for any reason.

**IMPORTANT:**

Ensure tine tube is supported at all times to prevent damage to the tube or other components.

## MAINTENANCE AND SERVICING

### NOTE:

Use a pair of modified channel lock pliers (A) to install bushing clamps (C). Secure pliers in a vice and grind a notch (B) into the end of each arm to fit the clamp as shown.

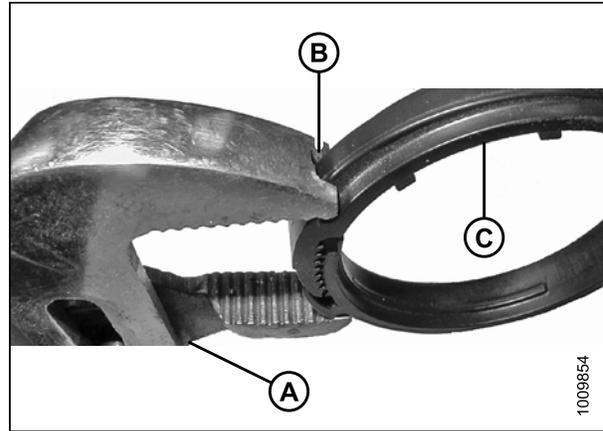


Figure 5.183: Modified Pliers

### Cam end bushings

1. Position the bushing halves (B) on the tine tube with the flangeless end adjacent to the reel arm, and position the lug in each bushing half into the hole in the tine tube.
2. Slide the tine tube (A) towards the tail end of the reel to insert the bushing (B) into the reel arm. If the tine tube supports are installed, ensure the bushings at those locations slide into the support.
3. Reinstall the previously removed fingers or tines. Refer to the following procedures as necessary:
  - [Removing Plastic Fingers, page 181](#)
  - [Removing Steel Fingers, page 180](#)
4. Install the bushing clamp (A) onto the tine tube adjacent to the flangeless end of the bushing (B).
5. Position the clamp (A) on the bushing (B) so the edges of the clamp and bushing are flush when the clamp is fit into the groove on the bushing and the lock tabs are engaged.

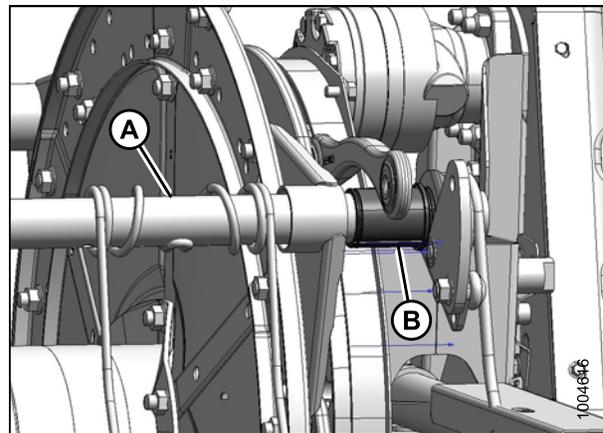


Figure 5.184: Cam End

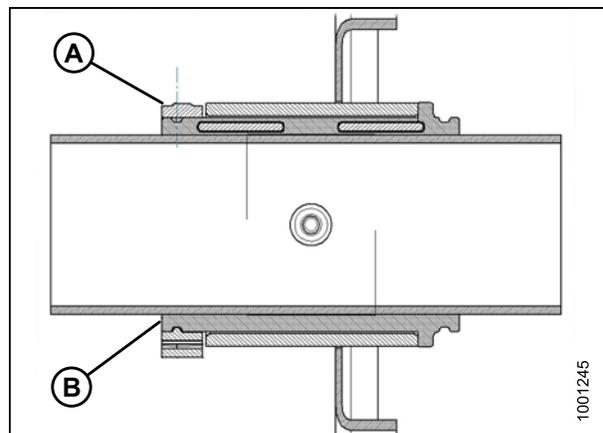


Figure 5.185: Bushing

## MAINTENANCE AND SERVICING

6. Tighten the clamp (A) using modified channel lock pliers (B) until finger pressure will **NOT** move the clamp.

**IMPORTANT:**

Over-tightening clamp may result in breakage.

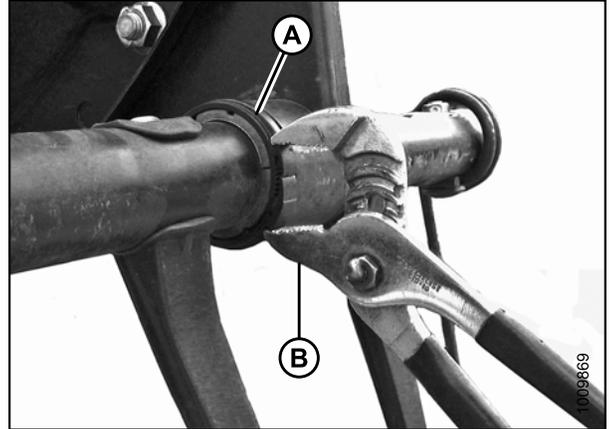


Figure 5.186: Installing Clamp

7. Line up the tine bar (B) with the cam arm and install bolt (A). Torque bolt to 165 N·m (120 ft·lbf).

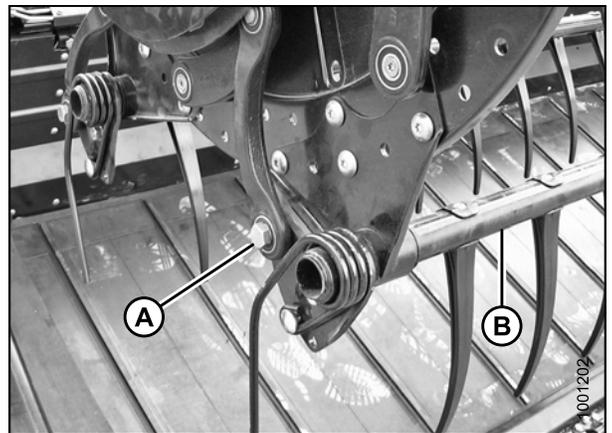


Figure 5.187: Cam End

8. Install the bolts (A) securing the arm (B) to the center disc.
9. Install the reel arm (B) and endshield support (C) to the tail end of the reel at the applicable tine tube location and secure with bolts (A).

**NOTE:**

There are no endshields on the center discs.

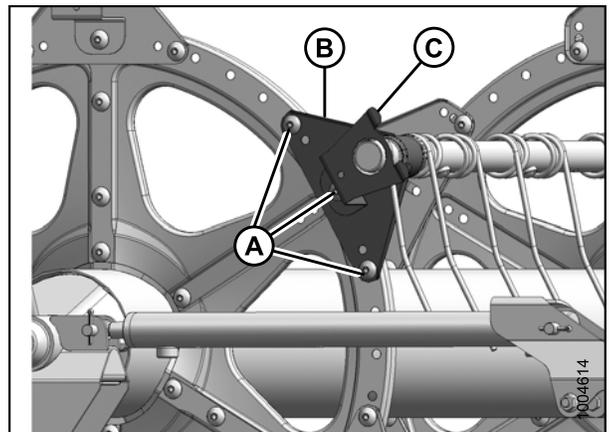


Figure 5.188: Tail End

## MAINTENANCE AND SERVICING

10. Install the endshield support (A) at the applicable tine tube location at the cam end.
11. Reinstall the reel endshields. Refer to [5.8.6 Reel Endshields, page 194](#).

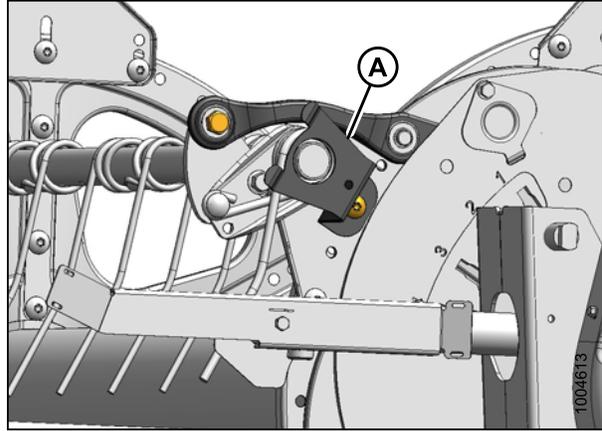


Figure 5.189: Cam End

### Center disc and tail end bushings

12. Position the bushing halves (B) on the tine tube with the flangeless end adjacent to the reel arm, and position the lug in each bushing half into the hole in the tine tube.
13. Slide the reel arm (A) onto the bushing (B) and position against the disc at the original location.
14. Reinstall the previously removed fingers or tines. Refer to the following procedures as necessary:
  - [Removing Plastic Fingers, page 181](#)
  - [Removing Steel Fingers, page 180](#)

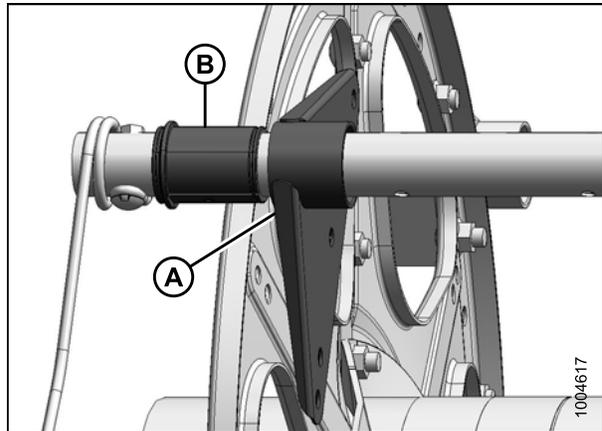


Figure 5.190: Tail End

15. Install the bushing clamp (A) onto the tine tube adjacent to the flangeless end of the bushing (B).
16. Position the clamp (A) on the bushing (B) so the edges of the clamp and bushing are flush when the clamp is fit into the groove on the bushing and the lock tabs are engaged.

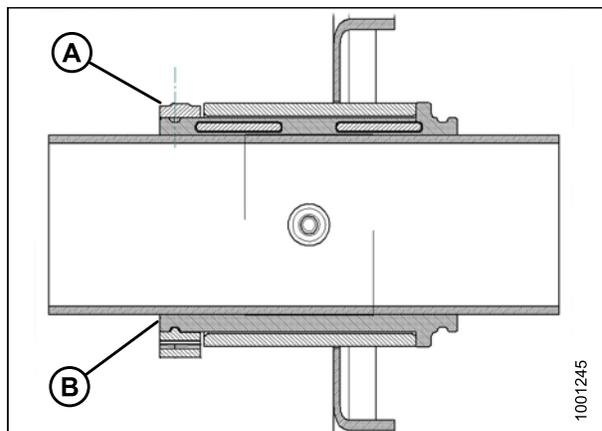


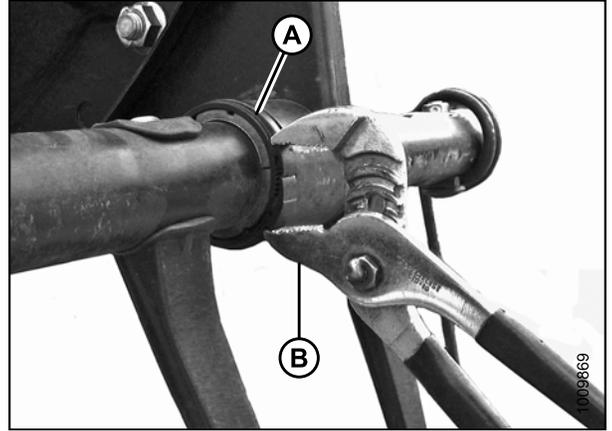
Figure 5.191: Bushing

## MAINTENANCE AND SERVICING

17. Tighten the clamp (A) using modified channel lock pliers (B) until finger pressure will **NOT** move the clamp.

**IMPORTANT:**

Over-tightening clamp may result in breakage.

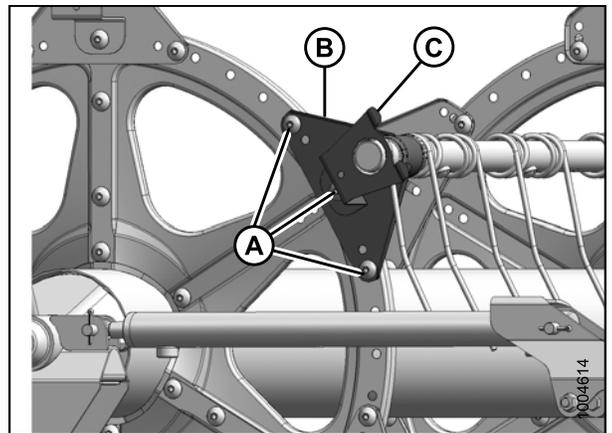


**Figure 5.192: Installing Clamp**

18. Install the bolts (A) securing the arm (B) to the center disc.
19. Install the reel arm (B) and endshield support (C) to the tail end of the reel at the applicable tine tube location and secure with bolts (A).

**NOTE:**

There are no endshields on the center discs.

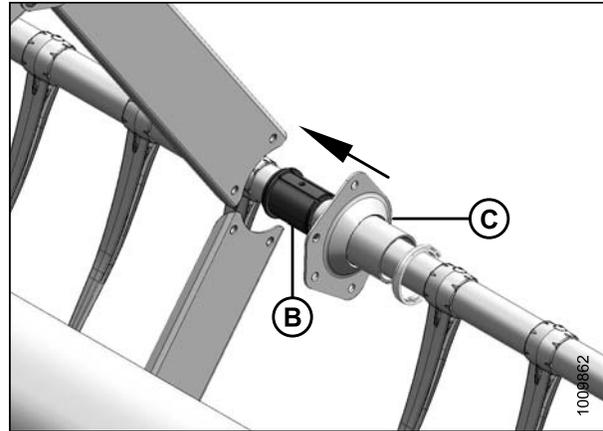


**Figure 5.193: Tail End**

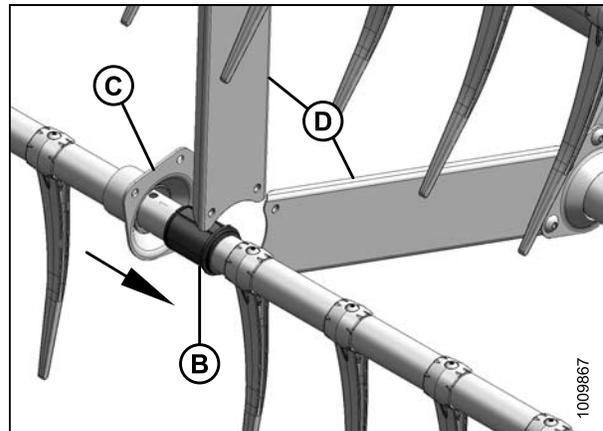
## MAINTENANCE AND SERVICING

### *Tine tube support (if installed) bushings*

20. Position the bushing halves (B) on the tine tube with the flangeless end adjacent to the reel arm, and position the lug in each bushing half into the hole in the tine tube.
21. Slide the support (C) onto the bushing (B). For the opposite tine tube, rotate the support (C) or slightly move the tine tube until it clears the channels (D).

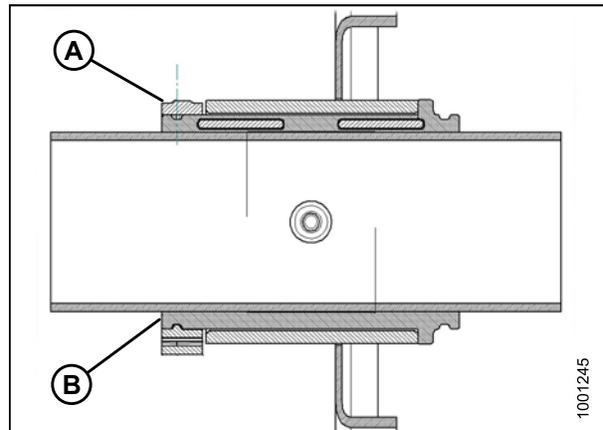


**Figure 5.194: Support**



**Figure 5.195: Opposite Support**

22. Install the bushing clamp (A) onto the tine tube adjacent to the flangeless end of the bushing (B).
23. Position the clamp (A) on the bushing (B) so the edges of the clamp and bushing are flush when the clamp is fit into the groove on the bushing and the lock tabs are engaged.



**Figure 5.196: Bushing Clamp**

## MAINTENANCE AND SERVICING

24. Tighten the clamp (A) using modified channel lock pliers (B) until finger pressure will **NOT** move the clamp.

**IMPORTANT:**

Over-tightening clamp may result in breakage.

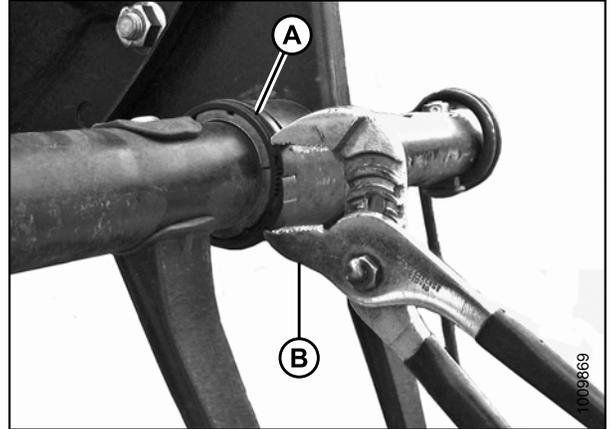


Figure 5.197: Installing Clamp

25. Reattach the channels (C) to the support (A) with screws (B) and nuts. Torque screws to 43 N·m (32 ft·lbf).
26. Reinstall any fingers (D) that were previously removed using screws (E). Refer to [Installing Plastic Fingers](#), page 181.

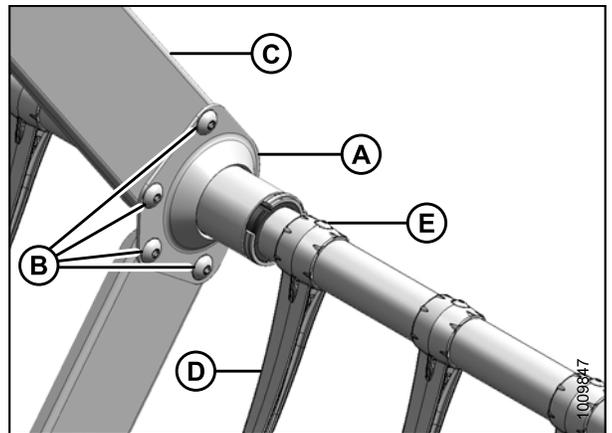


Figure 5.198: Support

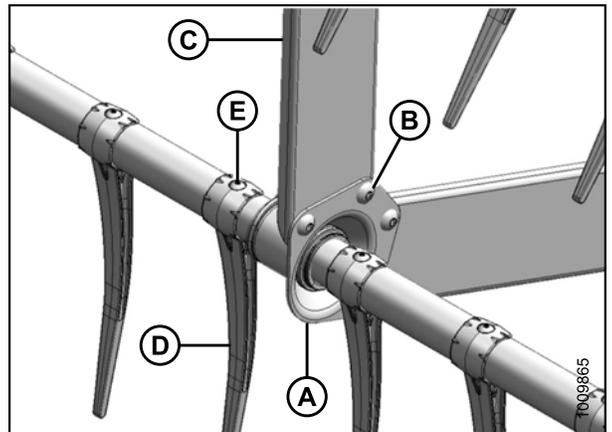


Figure 5.199: Opposite Support

## 5.8.6 Reel Endshields

Reel endshields and supports do not require regular maintenance, but they should be checked periodically for damage and loose or missing fasteners. Slightly dented or deformed endshields and supports are repairable, but it's necessary to replace severely damaged components.

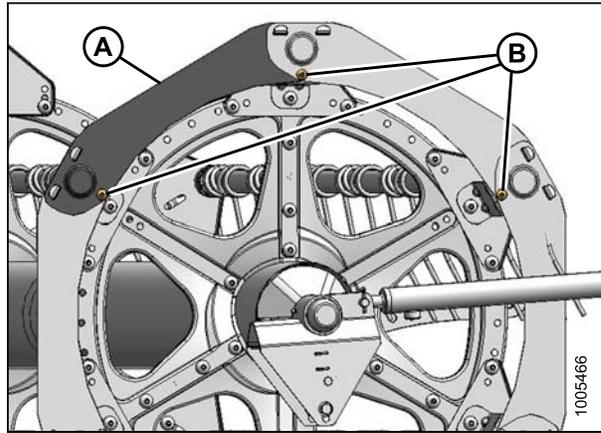
You can attach reel endshields to either end of the reel.

### *Replacing Reel Endshields*

#### **DANGER**

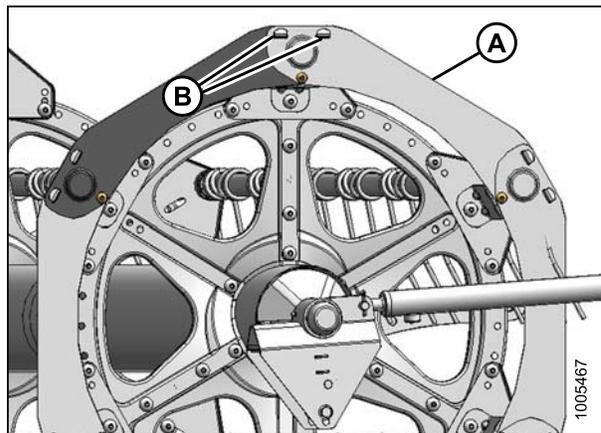
**To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.**

1. Lower the header and reel, shut down the engine, and remove the key from the ignition.
2. Rotate the reel manually until the reel endshield (A) requiring replacement is accessible.
3. Remove three bolts (B).



**Figure 5.200: Reel Endshields**

4. Lift end of reel endshield (A) off support (B).



**Figure 5.201: Reel Endshields**

## MAINTENANCE AND SERVICING

5. Remove the reel endshield from the supports.

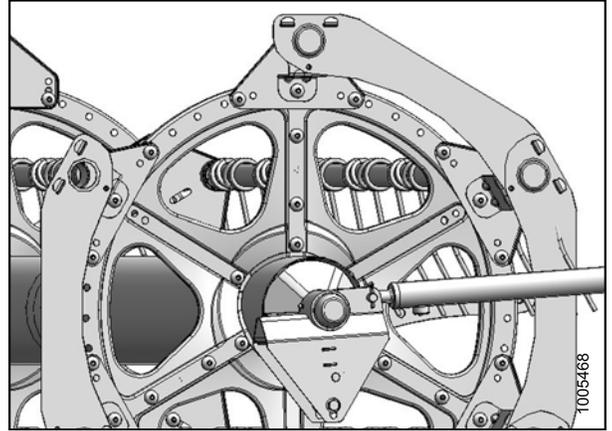


Figure 5.202: Reel Endshields

6. Remove the reel endshield (A) from support (B).
7. Install new reel endshield (C) onto support (B).
8. Reattach reel endshield (A) onto support (B) ensuring it is installed on top of the reel endshield (C).
9. Reinstall bolts (D).
10. Tighten all hardware.

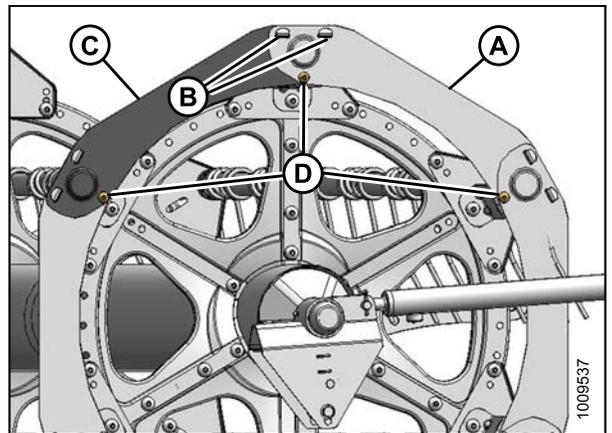


Figure 5.203: Reel Endshields

### Replacing Reel Endshields – Right-Hand Reel on Double-Reel Header

#### **DANGER**

To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.

1. Lower the header and reel, shut down the engine, and remove the key from the ignition.
2. Rotate the reel manually until the reel endshield (A) requiring replacement is accessible.
3. Remove six bolts (B). Retain hardware.

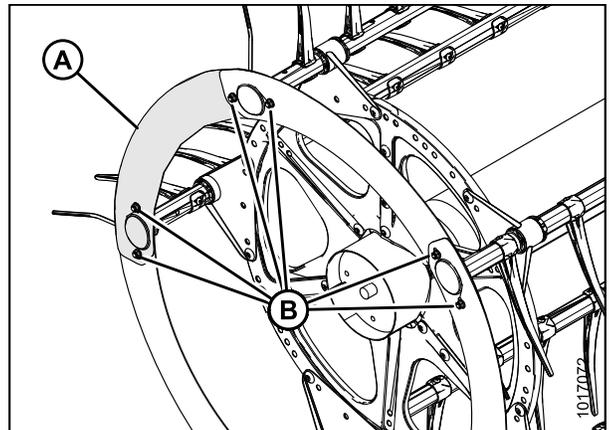


Figure 5.204: Reel Endshields

## MAINTENANCE AND SERVICING

4. Lift end of reel endshield (A) off endshield (E) and rotate down.
5. Remove bolt (B), steel tine (C), and bushing (D). Retain hardware.
6. Remove the reel endshield (E).

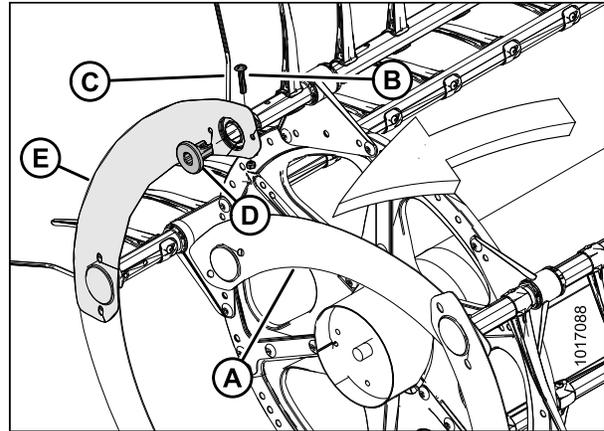


Figure 5.205: Reel Endshields

7. Install new reel endshield (A) onto reel.
8. Reattach bushing (B) and steel tine (C) using retained hardware (D).

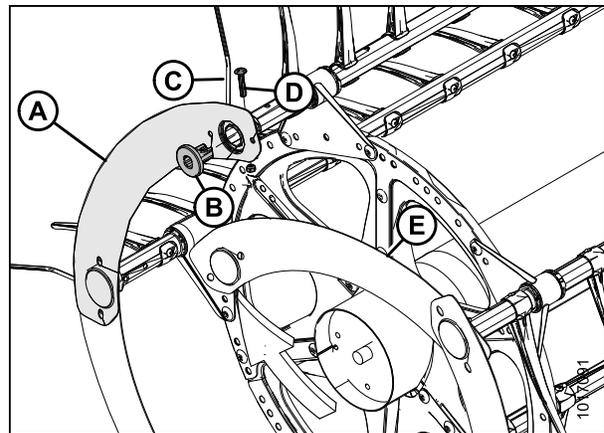


Figure 5.206: Reel Endshields

9. Reinstall bolts (A).
10. Tighten all hardware.

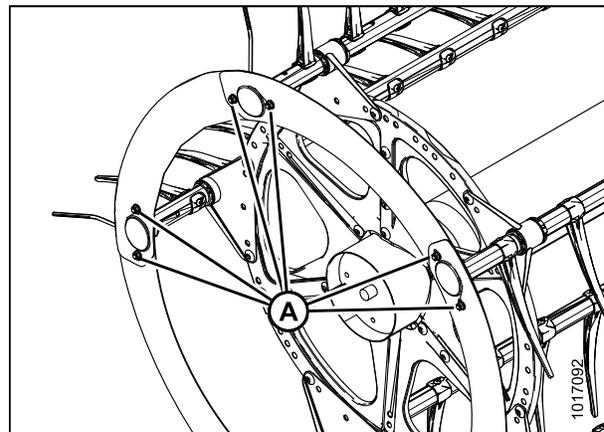


Figure 5.207: Reel Endshields

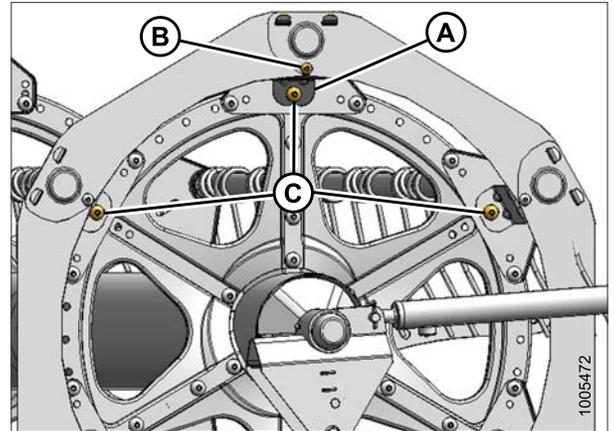
### *Replacing Reel Endshield Supports*

#### **DANGER**

To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.

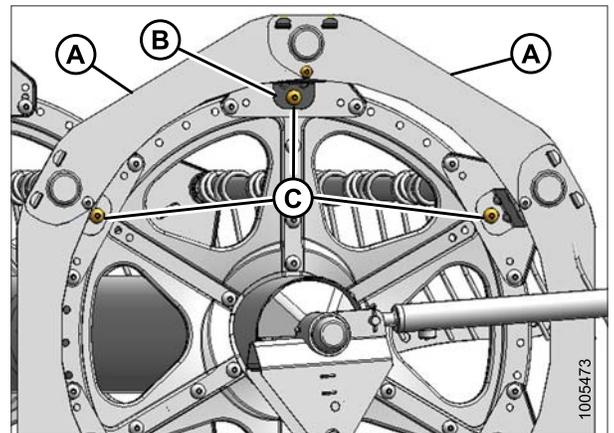
## MAINTENANCE AND SERVICING

1. Lower the header and reel, shut down the engine, and remove the key from the ignition.
2. Rotate the reel manually until the reel endshield (A) requiring replacement is accessible.
3. Remove bolt (B) from support (A).
4. Remove bolts (C) from support (A) and two adjacent supports.



**Figure 5.208: Reel Endshield Supports**

5. Move the reel endshields (A) away from the tine tube and rotate the support (B) towards the reel to remove it.
6. Insert tabs of new support (B) into the slots in the reel endshields (A). Ensure the tabs engage both reel endshields.
7. Secure support (B) to the disc with bolt (C) and nut. Do not tighten.
8. Secure the reel endshields (A) to support (B) with bolt (C) and nut. Do not tighten.
9. Reattach the supports with bolts (C) and nuts.
10. Check the clearance between the tine tube and reel endshield support and adjust if necessary.
11. Torque nuts to 27 N·m (20 ft·lbf).



**Figure 5.209: Reel Endshield Supports**

## 5.9 Reel System

The hydraulically driven reel motor drives the chain case that is attached to the right end of the reel on a single-reel header, and between the reels on a double-reel header.

### 5.9.1 Reel Drive Cover

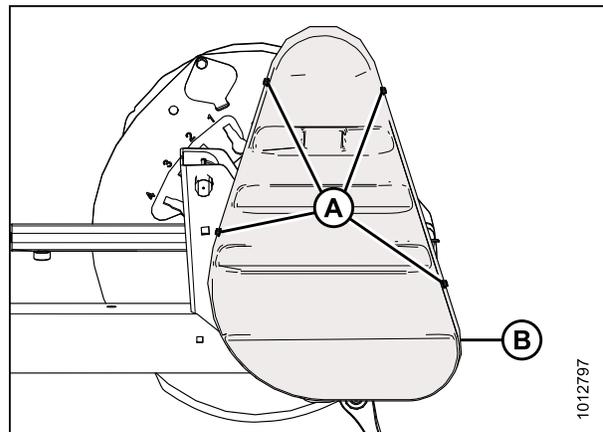
#### *Removing Reel Drive Cover*

#### **DANGER**

To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.

#### **Single-reel drive:**

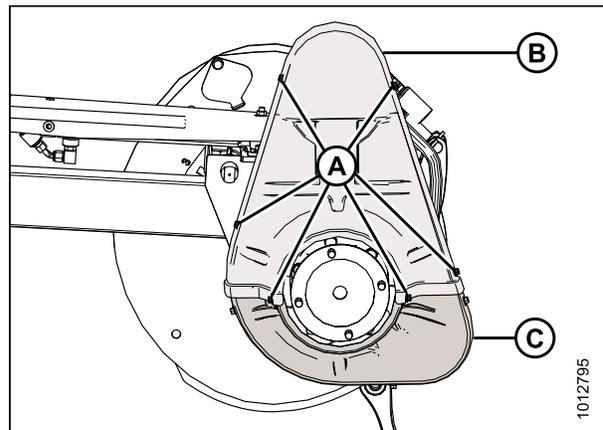
1. Stop the engine and remove the key from the ignition.
2. Remove four bolts (A) securing the cover (B) to the reel drive.



**Figure 5.210: Drive Cover – Single Reel**

#### **Double-reel drive:**

3. Stop the engine and remove the key from the ignition.
4. Remove six bolts (A) securing the upper cover (B) to the reel drive and lower cover (C).



**Figure 5.211: Drive Cover – Double Reel**

## MAINTENANCE AND SERVICING

5. Remove three bolts (A) and remove the lower cover (B) if necessary.

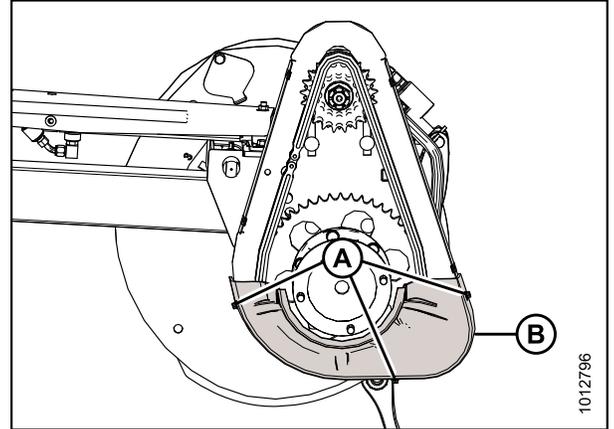


Figure 5.212: Lower Drive Cover (Upper Cover Removed)

### *Installing Reel Drive Cover*

#### **DANGER**

To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.

#### **Single-reel drive:**

1. Position the drive cover (B) onto the reel drive, and secure with four bolts (A).

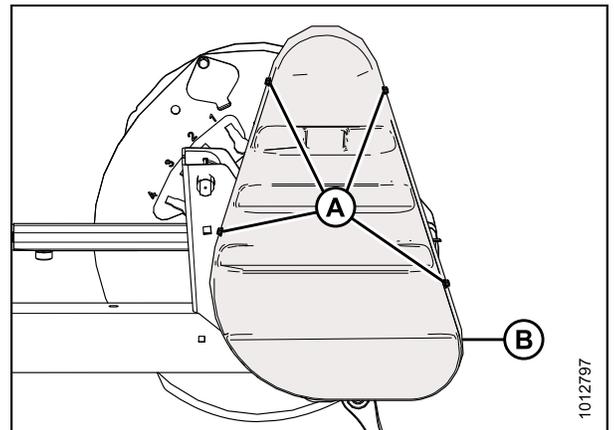
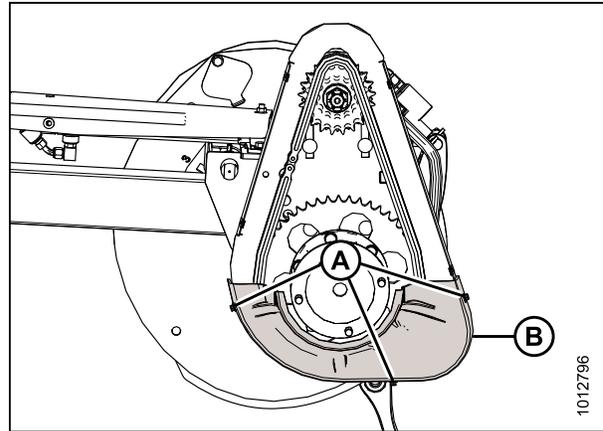


Figure 5.213: Drive Cover – Single Reel

## MAINTENANCE AND SERVICING

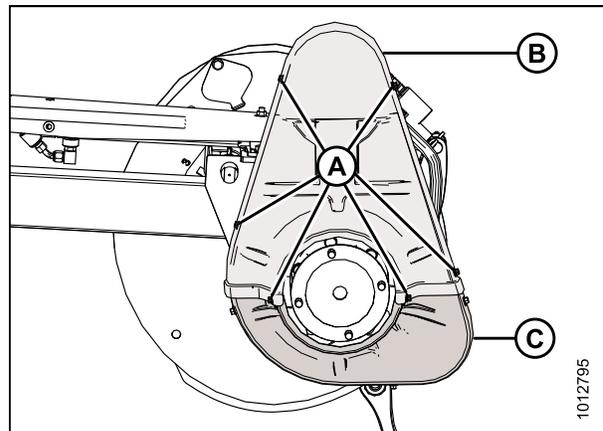
### **Double-reel drive:**

2. Position the lower drive cover (B) onto the reel drive (if previously removed), and secure with three bolts (A).



**Figure 5.214: Lower Drive Cover – Double Reel**

3. Position the upper drive cover (B) onto the reel drive and lower cover (C), and secure with six bolts (A).



**Figure 5.215: Drive Cover – Double Reel**

## 5.9.2 Reel Drive Chain Tension

### *Loosening Reel Drive Chain*

#### **DANGER**

To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.

## MAINTENANCE AND SERVICING

1. Shut down the windrower, and remove the key from the ignition.
2. Remove the drive cover. Refer to [Removing Reel Drive Cover, page 198](#).
3. Loosen six nuts (A). Slide the motor (B) and motor mount (C) down towards the reel shaft.

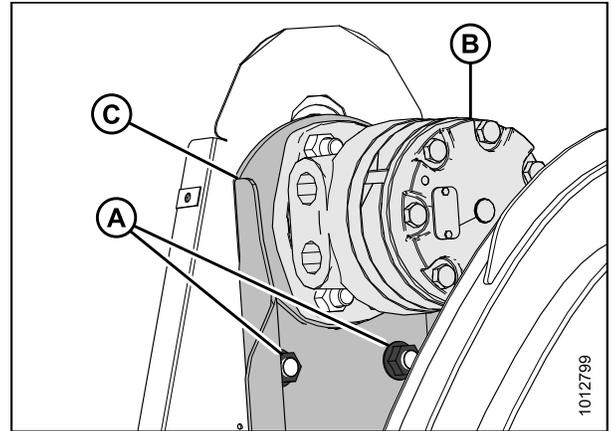


Figure 5.216: Single-Reel Drive

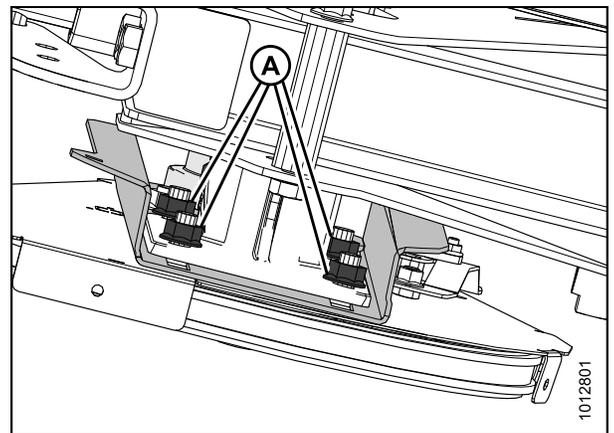


Figure 5.217: Single-Reel Drive – Viewed from Underside of Reel

### Tightening Reel Drive Chain

#### DANGER

To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.

1. Shut down the windrower, and remove the key from the ignition.
2. Ensure the six bolts (A) securing the motor mount to the chain case are loose.

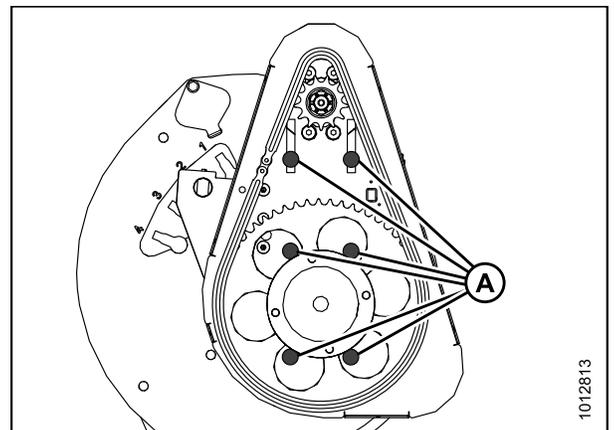
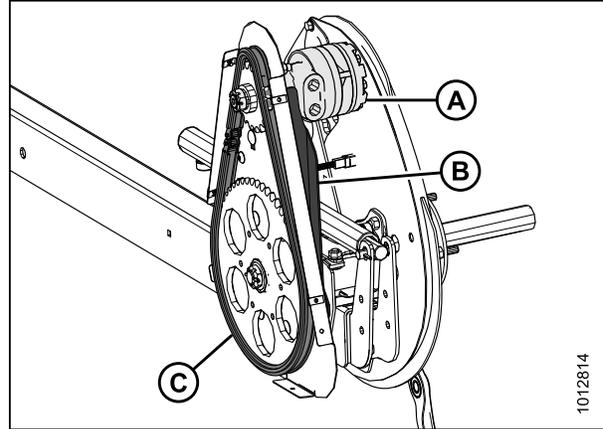


Figure 5.218: Single-Reel Drive Shown – Double Reel Similar

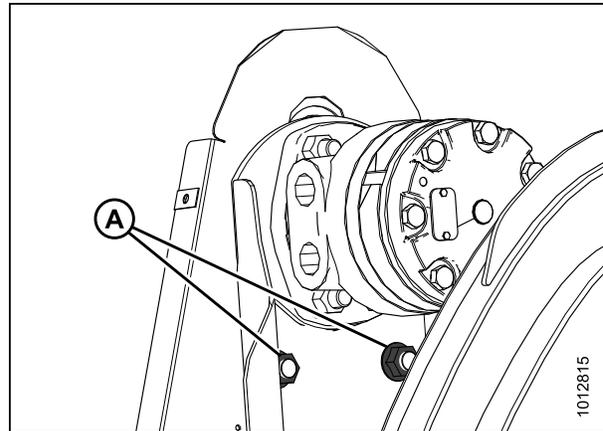
## MAINTENANCE AND SERVICING

- Slide the motor (A) and motor mount (B) upwards until the chain (C) is tight.

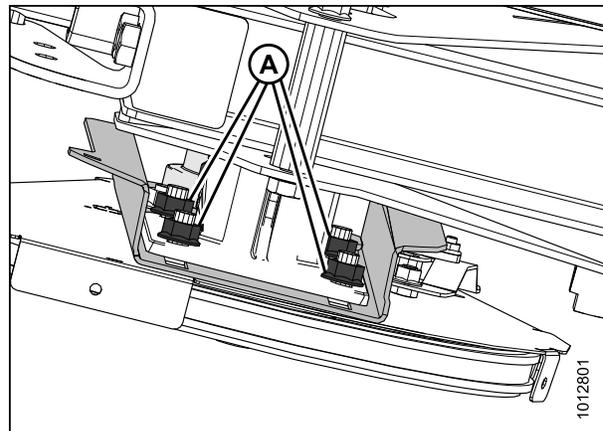


**Figure 5.219: Single-Reel Drive Shown – Double Reel Similar**

- Tighten six nuts (A).
- Ensure there is 3 mm (1/8 in.) of slack at the chain midspan. Adjust if necessary.
- Torque nuts (A) to 73 N·m (54 ft·lbf).
- Install the drive cover. Refer to [Installing Reel Drive Cover, page 199](#).



**Figure 5.220: Single-Reel Drive Shown – Double Reel Similar**



**Figure 5.221: Single-Reel Drive – Viewed from Underside of Reel**

### 5.9.3 Reel Drive Sprocket

#### Removing Reel Drive Sprocket

**⚠ DANGER**

To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.

1. Shut down the windrower, and remove the key from the ignition.
2. Loosen the drive chain. Refer to [Loosening Reel Drive Chain, page 200](#).
3. Remove the drive chain (A) from the drive sprocket (B).

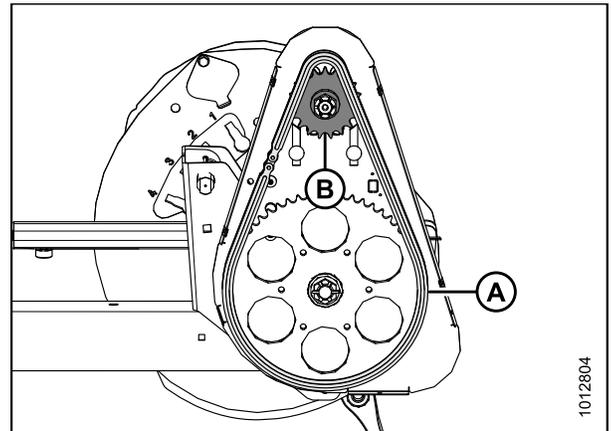


Figure 5.222: Reel Drive

4. Remove the cotter pin (A), slotted nut (B), and flat washer (C) from the motor shaft.
5. Remove the drive sprocket (D). Ensure the key remains in the shaft.

**IMPORTANT:**

To avoid damaging the motor, use a puller if the drive sprocket does not come off by hand. Do **NOT** use a pry bar and/or hammer to remove the drive sprocket (D).

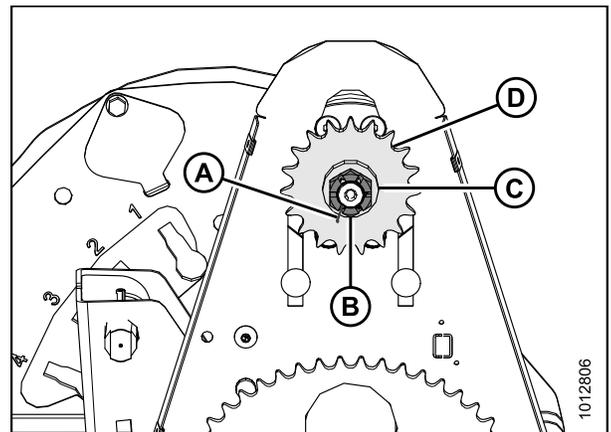


Figure 5.223: Reel Drive

#### Installing Reel Drive Sprocket

**⚠ DANGER**

To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.

## MAINTENANCE AND SERVICING

1. Align the keyway in sprocket (D) with the key on the motor shaft, and slide the sprocket onto the shaft. Secure with flat washer (C) and slotted nut (B).
2. Torque slotted nut (B) to 54 N·m (40 ft·lbf).
3. Install cotter pin (A). If necessary, tighten the slotted nut (B) to the next slot to install the cotter pin.

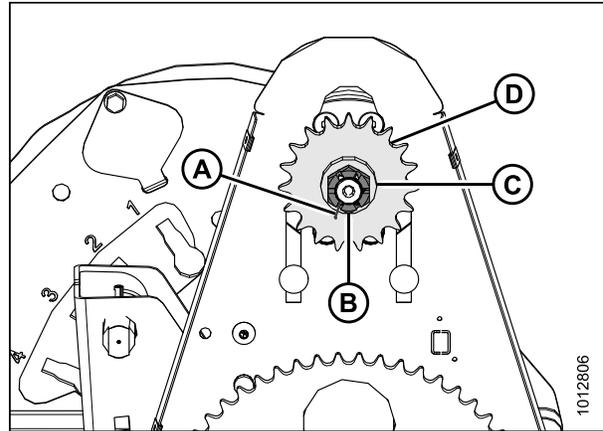


Figure 5.224: Reel Drive

4. Install the drive chain (A) onto the drive sprocket (B).
5. Tighten the drive chain. Refer to [Tightening Reel Drive Chain, page 201](#).

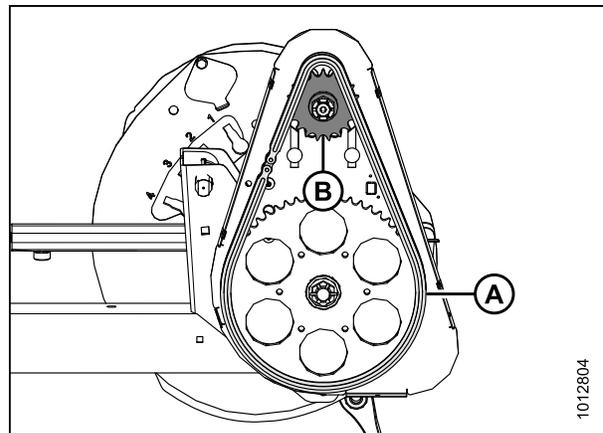


Figure 5.225: Reel Drive

### 5.9.4 Double-Reel U-Joint

The double-reel drive U-joint allows each reel to move independently from the other.

Lubricate the U-joint according to the specifications. Refer to [5.3.6 Lubrication and Servicing, page 104](#).

Replace the U-joint if severely worn or damaged. Refer to [Removing Double-Reel U-Joint, page 204](#).

#### *Removing Double-Reel U-Joint*

#### **DANGER**

**To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.**

1. Shut down the windrower, and remove the key from the ignition.
2. Remove the drive cover. Refer to [Removing Reel Drive Cover, page 198](#).

## MAINTENANCE AND SERVICING

3. Support the inboard end of the right reel with a front end loader and nylon slings (A) (or equivalent lifting device).

**IMPORTANT:**

Avoid damaging or denting the center tube by supporting the reel as close to the end disc as possible.

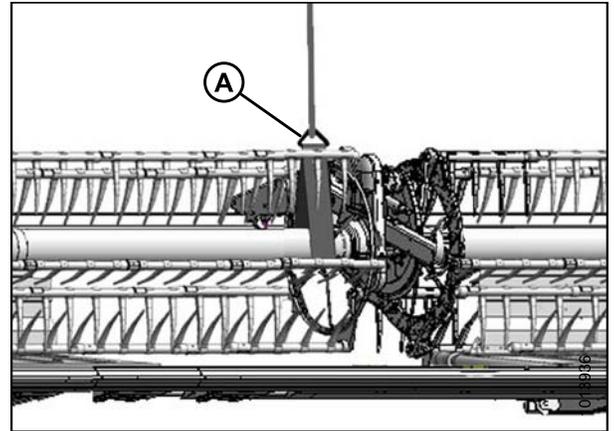


Figure 5.226: Supporting Reel

4. Remove the six bolts (A) attaching the U-joint flange (B) to the driven sprocket (C).
5. Remove the U-joint.

**NOTE:**

It may be necessary to move the right-hand reel sideways for the U-joint to clear the tube.

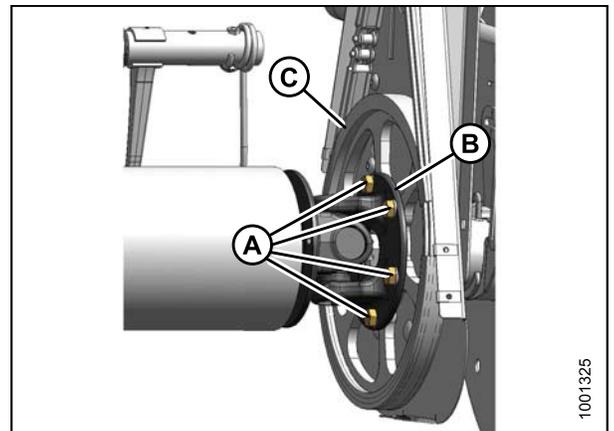


Figure 5.227: U-Joint

### *Installing Double-Reel U-Joint*

**NOTE:**

It may be necessary to move the right-hand reel sideways for the U-joint to clear the reel tube.

1. Position the U-joint flange (B) onto the driven sprocket (C) as shown. Install six bolts (A) and hand-tighten. Do **NOT** torque the bolts.

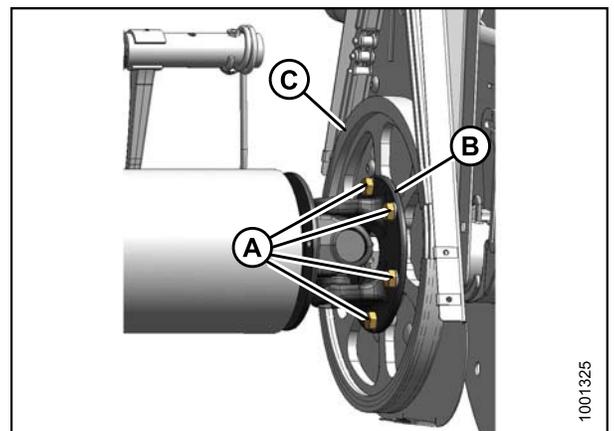


Figure 5.228: U-Joint

## MAINTENANCE AND SERVICING

2. Position the right-hand reel tube against the reel drive and engage the stub shaft into the U-joint pilot hole.
3. Rotate the reel until the holes in the end of the reel tube and U-joint flange (B) line up.
4. Apply Loctite® #243 (or equivalent) to four 1/2 in. bolts (A) and secure with lock washers.
5. Torque to 102–115 N·m (75–85 ft·lbf).

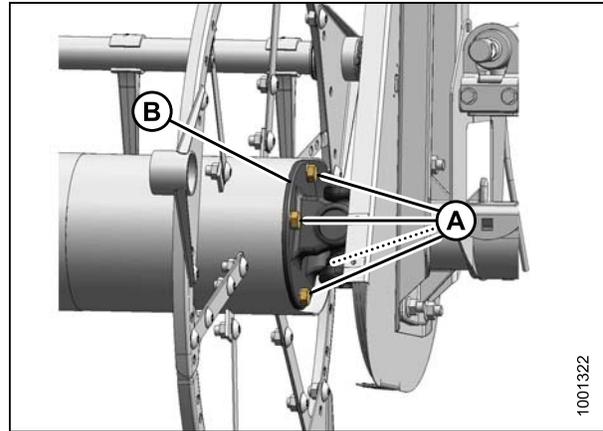


Figure 5.229: U-Joint

6. Remove the temporary reel support (A).
7. Install the drive cover. Refer to [Installing Reel Drive Cover, page 199](#).

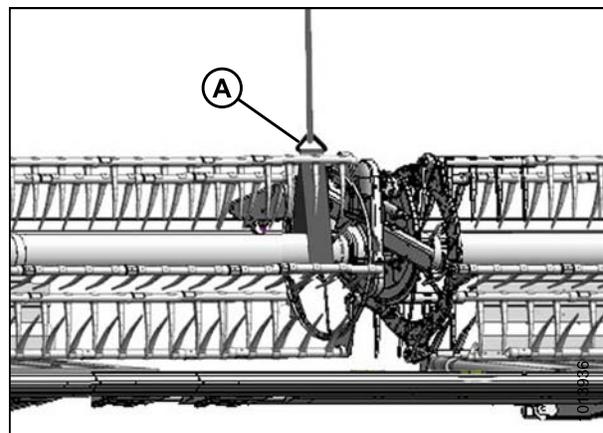


Figure 5.230: Supporting Reel

### 5.9.5 Reel Drive Motor

The reel drive motor does not require regular maintenance or servicing. If problems occur with the motor, remove it and have it serviced at your MacDon Dealer.

#### *Removing Reel Drive Motor*

#### **⚠ DANGER**

To avoid bodily injury or death from unexpected start-up of machine, always stop engine and remove key from ignition before leaving operator's seat for any reason.

1. Shut down the windrower, and remove the key from the ignition.
2. Loosen the drive chain. Refer to [Loosening Reel Drive Chain, page 200](#).
3. Remove the drive sprocket. Refer to [Removing Reel Drive Sprocket, page 203](#).

## MAINTENANCE AND SERVICING

4. Mark the hydraulic lines (A) and their locations in the motor (B) to ensure correct reinstallation.
5. Disconnect the hydraulic lines (A) at the motor (B). Cap or plug open ports and lines.
6. Remove four nuts and bolts (C), and remove the motor (A). Retrieve the spacer (if installed) from between the motor (B) and the motor mount.
7. If motor is being replaced, remove hydraulic fittings from old motor and install in new motor using the same orientation. Refer to [9 Reference, page 239](#) for fitting installation guidelines.

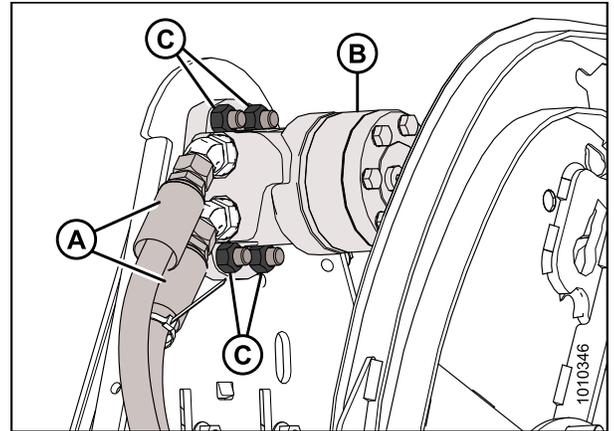


Figure 5.231: Reel Motor and Hoses

### Installing Reel Drive Motor

1. Slide the motor mount (A) up or down so the motor mounting holes (B) are accessible through the openings in the chain case.

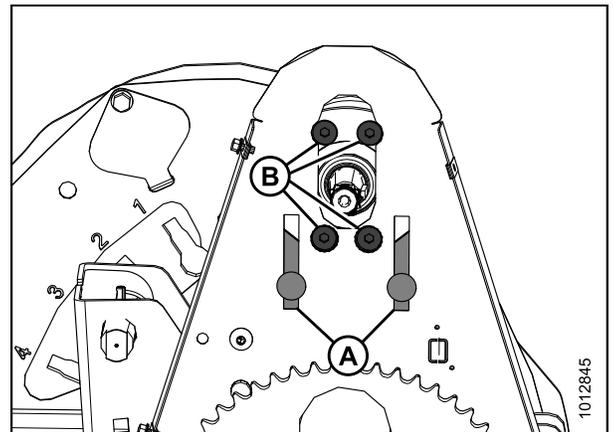


Figure 5.232: Reel Drive Motor Mounting Holes

2. Attach the motor (A) (and spacer if previously removed) to the motor mount (B) with four 1/2 x 1-3/4 in. countersunk bolts and nuts (C).
3. Torque nuts (C) to 73 N·m (54 ft·lbf).
4. If installing a new motor, install the hydraulic fittings (not shown) from the original motor and torque to 110–120 N·m (81–89 ft·lbf).

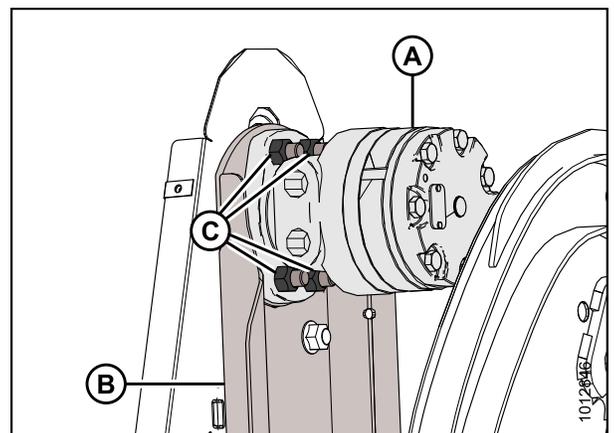


Figure 5.233: Reel Drive Motor

## MAINTENANCE AND SERVICING

5. Remove the caps or plugs from the ports and lines and connect the hydraulic lines (A) to the hydraulic fittings (B) on the motor (C).

**NOTE:**

Ensure the hydraulic lines (A) are installed at their original locations.

6. Install the drive sprocket. Refer to [Installing Reel Drive Sprocket, page 203](#).
7. Tighten the drive chain. Refer to [Tightening Reel Drive Chain, page 201](#).

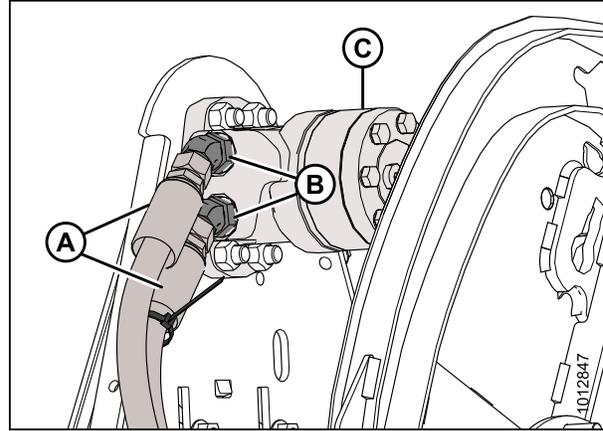


Figure 5.234: Reel Motor and Hoses

### 5.9.6 Replacing Drive Chain on Double Reel

Refer to the following two methods for replacing the drive chain on a double-reel drive:

- [Replacing Chain Using the Reel Drive Method, page 208](#)
- [Replacing Chain Using Breaking the Chain Method, page 210](#)

**NOTE:**

Both procedures are acceptable, but disconnecting the reel drive method is preferable because it doesn't affect the chain's integrity.

#### *Replacing Chain Using the Reel Drive Method*

1. Loosen the drive chain. Refer to [Loosening Reel Drive Chain, page 200](#).
2. Support the inboard end of the right reel with a front end loader and nylon slings (A) (or equivalent lifting device).

**IMPORTANT:**

Avoid damaging or denting the center tube by supporting the reel as close to the end disc as possible.

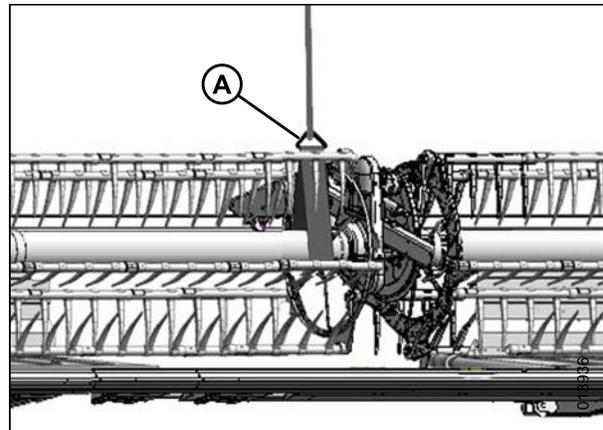


Figure 5.235: Supporting Reel

## MAINTENANCE AND SERVICING

3. Remove the four bolts (A) securing the reel tube to the U-joint flange (B).

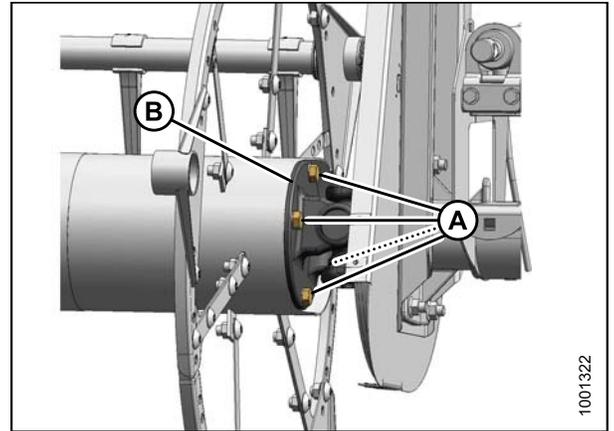


Figure 5.236: U-Joint

4. Move the right-hand reel sideways to separate the reel tube (A) from the U-joint (B).
5. Remove the drive chain (C).
6. Route the new chain (C) over the U-joint (B), and position onto the sprockets.

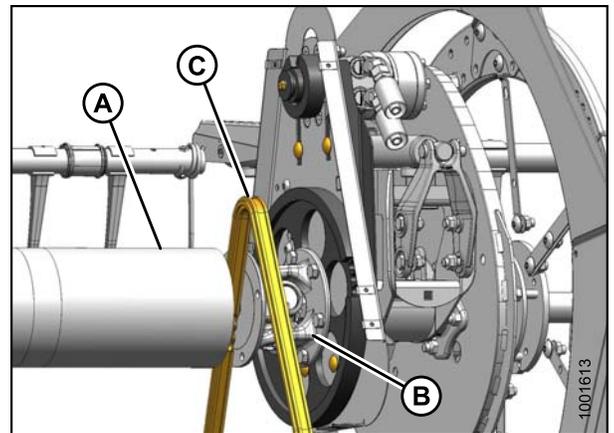


Figure 5.237: Replacing Chain

7. Position the right-hand reel tube (A) against the reel drive, and engage the stub shaft into the U-joint pilot hole.
8. Rotate the reel until the holes in end of the reel tube and U-joint flange (B) line up.
9. Apply Loctite® #243 (or equivalent) to four 1/2 in. bolts (A), and secure with lock washers.
10. Torque to 102–115 N·m (75–85 ft·lbf).

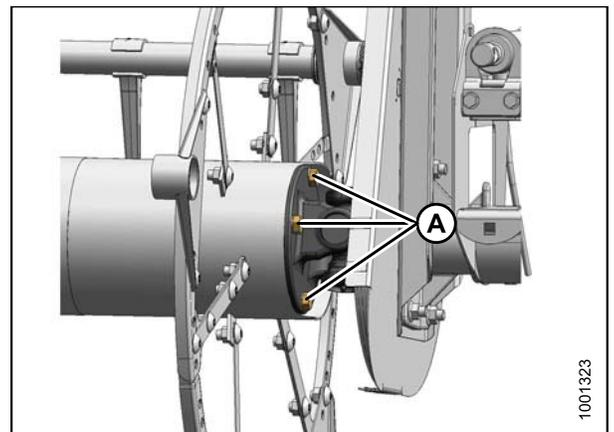


Figure 5.238: U-Joint

## MAINTENANCE AND SERVICING

11. Remove the temporary reel support (A).

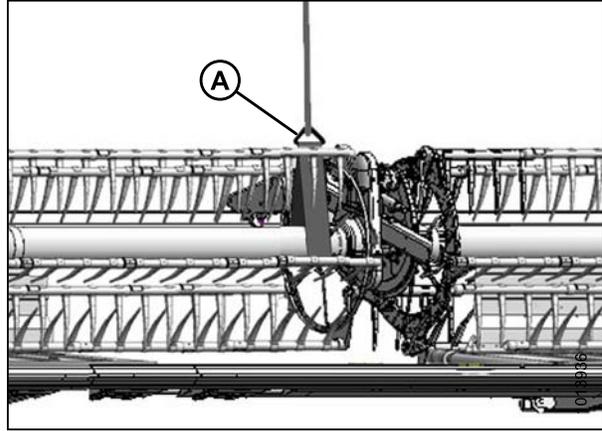


Figure 5.239: Supporting Reel

### Replacing Chain Using Breaking the Chain Method

1. Grind off the head of a link rivet on the chain (A), punch out the rivet, and remove the chain.
2. Grind off the head of a link rivet on the new chain, punch out the rivet, and separate the chain.
3. Position the ends of the new chain onto the sprocket (B).

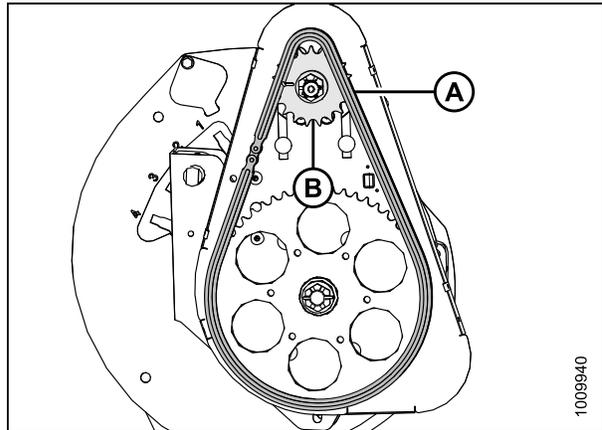


Figure 5.240: Reel Drive

4. Install the pin connector (A) (not available as a MacDon part) into the chain (preferably from the backside of the sprocket).
5. Install connector (B) onto pins.
6. Install the spring clip (C) onto the front pin (D) with the closed end of the spring clip facing the direction of the sprocket rotation.
7. Position one leg of the spring clip (C) into the groove of the aft pin (E).
8. Press the other leg of the spring clip (C) over the face of the aft pin (E) until it slips into the groove. Do **NOT** press the spring clip lengthwise from the closed end.
9. Ensure the spring clip (C) is seated into the grooves of the front pin (D) and aft pin (E).
10. Tighten the drive chain. Refer to [Tightening Reel Drive Chain, page 201](#).

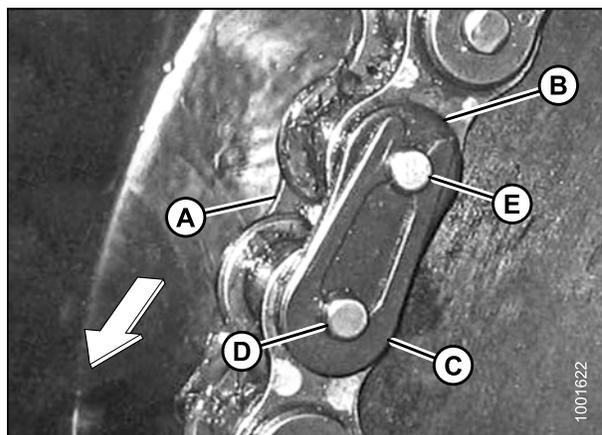


Figure 5.241: Chain

### 5.9.7 Replacing Drive Chain on Single Reel

1. Loosen the drive chain. Refer to [Loosening Reel Drive Chain, page 200](#).
2. Lift the chain (A) off the drive sprocket (B).
3. Lower the chain until free of the lower sprocket (C) and remove the chain from the drive.
4. Position the new chain (A) around the bottom teeth on the lower sprocket (C).
5. Lift the chain onto the drive sprocket (B) ensuring all the links are properly engaged in the teeth.
6. Tighten the drive chain. Refer to [Tightening Reel Drive Chain, page 201](#).

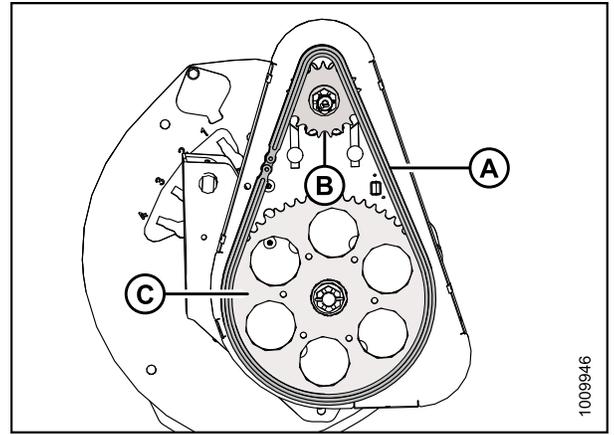


Figure 5.242: Reel Drive

## 5.10 Transport System (Optional)

Refer to [6.3.3 Stabilizer/Slow Speed Transport Wheels, page 219](#) for more information.

### 5.10.1 Checking Wheel Bolt Torque

If a transport system is installed, adhere to the following procedure for torquing the wheel bolts:

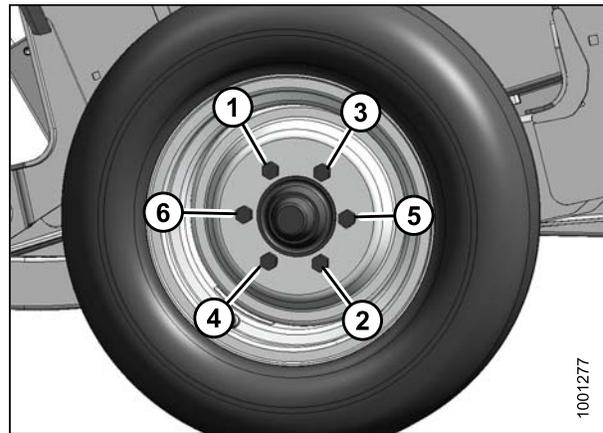
#### **WARNING**

**To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.**

1. Turn off the engine and remove key.
2. Follow the bolt tightening sequence shown, and torque the wheel bolts to 110–120 N·m (80–90 ft·lbf).

#### **IMPORTANT:**

Whenever a wheel is removed and reinstalled, check the wheel bolt torque after one hour of operation and every 100 hours thereafter.



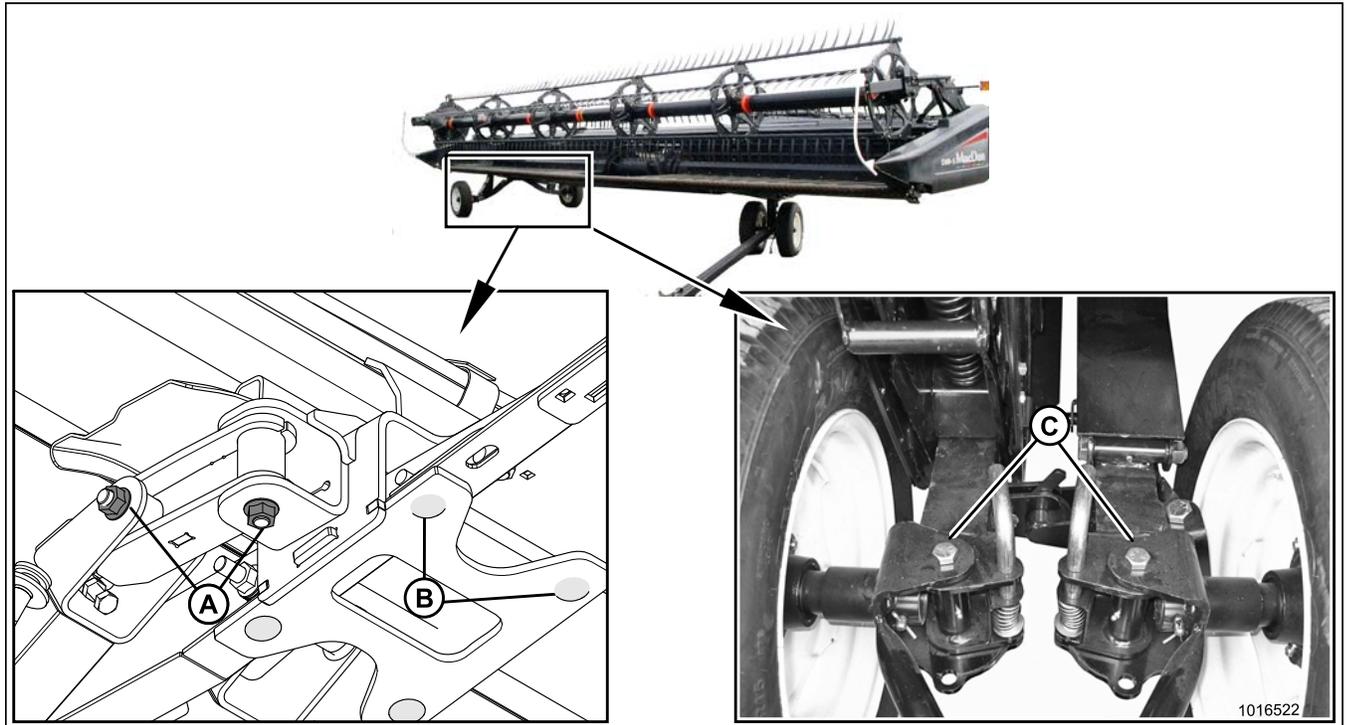
**Figure 5.243: Bolt Tightening Sequence**

## 5.10.2 Checking Axle Bolt Torque

If a transport system is installed, adhere to the following procedure for torquing the axle bolts:

### WARNING

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.



**Figure 5.244: Axle Bolts**

1. Check and tighten axle bolts **DAILY** until torque is maintained as follows:
  - (A): 244 N·m (180 ft·lbf)
  - (B): 203 N·m (150 ft·lbf)
  - (C): 244 N·m (180 ft·lbf)

### 5.10.3 Checking Tire Pressure

Check the tire inflation pressure and inflate according to the information provided in Table 5.7 *Tire Pressure*, page 214.

Table 5.7 Tire Pressure

Size	Load Range	Pressure
ST205/75 R15	D	448 kPa (65 psi)
	E	552 kPa (80 psi )

#### WARNING

- Service tires safely.
- A tire can explode during inflation which could cause serious injury or death.
- Do NOT stand over tire. Use a clip-on chuck and extension hose.
- Do NOT exceed maximum inflation pressure indicated on tire label or sidewall.
- Replace tires that have defects.
- Replace wheel rims that are cracked, worn, or severely rusted.
- Never weld a wheel rim.
- Never use force on an inflated or partially inflated tire.
- Make sure the tire is correctly seated before inflating to operating pressure.
- If the tire is not correctly positioned on the rim or is overinflated, the tire bead can loosen on one side causing air to escape at high speed and with great force. An air leak of this nature can thrust the tire in any direction endangering anyone in the area.
- Make sure all the air is removed from the tire before removing the tire from the rim.
- Do NOT remove, install, or repair a tire on a rim unless you have the proper equipment and experience to perform the job.
- Take the tire and rim to a qualified tire repair shop.

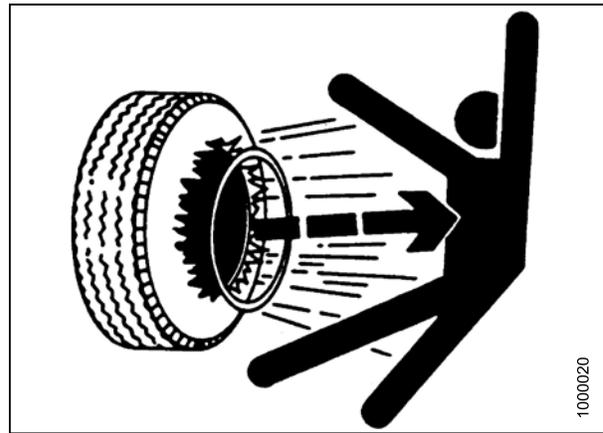


Figure 5.245: Inflation Warning

## 6 Options and Attachments

The following options and attachments are available for use with your header. See your MacDon Dealer for availability and ordering information.

### 6.1 Reel

#### 6.1.1 Lodged Crop Reel Finger Kit

The steel fingers attach to ends of every other tine bar and help in clearing material in heavy, hard-to-cut crops such as lodged rice.

Each kit contains three fingers for the cam end and three fingers for the tail end of the reel. Hardware, installation and adjustment instructions are included with the kit.

MD #B4831



Figure 6.1: Lodged Crop Finger

#### 6.1.2 Reel Endshield Kit

The steel shields provided in the reel endshield kit attach to the ends of the reels and help to clear material in heavy, hard-to-cut crops. They are standard equipment on all headers (except nine-bat reels). Hardware and installation instructions are included in the kit.

See your MacDon Dealer for more information.

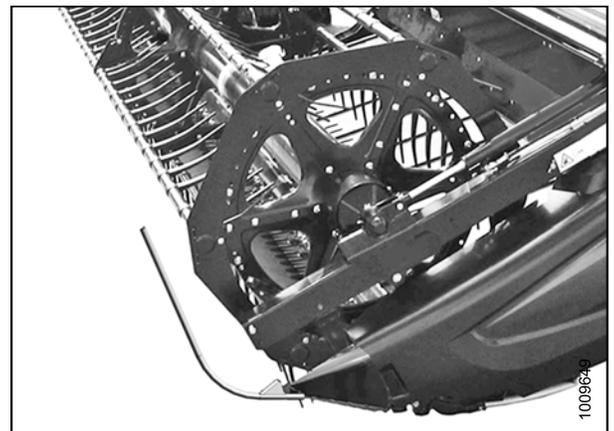
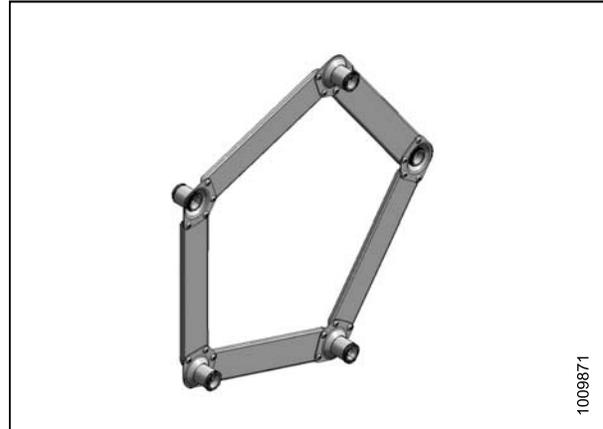


Figure 6.2: Reel Endshields

### 6.1.3 Tine Tube Reinforcing Kit

Tine tube reinforcing kits are available for five- and six-bat reels. They are designed to support high reel loads when cutting extremely heavy crops.

- Five-Bat Reels – MD #B5825
- Six-Bat Reels – MD #B5826



**Figure 6.3: Five-Bat Reinforcing Kit Shown – Six-Bat Reinforcing Kit Similar**

## 6.2 Cutterbar

### 6.2.1 Stub Guard Conversion Kit

Stub guards, complete with top guides and adjuster shoes, are designed to cut tough crops.

Installation and adjustment instructions are included in the kit.

Order one of the following bundles according to your header size:

- 30 foot – MD #B5012
- 35 foot – MD #B5013



Figure 6.4: Stub Guards

### 6.2.2 Vertical Knife Mounts

The vertical knife mounts allow the installation of vertically oriented knives onto both ends of the header.

The vertical knives themselves are not sold by MacDon and must be purchased from a separate supplier.

Installation and adjustment instructions are included in the bundle.

Order the mounts based on the left or right side:

**NOTE:**

Additional plumbing may be required by Dealer depending on header size/attachments.

- Left side – MD #B5757 (includes hardware and some plumbing. Also requires installation of MD #B5758)
- Right side – MD #B5758 (includes flow control, template, hardware, and some plumbing. This can be installed individually or with MD #B5757)

**NOTE:**

If mounting onto multiple headers, you will also require the auxiliary vertical knife plumbing kit MD #B5406.

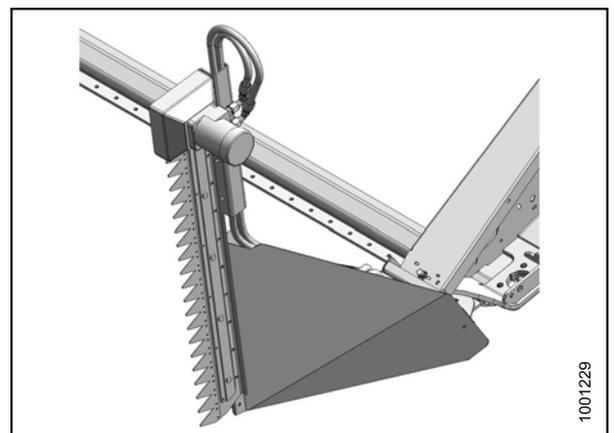


Figure 6.5: Vertical Knife Mount

## 6.3 Header

### 6.3.1 Divider Latch Kit

Divider latch kits attach to the endsheets. They allow for quick removal and storage of endsheet divider cones and, if required, reduce the transport width of the header. Installation instructions are included in the kit.

MD #B6158

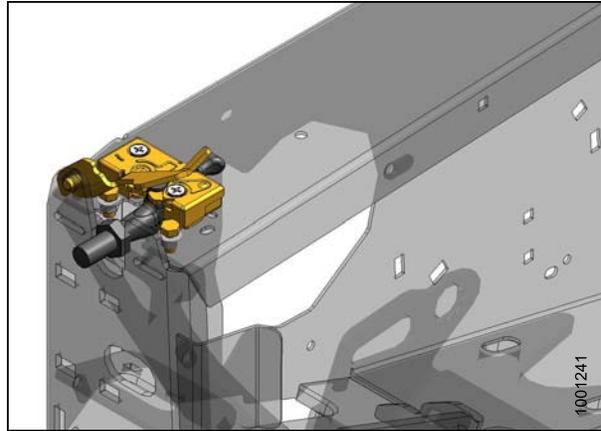


Figure 6.6: Divider Latch

### 6.3.2 Stabilizer Wheels

Stabilizer wheels help to stabilize the header in field conditions that would otherwise cause the header to bounce, resulting in uneven cutting heights. Installation and adjustment instructions are included in the kit.

MD #C1986

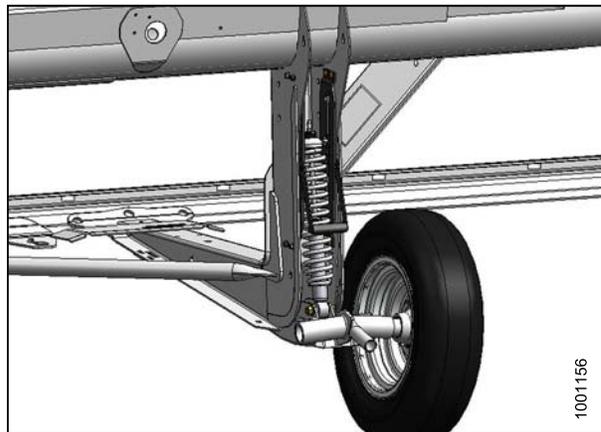


Figure 6.7: Stabilizer Wheel

### 6.3.3 Stabilizer/Slow Speed Transport Wheels

Stabilizer/slow speed transport wheels help to stabilize the header in field conditions that would otherwise cause the header to bounce, resulting in uneven cutting heights. This system is similar to the Stabilizer Wheel option. Refer to [6.3.2 Stabilizer Wheels, page 218](#).

Stabilizer/slow speed transport wheels are used to convert the header into transport mode for slow-speed towing behind a properly-configured windrower (or agricultural tractor). A tow pole and installation instructions are included in the kit.

This option is available for use with 30-, 35-, 40-, and 45-foot headers.

MD #C2009

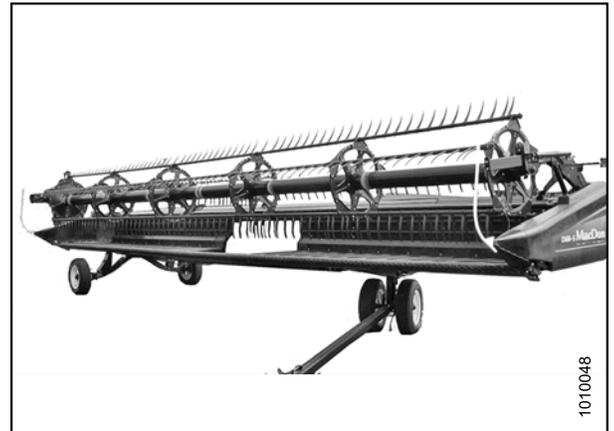


Figure 6.8: Stabilizer/Transport Wheels

## 6.4 Crop Delivery

### 6.4.1 Double Draper Drive (DDD) Kit

The DDD kit provides power to four draper rollers instead of the usual two in order to minimize draper slipping when using the side delivery feature in heavy forage crops.

Installation instructions are included with the kit.

**NOTE:**

The draper slip sensor is disabled with the installation of this kit.

- D125X – MD #B5653
- D1XL Series – MD #B6039

### 6.4.2 Draper Deflector (Narrow)

Narrow metal draper deflectors attach to the inboard side of the endsheets to prevent material from falling through the gap between the endsheet and the draper while minimizing reel carryover in bushy crops.

**NOTE:**

Narrow draper deflectors are not recommended for double windrowing; wide draper deflectors are available for this purpose.

Refer to the header parts catalog for the necessary parts.

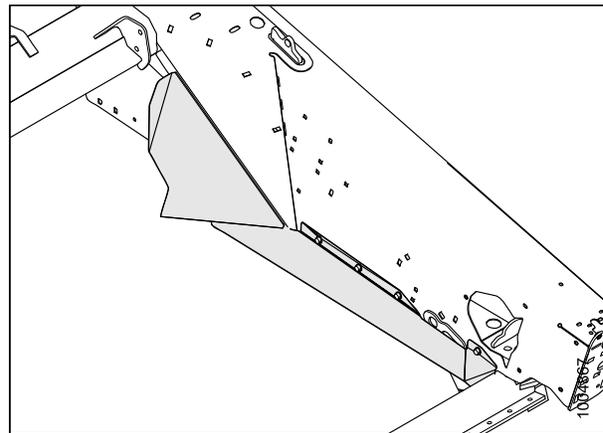


Figure 6.9: Draper Deflector (Narrow)

### 6.4.3 Draper Deflector (Wide)

Wide metal draper deflectors attach to the inboard side of the endsheets to prevent material from falling through the gap between the endsheet and the draper.

**NOTE:**

Required for double swathing only (leaves a gap between the standing crop and the swath for the divider to run through).

Refer to the header parts catalog for the necessary parts.

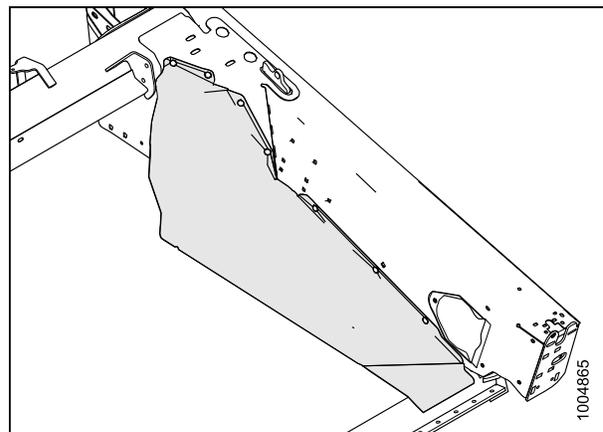


Figure 6.10: Draper Deflector (Wide)

### 6.4.4 Draper Extension Kit

The draper extension kit increases the inboard length of each deck up to 500 mm (20 in.) which narrows the header opening and decreases windrow width when cutting light/thin crops.

The kit includes roller support extensions, a draper repair kit, all necessary hardware, and installation instructions.

- D125X – MD #B5407
- D130XL and D135XL – MD #B6378

### 6.4.5 Swath Rods

End delivery deflector rods are used for double swathing with end delivery only.

The deflector rods help prevent delivered crop at the opening from interfering with the standing crop.

Installation and adjustment instructions are included with the bundle.

Order bundles according to left or right side:

- Left side: MD #B5088
- Right side: MD #B5089

For center delivery, order MD #B4803.

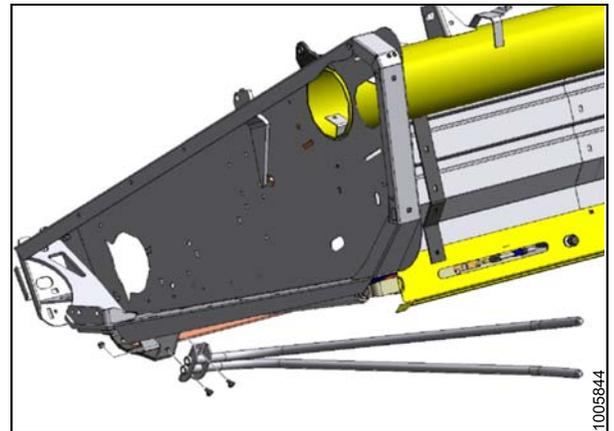


Figure 6.11: Swath Deflector

### 6.4.6 Upper Cross Auger (UCA)

The upper cross auger attaches in front of the backtube and improves crop feeding into the center of the header in heavy crop conditions. It is ideal for high-volume harvesting of forages, oats, canola, mustard and other tall, bushy, hard to feed crops.

Order from the following bundles according to your header size:

- 25 foot – MD #B6282
- 30 foot – MD #B6283
- 35 foot – MD #B6284
- 40 foot – MD #B6285
- 45 foot<sup>14</sup> – MD #B6286

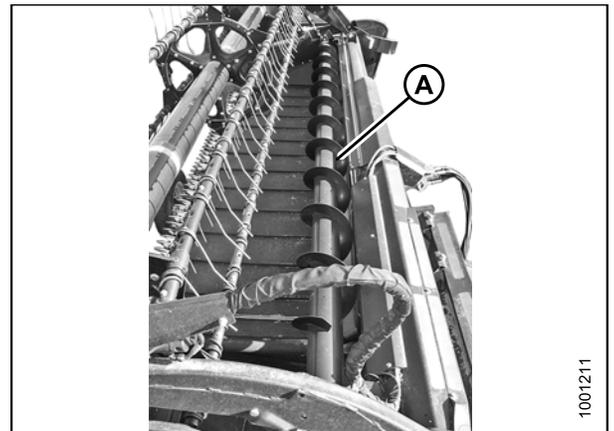


Figure 6.12: Upper Cross Auger

14. This is a 40-foot long auger and is backtube mounted (NOT a full length auger).

### 6.4.7 Rice Divider Rods

Rice divider rods attach to the left- and right-hand crop dividers and divide tall and tangled rice crops in a similar manner to standard crop divider rods performing in standing crops. Installation instructions are included in the kit.

MD #B5609



Figure 6.13: Rice Divider Rod

## 7 Unloading and Assembly

Refer to the header-specific instructions for unloading, assembly, and setup procedures that are included with your shipment.

**Table 7.1 Unloading and Assembly Instruction**

<b>Shipping Destination</b>	<b>Header Description</b>
North America	D1X Series Draper Header for Windrowers



## 8 Troubleshooting

### 8.1 Crop Loss at Cutterbar

Symptom	Problem	Solution	Refer to
<b>Does not pick up down crop</b>	Cutterbar too high	Lower cutterbar	<a href="#">3.7.1 Cutting Height, page 44</a>
	Header angle too low	Increase header angle	<a href="#">3.7.3 Header Angle, page 50</a>
	Reel too high	Lower reel	<a href="#">3.7.8 Reel Height, page 53</a>
	Reel too far back	Move reel forward	<a href="#">3.7.9 Reel Fore-Aft Position, page 54</a>
	Ground speed too fast for reel speed	Reduce ground speed or increase reel speed	<ul style="list-style-type: none"> <li><a href="#">3.7.4 Reel Speed, page 50</a></li> <li><a href="#">3.7.5 Ground Speed, page 51</a></li> </ul>
	Reel fingers not lifting crop sufficiently	Increase finger pitch aggressiveness	<a href="#">3.7.10 Reel Tine Pitch, page 55</a>
Install lifter guards		See your MacDon Dealer	
<b>Heads shattering or breaking off</b>	Reel speed too fast	Reduce reel speed	<a href="#">3.7.4 Reel Speed, page 50</a>
	Reel too low	Raise reel	<a href="#">3.7.8 Reel Height, page 53</a>
	Ground speed too fast	Reduce ground speed	<a href="#">3.7.5 Ground Speed, page 51</a>
	Crop too ripe	Operate at night when humidity is higher	—
<b>Material accumulating in gap between cut-out in endsheet and knifehead</b>	Crop heads leaning away from knifehead hole in endsheet	Add knifehead shields (except in damp or sticky soils)	<a href="#">5.5.8 Knifehead Shield, page 127</a>
<b>Strips of uncut material</b>	Crowding uncut crop	Allow enough room for crop to be fed to cutterbar	—
	Broken knife sections	Replace broken sections	<a href="#">5.5.1 Replacing Knife Section, page 116</a>
<b>Excessive bouncing at normal field speed</b>	Float set too light	Adjust header float	<a href="#">3.7.2 Header Float, page 49</a>
<b>Divider rod running down standing crop</b>	Divider rods too long	Remove divider rod	<a href="#">3.7.11 Crop Dividers, page 57</a>

## TROUBLESHOOTING

Symptom	Problem	Solution	Refer to
<b>Crop not being cut at ends</b>	Reel not frowning or not centered in header	Adjust reel frown or reel horizontal position	<ul style="list-style-type: none"> <li>• <a href="#">3.7.9 Reel Fore-Aft Position, page 54</a></li> <li>• <a href="#">5.8.2 Reel Frown, page 177</a></li> </ul>
	Knife hold-downs not adjusted properly	Adjust hold-downs so knife works freely but still keep sections from lifting off guards	<a href="#">Checking Knife Hold-Downs, page 125</a>
	Knife sections or guards are worn or broken	Replace all worn and broken cutting parts	<a href="#">5.5 Cutterbar, page 116</a>
	Header is not level	Level header	<a href="#">3.12 Levelling the Header, page 71</a>
	Reel fingers not lifting crop properly ahead of knife	Adjust reel position and/or finger pitch	<ul style="list-style-type: none"> <li>• <a href="#">3.7.9 Reel Fore-Aft Position, page 54</a></li> <li>• <a href="#">3.7.10 Reel Tine Pitch, page 55</a></li> </ul>
	Divider runs down thick crop at ends preventing proper feeding due to material bridging the cutter guards	Replace 3–4 end guards with stub guards	<ul style="list-style-type: none"> <li>• <a href="#">5.5.7 Knife Guards, page 120</a></li> <li>• <a href="#">6.2.1 Stub Guard Conversion Kit, page 217</a></li> <li>• See your MacDon Dealer</li> </ul>
<b>Bushy or tangled crop flows over divider rod, builds up on endsheets</b>	Divider rods providing insufficient separation	Install long divider rods	<a href="#">3.7.11 Crop Dividers, page 57</a>
<b>Cut grain falling ahead of cutterbar</b>	Ground speed too slow	Increase ground speed	<a href="#">3.7.5 Ground Speed, page 51</a>
	Reel speed too slow	Increase reel speed	<a href="#">3.7.4 Reel Speed, page 50</a>
	Reel too high	Lower reel	<a href="#">3.7.8 Reel Height, page 53</a>
	Cutterbar too high	Lower cutterbar	<a href="#">3.7.1 Cutting Height, page 44</a>
	Reel too far forward	Move reel back on arms	<a href="#">3.7.9 Reel Fore-Aft Position, page 54</a>
	Cutting at speeds over 6 mph (10 km/h) with 10-tooth reel drive sprocket	Replace with 19-tooth reel drive sprocket	<a href="#">5.9.3 Reel Drive Sprocket, page 203</a>
	Worn or broken knife components	Replace components	<a href="#">5.5 Cutterbar, page 116</a>

## TROUBLESHOOTING

### 8.2 Cutting Action and Knife Components

Symptom	Problem	Solution	Refer to
<b>Ragged or uneven cutting of crop</b>	Knife hold-downs not properly adjusted	Adjust hold-downs	<i>Checking Knife Hold-Downs, page 125</i>
	Knife sections or guards are worn or broken	Replace all worn and broken cutting parts	<i>Checking Knife Hold-Downs, page 125</i>
	Knife is not operating at recommended speed	Check engine speed of windrower	Refer to the windrower operator's manual
	Ground speed too fast for reel speed	Reduce ground speed or increase reel speed	<ul style="list-style-type: none"> <li>• <i>3.7.4 Reel Speed, page 50</i></li> <li>• <i>3.7.5 Ground Speed, page 51</i></li> </ul>
	Reel fingers not properly lifting crop ahead of knife	Adjust reel position and/or finger pitch	<ul style="list-style-type: none"> <li>• <i>3.7.9 Reel Fore-Aft Position, page 54</i></li> <li>• <i>3.7.10 Reel Tine Pitch, page 55</i></li> </ul>
	Cutterbar too high	Lower cutting height	<i>3.7.1 Cutting Height, page 44</i>
	Header angle too flat	Steepen header angle	<i>3.7.3 Header Angle, page 50</i>
	Bent knife causing binding of cutting parts	Straighten bent knife, and align guards	<i>5.5.7 Knife Guards, page 120</i>
	Cutting edge of guards not close enough or parallel to knife sections	Align guards	
	Tangled crop tough to cut	Install stub guards	<ul style="list-style-type: none"> <li>• <i>5.5.7 Knife Guards, page 120</i></li> <li>• <i>6.2.1 Stub Guard Conversion Kit, page 217</i></li> <li>• See your MacDon Dealer</li> </ul>
	Reel too far back	Move reel forward	<i>3.7.9 Reel Fore-Aft Position, page 54</i>
	Loose knife drive belt	Adjust drive belt tension	<ul style="list-style-type: none"> <li>• <i>Tensioning Non-Timed Knife Drive Belts, page 141</i></li> <li>• <i>Tensioning Timed Knife Drive Belts, page 147</i></li> </ul>

## TROUBLESHOOTING

Symptom	Problem	Solution	Refer to
<b>Knife plugging</b>	Reel too high or too far forward	Lower reel or move reel rearward	<ul style="list-style-type: none"> <li>• <a href="#">3.7.8 Reel Height, page 53</a></li> <li>• <a href="#">3.7.9 Reel Fore-Aft Position, page 54</a></li> </ul>
	Ground speed too slow	Increase ground speed	<a href="#">3.7.5 Ground Speed, page 51</a>
	Loose knife drive belt	Adjust drive belt tension	<ul style="list-style-type: none"> <li>• <a href="#">Tensioning Non-Timed Knife Drive Belts, page 141</a></li> <li>• <a href="#">Tensioning Timed Knife Drive Belts, page 147</a></li> </ul>
	Improper knife hold-down adjustment	Adjust hold-down	<a href="#">Checking Knife Hold-Downs, page 125</a>
	Dull or broken knife sections	Replace knife sections	<a href="#">5.5.1 Replacing Knife Section, page 116</a>
	Bent or broken guards	Align or replace guards	<a href="#">5.5.7 Knife Guards, page 120</a>
	Reel fingers not properly lifting crop ahead of knife	Adjust reel position and/or finger pitch	<ul style="list-style-type: none"> <li>• <a href="#">3.7.9 Reel Fore-Aft Position, page 54</a></li> <li>• <a href="#">3.7.10 Reel Tine Pitch, page 55</a></li> </ul>
	Steel pick-up fingers contacting knife	Increase reel clearance to cutterbar or adjust frown	<ul style="list-style-type: none"> <li>• <a href="#">Measuring Reel Clearance, page 175</a></li> <li>• <a href="#">5.8.2 Reel Frown, page 177</a></li> </ul>
	Float is set too heavy	Adjust springs for lighter float	<a href="#">3.7.2 Header Float, page 49</a>
	Mud or dirt build-up on cutterbar	Raise cutterbar by lowering skid shoes	<a href="#">Cutting on the Ground, page 48</a>
		Install cut-out sections	See your MacDon Dealer
		Flatten header angle	<a href="#">Adjusting Header Angle, page 50</a>
	Knife is not operating at recommended speed	Check engine speed of windrower	Refer to the windrower operator's manual

## TROUBLESHOOTING

Symptom	Problem	Solution	Refer to
<b>Knife back breakage</b>	Bent or broken guard	Straighten or replace guard	<a href="#">5.5.7 Knife Guards, page 120</a>
	Worn knifehead pin	Replace knifehead pin	<a href="#">5.5.3 Removing Knifehead Bearing, page 118</a>
	Dull knife	Replace knife	<ul style="list-style-type: none"> <li>• <a href="#">5.5.2 Removing Knife, page 118</a></li> <li>• <a href="#">5.5.5 Installing Knife, page 119</a></li> </ul>
<b>Excessive header vibration</b>	Knife hold-downs not properly adjusted	Adjust hold-downs	<a href="#">Checking Knife Hold-Downs, page 125</a>
	Knives on double-knife drive not timed	Adjust knife timing	<a href="#">Adjusting Double-Knife Timing, page 149</a>
	Knife not operating at recommended speed	Check engine speed of windrower	Refer to the windrower operator's manual
	Excessive knife wear	Replace knife	<ul style="list-style-type: none"> <li>• <a href="#">5.5.2 Removing Knife, page 118</a></li> <li>• <a href="#">5.5.5 Installing Knife, page 119</a></li> </ul>
	Loose or worn knifehead pin or drive arm	Tighten or replace parts	<ul style="list-style-type: none"> <li>• <a href="#">5.5.3 Removing Knifehead Bearing, page 118</a></li> <li>• <a href="#">5.6.1 Knife Drive Box, page 129</a></li> </ul>
	Bent cutterbar	Straighten cutterbar	See your MacDon Dealer
<b>Excessive breakage of knife sections or guards</b>	Knife hold-downs not properly adjusted	Adjust hold-downs	<a href="#">Checking Knife Hold-Downs, page 125</a>
	Cutterbar operating too low in stony conditions	Raise cutterbar using skid shoes	<a href="#">Cutting on the Ground, page 48</a>
	Float is set too heavy	Adjust springs for lighter float	<a href="#">3.7.2 Header Float, page 49</a>
	Bent or broken guard	Straighten or replace guard	<a href="#">5.5.7 Knife Guards, page 120</a>
	Header angle too steep	Flatten header angle	<a href="#">Adjusting Header Angle, page 50</a>

## TROUBLESHOOTING

### 8.3 Reel Delivery

Symptom	Problem	Solution	Refer to
<b>Reel not releasing material in normal standing crop</b>	Reel speed too fast	Reduce reel speed	<a href="#">3.7.4 Reel Speed, page 50</a>
	Reel too low	Raise reel	<a href="#">3.7.8 Reel Height, page 53</a>
	Reel tines too aggressive	Reduce cam setting	<a href="#">3.7.10 Reel Tine Pitch, page 55</a>
	Reel too far back	Move reel forward	<a href="#">3.7.9 Reel Fore-Aft Position, page 54</a>
<b>Reel not releasing material in lodged and standing crop (reel fully lowered)</b>	Reel tines too aggressive for standing crop	Reduce cam setting	<a href="#">3.7.10 Reel Tine Pitch, page 55</a>
<b>Wrapping on reel end</b>	Reel tines too aggressive	Reduce cam setting	<a href="#">3.7.10 Reel Tine Pitch, page 55</a>
	Reel too low	Raise reel	<a href="#">3.7.8 Reel Height, page 53</a>
	Reel speed too fast	Reduce reel speed	<a href="#">3.7.4 Reel Speed, page 50</a>
	Crop conditions	Install optional endshields	See your MacDon Dealer
	Reel not centered in header	Center reel in header	<a href="#">5.8.3 Centering the Reel, page 178</a>
<b>Reel releases crop too quickly</b>	Reel tines not aggressive enough	Increase cam setting	<a href="#">3.7.10 Reel Tine Pitch, page 55</a>
	Reel too far forward	Move reel back	<a href="#">3.7.9 Reel Fore-Aft Position, page 54</a>
<b>Reel will not lift</b>	Reel lift couplers are incompatible or defective	Change quick coupler	—
<b>Reel will not turn</b>	Control set at '0'	Activate reel speed control	<a href="#">3.7.4 Reel Speed, page 50</a>
	Quick couplers not properly connected	Connect couplers	<a href="#">4 Header Attachment/Detachment, page 91</a>
	Reel drive chain disconnected	Connect reel drive chain	<a href="#">5.9.7 Replacing Drive Chain on Single Reel, page 211</a>
<b>Reel motion uneven under no load</b>	Excessive slack in reel drive chain	Tighten drive chain	<a href="#">5.9.2 Reel Drive Chain Tension, page 200</a>

## TROUBLESHOOTING

Symptom	Problem	Solution	Refer to
<b>Reel motion is uneven or stalls in heavy crops</b>	Reel speed too fast	Reduce reel speed	<a href="#">3.7.4 Reel Speed, page 50</a>
	Reel fingers not aggressive enough	Move to a more aggressive finger pitch notch	<a href="#">3.7.10 Reel Tine Pitch, page 55</a>
	Reel too low	Raise reel	<a href="#">3.7.8 Reel Height, page 53</a>
	Relief valve on windrower has low relief pressure setting	Increase relief pressure to manufacturer's recommendations	Refer to the windrower operator's manual
	Low oil level in reservoir on windrower  <b>NOTE:</b> There may be more than one reservoir.	Fill to proper level	
	Relief valve malfunction	Replace relief valve	
Cutting tough crops with standard torque (19-tooth) reel drive sprocket	Replace with high torque (10-tooth) or 14-tooth reel drive sprocket	<a href="#">5.9.3 Reel Drive Sprocket, page 203</a>	
<b>Plastic fingers cut at tip</b>	Insufficient reel to cutterbar clearance	Increase clearance	<a href="#">5.8.1 Reel Clearance to Cutterbar, page 175</a>
<b>Plastic fingers bent rearward at tip</b>	Reel digging into ground with reel speed slower than ground speed	Raise header	<a href="#">3.7.1 Cutting Height, page 44</a>
		Decrease header tilt	<a href="#">3.7.3 Header Angle, page 50</a>
		Move reel aft	<a href="#">3.7.9 Reel Fore-Aft Position, page 54</a>
<b>Plastic fingers bent forward at tip (opposite of above)</b>	Reel digging into ground with reel speed faster than ground speed	Raise header	<a href="#">3.7.1 Cutting Height, page 44</a>
		Decrease header tilt	<a href="#">3.7.3 Header Angle, page 50</a>
		Move reel aft	<a href="#">3.7.9 Reel Fore-Aft Position, page 54</a>
<b>Plastic fingers bent close to tine tube</b>	Excessive plugging at cutterbar with wads of crop accumulating at cutterbar while maintaining reel operation	Correct plugging and cutting issues	<a href="#">3.13 Unplugging the Cutterbar, page 72</a>
		Stop reel before plugging becomes excessive	—

## TROUBLESHOOTING

### 8.4 Header and Drapers

Symptom	Problem	Solution	Refer to
Header lift insufficient	Low relief pressure	Increase relief pressure	See your MacDon Dealer
Insufficient draper speed	Speed control set too low	Increase speed control setting	<a href="#">3.7.6 Draper Speed, page 52</a>
	Relief pressure too low	Increase relief pressure to recommended setting	See your MacDon Dealer
	windrower header drive too slow	Adjust to correct speed for windrower model	Refer to the windrower operator's manual
	Worn out gear pump	Replace gear pump	See your MacDon Dealer
	Pressure compensator (V7) set too low	Adjust to increase setting	Refer to the windrower operator's manual
Draper will not move	Drapers are loose	Tighten drapers	<a href="#">5.7.3 Adjusting Draper Tension, page 157</a>
	Drive or idler roller wrapped with material	Loosen draper and clean rollers	
	Slat or connector bar jammed by frame or material	Loosen draper and clear obstruction	
	Roller bearing seized	Replace roller bearing	<a href="#">5.7.6 Header Draper Roller Maintenance, page 163</a>
	Low hydraulic oil	Fill windrower hydraulic oil reservoir to full level	Refer to the windrower operator's manual
	Incorrect relief setting at flow control valve	Adjust relief setting	See your MacDon Dealer
Draper stalling	Material not feeding evenly off knife	Lower reel	<a href="#">3.7.8 Reel Height, page 53</a>
		Install stub guards	<ul style="list-style-type: none"> <li>• <a href="#">5.5.7 Knife Guards, page 120</a></li> <li>• <a href="#">6.2.1 Stub Guard Conversion Kit, page 217</a></li> <li>• See your MacDon Dealer</li> </ul>
Hesitation in flow of bulky crop	Header angle too low	Increase header angle	<a href="#">3.7.3 Header Angle, page 50</a>
	Material overload on drapers	Increase side draper speed	<a href="#">3.7.6 Draper Speed, page 52</a>
		Install upper cross auger	<a href="#">3.14 Upper Cross Auger (UCA), page 73</a>
		Add flighting extensions	See your MacDon Dealer

## TROUBLESHOOTING

Symptom	Problem	Solution	Refer to
<b>Drapers back-feed</b>	Drapers running too slow in heavy crop	Increase draper speed	<i>3.7.6 Draper Speed, page 52</i>
<b>Crop is thrown across opening and under opposite side draper</b>	Drapers running too fast in light crop	Reduce draper speed	
<b>Material accumulates inside or under front edge of draper</b>	Deck height improperly adjusted	Adjust deck height	<i>5.7.5 Adjusting Deck Height, page 161</i>
<b>Material accumulating on end deflectors and releasing in bunches</b>	End deflectors too wide	For headers with manual deck shift only, trim deflector or replace with narrow deflector (MD #172381)	<i>3.13 Unplugging the Cutterbar, page 72</i>

## TROUBLESHOOTING

### 8.5 Cutting Edible Beans

Symptom	Problem	Solution	Refer to
<b>Plants being stripped and complete or partial plants left behind.</b>	Header off ground	Lower header to ground and run on skid shoes and/or cutterbar	<a href="#">Cutting on the Ground, page 48</a>
	Float set too light—rides on high spots and does not lower soon enough	Set float for the following conditions: - Dry ground: 100–150 lbf - Wet ground: 50–100 lbf	<a href="#">3.7.2 Header Float, page 49</a>
	Reel too high	Fully retract reel cylinders	<a href="#">3.7.8 Reel Height, page 53</a>
	Reel too high with cylinders fully retracted	Adjust reel height	<a href="#">3.7.8 Reel Height, page 53</a>
	Finger pitch not aggressive enough	Adjust finger pitch	<a href="#">3.7.10 Reel Tine Pitch, page 55</a>
	Reel too far aft	Move reel forward until the fingertips skim the soil surface with header on the ground and the center-link properly adjusted	<a href="#">3.7.9 Reel Fore-Aft Position, page 54</a>
	Header angle too shallow	Lengthen center-link	<a href="#">Adjusting Header Angle, page 50</a>
		Increase header angle can by fully retracting lift cylinders (if cutting on ground)	
	Reel too slow	Adjust reel speed to be marginally faster than ground speed	<a href="#">3.7.4 Reel Speed, page 50</a>
	Ground speed too fast	Lower ground speed	<a href="#">3.7.5 Ground Speed, page 51</a>
	Skid shoes too low	Raise skid shoes to highest setting	<a href="#">Cutting on the Ground, page 48</a>
	Dirt packs on bottom of cutterbar and raises cutterbar off the ground	Install plastic wear strips on bottom of cutterbar and skid shoes	See your MacDon Dealer
	Dirt packing on bottom of cutterbar with plastic wear strips on cutterbar and raises cutterbar off the ground	Ground too wet – allow soil to dry	—
Manually clean the bottom of cutterbar when excessive accumulation occurs			

## TROUBLESHOOTING

Symptom	Problem	Solution	Refer to
<b>Plants being stripped and complete or partial plants left behind.</b>	Plastic wear strip for cutterbar has been installed over top of steel wear plates	Remove steel cutterbar wear plates when installing the plastic wear strips for cutterbar	—
	Header not level	Level header	
	Worn or damaged knife sections	Replace sections or replace knife	<a href="#">5.5 Cutterbar, page 116</a>
	Parts of vines get caught in pointed guard tip. (Occurs more in row-cropped beans that are hilled from cultivating.)	Install stub guard conversion kit	<a href="#">6.2.1 Stub Guard Conversion Kit, page 217</a>
<b>Excessive losses at dividers</b>	Divider rod running down crop and shattering pods	Remove divider rod	<a href="#">3.7.11 Crop Dividers, page 57</a>
	Vines and plants build up on endsheet	Install divider rod	
<b>Plant vines pinched between top of draper and cutterbar</b>	Cutterbar fills with debris when draper to cutterbar gap is properly adjusted	Raise header fully at each end of field (or as required) and shift decks back and forth to help clean out cutterbar	—
	Shifting the decks with header raised does not clean out cutterbar debris.	Manually remove debris from cutterbar cavity to prevent damaging the drapers	
<b>Crop accumulating at guards and not moving rearward onto drapers</b>	Reel finger pitch not aggressive enough	Increase finger aggressiveness (cam position)	<a href="#">3.7.10 Reel Tine Pitch, page 55</a>
	Reel too high	Lower reel	<a href="#">3.7.8 Reel Height, page 53</a>
	Minimum reel clearance to cutterbar setting too high	Adjust minimum reel height with cylinders fully retracted	<a href="#">5.8.1 Reel Clearance to Cutterbar, page 175</a>
	Reel too far forward	Reposition reel	<a href="#">3.7.9 Reel Fore-Aft Position, page 54</a>
<b>Crop wrapping around reel</b>	Reel too low	Raise reel	<a href="#">3.7.8 Reel Height, page 53</a>

## TROUBLESHOOTING

Symptom	Problem	Solution	Refer to
<b>Reel shattering pods</b>	Reel too far forward	Reposition reel	<a href="#">3.7.9 Reel Fore-Aft Position, page 54</a>
	Reel speed too high	Reduce reel speed	<a href="#">3.7.4 Reel Speed, page 50</a>
	Bean pods are too dry	Cut at night when heavy dew is present and pods have softened	—
	Reel finger pitch not aggressive enough	Increase finger aggressiveness (cam position)	<a href="#">3.7.10 Reel Tine Pitch, page 55</a>
<b>Cutterbar guards breaking</b>	Float insufficient	Increase float	<a href="#">3.7.2 Header Float, page 49</a>
	Excessive number of rocks in field	Consider installing optional stub guards <b>Tip:</b> Install a few guards on one section of the cutterbar and compare the performance of the two different guard styles	<ul style="list-style-type: none"> <li>• <a href="#">5.5.7 Knife Guards, page 120</a></li> <li>• <a href="#">6.2.1 Stub Guard Conversion Kit, page 217</a></li> </ul>
<b>Cutterbar pushing too much debris and dirt</b>	Header too heavy	Readjust float to make header lighter	<a href="#">Header Float</a> <a href="#">3.7.2 Header Float, page 49</a>
	Header angle too steep	Decrease header angle with lift cylinders	<a href="#">3.7.3 Header Angle, page 50</a>
		Shorten the center-link	
	Regular guards push dirt and plug with debris or plug with debris and then push dirt	Install stub guard kit	<a href="#">6.2.1 Stub Guard Conversion Kit, page 217</a>
Insufficient support for header	Install center skid shoes on header	<a href="#">Cutting on the Ground, page 48</a>	
<b>Crop wrapping around reel ends</b>	Uncut crop interfering on reel ends	Add reel endshields	Refer to the header parts catalog
<b>Cutterbar fills up with dirt</b>	Excessive gap between top of front of draper and cutterbar	Adjust front deck supports to achieve proper clearance between cutterbar and draper	<a href="#">5.7.5 Adjusting Deck Height, page 161</a>
		Raise header fully at each end of field (or as required) and shift decks back and forth to help clean out cutterbar	—

## TROUBLESHOOTING

Symptom	Problem	Solution	Refer to
<b>Reel occasionally carries over plants in same location</b>	Reel fingers (steel) bent and hooking plants from crop flow on drapers	Straighten fingers (steel)	—
	Dirt accumulation on end of fingers preventing plants from dropping off fingers onto drapers	Raise reel	<a href="#">3.7.8 Reel Height, page 53</a>
		Adjust reel fore-aft position to move fingers out of the ground	<a href="#">3.7.9 Reel Fore-Aft Position, page 54</a>
<b>Cutterbar pushing too much dirt in certain locations for length of field</b>	Tire tracks or row crop ridges	Cut at angle to crop rows or ridges to allow knife and guards to clean out more effectively	—
	Rolling land along length of field	Cut at 90° to undulations (provided knife floats across without digging in)	
<b>Reel carries over an excessive amount of plants or wads</b>	Excessive accumulation of crop on drapers (up to height of reel center tube)	Increase draper speed	<a href="#">3.7.6 Draper Speed, page 52</a>
	Finger pitch too retarded	Increase finger pitch	<a href="#">3.7.10 Reel Tine Pitch, page 55</a>

## TROUBLESHOOTING

### 8.6 Windrow Formation

Symptom	Problem	Solution	Section
<b>Heads on ground and scattered</b>	Draper speed too slow	Increase draper speed	<a href="#">3.7.6 Draper Speed, page 52</a>
	Draper angle too flat	Increase header angle	<a href="#">3.7.3 Header Angle, page 50</a>
	Ground speed too slow	Increase ground speed	<a href="#">3.7.5 Ground Speed, page 51</a>
	Crop too ripe	Cut material before too mature	—
<b>Hollow in center</b>	Draper speed too slow	Increase draper speed	<a href="#">3.7.6 Draper Speed, page 52</a>
	Delivery opening too wide	Decrease delivery opening width	<a href="#">3.8 Delivery Opening, page 64</a>
<b>All heads in center</b>	Draper speed too fast or header angle too steep	Reduce draper speed and/or decrease header angle	<a href="#">3.7.6 Draper Speed, page 52</a> <a href="#">3.7.3 Header Angle, page 50</a>
	Ground speed too fast	Reduce ground speed	<a href="#">3.7.5 Ground Speed, page 51</a>
	Crop too green	Allow to mature	—
<b>All heads to one side</b>	Crop leaning to one side and reel too slow	Increase reel speed to re-orient crop parallel to draper slats and/or increase finger pitch aggressiveness	<ul style="list-style-type: none"> <li>• <a href="#">3.7.4 Reel Speed, page 50</a></li> <li>• <a href="#">3.7.10 Reel Tine Pitch, page 55</a></li> </ul>
<b>Uneven windrow (any crop condition)</b>	Ground speed too fast for drapers, causing heads to fan out and crop to leave drapers unevenly	Reduce ground speed or increase draper speed	<ul style="list-style-type: none"> <li>• <a href="#">3.7.5 Ground Speed, page 51</a></li> <li>• <a href="#">3.7.6 Draper Speed, page 52</a></li> </ul>
	Reel too low	Raise reel	<a href="#">3.7.8 Reel Height, page 53</a>
	Reel speed too fast	Reduce reel speed	<a href="#">3.7.4 Reel Speed, page 50</a>

## 9 Reference

### 9.1 Torque Specifications

The following tables provide correct torque values for various bolts, cap screws, and hydraulic fittings.

- Tighten all bolts to torque values specified in charts (unless otherwise noted throughout this manual).
- Replace hardware with same strength and grade of bolt.
- Use torque value tables as a guide and periodically check tightness of bolts.
- Understand torque categories for bolts and cap screws by using their identifying head markings.

#### **Jam Nuts**

When applying torque to finished jam nuts, multiply the torque applied to regular nuts by  $f=0.65$ .

#### **Self-Tapping Screws**

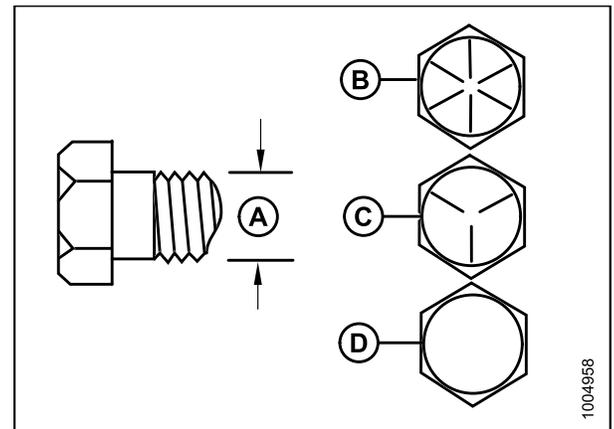
Standard torque is to be used (not to be used on critical or structurally important joints).

#### 9.1.1 SAE Bolt Torque Specifications

Torque values shown in following tables are valid for non-greased, or non-oiled threads and heads; therefore, do **NOT** grease or oil bolts or cap screws unless otherwise specified in this manual.

**Table 9.1 SAE Grade 5 Bolt and Grade 5 Free Spinning Nut**

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
1/4-20	11.9	13.2	*106	*117
5/16-18	24.6	27.1	*218	*241
3/8-16	44	48	32	36
7/16-14	70	77	52	57
1/2-13	106	118	79	87
9/16-12	153	170	114	126
5/8-11	212	234	157	173
3/4-10	380	420	281	311
7/8-9	606	669	449	496
1-8	825	912	611	676



**Figure 9.1: Bolt Grades**

A - Nominal Size  
C - SAE-5

B - SAE-8  
D - SAE-2

REFERENCE

Table 9.2 SAE Grade 5 Bolt and Grade F Distorted Thread Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
1/4-20	8.1	9	*72	*80
5/16-18	16.7	18.5	*149	*164
3/8-16	30	33	22	24
7/16-14	48	53	35	39
1/2-13	73	80	54	59
9/16-12	105	116	77	86
5/8-11	144	160	107	118
3/4-10	259	286	192	212
7/8-9	413	456	306	338
1-8	619	684	459	507

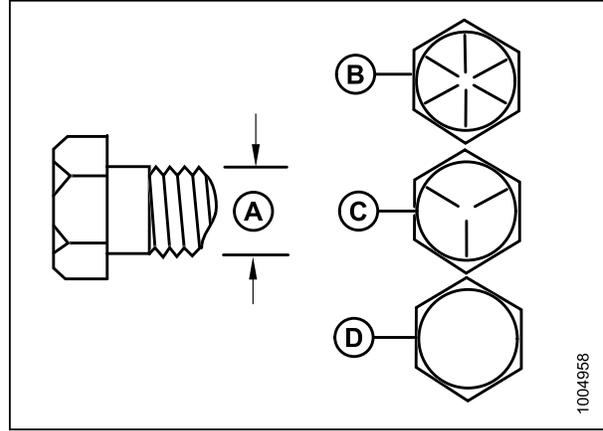


Figure 9.2: Bolt Grades

A - Nominal Size  
 B - SAE-8  
 C - SAE-5  
 D - SAE-2

Table 9.3 SAE Grade 8 Bolt and Grade G Distorted Thread Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
1/4-20	16.8	18.6	*150	*165
5/16-18	24	26	18	19
3/8-16	42	46	31	34
7/16-14	67	74	50	55
1/2-13	102	113	76	84
9/16-12	148	163	109	121
5/8-11	204	225	151	167
3/4-10	362	400	268	296
7/8-9	583	644	432	477
1-8	874	966	647	716

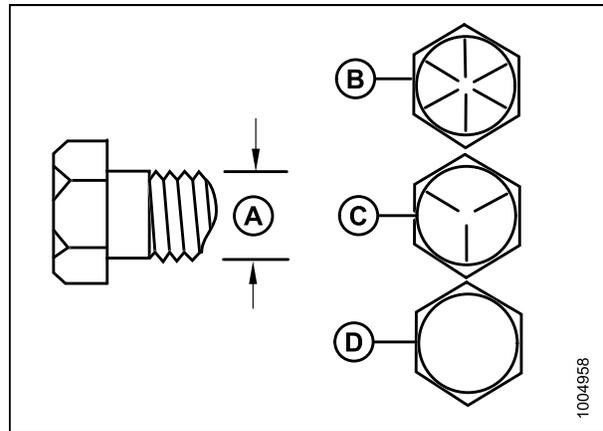


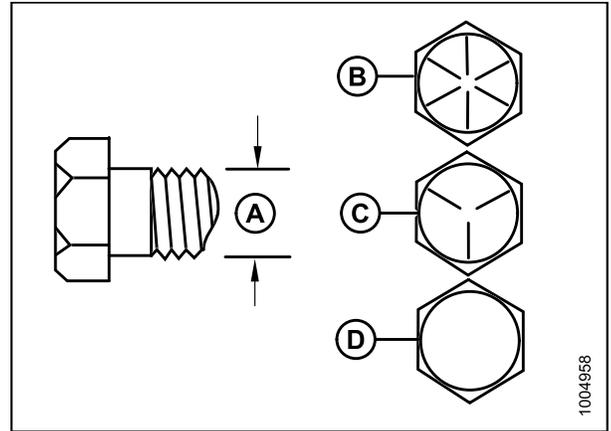
Figure 9.3: Bolt Grades

A - Nominal Size  
 B - SAE-8  
 C - SAE-5  
 D - SAE-2

## REFERENCE

**Table 9.4 SAE Grade 8 Bolt and Grade 8 Free Spinning Nut**

Nominal Size (A)	Torque (N-m)		Torque (ft-lbf) (*in-lbf)	
	Min.	Max.	Min.	Max.
1/4-20	16.8	18.6	*150	*165
5/16-18	35	38	26	28
3/8-16	61	68	46	50
7/16-14	98	109	73	81
1/2-13	150	166	111	123
9/16-12	217	239	160	177
5/8-11	299	330	221	345
3/4-10	531	587	393	435
7/8-9	855	945	633	700
1-8	1165	1288	863	954



**Figure 9.4: Bolt Grades**

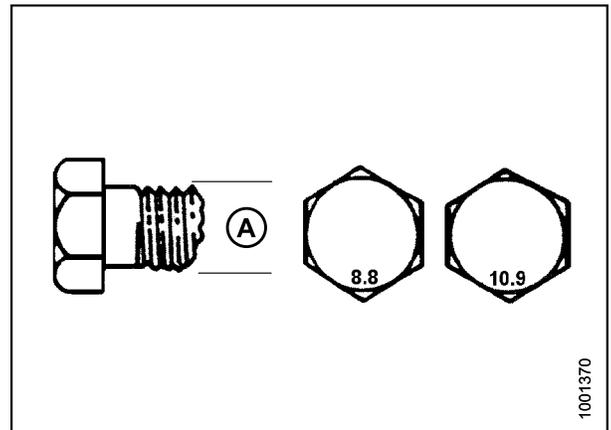
A - Nominal Size  
C - SAE-5

B - SAE-8  
D - SAE-2

### 9.1.2 Metric Bolt Specifications

**Table 9.5 Metric Class 8.8 Bolts and Class 9 Free Spinning Nut**

Nominal Size (A)	Torque (N-m)		Torque (ft-lbf) (*in-lbf)	
	Min.	Max.	Min.	Max.
3-0.5	1.4	1.6	*13	*14
3.5-0.6	2.2	2.5	*20	*22
4-0.7	3.3	3.7	*29	*32
5-0.8	6.7	7.4	*59	*66
6-1.0	11.4	12.6	*101	*112
8-1.25	28	30	20	23
10-1.5	55	60	40	45
12-1.75	95	105	70	78
14-2.0	152	168	113	124
16-2.0	236	261	175	193
20-2.5	460	509	341	377
24-3.0	796	879	589	651



**Figure 9.5: Bolt Grades**

REFERENCE

Table 9.6 Metric Class 8.8 Bolts and Class 9 Distorted Thread Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
3-0.5	1	1.1	*9	*10
3.5-0.6	1.5	1.7	*14	*15
4-0.7	2.3	2.5	*20	*22
5-0.8	4.5	5	*40	*45
6-1.0	7.7	8.6	*69	*76
8-1.25	18.8	20.8	*167	*185
10-1.5	37	41	28	30
12-1.75	65	72	48	53
14-2.0	104	115	77	85
16-2.0	161	178	119	132
20-2.5	314	347	233	257
24-3.0	543	600	402	444

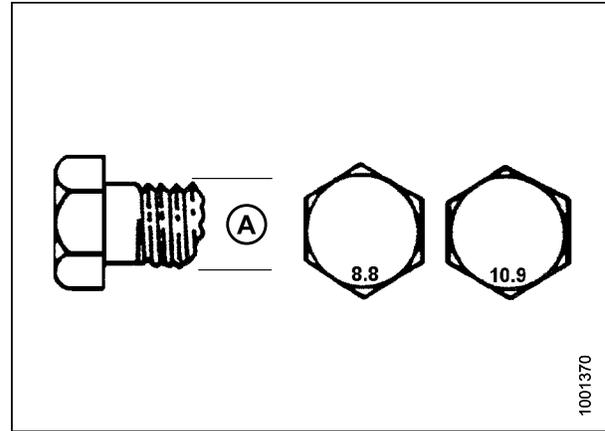


Figure 9.6: Bolt Grades

Table 9.7 Metric Class 10.9 Bolts and Class 10 Free Spinning Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
3-0.5	1.8	2	*18	*19
3.5-0.6	2.8	3.1	*27	*30
4-0.7	4.2	4.6	*41	*45
5-0.8	8.4	9.3	*82	*91
6-1.0	14.3	15.8	*140	*154
8-1.25	38	42	28	31
10-1.5	75	83	56	62
12-1.75	132	145	97	108
14-2.0	210	232	156	172
16-2.0	326	360	242	267
20-2.5	637	704	472	521
24-3.0	1101	1217	815	901

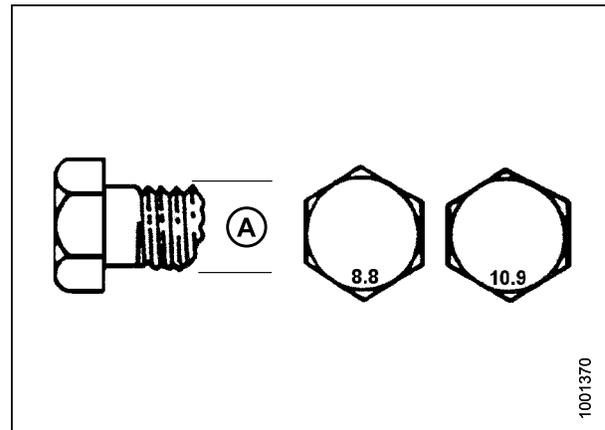


Figure 9.7: Bolt Grades

REFERENCE

Table 9.8 Metric Class 10.9 Bolts and Class 10 Distorted Thread Nut

Nominal Size (A)	Torque (N·m)		Torque (ft·lbf) (*in·lbf)	
	Min.	Max.	Min.	Max.
3-0.5	1.3	1.5	*12	*13
3.5-0.6	2.1	2.3	*19	*21
4-0.7	3.1	3.4	*28	*31
5-0.8	6.3	7	*56	*62
6-1.0	10.7	11.8	*95	*105
8-1.25	26	29	19	21
10-1.5	51	57	38	42
12-1.75	90	99	66	73
14-2.0	143	158	106	117
16-2.0	222	246	165	182
20-2.5	434	480	322	356
24-3.0	750	829	556	614

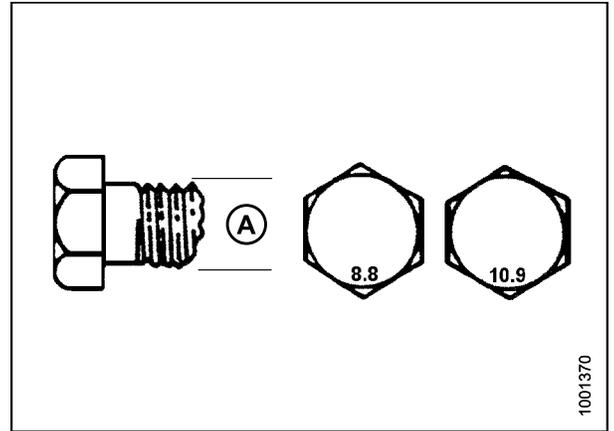


Figure 9.8: Bolt Grades

### 9.1.3 Metric Bolt Specifications Bolting into Cast Aluminum

Table 9.9 Metric Bolt Bolting into Cast Aluminum

Nominal Size (A)	Bolt Torque			
	8.8 (Cast Aluminum)		10.9 (Cast Aluminum)	
	N·m	ft·lbf	N·m	ft·lbf
M3	–	–	–	1
M4	–	–	4	2.6
M5	–	–	8	5.5
M6	9	6	12	9
M8	20	14	28	20
M10	40	28	55	40
M12	70	52	100	73
M14	–	–	–	–
M16	–	–	–	–

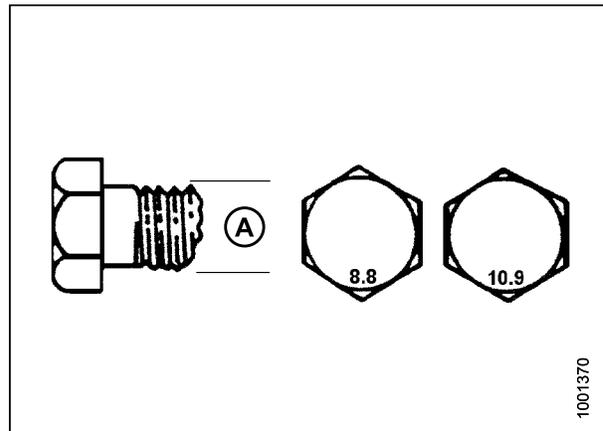


Figure 9.9: Bolt Grades

### 9.1.4 Flare-Type Hydraulic Fittings

1. Check flare (A) and flare seat (B) for defects that might cause leakage.
2. Align tube (C) with fitting (D) and thread nut (E) onto fitting without lubrication until contact has been made between flared surfaces.
3. Torque fitting nut (E) to specified number of flats from finger tight (FFFT) or to a given torque value in [Table 9.10 Flare-Type Hydraulic Tube Fittings, page 245](#).
4. Use two wrenches to prevent fitting (D) from rotating. Place one wrench on fitting body (D), and tighten nut (E) with other wrench to torque shown.
5. Assess final condition of connection.

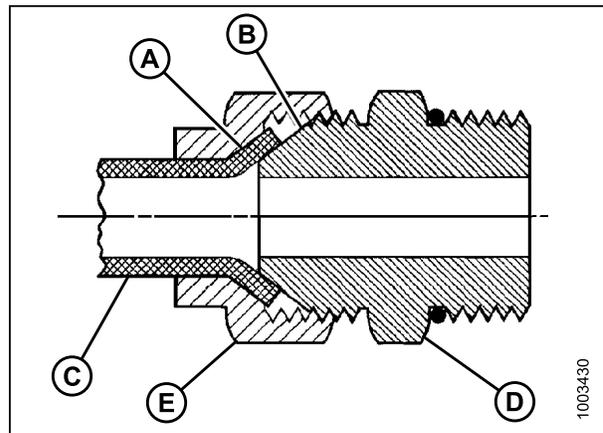


Figure 9.10: Hydraulic Fitting

**REFERENCE**

**Table 9.10 Flare-Type Hydraulic Tube Fittings**

SAE Dash Size	Thread Size (in.)	Torque Value <sup>15</sup>		Flats from Finger Tight (FFFT)	
		N-m	ft-lbf	Tube	Swivel Nut or Hose
-2	5/16-24	4-5	3-4	—	—
-3	3/8-24	7-8	5-6	—	—
-4	7/16-20	18-19	13-14	2-1/2	2
-5	1/2-20	19-21	14-15	2	2
-6	9/16-18	30-33	22-24	2	1-1/2
-8	3/4-16	57-63	42-46	2	1-1/2
-10	7/8-14	81-89	60-66	1-1/2	1-1/2
-12	1-1/16-12	113-124	83-91	1-1/2	1-1/4
-14	1-3/16-12	136-149	100-110	1-1/2	1-1/4
-16	1-5/16-12	160-176	118-130	1-1/2	1
-20	1-5/8-12	228-250	168-184	1	1
-24	1-7/8-12	264-291	195-215	1	1
-32	2-1/2-12	359-395	265-291	1	1
-40	3-12	—	—	1	1

15. Torque values shown are based on lubricated connections as in reassembly.

## REFERENCE

### 9.1.5 O-Ring Boss (ORB) Hydraulic Fittings (Adjustable)

1. Inspect O-ring (A) and seat (B) for dirt or obvious defects.
2. Back off lock nut (C) as far as possible. Ensure that washer (D) is loose and is pushed toward lock nut (C) as far as possible.
3. Check that O-ring (A) is **NOT** on threads and adjust if necessary.
4. Apply hydraulic system oil to O-ring (A).

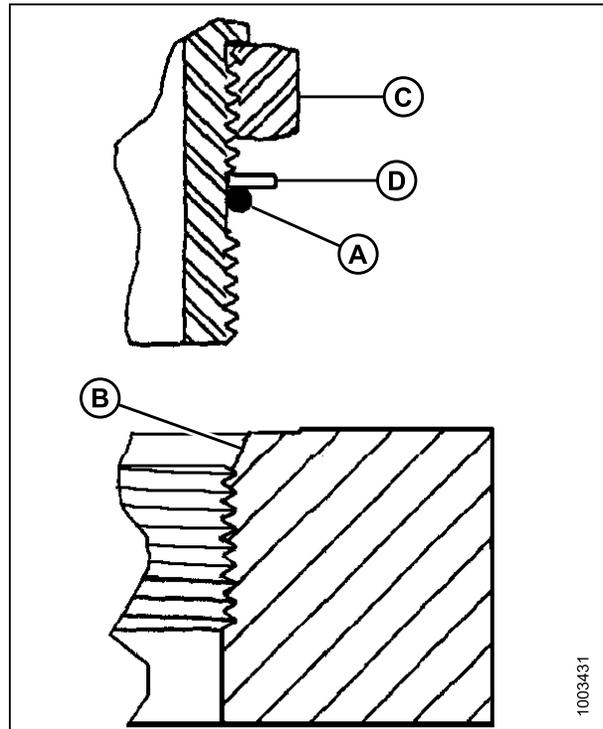


Figure 9.11: Hydraulic Fitting

5. Install fitting (B) into port until back up washer (D) and O-ring (A) contact part face (E).
6. Position angle fittings by unscrewing no more than one turn.
7. Turn lock nut (C) down to washer (D) and tighten to torque shown. Use two wrenches, one on fitting (B) and other on lock nut (C).
8. Check final condition of fitting.

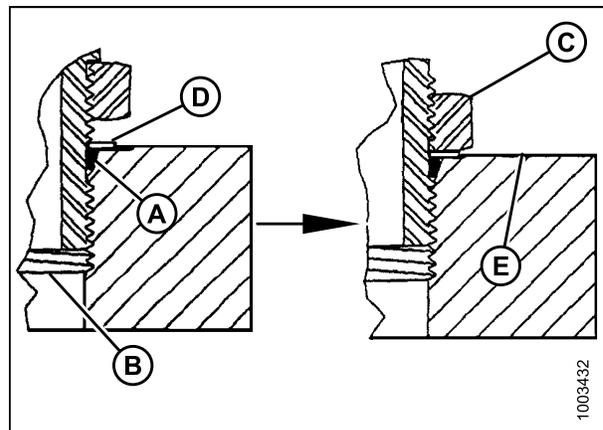


Figure 9.12: Hydraulic Fitting

**REFERENCE**

**Table 9.11 O-Ring Boss (ORB) Hydraulic Fittings (Adjustable)**

SAE Dash Size	Thread Size (in.)	Torque Value <sup>16</sup>	
		N-m	ft·lbf (*in·lbf)
-2	5/16-24	6-7	*53-62
-3	3/8-24	12-13	*106-115
-4	7/16-20	19-21	14-15
-5	1/2-20	21-33	15-24
-6	9/16-18	26-29	19-21
-8	3/4-16	46-50	34-37
-10	7/8-14	75-82	55-60
-12	1-1/16-12	120-132	88-97
-14	1-3/8-12	153-168	113-124
-16	1-5/16-12	176-193	130-142
-20	1-5/8-12	221-243	163-179
-24	1-7/8-12	270-298	199-220
-32	2-1/2-12	332-365	245-269

16. Torque values shown are based on lubricated connections as in reassembly.

## REFERENCE

### 9.1.6 O-Ring Boss (ORB) Hydraulic Fittings (Non-Adjustable)

1. Inspect O-ring (A) and seat (B) for dirt or obvious defects.
2. Check that O-ring (A) is **NOT** on threads and adjust if necessary.
3. Apply hydraulic system oil to O-ring.
4. Install fitting (C) into port until fitting is hand tight.
5. Torque fitting (C) according to values in Table 9.12 *O-Ring Boss (ORB) Hydraulic Fittings (Non-Adjustable)*, page 248.
6. Check final condition of fitting.

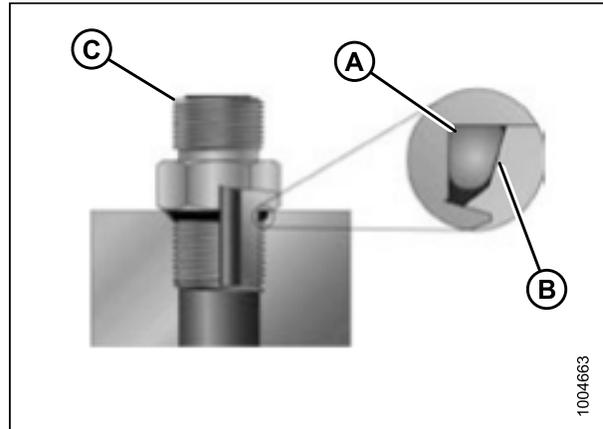


Figure 9.13: Hydraulic Fitting

**Table 9.12 O-Ring Boss (ORB) Hydraulic Fittings (Non-Adjustable)**

SAE Dash Size	Thread Size (in.)	Torque Value <sup>17</sup>	
		N-m	ft·lbf (*in·lbf)
-2	5/16-24	6-7	*53-62
-3	3/8-24	12-13	*106-115
-4	7/16-20	19-21	14-15
-5	1/2-20	21-33	15-24
-6	9/16-18	26-29	19-21
-8	3/4-16	46-50	34-37
-10	7/8-14	75-82	55-60
-12	1-1/16-12	120-132	88-97
-14	1-3/8-12	153-168	113-124
-16	1-5/16-12	176-193	130-142
-20	1-5/8-12	221-243	163-179
-24	1-7/8-12	270-298	199-220
-32	2-1/2-12	332-365	245-269

<sup>17</sup>. Torque values shown are based on lubricated connections as in reassembly.

### 9.1.7 O-Ring Face Seal (ORFS) Hydraulic Fittings

1. Check components to ensure that sealing surfaces and fitting threads are free of burrs, nicks, scratches, or any foreign material.



Figure 9.14: Hydraulic Fitting

2. Apply hydraulic system oil to O-ring (B).
3. Align tube or hose assembly so that flat face of sleeve (A) or (C) comes in full contact with O-ring (B).
4. Thread tube or hose nut (D) until hand-tight. The nut should turn freely until it is bottomed out.
5. Torque fittings according to values in Table 9.13 *O-Ring Face Seal (ORFS) Hydraulic Fittings, page 250*.

**NOTE:**

If applicable, hold hex on fitting body (E) to prevent rotation of fitting body and hose when tightening fitting nut (D).

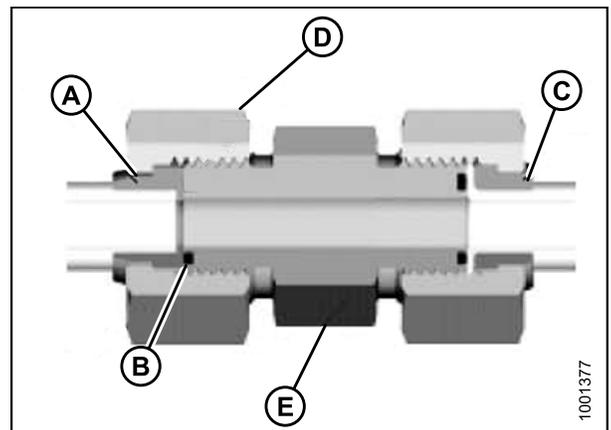


Figure 9.15: Hydraulic Fitting

6. Use three wrenches when assembling unions or joining two hoses together.
7. Check final condition of fitting.

**REFERENCE**

**Table 9.13 O-Ring Face Seal (ORFS) Hydraulic Fittings**

SAE Dash Size	Thread Size (in.)	Tube O.D. (in.)	Torque Value <sup>18</sup>	
			N·m	ft·lbf
-3	Note <sup>19</sup>	3/16	–	–
-4	9/16	1/4	25–28	18–21
-5	Note <sup>19</sup>	5/16	–	–
-6	11/16	3/8	40–44	29–32
-8	13/16	1/2	55–61	41–45
-10	1	5/8	80–88	59–65
-12	1-3/16	3/4	115–127	85–94
-14	Note <sup>19</sup>	7/8	–	–
-16	1-7/16	1	150–165	111–122
-20	1-11/16	1-1/4	205–226	151–167
-24	1–2	1-1/2	315–347	232–256
-32	2-1/2	2	510–561	376–414

18. Torque values and angles shown are based on lubricated connection as in reassembly.

19. O-ring face seal type end not defined for this tube size.

## REFERENCE

### 9.1.8 Tapered Pipe Thread Fittings

Assemble pipe fittings as follows:

1. Check components to ensure that fitting and port threads are free of burrs, nicks and scratches, or any form of contamination.
2. Apply pipe thread sealant (paste type) to external pipe threads.
3. Thread fitting into port until hand-tight.
4. Torque connector to appropriate torque angle. The Turns From Finger Tight (T.F.F.T.) values are shown in Table [9.14 Hydraulic Fitting Pipe Thread, page 251](#). Make sure that tube end of a shaped connector (typically 45° or 90°) is aligned to receive incoming tube or hose assembly. Always finish alignment of fitting in tightening direction. Never back off (loosen) pipe threaded connectors to achieve alignment.
5. Clean all residue and any excess thread conditioner with appropriate cleaner.
6. Assess final condition of fitting. Pay special attention to possibility of cracks to port opening.
7. Mark final position of fitting. If a fitting leaks, disassemble fitting and check for damage.

**NOTE:**

Over-torque failure of fittings may not be evident until fittings are disassembled.

**Table 9.14 Hydraulic Fitting Pipe Thread**

Tapered Pipe Thread Size	Recommended T.F.F.T.	Recommended F.F.F.T.
1/8-27	2-3	12-18
1/4-18	2-3	12-18
3/8-18	2-3	12-18
1/2-14	2-3	12-18
3/4-14	1.5-2.5	12-18
1-11 1/2	1.5-2.5	9-15
1 1/4-11 1/2	1.5-2.5	9-15
1 1/2-11 1/2	1.5-2.5	9-15
2-11 1/2	1.5-2.5	9-15

REFERENCE

## 9.2 Conversion Chart

Table 9.15 Conversion Chart

Quantity	SI Units (Metric)		Factor	Inch-Pound Units	
	Unit Name	Abbreviation		Unit Name	Abbreviation
Area	hectares	ha	$\times 2.4710 =$	acres	acres
Flow	liters per minute	L/min	$\times 0.2642 =$	US gallons per minute	gpm
Force	Newtons	N	$\times 0.2248 =$	pounds force	lbf
Length	millimeters	mm	$\times 0.0394 =$	inch	in.
	meters	m	$\times 3.2808 =$	foot	ft.
Power	kilowatts	kW	$\times 1.341 =$	horsepower	hp
Pressure	kilopascals	kPa	$\times 0.145 =$	pounds per square inch	psi
	megapascals	MPa	$\times 145.038 =$		
	bar (Non-SI)	bar	$\times 14.5038$		
Torque	Newton meters	N·m	$\times 0.7376 =$	pound feet or foot pounds	ft·lbf
	Newton meters	N·m	$\times 8.8507 =$	pound inches or inch pounds	in·lbf
Temperature	Celsius	°C	$(C^{\circ} \times 1.8) + 32 =$	degrees Fahrenheit	°F
Velocity	meters per minute	m/min	$\times 3.2808 =$	feet per minute	ft/min
	meters per second	m/s	$\times 3.2808 =$	feet per second	ft/s
	kilometers per hour	km/h	$\times 0.6214 =$	miles per hour	mph
Volume	liters	L	$\times 0.2642 =$	US gallons	US gal
	milliliters	ml	$\times 0.0338 =$	ounces	oz.
	cubic centimeters	cm <sup>3</sup> or cc	$\times 0.061 =$	cubic inches	in. <sup>3</sup>
Weight	kilograms	kg	$\times 2.2046 =$	pounds	lb.

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